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Soils Operable Unit Remedial Investigation Report at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

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Soils Operable Unit Remedial Investigation Report at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

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U.S. DEPARTMENT OF ENERGY
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Prepared by
LATA ENVIRONMENTAL SERVICES OF KENTUCKY, LLC
managing the
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Paducah Gaseous Diffusion Plant
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CONTENTS

CONTENTS iii

TABLES xv

FIGURES xxiii

ACRONYMS xxxi

EXECUTIVE SUMMARY ES-1

1. INTRODUCTION 1-1
   1.1 PURPOSE OF REPORT 1-6
   1.2 PROJECT SCOPE 1-7
   1.3 SOILS OU SWMU/AOC EVALUATION 1-8
   1.4 PROJECT SCHEDULE 1-11
   1.5 REPORT ORGANIZATION 1-11

2. STUDY AREA INVESTIGATION 2-1
   2.1 SOIL INVESTIGATIONS 2-1
   2.2 RECTIFICATION FROM ORIGINALLY PLANNED SAMPLE LOCATIONS 2-6
   2.3 QUALITY ASSURANCE/QUALITY CONTROL 2-6
      2.3.1 Field Sampling QC 2-6
      2.3.2 Laboratory QC 2-6
      2.3.3 Data Management QC 2-9

3. PHYSICAL CHARACTERISTICS OF THE STUDY AREA 3-1
   3.1 SURFACE FEATURES 3-1
   3.2 METEOROLOGY 3-1
   3.3 SURFACE WATER HYDROLOGY 3-3
   3.4 GEOLOGY 3-4
      3.4.1 Bedrock 3-4
      3.4.2 Rubble Zone 3-4
      3.4.3 McNairy Formation 3-4
      3.4.4 Porters Creek Clay/Porters Creek Terrace Slope 3-4
      3.4.5 Eocene Sands 3-4
      3.4.6 Continental Deposits 3-6
   3.5 SOILS 3-6
   3.6 HYDROGEOLOGY 3-7
   3.7 DEMOGRAPHY AND LAND USE 3-14
   3.8 ECOLOGY 3-16
      3.8.1 Terrestrial Systems 3-16
      3.8.2 Aquatic Systems 3-17
      3.8.3 Wetlands and Floodplains 3-17

4. EVALUATION APPROACH 4-1
   4.1 DATA SETS 4-1
   4.2 GAMMA WALKOVER SURVEY 4-3
   4.3 NATURE AND EXTENT 4-3

4.4 FATE AND TRANSPORT 4-4
4.4.1 Process for Developing Target Soil Constituents for Modeling 4-5
4.4.2 Data Interpretation and Results for Target Groundwater Modeling Soil Constituents 4-6
4.5 RISK ASSESSMENT 4-6
4.5.1 Human Health 4-13
4.5.2 Ecological Risk Screening 4-17
4.6 REMEDIAL GOAL OPTIONS 4-18

5. GROUP 1, FORMER FACILITY AREAS 5-1
5.1 SWMU 1, C-747-C OIL LANDFARM 5-4
5.1.1 Background 5-4
5.1.2 Fieldwork Summary 5-5
5.1.3 Nature and Extent of Contamination—Surface Soils 5-5
5.1.4 Nature and Extent of Contamination—Subsurface Soils 5-14
5.1.5 Fate and Transport 5-29
5.1.6 Baseline Risk Assessment 5-29
5.1.7 SWMU 1 Summary 5-29
5.1.8 SWMU 1 Conclusion 5-34
5.2 SWMU 99B, C-745 KELLOGG BUILDING SITE—SEPTIC SYSTEM/LEACH FIELD 5-36
5.2.1 Background 5-36
5.2.2 Fieldwork Summary 5-36
5.2.3 Nature and Extent of Contamination— Surface Soils 5-36
5.2.4 Nature and Extent of Contamination—Subsurface Soils 5-44
5.2.5 Fate and Transport 5-52
5.2.6 Baseline Risk Assessment 5-53
5.2.7 SWMU 99B Summary 5-53
5.2.8 SWMU 99B Conclusion 5-56
5.3 SWMU 194, DUF_6 FACILITY, MCGRAW CONSTRUCTION FACILITIES (SOUTH SIDE) 5-56
5.3.1 Background 5-56
5.3.2 Fieldwork Summary 5-56
5.3.3 Nature and Extent of Contamination—Surface Soils 5-57
5.3.4 Nature and Extent of Contamination—Subsurface Soils 5-81
5.3.5 Fate and Transport 5-105
5.3.6 Baseline Risk Assessment 5-105
5.3.7 SWMU 194 Summary 5-116
5.3.8 SWMU 194 Conclusion 5-120
5.4 SWMU 196, C-746-A SEPTIC SYSTEM 5-121
5.4.1 Background 5-121
5.4.2 Fieldwork Summary 5-121
5.4.3 Nature and Extent of Contamination—Surface Soils 5-121
5.4.4 Nature and Extent of Contamination—Subsurface Soils 5-130
5.4.5 Fate and Transport 5-138
5.4.6 Baseline Risk Assessment 5-138
5.4.7 SWMU 196 Summary 5-140
5.4.8 SWMU 196 Conclusion 5-142
5.5 SWMU 489, C-710 NORTH SEPTIC TANK, NORTH OF C-710 5-142
5.5.1 Background 5-142
5.5.2 Fieldwork Summary 5-142

5.5.3 Nature and Extent of Contamination—Surface Soils 5-144
5.5.4 Nature and Extent of Contamination—Subsurface Soils 5-151
5.5.5 Fate and Transport 5-158
5.5.6 Baseline Risk Assessment 5-158
5.5.7 SWMU 489 Summary 5-158
5.5.8 SWMU 489 Conclusion 5-161
5.6 SWMU 531, C-746-A SOUTH ALUMINUM SLAG REACTING AREA 5-161
5.6.1 Background 5-161
5.6.2 Fieldwork Summary 5-161
5.6.3 Nature and Extent of Contamination—Surface Soils 5-161
5.6.4 Nature and Extent of Contamination—Subsurface Soils 5-169
5.6.5 Fate and Transport 5-175
5.6.6 Baseline Risk Assessment 5-175
5.6.7 SWMU 531 Summary 5-177
5.6.8 SWMU 531 Conclusion 5-178

6. GROUP 1, STORAGE AREAS 6-1
6.1 SWMU 200, CENTRAL PGDP SOIL CONTAMINATION SOUTH OF TSCA WASTE STORAGE FACILITY 6-4
6.1.1 Background 6-4
6.1.2 Fieldwork Summary 6-4
6.1.3 Nature and Extent of Contamination—Surface Soils 6-6
6.1.4 Nature and Extent of Contamination—Subsurface Soils 6-16
6.1.5 Fate and Transport 6-26
6.1.6 Baseline Risk Assessment 6-26
6.1.7 SWMU 200 Summary 6-27
6.1.8 SWMU 200 Conclusion 6-29
6.2 SWMU 212, C-745-A RADIOLOGICAL CONTAMINATION AREA 6-29
6.2.1 Background 6-29
6.2.2 Fieldwork Summary 6-29
6.2.3 Nature and Extent of Contamination—Surface Soils 6-31
6.2.4 Nature and Extent of Contamination—Subsurface Soils 6-40
6.2.5 Fate and Transport 6-49
6.2.6 Baseline Risk Assessment 6-49
6.2.7 SWMU 212 Summary 6-49
6.2.8 SWMU 212 Conclusion 6-52
6.3 SWMU 213, C-745-A, OS-02 6-52
6.3.1 Background 6-52
6.3.2 Fieldwork Summary 6-53
6.3.3 Nature and Extent of Contamination—Surface Soils 6-53
6.3.4 Nature and Extent of Contamination—Subsurface Soils 6-60
6.3.5 Fate and Transport 6-66
6.3.6 Baseline Risk Assessment 6-66
6.3.7 SWMU 213 Summary 6-68
6.3.8 SWMU 213 Conclusion 6-69
6.4 SWMU 214, C-611, OS-03 6-69
6.4.1 Background 6-69
6.4.2 Fieldwork Summary 6-70
6.4.3 Nature and Extent of Contamination—Surface Soils 6-70
6.4.4 Nature and Extent of Contamination—Subsurface Soils 6-77
6.4.5 Fate and Transport 6-77

6.4.6 Baseline Risk Assessment 6-77
6.4.7 SWMU 214 Summary 6-79
6.4.8 SWMU 214 Conclusion 6-80
6.5 SWMU 215, C-743, OS-04 6-80
6.5.1 Background 6-80
6.5.2 Fieldwork Summary 6-81
6.5.3 Nature and Extent of Contamination—Surface Soils 6-81
6.5.4 Nature and Extent of Contamination—Subsurface Soils 6-89
6.5.5 Fate and Transport 6-97
6.5.6 Baseline Risk Assessment 6-97
6.5.7 SWMU 215 Summary 6-99
6.5.8 SWMU 215 Conclusion 6-100
6.6 SWMU 216, C-206, OS-05 6-100
6.6.1 Background 6-100
6.6.2 Fieldwork Summary 6-101
6.6.3 Nature and Extent of Contamination—Surface Soils 6-101
6.6.4 Nature and Extent of Contamination—Subsurface Soils 6-109
6.6.5 Fate and Transport 6-109
6.6.6 Baseline Risk Assessment 6-109
6.6.7 SWMU 216 Summary 6-113
6.6.8 SWMU 216 Conclusion 6-114
6.7 SWMU 217, C-740, OS-06 6-114
6.7.1 Background 6-114
6.7.2 Fieldwork Summary 6-115
6.7.3 Nature and Extent of Contamination—Surface Soils 6-115
6.7.4 Nature and Extent of Contamination—Subsurface Soils 6-129
6.7.5 Fate and Transport 6-142
6.7.6 Baseline Risk Assessment 6-143
6.7.7 SWMU 217 Summary 6-143
6.7.8 SWMU 217 Conclusion 6-146
6.8 SWMU 221, C-635, OS-10 6-146
6.8.1 Background 6-146
6.8.2 Fieldwork Summary 6-146
6.8.3 Nature and Extent of Contamination—Surface Soils 6-147
6.8.4 Nature and Extent of Contamination—Subsurface Soils 6-157
6.8.5 Fate and Transport 6-164
6.8.6 Baseline Risk Assessment 6-165
6.8.7 SWMU 221 Summary 6-165
6.8.8 SWMU 221 Conclusion 6-168
6.9 SWMU 222, C-410, OS-11 6-168
6.9.1 Background 6-168
6.9.2 Fieldwork Summary 6-168
6.9.3 Nature and Extent of Contamination—Surface Soils 6-170
6.9.4 Nature and Extent of Contamination—Subsurface Soils 6-178
6.9.5 Fate and Transport 6-184
6.9.6 Baseline Risk Assessment 6-185
6.9.7 SWMU 222 Summary 6-185
6.9.8 SWMU 222 Conclusion 6-188
6.10 SWMU 227, C-746-B, OS-16 6-188
6.10.1 Background 6-188
6.10.2 Fieldwork Summary 6-188

6.10.3 Nature and Extent of Contamination—Surface Soils....6-189
6.10.4 Nature and Extent of Contamination—Subsurface Soils....6-204
6.10.5 Fate and Transport....6-216
6.10.6 Baseline Risk Assessment....6-216
6.10.7 SWMU 227 Summary....6-219
6.10.8 SWMU 227 Conclusion....6-221
6.11 SWMU 228, C-747-B, OS-17....6-221
6.11.1 Background....6-221
6.11.2 Fieldwork Summary....6-221
6.11.3 Nature and Extent of Contamination—Surface Soils....6-221
6.11.4 Nature and Extent of Contamination—Subsurface Soils....6-230
6.11.5 Fate and Transport....6-237
6.11.6 Baseline Risk Assessment....6-238
6.11.7 SWMU 228 Summary....6-240
6.11.8 SWMU 228 Conclusion....6-241

7. GROUP 2, UNDERGROUND TANKS....7-1
7.1 SWMU 27, C-722 ACID NEUTRALIZATION TANK....7-4
7.1.1 Background....7-4
7.1.2 Fieldwork Summary....7-4
7.1.3 Nature and Extent of Contamination—Surface Soils....7-4
7.1.4 Nature and Extent of Contamination—Subsurface Soils....7-8
7.1.5 Fate and Transport....7-8
7.1.6 Baseline Risk Assessment....7-13
7.1.7 SWMU 27 Summary....7-13
7.1.8 SWMU 27 Conclusion....7-14
7.2 SWMU 76, C-632-B SULFURIC ACID STORAGE TANK....7-14
7.2.1 Background....7-14
7.2.2 Fieldwork Summary....7-14
7.2.3 Nature and Extent of Contamination—Surface Soils....7-14
7.2.4 Nature and Extent of Contamination—Subsurface Soils....7-22
7.2.5 Fate and Transport....7-29
7.2.6 Baseline Risk Assessment....7-29
7.2.7 SWMU 76 Summary....7-32
7.2.8 SWMU 76 Conclusion....7-33
7.3 SWMU 165, C-616-L PIPELINE and VAULT SOIL CONTAMINATION....7-33
7.3.1 Background....7-33
7.3.2 Fieldwork Summary....7-34
7.3.3 Nature and Extent of Contamination—Surface Soils....7-34
7.3.4 Nature and Extent of Contamination—Subsurface Soils....7-46
7.3.5 Fate and Transport....7-54
7.3.6 Baseline Risk Assessment....7-54
7.3.7 SWMU 165 Summary....7-57
7.3.8 SWMU 165 Conclusion....7-60
7.4 SWMU 170, C-729 ACETYLENE BUILDING DRAIN PITS....7-60
7.4.1 Background....7-60
7.4.2 Fieldwork Summary....7-60
7.4.3 Nature and Extent of Contamination—Surface Soils....7-60
7.4.4 Nature and Extent of Contamination—Subsurface Soils....7-67
7.4.5 Fate and Transport....7-73
7.4.6 Baseline Risk Assessment....7-73

7.4.7 SWMU 170 Summary 7-75
7.4.8 SWMU 170 Conclusion 7-76

8. GROUP 2, CHROMIUM AREAS 8-1
8.1 SWMU 158, C-720 CHILLED WATER SYSTEM LEAK SITE 8-4
8.1.1 Background 8-4
8.1.2 Fieldwork Summary 8-4
8.1.3 Nature and Extent of Contamination—Surface Soils 8-4
8.1.4 Nature and Extent of Contamination—Subsurface Soils 8-13
8.1.5 Fate and Transport 8-22
8.1.6 Baseline Risk Assessment 8-22
8.1.7 SWMU 158 Summary 8-25
8.1.8 SWMU 158 Summary 8-26
8.2 SWMU 169, C-410-E HF VENT SURGE PROTECTION TANK 8-27
8.2.1 Background 8-27
8.2.2 Fieldwork Summary 8-27
8.2.3 Nature and Extent of Contamination—Surface Soils 8-27
8.2.4 Nature and Extent of Contamination—Subsurface Soils 8-36
8.2.5 Fate and Transport 8-45
8.2.6 Baseline Risk Assessment 8-45
8.2.7 SWMU 169 Summary 8-48
8.2.8 SWMU 169 Conclusion 8-51

9. GROUP 2, SOIL/RUBBLE AREAS 9-1
9.1 SWMU 19, C-410-B HF NEUTRALIZATION LAGOON 9-4
9.1.1 Background 9-4
9.1.2 Fieldwork Summary 9-5
9.1.3 Nature and Extent of Contamination—Surface Soils 9-5
9.1.4 Nature and Extent of Contamination—Subsurface Soils 9-11
9.1.5 Fate and Transport 9-18
9.1.6 Baseline Risk Assessment 9-19
9.1.7 SWMU 19 Summary 9-19
9.1.8 SWMU 19 Conclusion 9-21
9.2 SWMU 138, C-100 SOUTHSIDE BERM 9-22
9.2.1 Background 9-22
9.2.2 Fieldwork Summary 9-22
9.2.3 Nature and Extent of Contamination—Surface Soils 9-22
9.2.4 Nature and Extent of Contamination—Subsurface Soils 9-35
9.2.5 Fate and Transport 9-47
9.2.6 Baseline Risk Assessment 9-47
9.2.7 SWMU 138 Summary 9-49
9.2.8 SWMU 138 Conclusion 9-51
9.3 SWMU 180, WKWMA OUTDOOR FIRING RANGE (WKWMA) 9-51
9.3.1 Background 9-51
9.3.2 Fieldwork Summary 9-51
9.3.3 Nature and Extent of Contamination—Surface Soils 9-51
9.3.4 Nature and Extent of Contamination—Subsurface Soils 9-61
9.3.5 Fate and Transport 9-69
9.3.6 Baseline Risk Assessment 9-69
9.3.7 SWMU 180 Summary 9-70
9.3.8 SWMU 180 Conclusion 9-74

9.4 SWMU 181, WEST SIDE OUTDOOR FIRING RANGE (PGDP) 9-74
9.4.1 Background 9-74
9.4.2 Fieldwork Summary 9-75
9.4.3 Nature and Extent of Contamination—Surface Soils 9-75
9.4.4 Nature and Extent of Contamination—Subsurface Soils 9-83
9.4.5 Fate and Transport 9-88
9.4.6 Baseline Risk Assessment 9-88
9.4.7 SWMU 181 Summary 9-90
9.4.8 SWMU 181 Conclusion 9-91
9.5 SWMU 195, SW PGDP CURLEE ROAD CONTAMINATED SOIL MOUNDS 9-91
9.5.1 Background 9-91
9.5.2 Fieldwork Summary 9-92
9.5.3 Nature and Extent of Contamination—Surface Soils 9-92
9.5.4 Nature and Extent of Contamination—Subsurface Soils 9-108
9.5.5 Fate and Transport 9-123
9.5.6 Baseline Risk Assessment 9-124
9.5.7 SWMU 195 Summary 9-124
9.5.8 SWMU 195 Conclusion 9-131
9.6 SWMU 486, WEST OF PGDP RUBBLE PILE WKWMA 9-132
9.6.1 Background 9-132
9.6.2 Fieldwork Summary 9-132
9.6.3 Nature and Extent of Contamination—Surface Soils 9-132
9.6.4 Nature and Extent of Contamination—Subsurface Soils 9-135
9.6.5 Fate and Transport 9-135
9.6.6 Baseline Risk Assessment 9-135
9.6.7 SWMU 486 Summary 9-137
9.6.8 SWMU 486 Conclusion 9-138
9.7 SWMU 487, WEST OF PGDP RUBBLE PILE WKWMA 9-138
9.7.1 Background 9-138
9.7.2 Fieldwork Summary 9-138
9.7.3 Nature and Extent of Contamination—Surface Soils 9-139
9.7.4 Nature and Extent of Contamination—Subsurface Soils 9-139
9.7.5 Fate and Transport 9-139
9.7.6 Baseline Risk Assessment 9-141
9.7.7 SWMU 487 Summary 9-141
9.7.8 SWMU 487 Conclusion 9-143
9.8 AOC 492, CONTAMINATED SOIL AREA, NORTH OF OUTFALL 010 9-144
9.8.1 Background 9-144
9.8.2 Fieldwork Summary 9-144
9.8.3 Nature and Extent of Contamination—Surface Soils 9-144
9.8.4 Nature and Extent of Contamination—Subsurface Soils 9-155
9.8.5 Fate and Transport 9-155
9.8.6 Baseline Risk Assessment 9-161
9.8.7 AOC 492 Summary 9-163
9.8.8 AOC 492 Conclusion 9-166
9.9 SWMU 493, CONCRETE RUBBLE PILES NEAR OUTFALL 001 9-166
9.9.1 Background 9-166
9.9.2 Fieldwork Summary 9-167
9.9.3 Nature and Extent of Contamination—Surface Soils 9-167
9.9.4 Nature and Extent of Contamination—Subsurface Soils 9-178
9.9.5 Fate and Transport 9-178

9.9.6 Baseline Risk Assessment 9-179
9.9.7 SWMU 493 Summary 9-181
9.9.8 SWMU 493 Conclusion 9-182
9.10 SWMU 517, RUBBLE AND DEBRIS EROSION CONTROL FILL AREA 9-182
9.10.1 Background 9-182
9.10.2 Fieldwork Summary 9-183
9.10.3 Nature and Extent of Contamination—Surface Soils 9-185
9.10.4 Nature and Extent of Contamination—Subsurface Soils 9-192
9.10.5 Fate and Transport 9-192
9.10.6 Baseline Risk Assessment 9-192
9.10.7 SWMU 517 Summary 9-194
9.10.8 SWMU 517 Conclusion 9-195
9.11 AOC 541, CONTAMINATED AREA BY OUTFALL 011 9-195
9.11.1 Background 9-195
9.11.2 Fieldwork Summary 9-196
9.11.3 Nature and Extent of Contamination—Surface Soils 9-196
9.11.4 Nature and Extent of Contamination—Subsurface Soils 9-217
9.11.5 Fate and Transport 9-226
9.11.6 Baseline Risk Assessment 9-227
9.11.7 AOC 541 Summary 9-227
9.11.8 AOC 541 Conclusion 9-231
9.12 SWMU 561, SOIL PILE I 9-231
9.12.1 Background 9-231
9.12.2 Fieldwork Summary 9-233
9.12.3 Nature and Extent of Contamination—Surface Soils 9-233
9.12.4 Nature and Extent of Contamination—Subsurface Soils 9-263
9.12.5 Fate and Transport 9-277
9.12.6 Baseline Risk Assessment 9-278
9.12.7 SWMU 561 Summary 9-282
9.12.8 SWMU 561 Conclusion 9-285
9.13 AOC 562, SOIL PILES c, d, e, f, g, h, j, k, and p IN SUBUNIT 1 9-285
9.13.1 Background 9-285
9.13.2 Fieldwork Summary 9-285
9.13.3 Nature and Extent of Contamination—Surface Soils 9-287
9.13.4 Nature and Extent of Contamination—Subsurface Soils 9-294
9.13.5 Fate and Transport 9-301
9.13.6 Baseline Risk Assessment 9-302
9.13.7 AOC 562 Summary 9-302
9.13.8 AOC 562 Conclusion 9-307
9.14 AOC 563, SOIL PILES 20, CC, AND BW IN SUBUNIT 4 9-307
9.14.1 Background 9-307
9.14.2 Fieldwork Summary 9-309
9.14.3 Nature and Extent of Contamination—Surface Soils 9-309
9.14.4 Nature and Extent of Contamination—Subsurface Soils 9-317
9.14.5 Fate and Transport 9-323
9.14.6 Baseline Risk Assessment 9-324
9.14.7 AOC 563 Summary 9-324
9.14.8 AOC 563 Conclusion 9-327
9.15 AOC 564, SOIL PILE “AT” IN SUBUNIT 5 9-327
9.15.1 Background 9-327
9.15.2 Fieldwork Summary 9-327

9.15.3 Nature and Extent of Contamination—Surface Soils 9-327
9.15.4 Nature and Extent of Contamination—Subsurface Soils 9-336
9.15.5 Fate and Transport 9-342
9.15.6 Baseline Risk Assessment 9-342
9.15.7 AOC 564 Summary 9-345
9.15.8 AOC 564 Conclusion 9-347
9.16 AOC 567, CONTAMINATED SOIL AREA K013 9-347
9.16.1 Background 9-347
9.16.2 Fieldwork Summary 9-347
9.16.3 Nature and Extent of Contamination—Surface Soils 9-347
9.16.4 Nature and Extent of Contamination—Subsurface Soils 9-355
9.16.5 Fate and Transport 9-360
9.16.6 Baseline Risk Assessment 9-360
9.16.7 AOC 567 Summary 9-362
9.16.8 AOC 567 Conclusion 9-363

10. GROUP 3, SCRAP YARDS 10-1
10.1 SWMU 14, C-746-E CONTAMINATED SCRAP YARD 10-4
10.1.1 Background 10-4
10.1.2 Fieldwork Summary 10-4
10.1.3 Nature and Extent of Contamination—Surface Soils 10-6
10.1.4 Nature and Extent of Contamination—Subsurface Soils 10-32
10.1.5 Fate and Transport 10-55
10.1.6 Baseline Risk Assessment 10-56
10.1.7 SWMU 14 Summary 10-65
10.1.8 SWMU 14 Conclusion 10-68
10.2 SWMU 518, C-746-P1 FIELD SOUTH OF C-746-P1 CLEAN SCRAP YARD 10-70
10.2.1 Background 10-70
10.2.2 Fieldwork Summary 10-70
10.2.3 Nature and Extent of Contamination—Surface Soils 10-70
10.2.4 Nature and Extent of Contamination—Subsurface Soils 10-80
10.2.5 Fate and Transport 10-87
10.2.6 Baseline Risk Assessment 10-87
10.2.7 SWMU 518 Summary 10-88
10.2.8 SWMU 518 Conclusion 10-92
10.3 SWMU 520, C-746-A SCRAP MATERIAL WEST OF C-746-A 10-92
10.3.1 Background 10-92
10.3.2 Fieldwork Summary 10-92
10.3.3 Nature and Extent of Contamination—Surface Soils 10-92
10.3.4 Nature and Extent of Contamination—Subsurface Soils 10-109
10.3.5 Fate and Transport 10-123
10.3.6 Baseline Risk Assessment 10-123
10.3.7 SWMU 520 Summary 10-126
10.3.8 SWMU 520 Conclusion 10-128

11. GROUP 3, PCBS 11-1
11.1 SWMU 57, C-541-A PCB WASTE STAGING AREA 11-4
11.1.1 Background 11-4
11.1.2 Fieldwork Summary 11-4
11.1.3 Nature and Extent of Contamination—Surface Soils 11-4
11.1.4 Nature and Extent of Contamination—Subsurface Soils 11-4

11.1.5 Fate and Transport 11-5
11.1.6 Baseline Risk Assessment 11-5
11.1.7 SWMU 57 Summary 11-5
11.1.8 SWMU 57 Conclusions 11-5
11.2 SWMU 81, C-541 PCB SPILL SITE 11-5
11.2.1 Background 11-5
11.2.2 Fieldwork Summary 11-5
11.2.3 Nature and Extent of Contamination—Surface Soils 11-7
11.2.4 Nature and Extent of Contamination—Subsurface Soils 11-17
11.2.5 Fate and Transport 11-26
11.2.6 Baseline Risk Assessment 11-26
11.2.7 SWMU 81 Summary 11-28
11.2.8 SWMU 81 Conclusions 11-29
11.3 SWMU 153, C-331 PCB SOIL CONTAMINATION (WEST) 11-31
11.3.1 Background 11-31
11.3.2 Fieldwork Summary 11-31
11.3.3 Nature and Extent of Contamination—Surface Soils 11-31
11.3.4 Nature and Extent of Contamination—Subsurface Soils 11-39
11.3.5 Fate and Transport 11-46
11.3.6 Baseline Risk Assessment 11-47
11.3.7 SWMU 153 Summary 11-47
11.3.8 SWMU 153 Conclusions 11-50
11.4 SWMU 156, C-310 PCB SOIL CONTAMINATION (WEST SIDE) 11-50
11.4.1 Background 11-50
11.4.2 Fieldwork Summary 11-50
11.4.3 Nature and Extent of Contamination—Surface Soils 11-50
11.4.4 Nature and Extent of Contamination—Subsurface Soils 11-59
11.4.5 Fate and Transport 11-66
11.4.6 Baseline Risk Assessment 11-67
11.4.7 SWMU 156 Summary 11-67
11.4.8 SWMU 156 Conclusions 11-70
11.5 SWMU 160, C-745 CYLINDER YARD SPOILS (PCB SOILS) 11-70
11.5.1 Background 11-70
11.5.2 Fieldwork Summary 11-70
11.5.3 Nature and Extent of Contamination—Surface Soils 11-70
11.5.4 Nature and Extent of Contamination—Subsurface Soils 11-78
11.5.5 Fate and Transport 11-85
11.5.6 Baseline Risk Assessment 11-86
11.5.7 SWMU 160 Summary 11-86
11.5.8 SWMU 160 Conclusions 11-88
11.6 SWMU 163, C-304 BUILDING/HVAC PIPING SYSTEM (SOIL BACKFILL) 11-89
11.6.1 Background 11-89
11.6.2 Fieldwork Summary 11-89
11.6.3 Nature and Extent of Contamination—Surface Soils 11-89
11.6.4 Nature and Extent of Contamination—Subsurface Soils 11-99
11.6.5 Fate and Transport 11-109
11.6.6 Baseline Risk Assessment 11-109
11.6.7 SWMU 163 Summary 11-109
11.6.8 SWMU 163 Conclusions 11-112

11.7 SWMU 219, C-728 OS-08 11-112
11.7.1 Background 11-112
11.7.2 Fieldwork Summary 11-112
11.7.3 Nature and Extent of Contamination—Surface Soils 11-112
11.7.4 Nature and Extent of Contamination—Subsurface Soils 11-119
11.7.5 Fate and Transport 11-125
11.7.6 Baseline Risk Assessment 11-125
11.7.7 SWMU 219 Summary 11-126
11.7.8 SWMU 219 Conclusions 11-128
11.8 SWMU 488, C-410 TRAILERS PCB CONTAMINATION AREA BY C-410 TRAILER COMPLEX 11-128
11.8.1 Background 11-128
11.8.2 Fieldwork Summary 11-129
11.8.3 Nature and Extent of Contamination - Surface Soils 11-129
11.8.4 Nature and Extent of Contamination—Subsurface Soils 11-137
11.8.5 Fate and Transport 11-144
11.8.6 Baseline Risk Assessment 11-144
11.8.7 SWMU 488 Summary 11-144
11.8.8 SWMU 488 Conclusions 11-147

12. CONCLUSIONS FOR THE SOILS OU REMEDIAL INVESTIGATION 12-1
12.1 Goal 1: Characterize Nature and Extent of Source Zone(s) 12-1
12.2 Goal 2: Determine Surface and Subsurface Transport Mechanisms and Pathways 12-3
12.3 Goal 3: Complete a Baseline Risk Assessment for the Soils OU 12-4
12.4 Goal 4: Support Evaluation of Remedial Alternatives 12-16

13. REFERENCES 13-1

APPENDIX A: TECHNICAL MEMORANDUM FOR FIELD ACTIVITIES A-1

APPENDIX B: DATA QUALITY ANALYSIS B-1

APPENDIX C: FATE AND TRANSPORT MODELING C-1

APPENDIX D: BASELINE HUMAN HEALTH RISK ASSESSMENT D-1

APPENDIX E: SCREENING ECOLOGICAL RISK ASSESSMENT E-1

APPENDIX F: APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE F-1

APPENDIX G: ANALYTICAL DATA (CD) G-1

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TABLES

1.1.	SWMUs/AOCs Addressed in the Soils OU RI Report	1-3
1.2.	SWMUs/AOCs Not Addressed in this Soils OU RI Report	1-4
1.3.	Goals, Decisions, and Questions Identified for the Soils OU RI	1-6
1.4.	Significant Chemicals of Potential Concern at the PGDP	1-9
1.5.	Project Schedule for Soils OU RI and FS	1-11
2.1.	Summary of Historical Information	2-2
2.2.	Field Analysis and Limits for Grid Sampling and Radiological Walkovers	2-4
2.3.	SWMU/AOC Samples Collected	2-5
2.4.	QA Assessment for Laboratory Measurements of RI Data	2-8
3.1.	Precipitation as a Function of Recurrence Interval and Storm Duration for Western Kentucky	3-3
4.1.	SWMUs/AOCs and Associated Soil Constituents Subjected to Modeling	4-6
4.2.	Field Analysis and Limits for Grid Sampling and Radiological Walkovers	4-7
4.3.	Exposure Factors Used for Intake Calculations in BHHRA	4-14
5.1.1.	Surface Soil Historical Data Summary: SWMU 1 Oil Land Farm	5-6
5.1.2.	Subsurface Soil Historical Data Summary: SWMU 1 Oil Land Farm	5-15
5.1.3.	RGOs for SWMU 1	5-30
5.1.4.	Ecological Screening for SWMU 1	5-32
5.2.1.	Surface Soil Historical Data Summary: SWMU 99B Kellogg Building Site	5-37
5.2.2.	Surface Soil RI Data Summary: SWMU 99B Kellogg Building Site	5-39
5.2.3.	Subsurface Soil Historical Data Summary: SWMU 99B Kellogg Building Site	5-45
5.2.4.	Subsurface Soil RI Data Summary: SWMU 99B Kellogg Building Site	5-48
5.2.5.	RGOs for SWMU 99B	5-54
5.2.6.	Ecological Screening for SWMU 99B	5-54
5.3.1.	Surface Soil Historical Data Summary: SWMU 194 DUF_6 Facility McGraw Construction Facilities (South Side)	5-59
5.3.2.	Surface Soil RI Data Summary: SWMU 194 DUF_6 Facility McGraw Construction Facilities (South Side)	5-62
5.3.3.	Subsurface Soil Historical Data Summary: SWMU 194 DUF_6 Facility McGraw Construction Facilities (South Side)	5-82
5.3.4.	Subsurface Soil RI Data Summary: SWMU 194 DUF_6 Facility McGraw Construction Facilities (South Side)	5-85
5.3.5.	RGOs for SWMU 194	5-107
5.3.6.	Ecological Screening for SWMU 194	5-115
5.4.1.	Surface Soil Historical Data Summary: SWMU 196, C-746-A Septic System	5-123
5.4.2.	Surface Soil RI Data Summary: SWMU 196, C-746-A Septic System	5-124
5.4.3.	Subsurface Soil Historical Data Summary: SWMU 196 C-746-A Septic System	5-131
5.4.4.	Subsurface Soil RI Data Summary: SWMU 196 C-746-A Septic System	5-132
5.4.5.	RGOs for SWMU 196	5-139
5.4.6.	Ecological Screening for SWMU 196	5-140
5.5.1.	Surface Soil RI Data Summary: SWMU 489 C-710 North Septic Tank	5-145
5.5.2.	Subsurface Soil RI Data Summary: SWMU 489 C-710 North Septic Tank	5-152
5.5.3.	RGOs for SWMU 489	5-159
5.5.4.	Ecological Screening for SWMU 489	5-160
5.6.1.	Surface Soil RI Data Summary: SWMU 531 C-746-A South Aluminum Slag Reacting Area	5-163
5.6.2.	Subsurface Soil RI Data Summary: SWMU 531 C-746-A South Aluminum Slag Reacting Area	5-170

5.6.3. RGOs for SWMU 531 5-176
5.6.4. Ecological Screening for SWMU 531 5-177
6.1.1. Surface Soil Historical Data Summary: SWMU 200 TSCA Waste Storage Facility 6-7
6.1.2. Surface Soil RI Data Summary: SWMU 200 Central PGDP Soil Contamination South of TSCA Waste Storage Facility 6-8
6.1.3. Subsurface Soil Historical Data Summary: SWMU 200 TSCA Waste Storage Facility 6-17
6.1.4. Subsurface Soil RI Data Summary: SWMU 200 Central PGDP Soil Contamination South of TSCA Waste Storage Facility 6-18
6.1.5. RGOs for SWMU 200 6-27
6.1.6. Ecological Screening for SWMU 200 6-27
6.2.1. Surface Soil Historical Data Summary: SWMU 212 C-745-A Radiological Contamination Area 6-32
6.2.2. Surface Soil RI Data Summary: SWMU 212 C-745-A Radiological Contamination 6-34
6.2.3. Subsurface Soil Historical Data Summary: SWMU 212 C-745-A Radiological Contamination Area 6-41
6.2.4. Subsurface Soil RI Data Summary: SWMU 212 C-745-A Radiological Contamination Area 6-43
6.2.5. RGOs for SWMU 212 6-50
6.2.6. Ecological Screening for SWMU 212 6-51
6.3.1. Surface Soil RI Data Summary: SWMU 213 C-745-A DMSA Outside-02 6-55
6.3.2. Subsurface Soil RI Data Summary: SWMU 213 C-745-A DMSA Outside-02 6-61
6.3.3. RGOs for SWMU 213 6-67
6.3.4. Ecological Screening for SWMU 213 6-68
6.4.1. Surface Soil RI Data Summary: SWMU 214 C-611 DMSA Outside-03 6-72
6.4.2. Subsurface Soil RI Data Summary: SWMU 214 C-611 DMSA Outside-03 6-78
6.4.3. Ecological Screening for SWMU 214 6-79
6.5.1. Surface Soil Historical Data Summary: SWMU 215 DMSA OS-04 6-83
6.5.2. Surface Soil RI Data Summary: SWMU 215 DMSA C-743 Outside-04 6-84
6.5.3. Subsurface Soil Historical Data Summary: SWMU 215 DMSA OS-04 6-90
6.5.4. Subsurface Soil RI Data Summary: SWMU 215 DMSA C-743 Outside-04 6-92
6.5.5. RGOs for SWMU 215 6-98
6.5.6. Ecological Screening for SWMU 215 6-99
6.6.1. Surface Soil Historical Data Summary: SWMU 216 DMSA OS-05 6-103
6.6.2. Surface Soil RI Data Summary: SWMU 216 C-206 DMSA Outside-05 6-104
6.6.3. Subsurface Soil Historical Data Summary: SWMU 216 DMSA OS-05 6-110
6.6.4. Subsurface Soil RI Data Summary: SWMU 216 C-206 DMSA Outside-05 6-111
6.6.5. RGOs for SWMU 216 6-112
6.6.6. Ecological Screening for SWMU 216 6-113
6.7.1. Surface Soil Historical Data Summary: SWMU 217 DMSA OS-06 6-117
6.7.2. Surface Soil RI Data Summary: SWMU 217 C-740 DMSA Outside-06 6-120
6.7.3. Subsurface Soil Historical Data Summary: SWMU 217 DMSA OS-06 6-130
6.7.4. Subsurface Soil RI Data Summary: SWMU 217 C-740 DMSA Outside-06 6-133
6.7.5. RGOs for SWMU 217 6-144
6.7.6. Ecological Screening for SWMU 217 6-145
6.8.1. Surface Soil Historical Data Summary: SWMU 221 DMSA OS-10 6-149
6.8.2. Surface Soil RI Data Summary: SWMU 221 C-635 DMSA Outside-10 6-150
6.8.3. Subsurface Soil Historical Data Summary: SWMU 221 DMSA OS-10 6-158
6.8.4. Subsurface Soil RI Data Summary: SWMU 221 C-635 DMSA Outside-10 6-159
6.8.5. RGOs for SWMU 221 6-166
6.8.6 Ecological Screening for SWMU 221 6-167
6.9.1. Surface Soil Historical Data Summary: SWMU 222 DMSA OS-11 6-171

6.9.2. Surface Soil RI Data Summary: SWMU 222, C-410 DMSA Outside-11 6-172
6.9.3. Subsurface Soil Historical Data Summary: SWMU 222 DMSA OS-11 6-179
6.9.4. Subsurface Soil RI Data Summary: SWMU 222, C-410 DMSA Outside-11 6-180
6.9.5. RGOs for SWMU 222 6-186
6.9.6. Ecological Screening for SWMU 222 6-187
6.10.1. Surface Soil Historical Data Summary: SWMU 227 DMSA OS-16 6-191
6.10.2. Surface Soil RI Data Summary: SWMU 227 C-746-B DMSA Outside-16 6-194
6.10.3. Subsurface Soil Historical Data Summary: SWMU 227 DMSA OS-16 6-205
6.10.4. Subsurface Soil RI Data Summary: SWMU 227 C-746-B DMSA Outside-16 6-208
6.10.5. RGOs for SWMU 227 6-218
6.10.6. Ecological Screening for SWMU 227 6-219
6.11.1. Surface Soil Historical Data Summary: SWMU 228 DMSA OS-17 6-223
6.11.2. Surface Soil RI Data Summary: SWMU 228 C-747-B DMSA Outside 17 6-224
6.11.3. Subsurface Soil Historical Data Summary: SWMU 228 DMSA OS-17 6-231
6.11.4. Subsurface Soil RI Data Summary: SWMU 228 C-747-B DMSA Outside 17 6-232
6.11.5. RGOs for SWMU 228 6-239
6.11.6. Ecological Screening for SWMU 228 6-240
7.1.1. Surface Soil Historical Data Summary: SWMU 27 C-722 Acid Neutralization Tank 7-6
7.1.2. Subsurface Soil Historical Data Summary: SWMU 27 C-722 Acid Neutralization Tank 7-9
7.2.1. Surface Soil RI Data Summary: SWMU 76, C-632-B Sulfuric Acid Storage Tank 7-16
7.2.2. Subsurface Soil RI Data Summary: SWMU 76, C-632-B Sulfuric Acid Storage Tank 7-23
7.2.3. RGOs for SWMU 76 7-31
7.2.4. Ecological Screening for SWMU 76 7-32
7.3.1. Surface Soil Historical Data Summary: SWMU 165 C-616-L Pipeline and Vault Soil Contamination 7-36
7.3.2. Surface Soil RI Data Summary: SWMU 165 C-616-L Pipeline and Vault Soil Contamination 7-40
7.3.3. Subsurface Soil Historical Data Summary: SWMU 165 C-616-L Pipeline and Vault Soil Contamination 7-47
7.3.4. Subsurface Soil RI Data Summary: SWMU 165 C-616-L Pipeline and Vault Soil Contamination 7-50
7.3.5. RGOs for SWMU 165 7-56
7.3.6. Ecological Screening for SWMU 165 7-57
7.4.1. Surface Soil Historical Data Summary: SWMU 170 C-729 Acetylene Building Drain Pits 7-62
7.4.2. Surface Soil RI Data Summary: SWMU 170 C-729 Acetylene Building Drain Pits 7-63
7.4.3. Subsurface Soil Historical Data Summary: SWMU 170 C-729 Acetylene Building Drain Pits 7-68
7.4.4. Subsurface Soil RI Data Summary: SWMU 170 C-729 Acetylene Building Drain Pits 7-69
7.4.5. RGOs for SWMU 170 7-74
8.1.1. Surface Soil Historical Data Summary: SWMU 158 C-720 Chilled Water System Leak Site 8-6
8.1.2. Surface Soil RI Data Summary: SWMU 158, Chilled Water System Leak Site 8-7
8.1.3. Subsurface Soil Historical Data Summary: SWMU 158 C-720 Chilled Water System Leak Site 8-14
8.1.4. Subsurface Soil RI Data Summary: SWMU 158, Chilled Water System Leak Site 8-16
8.1.5. RGOs for SWMU 158 8-24
8.1.6. Ecological Screening for SWMU 158 8-25
8.2.1. Surface Soil Historical Data Summary: SWMU 169 C-410-E HF Vent Surge Protection Tank 8-29
8.2.2. Surface Soil RI Data Summary: SWMU 169, C-410-E HF Vent Surge Protection Tank 8-30

8.2.3. Subsurface Soil Historical Data Summary: SWMU 169 C-410-E HF Vent Surge Protection Tank 8-37
8.2.4. Subsurface Soil RI Data Summary: SWMU 169, C-410-E HF Vent Surge Protection Tank 8-39
8.2.5. RGOs for SWMU 169 8-47
8.2.6. Ecological Screening for SWMU 169 8-48
9.1.1. Surface Soil Historical Data Summary: SWMU 19 C410-B HF Emergency Lagoon 9-7
9.1.2. Surface Soil RI Data Summary: SWMU 138, C-100 Southside Berm 9-12
9.1.3. RGOs for SWMU 19 9-20
9.2.1. Surface Soil Historical Data Summary: SWMU 138 C-100 Southside Berm 9-24
9.2.2. Surface Soil RI Data Summary: SWMU 138, C-100 Southside Berm 9-25
9.2.3. Subsurface Soil Historical Data Summary: SWMU 138 C-100 Southside Berm 9-36
9.2.4. Subsurface Soil RI Data Summary: SWMU 138, C-100 Southside Berm 9-37
9.2.5. RGOs for SWMU 138 9-48
9.2.6. Ecological Screening for SWMU 138 9-49
9.3.1. Surface Soil RI Data Summary: SWMU 180, WKWMA Outdoor Firing Range 9-53
9.3.2. Subsurface Soil RI Data Summary: SWMU 180, WKWMA Outdoor Firing Range 9-62
9.3.3. RGOs for SWMU 180 9-71
9.3.4. Ecological Screening for SWMU 180 9-72
9.4.1. Surface Soil Historical Data Summary: SWMU 181 PGDP Firing Range 9-77
9.4.2. Surface Soil RI Data Summary: SWMU 181 PGDP Firing Range 9-79
9.4.3. Subsurface Soil Historical Data Summary: SWMU 181 PGDP Firing Range 9-84
9.4.4. RGOs for SWMU 181 9-89
9.4.5. Ecological Screening for SWMU 181 9-90
9.5.1. Surface Soil RI Data Summary: SWMU 195, Curlee Road Contaminated Soil Mounds 9-94
9.5.2. Subsurface Soil RI Data Summary: SWMU 195, Curlee Road Contaminated Soil Mounds 9-109
9.5.3. RGOs for SWMU 195 9-125
9.5.4. Ecological Screening for SWMU 195 9-128
9.6.1. Surface Soil RI Data Summary: SWMU 486 Rubble Pile WKWMA 9-134
9.6.2. RGOs for SWMU 486 9-136
9.7.1. Surface Soil RI Data Summary: SWMU 487 Rubble Pile WKWMA 9-140
9.7.2. RGOs for SWMU 487 9-142
9.8.1. Surface Soil Historical Data Summary: SWMU 492 Outfall 011 Contaminated Soil Area 9-146
9.8.2. Surface Soil RI Data Summary: SWMU 492 Outfall 011 Contaminated Soil Area 9-150
9.8.3. Subsurface Soil Historical Data Summary: SWMU 492 Outfall 011 Contaminated Soil Area 9-156
9.8.4. RGOs for AOC 492 9-162
9.8.5. Ecological Screening for AOC 492 9-163
9.9.1. Surface Soil Historical Data Summary: SWMU 493 Concrete Rubble Piles 9-169
9.9.2. Surface Soil RI Data Summary: SWMU 493, Concrete Rubble Piles near Outfall 001 9-172
9.9.3. RGOs for SWMU 493 9-180
9.9.4. Ecological Screening for SWMU 493 9-181
9.10.1. Surface Soil Historical Data Summary: SWMU 517 Rubble and Debris, Erosion Control Fill Area 9-186
9.10.2. RGOs for SWMU 517 9-193
9.10.3. Ecological Screening for SWMU 517 9-193
9.11.1. Surface Soil Historical Data Summary: AOC 541 Outfall 011 Contaminated Soil Area 9-198
9.11.2. Surface Soil RI Data Summary: AOC 541 Outfall 011 Contaminated Soil Area 9-201

9.11.3. Subsurface Soil Historical Data Summary: AOC 541 Outfall 011 Contaminated Soil Area ... 9-218
9.11.4. RGOs for AOC 541 ... 9-228
9.11.5. Ecological Screening for AOC 541 ... 9-229
9.12.1. Surface Soil Historical Data Summary: SWMU 561 Soil Pile I ... 9-235
9.12.2. Surface Soil RI Data Summary: SWMU 561 Soil Pile I ... 9-239
9.12.3. Subsurface Soil Historical Data Summary: SWMU 561 Soil Pile I ... 9-264
9.12.4. RGOs for SWMU 561 ... 9-279
9.12.5. Ecological Screening for SWMU 561 ... 9-281
9.13.1. Surface Soil Historical Data Summary: AOC 562 Addendum 1B Soil Piles C, D, E, F, G, H, J, K, and P ... 9-288
9.13.2. Surface Soil RI Data Summary: AOC 562 Addendum 1B Soil Piles C, D, E, F, G, H, J, K, and P ... 9-290
9.13.3. Subsurface Soil Historical Data Summary: AOC 562 Addendum 1B Soil Piles C, D, E, F, G, H, J, K, and P ... 9-295
9.13.4. RGOs for AOC 562 ... 9-303
9.13.5. Ecological Screening for AOC 562 ... 9-305
9.14.1. Surface Soil Historical Data Summary: SWMU 563 Addendum 1B Soil Piles 20, BW, and CC ... 9-311
9.14.2. Surface Soil RI Data Summary: SWMU 563 Addendum 1B Soil Piles 20, BW, and CC ... 9-313
9.14.3. Subsurface Soil Historical Data Summary: SWMU 563 Addendum 1B Soil Piles 20, BW, and CC ... 9-318
9.14.4. RGOs for AOC 563 ... 9-325
9.14.5. Ecological Screening for AOC 563 ... 9-325
9.15.1. Surface Soil Historical Data Summary: AOC 564 Addendum 1B Soil Pile AT ... 9-329
9.15.2. Surface Soil RI Data Summary: SWMU 564 Addendum 1B Soil Pile AT ... 9-331
9.15.3. Subsurface Soil Historical Data Summary: SWMU 564 Addendum 1B Soil Pile AT ... 9-337
9.15.4. RGOs for AOC 564 ... 9-343
9.15.5. Ecological Screening for AOC 564 ... 9-345
9.16.1. Surface Soil Historical Data Summary: AOC 567 Addendum 1B Soil Pile at K013 ... 9-349
9.16.2. Surface Soil Historical Data Summary: AOC 567 Addendum 1B Soil Pile at K013 ... 9-351
9.16.3. Subsurface Soil Historical Data Summary: AOC 567 Addendum 1B Soil Pile at K013 ... 9-356
9.16.4. RGOs for AOC 567 ... 9-361
10.1.1. Surface Soil Historical Data Summary: SWMU 14 C-746-E/E1 Scrap Yard ... 10-7
10.1.2. Surface Soil RI Data Summary: SWMU 14 C-746-E Scrap Yard ... 10-8
10.1.3. Subsurface Soil Historical Data Summary: SWMU 14 C-746-E/E1 Scrap Yard ... 10-33
10.1.4. Subsurface Soil RI Data Summary: SWMU 14 C-746-E Scrap Yard ... 10-37
10.1.5. RGOs for SWMU 14 ... 10-57
10.1.6. Ecological Screening for SWMU 14 ... 10-65
10.2.1. Surface Soil Historical Data Summary: SWMU 518 Field South of P1 Yard ... 10-72
10.2.2. Surface Soil RI Data Summary: SWMU 518 Field South of P1 Yard ... 10-75
10.2.3. Subsurface Soil Historical Data Summary: SWMU 518 Field South of P1 Yard ... 10-81
10.2.4. RGOs for SWMU 518 ... 10-89
10.2.5. Ecological Screening for SWMU 518 ... 10-90
10.3.1. Surface Soil Historical Data Summary: SWMU 520 C-746-A Scrap Metal ... 10-94
10.3.2. Surface Soil RI Data Summary: SWMU 520 Scrap Material West of C-746-A ... 10-97
10.3.3. Subsurface Soil Historical Data Summary: SWMU 520 C-746-A Scrap Metal ... 10-110
10.3.4. Subsurface Soil RI Data Summary: SWMU 520 Scrap Material West of C-746-A ... 10-113
10.3.5. RGOs for SWMU 520 ... 10-124
10.3.6. Ecological Screening for SWMU 520 ... 10-126

11.2.1. Surface Soil Historical Data Summary: SWMUs 57/81 C-541-A PCB Staging Area and C-541 PCB Spill Site 11-8
11.2.2. Surface Soil RI Data Summary: SWMUs 57/81 C-541 PCB Spill Site 11-11
11.2.3. Subsurface Soil Historical Data Summary: SWMUs 57/81 C-541-A PCB Staging Area and C-541 PCB Spill Site 11-18
11.2.4. Subsurface Soil RI Data Summary: SWMUs 57/81 C-541-A PCB Staging Area and C-541 PCB Spill Site 11-20
11.2.5. RGOs for SWMUs 57 and 81 11-27
11.2.6. Ecological Screening for SWMU 57 and 81 11-28
11.3.1. Surface Soil Historical Data Summary: SWMU 153 C-331 PCB Soil Contamination (west) 11-33
11.3.2. Surface Soil RI Data Summary: SWMU 153 C-331 PCB Soil Contamination-West 11-34
11.3.3. Subsurface Soil Historical Data Summary: SWMU 153 C-331 PCB Soil Contamination (west) 11-40
11.3.4. Subsurface Soil RI Data Summary: SWMU 153 C-331 PCB Soil Contamination-West 11-41
11.3.5. RGOs for SWMU 153 11-48
11.3.6. Ecological Screening for SWMU 153 11-49
11.4.1. Surface Soil Historical Data Summary: SWMU 156 C-310 PCB Soil Contamination (west) 11-52
11.4.2. Surface Soil RI Data Summary: SWMU 156 C-310 PCB Soil Contamination-West 11-53
11.4.3. Subsurface Soil Historical Data Summary: SWMU 156 C-310 PCB Soil Contamination (west) 11-60
11.4.4. Subsurface Soil RI Data Summary: SWMU 156 C-310 PCB Soil Contamination-West 11-61
11.4.5. RGOs for SWMU 156 11-68
11.4.6. Ecological Screening for SWMU 156 11-69
11.5.1. Surface Soil Historical Data Summary: SWMU 160 C-745 Cylinder Yard (PCB Soils) Spoils 11-72
11.5.2. Surface Soil RI Data Summary: SWMU 160 C-745 Cylinder Yard Spoils-PCB Soils 11-73
11.5.3. Subsurface Soil Historical Data Summary: SWMU 160 C-745 Cylinder Yard (PCB Soils) Spoils 11-79
11.5.4. Subsurface Soil RI Data Summary: SWMU 160 C-745 Cylinder Yard Spoils-PCB Soils 11-80
11.5.5. RGOs for SWMU 160 11-87
11.5.6. Ecological Screening for SWMU 160 11-88
11.6.1. Surface Soil Historical Data Summary: SWMU 163 C-304 HVAC Piping System 11-91
11.6.2. Surface Soil RI Data Summary: SWMU 163 C-304 HVAC Piping System-Soil Backfill from C-611 11-94
11.6.3. Subsurface Soil Historical Data Summary: SWMU 163 C-304 HVAC Piping System 11-100
11.6.4. Subsurface Soil RI Data Summary: SWMU 163 C-304 HVAC Piping System-Soil Backfill from C-611 11-103
11.6.5. RGOs for SWMU 163 11-110
11.6.6. Ecological Screening for SWMU 163 11-110
11.7.1. Surface Soil RI Data Summary: SWMU 219 DMSA OS-08 11-114
11.7.2. Subsurface Soil RI Data Summary: SWMU 219 DMSA OS-08 11-120
11.7.3. RGOs for SWMU 219 11-127
11.7.4. Ecological Screening for SWMU 219 11-127
11.8.1. Surface Soil Historical Data Summary: SWMU 488 C-410 Trailers PCB Contamination Area 11-131
11.8.2. Surface Soil RI Data Summary: SWMU 488 PCB Contamination Area by the C-410 Trailer Complex 11-132

11.8.3. Subsurface Soil Historical Data Summary: SWMU 488 C-410 Trailers PCB Contamination Area 11-138
11.8.4. Subsurface Soil RI Data Summary: SWMU 488 PCB Contamination Area by the C-410 Trailer Complex 11-139
11.8.5. RGOs for SWMU 488 11-145
11.8.6. Ecological Screening for SWMU 488 11-145
12.2. Soils OU Constituents for the Groundwater Pathway and Properties 12-3
12.3. RGA Groundwater Modeling Results at the SWMU/AOC Boundary and Points of Exposure 12-4
12.4. Soils OU Future Industrial Worker Priority COCs (SWMUs/AOCs inside the Limited Area) 12-5
12.5. Soils OU Teen Recreational User Priority COCs (SWMUs/AOCs outside the Limited Area) 12-5
12.6. Summary of Direct Contact Total HI, Total ELCR, and Total Doses for the Soils OU SWMUs/AOCs by Grouping 12-6
12.7. Soils OU Ecological Risk by SWMU/AOC 12-9
12.8. Consolidated RGOs for the Soils OU SWMUs/AOCs 12-18

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FIGURES

1.1. Soils OU Paducah Soils Strategy ... 1-2
1.2. Location of SWMUs ... 1-10
3.1. Surface Water Features in the Vicinity of the DOE Site ... 3-2
3.2. PGDP Stratigraphic Sections ... 3-5
3.3. Water Table Trends in the Terrace Deposits South of the PGDP ... 3-8
3.4. Plot of Water Level Versus Well Screen for Upper Continental Recharge System Wells ... 3-9
3.5. Location of Trichloroethene Plume in Relation to Soils OU SWMUs ... 3-11
3.6. Location of Technetium-99 Plume in Relation to Soils OU SWMUs ... 3-12
3.7. RGA Monitoring Well Locations in Relation to Soils OU SWMUs ... 3-13
3.8. Example Stratigraphic and Hydrogeologic Units ... 3-15
4.1. Flowchart Depicting Application of Detect and Nondetect Flags ... 4-10
4.2. Exposure Point Concentration Calculation Scenarios ... 4-11
5.1. SWMU Locations and Features for Former Facilities ... 5-2
5.1.1. SWMU 1 Sample Locations – Surface Soil ... 5-9
5.1.2. SWMU 1 Background Exceedances – Surface Soil ... 5-10
5.1.3. SWMU 1 NAL Exceedances – Surface Soil ... 5-11
5.1.4. SWMU 1 Sample Locations – Subsurface Soil ... 5-18
5.1.5. SWMU 1 Background Exceedances – Subsurface Soil ... 5-19
5.1.6. SWMU 1 NAL Exceedances – Subsurface Soil ... 5-23
5.1.7. Summary of COCs Contributing to Risk to the Future Industrial Worker at SWMU 1 ... 5-35
5.2.1. SWMU 99B Sample Locations – Surface Soil ... 5-40
5.2.2. SWMU 99B Background Exceedances – Surface Soil ... 5-41
5.2.3. SWMU 99B NAL Exceedances – Surface Soil ... 5-42
5.2.4. SWMU 99B Sample Locations – Subsurface Soil ... 5-49
5.2.5. SWMU 99B Background Exceedances – Subsurface Soil ... 5-50
5.2.6. SWMU 99B NAL Exceedances – Subsurface Soil ... 5-51
5.3.1. SWMU 194 Gamma Walkover Survey ... 5-58
5.3.2. SWMU 194 Sample Locations – Surface Soil ... 5-64
5.3.3. SWMU 194 Background Exceedances – Surface Soil ... 5-65
5.3.4. SWMU 194 NAL Exceedances – Surface Soil ... 5-74
5.3.5. SWMU 194 Sample Locations – Subsurface Soil ... 5-87
5.3.6. SWMU 194 Background Exceedances – Subsurface Soil ... 5-88
5.3.7. SWMU 194 NAL Exceedances – Subsurface Soil ... 5-97
5.4.1. SWMU 196 Gamma Walkover Survey ... 5-122
5.4.2. SWMU 196 Sample Locations – Surface Soil ... 5-126
5.4.3. SWMU 196 Background Exceedances – Surface Soil ... 5-127
5.4.4. SWMU 196 NAL Exceedances – Surface Soil ... 5-128
5.4.5. SWMU 196 Sample Locations – Subsurface Soil ... 5-134
5.4.6. SWMU 1964 Background Exceedances – Subsurface Soil ... 5-135
5.4.7. SWMU 196 NAL Exceedances – Subsurface Soil ... 5-136
5.5.1. SWMU 489 Gamma Walkover Survey ... 5-143
5.5.2. SWMU 489 Sample Locations – Surface Soil ... 5-148
5.5.3. SWMU 489 Background Exceedances – Surface Soil ... 5-149
5.5.4. SWMU 489 NAL Exceedances – Surface Soil ... 5-150
5.5.5. SWMU 489 Sample Locations – Subsurface Soil ... 5-155
5.5.6. SWMU 498 Background Exceedances – Subsurface Soil ... 5-156
5.5.7 SWMU 498 NAL Exceedances – Subsurface Soil ... 5-157
5.6.1. SWMU 531 Gamma Walkover Survey ... 5-162

5.6.2. SWMU 531 Sample Locations – Surface Soil 5-165
5.6.3. SWMU 531 Background Exceedances – Surface Soil 5-166
5.6.4. SWMU 531 NAL Exceedances – Surface Soil 5-167
5.6.5. SWMU 531 Sample Locations – Subsurface Soil 5-172
5.6.6. SWMU 531 Background Exceedances – Subsurface Soil 5-173
5.6.7. SWMU 531 NAL Exceedances – Subsurface Soil 5-174
6.1. SWMU Locations and Features for Storage Areas 6-2
6.1.1. SWMU 200 Gamma Walkover Survey 6-5
6.1.2. SWMU 200 Sample Locations - Surface Soil 6-10
6.1.3. SWMU 200 Background Exceedances - Surface Soil 6-11
6.1.4. SWMU 200 NAL Exceedances - Surface Soil 6-14
6.1.5. SWMU 200 Sample Locations - Subsurface Soil 6-20
6.1.6. SWMU 200 Background Exceedances - Subsurface Soil 6-21
6.1.7. SWMU 200 NAL Exceedances - Subsurface Soil 6-23
6.2.1. SWMU 212 Gamma Walkover Survey 6-30
6.2.2. SWMU 212 Sample Locations - Surface Soil 6-36
6.2.3. SWMU 212 Background Exceedances - Surface Soil 6-37
6.2.4. SWMU 212 NAL Exceedances - Surface Soil 6-38
6.2.5. SWMU 212 Sample Locations - Subsurface Soil 6-45
6.2.6. SWMU 212 Background Exceedances - Subsurface Soil 6-46
6.2.7. SWMU 212 NAL Exceedances - Subsurface Soil 6-47
6.3.1. SWMU 213 Gamma Walkover Survey 6-54
6.3.2. SWMU 213 Sample Locations - Surface Soil 6-57
6.3.3. SWMU 213 Background Exceedances - Surface Soil 6-58
6.3.4. SWMU 213 NAL Exceedances - Surface Soil 6-59
6.3.5. SWMU 213 Sample Locations - Subsurface Soil 6-62
6.3.6. SWMU 213 Background Exceedances - Subsurface Soil 6-63
6.3.7. SWMU 213 NAL Exceedances - Subsurface Soil 6-64
6.4.1. SWMU 214 Gamma Walkover Survey 6-71
6.4.2. SWMU 214 Sample Locations - Surface Soil 6-74
6.4.3. SWMU 214 Background Exceedances - Surface Soil 6-75
6.4.4. SWMU 214 NAL Exceedances - Surface Soil 6-76
6.5.1. SWMU 215 Gamma Walkover Survey 6-82
6.5.2. SWMU 215 Sample Locations - Surface Soil 6-86
6.5.3. SWMU 215 Background Exceedances - Surface Soil 6-87
6.5.4. SWMU 215 NAL Exceedances - Surface Soil 6-88
6.5.5. SWMU 215 Sample Locations - Subsurface Soil 6-93
6.5.6. SWMU 215 Background Exceedances - Subsurface Soil 6-94
6.5.7. SWMU 215 NAL Exceedances - Subsurface Soil 6-95
6.6.1. SWMU 216 Gamma Walkover Survey 6-102
6.6.2. SWMU 216 Sample Locations - Surface Soil 6-106
6.6.3. SWMU 216 Background Exceedances - Surface Soil 6-107
6.6.4. SWMU 216 NAL Exceedances - Surface Soil 6-108
6.7.1. SWMU 217 Gamma Walkover Survey 6-116
6.7.2. SWMU 217 Sample Locations - Surface Soil 6-122
6.7.3. SWMU 217 Background Exceedances - Surface Soil 6-123
6.7.4. SWMU 217 NAL Exceedances - Surface Soil 6-126
6.7.5. SWMU 217 Sample Locations - Subsurface Soil 6-135
6.7.6. SWMU 217 Background Exceedances - Subsurface Soil 6-136
6.7.7. SWMU 217 NAL Exceedances - Subsurface Soil 6-139
6.8.1. SWMU 221 Gamma Walkover Survey 6-148

6.8.2. SWMU 221 Sample Locations - Surface Soil 6-152
6.8.3. SWMU 221 Background Exceedances - Surface Soil 6-153
6.8.4. SWMU 221 NAL Exceedances - Surface Soil 6-155
6.8.5. SWMU 221 Sample Locations - Subsurface Soil 6-160
6.8.6. SWMU 221 Background Exceedances - Subsurface Soil 6-161
6.8.7. SWMU 221 NAL Exceedances - Subsurface Soil 6-162
6.9.1. SWMU 222 Gamma Walkover Survey 6-169
6.9.2. SWMU 222 Sample Locations - Surface Soil 6-174
6.9.3. SWMU 222 Background Exceedances - Surface Soil 6-175
6.9.4. SWMU 222 NAL Exceedances - Surface Soil 6-176
6.9.5. SWMU 222 Sample Locations - Subsurface Soil 6-181
6.9.6. SWMU 222 Background Exceedances - Subsurface Soil 6-182
6.9.7. SWMU 222 NAL Exceedances - Subsurface Soil 6-183
6.10.1. SWMU 227 Gamma Walkover Survey 6-190
6.10.2. SWMU 227 Sample Locations - Surface Soil 6-196
6.10.3. SWMU 227 Background Exceedances - Surface Soil 6-197
6.10.4. SWMU 227 NAL Exceedances - Surface Soil 6-200
6.10.5. SWMU 227 Sample Locations - Subsurface Soil 6-210
6.10.6. SWMU 227 Background Exceedances - Subsurface Soil 6-211
6.10.7. SWMU 227 NAL Exceedances - Subsurface Soil 6-213
6.11.1. SWMU 228 Gamma Walkover Survey 6-222
6.11.2. SWMU 228 Sample Locations - Surface Soil 6-226
6.11.3. SWMU 228 Background Exceedances - Surface Soil 6-227
6.11.4. SWMU 228 NAL Exceedances - Surface Soil 6-228
6.11.5. SWMU 228 Sample Locations - Subsurface Soil 6-234
6.11.6. SWMU 228 Background Exceedances - Subsurface Soil 6-235
6.11.7. SWMU 228 NAL Exceedances - Subsurface Soil 6-236
7.1. SWMU Locations and Features for Underground/Tanks 7-2
7.1.1. SWMU 27 Gamma Walkover Survey 7-5
7.1.2. SWMU 27 Sample Locations - Subsurface Soil 7-7
7.1.3. SWMU 27 Background Exceedances - Subsurface Soil 7-11
7.1.4. SWMU 27 NAL Exceedances - Subsurface Soil 7-12
7.2.1. SWMU 76 Gamma Walkover Survey 7-15
7.2.2. SWMU 76 Sample Locations - Surface Soil 7-19
7.2.3. SWMU 76 Background Exceedances - Surface Soil 7-20
7.2.4. SWMU 76 NAL Exceedances - Surface Soil 7-21
7.2.5. SWMU 76 Sample Locations - Subsurface Soil 7-26
7.2.6. SWMU 76 Background Exceedances - Subsurface Soil 7-27
7.2.7. SWMU 76 NAL Exceedances - Subsurface Soil 7-28
7.3.1. SWMU 165 Gamma Walkover Survey 7-35
7.3.2. SWMU 165 Sample Locations - Surface Soil 7-41
7.3.3. SWMU 165 Background Exceedances - Surface Soil 7-42
7.3.4. SWMU 165 NAL Exceedances - Surface Soil 7-43
7.3.5. SWMU 165 Sample Locations - Subsurface Soil 7-51
7.3.6. SWMU 165 Background Exceedances - Subsurface Soil 7-52
7.3.7. SWMU 165 NAL Exceedances - Subsurface Soil 7-53
7.3.8. Summary of COCs Contributing to Risk to the Future Industrial Worker at SWMU 165 7-59
7.4.1. SWMU 170 Gamma Walkover Survey 7-61
7.4.2. SWMU 170 Sample Locations - Surface Soil 7-64
7.4.3. SWMU 170 Background Exceedances - Surface Soil 7-65
7.4.4. SWMU 170 NAL Exceedances - Surface Soil 7-66

7.4.5. SWMU 170 Sample Locations - Subsurface Soil 7-70
7.4.6. SWMU 170 Background Exceedances - Subsurface Soil 7-71
7.4.7. SWMU 170 NAL Exceedances - Subsurface Soil 7-72
8.1. SWMU Locations and Features for Chromium Areas 8-2
8.1.1. SWMU 158 Gamma Walkover Survey 8-5
8.1.2. SWMU 158 Sample Locations - Surface Soil 8-9
8.1.3. SWMU 158 Background Exceedances - Surface Soil 8-10
8.1.4. SWMU 158 NAL Exceedances - Surface Soil 8-11
8.1.5. SWMU 158 Sample Locations - Subsurface Soil 8-18
8.1.6. SWMU 158 Background Exceedances - Subsurface Soil 8-19
8.1.7. SWMU 158 NAL Exceedances - Subsurface Soil 8-20
8.2.1. SWMU 169 Gamma Walkover Survey 8-28
8.2.2. SWMU 169 Sample Locations - Surface Soil 8-32
8.2.3. SWMU 169 Background Exceedances - Surface Soil 8-33
8.2.4. SWMU 169 NAL Exceedances - Surface Soil 8-34
8.2.5. SWMU 169 Sample Locations - Subsurface Soil 8-41
8.2.6. SWMU 169 Background Exceedances - Subsurface Soil 8-42
8.2.7. SWMU 169 NAL Exceedances - Subsurface Soil 8-43
8.2.8. Summary of COCs Contributing to Risk to the Future Industrial Worker at SWMU 169 8-50
9.1. SWMU Locations and Features for Soil/Rubble Areas 9-2
9.1.1. SWMU 19 Gamma Walkover Survey 9-6
9.1.2. SWMU 19 Sample Locations – Surface Soil 9-8
9.1.3. SWMU 19 Background Exceedances – Surface Soil 9-9
9.1.4. SWMU 19 NAL Exceedances – Surface Soil 9-10
9.1.5. SWMU 19 Sample Locations – Subsurface Soil 9-15
9.1.6. SWMU 19 Background Exceedances – Subsurface Soil 9-16
9.1.7. SWMU 19 NAL Exceedances – Subsurface Soil 9-17
9.2.1. SWMU 138 Gamma Walkover Survey 9-23
9.2.2. SWMU 138 Sample Locations – Surface Soil 9-28
9.2.3. SWMU 138 Background Exceedances – Surface Soil 9-29
9.2.4. SWMU 138 NAL Exceedances – Surface Soil 9-33
9.2.5. SWMU 138 Sample Locations – Subsurface Soil 9-40
9.2.6. SWMU 138 Background Exceedances – Subsurface Soil 9-41
9.2.7. SWMU 138 NAL Exceedances – Subsurface Soil 9-45
9.3.1. SWMU 180 Gamma Walkover Survey 9-52
9.3.2. SWMU 180 Sample Locations – Surface Soil 9-56
9.3.3. SWMU 180 Background Exceedances – Surface Soil 9-57
9.3.4. SWMU 180 NAL Exceedances – Surface Soil 9-58
9.3.5. SWMU 180 Sample Locations – Subsurface Soil 9-65
9.3.6. SWMU 180 Background Exceedances – Subsurface Soil 9-66
9.3.7. SWMU 180 NAL Exceedances – Subsurface Soil 9-67
9.4.1. SWMU 181 Gamma Walkover Survey 9-76
9.4.2. SWMU 181 Sample Locations – Surface Soil 9-80
9.4.3. SWMU 181 Background Exceedances – Surface Soil 9-81
9.4.4. SWMU 181 NAL Exceedances – Surface Soil 9-82
9.4.5. SWMU 181 Sample Locations – Subsurface Soil 9-85
9.4.6. SWMU 181 Background Exceedances – Subsurface Soil 9-86
9.4.7. SWMU 181 NAL Exceedances – Subsurface Soil 9-87
9.5.1. SWMU 195 Gamma Walkover Survey 9-93
9.5.2. SWMU 195 Sample Locations – Surface Soil 9-97
9.5.3. SWMU 195 Background Exceedances – Surface Soil 9-98

9.5.4. SWMU 195 NAL Exceedances – Surface Soil 9-104
9.5.5. SWMU 195 Sample Locations- Subsurface Soil 9-112
9.5.6. SWMU 195 Background Exceedances – Subsurface Soil 9-113
9.5.7. SWMU 195 NAL Exceedances – Subsurface Soil 9-119
9.6.1. Surface Soil RI Data Summary: SWMU 486 Rubble Pile WKWMA 9-133
9.8.1. AOC 492 Gamma Walkover Survey 9-145
9.8.2. AOC 492 Sample Locations - Surface Soil 9-151
9.8.3. AOC 492 Background Exceedances - Surface Soil 9-152
9.8.4. AOC 492 NAL Exceedances - Surface Soil 9-153
9.8.5. AOC 492 Sample Locations - Subsurface Soil 9-158
9.8.6. AOC 492 Background Exceedances - Subsurface Soil 9-159
9.8.7. AOC 492 NAL Exceedances - Subsurface Soil 9-160
9.8.8. Summary of COCs Contributing to Risk to the Teen Recreator at AOC 492 9-165
9.9.1. SWMU 493 Gamma Walkover Survey 9-168
9.9.2. SWMU 493 Sample Locations - Surface Soil 9-175
9.9.3. SWMU 493 Background Exceedances - Surface Soil 9-176
9.9.4. SWMU 493 NAL Exceedances - Surface Soil 9-177
9.10.1. SWMU 517 Gamma Walkover Survey 9-184
9.10.2. SWMU 517 Sample Locations - Surface Soil 9-189
9.10.3. SWMU 517 Background Exceedances - Surface Soil 9-190
9.10.4. SWMU 517 NAL Exceedances - Surface Soil 9-191
9.11.1. AOC 541 Gamma Walkover Survey 9-197
9.11.2. AOC 541 Sample Locations - Surface Soil 9-202
9.11.3. AOC 541 Background Exceedances - Surface Soil 9-203
9.11.4. AOC 541 NAL Exceedances - Surface Soil 9-213
9.11.5. AOC 541 Sample Locations - Subsurface Soil 9-221
9.11.6. AOC 541 Background Exceedances - Subsurface Soil 9-222
9.11.7. AOC 541 NAL Exceedances - Subsurface Soil 9-223
9.11.8. Summary of COCs Contributing to Risk to the Teen Recreator at AOC 541 9-232
9.12.1. SWMU 561 Gamma Walkover Survey 9-234
9.12.2. SWMU 561 Sample Locations - Surface Soil 9-240
9.12.3. SWMU 561 Background Exceedances - Surface Soil 9-241
9.12.4. SWMU 561 NAL Exceedances - Surface Soil 9-258
9.12.5. SWMU 561 Sample Locations - Subsurface Soil 9-268
9.12.6. SWMU 561 Background Exceedances - Subsurface Soil 9-269
9.12.7. SWMU 561 NAL Exceedances - Subsurface Soil 9-273
9.12.8. Summary of COCs Contributing to Risk to the Teen Recreator at SWMU 561 9-284
9.13.1. AOC 562 Gamma Walkover Survey 9-286
9.13.2. AOC 562 Sample Locations - Surface Soil 9-291
9.13.3. AOC 562 Background Exceedances - Surface Soil 9-292
9.13.4. AOC 562 NAL Exceedances - Surface Soil 9-293
9.13.5. AOC 562 Sample Locations - Subsurface Soil 9-297
9.13.6. AOC 562 Background Exceedances - Subsurface Soil 9-298
9.13.7. AOC 562 NAL Exceedances - Subsurface Soil 9-299
9.13.8. Summary of COCs Contributing to Risk to the Teen Recreator at AOC 562 9-308
9.14.1. AOC 563 Gamma Walkover Survey 9-310
9.14.2. AOC 563 Sample Locations - Surface Soil 9-314
9.14.3. AOC 563 Background Exceedances - Surface Soil 9-315
9.14.4. SWMU 563 NAL Exceedances - Surface Soil 9-316
9.14.5. AOC 563 Sample Locations - Subsurface Soil 9-320
9.14.6. AOC 563 Background Exceedances - Subsurface Soil 9-321

9.14.7. AOC 563 NAL Exceedances - Subsurface Soil 9-322
9.15.1. AOC 564 Gamma Walkover Survey 9-328
9.15.2. AOC 564 Sample Locations - Surface Soil 9-332
9.15.3. AOC 564 Background Exceedances - Surface Soil 9-333
9.15.4. AOC 564 NAL Exceedances - Surface Soil 9-334
9.15.5. AOC 564 Sample Locations - Subsurface Soil 9-339
9.15.6. AOC 564 Background Exceedances - Subsurface Soil 9-340
9.15.7. AOC 564 NAL Exceedances - Subsurface Soil 9-341
9.16.1. AOC 567 Gamma Walkover Survey 9-348
9.16.2. AOC 567 Sample Locations – Surface Soil 9-352
9.16.3. AOC 567 Background Exceedance – Surface Soil 9-353
9.16.4. AOC 567 NAL Exceedances – Surface Soil 9-354
9.16.5. AOC 567 Sample Locations – Subsurface Soil 9-357
9.16.6. AOC 567 Background Exceedances – Subsurface Soil 9-358
9.16.7. AOC 567 NAL Exceedances – Subsurface Soil 9-359
10.1. SWMU Locations and Features for Scrap Yards 10-2
10.1.1. SWMU 14 Gamma Walkover Survey 10-5
10.1.2. SWMU 14 Sample Locations - Surface Soil 10-10
10.1.3. SWMU 14 Background Exceedances - Surface Soil 10-11
10.1.4. SWMU 14 NAL Exceedances - Surface Soil 10-22
10.1.5. SWMU 14 Sample Locations - Subsurface Soil 10-39
10.1.6. SWMU 14 Background Exceedances - Subsurface Soil 10-40
10.1.7. SWMU 14 NAL Exceedances - Subsurface Soil 10-48
10.1.8. Summary of COCs Contributing to Risk to the Future Industrial Worker at SWMU 14 10-69
10.2.1. SWMU 518 Gamma Walkover Survey 10-71
10.2.2. SWMU 518 Sample Locations - Surface Soil 10-76
10.2.3. SWMU 518 Background Exceedances - Surface Soil 10-77
10.2.4. SWMU 518 NAL Exceedances - Surface Soil 10-78
10.2.5. SWMU 518 Sample Locations - Subsurface Soil 10-84
10.2.6. SWMU 518 Background Exceedances - Subsurface Soil 10-85
10.2.7. SWMU 518 NAL Exceedances - Subsurface Soil 10-86
10.2.8. Summary of COCs Contributing to Risk to the Future Industrial Worker at SWMU 518 10-91
10.3.1. SWMU 520 Gamma Walkover Survey 10-93
10.3.2. SWMU 520 Sample Locations - Surface Soil 10-99
10.3.3. SWMU 520 Background Exceedances - Surface Soil 10-100
10.3.4. SWMU 520 NAL Exceedances - Surface Soil 10-104
10.3.5. SWMU 520 Sample Locations - Subsurface Soil 10-115
10.3.6. SWMU 520 Background Exceedances - Subsurface Soil 10-116
10.3.7. SWMU 520 NAL Exceedances - Subsurface Soil 10-119
11.1. SWMU Locations and Features for PCB Areas 11-2
11.2.1. SWMUs 57/81 Gamma Walkover Survey 11-6
11.2.2. SWMUs 57/81 Sample Locations - Surface Soil 11-13
11.2.3. SWMUs 57/81 Background Exceedances - Surface Soil 11-14
11.2.4. SWMUs 57/81 NAL Exceedances - Surface Soil 11-15
11.2.5. SWMUs 57/81 Sample Locations - Subsurface Soil 11-22
11.2.6. SWMUs 57/81 Background Exceedances - Subsurface Soil 11-23
11.2.7. SWMUs 57/81 NAL Exceedances - Subsurface Soil 11-24
11.2.8. Summary of COCs Contributing to Risk to the Future Industrial Worker at SWMUs 57/81 11-30
11.3.1. SWMU 153 Gamma Walkover Survey 11-32
11.3.2. SWMU 153 Sample Locations - Surface Soil 11-36

11.3.3. SWMU 153 Background Exceedances - Surface Soil 11-37
11.3.4. SWMU 153 NAL Exceedances - Surface Soil 11-38
11.3.5. SWMU 153 Sample Locations - Subsurface Soil 11-43
11.3.6. SWMU 153 Background Exceedances - Subsurface Soil 11-44
11.3.7. SWMU 153 NAL Exceedances - Subsurface Soil 11-45
11.4.1. SWMU 156 Gamma Walkover Survey 11-51
11.4.2. SWMU 156 Sample Locations - Surface Soil 11-55
11.4.3. SWMU 156 Background Exceedances - Surface Soil 11-56
11.4.4. SWMU 156 NAL Exceedances - Surface Soil 11-57
11.4.5. SWMU 156 Sample Locations - Subsurface Soil 11-63
11.4.6. SWMU 156 Background Exceedances - Subsurface Soil 11-64
11.4.7. SWMU 156 NAL Exceedances - Subsurface Soil 11-65
11.5.1. SWMU 160 Gamma Walkover Survey 11-71
11.5.2. SWMU 160 Sampling Locations – Surface Soil 11-75
11.5.3. SWMU 160 Background Exceedances - Surface Soil 11-76
11.5.4. SWMU 160 NAL Exceedances - Surface Soil 11-77
11.5.5. SWMU 160 Sample Locations - Subsurface Soil 11-82
11.5.6. SWMU 160 Background Exceedances - Subsurface Soil 11-83
11.5.7. SWMU 160 NAL Exceedances - Subsurface Soil 11-84
11.6.1. SWMU 163 Gamma Walkover Survey 11-90
11.6.2. SWMU 163 Sample Locations - Surface Soil 11-96
11.6.3. SWMU 163 Background Exceedances - Surface Soil 11-97
11.6.4. SWMU 163 NAL Exceedances - Surface Soil 11-98
11.6.5. SWMU 163 Sample Locations - Subsurface Soil 11-105
11.6.6. SWMU 163 Background Exceedances - Subsurface Soil 11-106
11.6.7. SWMU 163 NAL Exceedances - Subsurface Soil 11-107
11.7.1. SWMU 219 Gamma Walkover Survey 11-113
11.7.2. SWMU 219 Sample Locations - Surface Soil 11-116
11.7.3. SWMU 219 Background Exceedances - Surface Soil 11-117
11.7.4. SWMU 219 NAL Exceedances - Surface Soil 11-118
11.7.5. SWMU 219 Sample Locations - Subsurface Soil 11-122
11.7.6. SWMU 219 Background Exceedances - Subsurface Soil 11-123
11.7.7 SWMU 219 NAL Exceedances - Subsurface Soil 11-124
11.8.1. SWMU 488 Gamma Walkover Survey 11-130
11.8.2. SWMU 488 Sample Locations - Surface Soil 11-134
11.8.3. SWMU 488 Background Exceedances - Surface Soil 11-135
11.8.4. SWMU 488 NAL Exceedances - Surface Soil 11-136
11.8.5. SWMU 488 Sample Locations - Subsurface Soil 11-141
11.8.6. SWMU 488 Background Exceedances - Subsurface Soil 11-142
11.8.7. SWMU 488 NAL Exceedances - Subsurface Soil 11-143
12.1. Distribution of Mercury by Method and SWMU/AOC 12-16

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ACRONYMS

ACO	Administrative Consent Order
AL	action level
amsl	above mean sea level
AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
AT123D	Analytical Transient 1-,2-,3-Dimensional
BGOU	Burial Grounds Operable Unit
bgs	below ground surface
BHHRA	baseline human health risk assessment
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COC	contaminant of concern
COE	U.S. Army Corps of Engineers
COPC	chemical of potential concern
COPEC	contaminant of potential ecological concern
cpm	counts per minute
CSM	conceptual site model
CSOU	Comprehensive Site Operable Unit
D&D	decontamination and decommissioning
DAF	dilution attenuation factor
DCE	dichloroethene
DMSA	DOE Material Storage Area
DNAPL	dense nonaqueous-phase liquid
DOE	U.S. Department of Energy
DOECAP	DOE Consolidated Audit Program
DQO	data quality objective
DUF_6	depleted uranium hexafluoride
E/PP	excavation/penetration permit
EDD	electronic data deliverable
ELCR	excess lifetime cancer risk
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ER	environmental restoration
ESV	ecological screening values
EU	exposure unit
FFA	Federal Facility Agreement
FI/CR	Final Inventory/Characterization Report
FOE	frequency of exposure
FS	feasibility study
FSP	field sampling plan
GC/MS	gas chromatograph/mass spectrometer
GDP	gaseous diffusion plant
GPS	global positioning system
GWOU	Groundwater Operable Unit
GWS	gamma walkover survey
HF	hydrogen fluoride
HI	hazard index

HMW	high molecular weight
HQ	hazard quotient
HU	hydrogeologic unit
HVAC	heating, ventilation, and air-conditioning
ICP	inductively coupled plasma
KAR	*Kentucky Administrative Regulations*
KDEP	Kentucky Department for Environmental Protection
KDWM	Kentucky Division of Waste Management
KPDES	Kentucky Pollutant Discharge Elimination System
LCS	laboratory control sample
MARSSIM	Multi-Agency Radiological Survey and Site Investigation Manual
MCL	maximum contaminant level
MDA	minimum detectable activity
MDC	minimum detectable concentration
mrem	millirem
MS	matrix spike
MSA	method of standard additions
MSD	matrix spike duplicate
n/a	not applicable
NaI	sodium iodide
NAL	no action level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ncpm	negative counts per minute
ND	nondetect
NFA	no further action
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
NSDD	North-South Diversion Ditch
OREIS	Oak Ridge Environmental Information System
OS	outside
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PEMS	Project Environmental Measurements System
PGDP	Paducah Gaseous Diffusion Plant
POE	point of exposure
QA	quality assurance
QC	quality control
RAGS	Risk Assessment Guidance for Superfund
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RCW	recirculating cooling water
RG SSL	remedial guide soil screening level
RGA	Regional Gravel Aquifer
RGO	remedial goal option
RI	remedial investigation
RME	reasonable maximum exposure
ROD	Record of Decision
RPD	relative percent difference
SADA	Spatial Analysis and Decision Assistance
SAP	sampling and analysis plan

SAR	SWMU Assessment Report
SERA	screening-level ecological risk assessment
SESOIL	Seasonal Soil Compartment Model
SI	site investigation
SMO	Sample Management Office
SMP	Site Management Plan
SOP	standard operating procedure
SSL	soil screening level
SU	survey unit
SVOC	semivolatile organic compound
SWMU	solid waste management unit
SWOU	Surface Water Operable Unit
TAL	target analyte list
TCA	trichloroethane
TCE	trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TED	total effective dose
TSCA	Toxic Substances Control Act
TVA	Tennessee Valley Authority
UCL	upper confidence limit
UCRS	Upper Continental Recharge System
UF_4	uranium tetrafluoride
UF_6	uranium hexafluoride
USEC	United States Enrichment Corporation
USGS	U.S. Geological Survey
VOC	volatile organic compound
WAG	waste area grouping
WKWMA	West Kentucky Wildlife Management Area
XRF	X-ray fluorescence

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EXECUTIVE SUMMARY

The Paducah Gaseous Diffusion Plant (PGDP) is an active uranium enrichment facility that is owned by the U.S. Department of Energy (DOE). DOE is conducting environmental restoration activities at PGDP in accordance with the requirements of the Paducah Federal Facility Agreement (FFA), which coordinates Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation, and Liability Act cleanup requirements. PGDP was placed on the National Priorities List in 1994. DOE, the U.S. Environmental Protection Agency (EPA), and the Commonwealth of Kentucky (Kentucky) entered into an FFA in 1998 (EPA 1998).

This Remedial Investigation (RI) Report has been developed to present the results of the field investigation that was conducted in the summer of 2010 and to document the nature and extent of contamination, contaminant fate and transport, and risk characterization using data collected both during the summer of 2010 field effort and by historical investigations.

This RI Report was prepared following the outlines found in Appendix D of the FFA for PGDP (EPA 1998) and is consistent with the elements found in Appendix B of the Soils Operable Unit (OU) RI/Feasibility Study (FS) Work Plan (Work Plan) (DOE 2010a), but the outline format was modified to meet specific-project requirements.

The Soils OU solid waste management units (SWMUs) and areas of concern (AOCs) were divided into three groups, which are, in turn, divided into seven divisions. These groups are divisions of the SWMUs/AOCs developed with the agreement of the regulatory agencies during work plan development. Use of these divisions simplifies the reporting of RI results because the types and locations of contamination found at SWMUs/AOCs within each division are expected to be similar. The SWMUs/AOCs associated with the Soils OU are listed in Appendix 4 of the Paducah Site Management Plan (SMP) (DOE 2012a).

This report presents results of the RI for 50 of the 86 SWMUs/AOCs discussed in the Work Plan (DOE 2010a). The 50 SWMUs/AOCs addressed by this RI Report are listed in Table ES.1. The 37 SWMUs not included in this report are listed in Table ES.2. (Note: As a result of this RI, one SWMU, SWMU 99, was divided into two SWMUs, 99A and 99B. SWMU 99A, the cylinder yard portion, was moved to the Soils and Slabs OU, while SWMU 99B, the septic system/leach field portion, remains in this RI Report.)

The disposition of the 37 SWMUs not covered by this report is as follows:

- Twenty SWMUs were moved to the Soils and Slabs OU.

- Sixteen SWMUs were determined to require additional sampling results to delineate the extent of contamination and will be further investigated in a subsequent RI.

- A revised SWMU Assessment Report was submitted for SWMU 12, C-747-A UF_4 Drum Yard, documenting that the SWMU was the aboveground scrap metal that has been removed; therefore, SWMU 12 no longer exists and has been moved to a no further action status. The soils underneath the former SWMU 12 site are SWMU 7, which is part of Burial Grounds OU and will be addressed accordingly.

Table ES.1. SWMUs/AOCs Addressed in the Soils OU RI Report

SWMU/ AOC No.	Location	Description	Group/Division
1	C-747-C	Oil Landfarm	Group 1/Former Facility Site
14	C-746-E	Contaminated Scrap Yard	Group 3/Scrap Yard
19	C-410-B	HF Neutralization Lagoon	Group 2/Soil/Rubble Pile
27	C-722	Acid Neutralization Tank	Group 2/Underground/Tank
57*	C-541-A	PCB Waste Staging Area	Group 3/PCBs
76	C-632-B	Sulfuric Acid Storage Tank	Group 2/Underground/Tank
81*	C-541	PCB Spill Site	Group 3/PCBs
99B	C-745	Kellogg Building Site—Septic System	Group 1/Former Facility Site
138	C-100	Southside Berm	Group 2/Soil/Rubble Pile
153	C-331	PCB Soil Contamination (West)	Group 3/PCBs
156	C-310	PCB Soil Contamination (West Side)	Group 3/PCBs
158	C-720	Chilled Water System Leak Site	Group 2/Chromium Areas
160	C-745	Cylinder Yard Spoils (PCB soils)	Group 3/PCBs
163	C-304	Building/Heating, Ventilation, and Air Conditioning (HVAC) Piping System (Soil Backfill)	Group 3/PCBs
165	C-616-L	Pipeline & Vault Soil Contamination	Group 2/Underground/Tank
169	C-410-E	HF Vent Surge Protection Tank	Group 2/Chromium Area
170	C-729	Acetylene Building Drain Pits	Group 2/Underground/Tank
180	WKWMA	Outdoor Firing Range (WKWMA)	Group 2/Soil/Rubble Pile
181	West Side	Outdoor Firing Range (PGDP)	Group 2/Soil/Rubble Pile
194	DUF_6 Facility	McGraw Construction Facilities (Southside)	Group 1/Former Facility
195	SW PGDP	Curlee Road Contaminated Soil Mounds	Group 2/Soil/Rubble Pile
196	C-746-A	Septic System	Group 1/Former Facility
200	Central PGDP	Soil Contamination South of TSCA Waste Storage Facility	Group 1/Storage Area
212	C-745-A	Radiological Contamination Area	Group 1/Storage Area
213	C-745-A	Outside (OS)-02	Group 1/Storage Area
214	C-611	OS-03	Group 1/Storage Area
215	C-743	OS-04	Group 1/Storage Area
216	C-206	OS-05	Group 1/Storage Area
217	C-740	OS-06	Group 1/Storage Area
219	C-728	OS-08	Group 3/PCBs
221	C-635	OS-10	Group 1/Storage Area
222	C-410	OS-11	Group 1/Storage Area
227	C-746-B	OS-16	Group 1/Storage Area
228	C-747-B	OS-17	Group 1/Storage Area
486	West of PGDP	Rubble Pile WKWMA	Group 2/Soil/Rubble Pile
487	West of PGDP	Rubble Pile WKWMA	Group 2/Soil/Rubble Pile
488	C-410 Trailers	PCB Contamination Area by C-410 Trailer Complex	Group 3/PCBs
489	C-710 North	Septic Tank, North of C-710	Group 1/Former Facility
492	Outfall 011	Contaminated Soil Area, North of Outfall 10	Group 2/Soil/Rubble Pile
493	Outfall 001	Concrete Rubble Piles Near Outfall 001	Group 2/Soil/Rubble Pile
517	West of PGDP	Rubble and Debris Erosion Control Fill Area	Group 2/Soil/Rubble Pile
518	C-746-P1	Field south of C-746-P1 Clean Scrap Yard	Group 3/Scrap Yard

Table ES.1. SWMUs/AOCs Addressed in the Soils OU RI Report (Continued)

SWMU/ AOC No.	Location	Description	Group/Division
520	C-746-A	Scrap Material West of C-746-A	Group 3/Scrap Yard
531	C-746-A South	Aluminum Slag Reacting Area	Group 1/Former Facility
541	Outfall 011	Contaminated area by Outfall 011	Group 2/Soil/Rubble Pile
561	Near Outfall 002	Soil Pile I	Group 2/Soil/Rubble Pile
562	North of Soil Pile I, West of Little Bayou Creek	Soil Piles C, D, E, F, G, H, J, K, and P in Subunit 1	Group 2/Soil/Rubble Pile
563	North of Outfall 12, West of Little Bayou Creek	Soil Piles 20, CC, and BW in Subunit 4	Group 2/Soil/Rubble Pile
564	East of NSDD, North of P, S, and T Landfill	Soils Pile AT in Subunit 5	Group 2/Soil/Rubble Pile
567	Near Outfall 013 and west of Little Bayou Creek	Contaminated Soil Area K013	Group 2/Soil/Rubble Pile

DUF_6 = depleted uranium hexafluoride
HF = hydrogen fluoride
NSDD = North-South Diversion Ditch
PCB = polychlorinated biphenyl
PGDP = Paducah Gaseous Diffusion Plant
SW = southwest
TCE = trichloroethene
TSCA = Toxic Substances Control Act
WKWMA = West Kentucky Wildlife Management Area
* SWMU 57 is small in size and is located inside of SWMU 81; therefore, the data sets for SWMUs 57 and 81 have been merged for evaluation in the report.

Table ES.2. SWMUs/AOCs Not Addressed in this Soils OU RI Report

SWMU	Location	Description	Reason for Deferral
Soils and Slabs OU			
11	C-400 (SE)	C-400 TCE Leak Site	Concrete slab adjacent to active facility, located in area of groundwater remediation
20	C-410-E	Emergency Lagoon	Concrete slab
31	C-720	Compressor Pit Water Storage Tank	Concrete slab
32	C-720	C-728 Clean Waste Oil Tanks	Concrete dike
40	C-403	Neutralization Tank	Removal action deferred due to critical infrastructure in vicinity
75	C-633	PCB Spill Site	Inaccessible due to underground utilities adjacent to active transformer
78	C-420	PCB Spill Site	Asphalt surface
79	C-611	PCB Spill Site	Inaccessible due to underground utilities adjacent to active transformer and berm for water treatment lagoon
99A	C-745	Kellogg Building Site – Cylinder Yard	Active cylinder yard
135	C-333	PCB Soil Contamination	Asphalt surface adjacent to active facility
137	C-746-A	Inactive PCB Area	Concrete slab
154	C-331	PCB Soil Contamination (southeast)	Inaccessible due to underground utilities adjacent to active facility
155	C-333	PCB Soil Contamination (west)	Inaccessible due to underground utilities adjacent to active facility
172	C-726	Sandblasting Facility	Facility awaiting decontamination and decommissioning
176	C-331	Recirculating Water (RCW) Leak, Northwest Side	Inaccessible due to underground and above ground utilities adjacent to active facility
177	C-331	Leak on East Side	Inaccessible due to underground utilities adjacent to active facility
218	C-741	DMSA Outside (OS)-07	Concrete slab adjacent to active facility
220	C-409	DMSA OS-09	Concrete slab adjacent to active facility
223	C-301	DMSA OS-12	Concrete slab
483	C-603	C-603 Nitrogen Facility	Active facility
Subsequent RI			
13	C-746-P&P1	P&P1 Scrap Yards	Extent of surface soil undefined
15	C-746-C	C Scrap Yard	Extent undefined to the east
16	C-746-D	D Scrap Yard	Nature and extent undefined
26	C-400 to C-404	4 inches Underground Transfer Line	Extent of surface soil undefined
47	C-400	TCE Storage Tank Area	Extent undefined to the south and west
56	C-540-A	PCB Staging Area	To be evaluated with SWMU 80
74	C-340	Transformer Spill Site	Nature and extent undefined
77	C-634-B	Sulfuric Acid Storage Tank	Nature and extent undefined
80	C-540	PCB Spill Site	Vertical extent undefined, horizontal extent undefined south of road
204	Dyke Road	Historical Staging Area	Nature and extent undefined

Table ES.2. SWMUs/AOCs Not Addressed in this Soils OU RI Report (Continued)

SWMU	Location	Description	Reason for Deferral
Subsequent RI (Continued)			
211	C-720	TCE Spill Site Northwest	Extent undefined to the south and west
224	C-340	DMSA OS-13, empty drum storage	Extent undefined to the south, east, and west
225	C-533-1	DMSA OS-14, rail cars	Nature and extent undefined
226	C-745-B	DMSA OS-15	Extent undefined to the east and west
229	C-746-F	DMSA OS-18	Extent undefined to the south and east
565	North of C-611 Water Treatment Plant	Rubble Area K	Extent undefined to the north

DMSA = DOE Material Storage Area
PCB = polychlorinated biphenyl
SW = southwest
TCE = trichloroethene

PROJECT OBJECTIVES AND GOALS

The goals for the Soils OU RI/FS are consistent with those established in the Paducah FFA (EPA 1998) and the SMP (DOE 2012a) negotiated among DOE, EPA, and Kentucky. The primary objectives for the Soils OU presented in the SMP are to protect human health and the environment by taking actions necessary to prevent both on-site and off-site human exposure that presents an unacceptable risk and to implement actions that provide the greatest opportunities to achieve significant risk reduction before site closure.

The goals of this RI are as follows:

(1) Goal 1: Characterize Nature and Extent of Source Zone(s);
(2) Goal 2: Determine Surface and Subsurface Transport Mechanisms and Pathways;
(3) Goal 3: Complete a Baseline Risk Assessment for the Soils OU; and
(4) Goal 4: Support Evaluation of Remedial Alternatives.

The Work Plan (DOE 2010a) utilized a compilation of sampling information collected on and around PGDP ranging from 1988 to 2010. During development of the Work Plan, data existing at that time were evaluated relative to the data quality objectives defined in the Work Plan. The result of the evaluation was the identification of data gaps for each SWMU/AOC. The data collected during the summer of 2010 addressed those data gaps. Sampling results collected in the summer of 2010 and historical data of sufficient quality to meet data quality objectives, per the evaluation in the Work Plan (DOE 2010a), have been used in determining the nature and extent of contamination for each SWMU/AOC and have been used to model the effect the contamination may have on groundwater along with an assessment of potential risks and hazards posed by each SWMU/AOC using established EPA methodology.

This RI Report summarizes the results of the characterization of the sources at 50 of the SWMUs/AOCs, identifies SWMUs/AOCs with potential for migration from these impacted soils to groundwater or runoff to adjacent drainageways, and summarizes potential risks/hazards associated with the SWMUs/AOCs (Goals 1–3). These form the basis for supporting an evaluation of potential actions in an FS (Goal 4).

Soils OU SWMUs/AOCs are evaluated based on the criteria in the FFA for a reasonable maximum exposure for both current and future land use of 1E-6 or hazard index (HI) greater than 1.

CHARACTERIZE NATURE AND EXTENT OF SOURCE ZONE (GOAL 1)

The conceptual site model for the Soils OU SWMUs/AOCs represents no migration of contamination as the expected condition. The scenario that contaminants have impacted surface water and, through vertical infiltration in the soil, impacted the groundwater underlying these sources is unlikely.

The Soils OU includes a range of sites of different sizes, locations, and impacts for a range of historical activities all of which can affect potential current and future distribution of contamination. As noted from the SWMU/AOC descriptions, historical activities include spills, scrap yards, soil or rubble piles, PCB release sites, and impacts from a range of other discrete activities.

Collectively, analysis of the Soils OU SWMUs/AOCs indicates the presence of metals, organic compounds, and radionuclides above screening levels. Soil sampling results were compared to the appropriate no action levels (NALs) and background to identify the list of potential contaminants to be evaluated for the purposes of determining nature and extent of contamination. Consistent with the Work Plan, the horizontal and vertical extent were based on NALs for industrial workers (limited area), and teen recreator (outside the limited area). For naturally occurring constituents, delineation also is based on comparison with background. Chapters 5–11 summarize the characterization of these SWMUs/AOCs.

The prevalent contaminants are polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) [benzo(a)pyrene equivalents], uranium radioisotopes, and uranium.

The lateral extent of the contamination has been defined within the constraints of the approved Work Plan. Field data were used to assist in delineation. As per the approved Work Plan, extent was considered defined for these SWMUs/AOCs at the boundary of another SWMU or anthropogenic feature.

DETERMINE SURFACE AND SUBSURFACE TRANSPORT MECHANISMS AND PATHWAYS (GOAL 2)

Chapters 5–11 and Appendix C document the fate and transport modeling used in the evaluation of soil sources impacts on groundwater at SWMUs/AOCs investigated in this RI.

Some SWMUs/AOCs are adjacent to drainageways that have been characterized previously. Based upon the modeling performed as part of the Surface Water Site Investigation report for the outfalls and their associated internal ditches, no contaminants are migrating in surface water (dissolved or through sediment) from ditches to surrounding creeks at concentrations that may adversely impact human health (DOE 2008b).

The concentration at the source area is assumed to be higher than what would be found in the runoff; therefore, the concentration at the source area (direct contact) provides a conservative surrogate for the risks posed by the runoff. (i.e., the runoff would not pose a greater risk than the source area). Based upon the analysis that was performed on sources found within the SWMUs/AOCs, surface water is not expected to have a deleterious effect upon the integrator OUs.

Previous work has shown that the primary pathway for groundwater flow is vertical migration through the Upper Continental Recharge System (UCRS), followed by lateral migration in the Regional Gravel

Aquifer (RGA). Contaminated soil and groundwater could migrate to the points of exposure (POEs). The POEs evaluated were the RGA at the SWMU/AOC boundary, at DOE boundary, and at the discharge point (see Table ES.3 for groundwater results).

Impacts on groundwater in the RGA were evaluated for those soil constituents that had the potential to cause an exceedance of a primary drinking water standard [maximum contaminant level (MCL)] at the SWMU/AOC boundary.

Table ES.3. SESOIL and AT123D Maximum Predicted Groundwater Concentrations

SWMU/ AOC	Soil Constituents	MCL	RGA Groundwater Concentration at SWMU/AOC Boundary (Time to Reach Boundary)	RGA Groundwater Concentration at DOE Property Boundary (Time to Reach Boundary)	RGA Groundwater Concentration at Discharge Location[a] (Time to Reach Location)
14	Technetium-99	900 pCi/L[b]	1,700 pCi/L (38 years)	1,020 pCi/L (38 years)	339 pCi/L (45 years)
14	Chromium	Uranium, arsenic, Total PCBs, chromium (+3 or +6), and nickel do not reach the RGA in the 1,000-year SESOIL modeling period.			
14	Nickel				
81	Total PCBs				
81	Uranium				
165	Arsenic				
541	Total PCBs				
564	Arsenic				

[a] The discharge location is the location to which RGA groundwater discharges to surface water.
[b] 900 pCi/L is the value derived by EPA from the 4 mrem/yr MCL for technetium-99 (EPA 2002).

Because migration of uranium, arsenic, nickel, chromium, and PCBs is retarded in the UCRS, these constituents do not reach the RGA in the 1,000-year simulation period. Although it is anticipated that the chromium is present in its trivalent form at the site, it also was modeled as if the total chromium mass was in its hexavalent form to provide an estimate of the mobility of chromium that is unlikely to be exceeded. Neither form of chromium reached the RGA during the 1,000-year simulation period.

Based on the modeling results, technetium-99 present in soil at SWMU 14 has the potential to impact the RGA groundwater at the SWMU boundary at concentrations (1,700 pCi/L) that exceed 900 pCi/L. A review of the monitoring well and extraction well data does not show incremental impacts to the RGA technetium-99 plume from SWMU 14. The RGA technetium-99 plume is from the vicinity of C-400 without measured change as it passes by SWMU 14.

COMPLETE A BASELINE RISK ASSESSMENT FOR THE SOILS OU (GOAL 3)

PGDP is an industrial facility surrounded by a state-maintained wildlife refuge. The reasonably anticipated future use of the area within the current limited area (plant boundary) is expected to remain industrial, while outside the limited area is expected to be recreational. This expectation should be considered when using the risk information provided in the report to support risk management decision making.

The Baseline Human Health Risk Assessment (BHHRA) for the SWMUs/AOCs was based primarily on direct contact with soils (surface and/or subsurface) evaluated under a full range of reasonably anticipated and hypothetical current and future use reasonable maximum exposure (RME) scenarios.

For the Soils OU sites, there were five priority contaminants of concern (COCs) [priority COCs are identified as those COCs with excess lifetime cancer risk (ELCR) > 1E-04 or HI > 1, to highlight to risk managers the COCs driving Total ELCR or Total HI at the Soils OU SWMUs/AOCs] for the future industrial worker scenario or the teen recreational user scenario, as appropriate, based on results at one or more SWMUs/AOCs. Four of these—PCBs, PAHs [benzo(a)pyrene equivalents], uranium-235, and uranium-238—are associated with the highest Total ELCRs at most SWMUs/AOCs exceeding ELCR > 1E-04. The fifth priority COC is uranium, based on a chemical-specific HI > 1 for the future industrial worker scenario. Ten SWMUs/AOCs (1, 14, 81, 165, 169, 492, 518, 541, 561, and 562) considered to have the highest potential risk (e.g., Total ELCR greater than 1E-04) are illustrated in Chapters 5–11, as appropriate. These illustrations show a summary of COCs contributing to risk for the appropriate scenario (i.e., future industrial worker or teen recreational user, as appropriate).

Dose Assessment

- The dose assessment performed for the surface soil identified two SWMUs/AOCs with total dose estimates above 100 mrem/yr for hypothetical residential scenarios (SWMU 14 and AOC 541). The primary contributor to the dose was uranium-238, which exceeded the 25 mrem/yr reference level defined in the Risk Methods Document for each of these SWMUs/AOCs for the residential scenarios (DOE 2011a).

- Uranium-238 also exceeded the 25 mrem/yr reference level defined in the Risk Methods Document for residential scenarios at SWMUs/AOCs 492, 561, and 562, although the total dose was below 100 mrem/yr.

- Each of the SWMUs/AOCs identified with a dose that exceeds the reference level defined in the Risk Methods Document for residential scenarios also showed Total ELCR greater than 1E-06 for future industrial workers.

SCREENING ECOLOGICAL RISK ASSESSMENT

The comparison of maximum concentrations in surface soils to ecological screening levels for the Soils OU SWMUs/AOCs identifies the chemicals of interest, but does not accurately reflect to the limited habitat, SWMU/AOC size, or other factors that may provide risk managers with a framework to prioritize these issues. This screening-level ecological risk assessment will be used in the sitewide ecological Baseline Risk Assessment. The following observations are made for the information as summarized.

Primary Risk Drivers

- Total PCBs. The maximum PCB concentration was greater than 10 times the ecological screening values (ESVs) of 0.02 mg/kg at 28 SWMUs/AOCs. These SWMUs/AOCs have a combined area of about 78 acres. The largest of these is SWMU 194 (41.7 acres). Runoff from this SWMU discharges to Outfall 017. The maximum concentration of PCBs at these 28 SWMUs/AOCs was 370 mg/kg at SWMU 81. There is uncertainty when using field data because PCBs were not detected in some areas. The ESV is 0.02 mg/kg, which is well below the detection limit for field screening, therefore, the risk may be overstated, since one-half the detection limit is used for non-detected constituents.

- Uranium. The maximum uranium concentration was above 10 times the ESV of 5 mg/kg (background is 4.9 mg/kg) at 8 SWMUs/AOCs representing a combined area of 19 acres. The highest concentration was 20,200 mg/kg at AOC 541 (2 acres, soil/grass and trees near drainageway).

Other Chemicals of Potential Ecological Concern/Uncertainties

- Metals. As indicated in the Data Quality Analysis, there may be uncertainties when using X-ray fluorescence data to estimate risks, particularly when comparing with conservative screening values. Two metals (mercury and selenium) show exceedances of the ESVs at numerous SWMUs/AOCs.

SUPPORT EVALUATION OF REMEDIAL ALTERNATIVES (GOAL 4)

The representative data set used for the Soils OU SWMUs/AOCs is sufficient to support the evaluation of remedial alternatives in the FS. Other information was gathered in support of the evaluation of remedial alternatives to include infrastructure issues, extent of contamination, and verification of site descriptions. Discussion of possible remedial technologies applicable for these SWMUs/AOCs is located in the SWMU/AOC-specific sections along with impacts on or by other integrator OUs.

Remedial goal options (RGOs) were calculated for each COC as determined by the conclusions of the BHHRA. These RGOs should not be interpreted as being cleanup goals, but as risk-based values that may be used to guide the development of cleanup goals by risk managers. Cleanup goals will be determined in later decision documents. COCs and RGOs for direct contact are presented for the future industrial worker, excavation worker, and hypothetical future resident for the SWMUs inside the limited area and for the outdoor worker (exposed to surface soil), excavation worker, hypothetical future resident, and teen recreator for the SWMUs/AOCs outside the limited area.

CONCLUSIONS

Following are the major contaminant distribution findings for the 50 SWMUs investigated in the Soils OU RI.

- The BHHRA completed as part of the Soils OU RI indicates that the cumulative ELCR benchmark of 1E-06 is exceeded at 49 SWMUs/AOCs; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), an FS is appropriate to address impacted media at each of these SWMUs/AOCs (DOE 2010a).

- Five priority COCs based on a chemical-specific ELCR > 1E-04 or chemical-specific hazard quotient (HQ) >1 were identified based on results at one or more SWMUs/AOCs. Four of these—PCBs, PAHs [benzo(a)pyrene equivalents], uranium-235, and uranium-238—are associated with the highest total ELCRs at the most SWMUs/AOCs. The fifth priority COC is uranium, based on a chemical-specific HI > 1.

- SWMU 27 is being recommended for no further action due to a Total ELCR < 1E-6 and Total HI < 1.0 for the outdoor worker (exposed to surface and subsurface soils) scenario. This SWMU was not evaluated for the future industrial worker scenario because there are no surface soil data available.

The risk levels associated with contamination at the identified 49 SWMUs/AOCs meet the criteria to be further evaluated in an FS. Consistent with the FFA, an FS will be developed to evaluate remedial action alternatives to mitigate the potential risks and hazards to human health and the environment and address the potential migration of contaminants from source areas to surface water and groundwater for the 49 Soils OU SWMUs/AOCs that were evaluated in this RI Report.

UNCERTAINTIES/ASSUMPTIONS

The Work Plan identified data gaps on a SWMU-by-SWMU basis that needed to be filled to proceed with the FS. The Work Plan was implemented to reduce any remaining uncertainties from previous investigations regarding the nature of the source zone, extent of the source zone and secondary sources, surface transport mechanisms, and to support evaluation of remedial technologies in the FS.

Nature of the Source Zone

For the SWMUs/AOCs in this RI Report, the available historical documentation and soil characterization data are sufficient relative to chemical and physical properties of soil to screen technology types and to conduct detailed alternative analysis for the Soils OU. However, the RI identified several uncertainties that may affect the feasibility study. The potential impact of these source zone uncertainties on alternatives analysis will be documented, as necessary, and evaluated further in the FS (see Section 4.1 for examples). Additional uncertainty exists for Soils OU SWMUs/AOCs because of the higher detection limits for the field data used in the risk assessment, which is further discussed in Appendix B.

Many of the SWMUs/AOCs have been investigated previously. The Soils OU RI uses a combination of historical and current analytical results of soil and groundwater from the area of each SWMU/AOC. The results of previous investigations and the 2010 RI sampling document and confirm the presence of metals, organic compounds, and radionuclides in the Soils OU areas. The associated samples were collected and analyzed over several previous investigations, as well as the Soils OU RI, using several methods. Quality control/quality assurance practices at PGDP, now and previously, limit the uncertainty associated with the sampling and analysis process. Nevertheless, changes have occurred to analytical methods that limit the strict comparison of data (e.g., laboratory reporting limits have varied over time). In some cases, analytical method detection limits are above screening criteria, such as the future industrial worker NAL.

Extent of the Source Zone and Secondary Sources

Up to two contingency step-outs were allowed by the Work Plan (DOE 2010a). The RI investigated extent of contamination from ground surface to 10 ft below ground surface (bgs) or up to 16 ft bgs at infrastructure (e.g., pipelines) (DOE 2012a). Uncertainties associated with horizontal and vertical extent will be managed in the FS. Sampling did not identify any secondary sources of groundwater contamination from the Soils OU SWMUs/AOCs, such as potential dense nonaqueous-phase liquid (DNAPL) source zones. Remedial alternatives to address secondary sources, such as DNAPL at C-400, identified as parts of other projects (e.g., Groundwater OU) will be evaluated as part of those projects.

Surface and Subsurface Transport Mechanisms

Contaminated soil and groundwater could migrate to the POEs via a groundwater pathway. The POEs evaluated were at the SWMU/AOC, and in the wildlife management area (Figure ES.1). Previous work has shown that the primary pathway for groundwater flow and the site-related contaminants is vertical migration through the UCRS, followed by lateral migration in the RGA. Not all SWMUs/AOCs have transport pathways to all of the POEs.

There are pipelines in the proximity of some of the SWMUs/AOCs. These pipelines could act as pathways for contaminant transport. Their presence was accounted for in developing the sampling strategies for each SWMU/AOC; therefore, uncertainty about any contaminant transport along these pipelines has been minimized.

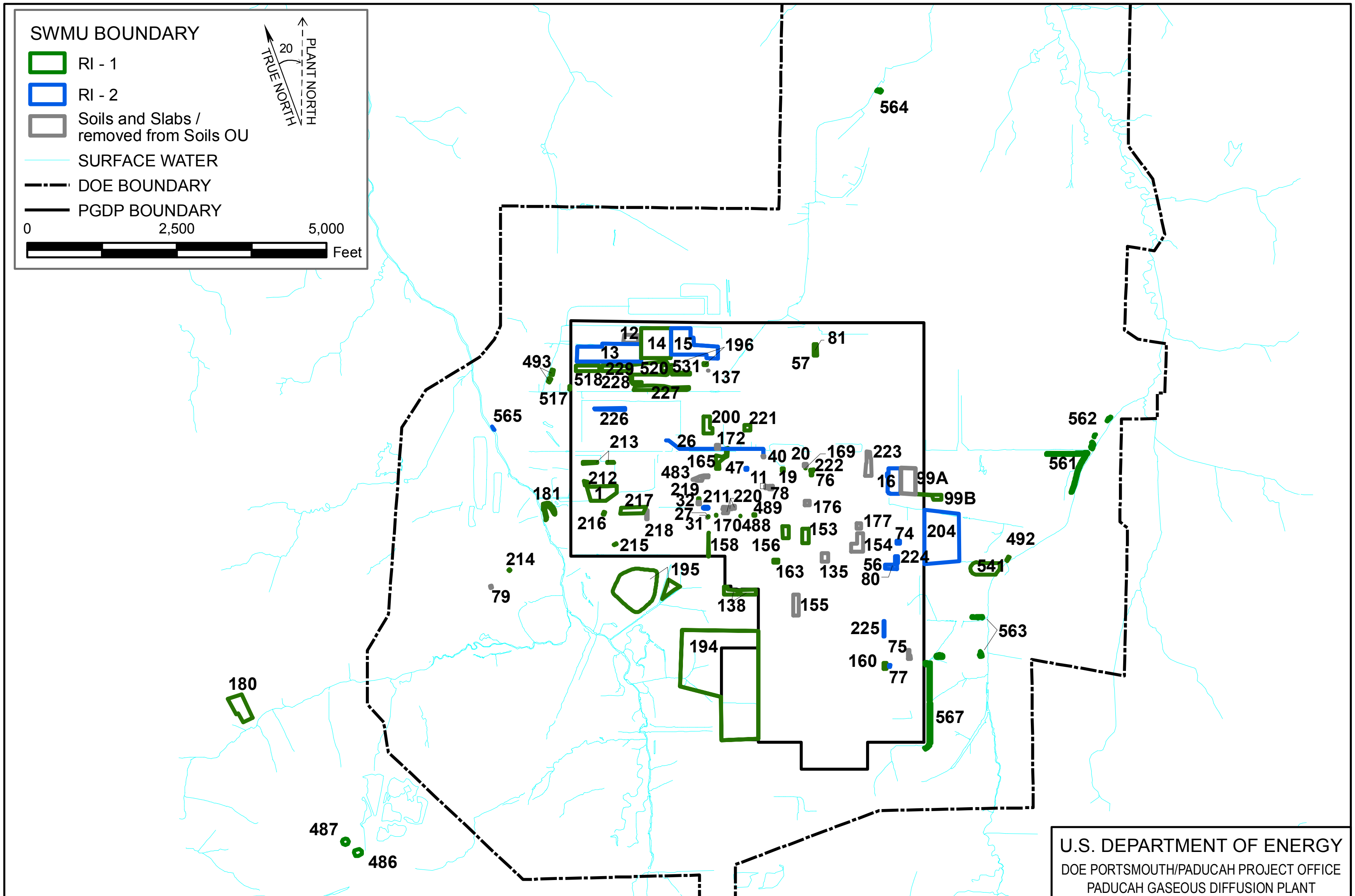

Figure ES.1. Location of Soils OU SWMUs/AOCs

LATA Environmental Services of Kentucky, LLC

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1. INTRODUCTION

The Paducah Gaseous Diffusion Plant (PGDP), located within the Jackson Purchase region of western Kentucky, is an active uranium enrichment complex that is owned by the U.S. Department of Energy (DOE). On July 1, 1993, the United States Enrichment Corporation (USEC) assumed management and operation of the PGDP enrichment complex under a lease agreement with DOE. DOE, however, still owns the enrichment complex and is responsible for environmental restoration (ER) activities associated with legacy operation of PGDP (CERCLIS #KY8-890-008-982). DOE is the lead agency for response actions, and the U.S. Environmental Protection Agency (EPA) and the Kentucky Department for Environmental Protection (KDEP) have regulatory oversight responsibilities.

In 1988, off-site groundwater contamination was detected in groundwater wells north of PGDP. Consequently, DOE and EPA Region 4 entered into an Administrative Consent Order (ACO) under Sections 104 and 106 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In 1994, PGDP was placed on the National Priorities List (NPL), a list of sites designated by EPA as having the highest priority for site remediation. Additionally, Section 120 of CERCLA requires federally owned NPL sites to enter into a Federal Facility Agreement (FFA) (EPA 1998). An FFA was finalized among DOE, EPA, and the Commonwealth of Kentucky (Kentucky) in 1998.

Source units and areas of contamination at PGDP have been combined into operable units (OUs) for evaluation of remedial actions. These OUs include the Surface Water OU (SWOU), the Burial Grounds OU (BGOU), the Soils OU, the Groundwater OU (GWOU), and the Decontamination and Decommissioning (D&D) OU. Each OU is designed to remediate contaminated media and/or facilities associated with PGDP. After completion of these activities, the Comprehensive Site OU (CSOU) evaluation will be conducted, with implementation of additional actions, as needed, to ensure long-term protectiveness.

The Soils OU is being implemented in a phased approach [i.e., pre-gaseous diffusion plant (GDP) shutdown and Soils and Slabs OU post-GDP shutdown] consisting of remedial and removal actions to accomplish the following goals:

- Prevent human exposure to contamination presenting an unacceptable risk;
- Prevent or minimize further off-site migration; and
- Reduce, control, or minimize contaminated soil hot spots contributing to off-site contamination.

Additionally, the phased approach allows the site to use information gained in earlier phases of the cleanup to refine and implement subsequent cleanup objectives and actions in support of final cleanup status. Slabs, subsurface structures, and underlying soils left after completing D&D of the operating GDP, will be addressed in subsequent actions. Figure 1.1, adapted from the Site Management Plan (SMP) (DOE 2012a), illustrates the phases and accomplishments of the Soils OU.

The Soils OU Remedial Investigation (RI)/Feasibility Study (FS) Work Plan (Work Plan) contained 86 solid waste management units (SWMUs)/areas of concern (AOCs) (DOE 2010a). This report presents results of the RI for 50 of the 86 SWMUs/AOCs discussed in the Work Plan. The 50 SWMUs/AOCs addressed by this RI Report are shown in Table 1.1. The 37 SWMUs not included in this report are listed in Table 1.2. (Note: As a result of this RI, one SWMU, SWMU 99, was divided into two SWMUs, 99A and 99B. SWMU 99A, the cylinder yard portion, was moved to the Soils and Slabs OU, while SWMU 99B, the septic system/leach field portion, remains in this RI Report.)

The disposition of the 37 SWMUs not covered by this report is as follows:

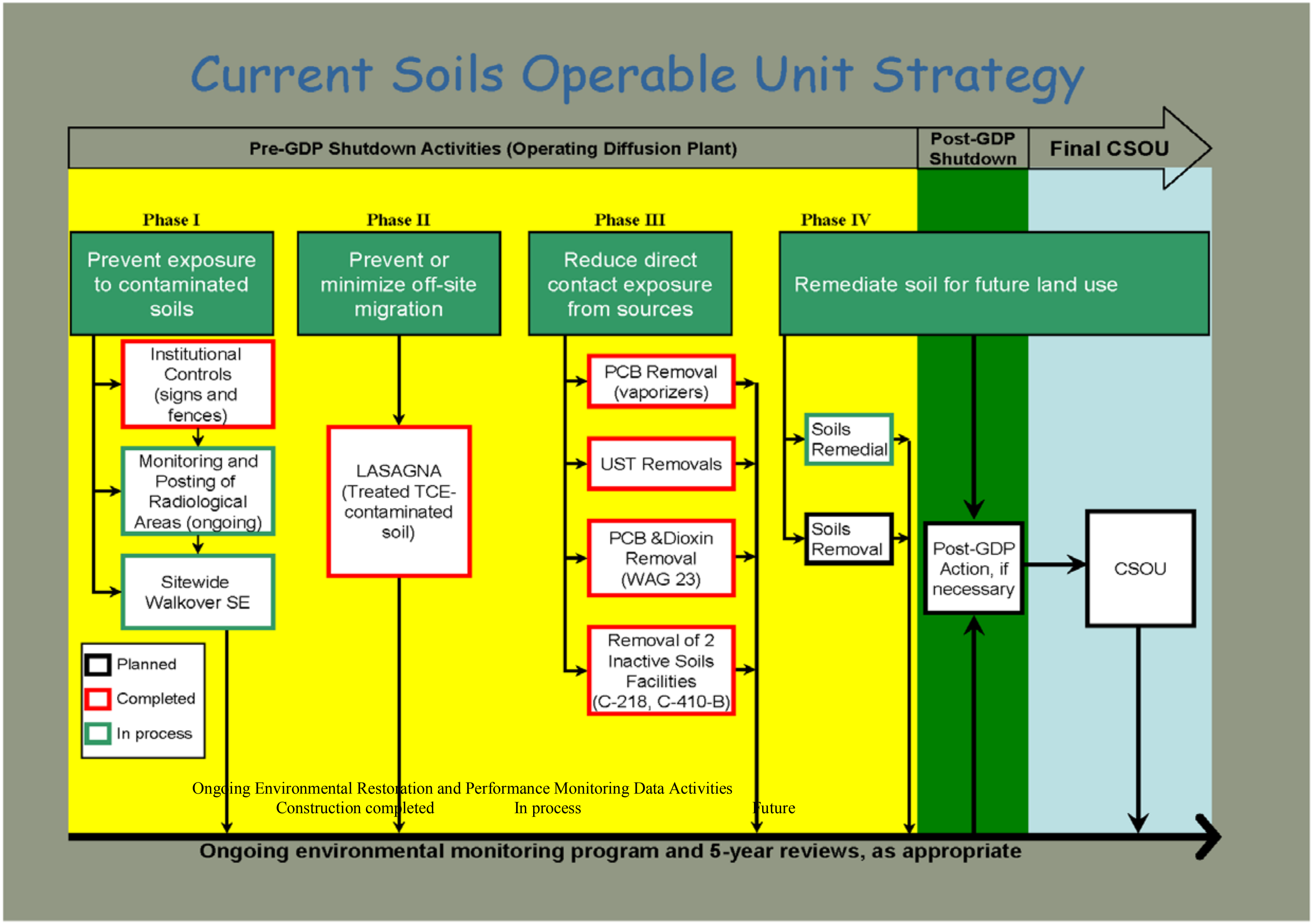

Figure 1.1. Soils OU Paducah Soils Strategy

- Twenty SWMUs were moved to the Soils and Slabs OU.

- Sixteen SWMUs were determined to require additional sampling results to delineate the extent of contamination and will be further investigated in a subsequent RI.

- A revised SWMU Assessment Report (SAR) was submitted for SWMU 12, C-747-A UF_4 Drum Yard, documenting that the SWMU was the aboveground scrap metal that has been removed; therefore, SWMU 12 no longer exists and has been moved to a no further action status. The soils underneath the former SWMU 12 site are SWMU 7, which is part of Burial Grounds OU and will be addressed accordingly.

Table 1.1. SWMUs/AOCs Addressed in the Soils OU RI Report

SWMU/ AOC No.	Location	Description	Group/Division
1	C-747-C	Oil Landfarm	Group 1/Former Facility Site
14	C-746-E	Contaminated Scrap Yard	Group 3/Scrap Yard
19	C-410-B	HF Neutralization Lagoon	Group 2/Soil/Rubble Pile
27	C-722	Acid Neutralization Tank	Group 2/Underground/Tank
57*	C-541-A	PCB Waste Staging Area	Group 3/PCBs
76	C-632-B	Sulfuric Acid Storage Tank	Group 2/Underground/Tank
81*	C-541	PCB Spill Site	Group 3/PCBs
99B	C-745	Kellogg Building Site—Septic System	Group 1/Former Facility Site
138	C-100	Southside Berm	Group 2/Soil/Rubble Pile
153	C-331	PCB Soil Contamination (West)	Group 3/PCBs
156	C-310	PCB Soil Contamination (West Side)	Group 3/PCBs
158	C-720	Chilled Water System Leak Site	Group 2/Chromium Areas
160	C-745	Cylinder Yard Spoils (PCB soils)	Group 3/PCBs
163	C-304	Building/Heating, Ventilation, and Air Conditioning (HVAC) Piping System (Soil Backfill)	Group 3/PCBs
165	C-616-L	Pipeline & Vault Soil Contamination	Group 2/Underground/Tank
169	C-410-E	HF Vent Surge Protection Tank	Group 2/Chromium Area
170	C-729	Acetylene Building Drain Pits	Group 2/Underground/Tank
180	WKWMA	Outdoor Firing Range (WKWMA)	Group 2/Soil/Rubble Pile
181	West Side	Outdoor Firing Range (PGDP)	Group 2/Soil/Rubble Pile
194	DUF_6 Facility	McGraw Construction Facilities (Southside)	Group 1/Former Facility
195	SW PGDP	Curlee Road Contaminated Soil Mounds	Group 2/Soil/Rubble Pile
196	C-746-A	Septic System	Group 1/Former Facility
200	Central PGDP	Soil Contamination South of TSCA Waste Storage Facility	Group 1/Storage Area
212	C-745-A	Radiological Contamination Area	Group 1/Storage Area
213	C-745-A	Outside (OS)-02	Group 1/Storage Area
214	C-611	OS-03	Group 1/Storage Area
215	C-743	OS-04	Group 1/Storage Area
216	C-206	OS-05	Group 1/Storage Area
217	C-740	OS-06	Group 1/Storage Area
219	C-728	OS-08	Group 3/PCBs
221	C-635	OS-10	Group 1/Storage Area
222	C-410	OS-11	Group 1/Storage Area

Table 1.1. SWMUs/AOCs Addressed in the Soils OU RI Report (Continued)

SWMU/ AOC No.	Location	Description	Group/Division
227	C-746-B	OS-16	Group 1/Storage Area
228	C-747-B	OS-17	Group 1/Storage Area
486	West of PGDP	Rubble Pile WKWMA	Group 2/Soil/Rubble Pile
487	West of PGDP	Rubble Pile WKWMA	Group 2/Soil/Rubble Pile
488	C-410 Trailers	PCB Contamination Area by C-410 Trailer Complex	Group 3/PCBs
489	C-710 North	Septic Tank, North of C-710	Group 1/Former Facility
492	Outfall 011	Contaminated Soil Area, North of Outfall 10	Group 2/Soil/Rubble Pile
493	Outfall 001	Concrete Rubble Piles Near Outfall 001	Group 2/Soil/Rubble Pile
517	West of PGDP	Rubble and Debris Erosion Control Fill Area	Group 2/Soil/Rubble Pile
518	C-746-P1	Field south of C-746-P1 Clean Scrap Yard	Group 3/Scrap Yard
520	C-746-A	Scrap Material West of C-746-A	Group 3/Scrap Yard
531	C-746-A South	Aluminum Slag Reacting Area	Group 1/Former Facility
541	Outfall 011	Contaminated area by Outfall 011	Group 2/Soil/Rubble Pile
561	Near Outfall 002	Soil Pile I	Group 2/Soil/Rubble Pile
562	North of Soil Pile I, West of Little Bayou Creek	Soil Piles C, D, E, F, G, H, J, K, and P in subunit 1 north of Soil Pile I on the west bank of Little Bayou Creek.	Group 2/Soil/Rubble Pile
563	North of Outfall 12, West of Little Bayou Creek	Soil Piles 20, CC, and BW in subunit 4 north of outfall 012 west of Little Bayou Creek	Group 2/Soil/Rubble Pile
564	East of NSDD, North of P, S, and T Landfill	Soils Pile AT in Subunit 5	Group 2/Soil/Rubble Pile
567	Near Outfall 013 and west of Little Bayou Creek	Contaminated Soil Area K013	Group 2/Soil/Rubble Pile

DUF_6 = depleted uranium hexafluoride
HF = hydrogen fluoride
NSDD = North-South Diversion Ditch
PCB = polychlorinated biphenyl
PGDP = Paducah Gaseous Diffusion Plant
SW = southwest
TCE = trichloroethene
TSCA = Toxic Substances Control Act
WKWMA = West Kentucky Wildlife Management Area

* SWMU 57 is small in size and is located inside of SWMU 81; therefore, the data sets for SWMUs 57 and 81 have been merged for evaluation in the report.

Table 1.2. SWMUs/AOCs Not Addressed in this Soils OU RI Report

SWMU	Location	Description	Reason for Deferral
Soils and Slabs OU			
11	C-400 (SE)	C-400 TCE Leak Site	Concrete slab adjacent to active facility, located in area of groundwater remediation
20	C-410-E	Emergency Lagoon	Concrete slab
31	C-720	Compressor Pit Water Storage Tank	Concrete slab
32	C-720	C-728 Clean Waste Oil Tanks	Concrete dike
40	C-403	Neutralization Tank	Removal action deferred due to critical infrastructure in vicinity
75	C-633	PCB Spill Site	Inaccessible due to underground utilities adjacent to active transformer

Table 1.2. SWMUs/AOCs Not Addressed in this Soils OU RI Report (Continued)

SWMU	Location	Description	Reason for Deferral
Soils and Slabs OU (Continued)			
78	C-420	PCB Spill Site	Asphalt surface
79	C-611	PCB Spill Site	Inaccessible due to underground utilities adjacent to active transformer and berm for water treatment lagoon
99A	C-745	Kellogg Building Site–Cylinder Yard	Active cylinder yard
135	C-333	PCB Soil Contamination	Asphalt surface adjacent to active facility
137	C-746-A	Inactive PCB Area	Concrete slab
154	C-331	PCB Soil Contamination (southeast)	Inaccessible due to underground utilities adjacent to active facility
155	C-333	PCB Soil Contamination (west)	Inaccessible due to underground utilities adjacent to active facility
172	C-726	Sandblasting Facility	Facility awaiting decontamination and decommissioning
176	C-331	Recirculating Water (RCW) Leak, Northwest Side	Inaccessible due to underground and above ground utilities adjacent to active facility
177	C-331	Leak on East Side	Inaccessible due to underground utilities adjacent to active facility
218	C-741	DMSA Outside (OS)-07	Concrete slab adjacent to active facility
220	C-409	DMSA OS-09	Concrete slab adjacent to active facility
223	C-301	DMSA OS-12	Concrete slab
483	C-603	C-603 Nitrogen Facility	Active facility
Subsequent RI			
13	C-746-P&P1	P&P1 Scrap Yards	Extent of surface soil undefined
15	C-746-C	C Scrap Yard	Extent undefined to the east
16	C-746-D	D Scrap Yard	Nature and extent undefined
26	C-400 to C-404	4 inches Underground Transfer Line	Extent of surface soil undefined
47	C-400	TCE Storage Tank Area	Extent undefined to the south and west
56	C-540-A	PCB Staging Area	To be evaluated with SWMU 80
74	C-340	Transformer Spill Site	Nature and extent undefined
77	C-634-B	Sulfuric Acid Storage Tank	Nature and extent undefined
80	C-540	PCB Spill Site	Vertical extent undefined, horizontal extent undefined south of road
204	Dyke Road	Historical Staging Area	Nature and extent undefined
211	C-720	TCE Spill Site Northwest	Extent undefined to the south and west
224	C-340	DMSA OS-13, empty drum storage	Extent undefined to the south, east, and west
225	C-533-1	DMSA OS-14, rail cars	Nature and extent undefined
226	C-745-B	DMSA OS-15	Extent undefined to the east and west
229	C-746-F	DMSA OS-18	Extent undefined to the south and east
565	North of C-611 Water Treatment Plant	Rubble Area K	Extent undefined to the north

DMSA = DOE Material Storage Area
PCB = polychlorinated biphenyl
SE = southeast
TCE = trichloroethene

1.1 PURPOSE OF REPORT

The Soils OU RI followed the investigation outlined in the Work Plan (DOE 2010a). This report documents the results of the RI, Baseline Human Health Risk Assessment (BHHRA), and Screening Ecological Risk Assessment (SERA) for 50 SWMUs/AOCs.

The work plan utilized the data quality objective (DQO) process as a planning tool to assist in the identification of environmental problems and to define the data collection process needed to support decisions.

The problem statement developed through the DQO process and documented in the Work Plan follows:

> Past releases from the PGDP may have resulted in the contamination of soil found at the SWMUs and AOCs. The nature and extent of contamination has not been adequately defined, nor is it known whether these potential contaminants pose unacceptable risks to current and reasonably anticipated future receptors under some exposure scenarios.

The goals of the RI are (1) characterize nature and extent of source zone; (2) determine surface and subsurface transport mechanisms and pathways; (3) complete a baseline risk assessment for the Soils OU; and (4) support evaluation of remedial alternatives. These goals are listed in Table 1.3.

Recommended remedial action objectives (RAOs) will be presented in the forthcoming FS.

Table 1.3. Goals, Decisions, and Questions Identified for the Soils OU RI

GOAL 1: CHARACTERIZE NATURE AND EXTENT OF SOURCE ZONE
Decisions and questions
1-1: What are the suspected contaminants?
1-2: What are the plant processes that could have contributed to the contamination? When and over what duration did releases occur?
1-3: What are the concentrations and activities at the source?
1-4: What is the area and volume of the source zone? What is the vertical and lateral extent of contamination?
1-5: What are the chemical and physical properties of associated material at the source areas?
1-6: What are the past, current, and potential future migratory paths?
GOAL 2: DETERMINE SURFACE AND SUBSURFACE TRANSPORT MECHANISMS AND PATHWAYS
2-1: What are the contaminant migration trends?
2-2: What are the effects of underground pipelines and plant operations on migration pathways including ditches?
2-3: What are the physical and chemical properties of the formations and subsurface matrices?
GOAL 3: COMPLETE A BASELINE RISK ASSESSMENT FOR THE SOILS OU
3-1: Where do the contaminant concentrations exceed no action levels?
3-2: Are isolated areas of contamination present or is contamination general?
3-3: What are the contaminants of concern (COCs) that define the contamination?
3-4: What are the no action levels?
3-5: Are SWMUs/AOCs within the Soils OU similar enough to be addressed in the same manner?

Table 1.3. Goals, Decisions, and Questions Identified for the Soils OU RI (Continued)

GOAL 4: SUPPORT EVALUATION OF REMEDIAL ALTERNATIVES
4-1: What are the possible remedial technologies applicable for this unit?
4-2: What are the physical and chemical properties of media to be remediated?
4-3: Are cultural impediments present?
4-4: What is the extent of contamination (geologic limitations presented by the source zone)?
4-5: What would be the impact of action on and by other sources?
4-6: What would the impact of an action at the source be on the integrator units[1]?
4-7: What are stakeholders' perceptions of contamination at or migrating from source zone?

Table from Work Plan (DOE 2010a).

1.2 PROJECT SCOPE

This Soils OU RI is focused on 50 SWMUs/AOCs listed in Table 1.1 and the areas immediately surrounding them to determine if the SWMUs/AOCs pose a risk to human health or the environment. As stated in the SMP, a primary objective for this project is to contribute to the protection of on-site workers and off-site residents by addressing sources of soil contamination (DOE 2012a).

The scope of the Soils OU includes potential contaminant migration pathways from the soil to surface water and groundwater, but does not include sampling either the surface water or groundwater. Also, the scope of the Soils OU does not include any drainage ditches bounding the Soils OU SWMUs/AOCs. These ditches are components of the SWOU. The GWOU will address dissolved-phase groundwater contamination in the Regional Gravel Aquifer (RGA) beneath the Soils OU SWMUs/AOCs. The secondary sources of groundwater contamination that are derived from the burial grounds or deep subsurface soil are within the scope of the BGOU or the CSOU. DOE integrates the natural resource damage assessment values into the CERCLA process. As such, it is the expectation that the sampling data generated by this RI, in addition to the historical data available, will be sufficient to support the natural resourced damage assessment process.

The DQO process was used to focus the sampling strategy on SWMU/AOC-specific media, contamination, and migration pathways, and identify data needs. Data collected during the Soils OU RI, together with historical data presented in the Work Plan (DOE 2010a), met project DQOs and were used to determine nature and extent.

The following list summarizes the activities that were conducted as part of the RI (not all activities were performed at each SWMU/AOC because of specific circumstances at the different SWMUs/AOCs):

- Collection of surface soil and subsurface soil samples;
- Analysis of the samples by the field laboratory [X-ray fluorescence (XRF) and polychlorinated biphenyl (PCB) test kits] and analysis of 10% of those by a fixed-base laboratory;
- Gamma walkover survey with judgmental grab sample for radiological constituents, if necessary;
- Evaluation of nature and extent of contamination based on collected RI samples and historical samples;
- Modeling of contaminant fate and transport and estimation of future exposure point concentrations; and

- Determination of ecological and human health risks associated with each site.

  - For the on-site industrial worker, if the SWMU was inside the PGDP security fence;

  - For the teenage recreational land user and for the wildlife area worker, if the SWMU/AOC was outside the PGDP security fence; or

  - Residential scenarios were assessed consistent with the Risk Methods Document (DOE 2011a).

Consistent with the Work Plan, the nature and extent of shallow surface soils (0–1 ft bgs) and deep surface soils (1–4 ft bgs) and subsurface soil (4–10 ft bgs) within the Soils OU SWMUs/AOCs are included in this RI.

To address uncertainties identified in the Soils OU, the observational approach was used in the design of the sampling strategy for the Soils OU RI/FS. The key concepts are as follows:

- The RI strategy is based on a specified "most probable site condition," which, for the Soils OU RI/FS, assumes that contamination is limited to surface and near surface soil (0–4 ft bgs) and potentially is impacting human health and welfare or the environment adversely.

- Reasonable deviations from the most probable site condition are identified. One reasonable deviation for the Soils OU RI/FS is that no contamination is impacting human health and welfare or the environment adversely. Other reasonable deviations would be that contamination has migrated to depths greater than 4 ft bgs, but still within the Soils OU bound of 10 ft bgs (16 ft bgs at pipelines) and to either the SWOU or GWOU. Site conditions should not differ significantly from the postulated conditions shown in the conceptual models, described in Chapter 3.

- Site assessment factors were identified for observation to detect contamination. These factors included sensory observation of contamination (sight and smell), field screening, field analyses with portable instruments, geophysical surveys, historical data evaluation, and laboratory analysis of samples.

- The Field Sampling Plan (FSP) included a contingency plan to address deviations from the most probable site conditions.

This RI field effort provided information to fill data gaps indentified for each SWMU/AOC. Data were screened against significant chemicals of potential concern (COPCs) listed in the *Methods for Conducting Risk Assessments and Risk Evaluations at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, Volume 1: Human Health, Volume 2: Ecological* (DOE 2011a; DOE 2010b). Significant COPCs for the PGDP are listed in Table 1.4.

1.3 SOILS OU SWMU/AOC EVALUATION

The scope of the Soils OU includes an RI, BHHRA, SERA, evaluation of remedial alternatives, remedy selection, and implementation of actions (i.e., excavation, radiological postings), as necessary, for protection of human health and the environment for the SWMUs/AOCs listed in Table 1.1. Figure 1.2 shows the location of these SWMUs/AOCs.

Project uncertainties that could affect the scope and schedule include the amount and scope of RI characterization needed (e.g., field samples, borings) and whether additional actions beyond remediation

Table 1.4. Significant Chemicals of Potential Concern at the PGDP[1]

Inorganic Chemicals		Organic Compounds		Radionuclides	
Analyte	**CAS Number**	**Analyte**	**CAS Number**	**Analyte**	**CAS Number**
Aluminum	7429905	Acenaphthene	83329	Americium-241	14596102
Antimony	7440360	Acenaphthylene	208968	Cesium-137+D	10045973
Arsenic	7440382	Acrylonitrile	107131	Cobalt-60	10198400
Barium	7440393	Anthracene	120127	Neptunium-237+D	13994202
Beryllium	7440417	Benzene	71432	Plutonium-238	13981163
Boron	7440428	Carbazole	86748	Plutonium-239	15117483
Cadmium	7440439	Carbon tetrachloride	56235	Plutonium-240	14119336
Chromium III	16065831	Chloroform	67663	Technetium-99	14133767
Chromium VI	18540299	1,1-Dichloroethene	75354	Thorium-230	14269637
Cobalt	7440484	1,2-Dichloroethene (mixed)	540590	Uranium-234	13966295
Copper	7440508	*trans*-1,2-Dichloroethene	156605	Uranium-235+D	15117961
Iron	7439896	*cis*-1,2-Dichloroethene	156592	Uranium-238+D	7440611
Lead	7439921	Dieldrin	60571		
Manganese	7439965	Ethylbenzene	100414		
Mercury	7439976	Fluoranthene	206440		
Molybdenum	7439987	Fluorene	86737		
Nickel	7440020	Hexachlorobenzene	118741		
Selenium	7782492	Naphthalene	91203		
Silver	7440224	2-Nitroaniline	88744		
Thallium	7440280	N-Nitroso-di-n-propylamine	621647		
Uranium	NA	Phenanthrene	85018		
Vanadium	7440622	Pyrene	129000		
Zinc	7440666	Tetrachloroethene	127184		
		Trichloroethene	79016		
		Total Dioxins/Furans	1746016		
		2,3,7,8-HpCDD	37871004		
		2,3,7,8-HpCDF	38998753		
		2,3,7,8-HxCDD	34465468		
		2,3,7,8-HxCDF	55684941		
		OCDD	3268879		
		OCDF	39001020		
		2,3,7,8-PeCDD	36088229		
		1,2,3,7,8-PeCDF	57117416		
		2,3,4,7,8-PeCDF	57117314		
		2,3,7,8-TCDD	1746016		
		2,3,7,8-TCDF	5127319		
		Total PAHs	50328		
		Benz(a)anthracene	56553		
		Benzo(a)pyrene	50328		
		Benzo(b)fluoranthene	205992		
		Benzo(k)fluoranthene	207089		
		Chrysene	218019		
		Dibenz(a,h)anthracene	53703		
		Indeno(1,2,3-cd)pyrene	193395		
		Total PCBs	1336363		
		Aroclor 1016	12674112		
		Aroclor 1221	11104282		
		Aroclor 1232	11141165		
		Aroclor 1242	53469219		
		Aroclor 1248	12672296		
		Aroclor 1254	11097691		
		Aroclor 1260	11096825		
		Vinyl chloride	75014		
		Xylenes (Mixture)	1330207		
		p-Xylene	106423		
		m-Xylene	108383		
		o-Xylene	95476		

CAS = Chemical Abstract Service

[1] This list of chemicals, compounds, and radionuclides was compiled from COPCs retained as COCs in baseline risk assessments performed at PGDP between 1990 and 2008 (DOE 2011a). This table differs from Table 1.1 of the Work Plan (DOE 2010a) to be consistent with the updated Risk Methods Document (DOE 2011a).

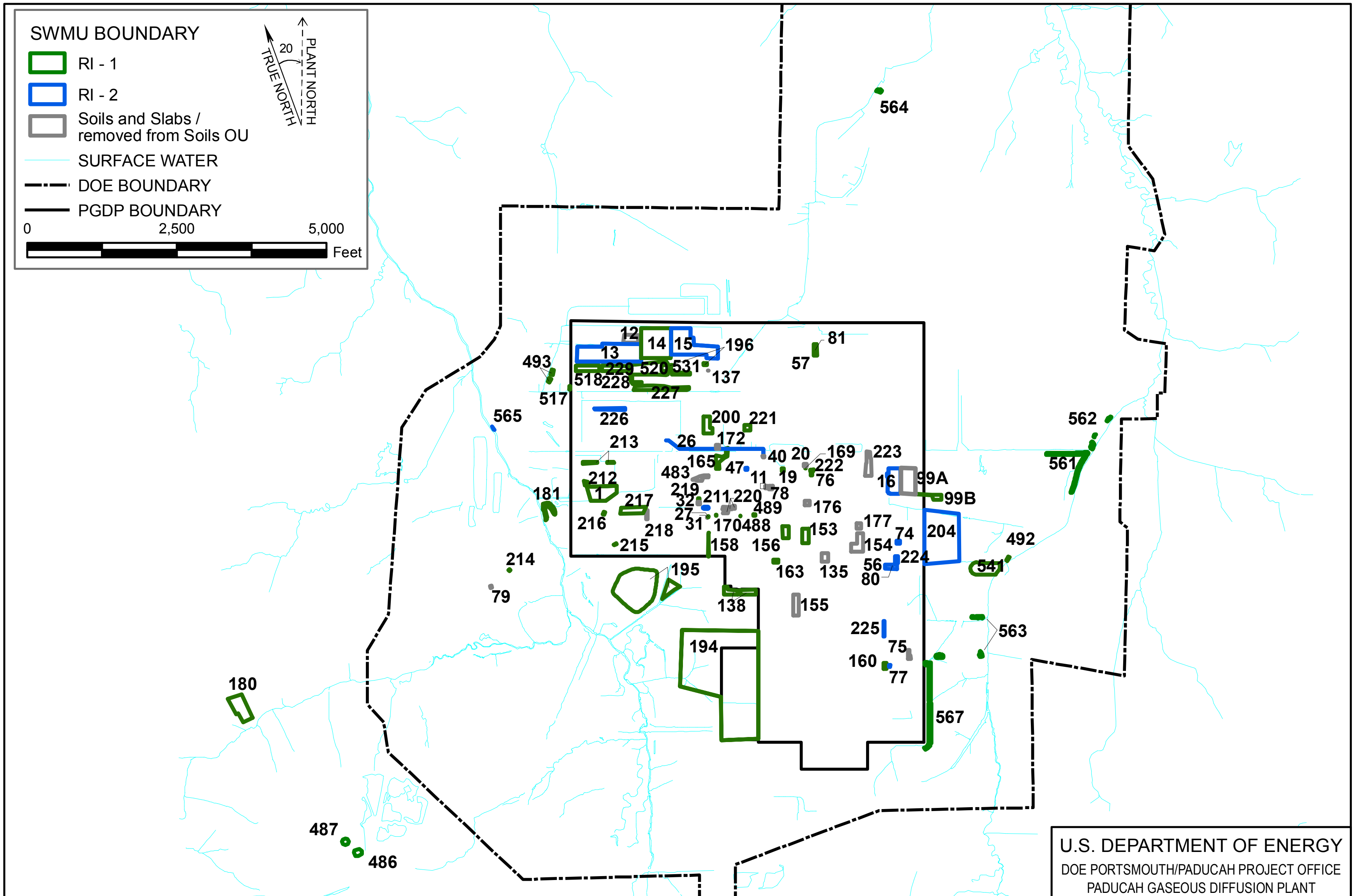

Figure 1.2. Location of SWMUs

6/26/2012 SoilsOU\RI Report\RI D2\01-02AllSWMUsbyRI.mxd will be required. The FFA parties agreed to a planning date for a D1 Record of Decision (ROD) of August 14, 2014.

One objective of this investigation is to determine the nature and extent of contamination in the soils to a depth of 10 ft bgs or up to 16 ft bgs at infrastructure (e.g., pipelines). For all source units, the initial focus of the investigation was surface and subsurface soil contamination to a depth of 4 ft bgs. If contamination at 4 ft bgs is found, then the subsurface soil to a depth of 10 ft bgs will be investigated. Any contamination that is found to extend past the depths specified in this investigation will be addressed by the BGOU, GWOU, or the CSOU after GDP shutdown, as appropriate. If a SWMU/AOC has a pipeline located within its boundary, then sampling will occur to a depth of 1 ft below the invert of the pipeline.

If interim remedial or removal actions are implemented at any of the SWMUs/AOCs addressed in this RI before the development of a final remedy, they will be consistent with the anticipated final action for the Soils OU and will contribute to the final remediation of the site. Remedial alternatives will be screened at the time the RAOs for the Soils OU are developed.

1.4 PROJECT SCHEDULE

Table 1.5 provides a planning schedule for the Soils OU. This schedule is an estimate for planning and is included here for informational purposes only and is not intended to establish enforceable schedules or milestones. Enforceable milestones are contained in Appendix C of the FFA or Appendix 5 of the SMP (DOE 2012a).

Table 1.5. Project Schedule for Soils OU RI and FS[1]

Activity	Milestone
Issue D1 RI Report	July 19, 2011
Issue D1 Feasibility Study	December 28, 2012
Issue D1 Proposed Plan	December 25, 2013
Issue D1 Removal Action Completion Report	October 5, 2016

[1] These are general planning dates for submittal of the CERCLA decision documents. Any extensions will impact the schedule. This schedule is included in this document for information purposes only and is not intended to establish enforceable schedules or milestones. Enforceable milestones, if any, will be established in the FFA or SMP and will be updated in accordance with Sections XXIX and/or XXXIX of the FFA.

1.5 REPORT ORGANIZATION

This RI report was prepared following the guidance found in Appendix D of the FFA for PGDP (EPA 1998), and is consistent with the elements found in Appendix B of the Work Plan, but was modified to meet specific project requirements.

Chapter 1—Introduction
Chapter 2—Study Area Investigation
Chapter 3—Physical Characteristics of the Study Area
Chapter 4—Evaluation Approach
Chapter 5—Group 1, Former Facility Areas
Chapter 6—Group 1, Storage Areas
Chapter 7—Group 2, Underground Tanks
Chapter 8—Group 2, Chromium Areas

Chapter 9—Group 2, Soil/Rubble Areas
Chapter 10—Group 3, Scrapyards
Chapter 11—Group 3, PCB Areas

Each of the Chapters 5–11 is divided into the following sections:

- Background
- Fieldwork Summary
- Nature and Extent of Contamination—Surface Soils
- Nature and Extent of Contamination—Subsurface Soils
- Fate and Transport
- Baseline Risk Assessment
- Summary
- Conclusions

Chapter 12—Conclusions for the Soils OU RI
Chapter 13—References

Additionally, the following appendices are included to support the information presented in the text.

Appendix A—Technical Memorandum for Field Activities
Appendix B—Data Quality Analysis
Appendix C—Fate and Transport Modeling
Appendix D—Baseline Human Health Risk Assessment
Appendix E—Screening Ecological Risk Assessment
Appendix F—Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered Guidance
Appendix G—Analytical Data (CD)

The SWMUs/AOCs were divided into seven divisions, which are, in turn, arranged into three groups. Each of the SWMUs/AOCs is listed along with the associated group and division in Table 1.23. These groups were the outcome of an agreement of the regulatory agencies during work plan development. Use of these divisions simplifies the reporting of RI results because the types and locations of contamination found at SWMUs within each division are expected to be similar.

2. STUDY AREA INVESTIGATION

This section includes descriptions of field activities associated with site characterization of the Soils OU, which was conducted in accordance with the approved Work Plan (DOE 2010a). A technical memorandum documenting details of field activities is included in Appendix A.

2.1 SOIL INVESTIGATIONS

When the Work Plan was being developed, the sampling information collected at and around PGDP over the course of the last several years was compiled and a searchable database of soil analytical results was included in Appendix B of the Work Plan (DOE 2010a) on a compact disk. Historic data was compiled from the resources listed in Table 2.1.

A review of historic data for each of the Soils OU SWMUs/AOCs was used to determine the following:

- SWMU/AOC COPCs,
- Extent and quality of existing data, and
- Sufficiency of data to support an FS for remedial options.

Where data were absent or insufficient to characterize the nature and extent of contamination and to support remedy selection, specific data gaps were identified. These data gaps were the basis for additional sampling. Contamination has been defined as concentrations exceeding background or any detected concentration if instrument reporting limits are higher than background values. Sampling for each SWMU/AOC included a gamma radiological walkover and grid-based composite sampling unless otherwise noted.

At SWMUs/AOCs for which additional sampling was performed, one five-point composite over each 45-ft grid was collected for surface soils (0–1 ft bgs) and one for shallow subsurface soils (1–4 ft bgs). Unless otherwise noted, one grab sample was collected from the center of each grid with four additional grab samples collected 15 ft from the center point in each cardinal direction (north, south, east, and west) to make up the five-point composite. On alternating grids, grab samples were collected from the center of the grid and four additional grab samples collected 15 ft from the center point in each secondary direction (northeast, northwest, southeast, southwest) to make up the five-point composite.

Soil samples were collected generally from 0–1 ft, 1–4 ft, and up to 16 ft bgs at pipelines in order to identify potential contaminant migration and exposure pathways, as directed by the Work Plan (DOE 2010a). Soil samples then were analyzed by the field laboratory to determine if contingency samples were needed by comparing the field laboratory results to the project action levels listed in Table 2.2, which is from the Work Plan. The project action levels were developed as a benchmark for contingency sampling only. Additional depth (4–7 ft and 7–10 ft bgs) and/or horizontal extent (step-out grid) sampling was required if the field laboratory results exceeded these levels. Locations of these soil samples are shown in figures for each SWMU/AOC, along with summary tables of data in Chapters 5–11 of this RI Report. A list of SWMUs sampled, acreage, and the associated number of collected samples is found in Table 2.3.

Table 2.1. Summary of Historical Information[1]

Year	Reference	Title	SWMUs/AOCs
1991	CH2M HILL 1991	Results of the Site Investigation, Phase I	1, 14, 27, 57, 81, 99B,
1992	Clausen et al. 1992	Groundwater Phase III Investigation	99B
1992	CH2M HILL 1992	Results of the Site Investigation, Phase II	1, 14, 19, 27, 57, 81, 99B
1993	DOE 1993	Interim Corrective Measure Work Plan for Containment of Scrap Yard Sediment Runoff	14
1994	DOE 1994a	RFI Work Plan for Waste Area Group 13 at the Paducah Gaseous Diffusion Plant	138
1994	DOE 1994b	Interim Corrective Measures Report & Operation and Maintenance Plan for Containment of Scrap Yard Sediment Runoff at the PGDP	14
1994	KDEP 1994	Waste Area Group 13 and 6 Reprioritization and Special Requests	138
1995	DOE 1995a	Northeast Plume Preliminary Characterization Summary Report	99B, 194
1995	DOE 1995b	Treatability Study Report for Waste Area Group 23 PCB Sites at PGDP	57, 81
1996	DOE 1996	Feasibility Study for Waste Area Group 23 and Solid Waste Management Unit 1 of Waste Area Group 27 at the Paducah Gaseous Diffusion Plant	1, 57, 81
1997	DOE 1997a	Action Memorandum for Waste Area Group 23 and Solid Waste Management Unit 1 of Waste Area Group 27, PCB Sites, Paducah Gaseous Diffusion Plant, Paducah, Kentucky	1, 57, 81
1997	DOE 1997b	Proposed Remedial Action Plan for Waste Area Group 23 and Solid Waste Management Unit 1 of Waste Area Group 27, PCB Sites	1, 57, 81
1997	DOE 1997c	Sampling and Analysis Plan for the Site Evaluation of Waste Area Group 9 and 11 at the Paducah Gaseous Diffusion Plant	19, 27, 165, 170
1997	DOE 1997d	Information Package for Waste Area Grouping 16 and 19 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky	153, 156, 160, 163
1998	DOE 1998a	Work Plan for Waste Area Group 28 Remedial Investigation/Feasibility Study and Waste Area Group 8 Preliminary Assessment/Site Investigation at the Paducah Gaseous Diffusion Plant	99B, 194
1998	DOE 1998b	Integrated Remedial Investigation/Feasibility Study Work Plan for Waste Area Group 27 at Paducah Gaseous Diffusion Plant	1, 196

Table 2.1. Summary of Historical Information[1] (Continued)

Year	Reference	Title	SWMUs/AOCs
1998	DOE 1998c	Proposed Remedial Action Plan for Waste Area Group 23 and Solid Waste Management Unit 1 of Waste Area Group 27, PCB Sites	1, 196
1998	DOE 1998d	Sampling and Analysis, Quality Assurance, and Data Management Plan for the Site Evaluation of Waste Area Groupings 16 and 19	153, 156, 160, 163
1999	DOE 1999a	Remedial Investigation Report for Waste Area Group 27 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky	1, 196
1999	DOE 1999b	WAGs 9 and 11 Site Evaluation Report at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky	19, 27, 165, 170
1999	DOE 1999c	Engineering Evaluation/Cost Analysis (EE/CA) for Scrap Metal Removal at PGDP	14, 518, 520
1999	DOE 1999d	Proposed Remedial Action Plan for Waste Area Group 23 and Solid Waste Management Unit 1 of Waste Area Group 27, PCB Sites	1, 196
1999	DOE 1999e	Remedial Investigation/Feasibility Study Work Plan for the Surface Water Operable Unit at PGDP	1, 165
1999	DOE 1999f	Residual Risk Evaluation Report for Waste Area Group 23 and Solid Waste Management Unit 1 of Waste Area Group 27, PCB Sites	1, 196
2000	DOE 2000	Remedial Investigation Report for Waste Area Group 28 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky	99B, 194
2001	DOE 2001a	Action Memorandum for Scrap Metal Disposition at the Paducah Gaseous Diffusion Plant	14
2001	DOE 2001b	Baseline Human Health Risk Assessment and Screening Ecological Risk Assessment for the Proposed Site of the UF_6 Conversion Facility, Including the Eastern Portion of SWMU 194, McGraw Construction Facilities (South Side), at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky	194
2001	BJC 2001	Depleted Uranium Hexafluoride (DUF_6) Conversion Facility Site Characterization Report, Paducah Gaseous Diffusion Plant, Paducah, Kentucky	194
2002	DOE 2002a	Final Inventory/Characterization Report for the OS-02, Department of Energy Material Storage Area at the Paducah Gaseous Diffusion Plant	213, 214, 215, 216, 217, 221, 222, 227, 228
2002	DOE 2002b	Final Inventory/Characterization Report for the OS-03, Department of Energy Material Storage Area at the Paducah Gaseous Diffusion Plant	214
2002	DOE 2002c	Final Inventory/Characterization Report for the OS-04, Department of Energy Material Storage Area at the Paducah Gaseous Diffusion Plant	215
2002	DOE 2002d	Final Inventory/Characterization Report for the OS-05, Department of Energy Material Storage Area at the Paducah Gaseous Diffusion Plant	216

Table 2.1. Summary of Historical Information[1] (Continued)

Year	Reference	Title	SWMUs/AOCs
2002	DOE 2002e	Final Inventory/Characterization Report for the OS-10, Department of Energy Material Storage Area at the Paducah Gaseous Diffusion Plant	221
2002	DOE 2002f	Final Inventory/Characterization Report for the OS-11, Department of Energy Material Storage Area at the Paducah Gaseous Diffusion Plant	222
2004	DOE 2004a	Final Inventory/Characterization Report for the OS-06, Department of Energy Material Storage Area at the Paducah Gaseous Diffusion Plant	217
2004	DOE 2004b	Final Inventory/Characterization Report for the OS-16, Department of Energy Material Storage Area at the Paducah Gaseous Diffusion Plant	227
2004	DOE 2004c	Final Inventory/Characterization Report for the OS-17, Department of Energy Material Storage Area at the Paducah Gaseous Diffusion Plant	228
2007	DOE 2007	Engineering Evaluation/Cost Analysis for Soils Operable Unit Inactive Facilities at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky	19, 181

[1] Table adapted from DOE 2010a.

Table 2.2. Field Analysis and Limits for Grid Sampling and Radiological Walkovers

Analyte	Project Quantitation Limit (mg/kg)	Industrial Worker ELCR = 1E-5 (mg/kg)[a]	Industrial Worker HI = 1 (mg/kg)[a]	PGDP Background (mg/kg)[b]	Project Action Limit (mg/kg)[c]
Antimony	30	n/a	3.79	0.21	30
Arsenic	11	5.23	84.1	7.9	11
Barium	100	n/a	2,290	170	170
Cadmium	12	753,000	213	0.21	12
Chromium	85	109,000	3,560	16	85
Copper	35	n/a	4,930	19	35
Iron	100	n/a	20,700	28,000	28,000
Lead	13	n/a	50[d]	23	23
Manganese	85	n/a	452	820	820
Mercury	10	n/a	9.82	0.13	10
Molybdenum	15	n/a	830	n/a	830
Nickel	65	n/a	2,420	21	65
Selenium	20	n/a	949	0.7	20
Silver	10	n/a	411	2.3	10
Uranium	20	n/a	202	4.6	20
Thallium	20	n/a	7.27	0.21	20
Vanadium	70	n/a	33.2	37	70
Zinc	25	n/a	27,300	60	60
Total PCBs	5	1.99	n/a	n/a	5
Uranium-238[e]	n/a	17.1 pCi/g	n/a	[f]	[f]

n/a = not applicable.

[a] Excess lifetime cancer risk (ELCR) and hazard index (HI) values are derived from values presented in Table A.17 of the Risk Methods Document (DOE 2011a).

[b] PGDP background values are taken from Table A.12 of the Risk Methods Document (DOE 2001c), the lesser of surface and subsurface is presented, with the exception of uranium-238.

[c] The project action limit is the greater of background and the more conservative between the ELCR and the HI, unless unachievable by the quantitation limit. If unachievable, the project quantitation limit is used as the project action limit, with the exception of uranium-238.

Table 2.2. Field Analysis and Limits for Grid Sampling and Radiological Walkovers (Continued)

[d] The value for lead is the no action level presented in Table A.17 of the Risk Methods Document (DOE 2011a), this value was not adjusted to ELCR=1E-5 or HI=1.
[e] Uranium-238 measurements will be collected with a FIDLER (Field Instrument for the Detection of Low Energy Radiation) connected to a Ludlum Model 2221 digital scalar and ratemeter. Ambient detector background is due to a combination of naturally occurring radionuclides, cosmic rays, electronic instrument noise, fallout from atomic weapons testing, and other components. Presently, the FIDLER/2221 combination measures average background at 11,000 cpm.
[f] Based on the March 1, 2010, conference call, Project Action Limits will be set to 30 pCi/g (1,800 ncpm) for AOCs and SWMUs outside the Limited Area (plant fence) and 171 pCi/g (10,300 ncpm) for AOCs and SWMUs inside the Limited Area. Net count per minute values corresponding to Project Action Levels are developed in accordance with NURGEG-1507 methodology. These numbers are examples. Should the Project Action Limit be reached, the elevated area indicating greater than the Action Level will be bounded, one grab sample will be collected from the location representing the highest detected activity, and the sample will be analyzed by a fixed-base laboratory for radiological constituents.

Table 2.3. SWMU/AOC Samples Collected

Group	SWMU/AOC	Samples Collected	Acres
Group 1, Former Facilities	99B	56	0.34
	194	709	41.6967
	196	2	0.4156
	489	2	0.02082
	531	14	0.21037
Group 1, Storage Areas	200	60	0.81408
	212	12	0.09263
	213	19	0.16258
	214	1	0.01355
	215	18	0.01279
	216	1	0.02663
	217	66	0.97704
	221	31	0.20831
	222	30	0.05279
	227	54	1.27855
	228	25	0.23234
Group 2, Underground/Tank	76	2	0.01947
Group 2, Chromium Areas	158	57	0.05785
	169	34	0.00231
Group 2, Soil/Rubble Areas	138	133	0.91754
	180	124	2.2076
	195	467	9.70968
	493	4	0.12949
	517	2	0.01475
Group 3, Scrap Yards	14	270	5.75068
	520	126	2.89439
Group 3, PCBs	81	48	0.26154
	153	13	0.60248
	156	19	0.46277
	160	4	0.11479
	163	26	0.08222
	219	2	0.03797
	488	3	0.00106
Total Samples Collected:		2,434	

To deal with uncertainties identified in the Soils OU, the observational approach was used in the design of the sampling strategy for the Soils OU RI/FS. Field laboratory results were used to determine locations of contingency samples used to determine the lateral and/or vertical (4–7 ft and 7–10 ft bgs) extent of contamination whenever results from the originally planned locations indicated that the "edge" of contamination had not been defined. A summary of these contingency samples is included in the summary of the investigation for each SWMU/AOC in Chapters 5–11. Figures display if contingency "step-out" grids were needed for horizontal extent. Concrete surfaces were examined for oil staining and a PCB wipe sample was conducted if staining was found. In addition, a judgmental radiological soil grab sample (0–6 inches) was collected based on the gamma radiological walkover results.

Split samples and replicates were obtained from the composite as necessary. Analyses for each composite sample consisted of field analysis of Resource Conservation and Recovery Act (RCRA) metals, plus uranium, by XRF and Total PCB by PCB test kits. Ten percent of the samples had fixed-base laboratory confirmation splits. The 10% included at least one surface and one shallow subsurface from each SWMU/AOC that was sampled. These fixed-base laboratory samples were randomly selected from all sample locations within the SWMUs/AOCs.

2.2 RECTIFICATION FROM ORIGINALLY PLANNED SAMPLE LOCATIONS

Site conditions necessitated elimination of some of the RI grids (i.e., asphalt, concrete, steep ditch banks, standing water, dense underground utilities). Necessary modifications of the sampling strategy are detailed in Appendix A and rectification maps are provided.

2.3 QUALITY ASSURANCE/QUALITY CONTROL

Quality control (QC) was monitored throughout the RI process. QC included field sampling, laboratory analysis, and data management.

2.3.1 Field Sampling QC

Field QC samples were collected to assess data quality. Appendix G provides the data from the field QC samples in a searchable database on compact disk. The target frequency of collection for QC samples for the entire project was 1 in 20 for equipment rinseates, field blanks, and field duplicates. Overall, this target was met for the project. Trip blanks were collected at a frequency of 1 per sample cooler containing volatile organic compound (VOC) samples.

2.3.2 Laboratory QC

Test America of St Louis, MO, performed all of the laboratory analyses of soil samples for the Soils OU RI. The laboratory was contracted through the DOE Sample Management Office (SMO) and is DOE-approved and Nuclear Regulatory Commission licensed. The laboratory is audited annually for compliance with DOE Consolidated Audit Program (DOECAP) requirements. Approved SW-846 methods were used for all samples, except those parameters for which other methods are necessary. The analysis followed appropriate protocols, and Level C and Level D data packages were provided along with electronic data deliverables (EDDs).

The following data qualifiers were used for reporting fixed-base laboratory results:

Inorganic Analysis

B This flag is used when the analyte is found in the associated blank as well as in the sample.

U The analyte was analyzed for, but not detected. For radionuclides, indicates compound was analyzed for, but result was less than the minimum detectable activity (MDA) [or minimum detectable concentration (MDC)].

J Indicates an estimated value.

E The reported value is estimated because of the presence of interference. An explanatory note must be included under comments on the cover page (if the problem applies to all samples) or on the specific Form I (if it is an isolated problem).

M Duplicate injection precision was not met.

N Spiked sample recovery was not within control limits.

S The reported value was determined by the method of standard additions (MSA).

W Postdigestion spike for furnace atomic absorption analysis is out of control limits (85–115%), while sample absorbance is less than 50% of spike absorbance.

X Other specific flags may be required to properly define the results.

* Duplicate analysis was not within control limits.

+ Correlation coefficient for the MSA is less than 0.995.

Organic Analysis

U Indicates compound was analyzed for, but not detected.

J Indicates an estimated value. This flag is used under the following circumstances: (1) when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed; and (2) when the mass spectral and retention time data indicate the presence of a compound that meets the pesticide/PCB identification criteria, and the result is less than the contract-required quantitation limit, but greater than zero.

P This flag is used for a pesticide/PCB target analyte when there is greater than 25% difference for detected concentrations between the two gas chromatograph (GC) columns.

C This flag applies to pesticide results where the identification has been confirmed by GC/mass spectrometer (GC/MS).

B This flag is used when the analyte is found in the associated blank as well as in the sample.

E This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.

D This flag identifies all compounds identified in an analysis at a secondary dilution factor.

X Other specific flags may be required to properly define the results.

Y Indicates matrix spike (MS)/matrix spike duplicate (MSD) recovery and/or relative percent difference (RPD) failed to meet acceptance criteria.

Radionuclide Analysis

B Method blank not statistically different from sample at 95% level of confidence.

D Sample is statistically different from duplicate at 95% level of confidence.

L Expected and measured value for laboratory control sample (LCS) is statistically different at 95% level of confidence.

M Expected and measured value for MS is statistically different at 95% level of confidence.

T Tracer recovery is < 20% or > 105%.

U Indicates compound was analyzed for, but result was less than the MDA (or MDC).

X Other specific flags may be required to properly define the results.

Precision, accuracy, and completeness objectives were presented in Section 11 of the Work Plan (DOE 2010a). An assessment of these objectives for laboratory analytical data was performed. The results of this assessment are provided in Table 2.4.

Precision refers to the level of agreement among repeated measurements of the same characteristic, usually under a given set of conditions. To determine the precision of the laboratory analysis, a routine program of replicate analyses is performed. The absolute difference between the two values calculated is referred to as the RPD. Precision was determined for this RI by reviewing laboratory-applied qualifiers that pertain to laboratory duplicates (i.e., "M" and "*" for inorganic analyses, "Y" for organic analyses, and "D" for radionuclide analyses) over all analyses. Quality assurance (QA) objectives for precision given in the Work Plan are performance based, with RPDs that ranged from 20 to 50%. These objectives were met by the data collected during this RI.

Table 2.4. QA Assessment for Laboratory Measurements of RI Data

Parameter	Method	Matrix	Precision (%)	Completeness (%)	Accuracy (%)
Metals	SW846-6020, 7471	Soil	93	84	74
PCBs	SW846-8082	Soil	99	99	100
SVOCs	SW846-8270	Soil	100	100	100
VOCs	SW846-8260	Soil	100	100	100
Alpha/Beta Activity	900.0 MOD	Soil	100	100	100
^{137}Cs	901.1 MOD	Soil	100	100	100
^{241}Am, ^{237}Np, ^{238}Pu, $^{239/240}Pu$, ^{228}Th, ^{230}Th, ^{232}Th, ^{234}U, ^{235}U, ^{238}U	DOE A-01-R MOD	Soil	100	100	100
^{99}Tc	DOE TC-02-RC MOD	Soil	100	100	100

Accuracy refers to the nearness of a measurement to an accepted reference or true value. To determine the accuracy of an analytical method and/or the laboratory analysis, a periodic program of sample spiking is conducted. Accuracy for this RI was determined by reviewing laboratory-applied qualifiers that pertain to laboratory spikes over all analyses (i.e., "N" and "W" for inorganic analyses; "Y" for organic analyses; and "B," "M," and "L" for radionuclide analyses). QA objectives for accuracy given in the Work Plan are performance based; no concentrations of target compounds greater than the quantitation limits in method/instrument blanks, field blanks, and equipment rinseates. This objective was achieved for the project data set.

Representativeness is the degree to which discrete samples accurately and precisely reflect a characteristic of a population, variations at a sampling location, or an environmental condition. Representativeness is a qualitative parameter and will be achieved through careful, informed selection of sampling sites, drilling sites, drilling depths, and analytical parameters and through the proper collection and handling of samples to avoid interference and minimize contamination and sample loss. This objective was achieved for the Soils OU RI by evaluating field condition before and during the data acquisition process to ensure that the most representative sample set possible was collected. This is evidenced by the field changes described in Appendix A.

Completeness is a measure of the percentage of valid, viable data obtained from a measurement system compared with the amount expected under normal conditions. The goal of completeness is to generate a sufficient amount of valid data to satisfy project needs. Completeness also is a measure of samples collected during the field effort with respect to those targeted for collection in the work plan. All soil samples targeted for collection during this RI were collected with the exceptions as noted in Appendix A.

Comparability is the extent to which comparisons among different measurements of the same quantity or quality will yield valid conclusions. Comparability was assessed in terms of field standard operating procedures (SOPs), analytical methods, QC, and data reporting. In addition, data validation assesses the processes employed by the laboratory that affect data comparability.

Historical data determined to be representative of current conditions were evaluated for precision and accuracy as described previously. This assessment was performed over all measurements for the projects associated with the Soils OU SWMUs/AOCs. Multiple laboratories analyzed samples for these projects. The comparison for the precision and accuracy of historical results encompassed the entire historical data set and did not differentiate between projects or laboratories. All historical analyses were within the criteria established by the Work Plan for RI data, with the exception of accuracy of metals analyses in soil.

2.3.3 Data Management QC

The Soils OU Project Environmental Measurements System (PEMS) was used to manage field-generated data; import laboratory-generated data; add data qualifiers based on data verification, validation, and assessment; and to transfer data to the Paducah Oak Ridge Environmental Information System (Paducah OREIS). PEMS included a tracking system to identify, track, and monitor each sample and associated data from point of collection through final data reporting. The system includes field measurements, chain-of-custody information, a tracking system for tracking hard copy data packages, and EDDs. PEMS also includes information for field planning and data evaluation.

All data packages and EDDs received from the laboratory were tracked, reviewed, and maintained in a secure environment. When first received, data packages were assigned a document control number and then logged into a tracking system. The following information was tracked: sample delivery group numbers, date received, document control number, number of samples, sample analyses, receipt of EDDs, and comments.

The data verification processes for laboratory data were implemented for both hard copy data and EDDs. The data packages were reviewed to confirm that all samples had been analyzed for the requested parameters. Discrepancies were reported to the laboratory and the data validators. As part of a series of internal integrity checks within PEMS, a check was run to identify which of the requested samples and analyses were not received in an EDD. Hard copy data packages were checked to confirm agreement with the associated EDD. Integrity checks in PEMS also were used to check the list of compounds generated by the laboratory to confirm that data were provided for all requested analytes. Discrepancies were reported to the laboratories for responses and/or correction and to the data validators.

Data verification within PEMS included standardization of analytical methods, chemical names and units, as well as checks for holding time violations and detections above background values.

PEMS system requirements included backups, security, change control, and interfacing with other data management systems. PEMS was housed on the Paducah network. System backups were performed nightly following standard Paducah network protocol. Updates made to the files were copied to a computer backup tape each night, and an entire backup was performed each week.

Security of PEMS and data used for the data management effort was considered essential to the success of the project. The security protocol followed by the data management team was consistent with that of the Paducah network. Access to the network is password protected. Access to PEMS was limited, on an as-needed basis, to the data management personnel. Read-write, graded access to PEMS was limited to the data management team, which consisted of the PEMS coordinator and the supporting data entry staff. The data management staff assisted other project members with data needs from PEMS by running requested queries.

A large volume of data was generated during the Soils OU RI. To confirm that the data set could be used in the decision making process, the RI team performed various checks and reviews during and after the fieldwork to maintain data consistency and identify problem areas. These checks and reviews included electronic verification and manual assessments by the RI team, as well as independent Level IV validation of fixed-base laboratory data. Approximately 41,610 records were reviewed during the Soils OU RI data assessment.

Data validation is a process performed for a data set by a qualified individual independent from sampling, laboratory, project management, and other decision making personnel for the project. Data validation is performed in accordance with EPA guidance. In the data validation process, the laboratory adherence to analytical method requirements is evaluated. Data collected for this RI was validated at a frequency of 10%.

As part of the data review process, findings were qualified as necessary to reflect data validation results. The following qualifiers were assigned by the data validators:

U Analyte or compound considered not detected above the reported detection limit.

J Analyte or compound identified; the associated numerical value is approximated.

UJ Analyte or compound not detected above the reported detection limit, and the reported detection limit is approximated due to quality deficiency.

R Result is not usable for its intended purpose, so data are of "information only" quality and should be supplemented with additional data for decision making.

= Data were validated; however, no qualifier was added.

The majority of the data rejected by validation was VOC analyses. Acetone (2 rejected of 6 data points), acrolein (6 rejected of 6 data points), acrylonitrile (6 rejected of 6 data points), 2-butanone (6 rejected of 6 data points), and 2-chloroethyl vinyl ether (6 rejected of 6 data points) were rejected due to the initial and continuing calibration relative response factors being less than 0.05. Also rejected by validation was neptunium-237 (12 rejected of 26 data points). This analysis was rejected due to failed relative bias and recovery for the laboratory control sample. Most of the rejected neptunium-237 analyses were reported below the minimum detectable activity (9 rejected of 12 data points below minimum detectable activity).

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3. PHYSICAL CHARACTERISTICS OF THE STUDY AREA

This chapter presents the physical and ecological characteristics of PGDP and the region surrounding it. The discussion focuses on region- and PGDP-wide characteristics to support subsequent evaluations of the nature and extent and the fate and transport of contaminants exiting the SWMUs/AOCs.

This RI field effort focused on collection and analysis of soil samples to address deficiencies in the existing characterization of the nature and extent of contamination. These sampling and analytical activities yielded additional data for the soils in each SWMU/AOC. The results of those activities have been incorporated into the SWMU/AOC-specific discussions.

Numerous investigations detail physical characteristics of PGDP that are pertinent to the Soils OU; the primary references include those listed in Table 2.1.

3.1 SURFACE FEATURES

PGDP is located on a 3,556-acre DOE site approximately 10 miles west of Paducah, Kentucky, and 3.5 miles south of the Ohio River in the western part of McCracken County (Figure 3.1). The PGDP industrial area occupies approximately 650 acres of the DOE site, surrounded by an additional 689-acre buffer zone. DOE licenses most of the remaining acreage to the Commonwealth of Kentucky as part of the West Kentucky Wildlife Management Area (WKWMA). Tennessee Valley Authority (TVA) Shawnee Fossil Plant borders the DOE site to the northeast, between PGDP and the Ohio River.

Three small communities are situated within three miles of the DOE property boundary: Heath and Grahamville to the east and Kevil to the southwest. The next closest municipality is Metropolis, Illinois, five miles to the northeast of PGDP on the north side of the Ohio River.

The dominant topographic features in the area of PGDP are nearly level to gently sloping dissected plains and the flood plain of the Ohio River. Local elevations range from 290 ft above mean sea level (amsl) along the Ohio River to 450 ft amsl southwest of PGDP. Ground surface elevations vary from 360 ft to 390 ft amsl within the PGDP boundary, where most of the Soils OU SWMUs/AOCs are located. Generally, the topography in the PGDP area slopes toward the Ohio River at an approximate gradient of 27 ft per mile (CH2M HILL 1992).

3.2 METEOROLOGY

The National Weather Service office at Barkley Regional Airport (located four miles to the southeast of PGDP) documents hourly meteorological measurements. Current and historical meteorological information regarding temperature, precipitation, and wind speed/direction are available from the National Oceanic and Atmospheric Administration's (NOAA's) National Climatic Data Center.

The climate of the PGDP region is humid-continental. Summers are warm (July averages 79°F) and winters are moderately cold (January averages 35°F). PGDP experiences a yearly surplus of precipitation versus evapotranspiration. The 30-year average monthly precipitation for the period 1961 through 1990 is 4.11 inches, varying from an average of 3.00 inches in October (the monthly average low) to an average of 5.01 inches in April (the monthly average high). Monthly estimates of evapotranspiration using the Thornthwaite method (Thornthwaite and Mather 1957) equal or exceed average rainfall for the period May through September (season of no net infiltration).

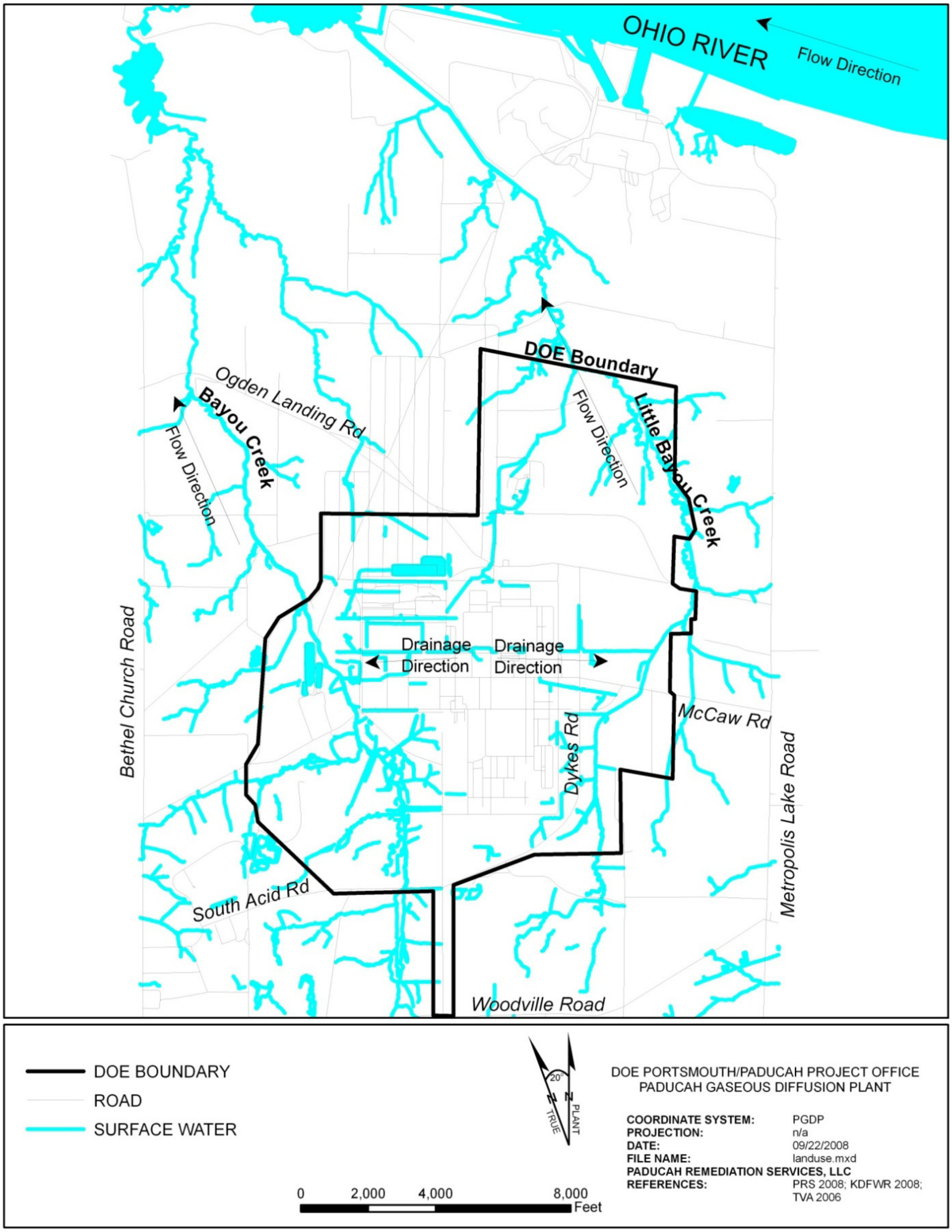


Figure 3.1. Surface Water Features in the Vicinity of the DOE Site

Heavy rainfall associated with thunderstorms or low-pressure systems occurs occasionally at PGDP. Table 3.1 presents the predicted storm recurrence intervals for PGDP (Dupont and Allen 2000).

Table 3.1. Precipitation as a Function of Recurrence Interval and Storm Duration for Western Kentucky

	Recurrence Interval (years)					
Storm Duration (minutes)	2	5	10	25	50	100
	Precipitation (inches)					
5	11.80	16.69	19.98	24.19	27.33	30.46
10	7.02	9.44	11.05	13.09	14.61	16.11
15	5.20	6.82	7.90	9.25	10.26	11.26
20	4.20	5.43	6.25	7.27	8.04	8.79
30	3.12	3.96	4.52	5.22	5.74	6.25
60	1.89	2.34	2.64	3.02	3.31	3.59
80	1.54	1.89	2.13	2.43	2.65	2.87
100	1.30	1.61	1.81	2.05	2.24	2.43
120	1.15	1.41	1.58	1.80	1.96	2.12
1,440	0.20	0.26	0.30	0.34	0.38	0.41

The prevailing wind is from the south-southwest at approximately 10 miles per hour. Historically, stronger winds are recorded when the winds are from the southwest.

3.3 SURFACE WATER HYDROLOGY

PGDP is situated in the western portion of the Ohio River basin, 15 miles downstream of the confluence of the Ohio River with the Tennessee River and 35 miles upstream of the confluence of the Ohio River with the Mississippi River. The Ohio River is located approximately 3.5 miles north of PGDP. It is the most significant surface water feature in the region, carrying over 25 billion gal/day of water through its channel. A U.S. Geological Survey (USGS) gaging station at Metropolis, Illinois (USGS 03611500), monitors the Ohio River stage near PGDP. River stage typically varies between 290 ft and 328 ft amsl over the course of a year. Water levels on the lower Ohio River generally are highest in winter and early spring and lowest in late summer and early fall. The entire PGDP is above the historical high water floodplain of the Ohio River (CH2M HILL 1991) and above the local 100-year flood elevation of the Ohio River (333 ft). [The highest Ohio River stage recorded at Metropolis, Illinois (February 2, 1937) was 343 ft.]

The plant overlies the divide between Bayou and Little Bayou Creeks (Figure 3.1). Bayou Creek is a perennial stream on the western boundary of the plant that flows generally northward, from approximately 2.5 miles south of the plant site to the Ohio River along a 9-mile course. Little Bayou Creek is an intermittent stream located on the eastern boundary of the plant; its drainage originates within WKWMA and extends northward along a 6.5-mile course, which joins Bayou Creek near the Ohio River. Most of the flow within Bayou and Little Bayou Creeks is from process effluents or surface water runoff from PGDP. Networks of ditches discharge effluent and surface water runoff from PGDP to the creeks. Contributions from PGDP comprise approximately 85% of the base flow within Bayou Creek and 100% of the base flow within Little Bayou Creek.

Multiple groundwater aquifers underlie PGDP (see Section 3.6 for a discussion of PGDP hydrogeology). The shallowest aquifers occur in the Continental Deposits and the McNairy Formation, both of which discharge into the Ohio River north of PGDP. A large, downward, vertical hydraulic gradient within the Upper Continental Deposits, which represents an aquitard, typically limits the amount of groundwater discharge to the ditches of PGDP and adjacent creeks. Gaining reaches in the creeks are found on Bayou Creek south of PGDP and on Little Bayou Creek to the north of PGDP where it meets the Ohio River flood plain. Both creeks have gaining reaches adjacent to the Ohio River.

Other surface water bodies in the vicinity of PGDP include several small ponds, inactive clay and gravel pits, and settling basins scattered throughout the PGDP plant area; a marshy area just south of the confluence of Bayou Creek and Little Bayou Creek; ash settling ponds of the Shawnee Fossil Plant; and Metropolis Lake, located east of the Shawnee Fossil Plant.

3.4 GEOLOGY

PGDP lies within the Jackson Purchase region of western Kentucky, which represents the northern tip of the Mississippi Embayment portion of the Coastal Plain Province. The stratigraphic sequence in the region consists of Cretaceous, Tertiary, and Quaternary sediments unconformably overlying Paleozoic bedrock (Figure 3.2). The following sections describe the primary geologic units of the PGDP region.

3.4.1 Bedrock

Mississippian carbonates, composed of dark gray limestone with some interbedded chert and shale, underlie the entire PGDP area at an approximate depth of 300 ft to 340 ft.

3.4.2 Rubble Zone

Deep soil borings at PGDP commonly encounter a rubble zone of chert gravel at the top of the bedrock. The age and continuity of the rubble zone remain undetermined.

3.4.3 McNairy Formation

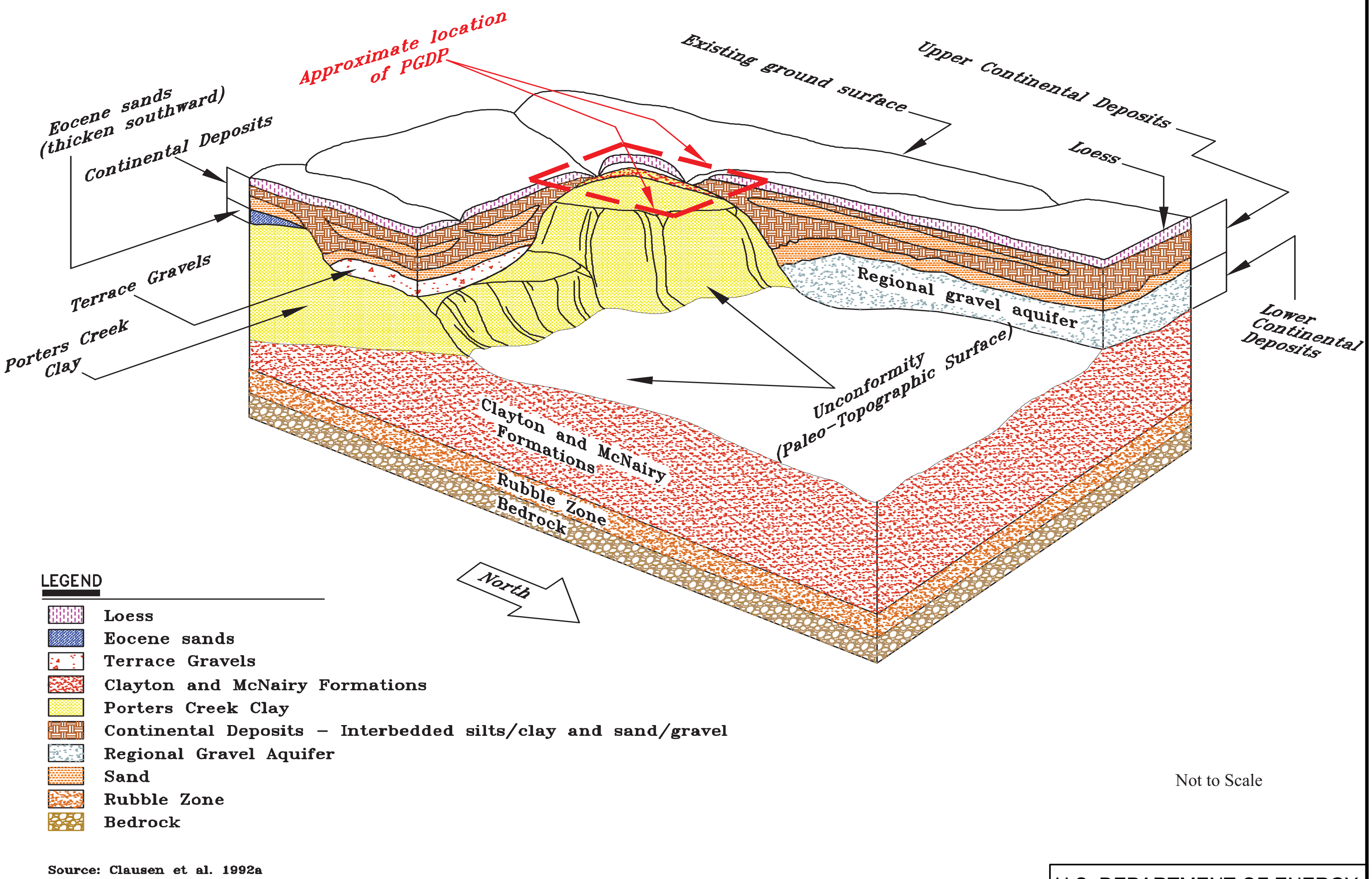
The McNairy Formation consists of Upper Cretaceous, fine clastic sediments. At PGDP, the upper and middle members of the McNairy Formation are typically grayish-white to dark-gray, micaceous silt and clay interbedded with gray to yellow, very fine- to fine-grained sand. The middle (Levings) member tends to contain fewer sand interbeds. The basal McNairy member at PGDP is primarily a light gray, very fine to fine sand.

3.4.4 Porters Creek Clay/Porters Creek Terrace Slope

Paleocene age Porters Creek Clay underlies the southern portions of the DOE site and consists of dark gray to black silt with varying amounts of clay and fine-grained, micaceous, commonly glauconitic, sand. The Porters Creek Clay subcrops along a buried terrace slope that extends east–west under the south end of the PGDP industrial area. This subcrop is the northern limit of Porters Creek Clay and the southern limit of the Pleistocene Lower Continental Deposits under PGDP.

3.4.5 Eocene Sands

Eocene sands occur south of PGDP above the Porters Creek Clay. This unit includes undifferentiated quartz sands and interbedded and interlensing silts and clays of the Claiborne Group and Wilcox Formation (Olive 1980). The Eocene sands thicken to the south of PGDP.



Not to Scale

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Figure 3.2. PGDP Stratigraphic Sections

3.4.6 Continental Deposits

Continental sediments [Pliocene(?)[1] to Pleistocene age] unconformably overlie the Cretaceous through Eocene strata throughout the area. These continental sediments were deposited on an irregular erosional surface consisting of several terraces. The thicker Continental Deposits sections represent Pleistocene valley fill sediments that comprise a fining-upward cycle. The continental sediments have been divided into the two distinct facies described below.

(1) Lower Continental Deposits. The Lower Continental Deposits is a gravel facies consisting of chert, ranging from pebbles to cobbles, in a matrix of poorly sorted sand and silt. Gravels of the Lower Continental Deposits overlie three distinct terraces in the PGDP area.

- The upper terrace Lower Continental Deposits consists of Pliocene(?) gravel units, ranging in thickness from near 0 ft to 30 ft, occurring in the southern portion of the DOE site at elevations greater than 350 ft amsl. This gravel unit overlies the Eocene sands and Porters Creek Clay (where the Eocene sands are missing).

- Pliocene(?) gravels of the Lower Continental Deposits also occur on an intermediate terrace eroded into the Porters Creek Clay at an elevation of approximately 320 ft to 345 ft amsl in the southeastern and eastern portions of the DOE site. The thickness of this unit typically ranges from 15 ft to 20 ft.

- The Lower Continental Deposits of the upper and intermediate terraces are collectively referred to as the Terrace Gravel.

- The third and most prominent of the three Lower Continental Deposits members consists of a Pleistocene gravel deposit resting on an erosional surface at an elevation of approximately 280 ft amsl. This gravel underlies most of the plant area and the region to the north, but pinches out under the south side of PGDP along the subcrop of the Porters Creek Clay. The Pleistocene member of the Lower Continental Deposits averages approximately 30 ft in thickness. Trends of greater thickness, as much as 50 ft, fill deeper scour channels that trend east–west beneath the site.

(2) Upper Continental Deposits. The Upper Continental Deposits are a Pleistocene age, fine-grained clastics facies that commonly overlies the Lower Continental Deposits. This unit ranges in thickness from 15 ft to 55 ft. The Upper Continental Deposits includes three general horizons beneath PGDP: (1) an upper silt and clay interval, (2) an intermediate interval of common sand and gravel lenses (sand and gravel content generally diminishes northward), and (3) a lower silt and clay interval. The upper silt and clay interval consists of the Peoria Loess and Roxana Silt (DOE 2003; WLA 2006). The Peoria Loess and Roxana Silt blanket the entire PGDP area.

3.5 SOILS

The surficial deposits found in the vicinity of PGDP are Pleistocene loess and Holocene alluvium. Both units commonly consist of clayey silt or silty clay and range in color from yellowish-brown to brownish-gray or tan, making field differentiation difficult. The general soil map for Ballard and McCracken Counties delineates three soil associations within the vicinity of PGDP: the Rosebloom-Wheeling-Dubbs association, the Grenada-Calloway association, and the Calloway-Henry association (USDA 1976).

[1] A question mark indicates uncertain age.

In the immediate PGDP area, the predominant soil is the Henry soil series of the Calloway-Henry association, which consists of nearly level, somewhat poorly to poorly drained, medium-textured soils on upland positions. The Henry soil series contains poorly drained, acidic soils that have a fragipan. Henry soils typically have moderate permeability above the fragipan and low permeability within the fragipan. Permeability in the fragipan is less than 0.4 ft/day (DOE 1998c). It should be noted that soils within the industrial area of PGDP could be classified as "urban" since they have been impacted by human influence and many of the original characteristics have been lost.

Several other soil groups also occur in limited areas of the region, including the Grenada, Falaya-Collins, Waverly, Vicksburg, and Loring.

The soils in the vicinity of PGDP tend to have a low buffering capacity, with a pH ranging from 4.5 to 5.5. Measurements of the cation exchange capacity of site soils range from 8.92 to 69.8 milliequivalents per liter (mEq/L) (DOE 1999c). Under background conditions, the cation exchange capacity is sufficient to bind metals in the soils; however, acidic leachate will increase metal solubility and mobility significantly.

3.6 HYDROGEOLOGY

The significant geologic units relative to shallow groundwater flow at PGDP include the Terrace Gravel and Porters Creek Clay (south part of the DOE site) and the Pleistocene Continental Deposits and McNairy Formation (underlying PGDP and adjacent areas to the north). Groundwater flow in the Pleistocene Continental Deposits is a primary pathway for transport of dissolved contamination from PGDP. The following paragraphs provide the framework of the shallow groundwater flow system at PGDP.

(1) Terrace Gravel Flow System. The Porters Creek Clay is a confining unit to downward groundwater flow south of the PGDP industrial area. A shallow water table flow system is developed in the Terrace Gravel, where it overlies the Porters Creek Clay south of the PGDP industrial area. Discharge from this water table flow system provides baseflow to Bayou Creek and underflow to the Pleistocene Continental Deposits to the east of PGDP.

The elevation of the top of the Porters Creek Clay is an important control to the area's groundwater flow trends. A distinct groundwater divide is centered in hills located approximately 9,000 ft southwest of the PGDP industrial area, where the Terrace Gravel and Eocene sands overlie a "high" on the top of the Porters Creek Clay. In adjacent areas where the top of the Porters Creek Clay approaches land surface, as it does south of PGDP and near the subcrop of the Porters Creek Clay to the west of the industrial complex, the majority of groundwater flow is forced to discharge into surface streams (gaining reaches) and little underflow occurs into the Pleistocene Continental Deposits. To the east of PGDP, the Terrace Gravel overlies a lower terrace eroded into the top of the Porters Creek Clay. In this area, a thick sequence of Terrace Gravel occurs adjacent to the Pleistocene Continental Deposits, allowing significant underflow from the Terrace Gravel. Surface drainages in this area are typically loosing reaches. Figure 3.3 presents hydraulic potential trends for the Terrace Gravel flow system.

(2) Upper Continental Recharge System (UCRS). The upper strata, where infiltration of water from the surface occurs and where the uppermost zone of saturation exists, in the Upper Continental Deposits (beneath PGDP and the contiguous land to the north) is called the UCRS. Groundwater flow is primarily downward in the Upper Continental Deposits. A plot of elevation of water level versus midpoint of well screen for UCRS wells at PGDP (Figure 3.4) demonstrates that steep vertical

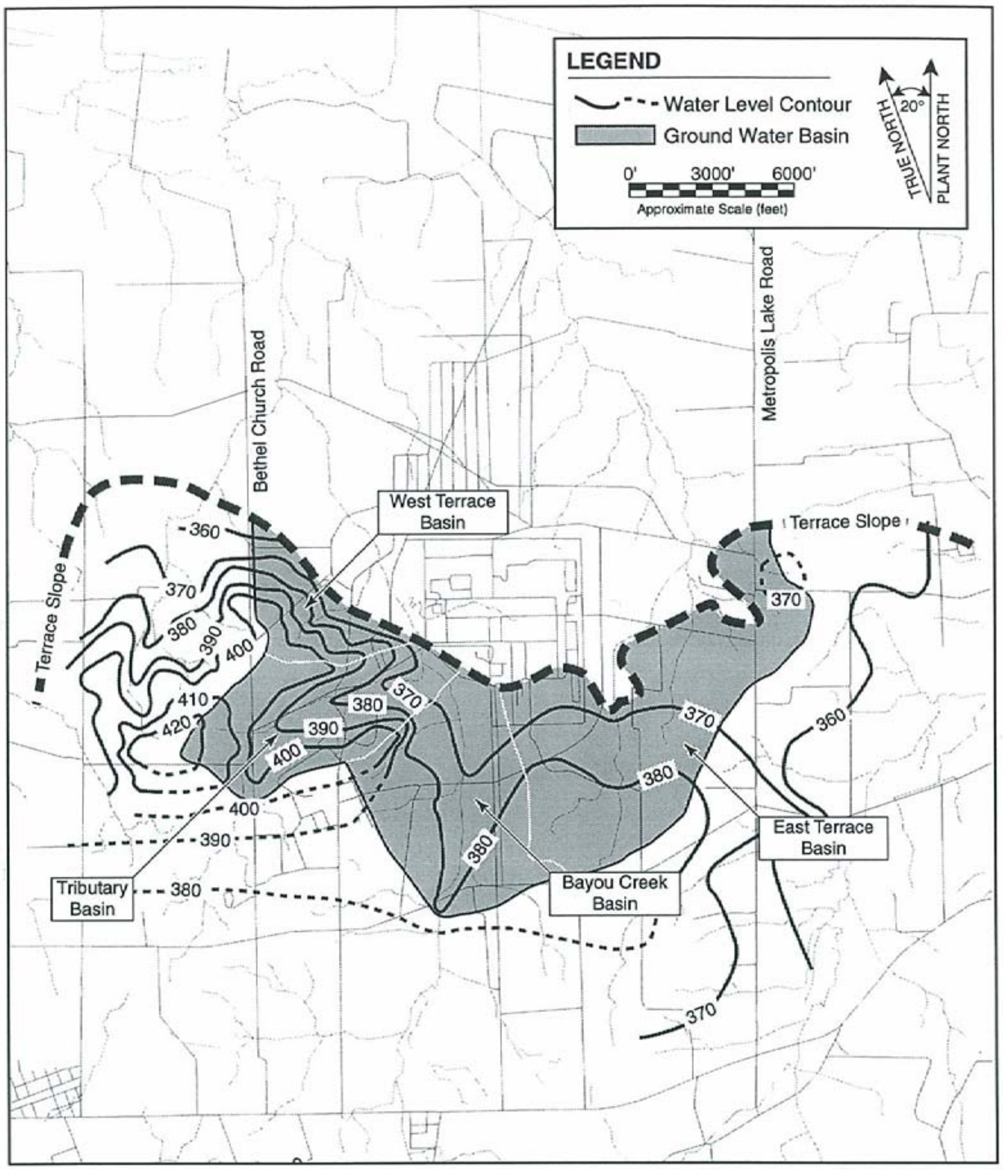

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Figure 3.3. Water Table Trends in the Terrace Deposits South of the PGDP

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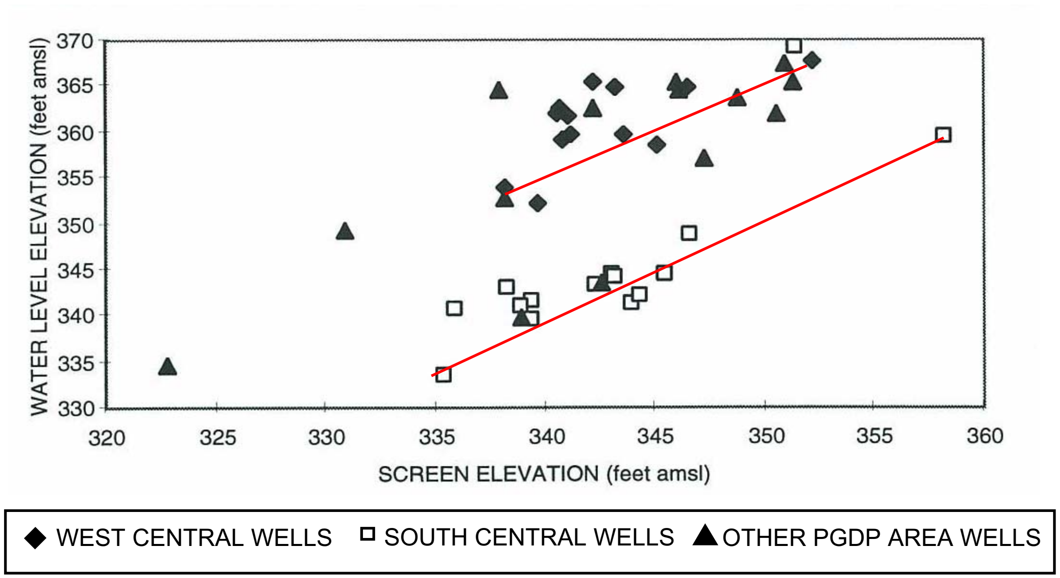

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Figure 3.4. Plot of Water Level versus Well Screen for Upper Continental Recharge System Wells

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hydraulic gradients are characteristic of the UCRS. Vertical hydraulic gradients generally range from 0.5 to 1 ft/ft where measured by wells completed at different depths in the UCRS. Vertical gradients are 1 to 2 orders of magnitude greater than lateral hydraulic gradients. While groundwater flow is predominantly downward, there will be some lateral flow due to heterogeneities in the shallow soils.

The infiltration rate for the PGDP area is approximately 6.6 inches/yr based on site-specific groundwater modeling. This 6.6 inches/yr applied over the area of the industrial area of the plant yields approximately 0.4 mgd of recharge to the shallow groundwater system. Leakage from plant water utilities, ditches, lagoons, and cooling tower basins is suspected to be another important source of infiltration at PGDP. Water use for PGDP for calendar year 2006 averaged 13 mgd. Municipal water systems lose as much as 24% of their daily conveyance (Jowitt and Xu 1990). A similar loss of the PGDP system would equal 3.1 mgd. Since the UCRS groundwater flow is predominantly downward, areas with higher anthropogenic recharge create mounding of hydraulic head in the RGA that can affect contaminant transport. Because the hydraulic conductivity in the RGA on-site is relatively large, the mounding is only slight (often less than 1 ft) and difficult to measure.

(3) RGA. Vertically infiltrating water from the UCRS moves downward into a basal sand member of the Upper Continental Deposits and the Pleistocene gravel member of the Lower Continental Deposits and then laterally north toward the Ohio River. This lateral flow system is called the RGA. The RGA is the shallow aquifer beneath PGDP and contiguous lands to the north. Groundwater of the RGA meets requirements of a Class II groundwater as delineated in *Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy* (EPA 1988).

Hydraulic potential in the RGA declines toward the Ohio River, which is the control of base level of the region's surface water and groundwater systems. The RGA potentiometric surface gradient beneath PGDP is commonly 10-4 ft/ft, but increases by an order of magnitude near the Ohio River. (Vertical gradients are not well documented, but small.)

The hydraulic conductivity of the RGA varies spatially. Pumping tests have documented the hydraulic conductivity of the RGA ranges from 53 ft/day to 5,700 ft/day. East-to-west flow of the ancestral Tennessee River, which laid down the Pleistocene Continental Deposits gravel member, tended to orient permeable gravel and sand lenses east-west. Thus, with the hydraulic head in the RGA generally decreasing northward toward the Ohio River, groundwater flow trends to the northeast and northwest from PGDP in response to the anisotropy of the hydraulic conductivity as well as the anthropogenic recharge, which is greatest in the industrial portion of the plant. Anthropogenic recharge from waterline leaks, lagoons, cooling tower basins, and other sources provides the primary driving force in moving groundwater in northeastern and northwestern flow directions from the industrial plant area. Ambient groundwater flow rates in the more permeable pathways of the RGA commonly range from 1 to 3 ft/day.

Previous work has shown that the primary pathway for groundwater flow and the site-related contaminants is vertical migration through the UCRS, followed by lateral migration in the RGA. The two primary groundwater plume contaminants at PGDP are trichloroethene (TCE) and technetium-99. Interpretation of the location of these plumes is updated on a regular basis with the addition of groundwater analytical data from various projects at the site. Figures 3.5 and 3.6 illustrate the plume maps presented in the calendar year 2010 plume map update (LATA Kentucky 2011). Monitoring wells that routinely monitor the RGA located near the Soils OU SWMUs are shown in Figure 3.7.

(4) McNairy Flow System. Groundwater flow in the fine sands and silts of the McNairy Formation is called the McNairy Flow System. The overall McNairy groundwater flow direction in the area of

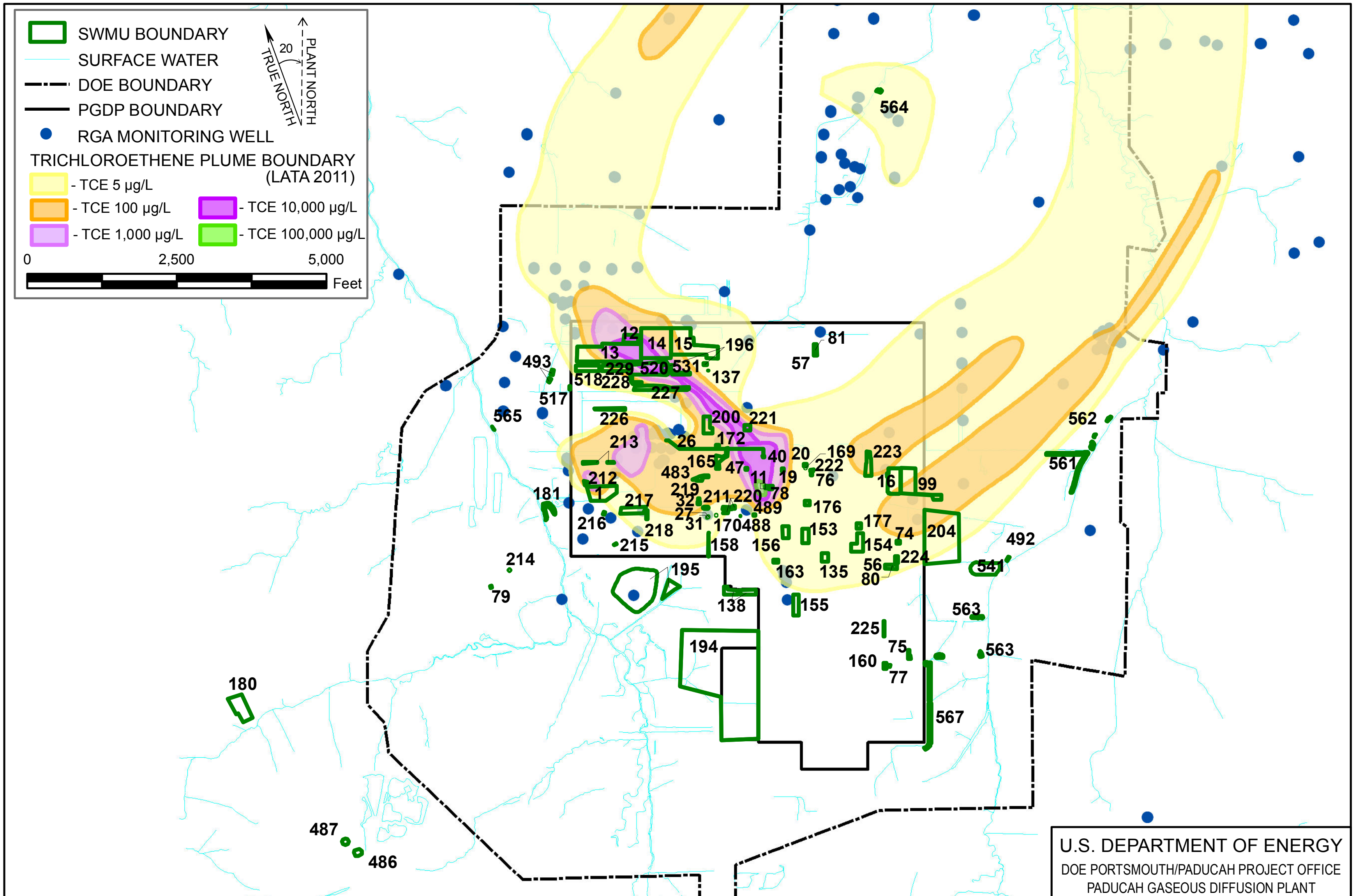

Figure 3.5. Location of Trichloroethene Plume in Relation to Soils OU SWMUs

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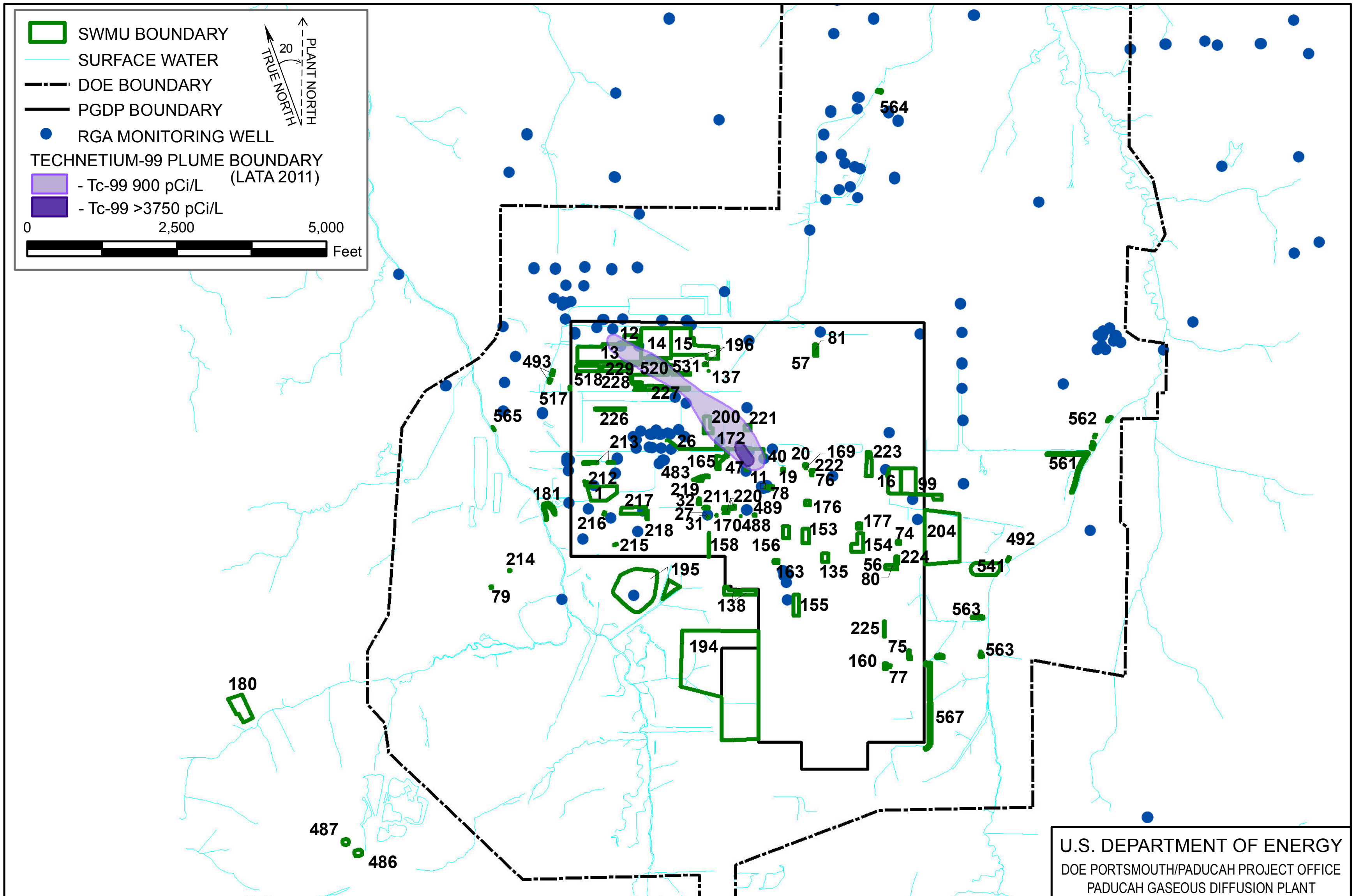

Figure 3.6. Location of Technetium-99 Plume in Relation to Soils OU SWMUs

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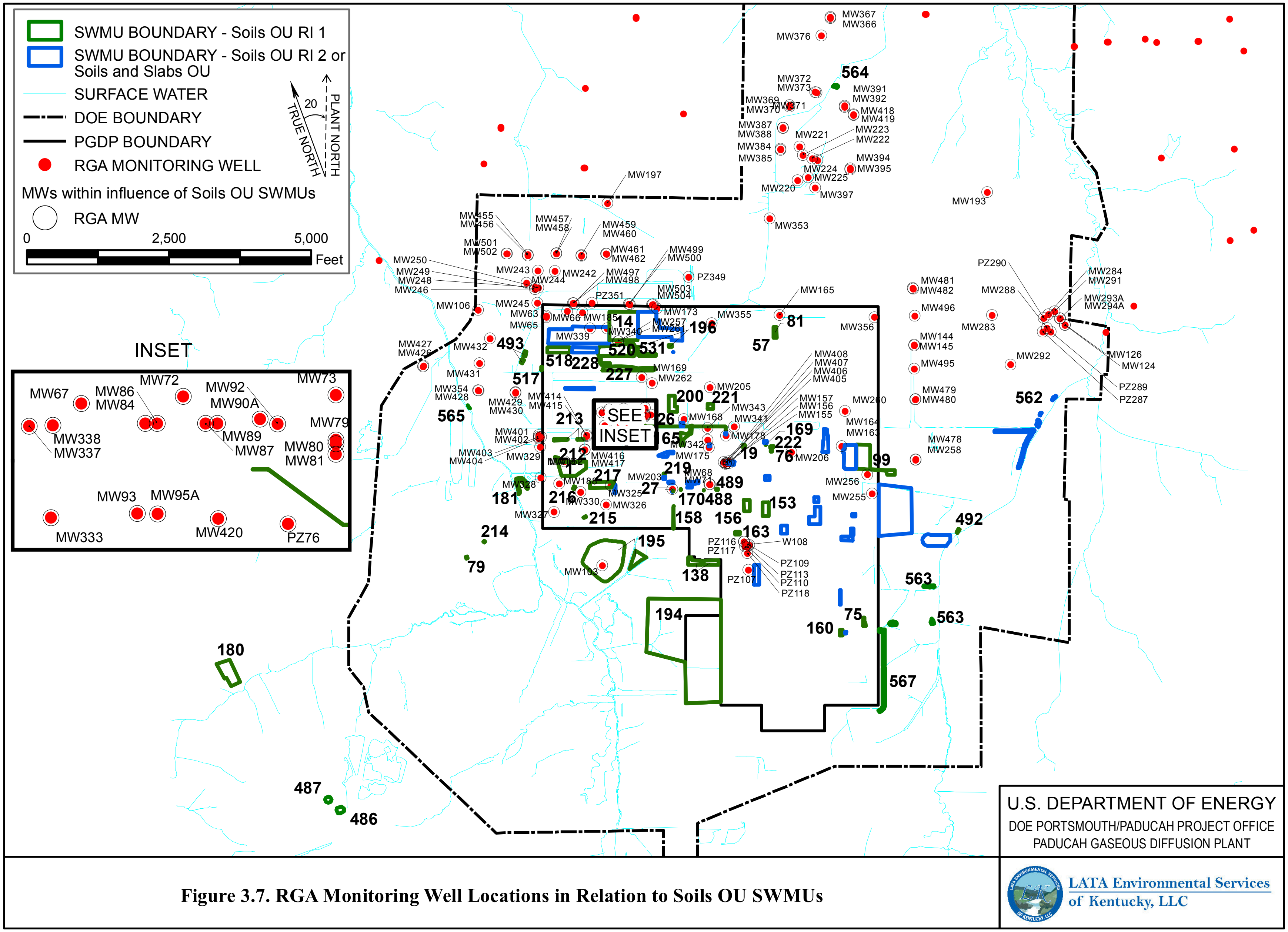

Figure 3.7. RGA Monitoring Well Locations in Relation to Soils OU SWMUs

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PGDP is northward to the Ohio River, similar to that of the RGA. Hydraulic potential is greater in the RGA than in the McNairy Flow System beneath PGDP. Area monitoring well clusters document an average downward vertical gradient of 0.03 ft/ft. Because the RGA has a steeper hydraulic potential slope toward the Ohio River than does the McNairy Flow System, the vertical gradient reverses nearer the Ohio River. [The "hinge line," which is where the vertical hydraulic gradient between the RGA and McNairy Flow System changes from a downward vertical gradient to an upward vertical gradient, parallels the Ohio River near the northern DOE property boundary (LMES 1996).]

The contact between the Lower Continental Deposits and the McNairy Formation is a marked hydraulic properties boundary. Representative lateral and vertical hydraulic conductivities of the upper McNairy Formation in the area of PGDP are approximately 0.02 ft/day and 0.0005 ft/day, respectively. Vertical infiltration of groundwater into the McNairy Formation beneath PGDP is on the order of 0.1 inch per year. (Lateral flow in the McNairy Formation beneath PGDP is on the order of 0.03 inch per year.) As a result, little interchange occurs between the RGA and McNairy Flow System.

Hydrogeologic Units

Five hydrogeologic units (HUs) commonly are used to discuss the shallow groundwater flow system beneath the DOE site and the contiguous lands to the north (Figure 3.8). In descending order, the HUs are described below:

- Upper Continental Deposits
  - HU 1 (UCRS): Loess that covers the entire site.
  - HU 2 (UCRS): Discontinuous sand and gravel lenses in a clayey silt matrix. In some areas of the plant, the HU2 interval consists of an upper sand and gravel member (HU2A) and a lower sand and gravel member (HU2B) separated by a thin silt unit.
  - HU 3 (UCRS): Relatively impermeable unit that acts as the upper semiconfining-to-confining layer for the RGA. The lithologic composition of HU3 varies from clay to fine sand, but is predominantly silt and clay.
  - HU 4 (RGA): Near-continuous sand unit with a clayey silt matrix that forms the top of the RGA.
- Lower Continental Deposits
  - HU 5 (RGA): Gravel, sand, and silt.

3.7 DEMOGRAPHY AND LAND USE

The WKWMA and some sparsely populated agricultural lands surround PGDP. Historically, the economy of western Kentucky has been based on agriculture, although there has been increased industrial development in recent years. USEC employs approximately 1,400 people, while the TVA Shawnee Fossil Plant employs an additional 260 people. According to the 2009 census estimates for the total population within the 32 counties that lie within a 50-mile radius of PGDP is approximately 731,500; and approximately 89,000 people live within the three counties contained within a 10-mile radius of the plant (Massac County, Illinois, and Ballard and McCracken Counties, Kentucky). The estimated population of

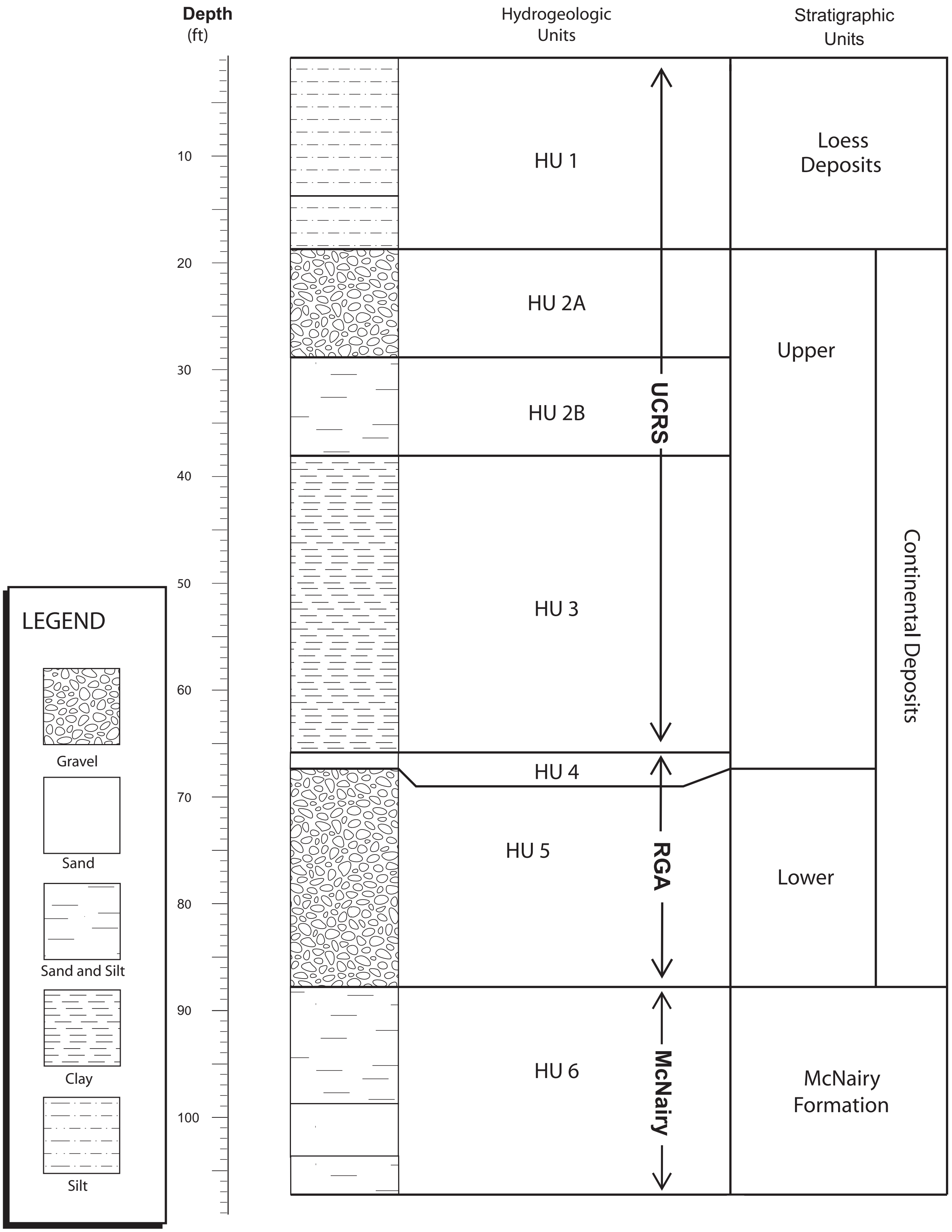

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Figure 3.8. Example Stratigraphic and Hydrogeologic Units

Paducah, Kentucky, (2009) is approximately 25,720. Metropolis, Illinois, has an estimated population (2009) of approximately 6,490 (U.S. Census Bureau 2009).

In addition to the residential population surrounding the plant, WKWMA draws thousands of visitors each year for recreational purposes. Visitors use the area primarily for hunting and fishing, but other activities include horseback riding, hiking, and bird watching. An estimated 5,000 fishermen visit the area each year.

3.8 ECOLOGY

The following sections give a brief overview of the terrestrial and aquatic systems at PGDP. A more detailed description, including identification and discussion of sensitive habitats and threatened/endangered species, is contained in the *Investigation of Sensitive Ecological Resources Inside the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (CDM Federal 1994) and *Environmental Investigations at the Paducah Gaseous Diffusion Plant and Surrounding Area, McCracken County, Kentucky, Volume V: Floodplain Investigation, Part A: Results of Field Survey* (COE 1994).

3.8.1 Terrestrial Systems

The terrestrial component of the PGDP ecosystem includes the plants and animals that use the upland habitats for food, reproduction, and protection. Upland vegetative communities in the vicinity of PGDP consist primarily of grassland, forest, and thicket habitats with agricultural areas. The main crops grown in the PGDP area include soybeans, corn, tobacco, and sorghum.

Most of the area in the vicinity of PGDP has been cleared of vegetation at some time. PGDP mows much of the grassland habitat adjacent to the plant. The Kentucky Department of Fish and Wildlife Resources manages a large percentage of the adjacent WKWMA to promote native prairie vegetation by burning, mowing, and various other techniques.

Dominant overstory species of the forested areas include oaks, hickories, maples, elms, and sweetgum. Understory species include snowberry, poison ivy, trumpet creeper, Virginia creeper, and Solomon’s seal. Thicket areas consist predominantly of maples, black locust, sumac, persimmon, and forest species in the sapling stage with herbaceous ground cover similar to that of the forest understory.

Wildlife commonly found in the PGDP area consists of species indigenous to open grassland, thicket, and forest habitats. Small mammal surveys conducted on WKWMA documented the presence of southern short-tailed shrew, prairie vole, house mouse, rice rat, and deer mouse (KSNPC 1991). Large mammals commonly present in the area include coyote, eastern cottontail, opossum, groundhog, whitetail deer, raccoon, and gray squirrel. Mist netting activities in the area have captured red bat, little brown bat, Indiana bat, northern long-eared bat, evening bat, and eastern pipistrelle (KSNPC 1991).

The typical birds of the area are European starling, cardinal, red-winged blackbird, mourning dove, bobwhite quail, turkey, killdeer, American robin, eastern meadowlark, eastern bluebird, bluejay, red-tail hawk, and great horned owl.

Amphibians and reptiles present in the PGDP area include cricket frog, Fowler’s toad, common snapping turtle, green tree frog, chorus frog, southern leopard frog, eastern fence lizard, and red-eared slider (KSNPC 1991).

3.8.2 Aquatic Systems

The aquatic communities in and around the PGDP area that could be impacted by PGDP discharges include two perennial streams (Bayou Creek and Little Bayou Creek), the North-South Diversion Ditch (NSDD) (a former ditch for the discharge of plant effluents to Little Bayou Creek), a marsh located at the confluence of Bayou Creek and Little Bayou Creek, and other smaller drainage areas. The dominant taxa in all surface waters include several species of sunfish, especially bluegill and green sunfish, as well as bass and catfish. Shallow streams, characteristic of the two main area creeks, are commonly dominated by bluegill, green and longear sunfish, and stonerollers.

3.8.3 Wetlands and Floodplains

The wetlands of the PGDP vicinity include a swamp covering 165 acres immediately south of the confluence of Bayou and Little Bayou Creeks. A 1994 study of the PGDP area by the U.S. Corps of Engineers (COE) (1994) groups the area wetlands into 16 vegetative cover types encompassing forested, scrub/shrub, and emergent wetlands. Wetland vegetation consists of species such as sedges, rushes, spikerushes, and various other grasses and forbs in the emergent portions; red maple, sweet gum, oaks, and hickories in the forested portions; and black willow and various other saplings of forested species in the thicket portions. Wetlands inside the plant security fence are confined to portions of drainage ditches traversing the site (CDM Federal 1994).

At PGDP, three bodies of water cause most area flooding: the Ohio River, Bayou Creek, and Little Bayou Creek. The floodplain analysis performed by the COE found that much of the built-up portions of the plant lie outside the 100- and 500-year floodplains of these streams (COE 1994). In addition, this analysis determined that ditches within the plant area can contain the expected 100- and 500-year discharges. It should be noted that precipitation frequency estimates for the 100- and 500-year events were updated in 2004 in the NOAA Atlas 14 (NOAA 2004). In the updated report, the mean precipitation estimate for the 100-year, 24-hour event in Atlas 14 for the Paducah area is 10.1% to 15% greater than the mean estimate in previous publications. As stated in Atlas 14, in many cases, the mean precipitation estimate used previously still is within the confidence limits provided in Atlas 14; therefore, it is likely the plant ditches still will contain the 100- and 500-year discharges.

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4. EVALUATION APPROACH

Prior to GDP shutdown, the Soils OU will focus on accessible plant surface soils (ground surface to 10 ft bgs and 16 ft bgs in the vicinity of pipelines) not associated with PGDP operations (DOE 2012a). This Soils OU RI Report has been prepared to present findings from the investigation conducted to adequately assess the nature and extent of the release or threat of release of hazardous substances, pollutants, or contaminants or hazardous wastes and hazardous constituents and to gather necessary data to support the corresponding baseline risk assessment (BRA) and FS, and shall be consistent with 40 *CFR* § 300.5 (EPA 1998), as planned by the Work Plan (DOE 2010a). This report is a foundation to determine what actions, if any, are needed to address impacts in soils associated with the Soils OU.

This report does the following:

- Provides a summary of the samples collected and analytical results by SWMU/AOC and COPC, including a summary of the sampling methodology;

- Screens the results against background and risk-based levels taken from the Risk Methods Document (DOE 2011a) and developed in the BHHRA (Appendix D) to identify COCs that are present at the SWMU/AOC;

- Presents the results of a BHHRA, including selection of COCs for each SWMU/AOC based upon consideration of uncertainties in risk characterization and observations on the risk evaluation [e.g., adjust dermal absorption for each SWMU based on RAGS Part E (EPA 2004), as referenced in DOE letter dated April 23, 2012 (DOE 2012b)];

- Develops Remedial Goal Options (RGOs) for scenarios evaluated in the BHHRA; and

- Compares the analytical results to the RGOs and presents a summary of those comparisons.

The information/data and analyses that form the basis of the decision process for the remainder of the SWMUs/AOCs are documented in subsections of the Chapters 5–11 of this RI. Given the large number of SWMUs/AOCs, this section highlights the information to be presented generally for each of these SWMU/AOC evaluations to address the goals of the RI. Of note is SWMU 57 that, due to its small size and location, has been evaluated as part of SWMU 81, and the evaluation has been summarized in the discussion on SWMU 81.

4.1 DATA SETS

The data set for the Soils OU consists of historical data collected at depths up to 16 ft bgs and data collected during this RI. Use of historical and RI data is addressed in Appendix B. The historical data set includes the Soils OU analytical suite as defined in the Work Plan (DOE 2010a) and was evaluated as described in the Work Plan. Any exceptions to the rules indentified in the Work Plan have been noted in Appendix D.

Collectively, quality historical data and RI data are considered the representative data set and are sufficient for decision making associated with the SWMUs/AOCs evaluated in this report.

During the RI, the data collected consisted of field laboratory (i.e., PCB test kits and metal analysis by XRF) and fixed-base laboratory data analyses. Data quality is described in Appendix B. Of note, the evaluation of the XRF data with fixed-base laboratory data indicates the use of XRF results for copper, iron, lead, nickel, uranium, and zinc has good correlation and, therefore, is reliable for use in determining nature and extent and hot spots. Molybdenum, mercury, selenium, and silver XRF results are generally below the reporting limits and will not lead to incorrect decisions in the risk assessment; however, these results may not provide much useful information for nature and extent determination. Use of XRF results for arsenic, chromium, and manganese has uncertainties; however, higher values in the complete data set indicate overall patterns in SWMUs/AOCs. Uncertainties associated with arsenic will be managed in the FS, because detections at high concentrations from the fixed-base laboratory were detected at lower concentrations by the XRF and may lead to underestimating risk. For vanadium, comparison with the fixed-base laboratory data indicates risks derived from XRF data will be significantly overstated for detects. See Appendix B for additional information.

In general, because of differences in detection limits, XRF detections near or below their detection limits may incorrectly suggest the presence of the metal above background levels.

Uncertainty Analysis. Because of the scope of this RI, the conducted evaluations used the entire data set, default assumptions, and standard evaluations (e.g., screening using maximum values) that do not incorporate potentially-relevant differences among SWMUs/AOC. This is appropriate for the RI; however, the use of this approach introduces an uncertainty because such an evaluation may overestimate the impacts associated with an individual SWMU/AOC. In developing alternatives in the FS, additional evaluation may be performed to address these uncertainties. Additional evaluation may include these steps or processes.

1. Incorporate future changes to site conditions.

2. Evaluate the data from a given SWMU/AOC against the full range of background (rather than the initial screening against site-specific background already conducted). This additional evaluation would seek to identify whether the presence of certain metals and radionuclides in the Soils OU SWMUs/AOCs is at levels consistent with or above background.

3. Reconsider the default assumptions used in the data treatment for a given SWMU/AOC to ensure that the FS considers the data and determines them to be representative of the SWMU/AOC conditions.

4. Evaluate individual constituent results to ensure that they should properly be considered as representative of the data set. These evaluations may include these steps or processes.

   - Review data associated with common laboratory contaminants [e.g., methylene chloride (EPA 1996)]. The concentrations in the Soils OU data set may be associated with laboratory contamination; therefore, before an action is taken to address the methylene chloride at a given SWMU/AOC, its presence in the SWMU/AOC may be reevaluated to determine whether these data are representative of the actual site conditions.

   - Reevaluate data to develop a set more representative of actual conditions. As noted, the RI typically conducted an initial screening using the maximum value. The FS may perform additional data evaluation to subdivide the SWMUs/AOCs to allow the remedial approach to treat sub-areas differently, should this evaluation warrant. For example, the FS could contemplate removal of hot spots that would then allow a reestimation of the data set to be representative of the residual conditions;

5. Adjust the default parameters to more accurately reflect the specific SWMU/AOC conditions. For example, the soil/water distribution coefficient (i.e., K_d) for technetium-99 is a very sensitive

parameter used in groundwater modeling (DOE 2011a). The K_d for technetium-99 that was used in the modeling assumes the technetium-99 is in a form that will readily dissolve in water; however, the form of this constituents at a particular SWMU may not conform to this assumption. Should additional evaluation identify that the K_d for a given constituent for a SWMU is not appropriate, the value may be adjusted and the modeling reperformed to support the FS remedy evaluation.

4.2 GAMMA WALKOVER SURVEY

Gamma walkover surveys (GWSs) were completed as part of this RI to indicate levels of high activity to support the collection of judgmental radiological samples for fixed-base laboratory analysis to be used to better understand the nature of contamination (DOE 2010a). Results of GWS for many SWMUs and AOCs were found not to match up well with results from samples sent for fixed-base laboratory analyses. There are two primary contributing factors for this lack of correlation between the results of GWS and analyses of samples sent to the fixed-base laboratory:

1. *A priori* calculations of detector response and scanning MDC were performed in accordance with Multi-Agency Radiological Survey and Site Investigation Manual (MARSSIM), as approved by Nuclear Regulatory Commission, DOE, and EPA. Guidance and examples contained within MARSSIM and supporting documents (such as NUREG 1507) provide the equations and parameters for determining scanning MDC and derivation of a net cpm value correlating to a specific soil concentration in pCi/g. These calculations are performed using default parameters that describe an area 56 cm in diameter uniformly contaminated down to 15 cm bgs. If the contaminated area is larger or smaller than the area used in the calculations or the contamination is not uniform, then different results in net cpm correlate to varying activity concentrations. For example, using the default parameters, a 10,800 net cpm is equivalent to an activity concentration of uranium-238 and short-lived decay products of 171 pCi/g of soil. If the contaminated area is really 100 cm in diameter, then the same reading of 10,800 cpm is equivalent to an activity concentration of uranium-238 and short-lived decay products of 25 pCi/g of soil.

2. The GWS net cpm result and the fixed-base laboratory sampling result represent contamination present in different parts of the soil column. The GWS net cpm result is representative of contamination found on or near the soil surface. The sample collected for fixed-based laboratory analysis, however, is representative of contamination that extends from the soil surface to a depth of 6 inches after the vegetative layer is removed, if necessary.

For some locations, results of GWS may not match well with results from fixed-base laboratory analyses due to influence of background radiation. For example, for several Soil OU SWMUs and AOCs, the “shine” from adjacent yards containing cylinders of UF_6 does not allow for the reliable GWS measurement of soil contamination in the SWMU or AOC.

4.3 NATURE AND EXTENT

The SWMU/AOC evaluations focus first on summarizing the representative analytical results for surface and subsurface soils. The process for highlighting chemicals of greatest potential interest was done consistent with the work plan considering the following:

· Background concentrations

· Action levels (ALs) and no action levels (NALs) (industrial worker on-site, teen recreator off-site)

· Groundwater protection site-specific remedial guide soil screening levels (RG SSLs) for the UCRS and RGA [dilution attenuation factors (DAFs) of 1 and 58 for the UCRS and RGA, respectively, based on MCLs, where available]

The values used for highlighting the contaminants of greatest potential interest (denoted as COPCs in Nature and Extent sections) are consistent with the Risk Methods Document (DOE 2011a) and are included in Appendix D for the chemicals evaluated for this OU. The RG SSLs protective of groundwater for the RGA screening are discussed further in Section 4.4 and Appendix C.

4.4 FATE AND TRANSPORT

Potential migration of surface and subsurface contamination may occur via leaching to groundwater and subsequent transport or runoff of surface contamination to adjacent drainageways. SWMUs that are adjacent to drainageways are identified, and where COPCs are identified in surface soils, this pathway is considered complete, but only qualitatively evaluated. Internal plant ditches are grass-lined and the outfall ditches are grass-lined or otherwise stabilized; therefore, the contaminants are not likely to be transported attached to suspended soil particles within the ditches and outfalls (DOE 2008a).

The surface water pathway is not considered a likely off-site exposure route from Soils OU source areas. Surface water at the site is controlled by a series of ditches and outfalls. Surface water flow in the ditches is intermittent and not consistently available for human contact; therefore, risk was not calculated for future contaminants in surface water. Additionally, the intermittent flow limits the ecological receptors that are present in the ditches.

The SI/BRA for the SWOU (DOE 2006) presented the following for the outfalls and their associated internal ditches. Of the 54 contingency samples collected from internal ditches and areas associated with outfalls 001, 008, 010 and 015, seven showed uranium-238 and/or cesium-137 activity exceeding indicator levels. Six contingency samples and one duplicate sample showed elevated PCB concentrations in the outfalls. This was most notable in Outfall 010, EU 10, where all five of the contingency samples contained Total PCB concentrations in excess of 100 mg/kg each. This indicates that there is a potential source uncertainty to manage considering impacts to ditches bordering the Soils OU SWMUs.

Based upon the modeling performed as part of the SWOU Engineering Evaluation/Cost Analysis for the outfalls and their associated internal ditches, no contaminants are migrating in surface water (dissolved or through sediment) from ditches to surrounding creeks at concentrations that may adversely impact human health (DOE 2008b).

The concentration at the source area is assumed to be higher than what would be found in the runoff. Therefore, the concentration at the source area (direct contact) provides a conservative surrogate for the risks posed by the runoff. (i.e., the runoff would not pose a greater risk than the source area and the direct contact evaluation addresses this uncertainty of migration impacts).

Only the northwest corner of PGDP (e.g., SWMU 14) provides an exception. The Northwest Corner Scrap Yard area is controlled under an interim corrective measure. Drainage ditches around SWMU 14 are routed to the C-613 Sedimentation Basin before discharging into Outfall 001.

A primary migration pathway of concern for contaminants in soil is the potential for these to pose an ongoing source of contamination to RGA groundwater and subsequent migration to off-site areas. In Chapters 5–11 of this RI, the nature and extent evaluation highlights detected contaminants exceeding the RG SSL for one or more of the samples. The RG SSL for the RGA screening is derived using the project-specific DAF of 58 and the RG SSL for the UCRS screening is derived using the project-specific DAF of 1, as presented in Appendix C, Attachment C2.

This process conservatively identifies chemicals that should be considered further for potential impacts to the RGA and downgradient receptors. The screening process is supplemented with a review of related information to ensure that concentrations that may be below background levels or of constituents that do not pose a threat to the RGA at PGDP and/or are infrequently detected/exceeded are not evaluated further. Therefore, a process to refine this list and identify chemicals for more detailed modeling was established as discussed in Appendix C, Attachment C1.

4.4.1 Process for Developing Target Soil Constituents for Modeling

The overall modeling process as detailed in Appendix C includes the following:

- Screen historical and RI analytical results from the Soils OU against the RG SSLs protective of groundwater to identify soil constituents that might impact groundwater;

- Review of the site-related soil constituents that are not screened from further modeling to identify which SWMU/AOC soil constituent combinations to subject to more detailed modeling;

- Identify certain process-related soil constituents for detailed modeling even though they were not detected above RG SSLs for groundwater protection to ensure appropriate DAF was used;

- Identify hotspots by evaluating the distribution of soil contaminants across SWMUs/AOCs using Spatial Analysis and Decision Assistance (SADA) software (UT 2002);

- For soil constituents selected for detail modeling, evaluate transport to the RGA using Seasonal Soil Compartment Model (SESOIL); and

- Estimate the concentrations of soil constituents in RGA groundwater at the SWMU/AOC boundary and downgradient locations using Analytical Transient 1-,2-,3-Dimensional (AT123D).

It was clear when reviewing these screening results on an OU-wide basis, that many of these chemicals were not indicative of potential threats to groundwater based on the data patterns, background, and results of groundwater monitoring. Many of the RG SSLs are at concentrations consistent with background for many naturally occurring chemicals, a factor that was considered further in the modeling process. Because of these issues, the list of chemicals was refined to define more accurately those with potential concern for impacts to the RGA.

For example, VOC concentrations at levels below that which would pose a risk to the RGA groundwater (e.g., TCE at SWMU 217 at 0.014 mg/kg) still may have the potential to impact a limited volume of UCRS water or soil vapors that hypothetically would pose a low risk under a future residential scenario where contact with UCRS water or soil vapors could occur (as in a basement for a residence built into SWMU 217). SWMUs/AOCs that have detectable levels of VOCs that are not considered to pose a threat to RGA groundwater include SWMUs/AOCs 1,[2] 165, 217, 227, 489, 493, 517, 518, 541, and 561.

This RI developed information to support the FS evaluation of a range of remedial alternatives selected for a given SWMU/AOC that addresses potentially complete exposure pathways and manages the risks/uncertainties identified in this RI.

[2] VOCs in SWMU 1 are addressed in the VOC Sources for the Southwest Plumes ROD (DOE 2012c).

Initial screening of the maximum detected value of constituents from each SWMU/AOC included determining how many of the results from that SWMU/AOC had a detected value greater than the RG SSL or the greater of the surface and subsurface background value.

Additional evaluation was conducted to identify which groundwater SWMU/AOC soil constituent combinations were actually subjected to groundwater modeling. The additional evaluation included a comparison of the overall average value of the constituent (calculated using both detected values and nondetected values at one-half the detection limit) with the screening values described above. If the overall average value of the constituent for the SWMU/AOC was below the background value or the RG SSL, then the constituent was not further considered for modeling for fate and transport. If the average value was above both the background value and the RG SSL, then the constituent was reviewed further to identify whether modeling would be performed.

Further, to determine if hot spots existed within a SWMU/AOC, for those SWMUs/AOCs not already being modeled, the detected results of those constituents exceeding either the RG SSL or background value were visually examined and evaluated, [e.g., consideration of GWOU FS (DOE 2001d) and SADA (see Appendix C)].

Based on the screening discussed in Appendix C, Attachment C1, modeling was completed for the soil constituents as listed in Table 4.1.

Table 4.1. SWMUs/AOCs and Associated Soil Constituents Subjected to Modeling

SWMU/AOC	Soil Constituent
1	Trichloroethene*
1	*cis*-Dichloroethene*
1	Vinyl Chloride*
14	Chromium (+3/+6)
14	Nickel
14	Technetium-99
81	Uranium
81	Total PCBs
165	Arsenic
541	Total PCBs
564	Arsenic

* Not modeled as part of Soils OU RI; addressed as part of the Southwest Plume.

4.4.2 Data Interpretation and Results for Target Groundwater Modeling Soil Constituents

Chemicals subjected to detailed modeling underwent SESOIL and AT123D modeling evaluation to further refine the estimates of RGA groundwater concentrations at the SWMU/AOC boundary and also at downgradient locations (Appendix C).

4.5 RISK ASSESSMENT

Grid sampling for the RI was set up primarily on 45-ft centers with compositing of five grab samples within each grid for two horizons: surface and subsurface. Coordinates for these samples were recorded as the center of the grid, as the composite sampling was designed to be representative of the grid. The grid sampling yielded approximately 10 samples per horizon per half acre, on average. [One-half acre is significant because it typically is used as the size of an exposure unit (EU) for risk assessment purposes.]

Step-out contingency locations were included in the EU to which the contingency grid is adjacent. As described in the Work Plan, step-out contingency grids were sampled if contamination was found at the boundary of a SWMU/AOC when field data results exceeded the AL listed in Table 9.2 of the Work Plan (DOE 2010a). This table is reproduced as Table 4.2 of this report. Up to two grids were sampled past the SWMU/AOC administrative boundary unless an anthropogenic feature (e.g., ditch, road, building, or another SWMU/AOC) was reached. All of these samples obtained field analytical data for metals and PCBs. Additionally, fixed-base analytical data were obtained for each horizon for each unit for metals and PCBs, as well as radionuclides and semivolatile organic compounds (SVOCs). Samples from which fixed-base analytical data were obtained were selected randomly among the samples on each horizon (i.e., the surface grid sample and the subsurface grid sample submitted for fixed-base laboratory analysis may not be from the same grid location).

Table 4.2. Field Analysis and Limits for Grid Sampling and Radiological Walkovers

Analyte	Project Quantitation Limit (mg/kg)	Industrial Worker ELCR = 1E-5 (mg/kg)[a]	Industrial Worker HI = 1 (mg/kg)[a]	PGDP Background (mg/kg)[b]	Project Action Limit (mg/kg)[c]
Antimony	30	NA	3.79	0.21	30
Arsenic	11	5.23	84.1	7.9	11
Barium	100	NA	2,290	170	170
Cadmium	12	753,000	213	0.21	12
Chromium	85	109,000	3,560	16	85
Copper	35	NA	4,930	19	35
Iron	100	NA	20,700	28,000	28,000
Lead	13	NA	50[d]	23	23
Manganese	85	NA	452	820	820
Mercury	10	NA	9.82	0.13	10
Molybdenum	15	NA	830	NA	830
Nickel	65	NA	2,420	21	65
Selenium	20	NA	949	0.7	20
Silver	10	NA	411	2.3	10
Uranium	20	NA	202	4.6	20
Thallium	20	NA	7.27	0.21	20
Vanadium	70	NA	33.2	37	70
Zinc	25	NA	27,300	60	60
Total PCBs	5	1.99	NA	NA	5
Uranium-238[e]	NA	17.1 pCi/g	NA	11,000 cpm	1,800 ncpm 10,300 ncpm[f]

Table is taken from Table 9.2 of the Work Plan (DOE 2010a).
n/a = not applicable.
[a] ELCR and HI values are derived from values presented in Table A.17 of the Risk Methods Document (DOE 2001c).
[b] PGDP background values are taken from Table A.12 of the Risk Methods Document (DOE 2001c), the lesser of surface and subsurface is presented.
[c] The project action limit is the greater of background and the more conservative between the ELCR and the HI, unless unachievable by the quantitation limit. If unachievable, the project quantitation limit is used as the project action limit.
[d] The value for lead is the no action level presented in Table A.17 of the Risk Methods Document (DOE 2001c), this value was not adjusted to ELCR=1E-5 or HI=1.
[e] Uranium-238 measurements will be collected with a FIDLER (Field Instrument for the Detection of Low Energy Radiation) connected to a Ludlum Model 2221 digital scalar and ratemeter. Ambient detector background is due to a combination of naturally occurring radionuclides, cosmic rays, electronic instrument noise, fallout from atomic weapons testing, and other components. Presently, the FIDLER/2221 combination measures background at 11,000 cpm.
[f] Based on the 3/1/10 conference call, Project Action Limits will be set to 30 pCi/g (1,800 ncpm) for AOCs and SWMUs outside the Limited Area (plant fence) and 171 pCi/g (10,300 ncpm) for AOCs and SWMUs inside the Limited Area. Net count per minute values corresponding to Project Action Levels are developed in accordance with NURGEG-1507 methodology. Should the Project Action Limit be reached, the elevated area indicating greater than the Action Level will be bounded, one grab sample will be collected from the location representing the highest detected activity, and the sample will be analyzed by a fixed-base laboratory for radiological constituents.

Acceptable historical data, as determined by the data quality analysis, were assigned to an appropriate grid before beginning the data analysis described here.

Historical data located outside the SWMU/AOC boundary and outside the boundary of a step-out contingency grid will not be considered applicable to the SWMU/AOC.

The representative sampling design for the SWMUs/AOCs was gridding. In some instances (such as SWMUs/AOCs not grid sampled in summer 2010), when a grid was applied to the SWMUs/AOCs, empty cells resulted. In order to fill an empty cell, the average value of similar cells was considered the most appropriate value. For this RI, similar cells were defined as those within the EU. Samples outside the SWMU/AOC boundary were considered similar to step-outs, as described above (i.e., if data near the boundary are above screening values, then data outside the boundary up to 45 ft was included in the data set). SWMUs/AOCs where no historical data was available and were not grid sampled in summer 2010 have been assigned to be included with another action as noted in the work plan (e.g., "This SWMU will be addressed as a final action as part of the Soils and Slabs OU, which is scheduled to occur during post-GDP shutdown activities.").

For each grid, a detect or nondetect flag was assigned for each analyte using field laboratory data, fixed-base laboratory data, and/or historical data. All radiological data was considered detects. A nondetect flag was set only if both field laboratory results and fixed-base results are nondetect or not available. Flags were assigned according to the following rules:

(1) If field laboratory result is a nondetect and a fixed-base laboratory sample was not collected and an acceptable historical result is not available for the grid, then the grid is assigned a nondetect flag.

(2) If the field laboratory result is a nondetect and a fixed-base laboratory sample was collected or an acceptable historical result is available, then the fixed-base laboratory or historical result is used in assigning flag.

    (a) If the fixed-base laboratory result is a nondetect, then the grid is assigned a nondetect flag.

    (b) If the fixed-base laboratory result is a detect, then the grid is assigned a detect flag.

(3) If the field laboratory result is a detect and a fixed-base laboratory sample was not collected and no acceptable historical result is available for the grid, then the grid is assigned a detect flag.

(4) If the field laboratory result is a detect and a fixed-base laboratory sample was collected or an acceptable historical result is available, then

    (a) If the fixed-base laboratory result is a nondetect, then the grid is assigned a detect flag.

    (b) If the fixed-base laboratory result is a detect, then the grid is assigned a detect flag.

For each grid, a concentration for each analyte was assigned.

(1) If the analyte has a nondetect flag for the grid, then the concentration was set as the lower of field laboratory and fixed-base laboratory detection limit.

(2) If the analyte has a detect flag, then the concentration was set as the maximum detected value across field laboratory and fixed-base laboratory results.

These rules are in the flowchart depicted in Figure 4.1.

Background values (see Appendix D) were compared on an EU basis by examining the results across all the grids within the EU. Nondetect results were not considered present above background even if the detection limit for the chemical was greater than the background value; a discussion of the uncertainty associated with this approach is presented in Appendix D, Attachment D7. If an analyte was detected in one or more grids within the EU, then the maximum detected value across all grids within the EU was used for background comparison. (If the maximum detected value was greater than background, then the analyte is considered to be present above background. If the maximum detected value was less than background, then the analyte is not considered to be present above background.) The maximum radiological value across all the grids within the EU was used for background comparison.

COPCs were selected for each EU for those analytes that were detected above background and where the maximum detected value is greater than the no action level [as defined in the Risk Methods Document (DOE 2011a) for the hypothetical child residential scenario, see Appendix D]. As described in the Work Plan, for those analytes that were never detected within an EU, even if the detection limit is greater than the NAL, the analyte was not considered a COPC (DOE 2010a). With the large number of samples required for the gridded sampling approach, the majority of the samples were analyzed using field analytical instruments. Though the quantitation limits are higher for these instruments, the increased coverage of each unit decreases the uncertainty of the analytical precision. Trace analytes may not be determined throughout the unit, but major constituents are thus, less likely to be missed. Fixed-base laboratory detection limits that are higher than no action levels were addressed as an uncertainty in the baseline human health risk assessment.

Exposure point calculations were performed for each EU for those analytes that are retained as COPCs. For each COPC, data were summarized within each sampling location (i.e., within each grid) before calculating the exposure point concentration (EPC) for the EU. This was necessary to ensure that each location was equally represented in the EU EPC calculation. The scenarios shown in Figure 4.2 illustrate each possible case that may have resulted from implementation of the field sampling strategy for this RI and its response.

Further, in Case 1, shown in Figure 4.2, the COPC consists of all detected results, so the EPC was calculated using, as the grid result, the maximum detected value within the grid.
In Case 2, only detect and nondetect field results are available for grids. In this case, the EPC for the EU is calculated using the maximum detected field result for grids with detected results and the field detection limit for grids without a detected result.

In Case 3, data are a combination of historical and field results. In this case, maximum field detect result is used for the grid value if all historical results are nondetects; the maximum historical detect result is used for the grid value if all field results are nondetects; the largest detected value is used as the grid result if all field and historical results are detects, and, the smallest detection limit is used for the grid result if all field and historical results are nondetects. [It should be noted, discarding nondetect results that are greater than the maximum detected result in this manner, if they do not significantly influence the outcome, is consistent with EPA Risk Assessment Guidance (RAGS) (EPA 1989).]

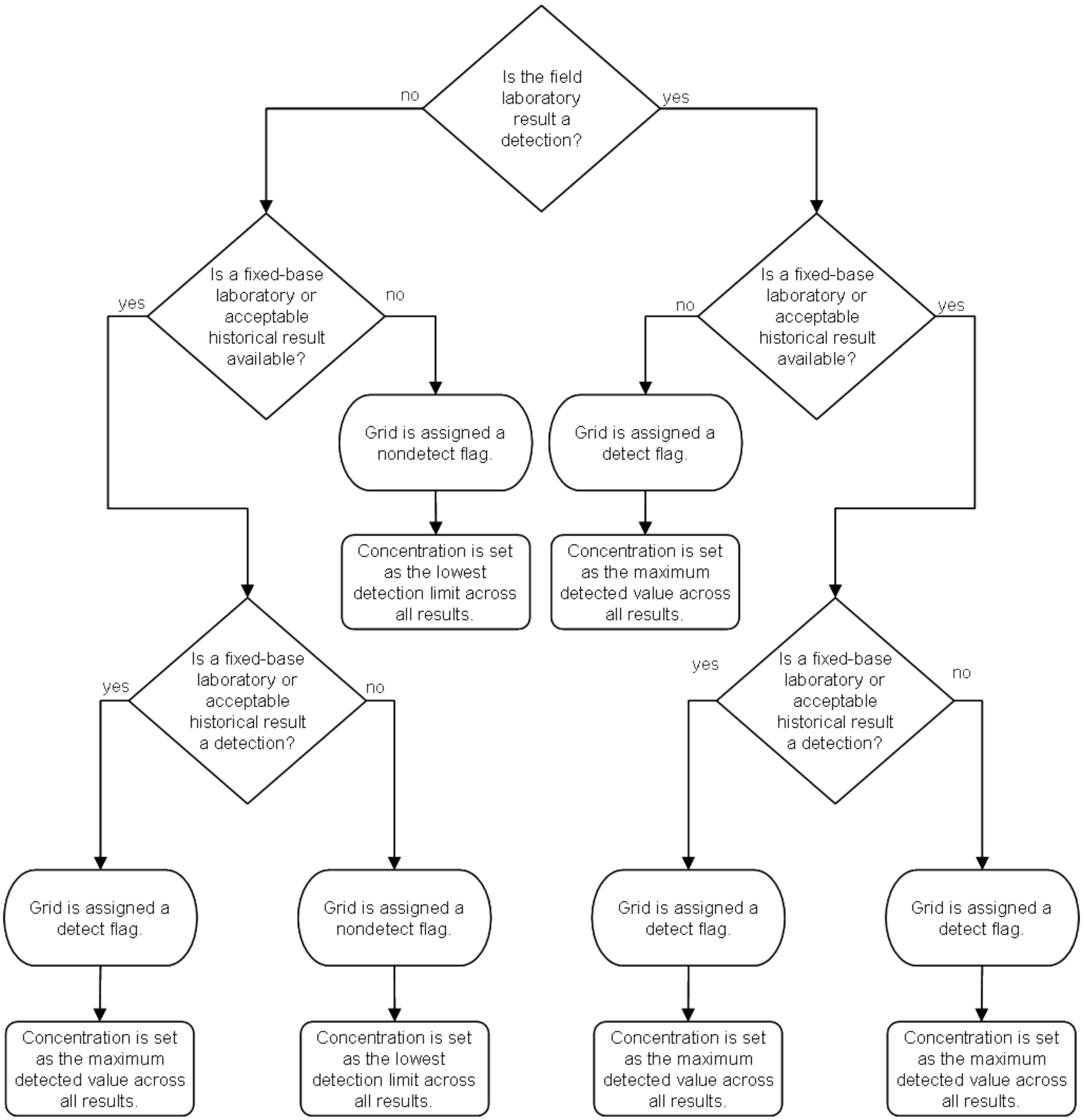


Figure 4.1. Flowchart Depicting Application of Detect and Nondetect Flags

	RESULTS	TO REPRESENT GRID ANALYTE CONCENTRATION
Case 1: *Field laboratory results,* *Fixed-base laboratory results,* *No historical results*	Field laboratory: detect Fixed-base laboratory: nondetect	Use the field laboratory result
	Field laboratory: nondetect Fixed-base laboratory: detect	Use the fixed-base laboratory result
	Field laboratory: detect Fixed-base laboratory: detect	Use the maximum detected result
	Field laboratory: nondetect Fixed-base laboratory: nondetect	Use the smaller detection limit
Case 2: *Field laboratory results,* *No fixed-base laboratory results,* *No historical results*	Field laboratory: detect	Use the field laboratory result
	Field laboratory: nondetect	Use the field laboratory detection limit
Case 3: *Field laboratory results,* *No fixed-base laboratory results,* *Historical results*	Field laboratory: detect Historical: nondetect	Use the field laboratory result
	Field laboratory: nondetect Historical: detect	Use the historical result
	Field laboratory: detect Historical: detect	Use the maximum detected result
	Field laboratory: nondetect Historical: nondetect	Use the smaller detection limit
Case 4: *Field laboratory results,* *Fixed-base laboratory results,* *Historical results*	Field laboratory: detect Fixed-base laboratory: nondetect Historical: nondetect	Use the field laboratory result
	Field laboratory: nondetect Fixed-base laboratory: detect Historical: nondetect	Use the fixed-base laboratory result
	Field laboratory: nondetect Fixed-base laboratory: nondetect Historical: detect	Use the historical result and consider any uncertainties regarding historical data during project nature and extent scoping
	Field laboratory: detect Fixed-base laboratory: detect Historical: nondetect	Use the maximum detected result
	Field laboratory: detect Fixed-base laboratory: nondetect Historical: detect	Use the maximum detected result
	Field laboratory: nondetect Fixed-base laboratory: detect Historical: detect	Use the maximum detected result
	Field laboratory: detect Fixed-base laboratory: detect Historical: detect	Use the maximum detected result
	Field laboratory: nondetect Fixed-base laboratory: nondetect Historical: nondetect	Use the smallest detection limit

Figure 4.2. Exposure Point Concentration Calculation Scenarios

In Case 4, data are a combination of historical, fixed-base laboratory, and field results. In this case, maximum field detect result is used for the grid value if all historical results and fixed-base results are nondetects; the maximum fixed-base detect result is used for the grid value if all field results and historical results are nondetects; the maximum historical detect result is used for the grid value if all field results and fixed-base results are nondetects; the largest detected value is used as the grid result if a combination of field, fixed-base, and historical results are detects; and the smallest detection limit is used for the grid result if all field, fixed-base, and historical results are nondetects. [This methodology is consistent with RAGS (EPA 1989).] A calculation was completed to determine the importance of the anomalous situation where the nondetect result exceeds the maximum detected value within a data set being analyzed. If the nondetect value that exceeds the maximum detected result would cause the EPC to exceed the maximum detected result, then it would be discarded from the data set.

Analytical results from radiological judgmental sampling and pipeline sampling were included with other fixed-base laboratory results when assigning grid values with the grid sampling previously described.

After the data set was built for each analyte within the EU, the rules for EPC calculation were as follows:

(1) If results from fewer than ten grids are available, then the EU EPC was the maximum detected concentration across all grids within the EU.

(2) If results from ten or more grids are available, then a distribution check was performed, and the EU EPC was the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean of the appropriate distribution. EPA's ProUCL 4.0 software incorporates a number of different distributional tests that may be used to perform the distributional tests and calculate the most appropriate UCL (EPA 2007). An exception to this is if not all the grids contained a value for an analyte. In this instance, the average of the grid values present was assigned to the grids with no value before the EU EPC was calculated.

The BHHRA characterized risk and hazard by EU for each SWMU/AOC for all COPCs for the following scenarios:

- Current Industrial Worker
- Future Industrial Worker
- Future Teen Recreational User
- Future Hypothetical Rural Resident
- Outdoor Worker
- Excavation Worker

Likely scenarios for the Soils OU SWMUs/AOCs are discussed in Chapters 5—11 and include that of the future industrial worker for SWMUs/AOCs inside the PGDP secure area and teen recreator for SWMUs/AOCs outside the secure area. Additionally, a hypothetical residential scenario, an excavation worker scenario, and an outdoor worker exposed to surface soils outside the PGDP secure area were assessed for all SWMUs/AOCs.

Analytical results from judgmental radiological sampling and pipeline sampling were included with other fixed-base laboratory results when assigning grid values as previously described.

4.5.1 Human Health

A detailed approach to the risk assessment and the supporting information and tables is provided in Appendix D. For each of the SWMU/AOC summaries, tables are provided with the risk estimates for the various receptors, the COCs, and the primary routes of exposure that are driving these results.

The receptors evaluated and the exposure parameters used to develop risk estimates are in Table 4.3. The following highlighted components of the risk assessment are included in the SWMU/AOC summaries as appropriate.

Direct Contact Exposures. This includes incidental ingestion, inhalation, dermal absorption, and external exposure to ionizing radiation routes of exposure. This may include contact with contamination currently at the surface or to contaminants in the entire soil column in the future during earthwork.

- **Surface soil (0–1 ft) impacts are evaluated with a range of exposure scenarios.** Because of the sizes of the EUs and limited activities in these areas, current worker exposures are estimated based on more representative frequency (14 days/year); however, the future worker scenario includes default assumptions (250 days/year). A future hypothetical resident, a teen recreational user, and outdoor worker scenarios also were evaluated.

- **Surface/subsurface soils.** Bounding the potential contact issues with contaminants that may be present in soils from 0–16 ft requires scenarios either for temporary exposures during excavation or longer term exposures if the soil column were mixed during future activities and, subsequently, a receptor may be in contact with this average concentration for a longer duration. The surface/subsurface soils were evaluated using the outdoor worker assumptions [185 days/year for 25 years as per the Risk Methods Document (DOE 2011a)]. The intake parameters for the excavation worker are the same as the outdoor worker with the exception of exposure frequency or duration. The typical exposure unit was 0.5 acres. Assuming an excavation depth of 15 ft and a rate of 20 m^3 of soil per hour,[3] this excavation would be completed in approximately 58 days. This adjustment to the exposure duration and frequency were the basis for calculating ELCR and HI for this receptor as discussed in Appendix D.

Surface Water. Although some SWMUs/AOCs are located near drainageways, significant surface water contamination is not expected as a result of these SWMUs/AOCs (UK 2007). Internal plant ditches are grass-lined and the outfalls are grass-lined or otherwise stabilized; therefore, the contaminants are not likely to be transported attached to suspended soil particles within the ditches and outfalls (DOE 2008a). Further, due to the physical cover at the SWMUs limiting the potential for particulate transport through sheet flow and based upon the modeling performed as part of the SI report for the outfalls and their associated internal ditches, no contaminants are migrating in surface water (dissolved or through

[3] *Regulatory Impact Analysis for Radiation Site Cleanup Proposed Rule* (EPA 1995) and *Means Heavy Construction Cost Data, 8th Annual Edition*, R.S. Means Company, Inc. Kingston, MA.

Table 4.3. Exposure Factors Used for Intake Calculations in BHHRA

Pathway Variable	Units	Current On-site Industrial Worker		Future On-site Industrial Worker		Off-site Outdoor Worker[c]		Adult Resident		Child Resident		Teen Recreational User	
		Value	Source	Value	Source	Value	Source	Value	Source	Value	Source	Value	Source
General Parameters Used in All Intake Models													
Exposure frequency (EF)	days/year	14	b	250	a	185	a	350	a	350	a	140	a
Exposure duration (ED)	years	25	a	25	a	25	a	24	a	6	a	12	a
Body weight (BW)	kilograms	70	a	70	a	70	a	70	a	15	a	43	a
Averaging time - noncancer (AT-N)	days	9,125	a	9,125	a	9,125	a	8,760	a	2,190	a	4,380	a
Averaging time - cancer (AT-C)	days	25,550	a	25,550	a	25,550	a	25,550	a	25,550	a	25,550	a
Inhalation of VOCs and Resuspended Dust from Soil													
Outdoor inhalation rate (IN)	m^3/hour	2.5	a	2.5	a	2.5	a	0.833	a	0.833	a	2.5	a
Exposure time (ET)	hours/day	8	a	8	a	8	a	24	a	24	a	6	a
Volatilization Factor (VF)	m^3/kg	CSV		CSV		CSV		CSV		CSV		CSV	
Particulate emission factor (PEF)	m^3/kg	6.20E+08	a	6.20E+08	a	6.20E+08	a	9.30E+08	a	9.30E+08	a	9.30E+08	a
Incidental Ingestion of Soil													
Incidental ingestion rate (IR-S)	mg/day	50	a	50	a	480	a	100	a	200	a	100	a
Dermal Contact with Soil													
Body surface area exposed (SA)	m^2/day	0.47	a	0.47	a	0.47	a	0.57	a	0.28	a, e	0.75	a
Soil-to-skin adherence factor (SSAF)	mg/cm^2-day	1	a	1	a	1	a	1	a	1	a, e	1	a
Dermal absorption factor (DABS)	unitless	CSV		CSV		CSV		CSV		CSV		CSV	
External Exposure													
Exposure frequency (EF)	day/day	14/365	b	250/365	a	185/365	a	350/365	a	350/365	a	140/365	a
Gamma shielding factor	unitless	0.2	a	0.2	a	0.2	a	0.2	a	0.2	a	0	a
Gamma exposure time factor	hr/hr	8/24	a	8/24	a	8/24	a	24/24	a	24/24	a	5/24	a
Drinking Water Ingestion													
Drinking water ingestion rate (IR-GW)	L/day	NA		NA		NA		2	a	1.5	a	NA	
Dermal Contact with RGA Groundwater													
Body surface area exposed (SA)	m^2/day	NA		NA		NA		1.815	a	0.65	a	NA	
Fraction absorbed water	unitless	NA		NA		NA		CSV		CSV		NA	
Permeability coefficient (Kp)	cm/hour	NA		NA		NA		CSV		CSV		NA	
Lag time (t)	hour/event	NA		NA		NA		CSV		CSV		NA	
Time to reach steady-state (t*)	hours	NA		NA		NA		CSV		CSV		NA	
Ratio of permeability of stratum corneum to epidermis (B)	unitless	NA		NA		NA		CSV		CSV		NA	
Event time (t_{event})	hour/event	NA		NA		NA		0.2	a	0.2	a	NA	
Event frequency (EV)	events/day	NA		NA		NA		1	a	1	a	NA	

Table 4.3. Exposure Factors Used for Intake Calculations in BHHRA (Continued)

Pathway Variable	Units	Current On-site Industrial Worker		Future On-site Industrial Worker		Off-site Outdoor Worker		Adult Resident		Child Resident		Teen Recreational User	
		Value	Source	Value	Source	Value	Source	Value	Source	Value	Source	Value	Source
Inhalation RGA Groundwater (showering)													
Indoor inhalation rate	m^3/hour	NA		NA		NA		0.833	a	0.833	a	NA	
Exposure frequency (EF)	day/year	NA		NA		NA		350	a	350	a	NA	
Exposure time (ET)	hours/day	NA		NA		NA		0.2	a	0.2	a	NA	
Time of shower (t1)	hour	NA		NA		NA		0.1	a	0.1	a	NA	
Time after shower (t2)	hour	NA		NA		NA		0.1	a	0.1	a	NA	
Fraction volatilized (f)	unitless	NA		NA		NA		0.75	a	0.75	a	NA	
Water flow rate (Fw)	L/h	NA		NA		NA		890	a	890	a	NA	
Bathroom volume (Va)	m^3	NA		NA		NA		11	a	11	a	NA	
Inhalation RGA Groundwater (household use)													
Indoor inhalation rate	m^3/hour	NA		NA		NA		0.833	a	0.833	a	NA	
Exposure frequency (EF)	day/year	NA		NA		NA		350	a	350	a	NA	
Exposure time (ET)	hours/day	NA		NA		NA		24	a	24	a	NA	
Exchange rate (ER)	changes/day	NA		NA		NA		10	a	10	a	NA	
Mixing coefficient (MC)	unitless	NA		NA		NA		0.5	a	0.5	a	NA	
Fraction volatilized (f)	unitless	NA		NA		NA		0.5	a	0.5	a	NA	
Water flow rate (WHF)	L/day	NA		NA		NA		890	a	890	a	NA	
House volume (HV)	m^3	NA		NA		NA		450	a	450	a	NA	

Notes:

[a] DOE 2011a, *Methods for Conducting Risk Assessment and Risk Evaluation at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, Volume 1. Human Health,* DOE/LX/07-0107&D2/R1/V1, February.

[b] Best professional judgment; similar to value used for DOE 2008a, *Surface Water Operable Unit (On-Site) Site Investigation and Baseline Risk Assessment at the Paducah Gaseous Diffusion Plant,* DOE/LX/07-0001&D2/R1, U.S. Department of Energy, Paducah, KY, February.

[c] Excavation worker exposure durations are a ratio of the off-site outdoor worker.

Additional information is available in Sections D.3.5.1 and D.5 and the text box to the side.

n/a = not applicable

Area	Acres	0.5
	m2	2023.5
	ft2	21780
Depth	feet	15
	m	4.572
Volume	m3	9251.442
Excavation Rate	m3/hr	20
	m3/day	160
Excavation time	days	57.82151
	Weeks	11.5643
	Months	2.891076
	Yrs	0.231286
	Max Workdays/yr	250
Default outdoor worker	days/yr	185
	yrs	25
	Total days	4625
No. of whole years		1
	days/yr	57.82151
Multiplier for ELCR		**0.0125**
Multiplier for HI		**0.313**

sediment) from ditches to surrounding creeks at concentrations that may adversely impact human health (DOE 2008b). The uncertainty in surface water transport of contaminants will be managed in the FS**.** As a result, human health risks associated with exposure to surface water will not be assessed in those BHHRA (Appendix D).

Groundwater. Ingestion of groundwater is evaluated only for hypothetical future residential scenarios at the one SWMU identified in the fate and transport section and modeled (SWMU 14) to show transport potentially reaching the RGA. The RGA groundwater concentration at the SWMU boundary was used for risk estimates. The UCRS groundwater is not evaluated specifically; however, the tables shown in the nature and extent section highlight those constituents that exceeded SSL values for the UCRS. Though not quantified in this evaluation, UCRS groundwater could pose as a medium of concern under certain exposure scenarios; however, these risks were not quantified due to the high improbability of the UCRS at these SWMUs/AOCs being used as a drinking water aquifer [see Section 3.3.4.3 of the Risk Methods Document (DOE 2011a)].

Dose Assessment. This RI does not integrate potential dose across multiple routes of exposure, particularly since radionuclides were not identified during the evaluation of impacts to groundwater and dose from ingestion of game were not evaluated for the current on-site areas. Dose assessments are conducted to provide information for risk managers and are separate from the risk assessment conducted for decision making. The Risk Methods Document (Table A.8) provides dose-based SSLs. These were used to derive an estimate of the total dose (mrem/yr) for each of the primary scenarios evaluated (DOE 2011a). In presenting these results, the following comparisons are considered:

- Per the Risk Methods Document (DOE 2011a), a dose less than 1 mrem/yr is *de minimis*, and the benchmark for dose-based action is 25 mrem/year [DOE Order 458.1 states that if the estimated total effective dose (TED) for members of the public exceeds 25 mrem in a year, then additional evaluation is conducted].

- DOE Order 458.1, *Radiation Protection of the Public and Environment*, requires that all exposure pathways not result in radiation exposures to members of the general public greater than a TED of 100 mrem/year (not applicable for current on-site areas, but consideration for future use).

- These do not reflect exposures to the public, which would be estimated at the site boundary (i.e., the limited area). Significant releases to air are not expected from individual SWMUs/AOCs.

Pathways Not Quantitatively Evaluated

- In the SWMU/AOC summaries, it is noted where a SWMU/AOC is near a drainageway. Surface water pathways were not quantitatively evaluated in this OU because the potential for surface water migration of contaminants was addressed during the SWOU (On-Site) SI. The EE/CA for that project stated the following: "Based upon the modeling performed as part of the SI report for the outfalls and their associated internal ditches, no contaminants are migrating in surface water (dissolved or through sediment) from ditches to surrounding creeks at concentrations that may adversely impact human health" (DOE 2008b).

  The concentration at the source area is assumed to be higher than what would be found in the runoff. Therefore, the concentration at the source area (direct contact) provides a conservative surrogate for the risks posed by the runoff (i.e., the runoff would not pose a greater risk than the source area, and this evaluation addresses the uncertainty of migration impacts).

Only the northwest corner of PGDP (e.g., SWMU 14) provides an exception. The Northwest Corner Scrap Yard area is controlled under an interim corrective measure. Drainage ditches around SWMU 14 are routed to the C-613 Sedimentation Basin before discharging into Outfall 001.

- A rural resident with a garden or raising beef was not evaluated. Residential use on-site is considered unlikely. Criteria more protective than the typical residential scenarios may be derived during the FS. (All except one SWMU would exceed 1E-6 risk cumulative risk for the hypothetical resident without including the garden/beef scenarios.)

- Ingestion of game. Recreational use of the off-site areas is considered likely; however, this was not evaluated on a SWMU/AOC-specific basis. Considering the range of the game, the range of the hunter, and the small size of the SWMUs/AOCs, the analysis of this has great uncertainty for any SWMU/AOC-specific risk management decision.

Lead. Lead is evaluated separately from the cancer risks and noncancer hazards assessment methodology, as proposed by EPA. Exposures to lead were evaluated based on the approach recommended in the *Memorandum: Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (EPA 1994). The site media lead levels are compared directly against the health protective lead concentrations for the risk-based site management decisions. Lead was identified as a COPC if the maximum concentration is greater than 400 mg/kg (residential screening value) consistent with the Risk Methods Document (DOE 2011a). The average concentration subsequently was compared with this value (this is consistent with EPA guidance for estimating soil lead concentrations for use in lead uptake models, which emphasized the importance that the frequency of exposure and the duration of exposure be over a sufficient duration for the blood lead concentration to become nearly constant over time). No subsequent modeling of lead exposures was completed since the average soil concentration was below 400 mg/kg (residential scenario) at each of the Soils OU SWMUs/AOCs. Lead was identified as a COC for human health at SWMU 180 only based on process knowledge.

Contaminants of Concern. For each SWMU/AOC, the total ELCR and HI for all pathways within a use scenario of concern are compared to the benchmarks of ELCR > 1E-6 or an HI > 0.1, respectively. COPCs within a use scenario of concern exceeding either of these benchmarks are deemed COCs for the use scenario of concern. Refinement of the COPC evaluation to select COCs includes consideration of dermal absorption uncertainties. The COCs are identified in the tables in Chapters 5–11. Priority COCs are identified as those COCs with ELCR > 1E-04 and HI > 1 to highlight to risk managers the COCs driving Total ELCR or Total HI at the Soils OU SWMUs/AOCs.

Uncertainty Analysis. The uncertainty discussion for the BHHRA (Appendix D) documents a range of issues that may be considered by risk managers in making decisions for these sites.

4.5.2 Ecological Risk Screening

The surface soil concentrations were screened against the ecological soil screening values as included in Appendix E. This approach does not include consideration of background or other factors. Given the industrial nature of many of these SWMUs/AOCs, the background and maximum concentrations are included. For each SWMU/AOC summary, the primary chemicals that exceeded their respective screening values are shown (HQ ≥ 10) as well as the overall HI for the constituents detected, allowing comparison of the HIs, SWMU/AOC sizes, and other factors like proximity to a drainageway.

4.6 REMEDIAL GOAL OPTIONS

RGOs were developed individually for each SWMU/AOC for scenarios analyzed in the BHHRA. RGOs were calculated for each COC as determined in the conclusions of the BHHRA. COCs and RGOs are presented to evaluate direct contact exposure for the future industrial worker, excavation worker, and future hypothetical resident for the SWMUs inside the Limited Area and for the outdoor worker, excavation worker, future hypothetical resident, and teen recreational user for the SWMUs/AOCs outside the Limited Area in Chapters 5–11.

5. GROUP 1, FORMER FACILITY AREAS

This chapter includes a discussion of the former facility areas SWMUs, which includes the following six SWMUs:

- SWMU 1, C-747-C Oil Landfarm, not sampled in 2010 per the work plan
- SWMU 99B, C-745 Kellogg Building Site–septic system/leach field, sampled in 2010
- SWMU 194, DUF_6 Facility McGraw Construction Facilities (south side), sampled in 2010
- SWMU 196, C-746-A Septic System, sampled in 2010
- SWMU 489, C-710 North Septic Tank, North of C-710, sampled in 2010
- SWMU 531, C-746-A South Aluminum Slag Reacting Area, sampled in 2010

The SWMU-specific discussions highlight the current understanding of the impact of each SWMU. Chapter 4 describes the overall evaluation approach that was used for each SWMU. Figures display the 45 ft grids that were used for the composite sampling and historical sample assignments. There are approximately 10 grids for each EU for SWMUs that are larger than 0.5 acres. If a SWMU is smaller than 0.5 acres, it is considered one EU. If contingency “step-out” grids were deemed necessary by field laboratory results to define extent, the step-out grids are displayed on the figures.

All of the former facility area SWMUs, except SWMUs 194 and 99B, are located within the industrial area of PGDP, as shown on Figure 5.1 and fieldwork was conducted in accordance with the Work Plan (DOE 2010a).

The nature and extent is divided into surface and subsurface sections that summarize the representative data set and describe the future industrial worker scenario for SWMUs located inside the limited area and teen recreator scenario for SWMUs located outside the limited area. The evaluation of the XRF data with fixed-base laboratory data indicates the use of XRF results for copper, iron, lead, nickel, uranium, and zinc has good correlation and, therefore, is reliable for use in determining nature and extent and hot spots. Molybdenum, mercury, selenium, and silver XRF results are generally below the reporting limits and will not lead to incorrect decisions in the risk assessment; however, these results may not provide much useful information for nature and extent determination. Use of XRF results for arsenic, chromium, and manganese has uncertainties; however, higher values in the complete data set indicate overall patterns of these constituents present in the soils at the SWMUs/AOCs. Uncertainties associated with arsenic will be managed in the FS because detections at high concentrations from the fixed-base laboratory were detected at lower concentrations by the XRF and may lead to underestimating risk. For vanadium, comparison with the fixed-base laboratory data indicates XRF data are much higher and, therefore, risks may be overestimated when using the XRF data. See Appendix B for additional information.

For the fate and transport section, the process for evaluating surface water runoff and groundwater modeling is described in Chapter 4 and Appendix C, and only the conclusions are provided in the SWMU/AOC-specific sections.

The human health risk assessment narrative discusses the future industrial worker (for SWMUs 99B and 194, which are outside the limited area, the outdoor worker exposed to surface soil is discussed instead of the future industrial worker); the excavation worker; and the hypothetical future resident. For SWMUs/AOCs outside the limited area, the teen recreational user also is discussed. Each SWMU/AOC was evaluated for the scenarios listed below. Additional discussion of these scenarios is presented in Appendix D.

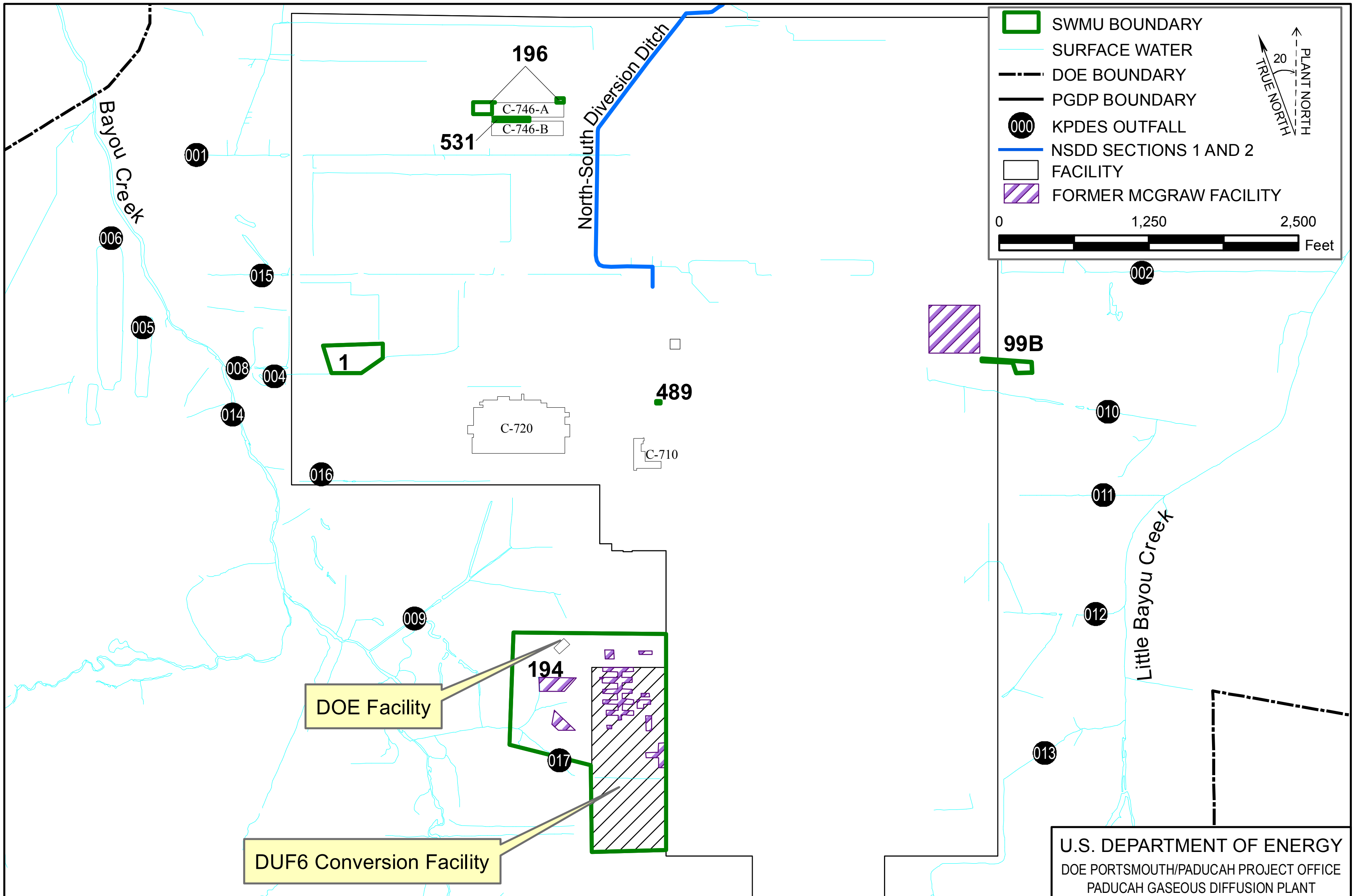


Figure 5.1. SWMU Locations and Features for Former Facilities

9/25/2012 SoilsOU\RI Report\RI D2\05-00SWMUsandFeatures R1.mxd

- Current industrial on-site worker (This assumes exposure to surface soils only.)

- Future industrial on-site worker (This assumes exposure to surface soils only.)

- Outdoor worker (Surface and Subsurface Soils: 0–16 ft bgs) [This assumes exposure to surface (0–1 ft bgs) and a mixture of the surface (0–1 ft bgs) and subsurface soils (1–16 ft bgs), as appropriate, following a future construction activity. As a subset of the outdoor worker exposed to surface and subsurface soils, the potential risks and hazards for shorter-term exposure for workers during excavation also are provided.]

- Hypothetical future adult and child residents (This assumes exposure to surface soils only.)

- Future teen recreational users (This assumes exposure to surface soils only.)

The following are the uncertainties in the human health risk assessment that may affect SWMUs/AOCs in Chapter 5.

- Overly conservative dermal toxicity factors potentially lead to an overestimation of risk.

- Arithmetic average lead concentration is compared to the NAL to determine additional risk analysis potentially leading to missed lead exposure (specifically SWMU 531).

- Concentration of total cancerous polycyclic aromatic hydrocarbons (PAHs) were used to estimate risk, and the minimum detection limit of the PAHs with toxicity equivalence factors were used when PAHs were not detected.

- Some detection limits for XRF data are above background concentrations and NALs; the COPCs identified using these data are expected to overstate the presence of these metals.

- For those constituents that never were detected within an EU, even if the detection limit is greater than the NAL, the constituent was not considered a COPC.

- For determining COPCs, maximum detected values were screened against background values presented in the Risk Methods Document regardless of analytical method used (DOE 2011a). For uranium-238, this presents an uncertainty with respect to those samples analyzed using nitric extraction. The adjusted background value for uranium-238 is lower that the value used to screen.

- UCL (95% on the mean) concentrations were used as EPCs if there were a sufficient number of samples and distinct results to calculate a UCL. This likely will lead to an overestimation of actual exposure because receptors are assumed to be exposed to the UCL concentration for the entire exposure duration.

- Conservative (i.e., health protective) exposure factors are used when information available is limited in the form of using reasonable maximum exposure assumptions, as per the Risk Methods Document (DOE 2011a). This may result in an overestimation of potential risk.

- Many of the SWMUs/AOCs (especially SWMU 489) evaluated in this assessment are very small, and the assumptions used for the levels of exposures (duration, frequency) overstate potential chronic exposures in these units.

- The risk assessment does not consider that concentrations of some COCs may be lower or higher in the future because of processes such as degradation and attenuation.

- Additivity of multiple chemicals is assumed. Whether assuming additivity can lead to an underestimation or overestimation of risk is unknown.

- Most of the assumptions about exposure and toxicity used in the BHHRA are representative of statistical upper-bounds or even maximums for each parameter. The result of combining several such upper-bound assumptions is that the final estimate of potential exposure or potential risk is conservative.

Additional information can be found in Appendix D.

For the ecological screening, the priority COPECs that exceeded their respective screening values are shown in tables within each subsection (maximum HQ ≥ 10) as well as the overall HI for the constituents detected. This allows for comparison of the HIs, SWMU sizes, and other factors such as proximity to a surface water body. Additional information is contained in Appendix E.

5.1 SWMU 1, C-747-C OIL LANDFARM

5.1.1 Background

The C-747-C Oil Landfarm (SWMU 1) is located in the extreme west-central portion of the plant and is approximately 2.3 acres. The area now is mowed regularly as part of PGDP maintenance operations. The southern border of this SWMU is the Kentucky Pollutant Discharge Elimination System (KPDES) Outfall 008 Ditch. This SWMU is part of the Soils OU and the GWOU. SWMU 1 was used from 1975 to 1979 for the biodegradation of waste oils contaminated with TCE, PCBs, 1,1,1-trichloroethane, and uranium. It is estimated that approximately 5,000 gal of waste oil was applied to the landfarm during its period of operation (DOE 1999a). These waste oils were believed to have been derived from a variety of plant processes. The landfarm consisted of two 1,125 ft^2 plots that were plowed to 1 ft to 2 ft depth. Waste oils were spread on the surface every three to four months, then limed and fertilized. No recirculating water lines or sewers were associated with the operation of this facility. Storm sewers and recirculating water lines coincidentally are located within the boundary of the SWMU. Average depths to these utilities are 3 ft and 13 ft bgs, respectively. The storm sewer is a 60-inch reinforced concrete pipe, while the recirculating water lines are 36-inch pipe.

Investigations that have included collecting data on SWMU 1 are the Phase I and Phase II Site Investigation (SI) (CH2M HILL 1991, 1992). Additional sampling was performed to support the Waste Area Group (WAG) 23 FS (DOE 1996), the WAG 23 Proposed Remedial Action Plan (DOE 1998d), the WAG 27 RI (DOE 1999a), and the Southwest Plume Site Investigation (DOE 2004d). These investigations and actions identified solvents, PCBs, dioxins, SVOCs, heavy metals, and radionuclides (DOE 1999a). A removal action was conducted at SWMU 1 as a result of WAG 23 to remediate dioxins. The removal action conclusion for dioxins was that the levels are well within the EPA’s acceptable risk range, as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Note: Subsurface VOC-contaminated soil at SWMU 1 is being addressed by the VOC Sources for the Southwest Plume project, as defined in the VOC Sources for the Southwest Plumes ROD (DOE 2012c). All non-VOC contaminated soils at SWMU 1 will be addressed in the Soils OU FS.

5.1.2 Fieldwork Summary

The historical data are representative of the nature and adequately delineate the extent of the contamination; therefore, no samples were collected from SWMU 1 during the Soils OU RI sampling effort (DOE 2010a).

SWMU 1 did not undergo a gamma radiological walkover survey using a field instrument for the detection of low energy radiation (FIDLER) because the influence of background radiation from nearby cylinders does not allow a reliable determination if/where a sample would be required. Elevated gamma dose rate from the cylinder yard exhibits a positive bias on the GWS instrument readings. As noted above, historical data are representative of the nature and adequately delineate the extent of the contamination.

5.1.3 Nature and Extent of Contamination—Surface Soils

The representative data set presented in Table 5.1.1 provides the nature of the contamination in SWMU 1 surface soils and Figures 5.1.1–5.1.3 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The lateral extent of SWMU 1 surface soil contamination is considered adequately defined for supporting the baseline risk assessment and FS. SWMU 1 consists of 5 EUs.

Metals

The following are the metals that were detected in the surface soil above both background screening levels and the industrial worker NALs, and the grids and EUs in which they were detected.

Metal	Grid	EU
Beryllium	16, 28, 44, 46, 49	1, 2, 4, 5
Cadmium	16, 28	2
Chromium	28, 49	2, 5
Mercury	28	2
Nickel	28, 46	2, 4
Silver	28	2
Vanadium	28	2

None of these grids are on the border of SWMU 1; therefore, the lateral extent of metal contamination in the SWMU 1 surface soil can be considered adequately defined.

Beryllium was detected above both the background screening level and the industrial worker ALs in grid 28 (EU 2) only. Grid 28 is not located along the SWMU 1 border.

Table 5.1.1. Surface Soil Historical Data Summary: SWMU 1 Oil Land Farm

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	4.29E+03	1.24E+04	7.91E+03	0/20	20/20	0/20	1.30E+04	0/20	3.32E+04	0/20	3.97E+06	0/20	20/20	1.3135 - 19.5
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	2.10E-01	0/17	2.53E+00	0/17	1.51E+03	0/17	0/17	0.5215 - 12.2
METAL	Arsenic	mg/kg	3.17E+00	9.00E+00	5.84E+00	0/23	18/23	0/23	1.20E+01	18/23	9.97E-01	0/23	9.97E+01	0/23	18/23	0.0827 - 4.83
METAL	Barium	mg/kg	3.74E+01	1.59E+02	9.12E+01	0/23	23/23	0/23	2.00E+02	0/23	5.92E+02	0/23	3.78E+05	0/23	14/23	0.0242 - 2.44
METAL	Beryllium	mg/kg	4.67E-01	1.05E+01	2.14E+00	0/20	16/20	5/20	6.70E-01	16/20	1.40E-02	1/20	9.22E+00	0/20	3/20	0.0188 - 0.48
METAL	Cadmium	mg/kg	7.90E-01	6.50E+00	3.20E+00	0/23	5/23	5/23	2.10E-01	2/23	3.16E+00	0/23	3.16E+02	0/23	5/23	0.0489 - 1.95
METAL	Calcium	mg/kg	2.29E+01	3.10E+04	4.72E+03	0/20	20/20	0/20	2.00E+05	0/20	n/a	0/20	n/a	n/a	n/a	0.005 - 97.5
METAL	Chromium	mg/kg	4.50E+00	2.58E+02	2.79E+01	0/23	23/23	4/23	1.60E+01	2/23	3.02E+01	0/23	3.02E+03	0/23	0/23	0.1325 - 2.44
METAL	Cobalt	mg/kg	3.40E+00	1.37E+01	6.58E+00	0/20	20/20	0/20	1.40E+01	1/20	1.05E+01	0/20	1.52E+03	20/20	20/20	0.0847 - 3
METAL	Copper	mg/kg	6.70E+00	2.31E+02	2.31E+01	0/20	20/20	2/20	1.90E+01	0/20	1.43E+03	0/20	2.24E+05	0/20	2/20	0.1067 - 2.44
METAL	Iron	mg/kg	9.13E+03	1.83E+04	1.36E+04	0/20	20/20	0/20	2.80E+04	0/20	2.51E+04	0/20	3.92E+06	20/20	20/20	0.6677 - 19.5
METAL	Lead	mg/kg	1.02E-01	3.23E+02	3.34E+01	0/23	16/23	1/23	3.60E+01	0/23	4.00E+02	0/23	4.00E+02	0/23	10/23	0.0024 - 19.5
METAL	Magnesium	mg/kg	8.34E+02	1.12E+04	1.78E+03	0/20	20/20	1/20	7.70E+03	0/20	n/a	0/20	n/a	n/a	n/a	3.7451 - 48.8
METAL	Manganese	mg/kg	4.39E+00	1.06E+03	5.17E+02	0/20	20/20	0/20	1.50E+03	0/20	2.58E+03	0/20	1.16E+05	19/20	20/20	0.0003 - 2.44
METAL	Mercury	mg/kg	1.99E-02	7.70E+00	1.17E+00	0/23	7/23	1/23	2.00E-01	1/23	9.00E-01	0/23	7.85E+02	1/23	3/23	0.0078 - 0.13
METAL	Molybdenum	mg/kg	1.42E+01	1.42E+01	1.42E+01	0/6	1/6	0/6	n/a	0/6	1.79E+02	0/6	2.80E+04	1/6	1/6	4.49 - 4.88
METAL	Nickel	mg/kg	4.95E+00	8.54E+01	2.04E+01	0/23	19/23	5/23	2.10E+01	2/23	4.28E+01	0/23	3.18E+04	1/23	19/23	0.1277 - 6.8
METAL	Selenium	mg/kg	1.71E-01	9.80E-01	3.84E-01	0/23	8/23	1/23	8.00E-01	0/23	1.79E+02	0/23	2.80E+04	0/23	4/23	0.0891 - 19.5
METAL	Silver	mg/kg	4.25E+01	4.25E+01	4.25E+01	0/23	1/23	1/23	2.30E+00	1/23	1.08E+01	0/23	9.15E+03	1/23	1/23	0.1799 - 3.2
METAL	Sodium	mg/kg	4.46E+01	1.81E+02	8.58E+01	2/20	13/20	0/20	3.20E+02	0/20	n/a	0/20	n/a	n/a	n/a	2.7264 - 97.5
METAL	Thallium	mg/kg	3.70E-01	3.70E-01	3.70E-01	0/23	1/23	1/23	2.10E-01	0/23	2.87E+00	0/23	4.48E+02	0/23	1/23	0.24 - 19.5
METAL	Uranium	mg/kg	2.86E+00	9.86E+00	5.07E+00	0/6	6/6	3/6	4.90E+00	0/6	1.07E+02	0/6	1.65E+04	0/6	0/6	0.89 - 0.97
METAL	Vanadium	mg/kg	2.53E-01	4.21E+01	2.08E+01	0/20	20/20	1/20	3.80E+01	20/20	1.51E-01	0/20	9.30E+01	19/20	20/20	0.0014 - 2.44
METAL	Zinc	mg/kg	2.31E+01	3.90E+02	6.01E+01	0/20	20/20	2/20	6.50E+01	0/20	1.08E+04	0/20	1.68E+06	0/20	20/20	0.0806 - 19.5
PPCB	PCB, Total	mg/kg	2.00E-02	3.50E+01	1.57E+00	0/129	28/129	0/129	n/a	14/129	1.88E-01	1/129	1.88E+01	1/129	26/129	0.12 - 1.9
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	0/14	0/14	0.33 - 0.46
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	0/14	0/14	0.33 - 0.46
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	n/a	0/17	n/a	0/17	n/a	0/17	0/17	0.33 - 0.46
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	n/a	0/17	n/a	0/17	n/a	n/a	n/a	0.33 - 2.3
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	n/a	0/17	n/a	0/17	n/a	n/a	n/a	0.33 - 0.46
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	n/a	0/17	n/a	0/17	n/a	n/a	n/a	1.65 - 2.3
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	1.65 - 2.3
SVOA	2-Methylnaphthalene	mg/kg	9.00E-02	9.00E-02	9.00E-02	1/14	1/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	n/a	0/17	n/a	0/17	n/a	n/a	n/a	0.33 - 0.46
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	1.30E+00	0/14	3.91E+01	0/14	0/14	1.65 - 2.3
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.91
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	1.65 - 2.3
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	1.65 - 2.3
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	6.02E+02	0/20	1.81E+04	0/20	0/20	0.33 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	0.33 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	4.05E+03	0/20	1.22E+05	0/20	0/20	0.33 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.1.1. Surface Soil Historical Data Summary: SWMU 1 Oil Land Farm (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	0.33 - 0.5
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	1.65 - 2.3
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	8.90E-02	4.00E-01	1.67E-01	4/14	5/14	0/14	n/a	0/14	n/a	0/14	n/a	0/14	0/14	0.33 - 0.46
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	Di-n-butyl phthalate	mg/kg	5.70E-02	6.70E-02	6.20E-02	2/14	2/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	Fluoranthene	mg/kg	8.30E-02	6.20E-01	3.54E-01	2/20	4/20	0/20	n/a	0/20	6.01E+02	0/20	1.80E+04	0/20	0/20	0.33 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	4.87E+02	0/20	1.46E+04	0/20	0/20	0.33 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	n/a	0/17	1.17E-01	0/17	1.17E+01	0/17	0/17	0.33 - 0.46
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	n/a	0/17	n/a	0/17	n/a	n/a	n/a	0.33 - 0.46
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	n/a	0/17	n/a	0/17	n/a	n/a	n/a	0.33 - 0.46
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Naphthalene	mg/kg	6.30E-02	6.30E-02	6.30E-02	1/20	1/20	0/20	n/a	0/20	2.24E+00	0/20	2.24E+02	1/20	1/20	0.33 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	n/a	0/17	n/a	0/17	n/a	n/a	n/a	0.33 - 0.46
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	5.22E-02	0/14	5.22E+00	0/14	0/14	0.33 - 0.46
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	n/a	0/17	n/a	0/17	n/a	0/17	0/17	1.65 - 2.3
SVOA	Phenanthrene	mg/kg	4.50E-02	6.00E-01	2.33E-01	2/20	3/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	0.33 - 0.5
SVOA	Phenol	mg/kg	1.80E+00	1.80E+00	1.80E+00	0/14	1/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.33 - 0.46
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	1.65 - 2.3
SVOA	Pyrene	mg/kg	9.50E-02	6.80E-01	3.46E-01	2/20	4/20	0/20	n/a	0/20	4.49E+02	0/20	1.35E+04	0/20	1/20	0.33 - 0.5
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Total PAH	mg/kg	7.93E-02	9.83E-02	8.84E-02	0/20	3/20	0/20	n/a	3/20	5.92E-02	0/20	5.92E+00	0/20	3/20	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/15	0/15	0/15	n/a	0/15	n/a	0/15	n/a	0/15	0/15	0.005 - 0.007
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.006 - 0.007
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	0.006 - 0.007
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.006 - 0.007
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	4.89E-02	0/12	5.53E+00	0/12	0/12	0.006 - 0.007
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	0/11	0.006 - 0.007
VOA	1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	5.48E+00	0/9	1.76E+02	0/9	0/9	0.006 - 0.007
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.006 - 0.007
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.011 - 0.014
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.011 - 0.014
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.011 - 0.014
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.012 - 0.025
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	6.98E-01	0/12	8.22E+01	0/12	0/12	0.006 - 0.007
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.006 - 0.007
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.006 - 0.007
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.011 - 0.014
VOA	Carbon disulfide	mg/kg	1.00E-03	1.00E-03	1.00E-03	1/9	1/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.006 - 0.007
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	4.97E-01	0/12	5.76E+01	0/12	0/12	0.006 - 0.007
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	0/12	0/12	0.006 - 0.007
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.011 - 0.014
VOA	Chloroform	mg/kg	4.00E-03	4.00E-03	4.00E-03	1/12	1/12	0/12	n/a	0/12	2.42E-01	0/12	2.49E+01	0/12	0/12	0.006 - 0.007

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.1.1. Surface Soil Historical Data Summary: SWMU 1 Oil Land Farm (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified	FOD	Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD		FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.011 - 0.014
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.006 - 0.007
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	0.006 - 0.007
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	3.29E+00	0/9	3.84E+02	0/9	0/9	0.006 - 0.007
VOA	Methylene chloride	mg/kg	6.00E-03	6.00E-03	6.00E-03	0/9	1/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	1/9	0.006 - 0.063
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	0.006 - 0.007
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	2.82E-01	0/12	7.08E+01	0/12	0/12	0.006 - 0.007
VOA	Toluene	mg/kg	4.00E-03	4.00E-03	4.00E-03	1/9	1/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	0.006 - 0.007
VOA	Total Xylene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	3.50E+01	0/9	1.07E+03	0/9	0/9	0.006 - 0.007
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.006 - 0.007
VOA	Trichloroethene	mg/kg	1.00E-03	1.50E-02	9.00E-03	1/18	3/18	0/18	n/a	0/18	4.69E-02	0/18	4.98E+00	0/18	2/18	0.001 - 0.007
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.011 - 0.014
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	2.04E-01	0/12	4.83E+01	0/12	0/12	0.001 - 0.014
RADS	Americium-241	pCi/g	-1.94E-02	9.98E-01	2.32E-01	0/6	6/6	0/6	n/a	0/6	5.01E+00	0/6	5.01E+02	0/6	2/6	0.03 - 0.05
RADS	Cesium-137	pCi/g	8.78E-02	7.53E-01	3.53E-01	0/6	6/6	2/6	4.90E-01	6/6	8.61E-02	0/6	8.61E+00	0/6	0/6	0.05 - 0.08
RADS	Cobalt-60	pCi/g	-2.26E-02	2.20E-02	-3.10E-03	0/6	6/6	0/6	n/a	1/6	1.77E-02	0/6	1.77E+00	0/6	0/6	0.03 - 0.08
RADS	Neptunium-237	pCi/g	-3.33E-03	6.63E-01	1.14E-01	0/6	6/6	1/6	1.00E-01	1/6	2.71E-01	0/6	2.71E+01	1/6	2/6	0.03 - 0.04
RADS	Plutonium-238	pCi/g	-8.63E-03	1.11E-01	2.63E-02	0/6	6/6	1/6	7.30E-02	0/6	1.09E+01	0/6	1.09E+03	0/6	1/6	0.02 - 0.04
RADS	Plutonium-239/240	pCi/g	2.21E-03	9.05E+00	2.20E+00	0/6	6/6	4/6	2.50E-02	0/6	1.07E+01	0/6	1.07E+03	1/6	4/6	0.02 - 0.02
RADS	Technetium-99	pCi/g	3.43E-01	8.29E+00	3.93E+00	0/6	6/6	5/6	2.50E+00	0/6	3.61E+02	0/6	3.61E+04	0/6	5/6	2.81 - 3.27
RADS	Thorium-228	pCi/g	2.52E-01	7.64E-01	4.46E-01	0/6	6/6	0/6	1.60E+00	0/6	n/a	0/6	n/a	n/a	n/a	0.04 - 0.06
RADS	Thorium-230	pCi/g	3.37E-01	6.50E+01	1.56E+01	0/6	6/6	4/6	1.50E+00	2/6	1.38E+01	0/6	1.38E+03	2/6	6/6	0.18 - 0.21
RADS	Thorium-232	pCi/g	1.59E-01	7.94E-01	4.79E-01	0/6	6/6	0/6	1.50E+00	0/6	n/a	0/6	n/a	n/a	n/a	0.03 - 0.05
RADS	Uranium-234	pCi/g	4.70E-01	3.44E+00	1.27E+00	0/6	6/6	2/6	1.20E+00	0/6	1.89E+01	0/6	1.89E+03	0/6	0/6	0.13 - 0.15
RADS	Uranium-235	pCi/g	2.26E-02	1.93E-01	7.21E-02	0/6	6/6	3/6	6.00E-02	0/6	3.95E-01	0/6	3.95E+01	0/6	0/6	0.02 - 0.03
RADS	Uranium-238	pCi/g	5.97E-01	3.31E+00	1.36E+00	0/6	6/6	2/6	1.20E+00	2/6	1.70E+00	0/6	1.70E+02	0/6	0/6	0.15 - 0.16

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

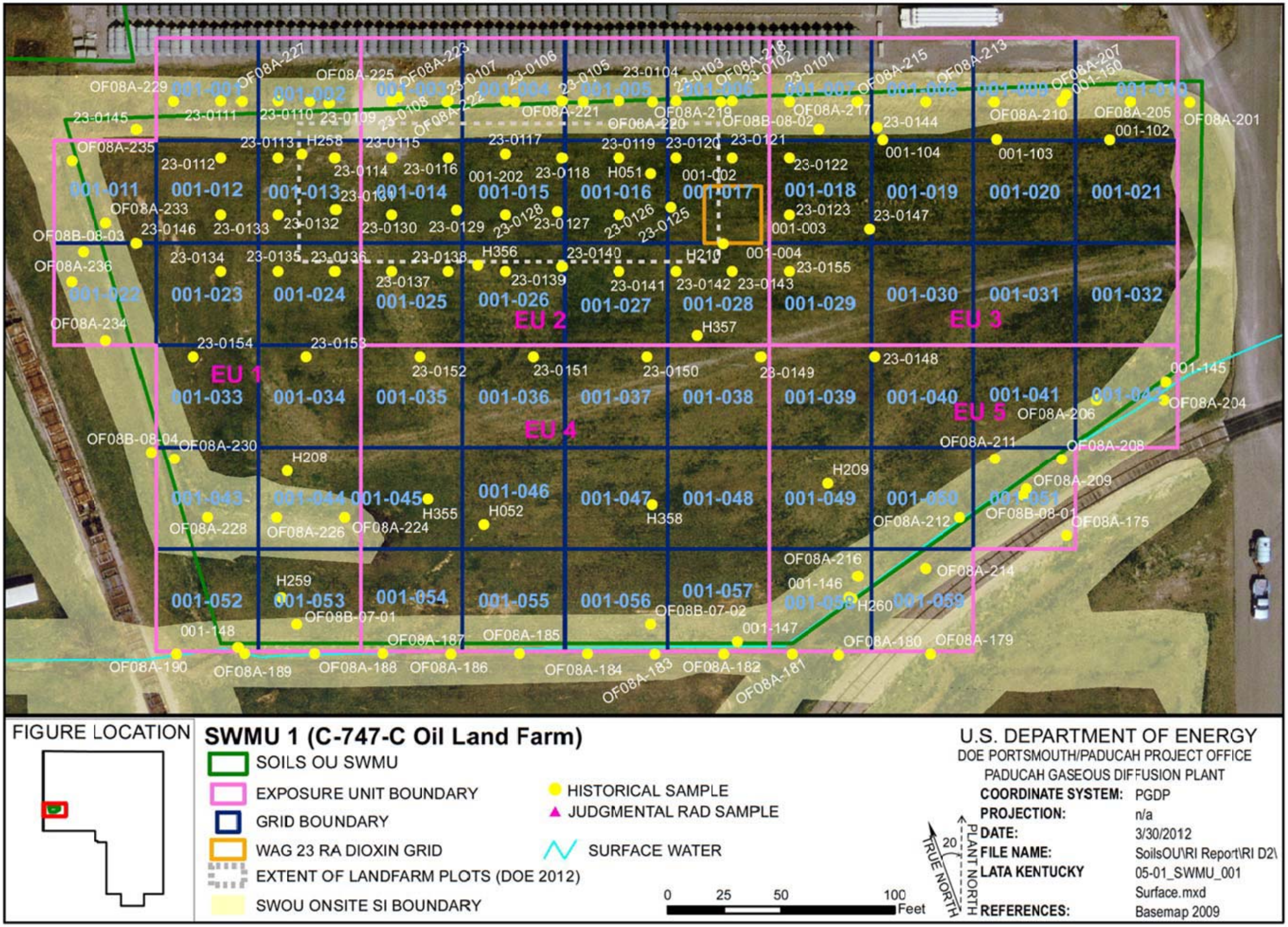


Figure 5.1.1. SWMU 1 Sample Locations - Surface Soil

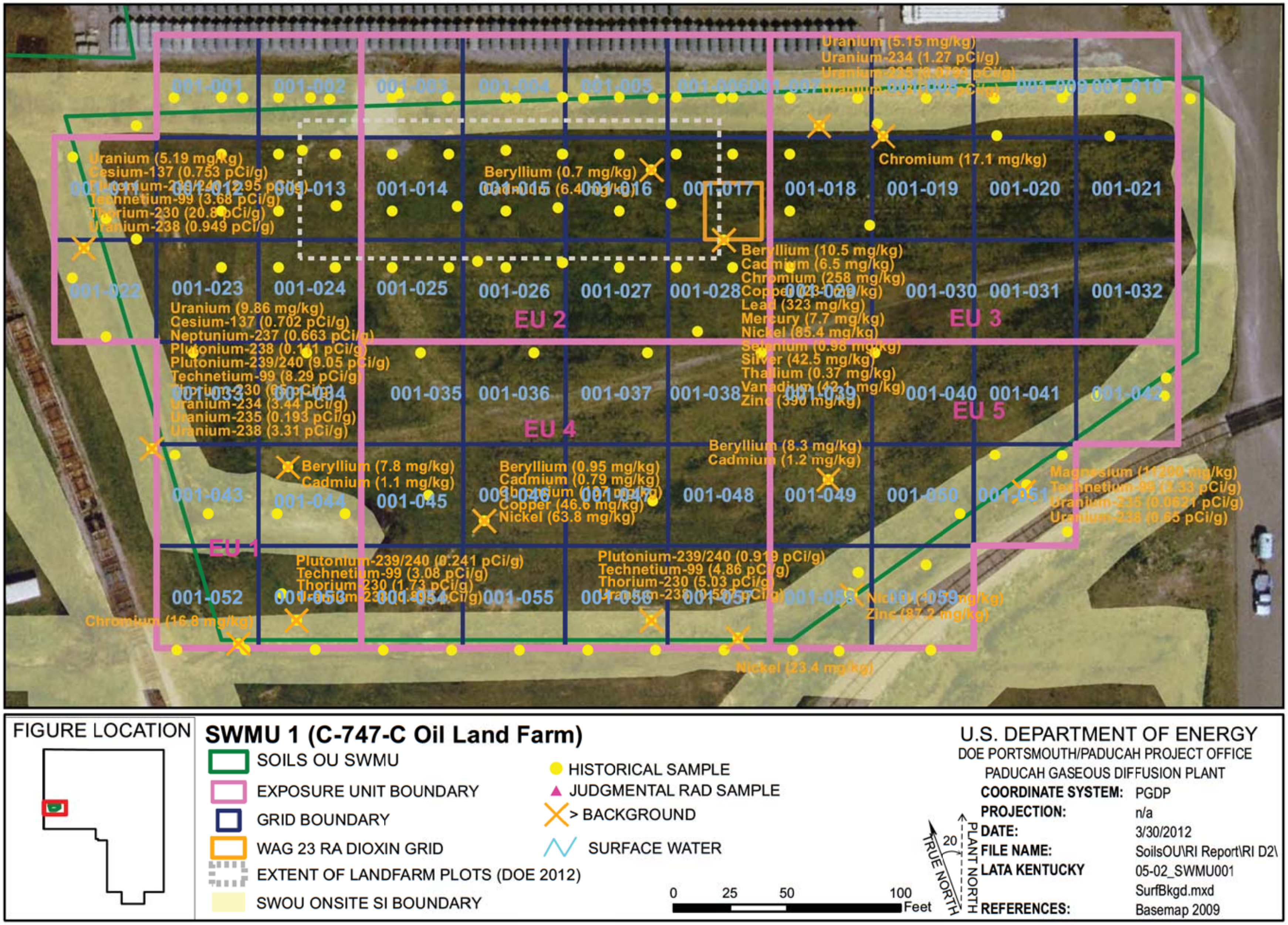


Figure 5.1.2. SWMU 1 Background Exceedances - Surface Soil

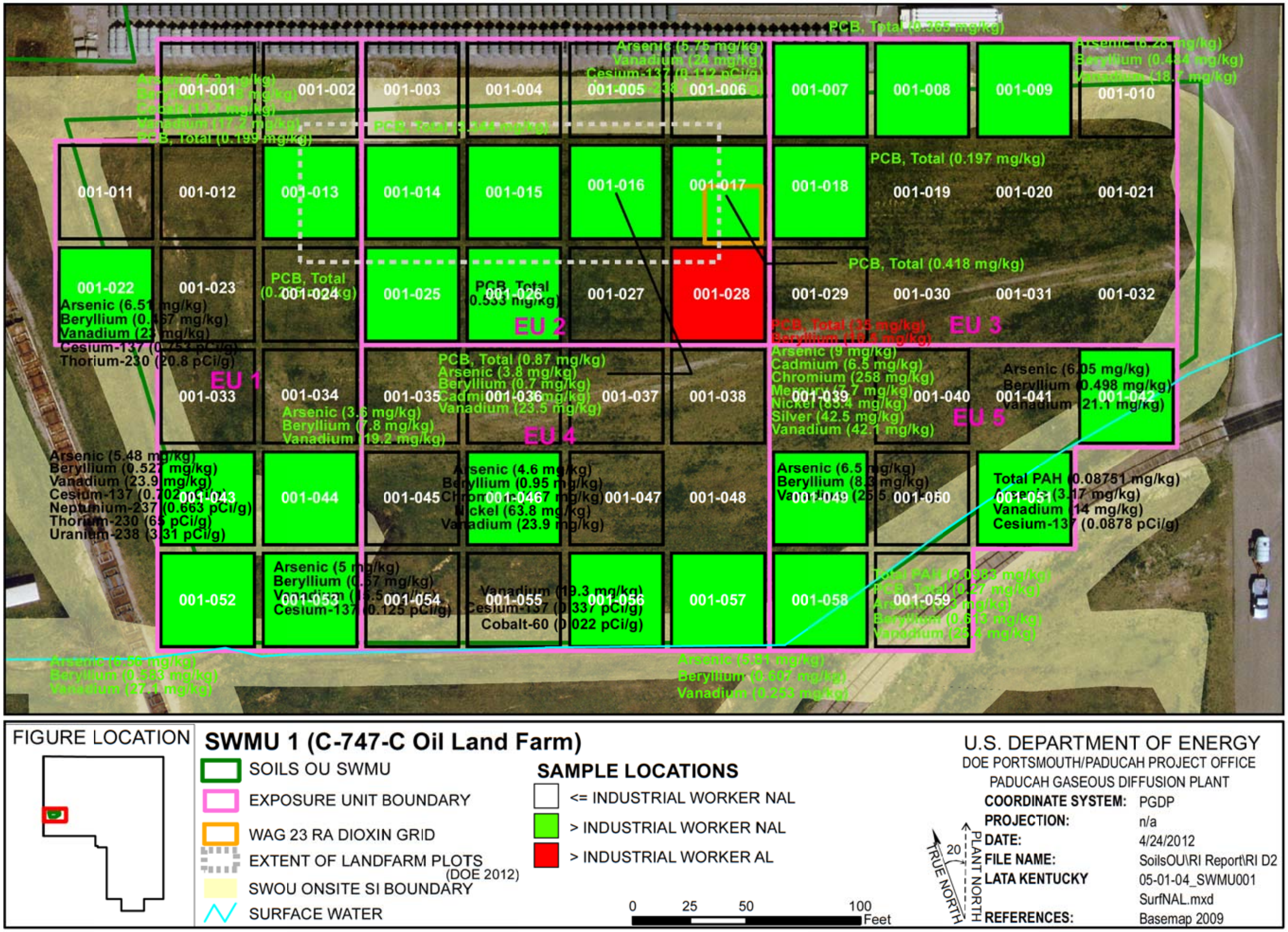


Figure 5.1.3. SWMU 1 NAL Exceedances - Surface Soil

The following metals were detected in the SWMU 1 surface soil above both the SSLs for the protection of UCRS groundwater and the background screening levels.

Metal	Grid	EU
Beryllium	44, 49, 28	1, 2, 5
Cadmium	16, 28, 44, 46, 49	1, 2, 4, 5
Copper	28, 46	2, 4
Lead	28	2
Mercury	28	2
Molybdenum[1]	51	5
Nickel	28, 46, 57, 58	2, 4, 5
Selenium	28	2
Silver	28	2
Thallium	28	2
Vanadium	28	2
Zinc	28, 58	2, 5

[1] No background value is available.

The following were detected above the SSLs for the protection of RGA groundwater and the background screening levels: mercury, nickel, silver, and vanadium in grid 28, EU 2; and molybdenum (no background value available) in grid 51, EU 5.

PCBs

Total PCBs were detected above the industrial worker NALs in the surface soil in grids 13 (EU 1), 14, 15, 16, 17, 25, 26, 28 (EU 2), 8, 18 (EU 3), and 58 (EU 5). Only two of these grids are on the border of the SWMU: grids 8 and 58. Although data indicate the presence of PCBs above industrial worker NALs in grid 8, which is located on the northern edge of the SWMU, the grid is adjacent to the C 745-A Cylinder Yard, the operations of which are unlikely to have resulted in PCB contamination; therefore the areal extent of surface soil PCB contamination on the northern border of SWMU 1 may be considered defined by existing data. The other border grid in which PCBs exceeded industrial worker NALs, grid 58, is on the southern border of SWMU 1. Grid 58 borders KPDES Outfall 008 ditch and the railroad. PCB contamination at SWMU 1 is the result of direct application of PCB-contaminated oils onto the ground, and the areas on the southern side of the drainage ditch are not likely to have had those oils applied; therefore, the lateral extent of surface soil PCB contamination to the south may be considered defined. There were no grids with PCB concentrations above NALs along either the eastern or western borders of SWMU 1.

Total PCBs were detected above the industrial worker ALs in grid 28 (EU 2) only. Grid 28 is not located along the SWMU 1 border.

Total PCBs were detected in the SWMU 1 surface soil above the SSLs for the protection of UCRS groundwater in grids 13 (EU 1); 3, 14, 15, 16, 17, 25, 26, 27, 28 (EU 2); 8, 18 (EU 3); 55 (EU 4); and 58 (EU 5) and for RGA groundwater in grid 28 (EU 2).

SVOCs

Total PAHs were detected above industrial worker NALs in the surface soil in two grids: 51 and 58 (EU 5). Both of these grids are adjacent to the railroad track that runs along the southeast border of SWMU 1.

No SVOCs were detected in the SWMU 1 surface soil above industrial worker ALs.

Of the SVOCs, naphthalene (grid 58) and Total PAHs (grids 51 and 58) in EU 5 and pyrene (grid 46) in EU 4 were detected above the SSLs for the protection of UCRS groundwater. Naphthalene (grid 58) in EU 5 was detected above the SSLs for the protection of RGA groundwater.

VOCs

No VOCs were detected above industrial worker NALs or ALs in the SWMU 1 surface soil.

Methylene chloride (grid 58) in EU 5 and trichloroethene (grids 9 and 10) in EU 3 were detected in the SWMU 1 surface soil above the SSLs for the protection of UCRS groundwater. No VOCs were detected above the SSLs for the protection of RGA groundwater in the Soils OU dataset.

Radionuclides

The following are the radioisotopes that were above both the background screening levels and the industrial worker NALs and the grids and EUs in which they were found.

Radioisotope	Grid	EU
Cesium-137	22, 43	1
Cobalt-60	56	4
Neptunium-237	43	1
Thorium-230	22, 43	1
Uranium-238	7, 43	1, 3

Each of the grids listed above is on the borders of SWMU 1.

Grids 22 and 43 (EU 1), where cesium-137 and thorium-230 were detected above the industrial worker NAL, are adjacent to the railroad track on the west side of SWMU 1. The range of all detected activities of cesium-137 at SWMU 1 was 0.0878 to 0.753 pCi/g. The industrial worker AL is 8.61 pCi/g, which is significantly above the highest detected value of cesium-137 in SWMU 1.

Grid 56 (EU 4), where cobalt-60 was detected above the industrial worker NAL, is on the southern border of SWMU 1. The other five samples that were analyzed for cobalt-60 did not exceed the industrial worker NAL; two of the five were located in grids 51 and 53, which also are on the southern border of SWMU 1. The cobalt-60 result reported at 0.022 pCi/g had an uncertainty of 0.04 pCi/g and a minimum detectable activity of 0.08 pCi/g. This result was qualified by the laboratory with a "U." As agreed to during scoping of the RI Report and documented in Chapter 4, all radiological results were considered detects.

Grid 7 (EU 3), one of the grids in which uranium-238 was detected above the industrial worker NAL, borders the C-745 Cylinder Yard.

No radionuclides were detected above industrial worker ALs in the SWMU 1 surface soil.

The following were detected above both the background screening levels and SSLs for the protection of UCRS.

Radioisotope	Grid	EU
Americium-241[1]	43	1
Neptunium-237	43	1
Plutoniu-238	43	1
Plutonium-239/240	22, 43, 53, 56	1, 4
Technetium-99	22, 43, 51, 53, 56,	1, 4, 5
Thorium-230	22, 43, 53, 56	1, 4

[1]No background value is available.

Neptunium-237 (grid 43), plutonium-239/240 (grid 43), and thorium-230 (grids 22 and 43), all in EU 1, were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

5.1.4 Nature and Extent of Contamination—Subsurface Soils

The representative data set presented in Table 5.1.2 provides the nature of contamination in SWMU 1 subsurface soils and Figures 5.1.4–5.1.6 illustrate the horizontal extent. A complete list of detailed sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 1 subsurface soil contamination is considered adequately defined for supporting the baseline risk assessment and FS. There is some uncertainty with vertical extent; however, this will be addressed in the FS.

Metals

Metals were detected above the industrial worker NALs in the SWMU 1 subsurface soil. The following are the metals detected at or above both background screening levels and the industrial worker NALs, and the grids and EUs in which they were detected.

Metal	Grid	EU
Antimony	44	1
Arsenic	17, 24, 25, 30, 49, 53	1, 2, 3, 5
Beryllium	11, 12, 14, 17, 28, 34, 43, 45, 49, 53, 56, 58	1, 2, 4, 5
Cadmium	27, 29, 45	2, 3, 4
Chromium	11, 28	1, 2
Cobalt	43, 49	1, 5
Silver	17, 28	2
Vanadium	11, 14, 35	1, 2, 4

Grids 11 and 43 (EU 1) are located on the western border of SWMU 1; and grids 53 (EU 1), 56 (EU 4), and 58 (EU 5) (in samples associated with this RI Report) at or above both background screening levels and the industrial worker NALs was 16 ft bgs. The end depths of the boreholes from grids 11, 12, 14, 16, 17, 25, 28, 35, 44, and 49 ranged from 20 to 29 ft bgs and are associated with the GWOU; however, the dataset for this RI Report includes only results for samples taken at or above 16 ft bgs, per the Work Plan (DOE 2010a). The Soils OU is defined in the SMP as soils to 10 ft bgs (or 16 ft bgs at pipelines).

No metals were detected above the industrial worker ALs in the SWMU 1 subsurface soil.

Table 5.1.2. Subsurface Soil Historical Data Summary: SWMU 1 Oil Land Farm

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	1.04E+03	1.43E+04	7.68E+03	0/82	81/82	1/82	1.20E+04	0/82	3.32E+04	0/82	3.97E+06	0/82	80/82	1.3135 - 13.135
METAL	Antimony	mg/kg	1.30E-02	5.00E+00	1.30E+00	0/78	12/78	11/78	2.10E-01	1/78	2.53E+00	0/78	1.51E+03	0/78	11/78	0.0052 - 5.32
METAL	Arsenic	mg/kg	1.00E+00	1.67E+01	4.70E+00	0/82	81/82	6/82	7.90E+00	81/82	9.97E-01	0/82	9.97E+01	0/82	81/82	0.0827 - 4.6
METAL	Barium	mg/kg	1.27E+00	2.47E+02	1.12E+02	0/82	82/82	6/82	1.70E+02	0/82	5.92E+02	0/82	3.78E+05	0/82	67/82	0.0002 - 0.1709
METAL	Beryllium	mg/kg	5.94E-03	1.07E+00	4.95E-01	0/82	80/82	12/82	6.90E-01	79/82	1.40E-02	0/82	9.22E+00	0/82	0/82	0.0001 - 0.4
METAL	Cadmium	mg/kg	4.33E-03	3.35E+00	1.65E+00	0/82	45/82	35/82	2.10E-01	3/82	3.16E+00	0/82	3.16E+02	0/82	31/82	0.0004 - 0.971
METAL	Calcium	mg/kg	4.57E+02	3.24E+03	1.17E+03	0/82	82/82	0/82	6.10E+03	0/82	n/a	0/82	n/a	n/a	n/a	0.1 - 6.6323
METAL	Chromium	mg/kg	1.29E-01	6.35E+01	1.39E+01	0/82	81/82	2/82	4.30E+01	2/82	3.02E+01	0/82	3.02E+03	0/82	0/82	0.0013 - 2.3
METAL	Cobalt	mg/kg	5.76E-02	1.54E+01	5.62E+00	0/82	81/82	3/82	1.30E+01	6/82	1.05E+01	0/82	1.52E+03	80/82	81/82	0.0008 - 3
METAL	Copper	mg/kg	2.09E-01	6.01E+01	1.08E+01	0/82	82/82	1/82	2.50E+01	0/82	1.43E+03	0/82	2.24E+05	0/82	1/82	0.0021 - 0.2113
METAL	Iron	mg/kg	1.41E+02	2.48E+04	1.39E+04	0/82	82/82	0/82	2.80E+04	0/82	2.51E+04	0/82	3.92E+06	81/82	82/82	0.007 - 23.597
METAL	Lead	mg/kg	2.92E+00	7.04E+01	9.29E+00	0/82	80/82	1/82	2.30E+01	0/82	4.00E+02	0/82	4.00E+02	0/82	10/82	0.2 - 2.4842
METAL	Magnesium	mg/kg	1.17E+02	2.63E+03	1.54E+03	0/82	82/82	9/82	2.10E+03	0/82	n/a	0/82	n/a	n/a	n/a	3.7451 - 6.7902
METAL	Manganese	mg/kg	3.04E+00	2.16E+03	4.30E+02	0/82	82/82	8/82	8.20E+02	0/82	2.58E+03	0/82	1.16E+05	80/82	82/82	0.0003 - 0.2014
METAL	Mercury	mg/kg	2.71E-04	2.80E-01	4.13E-02	0/82	60/82	2/82	1.30E-01	0/82	9.00E-01	0/82	7.85E+02	0/82	2/82	0 - 0.125
METAL	Nickel	mg/kg	2.98E-01	2.97E+01	1.31E+01	0/82	82/82	5/82	2.20E+01	0/82	4.28E+01	0/82	3.18E+04	0/82	81/82	0.0012 - 6.8
METAL	Selenium	mg/kg	8.91E-02	5.90E-01	2.45E-01	0/82	23/82	0/82	7.00E-01	0/82	1.79E+02	0/82	2.80E+04	0/82	9/82	0.0008 - 0.78
METAL	Silver	mg/kg	1.85E-03	7.39E+01	1.56E+01	0/82	6/82	3/82	2.70E+00	2/82	1.08E+01	0/82	9.15E+03	3/82	5/82	0.0017 - 3.5
METAL	Sodium	mg/kg	5.22E+00	5.70E+02	3.01E+02	0/82	78/82	28/82	3.40E+02	0/82	n/a	0/82	n/a	n/a	n/a	0.0272 - 121
METAL	Thallium	mg/kg	1.17E-01	1.56E+00	2.11E-01	0/82	28/82	1/82	3.40E-01	0/82	2.87E+00	0/82	4.48E+02	0/82	18/82	0.0053 - 9.3
METAL	Vanadium	mg/kg	2.31E-01	5.33E+01	2.23E+01	0/82	81/82	3/82	3.70E+01	81/82	1.51E-01	0/82	9.30E+01	80/82	81/82	0.0014 - 0.6021
METAL	Zinc	mg/kg	7.40E+00	1.65E+02	4.47E+01	0/82	82/82	15/82	6.00E+01	0/82	1.08E+04	0/82	1.68E+06	0/82	76/82	0.0806 - 0.1438
PPCB	PCB, Total	mg/kg	1.69E-01	1.10E+01	2.93E+00	0/114	4/114	0/114	n/a	3/114	1.88E-01	0/114	1.88E+01	1/114	4/114	0.017 - 4.7
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/89	0/89	0/89	n/a	0/89	n/a	0/89	n/a	0/89	0/89	0.006 - 2.5
SVOA	1,2-Dichlorobenzene	mg/kg	8.50E-02	1.20E-01	1.03E-01	2/91	2/91	0/91	n/a	0/91	n/a	0/91	n/a	0/91	0/91	0.006 - 2.5
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/89	0/89	0/89	n/a	0/89	n/a	0/89	n/a	n/a	n/a	0.006 - 2.5
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/89	0/89	0/89	n/a	0/89	n/a	0/89	n/a	0/89	0/89	0.006 - 2.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/90	0/90	0/90	n/a	0/90	n/a	0/90	n/a	n/a	n/a	0.33 - 2.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/90	0/90	0/90	n/a	0/90	n/a	0/90	n/a	n/a	n/a	0.33 - 2.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	1.65 - 5
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/90	0/90	0/90	n/a	0/90	n/a	0/90	n/a	n/a	n/a	0.33 - 2.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	1.65 - 2.5
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/90	0/90	0/90	n/a	0/90	n/a	0/90	n/a	n/a	n/a	0.33 - 2.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	1.30E+00	0/88	3.91E+01	0/88	0/88	1.65 - 2.5
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	1.65 - 2.5
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	1.65 - 2.5
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	6.02E+02	0/88	1.81E+04	0/88	0/88	0.33 - 2.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	4.05E+03	0/88	1.22E+05	0/88	0/88	0.33 - 2.5
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.1.2. Subsurface Soil Historical Data Summary: SWMU 1 Oil Land Farm (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	5.10E-02	3.80E+00	1.31E+00	2/89	3/89	0/89	n/a	0/89	n/a	0/89	n/a	n/a	n/a	1.65 - 2.5
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	6.20E-02	1.50E+00	3.06E-01	17/88	22/88	0/88	n/a	0/88	n/a	0/88	n/a	0/88	2/88	0.02 - 2.5
SVOA	Butyl benzyl phthalate	mg/kg	2.00E-01	2.00E-01	2.00E-01	1/88	1/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.02 - 2.5
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	Di-n-butyl phthalate	mg/kg	4.80E-02	2.20E+01	3.25E+00	8/90	10/90	0/90	n/a	0/90	n/a	0/90	n/a	n/a	n/a	0.01 - 2.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	6.01E+02	0/88	1.80E+04	0/88	0/88	0.33 - 2.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	4.87E+02	0/88	1.46E+04	0/88	0/88	0.33 - 2.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/90	0/90	0/90	n/a	0/90	1.17E-01	0/90	1.17E+01	0/90	0/90	0.33 - 2.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/91	0/91	0/91	n/a	0/91	n/a	0/91	n/a	n/a	n/a	0.006 - 2.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/90	0/90	0/90	n/a	0/90	n/a	0/90	n/a	n/a	n/a	0.33 - 2.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	m,p-Cresol	mg/kg	2.30E+00	2.30E+00	2.30E+00	0/6	1/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	2.2 - 2.4
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/89	0/89	0/89	n/a	0/89	2.24E+00	0/89	2.24E+02	0/89	0/89	0.006 - 2.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/90	0/90	0/90	n/a	0/90	n/a	0/90	n/a	n/a	n/a	0.33 - 2.5
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	5.22E-02	0/88	5.22E+00	0/88	0/88	0.33 - 2.5
SVOA	N-Nitrosodiphenylamine	mg/kg	4.80E-02	6.40E-02	5.87E-02	3/88	3/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	Pentachlorophenol	mg/kg	5.50E-02	1.10E-01	8.25E-02	2/90	2/90	0/90	n/a	0/90	n/a	0/90	n/a	0/90	2/90	0.4 - 2.5
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	0.33 - 2.5
SVOA	Phenol	mg/kg	7.00E-01	1.70E+01	8.85E+00	0/89	2/89	0/89	n/a	0/89	n/a	0/89	n/a	n/a	n/a	0.33 - 2.5
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	n/a	0/88	n/a	n/a	n/a	1.65 - 5
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	4.49E+02	0/88	1.35E+04	0/88	0/88	0.33 - 2.5
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	2.4 - 2.4
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/88	0/88	0/88	n/a	0/88	5.92E-02	0/88	5.92E+00	0/88	0/88	-
VOA	1,1,1,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	1,1,1-Trichloroethane	mg/kg	5.00E-04	1.30E-02	6.75E-03	1/30	2/30	0/30	n/a	0/30	n/a	0/30	n/a	0/30	0/30	0.002 - 0.031
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.002 - 0.031
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	0/30	0/30	0.002 - 0.031
VOA	1,1-Dichloroethane	mg/kg	5.00E-01	5.00E-01	5.00E-01	0/42	1/42	0/42	n/a	0/42	n/a	0/42	n/a	n/a	n/a	0.002 - 0.031
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/147	0/147	0/147	n/a	0/147	4.89E-02	0/147	5.53E+00	0/147	0/147	0.002 - 3.5
VOA	1,2,3-Trichloropropane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.006 - 0.006
VOA	1,2-Dibromoethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	0/30	0/30	0.002 - 0.031
VOA	1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/25	0/25	0/25	n/a	0/25	5.48E+00	0/25	1.76E+02	0/25	0/25	0.006 - 0.031
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.002 - 0.031
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	2.38E+02	0/6	8.21E+03	0/6	0/6	0.002 - 0.02
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/27	0/27	0/27	n/a	0/27	n/a	0/27	n/a	n/a	n/a	0.011 - 0.49
VOA	2-Chloroethyl vinyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.01 - 0.098
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/29	0/29	0/29	n/a	0/29	n/a	0/29	n/a	n/a	n/a	0.011 - 0.24
VOA	Acetone	mg/kg	3.00E-03	4.00E-01	9.11E-02	2/30	11/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.006 - 0.49
VOA	Acrolein	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.06 - 0.06
VOA	Acrylonitrile	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.70E-01	0/2	2.67E+01	n/a	n/a	0.06 - 0.06
VOA	Benzene	mg/kg	9.00E-03	9.00E-03	9.00E-03	0/30	1/30	0/30	n/a	0/30	6.98E-01	0/30	8.22E+01	0/30	1/30	0.002 - 0.031
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.002 - 0.031
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.002 - 0.031
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.004 - 0.062

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.1.2. Subsurface Soil Historical Data Summary: SWMU 1 Oil Land Farm (Continued)

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Industrial Worker FOE	Industrial Worker NAL	Industrial Worker FOE	Industrial Worker AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
VOA	Carbon disulfide	mg/kg	2.00E-03	2.00E-03	2.00E-03	4/30	4/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.002 - 0.031
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	4.97E-01	0/30	5.76E+01	0/30	0/30	0.002 - 0.031
VOA	Chlorobenzene	mg/kg	1.00E-03	1.00E-03	1.00E-03	1/30	1/30	0/30	n/a	0/30	n/a	0/30	n/a	0/30	0/30	0.002 - 0.031
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.004 - 0.062
VOA	Chloroform	mg/kg	2.00E-04	2.00E-04	2.00E-04	1/30	1/30	0/30	n/a	0/30	2.42E-01	0/30	2.49E+01	0/30	0/30	0.002 - 0.031
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.004 - 0.062
VOA	cis-1,2-Dichloroethene	mg/kg	2.60E-02	2.40E+03	1.52E+02	6/125	11/125	0/125	n/a	2/125	4.74E+00	1/125	1.93E+02	5/125	11/125	0.002 - 3.5
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.002 - 0.031
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	0/30	0/30	0.002 - 0.031
VOA	Dibromomethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	Dichlorodifluoromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	Ethyl methacrylate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	3.29E+00	0/30	3.84E+02	0/30	0/30	0.002 - 0.031
VOA	Iodomethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	3.50E+01	0/6	1.07E+03	0/6	0/6	0.002 - 0.02
VOA	Methylene chloride	mg/kg	4.10E-03	1.40E-01	6.48E-02	1/30	8/30	0/30	n/a	0/30	n/a	0/30	n/a	2/30	8/30	0.002 - 0.12
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	0/30	0/30	0.002 - 0.031
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	2.82E-01	0/30	7.08E+01	0/30	0/30	0.002 - 0.031
VOA	Toluene	mg/kg	2.00E-03	3.00E-03	2.25E-03	4/30	4/30	0/30	n/a	0/30	n/a	0/30	n/a	0/30	0/30	0.002 - 0.031
VOA	Total Xylene	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	3.50E+01	0/24	1.07E+03	0/24	0/24	0.006 - 0.031
VOA	trans-1,2-Dichloroethene	mg/kg	1.00E-01	1.60E+01	2.83E+00	4/123	16/123	0/123	n/a	2/123	1.07E+01	0/123	3.42E+02	5/123	16/123	0.002 - 3.5
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.002 - 0.031
VOA	Trans-1,4-Dichloro-2-butene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	Trichloroethene	mg/kg	6.00E-04	8.70E+01	6.61E+00	19/152	36/152	0/152	n/a	32/152	4.69E-02	8/152	4.98E+00	24/152	34/152	0.001 - 3.5
VOA	Trichlorofluoromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/26	0/26	0/26	n/a	0/26	n/a	0/26	n/a	n/a	n/a	0.006 - 0.062
VOA	Vinyl chloride	mg/kg	2.00E-01	4.80E+00	1.59E+00	4/147	5/147	0/147	n/a	4/147	2.04E-01	0/147	4.83E+01	5/147	5/147	0.001 - 3.5

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

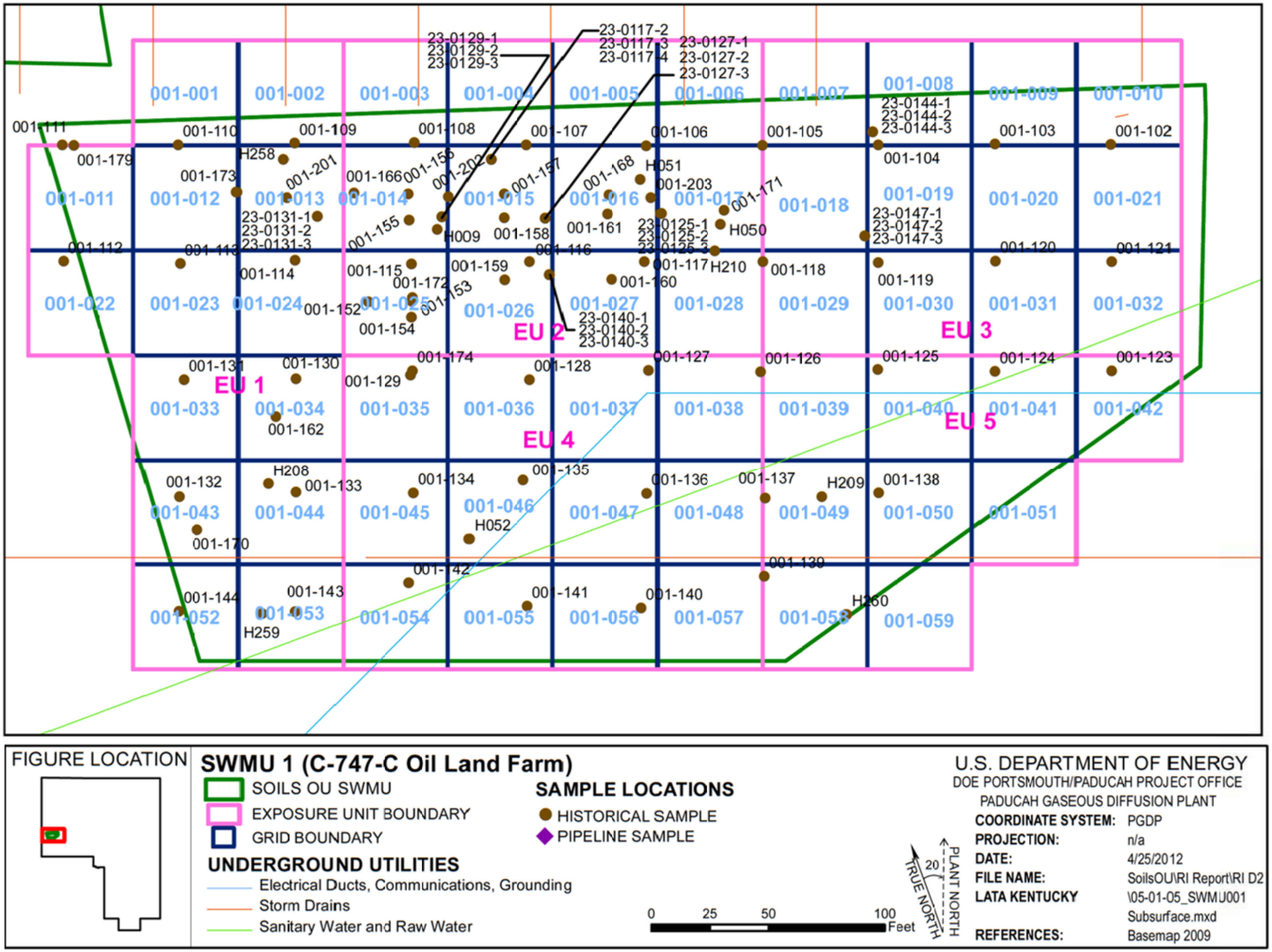


Figure 5.1.4. SWMU 1 Sample Locations - Subsurface Soil

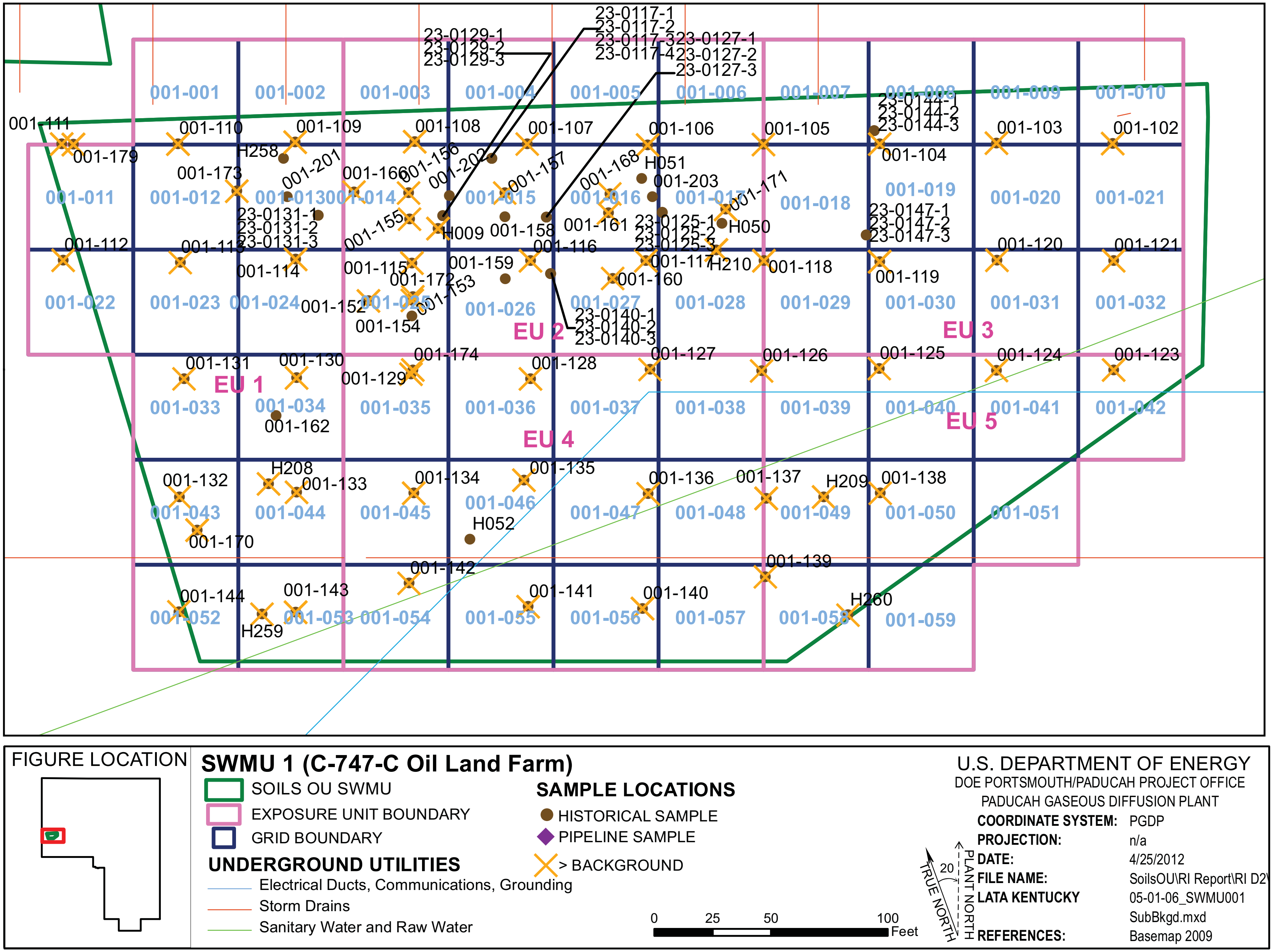


Figure 5.1.5. SWMU 1 Background Exceedances - Subsurface Soil

Station	Results Exceeding Background
001-102	Antimony 0.784 (mg/kg) Sodium 492 (mg/kg)
001-103	Cadmium 1.65 (mg/kg) Sodium 480 (mg/kg)
001-104	Cadmium 2.19 (mg/kg) Sodium 556 (mg/kg)
001-105	Cadmium 2.32 (mg/kg) Sodium 476 (mg/kg)
001-106	Cadmium 2.48 (mg/kg) Sodium 434 (mg/kg)
001-107	Cadmium 2.82 (mg/kg)
001-108	Barium 181 (mg/kg) Cadmium 2.83 (mg/kg) Nickel 26.2 (mg/kg) Sodium 405 (mg/kg)
001-109	Antimony 1.32 (mg/kg) Magnesium 2190 (mg/kg) Sodium 418 (mg/kg)
001-110	Antimony 1.4 (mg/kg) Magnesium 2160 (mg/kg) Nickel 26.8 (mg/kg) Sodium 431 (mg/kg)
001-111	Antimony 1.11 (mg/kg) Sodium 393 (mg/kg)
001-112	Cadmium 2.81 (mg/kg) Sodium 419 (mg/kg)
001-113	Antimony 0.638 (mg/kg)
001-114	Arsenic 10.7 (mg/kg) Cadmium 3.08 (mg/kg) Magnesium 2110 (mg/kg)
001-115	Arsenic 9.41 (mg/kg) Barium 174 (mg/kg) Cadmium 3.13 (mg/kg)
001-116	Barium 175 (mg/kg) Cadmium 0.997 (mg/kg) Sodium 350 (mg/kg)
001-117	Cadmium 3.2 (mg/kg) Sodium 410 (mg/kg)
001-118	Cadmium 3.32 (mg/kg) Magnesium 2310 (mg/kg) Sodium 570 (mg/kg)
001-119	Arsenic 10.5 (mg/kg) Barium 197 (mg/kg) Cadmium 2.9 (mg/kg) Manganese 881 (mg/kg) Nickel 29.7 (mg/kg) Sodium 534 (mg/kg)
001-120	Cadmium 2.68 (mg/kg) Sodium 487 (mg/kg)
001-121	Cadmium 2.17 (mg/kg) Sodium 446 (mg/kg)
001-123	Cadmium 2.35 (mg/kg) Sodium 471 (mg/kg)
001-124	Cadmium 1.5 (mg/kg) Sodium 417 (mg/kg)
001-125	Cadmium 2.23 (mg/kg)
001-126	Cadmium 1.52 (mg/kg)
001-127	Cadmium 2.66 (mg/kg)
001-128	Cadmium 2.46 (mg/kg) Magnesium 2520 (mg/kg)
001-129	Cadmium 0.513 (mg/kg) Zinc 60.8 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.1.5. SWMU 1 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
001-130	Antimony 0.934 (mg/kg)
	Beryllium 0.745 (mg/kg)
001-131	Antimony 1.72 (mg/kg)
001-132	Antimony 0.633 (mg/kg)
001-133	Antimony 1.51 (mg/kg)
	Sodium 388 (mg/kg)
001-134	Beryllium 1.07 (mg/kg)
	Cadmium 3.35 (mg/kg)
	Magnesium 2450 (mg/kg)
001-135	Cadmium 2.21 (mg/kg)
	Sodium 372 (mg/kg)
001-136	Cadmium 2.74 (mg/kg)
	Mercury 0.152 (mg/kg)
001-137	Arsenic 16.7 (mg/kg)
	Barium 215 (mg/kg)
	Beryllium 0.936 (mg/kg)
	Cadmium 2.97 (mg/kg)
	Cobalt 13.3 (mg/kg)
	Manganese 2160 (mg/kg)
	Nickel 24 (mg/kg)
	Sodium 350 (mg/kg)
001-138	Cadmium 1.99 (mg/kg)
001-139	Cadmium 1.48 (mg/kg)
001-140	Beryllium 0.776 (mg/kg)
	Cadmium 0.22 (mg/kg)
	Magnesium 2630 (mg/kg)
	Sodium 421 (mg/kg)
	Zinc 108 (mg/kg)
001-141	Cadmium 0.212 (mg/kg)
	Magnesium 2140 (mg/kg)
	Zinc 75.8 (mg/kg)
001-142	Zinc 118 (mg/kg)
001-143	Aluminum 14300 (mg/kg)
	Arsenic 10.6 (mg/kg)
	Beryllium 0.767 (mg/kg)
	Manganese 1080 (mg/kg)
001-144	Zinc 60.2 (mg/kg)
001-152	Cadmium 0.284 (mg/kg)
	Zinc 70.1 (mg/kg)
001-153	Zinc 64.7 (mg/kg)
001-155	Zinc 73.3 (mg/kg)
001-156	Zinc 63.6 (mg/kg)
001-157	Zinc 165 (mg/kg)
001-160	Sodium 409 (mg/kg)
001-161	Zinc 80.7 (mg/kg)
001-166	Sodium 354 (mg/kg)
001-168	Zinc 78.9 (mg/kg)
001-170	Barium 247 (mg/kg)
	Beryllium 0.802 (mg/kg)
	Cobalt 15.4 (mg/kg)
	Manganese 1990 (mg/kg)
	Thallium 1.56 (mg/kg)
001-171	Arsenic 11.5 (mg/kg)
	Beryllium 0.757 (mg/kg)
	Manganese 902 (mg/kg)
	Nickel 27 (mg/kg)
	Silver 73.9 (mg/kg)
	Zinc 85.3 (mg/kg)
001-172	Cadmium 1.67 (mg/kg)
001-173	Beryllium 0.715 (mg/kg)
	Sodium 489 (mg/kg)
001-174	Sodium 401 (mg/kg)
	Vanadium 40.2 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.1.5. SWMU 1 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
001-179	Antimony 0.552 (mg/kg)
	Beryllium 0.699 (mg/kg)
	Cadmium 0.287 (mg/kg)
	Chromium 56.2 (mg/kg)
	Vanadium 53.3 (mg/kg)

Station	Results Exceeding Background
H009	Beryllium 0.95 (mg/kg)
	Manganese 847.6 (mg/kg)
	Silver 2.9 (mg/kg)
	Vanadium 37.5 (mg/kg)

Station	Results Exceeding Background
H208	Antimony 5 (mg/kg)
	Manganese 1290 (mg/kg)

Station	Results Exceeding Background
H209	Cobalt 14.3 (mg/kg)
	Manganese 1500 (mg/kg)
	Sodium 427 (mg/kg)

Station	Results Exceeding Background
H210	Cadmium 1.7 (mg/kg)
	Chromium 63.5 (mg/kg)
	Copper 60.1 (mg/kg)
	Lead 70.4 (mg/kg)
	Mercury 0.28 (mg/kg)
	Silver 14 (mg/kg)
	Zinc 103 (mg/kg)

Station	Results Exceeding Background
H259	Magnesium 2120 (mg/kg)

Station	Results Exceeding Background
H260	Beryllium 0.72 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.1.5. SWMU 1 Background Exceedances – Subsurface (Continued)

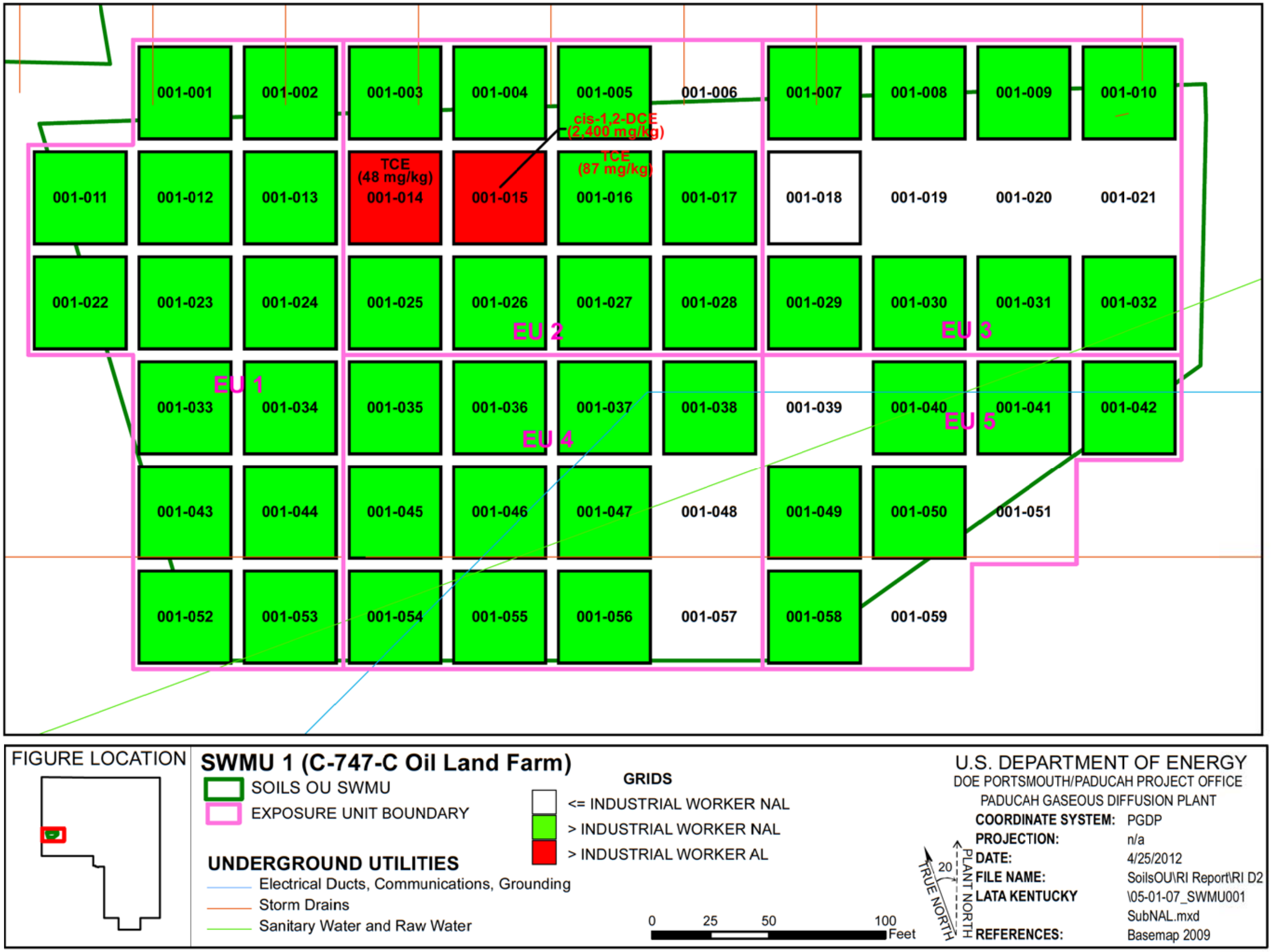


Figure 5.1.6. SWMU 1 NAL Exceedances - Subsurface Soil

Grid	Results Exceeding NAL
001-001	Arsenic 3.93 (mg/kg) Beryllium 0.573 (mg/kg) Vanadium 22.7 (mg/kg)

Grid	Results Exceeding NAL
001-002	Arsenic 2.55 (mg/kg) Beryllium 0.571 (mg/kg) Vanadium 18.6 (mg/kg)

Grid	Results Exceeding NAL
001-003	Arsenic 4.69 (mg/kg) Beryllium 0.258 (mg/kg) Vanadium 23 (mg/kg)

Grid	Results Exceeding NAL
001-004	Arsenic 4.01 (mg/kg) Beryllium 0.349 (mg/kg) Vanadium 23.3 (mg/kg)

Grid	Results Exceeding NAL
001-005	Arsenic 3.98 (mg/kg) Beryllium 0.273 (mg/kg) Vanadium 19.8 (mg/kg)

Grid	Results Exceeding NAL
001-007	Arsenic 4.97 (mg/kg) Beryllium 0.283 (mg/kg) Vanadium 24.9 (mg/kg)

Grid	Results Exceeding NAL
001-008	Arsenic 5.91 (mg/kg) Beryllium 0.222 (mg/kg) Vanadium 20.1 (mg/kg)

Grid	Results Exceeding NAL
001-009	Arsenic 3.48 (mg/kg) Beryllium 0.186 (mg/kg) Vanadium 16.5 (mg/kg)

Grid	Results Exceeding NAL
001-010	Arsenic 2.09 (mg/kg) Vanadium 0.231 (mg/kg)

Grid	Results Exceeding NAL
001-011	Arsenic 3.38 (mg/kg) Beryllium 0.699 (mg/kg) Chromium 56.2 (mg/kg) Vanadium 53.3 (mg/kg)

Grid	Results Exceeding NAL
001-012	Arsenic 1.58 (mg/kg) Beryllium 0.715 (mg/kg) Vanadium 35.4 (mg/kg)

Grid	Results Exceeding NAL
001-013	Arsenic 5.2 (mg/kg) Beryllium 0.62 (mg/kg) Vanadium 14.6 (mg/kg) Trichloroethene 0.69 (mg/kg)

Grid	Results Exceeding NAL
001-014	Arsenic 6.2 (mg/kg) Beryllium 0.95 (mg/kg) Cobalt 11.3 (mg/kg) Vanadium 37.5 (mg/kg) Trichloroethene 48 (mg/kg)

Grid	Results Exceeding NAL
001-015	Arsenic 3.92 (mg/kg) Beryllium 0.675 (mg/kg) Vanadium 30.7 (mg/kg) cis-1,2-Dichloroethene 2400 (mg/kg) trans-1,2-Dichloroethene 16 (mg/kg) Trichloroethene 87 (mg/kg) Vinyl chloride 0.4 (mg/kg)

Grid	Results Exceeding NAL
001-016	Arsenic 3.99 (mg/kg) Beryllium 0.64 (mg/kg) Vanadium 26.3 (mg/kg) Trichloroethene 0.2 (mg/kg)

Grid	Results Exceeding NAL
001-017	Arsenic 11.5 (mg/kg) Beryllium 0.757 (mg/kg) Silver 73.9 (mg/kg) Vanadium 33 (mg/kg) PCB, Total 0.3 (mg/kg)

Grid	Results Exceeding NAL
001-022	Arsenic 2.42 (mg/kg) Beryllium 0.355 (mg/kg) Vanadium 19.7 (mg/kg)

Grid	Results Exceeding NAL
001-023	Arsenic 1.88 (mg/kg) Beryllium 0.48 (mg/kg) Vanadium 22.8 (mg/kg)

Grid	Results Exceeding NAL
001-024	Arsenic 10.7 (mg/kg) Beryllium 0.312 (mg/kg) Vanadium 26.3 (mg/kg)

Grid	Results Exceeding NAL
001-025	Arsenic 9.41 (mg/kg) Beryllium 0.559 (mg/kg) Vanadium 34 (mg/kg) cis-1,2-Dichloroethene 6 (mg/kg) Trichloroethene 2.1 (mg/kg) Vinyl chloride 4.8 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.1.6. SWMU 1 NAL Exceedances – Subsurface (Continued)

Grid	Results Exceeding NAL
001-026	Arsenic 7.87 (mg/kg) Beryllium 0.555 (mg/kg) Vanadium 23.8 (mg/kg) Trichloroethene 0.1 (mg/kg)

Grid	Results Exceeding NAL
001-027	Arsenic 4.64 (mg/kg) Beryllium 0.496 (mg/kg) Cadmium 3.2 (mg/kg) Vanadium 19.5 (mg/kg) Trichloroethene 0.2 (mg/kg) Vinyl chloride 0.5 (mg/kg)

Grid	Results Exceeding NAL
001-028	Arsenic 7.2 (mg/kg) Beryllium 0.69 (mg/kg) Chromium 63.5 (mg/kg) Silver 14 (mg/kg) Vanadium 16.4 (mg/kg) PCB, Total 11 (mg/kg)

Grid	Results Exceeding NAL
001-029	Arsenic 3.66 (mg/kg) Beryllium 0.428 (mg/kg) Cadmium 3.32 (mg/kg) Vanadium 17.5 (mg/kg)

Grid	Results Exceeding NAL
001-030	Arsenic 10.5 (mg/kg) Beryllium 0.284 (mg/kg) Vanadium 16.9 (mg/kg)

Grid	Results Exceeding NAL
001-031	Arsenic 3.69 (mg/kg) Beryllium 0.255 (mg/kg) Vanadium 20.1 (mg/kg)

Grid	Results Exceeding NAL
001-032	Arsenic 3.37 (mg/kg) Beryllium 0.255 (mg/kg) Vanadium 20.4 (mg/kg)

Grid	Results Exceeding NAL
001-033	Arsenic 3.98 (mg/kg) Beryllium 0.639 (mg/kg) Cobalt 12.7 (mg/kg) Vanadium 23.1 (mg/kg)

Grid	Results Exceeding NAL
001-034	Arsenic 5.54 (mg/kg) Beryllium 0.745 (mg/kg) Vanadium 36.4 (mg/kg)

Grid	Results Exceeding NAL
001-035	Arsenic 4.91 (mg/kg) Beryllium 0.677 (mg/kg) Vanadium 40.2 (mg/kg)

Grid	Results Exceeding NAL
001-036	Arsenic 6.27 (mg/kg) Beryllium 0.577 (mg/kg) Vanadium 25.6 (mg/kg)

Grid	Results Exceeding NAL
001-037	Arsenic 5.13 (mg/kg) Beryllium 0.42 (mg/kg) Vanadium 19.9 (mg/kg)

Grid	Results Exceeding NAL
001-038	Arsenic 3.18 (mg/kg) Beryllium 0.307 (mg/kg) Vanadium 18.7 (mg/kg)

Grid	Results Exceeding NAL
001-040	Arsenic 4.06 (mg/kg) Beryllium 0.332 (mg/kg) Vanadium 17.4 (mg/kg)

Grid	Results Exceeding NAL
001-041	Arsenic 4.48 (mg/kg) Beryllium 0.36 (mg/kg) Vanadium 17.9 (mg/kg)

Grid	Results Exceeding NAL
001-042	Arsenic 5.25 (mg/kg) Beryllium 0.492 (mg/kg) Vanadium 27.1 (mg/kg)

Grid	Results Exceeding NAL
001-043	Arsenic 6.77 (mg/kg) Beryllium 0.802 (mg/kg) Cobalt 15.4 (mg/kg) Vanadium 32.2 (mg/kg)

Grid	Results Exceeding NAL
001-044	Antimony 5 (mg/kg) Arsenic 5.4 (mg/kg) Beryllium 0.6 (mg/kg) Vanadium 22.4 (mg/kg)

Grid	Results Exceeding NAL
001-045	Arsenic 2.9 (mg/kg) Beryllium 1.07 (mg/kg) Cadmium 3.35 (mg/kg) Vanadium 25.1 (mg/kg)

Grid	Results Exceeding NAL
001-046	Arsenic 5.34 (mg/kg) Beryllium 0.489 (mg/kg) Vanadium 21.6 (mg/kg) Trichloroethene 0.19 (mg/kg)

Grid	Results Exceeding NAL
001-047	Arsenic 7.06 (mg/kg) Beryllium 0.645 (mg/kg) Vanadium 20.9 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.1.6. SWMU 1 NAL Exceedances – Subsurface (Continued)

Grid	Results Exceeding NAL
001-049	Arsenic 16.7 (mg/kg) Beryllium 0.936 (mg/kg) Cobalt 14.3 (mg/kg) Vanadium 21.6 (mg/kg)

Grid	Results Exceeding NAL
001-050	Arsenic 3.53 (mg/kg) Beryllium 0.462 (mg/kg) Vanadium 22.3 (mg/kg)

Grid	Results Exceeding NAL
001-052	Arsenic 2.64 (mg/kg) Beryllium 0.458 (mg/kg) Vanadium 26.9 (mg/kg)

Grid	Results Exceeding NAL
001-053	Arsenic 10.6 (mg/kg) Beryllium 0.767 (mg/kg) Cobalt 11.4 (mg/kg) Vanadium 34 (mg/kg)

Grid	Results Exceeding NAL
001-054	Arsenic 4.69 (mg/kg) Beryllium 0.374 (mg/kg) Vanadium 20.4 (mg/kg)

Grid	Results Exceeding NAL
001-055	Arsenic 6.71 (mg/kg) Beryllium 0.613 (mg/kg) Vanadium 33.6 (mg/kg)

Grid	Results Exceeding NAL
001-056	Arsenic 5.66 (mg/kg) Beryllium 0.776 (mg/kg) Vanadium 31.6 (mg/kg)

Grid	Results Exceeding NAL
001-058	Arsenic 6.04 (mg/kg) Beryllium 0.72 (mg/kg) Vanadium 27.2 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.1.6. SWMU 1 NAL Exceedances – Subsurface (Continued)

The following metals were detected in the SWMU 1 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater.

Metal	Grid	EU
Aluminum	53, 58	1, 5
Antimony	1, 2, 10, 11, 23, 33, 34, 43, 44	1, 3
Arsenic	17, 24, 25, 30, 49, 53	1, 2, 3, 5
Barium	3, 25, 26, 30, 43, 49	1, 2, 5
Cadmium	3, 4, 5, 7, 8, 9, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 35, 36, 37, 38, 40, 41, 42, 45, 46, 47, 49, 50, 58	1, 2, 3, 4, 5
Cobalt	43, 49	1, 5
Copper	28	2
Lead	28	2
Manganese	14, 17 ,30, 43, 44 ,49, 53	1, 2, 3, 5
Mercury	1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 22, 23, 25, 26, 28, 29, 30, 31, 32, 34, 35, 36, 37, 38, 40, 41, 42, 43, 44, 45, 46, 47, 49, 50, 52, 53, 54, 55, 56, 58	1, 2,4,5
Nickel	1, 3, 17, 30, 49	1, 2, 3, 5
Silver	14, 17, 28	2
Thallium	43	1
Vanadium	11, 14, 35	1, 2, 5
Zinc	14, 15, 16, 17, 25, 28, 35, 52, 54, 55, 56,	1, 2, 4

The following metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

Metal	Grid	EU
Cobalt	43, 49	1, 5
Manganese	14, 17, 30, 43, 44, 49, 53	1, 2, 3, 5
Silver	14, 17, 28	2, 3, 4
Vanadium	11, 14, 35	1, 2, 4

PCBs

Total PCBs were detected above industrial worker NALs in the subsurface soil of grids 17 and 28 (EU 2). Neither grid 17 nor grid 28 is on the border of SWMU 1.

The PCBs were detected above industrial worker NALs to a maximum depth of 15 ft bgs. The end depth of the borehole from which the 15 ft bgs sample was taken was 25 ft bgs. The dataset for this RI Report includes only results for samples taken at or above 16 ft bgs, per the Work Plan (DOE 2010a). The Soils OU is defined in the SMP as soils to 10 ft bgs (or 16 ft bgs at pipelines).

No PCBs were detected above industrial worker ALs in the SWMU 1 subsurface soil.

Total PCBs were detected above the SSLs for the protection of the UCRS (grids 17 and 28) and RGA (grid 28) groundwater in EU 2.

SVOCs

No SVOCs were detected above industrial worker NALs or ALs in the SWMU 1 subsurface soil.

Bis(2-ethylhexyl)phthalate (grid 14, EU 2) and pentachlorophenol (grid 53, EU 1 and grid 28, EU 2) were detected above the SSLs for the protection of UCRS groundwater. No SVOCs were detected above the SSLs for the protection of RGA groundwater.

VOCs

VOCs were detected above the industrial worker NALs in the SWMU 1 subsurface soil. The following are those VOCs and the grids and EUs in which they were detected.

VOC	Grid	EU
cis-1,2-Dichloroethene	15, 25	2
trans-1,2-Dichloroethene	15	2
Trichloroethene	13, 14, 15, 16, 25, 26, 27, 46	1, 2, 4
Vinyl chloride	15, 25, 27	2

None of these grids are on the border of SWMU 1. VOCs were detected above industrial worker NALs to a maximum depth of 15.5 ft bgs. (The end depth of the borehole was 15.5 ft bgs.)

Two VOCs were detected above the industrial worker ALs in the subsurface soil. The following are those VOCs and the grids and EUs in which they were detected.

VOC	Grid	EU
cis-1,2-Dichloroethene	15	2
Trichloroethene	14, 15	2

The following VOCs were detected above the SSLs for the protection of UCRS groundwater.

VOC	Grid	EU
Benzene	46	4
cis-1,2-dichloroethene	13, 14, 15, 25	1, 2
Methylene chloride	15, 28, 44, 49	1, 2, 5
trans-1,2- dichloroethene	14, 15, 25, 26, 27	2
Trichloroethene	13, 14, 15, 16, 25, 26, 27, 46	1, 2, 4
Vinyl chloride	15, 25, 27	2

The following VOCs were detected above the SSLs for the protection of RGA groundwater.

VOC	Grid	EU
cis-1,2-dichloroethene	15, 25	2
Methylene chloride	49	5
trans-1,2- dichloroethene	14, 15, 25	2
Trichloroethene	13, 14, 15, 16, 25, 27, 46	1, 2, 4
Vinyl chloride	15, 25, 27	2

Radionuclides

There are no results for radionuclides in the subsurface of SWMU 1.

5.1.5 Fate and Transport

SWMU 1 is a grass-covered SWMU which, due to the physical cover at the SWMU, limits the potential for particulate transport through sheet flow. SWMU 1 has potential for runoff that flows to Outfall 008, but is not considered significant as determined by the SWOU SI (DOE 2008a). A final response action for Outfall 008 will be addressed by the SWOU, as described in the SMP. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs/AOCs to surrounding ditches.

Groundwater/vapor modeling for VOCs was accomplished as part of the Southwest Plume FS (DOE 2011b), no other contaminants were targeted for further evaluation under fate and transport (Chapter 4).

5.1.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 1 were evaluated for each of five exposure units (~ 0.5 acres each) for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI. Lead previously was identified as a COC; however, the maximum concentration did not exceed 400 mg/kg, the NAL for lead for the residential scenario (DOE 2011a). The evaluation of historical data for SWMU 1 indicates that TCE, *cis*-DCE, and vinyl chloride are COCs for groundwater contamination in the subsurface soils, and this source is being addressed as part of the Southwest Plume ROD (DOE 2012c).

The cumulative ELCR and the cumulative HI for one or more EUs at SWMU 1 exceed the benchmarks of cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a, (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 5.1.3 for the future industrial worker, excavation worker, and the hypothetical resident. Table 5.1.3 also compares the EPC to the RGO for each COC under each exposure scenario. Table 5.1.3 summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. Chemicals of potential ecological concern (COPECs) for SWMU 1 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 5.1.4.

5.1.7 SWMU 1 Summary

The text below summarizes the results for SWMU 1 using the goals for the project identified during the DQO process for RI scoping.

Table 5.1.3. RGOs for SWMU 1

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Future Industrial Worker											
1	Cesium-137	5.91E-01	pCi/g	6.9E-06	8.61E-02	8.61E-01	8.61E+00	n/a	n/a	n/a	n/a
	Neptunium-237	4.02E-01	pCi/g	1.5E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	Thorium-230	4.40E+01	pCi/g	3.2E-06	1.38E+01	1.38E+02	1.38E+03	n/a	n/a	n/a	n/a
	Uranium-238	1.97E+00	pCi/g	1.2E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.3E-05**				**n/a**			
2	Chromium	2.01E+02	mg/kg	6.7E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	PCB, Total	3.21E+01	mg/kg	1.7E-04	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Cumulative			**1.8E-04**				**< 1**			
3	PCB, Total	2.17E-01	mg/kg	1.2E-06	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Uranium-238	1.73E+00	pCi/g	1.0E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**2.2E-06**				**< 1**			
4	Chromium	9.30E+01	mg/kg	3.1E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Cumulative			**3.1E-06**				**< 1**			
5	PCB, Total	2.70E-01	mg/kg	1.4E-06	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	9.83E-02	mg/kg	1.7E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Cumulative			**3.1E-06**				**< 1**			
Excavation Worker											
2	*cis*-1,2-Dichloroethene	2.40E+03	mg/kg	< 1E-06	n/a	n/a	n/a	12.9	1.86E+01	1.86E+02	5.58E+02
	PCB, Total	3.21E+01	mg/kg	2.5E-06	1.30E+01	1.30E+02	1.30E+03	< 1	n/a	n/a	n/a
	Trichloroethene	6.48E+01	mg/kg	1.3E-05	4.96E+00	4.96E+01	4.96E+02	1.0	6.24E+00	6.24E+01	1.87E+02
	Cumulative			**1.6E-05**				**13.9**			
Hypothetical Resident[5]											
1	PCB, Total	1.76E-01	mg/kg	2.8E-06	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Uranium-238	1.97E+00	pCi/g	5.7E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Uranium-235	1.06E-01	pCi/g	1.3E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Thorium-230	4.40E+01	pCi/g	1.2E-05	3.57E+00	3.57E+01	3.57E+02	n/a	n/a	n/a	n/a
	Plutonium-239/240	6.14E+00	pCi/g	2.2E-06	2.78E+00	2.78E+01	2.78E+02	n/a	n/a	n/a	n/a
	Cesium-137	5.91E-01	pCi/g	3.5E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Neptunium-237	4.02E-01	pCi/g	7.4E-06	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Cumulative			**6.6E-05**				**< 1**			

Table 5.1.3. RGOs for SWMU 1 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
2	Chromium	2.01E+02	mg/kg	1.3E-05	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	PCB, Total	3.21E+01	mg/kg	5.0E-04	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Cumulative			**5.2E-04**				**< 1**			
3	PCB, Total	2.17E-01	mg/kg	3.4E-06	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Uranium-238	1.73E+00	pCi/g	5.0E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**8.4E-06**				**< 1**			
4	PCB, Total	1.30E-01	mg/kg	2.0E-06	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Thorium-230	5.03E+00	pCi/g	1.4E-06	3.57E+00	3.57E+01	3.57E+02	n/a	n/a	n/a	n/a
	Chromium	9.30E+01	mg/kg	6.0E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**9.4E-06**				**< 1**			
5	PCB, Total	2.70E-01	mg/kg	4.2E-06	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Total PAH	9.83E-02	mg/kg	5.1E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Cumulative			**9.3E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
Note: Subsurface VOC-contaminated soil at SWMU 1 is being addressed by the VOC Sources for the Southwest Plume project, as defined in the VOC Sources for the Southwest Plumes ROD (DOE 2012c).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.5, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.5, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 5.1.4 Ecological Screening for SWMU 1

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Grass	Yes	2008	Cadmium	2.10E-01	6.50E+00	3.60E-01	18
			Lead	3.60E+01	3.23E+02	1.10E+01	29
			Mercury	2.00E-01	7.70E+00	1.00E-01	77
			PCB, Total	n/a	3.50E+01	2.00E-02	1,750
			Phenol	n/a	1.80E+00	5.00E-02	36
			Selenium	8.00E-01	9.75E+00	5.20E-01	19
			Silver	2.30E+00	4.25E+01	4.20E+00	10
			Trichloroethene	n/a	1.50E-02	1.00E-03	15

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

Goal 1. Characterize Nature and Extent of Source Zone

SWMU 1 was contaminated by spreading contaminated oils over the ground for biodegradation volatilization. This occurred from 1975 to 1979. SWMU 1 is a grass covered area of approximately 2.3 acres. Contamination is present throughout the SWMU 1 area, but PCBs are concentrated in the southeastern corner of EU 2, grid 28. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 15 ft bgs. SWMU 1 did not undergo a gamma radiological walkover survey because the area background is too high due to the unit's proximity to a cylinder yard.

COPCs for surface and subsurface soils from SWMU 1 are shown on Tables 5.1.1 and 5.1.2 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. A complete list of sampling results is provided in Appendix G.

The following are the types of COPCs for SWMU 1 by EU:

- EU 1
  - Surface—metals, PCBs, radionuclides
  - Subsurface—metals, SVOCs, VOCs
- EU 2
  - Surface—metals, PCBs, VOCs
  - Subsurface—metals, PCBs, SVOCs, VOCs
- EU 3
  - Surface—metal, PCBs, radionuclides
  - Subsurface—metals

- EU 4
  - Surface—metals, SVOCs, radionuclides
  - Subsurface—metals, VOCs
- EU 5
  - Surface—metals, PCBs, SVOCs, VOCs, radionuclides
  - Subsurface—metals, VOCs

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

Contaminant migration at SWMU 1 trends downward through the soil to the underlying groundwater. No recirculating water lines or sewers were associated with the operation of this facility. Storm sewers and recirculating water lines coincidentally are located within the boundary of the SWMU and will be investigated as part of post-GDP activities. The conceptual site model (CSM) can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker, excavation worker, and hypothetical residential scenarios. COCs for these scenarios for SWMU 1 are as follows:

- Future Industrial worker
  - Cesium-137
  - Chromium
  - Neptunum-237
  - Thorium-230
  - Total PAHs
  - Total PCBs
  - Uranium-238
- Excavation worker
  - *cis*-1,2-Dichloroethene
  - Total PCBs
  - Trichloroethene
- Hypothetical Resident (hazards evaluated against the child resident)
  - Cesium-137
  - Chromium
  - Neptunium-237
  - Plutonium-239/240
  - Thorium-230
  - Total PAHs
  - Total PCBs

— Uranium-235
— Uranium-238

Note: Subsurface VOC-contaminated soil at SWMU 1 is being addressed by the VOC Sources for the Southwest Plume project, as defined in the VOC Sources for the Southwest Plumes ROD (DOE 2012c).

Figure 5.1.7 shows the COCs exceeding RGOs for the future industrial worker.

Priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 1 are located all in EU 2. The non-VOC priority COC is Total PCBs for the industrial worker and hypothetical resident. Priority COCs for other scenarios are described in Appendix D.

For SWMU 1, COPECs exceed ecological screening values (ESVs). Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Cadmium
- Lead
- Mercury
- Total PCBs
- Phenol
- Selenium
- Silver
- Trichloroethene

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 1 is sufficient to support decision making and indicates that SWMU 1 should proceed to the FS. An uncertainty concerning depth of sampling should be considered in the FS. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), excavation, and *in situ* treatment. This SWMU is contributing to groundwater contamination in the Southwest Plume. Contamination from SWMU 1 has migrated beyond the boundaries of the Soils OU. An early action could have a positive impact on the groundwater integrator unit by reducing a known source of contamination to it. Subsurface VOC-contaminated soil at SWMU 1 is being addressed by the VOC Sources for the Southwest Plume project, as defined in the VOC Sources for the Southwest Plumes ROD (DOE 2012c). Interim LUCs placed at SWMU 1 as part of the ROD will consist of the excavation/penetration permit program (E/PP) and placement of warning signs to provide notice and warning of environmental contamination. These are necessary for any residual or remaining VOC and non-VOC contamination that is not treated by the remedial action contained in Alternative 3 and whose concentrations prevent unrestricted use/unlimited exposure in the Southwest Groundwater Plume source areas. The interim LUCs will remain in place pending final remedy selection as part of a subsequent OU that addresses the relevant media. All non-VOC contaminated soils at SWMU 1 will be addressed in the Soils OU FS.

5.1.8 SWMU 1 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 1; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark (DOE 2010a) for scenarios including future industrial worker, excavation worker, and hypothetical resident. The reasonably anticipated future land use for this SWMU is industrial land use as shown in the SMP (DOE 2012a).

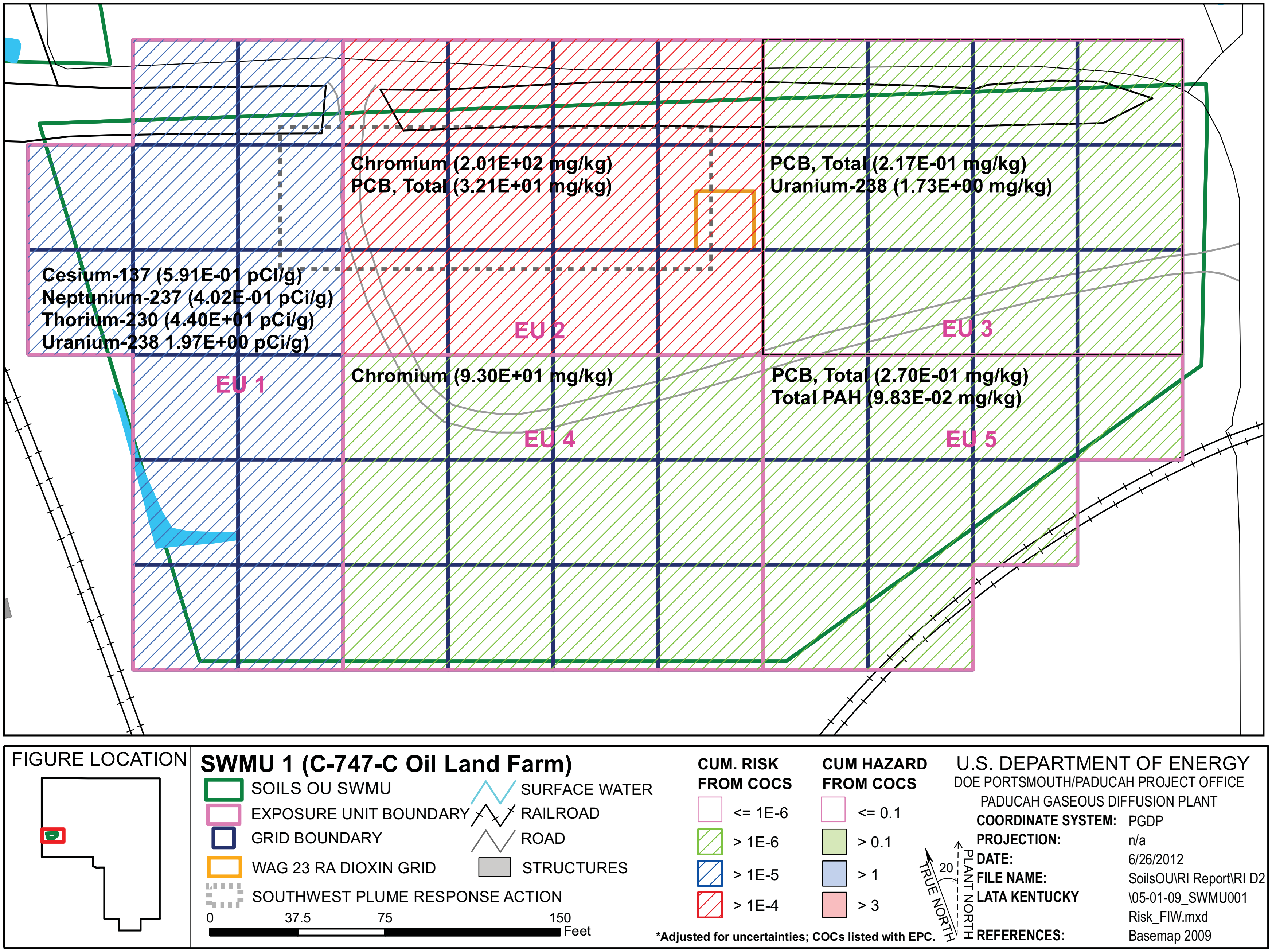


Figure 5.1.7. Summary of COCs Contributing to Risk to the Future Industrial Worker at SWMU 1

5.2 SWMU 99B, C-745 KELLOGG BUILDING SITE—SEPTIC SYSTEM/LEACH FIELD

5.2.1 Background

The C-745 Kellogg Building site, septic system/leach field (SWMU 99B) is located in the east-central portion of the plant site. Runoff from the SWMU flows south and east directly into Outfall 010. Included in the SWMU are a former septic tank, leach field, clay piping and the gravel covered parking area southeast of the former building location (concrete pad) (SWMU 99A). SWMU 99B totals approximately 0.34 acres.

The C-745 Kellogg Building was constructed in 1951 for pipe fabrication and pipe cleaning activities during construction of the plant. The building was demolished in 1955, but the remaining concrete pads are used to store uranium hexafluoride (UF_6) cylinders (SWMU 99A) and waste at the C-745-E Cylinder Storage Yard and the C-746-D Scrap Yard (SWMU 16), respectively.

The septic tank and the leaching field are believed to have been designed to receive sanitary waste from the building's operations; however, the actual configuration of the drainage system is unknown. No records exist as to what was done with the residual contents of the tank after the buildings were demolished or whether any closure or removal actions were taken. The lateral lines for the leach field were found intact when they were uncovered during construction activities in late 1994.

SWMU 99 (A and B) was investigated during the Phase II SI (CH2M HILL 1992). The WAG 28 RI/FS (DOE 2000e) conducted in 1999 focused on potential metals contamination in soils of SWMU 99 based on previous studies and the process knowledge of the activities conducted in this area at the Kellogg Building and support facilities. These studies noted the sporadic presence of some metals in soil at slightly above background levels for subsurface soils. The results are documented in the RI Report for WAG 28 (DOE 2000). The SWMU was divided into two sections—99A (Kellogg Building Sites) and 99B (septic system/leach field) for the previous assessment. The Soils OU RI investigation also viewed this unit as two sections and evaluated 99B within this RI report.

5.2.2 Fieldwork Summary

SWMU 99B sampling was limited due to dense utilities and asphalt; therefore, 6 of the 12 planned grid samples were taken and 46 contingency samples were taken out of 74 planned. Four of the 8 planned pipeline samples were collected. Figure A.1 in Appendix A is the sampling rectification map.

The SWMU did not undergo a gamma radiological walkover survey using a FIDLER because the area had a high background. The influence of radiation due to proximity to a cylinder yard would have prevented the ability to determine accurately if/where a sample would be required. Elevated gamma dose rate from the cylinder yard exhibits a positive bias on the walkover field instrument.

Nature, extent, and the BHHRA results are representative of only SWMU 99B. All information for SWMU 99A will be assessed, as appropriate, by the Soils and Slabs OU.

5.2.3 Nature and Extent of Contamination— Surface Soils

The representative data set for SWMU 99B surface soils presented in Tables 5.2.1 and 5.2.2 provides the nature of the contamination. Figures 5.2.1–5.2.3 illustrate the horizontal extent in SWMU 99B surface soils. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

Table 5.2.1. Surface Soil Historical Data Summary: SWMU 99 Kellogg Building Site

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	8.67E+03	8.82E+03	8.75E+03	0/2	2/2	0/2	1.30E+04	0/2	2.77E+04	0/2	8.91E+06	0/2	2/2	19.4 - 19.4
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	1.78E+00	0/2	1.90E+03	0/2	0/2	9.69 - 9.72
METAL	Arsenic	mg/kg	6.83E+00	7.47E+00	7.15E+00	0/2	2/2	0/2	1.20E+01	2/2	1.02E+00	0/2	1.02E+02	0/2	2/2	4.84 - 4.86
METAL	Barium	mg/kg	6.36E+01	7.67E+01	7.02E+01	0/2	2/2	0/2	2.00E+02	0/2	4.15E+02	0/2	4.58E+05	0/2	0/2	2.42 - 2.43
METAL	Beryllium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	6.70E-01	0/2	1.29E-02	0/2	8.65E+00	0/2	0/2	0.48 - 0.48
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	3.14E+00	0/2	3.14E+02	0/2	0/2	1.94 - 1.94
METAL	Calcium	mg/kg	1.80E+04	4.30E+04	3.05E+04	0/2	2/2	0/2	2.00E+05	0/2	n/a	0/2	n/a	n/a	n/a	96.9 - 97.2
METAL	Chromium	mg/kg	1.10E+01	1.77E+01	1.44E+01	0/2	2/2	1/2	1.60E+01	0/2	7.15E+01	0/2	7.15E+03	0/2	0/2	2.42 - 2.43
METAL	Cobalt	mg/kg	3.63E+00	5.23E+00	4.43E+00	0/2	2/2	0/2	1.40E+01	0/2	8.45E+00	0/2	3.29E+03	2/2	2/2	2.42 - 2.43
METAL	Copper	mg/kg	6.48E+00	9.28E+00	7.88E+00	0/2	2/2	0/2	1.90E+01	0/2	1.13E+03	0/2	4.75E+05	0/2	0/2	2.42 - 2.43
METAL	Iron	mg/kg	1.30E+04	1.33E+04	1.32E+04	0/2	2/2	0/2	2.80E+04	0/2	1.98E+04	0/2	8.31E+06	2/2	2/2	19.4 - 19.4
METAL	Lead	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	3.60E+01	0/2	4.00E+02	0/2	4.00E+02	0/2	0/2	19.4 - 19.4
METAL	Magnesium	mg/kg	1.20E+03	2.35E+03	1.78E+03	0/2	2/2	0/2	7.70E+03	0/2	n/a	0/2	n/a	n/a	n/a	4.84 - 4.86
METAL	Manganese	mg/kg	2.75E+02	4.30E+02	3.53E+02	0/2	2/2	0/2	1.50E+03	0/2	3.47E+03	0/2	2.94E+05	2/2	2/2	2.42 - 2.43
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.00E-01	0/2	6.25E-01	0/2	7.88E+02	0/2	0/2	0.08 - 0.09
METAL	Molybdenum	mg/kg	5.88E+00	1.60E+01	1.09E+01	0/2	2/2	0/2	n/a	0/2	1.42E+02	0/2	5.94E+04	1/2	2/2	4.84 - 4.86
METAL	Nickel	mg/kg	5.53E+00	6.77E+00	6.15E+00	0/2	2/2	0/2	2.10E+01	0/2	2.98E+01	0/2	3.07E+04	0/2	2/2	4.84 - 4.86
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	8.00E-01	0/2	1.42E+02	0/2	5.93E+04	0/2	0/2	19.4 - 19.4
METAL	Silver	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.30E+00	0/2	7.45E+00	0/2	8.07E+03	0/2	0/2	2.42 - 2.43
METAL	Sodium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	3.20E+02	0/2	n/a	0/2	n/a	n/a	n/a	96.9 - 97.2
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	2.27E+00	0/2	9.50E+02	0/2	0/2	19.4 - 19.4
METAL	Uranium	mg/kg	1.40E+00	4.53E+00	2.97E+00	0/2	2/2	0/2	4.90E+00	0/2	8.49E+01	0/2	3.50E+04	0/2	0/2	0.49 - 0.97
METAL	Vanadium	mg/kg	2.31E+01	2.36E+01	2.34E+01	0/2	2/2	0/2	3.80E+01	2/2	1.04E-01	0/2	7.61E+01	2/2	2/2	2.42 - 2.43
METAL	Zinc	mg/kg	5.42E+01	7.11E+01	6.27E+01	0/2	2/2	1/2	6.50E+01	0/2	8.50E+03	0/2	3.56E+06	0/2	2/2	19.4 - 19.4
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	1.83E-01	0/9	1.83E+01	0/9	0/9	0.12 - 0.13
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.87E+02	0/2	1.76E+04	0/2	0/2	0.47 - 0.48
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.47 - 0.48
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.25E+03	0/2	9.74E+04	0/2	0/2	0.47 - 0.48
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.47 - 0.48
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.47E+02	0/2	1.34E+04	0/2	0/2	0.47 - 0.48
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.19E+02	0/2	1.26E+04	0/2	0/2	0.47 - 0.48
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.27E+00	0/2	5.27E+02	0/2	0/2	0.47 - 0.48
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.47 - 0.48
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.35E+02	0/2	1.00E+04	0/2	0/2	0.47 - 0.48
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.57E-02	0/2	5.57E+00	0/2	0/2	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.005 - 0.005
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	9.91E-02	0/2	1.17E+01	0/2	0/2	0.005 - 0.005
RADS	Americium-241	pCi/g	-1.96E-02	-1.38E-02	-1.67E-02	0/2	2/2	0/2	n/a	0/2	1.28E+01	0/2	1.28E+03	0/2	0/2	0.03 - 0.03
RADS	Cesium-137	pCi/g	1.95E-02	2.02E-01	1.11E-01	0/2	2/2	0/2	4.90E-01	1/2	1.98E-01	0/2	1.98E+01	0/2	0/2	0.07 - 0.08
RADS	Cobalt-60	pCi/g	-9.83E-03	2.12E-02	5.69E-03	0/2	2/2	0/2	n/a	0/2	4.06E-02	0/2	4.06E+00	0/2	0/2	0.06 - 0.07
RADS	Neptunium-237	pCi/g	1.93E-03	5.03E-03	3.48E-03	0/2	2/2	0/2	1.00E-01	0/2	6.26E-01	0/2	6.26E+01	0/2	1/2	0.03 - 0.03
RADS	Plutonium-238	pCi/g	-1.12E-02	-8.18E-03	-9.69E-03	0/2	2/2	0/2	7.30E-02	0/2	3.64E+01	0/2	3.64E+03	0/2	0/2	0.02 - 0.02
RADS	Plutonium-239/240	pCi/g	-1.24E-02	1.03E-02	-1.05E-03	0/2	2/2	0/2	2.50E-02	0/2	3.56E+01	0/2	3.56E+03	0/2	0/2	0.01 - 0.02
RADS	Technetium-99	pCi/g	3.41E+00	3.73E+00	3.57E+00	0/2	2/2	2/2	2.50E+00	0/2	1.11E+03	0/2	1.11E+05	0/2	2/2	2.81 - 2.81
RADS	Thorium-228	pCi/g	2.68E-01	3.33E-01	3.01E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.05 - 0.05
RADS	Thorium-230	pCi/g	2.69E-01	3.02E-01	2.86E-01	0/2	2/2	0/2	1.50E+00	0/2	4.49E+01	0/2	4.49E+03	0/2	0/2	0.2 - 0.2
RADS	Thorium-232	pCi/g	2.87E-01	3.00E-01	2.94E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.04 - 0.04
RADS	Uranium-234	pCi/g	3.05E-01	5.06E-01	4.06E-01	0/2	2/2	0/2	1.20E+00	0/2	6.25E+01	0/2	6.25E+03	0/2	0/2	0.15 - 0.15
RADS	Uranium-235	pCi/g	1.17E-02	4.25E-02	2.71E-02	0/2	2/2	0/2	6.00E-02	0/2	9.12E-01	0/2	9.12E+01	0/2	0/2	0.03 - 0.03
RADS	Uranium-238	pCi/g	4.55E-01	1.30E+00	8.78E-01	0/2	2/2	1/2	1.20E+00	0/2	4.02E+00	0/2	4.02E+02	0/2	0/2	0.16 - 0.16

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.2.1. Surface Soil Historical Data Summary: SWMU 99 Kellogg Building Site (Continued)

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.2.2. Surface Soil RI Data Summary: SWMU 99 Kellogg Building Site

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Arsenic	mg/kg	6.17E+00	9.08E+00	7.47E+00	0/14	6/14	0/14	1.20E+01	6/14	1.02E+00	0/14	1.02E+02	0/14	6/14	11 - 11
METAL	Chromium	mg/kg	3.85E+01	5.51E+01	4.17E+01	0/14	6/14	6/14	1.60E+01	0/14	7.15E+01	0/14	7.15E+03	0/14	0/14	85 - 85
METAL	Copper	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	1.90E+01	0/14	1.13E+03	0/14	4.75E+05	0/14	0/14	35 - 35
METAL	Iron	mg/kg	9.19E+03	1.37E+04	1.19E+04	0/14	14/14	0/14	2.80E+04	0/14	1.98E+04	0/14	8.31E+06	14/14	14/14	100 - 100
METAL	Lead	mg/kg	1.10E+01	1.66E+01	1.43E+01	0/14	14/14	0/14	3.60E+01	0/14	4.00E+02	0/14	4.00E+02	0/14	10/14	13 - 13
METAL	Manganese	mg/kg	2.21E+02	6.01E+02	3.80E+02	0/14	14/14	0/14	1.50E+03	0/14	3.47E+03	0/14	2.94E+05	14/14	14/14	85 - 85
METAL	Mercury	mg/kg	9.53E+00	9.53E+00	9.53E+00	0/14	1/14	1/14	2.00E-01	1/14	6.25E-01	0/14	7.88E+02	1/14	1/14	10 - 10
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	1.42E+02	0/14	5.94E+04	0/14	0/14	15 - 15
METAL	Nickel	mg/kg	7.02E+01	7.02E+01	7.02E+01	0/14	1/14	1/14	2.10E+01	1/14	2.98E+01	0/14	3.07E+04	0/14	1/14	65 - 65
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	8.00E-01	0/14	1.42E+02	0/14	5.93E+04	0/14	0/14	20 - 20
METAL	Silver	mg/kg	1.03E+01	1.03E+01	1.03E+01	0/14	1/14	1/14	2.30E+00	1/14	7.45E+00	0/14	8.07E+03	1/14	1/14	10 - 10
METAL	Uranium	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	4.90E+00	0/14	8.49E+01	0/14	3.50E+04	0/14	0/14	20 - 20
METAL	Zinc	mg/kg	3.10E+01	4.72E+02	1.12E+02	0/14	14/14	6/14	6.50E+01	0/14	8.50E+03	0/14	3.56E+06	0/14	14/14	25 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.83E-01	0/3	1.83E+01	0/3	0/3	5 - 5

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

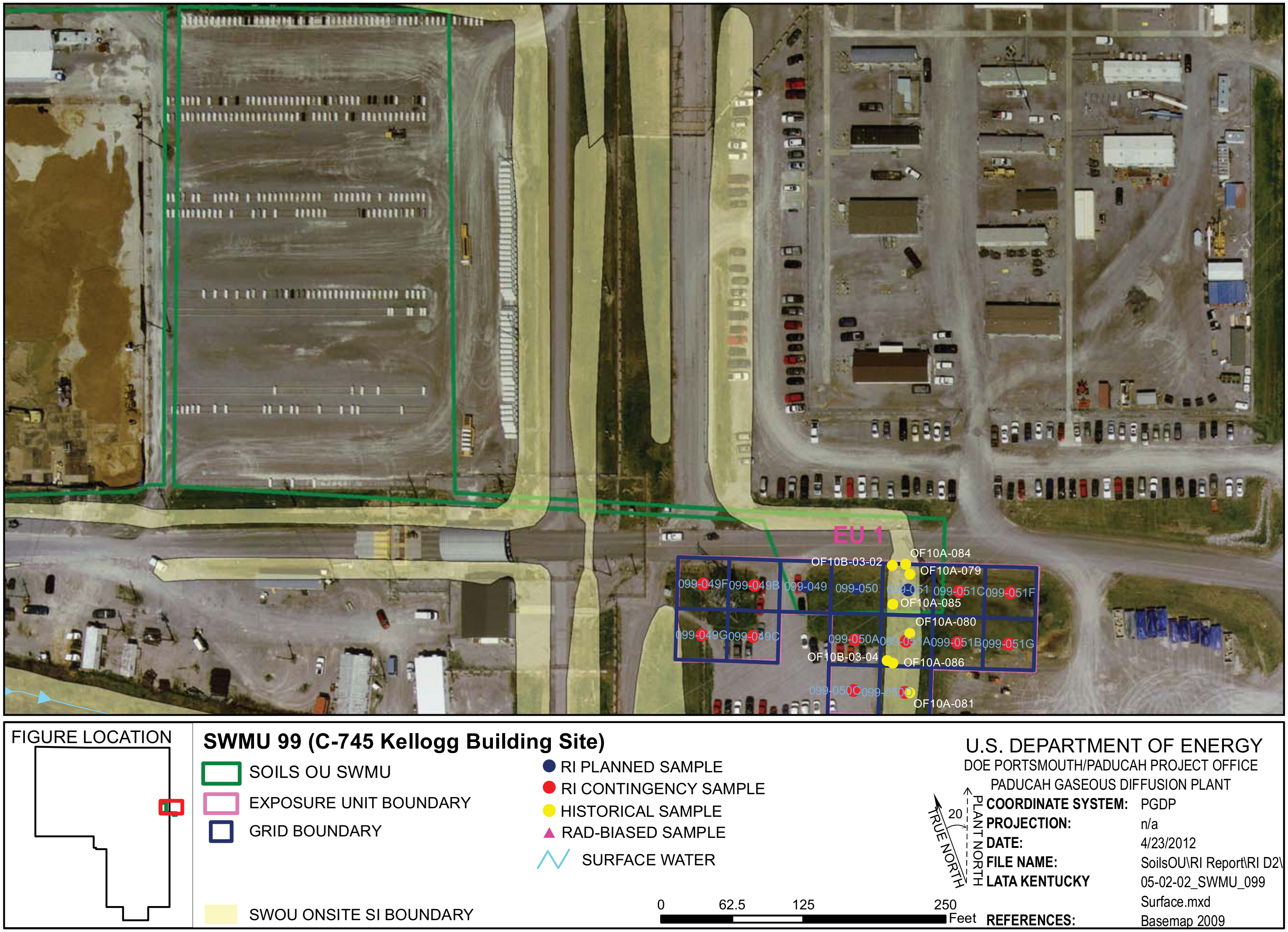


Figure 5.2.1. SWMU 99 Sample Locations - Surface Soil

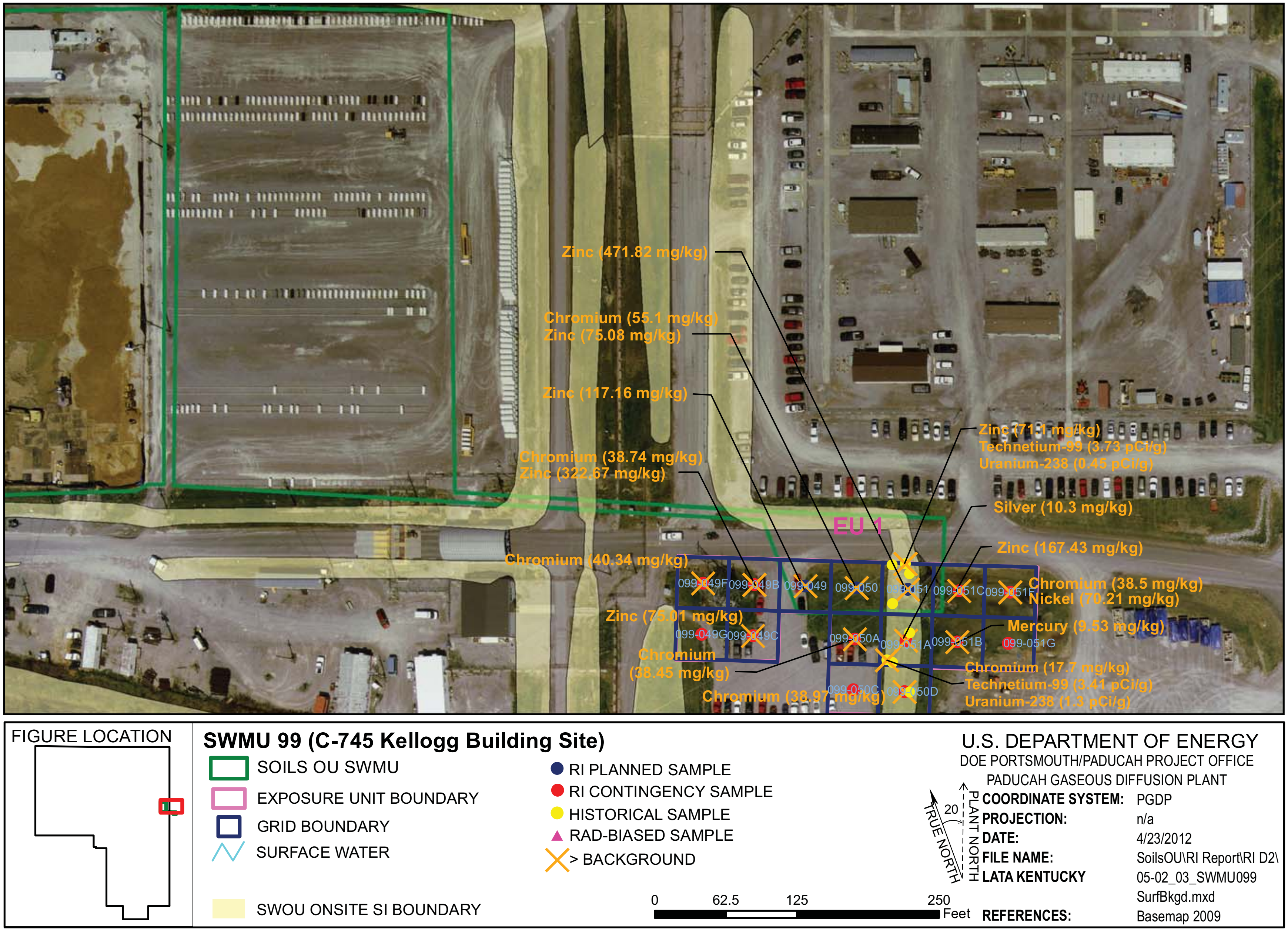


Figure 5.2.2. SWMU 99 Background Exceedances - Surface Soil

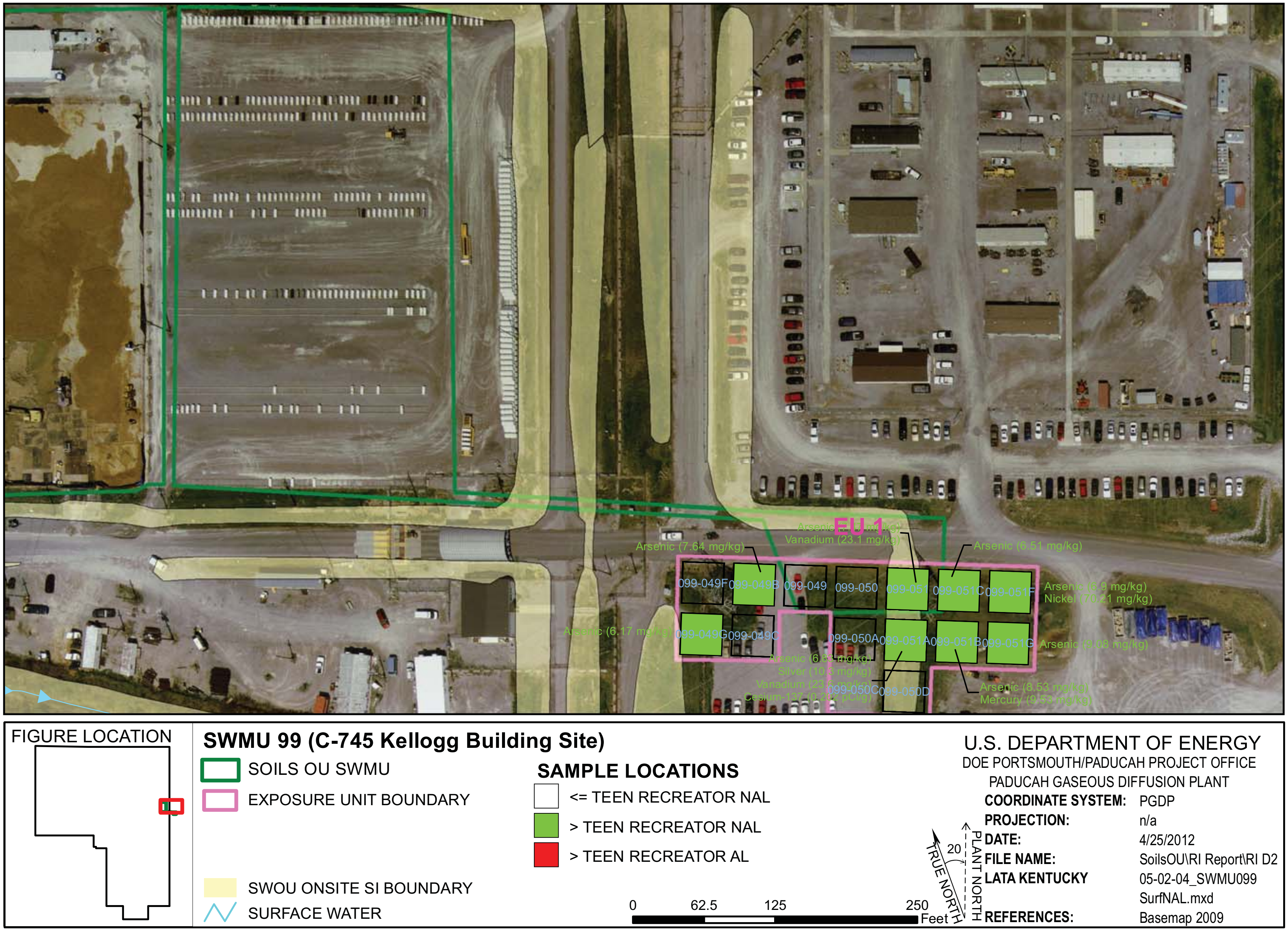


Figure 5.2.3. SWMU 99 NAL Exceedances - Surface Soil

The horizontal extent of SWMU 99B surface soil contamination is considered adequately defined for supporting the baseline risk assessment and FS. No surface samples are available for the pipeline area of SWMU 99B. SWMU 99B consists of one surface soil EU.

Metals

Metals were detected above the teen recreator NALs in the SWMU 99B surface soil. The following are the metals detected at or above both background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.

Metal	Grid
Mercury	51B
Nickel	51F
Silver	51A

* SWMU 99B consists of one surface soil EU.

Grids 51A, 51B, and 51F are not located within the administrative boundary of SWMU 99B; instead, they are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 99B, as described in the Work Plan (DOE 2010a).

No metals were detected above the teen recreator ALs in the SWMU 99B surface soil.

The following metals were detected in the SWMU 99B surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater.

Metal	Grid
Mercury	51B
Molybdenum[1]	51, 51A
Nickel	51F
Silver	51A
Zinc	49, 49B, 49C, 50, 51, 51C

* SWMU 99B consists of one surface soil EU.
[1] No background value is available.

Mercury (grid 51B), molybdenum (no background value available) (grid 51), and silver (grid 51A) were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 99B surface soil.

SVOCs

No SVOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 99B surface soil.

VOCs

No VOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 99B surface soil.

Radionuclides

No radionuclides were detected above both the background screening levels and the teen recreator NALs or ALs in the SWMU 99B surface soil.

Technetium-99 in grids 51 and 51A was detected above both the background screening level and the SSL for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

5.2.4 Nature and Extent of Contamination—Subsurface Soils

The representative data set for SWMU 99B subsurface soils is presented in Tables 5.2.3 and 5.2.4 and provides the nature of the contamination in SWMU 99B subsurface soils. Figures 5.2.4–5.2.6 illustrate the horizontal extent. A complete list of detailed sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 99B subsurface soil contamination is considered adequately defined for supporting the baseline risk assessment and FS. SWMU 99B consists of two subsurface soil EUs. “EU 2” consists of pipeline samples.

Metals

Metals were detected above the teen recreator NALs in the SWMU 99B subsurface soil. The following are the metals detected at or above both background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	49, 49B, 49C, 49F, 49G, 50D, 51, 51F, 51G	1
Beryllium	50A, 51G	1
Chromium	49F	1
Mercury	49G	1
Nickel	49F, 49G, 50A, 50D, 51A, 51B	1
Silver	51	1

Grids 49 and 51 are located on the southern border of EU 1 within the administrative boundary of SWMU 99. Grids 49B, 49C, 49F, 49G, 50A, 50D, 51A, 51B, 51F, and 51G are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination in SWMU 99B, as described in the Work Plan (DOE 2010a). Tennessee Avenue covers most of the northern half of EU 1.

The maximum depth at which metals were detected (in samples associated with this RI Report) at or above both background screening levels and the teen recreator NALs was 10 ft bgs. The end depths of the boreholes taken from grids 49, 49B, 49C, 49F, 49G, 50A, 50D, 51, 51A, 51B, 51F, and 51G ranged from 4 to 25 ft bgs. The dataset for this RI Report includes results for samples taken only at or above 16 ft bgs, per the Work Plan (DOE 2010a). The Soils OU is defined in the SMP as soils to 10 ft bgs (or 16 ft bgs at pipelines).

No metals were detected above the teen recreator ALs in the SWMU 99B subsurface soil.

Table 5.2.3. Subsurface Soil Historical Data Summary: SWMU 99 Kellogg Building Site

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	9.31E+03	1.50E+04	1.21E+04	0/6	6/6	3/6	1.20E+04	0/6	2.77E+04	0/6	8.91E+06	0/6	6/6	20 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	2.10E-01	0/6	1.78E+00	0/6	1.90E+03	0/6	0/6	20 - 20
METAL	Arsenic	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	7.90E+00	0/4	1.02E+00	0/4	1.02E+02	0/4	0/4	5 - 5
METAL	Barium	mg/kg	6.50E+01	1.30E+02	8.64E+01	0/6	6/6	0/6	1.70E+02	0/6	4.15E+02	0/6	4.58E+05	0/6	3/6	1 - 1
METAL	Beryllium	mg/kg	5.70E-01	1.00E+00	7.05E-01	0/6	4/6	1/6	6.90E-01	4/6	1.29E-02	0/6	8.65E+00	0/6	0/6	0.5 - 0.5
METAL	Boron	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.66E+03	0/6	2.34E+06	0/6	0/6	100 - 100
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	2.10E-01	0/6	3.14E+00	0/6	3.14E+02	0/6	0/6	2 - 2
METAL	Calcium	mg/kg	5.03E+02	7.17E+03	2.78E+03	0/4	4/4	1/4	6.10E+03	0/4	n/a	0/4	n/a	n/a	n/a	50 - 50
METAL	Chromium	mg/kg	1.18E+01	2.61E+01	1.85E+01	0/6	6/6	0/6	4.30E+01	0/6	7.15E+01	0/6	7.15E+03	0/6	0/6	2 - 2
METAL	Cobalt	mg/kg	1.91E+00	6.94E+00	4.11E+00	0/6	6/6	0/6	1.30E+01	0/6	8.45E+00	0/6	3.29E+03	6/6	6/6	1 - 1
METAL	Copper	mg/kg	5.25E+00	1.30E+01	8.59E+00	0/6	6/6	0/6	2.50E+01	0/6	1.13E+03	0/6	4.75E+05	0/6	0/6	2 - 2
METAL	Iron	mg/kg	9.66E+03	1.81E+04	1.45E+04	0/6	6/6	0/6	2.80E+04	0/6	1.98E+04	0/6	8.31E+06	6/6	6/6	5 - 5
METAL	Lead	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	2.30E+01	0/6	4.00E+02	0/6	4.00E+02	0/6	0/6	20 - 20
METAL	Magnesium	mg/kg	1.18E+03	2.20E+03	1.74E+03	0/6	6/6	1/6	2.10E+03	0/6	n/a	0/6	n/a	n/a	n/a	15 - 15
METAL	Manganese	mg/kg	6.32E+01	5.24E+02	2.17E+02	0/6	6/6	0/6	8.20E+02	0/6	3.47E+03	0/6	2.94E+05	5/6	6/6	1 - 1
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	1.30E-01	0/6	6.25E-01	0/6	7.88E+02	0/6	0/6	0.2 - 0.2
METAL	Nickel	mg/kg	7.27E+00	2.51E+01	1.31E+01	0/6	5/6	1/6	2.20E+01	0/6	2.98E+01	0/6	3.07E+04	0/6	5/6	5 - 5
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	7.00E-01	0/2	1.42E+02	0/2	5.93E+04	0/2	0/2	1 - 1
METAL	Silver	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	2.70E+00	0/6	7.45E+00	0/6	8.07E+03	0/6	0/6	4 - 4
METAL	Sodium	mg/kg	2.11E+02	2.41E+02	2.26E+02	0/6	2/6	0/6	3.40E+02	0/6	n/a	0/6	n/a	n/a	n/a	200 - 200
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	3.40E-01	0/6	2.27E+00	0/6	9.50E+02	0/6	0/6	15 - 15
METAL	Vanadium	mg/kg	1.97E+01	3.44E+01	2.46E+01	0/6	6/6	0/6	3.70E+01	6/6	1.04E-01	0/6	7.61E+01	6/6	6/6	2 - 2
METAL	Zinc	mg/kg	1.96E+01	5.22E+01	3.62E+01	0/6	6/6	0/6	6.00E+01	0/6	8.50E+03	0/6	3.56E+06	0/6	6/6	15 - 15
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.83E-01	0/4	1.83E+01	0/4	0/4	0.118 - 0.125
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.5 - 0.5
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.5 - 0.5
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.5 - 0.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	3.35E+00	0/6	1.00E+02	0/6	0/6	0.5 - 0.5
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.87E+02	0/6	1.76E+04	0/6	0/6	0.5 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	3.25E+03	0/6	9.74E+04	0/6	0/6	0.5 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.2.3. Subsurface Soil Historical Data Summary: SWMU 99 Kellogg Building Site (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.5 - 0.5
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	2.61E+01	0/6	2.61E+03	n/a	n/a	0.5 - 0.5
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.47E+02	0/6	1.34E+04	0/6	0/6	0.5 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.19E+02	0/6	1.26E+04	0/6	0/6	0.5 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	1.78E-01	0/6	1.78E+01	0/6	0/6	0.5 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.27E+00	0/6	5.27E+02	0/6	0/6	0.5 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	6.10E-02	0/6	6.10E+00	0/6	0/6	0.5 - 0.5
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.5 - 0.5
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.5 - 0.5
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	3.35E+02	0/6	1.00E+04	0/6	0/6	0.5 - 0.5
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.57E-02	0/6	5.57E+00	0/6	0/6	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	1.2 - 1.2
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	1.2 - 1.2
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	9.45E-02	0/6	1.29E+01	0/6	0/6	0.04 - 1.2
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	1.2 - 1.2
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.50E+02	0/6	2.11E+04	0/6	0/6	1.2 - 1.2
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	1.28E+00	0/6	1.91E+02	0/6	0/6	1.2 - 1.2
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	9.30E-01	0/6	1.34E+02	0/6	0/6	1.2 - 1.2
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	1.2 - 1.2
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.38E-01	0/6	5.85E+01	0/6	0/6	1.2 - 1.2
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	7.03E+00	0/6	4.84E+02	0/6	0/6	0.285 - 1.2
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	1.2 - 1.2
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	6.11E+00	0/6	8.90E+02	0/6	0/6	1.2 - 1.2
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	8.66E+01	0/6	2.79E+03	0/6	0/6	2.4 - 2.5
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	1.2 - 1.2
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	1.2 - 1.2

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.2.3. Subsurface Soil Historical Data Summary: SWMU 99 Kellogg Building Site (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	3.26E-01	0/6	1.48E+02	0/6	0/6	1.2 - 1.2
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	1.2 - 1.2
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	2.39E+01	0/6	8.87E+02	0/6	0/6	0.285 - 1.2
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	1.2 - 1.2
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	9.91E-02	0/6	1.17E+01	0/6	0/6	0.005 - 1.2
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	2.39E-01	0/6	1.02E+02	0/6	0/6	0.285 - 100
RADS	Technetium-99	pCi/g	9.40E-01	9.40E-01	9.40E-01	0/1	1/1	0/1	2.80E+00	0/1	1.11E+03	0/1	1.11E+05	0/1	1/1	4.48 - 4.48

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.2.4. Subsurface Soil RI Data Summary: SWMU 99 Kellogg Building Site

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	8.27E+03	9.56E+03	8.88E+03	0/5	5/5	0/5	1.20E+04	0/5	2.77E+04	0/5	8.91E+06	0/5	5/5	5.5 - 6.1
METAL	Antimony	mg/kg	1.40E-01	5.30E-01	2.86E-01	0/5	5/5	3/5	2.10E-01	0/5	1.78E+00	0/5	1.90E+03	0/5	2/5	0.55 - 0.61
METAL	Arsenic	mg/kg	4.00E+00	1.24E+01	7.75E+00	0/45	27/45	10/45	7.90E+00	27/45	1.02E+00	0/45	1.02E+02	0/45	27/45	1.1 - 11
METAL	Barium	mg/kg	7.75E+01	1.92E+02	1.32E+02	0/5	5/5	1/5	1.70E+02	0/5	4.15E+02	0/5	4.58E+05	0/5	4/5	2.2 - 2.4
METAL	Beryllium	mg/kg	3.70E-01	8.70E-01	5.96E-01	0/5	5/5	1/5	6.90E-01	5/5	1.29E-02	0/5	8.65E+00	0/5	0/5	0.11 - 0.12
METAL	Cadmium	mg/kg	6.70E-02	2.00E-01	1.02E-01	0/5	5/5	0/5	2.10E-01	0/5	3.14E+00	0/5	3.14E+02	0/5	0/5	0.055 - 0.061
METAL	Calcium	mg/kg	1.32E+03	9.69E+04	2.19E+04	0/5	5/5	1/5	6.10E+03	0/5	n/a	0/5	n/a	n/a	n/a	55.3 - 277
METAL	Chromium	mg/kg	1.45E+01	1.17E+02	4.35E+01	0/45	21/45	13/45	4.30E+01	1/45	7.15E+01	0/45	7.15E+03	0/45	0/45	1.1 - 85
METAL	Cobalt	mg/kg	4.70E+00	8.60E+00	6.56E+00	0/5	5/5	0/5	1.30E+01	1/5	8.45E+00	0/5	3.29E+03	5/5	5/5	0.22 - 0.24
METAL	Copper	mg/kg	9.00E+00	2.86E+01	1.27E+01	0/45	6/45	1/45	2.50E+01	0/45	1.13E+03	0/45	4.75E+05	0/45	0/45	1.1 - 35
METAL	Iron	mg/kg	7.31E+03	2.32E+04	1.32E+04	0/45	45/45	0/45	2.80E+04	2/45	1.98E+04	0/45	8.31E+06	45/45	45/45	5.5 - 100
METAL	Lead	mg/kg	6.20E+00	2.20E+01	1.17E+01	0/45	43/45	0/45	2.30E+01	0/45	4.00E+02	0/45	4.00E+02	0/45	9/45	0.33 - 13
METAL	Magnesium	mg/kg	1.11E+03	2.37E+03	1.68E+03	0/5	5/5	1/5	2.10E+03	0/5	n/a	0/5	n/a	n/a	n/a	55.3 - 60.7
METAL	Manganese	mg/kg	8.56E+01	1.23E+03	3.35E+02	0/45	44/45	1/45	8.20E+02	0/45	3.47E+03	0/45	2.94E+05	43/45	44/45	0.22 - 85
METAL	Mercury	mg/kg	1.35E-02	7.22E+00	8.32E-01	0/45	5/45	1/45	1.30E-01	1/45	6.25E-01	0/45	7.88E+02	1/45	1/45	0.0369 - 10
METAL	Molybdenum	mg/kg	3.30E-01	9.60E-01	7.70E-01	0/45	5/45	0/45	n/a	0/45	1.42E+02	0/45	5.94E+04	0/45	5/45	0.55 - 15
METAL	Nickel	mg/kg	8.50E+00	9.05E+01	4.67E+01	0/45	14/45	10/45	2.20E+01	10/45	2.98E+01	0/45	3.07E+04	3/45	14/45	0.55 - 65
METAL	Selenium	mg/kg	9.30E-01	1.30E+00	1.08E+00	0/45	5/45	5/45	7.00E-01	0/45	1.42E+02	0/45	5.93E+04	0/45	5/45	0.55 - 20
METAL	Silver	mg/kg	3.00E-02	9.78E+00	9.32E-01	0/45	6/45	1/45	2.70E+00	1/45	7.45E+00	0/45	8.07E+03	1/45	3/45	0.22 - 10
METAL	Sodium	mg/kg	4.04E+01	1.70E+02	9.57E+01	0/5	5/5	0/5	3.40E+02	0/5	n/a	0/5	n/a	n/a	n/a	22.1 - 24.3
METAL	Thallium	mg/kg	1.50E-01	2.50E-01	2.04E-01	0/5	5/5	0/5	3.40E-01	0/5	2.27E+00	0/5	9.50E+02	0/5	5/5	0.22 - 0.24
METAL	Uranium	mg/kg	5.90E-01	1.61E+01	4.81E+00	0/45	9/45	4/45	4.60E+00	0/45	8.49E+01	0/45	3.50E+04	0/45	1/45	0.11 - 20
METAL	Vanadium	mg/kg	2.37E+01	3.49E+01	2.98E+01	0/5	5/5	0/5	3.70E+01	5/5	1.04E-01	0/5	7.61E+01	5/5	5/5	1.1 - 1.2
METAL	Zinc	mg/kg	1.48E+01	4.86E+02	5.81E+01	0/45	45/45	6/45	6.00E+01	0/45	8.50E+03	0/45	3.56E+06	0/45	44/45	2.2 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	1.83E-01	0/7	1.83E+01	0/7	0/7	5 - 5

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

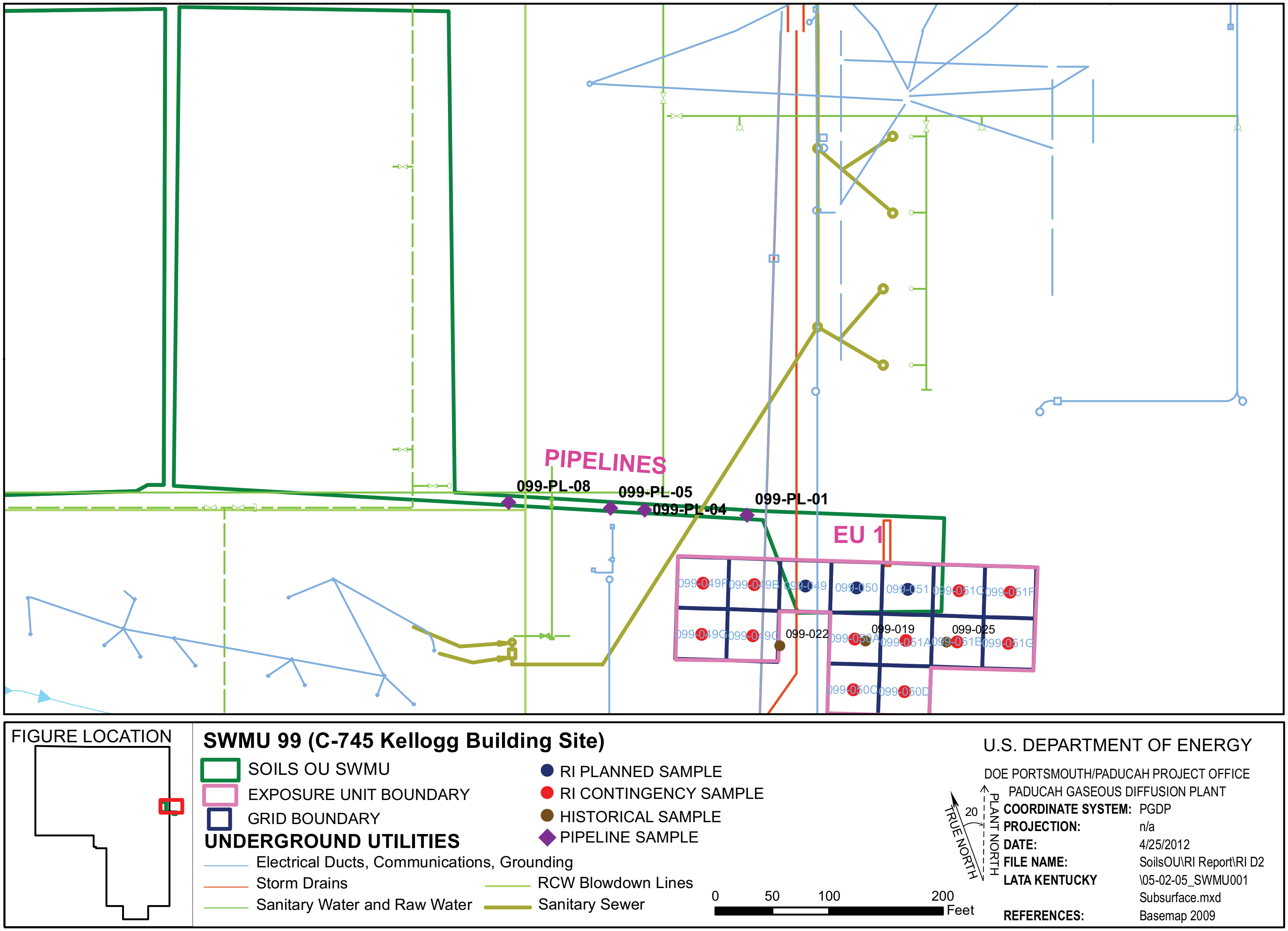


Figure 5.2.4. SWMU 99 Sample Locations - Subsurface Soil

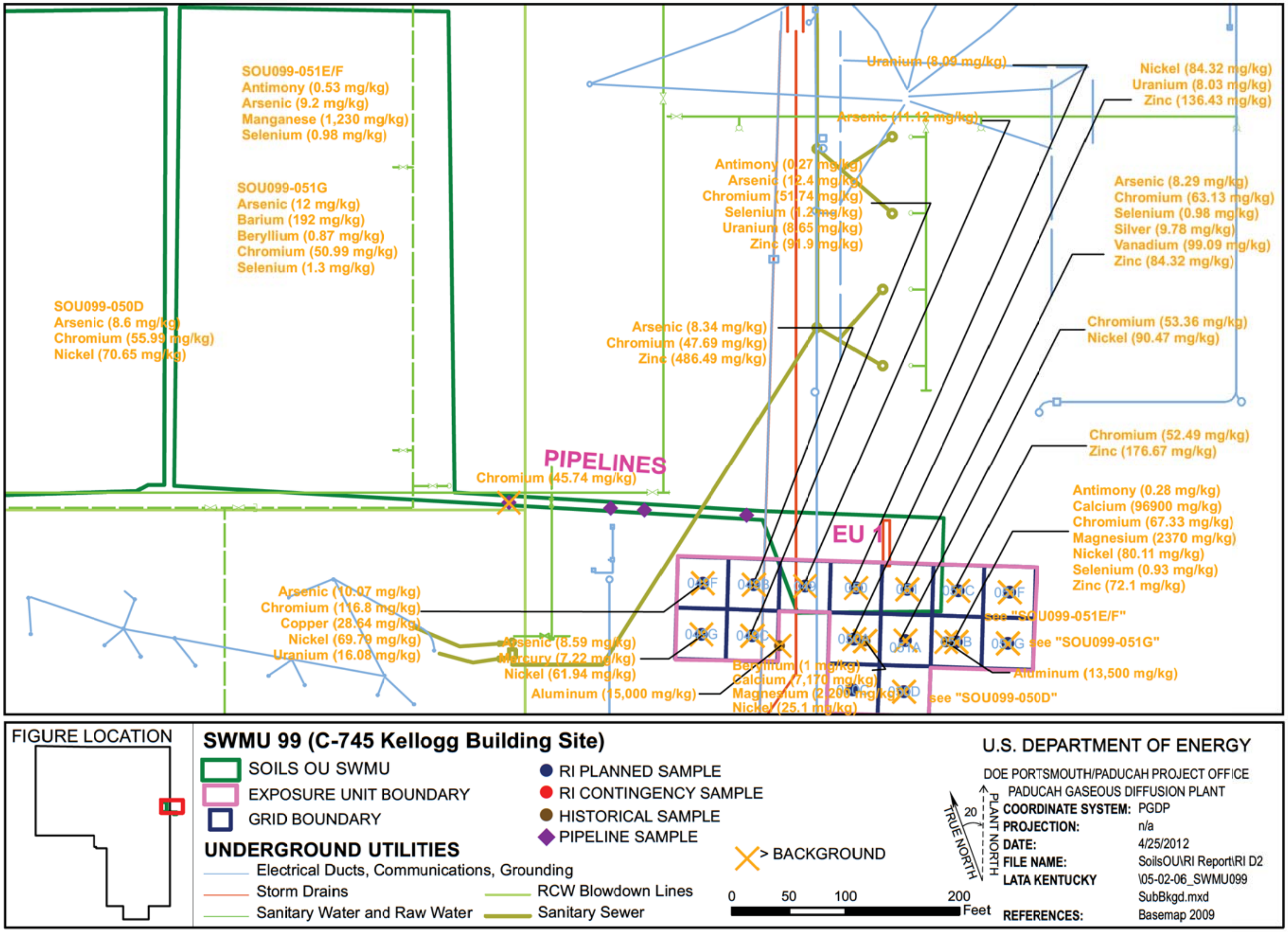


Figure 5.2.5. SWMU 99 Background Exceedances - Subsurface Soil

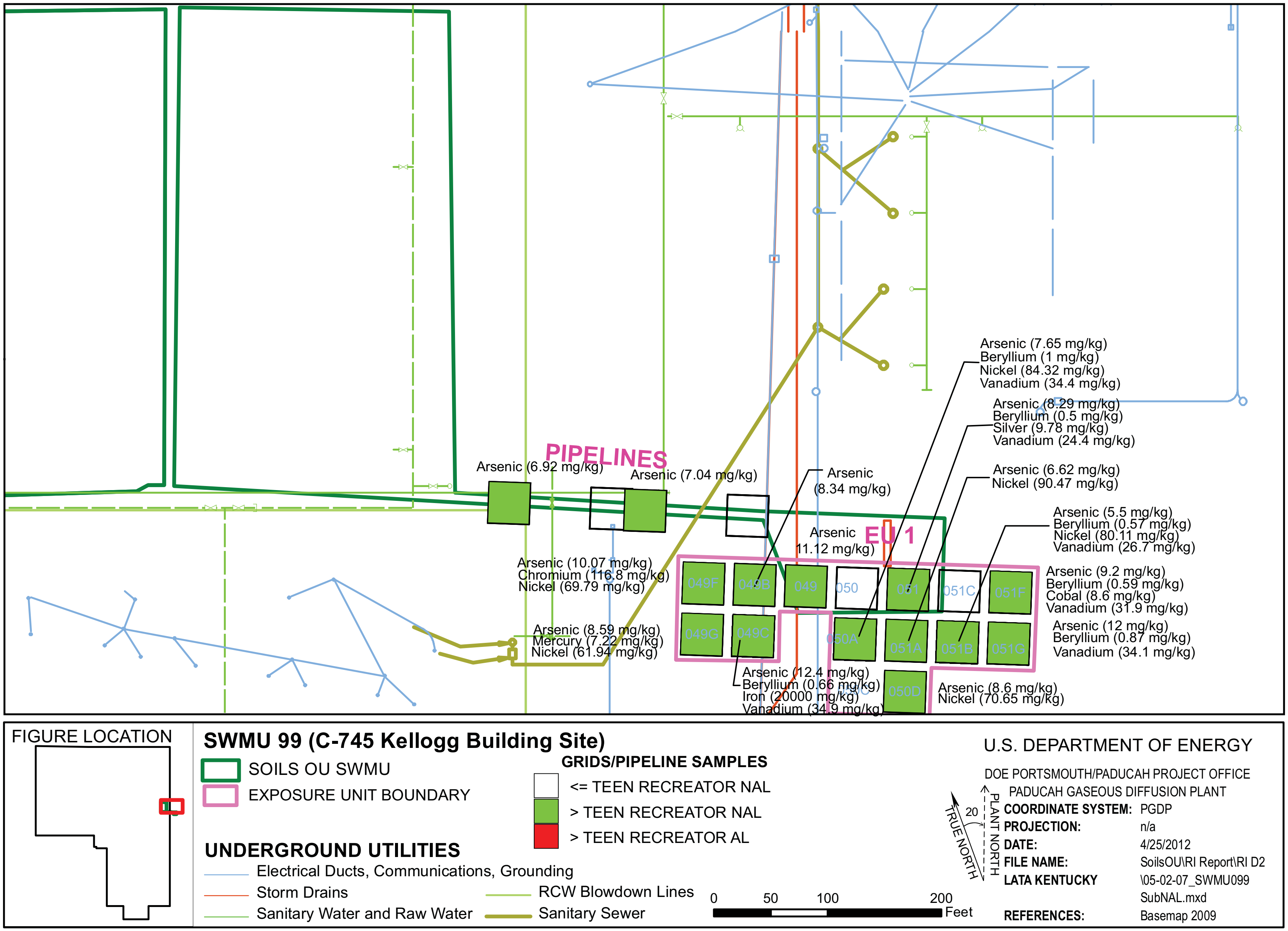


Figure 5.2.6. SWMU 99 NAL Exceedances - Subsurface Soil

The following metals were detected in the SWMU 99B subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater.

Metal	Grid	EU
Aluminum	49C, 51B, 51F	1
Antimony	51F	1
Arsenic	49, 49B, 49C, 49F, 49G, 50D, 51, 51F, 51G	1
Barium	51G	1
Manganese	51F	1
Mercury	49G	1
Molybdenum[1]	49C, 51, 51B, 51F, 51G	1
Nickel	49F, 49G, 50A, 50D, 51A, 51B	1
Selenium	49C, 51, 51B, 51F, 51G	1
Silver	51	1
Uranium	49F	1
Zinc	49B, 49C, 50A, 51, 51B, 51C	1

[1] No background value is available.

Manganese (grid 51F), mercury (grid 49G), nickel (in grid 51A and 51B), and silver (grid 51) were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 99B subsurface soil.

SVOCs

No SVOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 99B subsurface soil.

VOCs

No VOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 99B subsurface soil.

Radionuclides

No radionuclides exceed both the background screening level and the teen recreator NAL, teen recreator AL, or the SSLs for the protection of UCRS and RGA groundwater.

5.2.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). This SWMU is underground; therefore, it has no direct connection to surface water. The surface of SWMU 99B is covered with grass, gravel, or asphalt. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs/AOCs to surrounding ditches.

5.2.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 99B (septic portion) were evaluated for direct contact. These results are summarized in Appendix D and the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI. COCs for this SWMU include metals and radionuclides.

The cumulative ELCR for one or more EUs at SWMU 99B exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a, (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 5.2.5 for the outdoor worker (exposed to surface soils) and the hypothetical resident. The excavation worker and teen recreational user did not have any identified COCs. Table 5.2.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 99B include metals. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 5.2.6.

5.2.7 SWMU 99B Summary

The following text summarizes the results for SWMU 99B using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

The processes that are likely to have contributed to contamination at the Kellogg Building location are the pipe fabrication and cleaning that took place from 1951 to 1955. The septic tank leach field may have received process discharges from the pipe fabrication and cleaning processes that took place.

The existing data have adequately defined the nature and extent of surface and subsurface soils contamination. The information supporting that conclusion is presented in Section 5.2.3.

COPCs for surface and subsurface soils from SWMU 99B are shown on Tables 5.2.1–5.2.4 as those analytes with green boxes under the “Teen Recreator/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 12 ft bgs. A complete list of sampling results is provided in Appendix G.

The investigation for SWMU 99B revealed that metals and radionuclides are the types of COPCs found in the surface and only metals in the subsurface.

Table 5.2.5. RGOs for SWMU 99B

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	**COC**	**EPC[1]**	**Units**	**ELCR[2]**	**1 x 10^{-6}**	**1 x 10^{-5}**	**1 x 10^{-4}**	**HI[4]**	**0.1**	**1**	**3**
Outdoor Worker (exposed to surface soil)											
1	Chromium	5.51E+01	mg/kg	1.4E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.4E-06**				**< 1**			
Hypothetical Resident[5]											
1	Uranium-238	9.45E-01	pCi/g	2.7E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**2.7E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.7, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.7, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 5.2.6 Ecological Screening for SWMU 99B

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Mostly gravel with grass over the small eastern section	Yes	127	Mercury	2.00E-01	9.53E+00	1.00E-01	95
			Zinc	6.50E+01	4.72E+02	4.60E+01	10

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

SWMU 99B is an underground pipeline to a septic tank and leach field that may contribute to contamination migration from the Kellogg Building site, though no significant contamination was found. Potential contaminant migration due to the pipeline and tank would be limited to the shallow subsurface, based on there being only metals detected in the subsurface soils above SSLs protective of the UCRS and RGA. There was no evidence of migration of these metals to the RGA (one technetium-99 sample reported 0.94 pCi/g, but it was below the minimum detectable activity of 4.48 pCi/g). Additionally, there is no direct connection to surface water. Sampling was adequate to determine the nature and extent of contamination for SWMU 99B. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soils) and hypothetical residential scenarios. COCs for these scenarios for SWMU 99B are as follows:

- Outdoor worker (exposed to surface soils)
  - Chromium
- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Uranium-238
- Teen Recreational User
  - None

Of the above, there are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04), nor are there priority COCs for other scenarios.

For SWMU 99B, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Mercury
- Zinc

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 99B is sufficient to support decision making and indicates that SWMU 99B should proceed to the FS. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. There are no cultural impediments in this SWMU. There are no impacts of this SWMU on other SWMUs. An action on this SWMU is not likely to impact other integrator units.

5.2.8 SWMU 99B Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 99B; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark (DOE 2010a) for scenarios including the outdoor worker (exposed to surface soils) and hypothetical residential. The reasonably anticipated future land use for this SWMU is recreational land use as shown in the SMP (DOE 2012a).

5.3 SWMU 194, DUF_6 FACILITY, MCGRAW CONSTRUCTION FACILITIES (SOUTH SIDE)

5.3.1 Background

The McGraw Construction Facilities (south side) (SWMU 194) is an open field located southwest of the plant site. SWMU 194 is approximately 540,000 ft^2 (600 ft x 900 ft). This SWMU is part of the Soils OU, the Soils and Slabs OU, and the GDP D&D OU. Outfall 017 originates inside SWMU 194.

The McGraw Construction Facilities were constructed in 1951 to support the original plant construction. Buildings located in this area included an administration building, a cafeteria, a boiler house, guard headquarters, a hospital, and a purchasing building. The facilities were demolished following completion of PGDP construction. The area was graded and has been maintained as a grassy area since that time. A portion of the site east of Hobbs Road (also known as the Access Road) and south of the C-100 Parking Lot is the location of the Depleted Uranium Hexafluoride (DUF_6) Conversion Facility. Concrete footers and debris may remain below grade, although no known disposal of hazardous constituents have occurred.

The Northeast Plume Investigation (DOE 1995c) was conducted in 1995 to identify possible sources of contamination associated with various buildings and operations within SWMU 194. The results of this investigation indicated potential metal contamination. The WAG 28 RI conducted in 1999 focused on potential metals contamination of SWMU 194 based on the previous study and the process knowledge of the activities conducted in this area by the McGraw Construction Facilities. This study noted the sporadic presence of some metals that were slightly above background levels.

Additional site characterization was conducted in 2000 in support of the DUF_6 Conversion Project. The results of this investigation are documented in DUF_6 Conversion Facility Site Characterization (BJC 2001).

The data contained in the aforementioned studies have been assessed for potential risks and hazards. The results are documented in the BHHRA and SERA (DOE 2001b). The risk assessment supported a no further action (NFA) recommendation for the proposed site of the DUF_6 Conversion Facility, if the site were developed and maintained as an industrial area.

5.3.2 Fieldwork Summary

Of the total 788 planned samples, 651 samples were collected. Field laboratory results indicated that contingency samples were needed to determine the lateral and vertical extent of contamination due to concentrations of arsenic, cadmium, iron, lead, manganese, nickel, silver, uranium, and zinc. Out of 70 contingency samples, 58 were taken. Samples not collected were due to asphalt surface, steep slope of ditch, addition of building, gravel/concrete, shallow refusal, dense woods, and dense utilities. Figure A.2 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey using a FIDLER (Figure 5.3.1); the 83,462 measurements ranged from 2,700 to 48,147 gross cpm. The area consists of fairly distinct regions of rolling terrain, drainage ditches, wooded areas, a mix of mostly soil and grass, gravel, and concrete and buildings. In addition, SWMU 194 is immediately adjacent to a DUF_6 conversion facility and cylinder storage yards, causing elevated gamma dose rate. Due to the terrain and shielding effects caused by structures in this area, a consistent dose rate gradient from the cylinder yard area is not evident. The influence of background radiation from nearby cylinders does not allow a reliable determination for areas of contamination at project action limit. A judgmental sample was collected for radiological constituents at the area with the highest recorded reading, regardless of the potential interference.

5.3.3 Nature and Extent of Contamination—Surface Soils

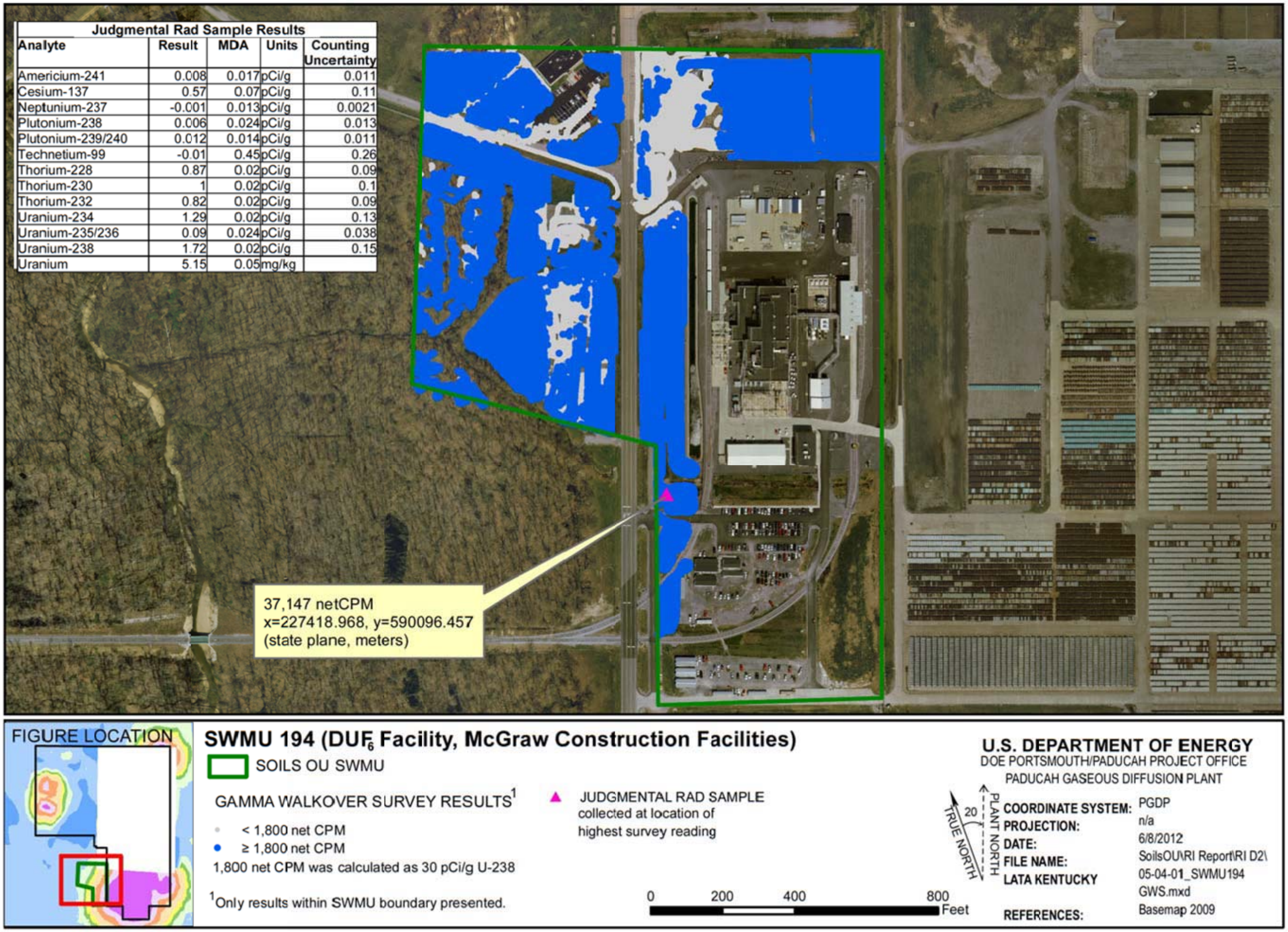
The representative data set for SWMU 194 surface soils is presented in Tables 5.3.1 and 5.3.2 and provides the nature of the contamination in SWMU 194 surface soils. Figures 5.3.2–5.3.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 194 surface soil contamination is considered adequately defined for supporting the baseline risk assessment and FS. SWMU 194 consists of 31 EUs.

<u>Metals</u>

Metals were detected above the teen recreator NALs in the SWMU 194 surface soil. The following are the metals detected above both background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	58, 60, 108, 133, 184, 219, 243, 249, 271, 279, 285, 311, 342, 370	3, 9, 10, 16, 17, 18, 20, 23, 28
Beryllium	243, 279, 285, 342, 362	16, 18, 20, 26, 28
Chromium	355	28
Cobalt	285	20
Iron	311	23
Manganese	285	20
Mercury	29, 90, 94, 166, 221, 273, 288, 393	1, 4, 5, 11, 20, 21, 30
Nickel	1, 17, 18, 21, 38, 42, 60, 85, 89, 91, 96, 97, 111, 135, 137, 138, 140, 142, 145, 162, 163, 179, 189, 215, 230, 231, 255, 263, 273, 274, 282, 295 ,296 ,309, 310, 312, 341, 343, 355, 366, 372,378, 379, 387, 388, 389, 392	1, 3, 4, 5, 6, 7,10, 11, 12, 13, 16, 18, 19, 20, 21, 23, 24, 25, 27, 28, 29, 30
Silver	25, 40, 41, 56, 77, 78,87, 90, 91, 93, 94, 111, 115, 126, 151, 166, 241, 259, 311, 337, 341, 342, 360, 369, 371, 378, 388, 392	1, 2, 4, 5, 6, 7, 11, 12, 15, 20, 23, 26, 27, 28, 29, 30
Vanadium	243, 285, 342,	16, 20, 28



Judgmental Rad Sample Results				
Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.008	0.017	pCi/g	0.011
Cesium-137	0.57	0.07	pCi/g	0.11
Neptunium-237	-0.001	0.013	pCi/g	0.0021
Plutonium-238	0.006	0.024	pCi/g	0.013
Plutonium-239/240	0.012	0.014	pCi/g	0.011
Technetium-99	-0.01	0.45	pCi/g	0.26
Thorium-228	0.87	0.02	pCi/g	0.09
Thorium-230	1	0.02	pCi/g	0.1
Thorium-232	0.82	0.02	pCi/g	0.09
Uranium-234	1.29	0.02	pCi/g	0.13
Uranium-235/236	0.09	0.024	pCi/g	0.038
Uranium-238	1.72	0.02	pCi/g	0.15
Uranium	5.15	0.05	mg/kg	

Figure 5.3.1. SWMU 194 Gamma Walkover Survey

Table 5.3.1. Surface Soil Historical Data Summary: SWMU 194 DUF_6 Facility McGraw Construction Facilities (South Side)

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Teen Recreator FOE	Teen Recreator NAL	Teen Recreator FOE	Teen Recreator AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
METAL	Aluminum	mg/kg	4.38E+03	4.38E+03	4.38E+03	0/1	1/1	0/1	1.30E+04	0/1	2.77E+04	0/1	8.91E+06	0/1	1/1	20 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	1.78E+00	0/1	1.90E+03	0/1	0/1	20 - 20
METAL	Arsenic	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	1.20E+01	0/1	1.02E+00	0/1	1.02E+02	0/1	0/1	5 - 5
METAL	Barium	mg/kg	4.17E+01	4.17E+01	4.17E+01	0/1	1/1	0/1	2.00E+02	0/1	4.15E+02	0/1	4.58E+05	0/1	0/1	5 - 5
METAL	Beryllium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	6.70E-01	0/1	1.29E-02	0/1	8.65E+00	0/1	0/1	0.5 - 0.5
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	3.14E+00	0/1	3.14E+02	0/1	0/1	2 - 2
METAL	Calcium	mg/kg	2.40E+03	2.40E+03	2.40E+03	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	100 - 100
METAL	Chromium	mg/kg	8.26E+00	8.26E+00	8.26E+00	0/1	1/1	0/1	1.60E+01	0/1	7.15E+01	0/1	7.15E+03	0/1	0/1	2.5 - 2.5
METAL	Copper	mg/kg	6.47E+00	6.47E+00	6.47E+00	0/1	1/1	0/1	1.90E+01	0/1	1.13E+03	0/1	4.75E+05	0/1	0/1	2.5 - 2.5
METAL	Lead	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	3.60E+01	0/1	4.00E+02	0/1	4.00E+02	0/1	0/1	20 - 20
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.00E-01	0/1	6.25E-01	0/1	7.88E+02	0/1	0/1	0.2 - 0.2
METAL	Nickel	mg/kg	7.41E+00	7.41E+00	7.41E+00	0/1	1/1	0/1	2.10E+01	0/1	2.98E+01	0/1	3.07E+04	0/1	1/1	5 - 5
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	8.00E-01	0/1	1.42E+02	0/1	5.93E+04	0/1	0/1	1 - 1
METAL	Silver	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.30E+00	0/1	7.45E+00	0/1	8.07E+03	0/1	0/1	4 - 4
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	2.27E+00	0/1	9.50E+02	0/1	0/1	20 - 20
METAL	Uranium	mg/kg	1.00E+00	3.00E+00	2.17E+00	0/12	12/12	0/12	4.90E+00	0/12	8.49E+01	0/12	3.50E+04	0/12	0/12	-
METAL	Vanadium	mg/kg	1.16E+01	1.16E+01	1.16E+01	0/1	1/1	0/1	3.80E+01	1/1	1.04E-01	0/1	7.61E+01	1/1	1/1	2.5 - 2.5
METAL	Zinc	mg/kg	1.34E+02	1.34E+02	1.34E+02	0/1	1/1	1/1	6.50E+01	0/1	8.50E+03	0/1	3.56E+06	0/1	1/1	20 - 20
PPCB	PCB, Total	mg/kg	1.80E+01	1.80E+01	1.80E+01	0/3	1/3	0/3	n/a	1/3	1.83E-01	0/3	1.83E+01	1/3	1/3	0.043 - 0.1
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.47 - 0.47
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.47 - 0.47
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.47 - 0.47
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.35E+00	0/1	1.00E+02	0/1	0/1	0.47 - 0.47
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.87E+02	0/1	1.76E+04	0/1	0/1	0.47 - 0.47
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.25E+03	0/1	9.74E+04	0/1	0/1	0.47 - 0.47
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.47 - 0.47

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.3.1. Surface Soil Historical Data Summary: SWMU 194 DUF_6 Facility McGraw Construction Facilities (South Side) (Continued)

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Teen Recreator FOE	NAL	Teen Recreator FOE	AL	GW Protection Screen RGA	UCRS	DL Range
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.61E+01	0/1	2.61E+03	n/a	n/a	0.47 - 0.47
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Di-n-butyl phthalate	mg/kg	1.20E+01	1.20E+01	1.20E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.47E+02	0/1	1.34E+04	0/1	0/1	0.47 - 0.47
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.19E+02	0/1	1.26E+04	0/1	0/1	0.47 - 0.47
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.78E-01	0/1	1.78E+01	0/1	0/1	0.47 - 0.47
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.27E+00	0/1	5.27E+02	0/1	0/1	0.47 - 0.47
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.10E-02	0/1	6.10E+00	0/1	0/1	0.47 - 0.47
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.47 - 0.47
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.35E+02	0/1	1.00E+04	0/1	0/1	0.47 - 0.47
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.47 - 0.47
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.57E-02	0/1	5.57E+00	0/1	0/1	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	9.45E-02	0/1	1.29E+01	0/1	0/1	0.01 - 0.01
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.50E+02	0/1	2.11E+04	0/1	0/1	0.01 - 0.01
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.28E+00	0/1	1.91E+02	0/1	0/1	0.01 - 0.01
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	9.30E-01	0/1	1.34E+02	0/1	0/1	0.01 - 0.01
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.38E-01	0/1	5.85E+01	0/1	0/1	0.01 - 0.01
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	7.03E+00	0/1	4.84E+02	0/1	0/1	0.01 - 0.01
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.11E+00	0/1	8.90E+02	0/1	0/1	0.01 - 0.01
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	8.66E+01	0/1	2.79E+03	0/1	0/1	0.02 - 0.02
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.26E-01	0/1	1.48E+02	0/1	0/1	0.01 - 0.01
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.3.1. Surface Soil Historical Data Summary: SWMU 194 DUF$_6$ Facility McGraw Construction Facilities (South Side) (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
VOA	Total Xylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	8.66E+01	0/1	2.79E+03	0/1	0/1	0.03 - 0.03
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.39E+01	0/1	8.87E+02	0/1	0/1	0.01 - 0.01
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	9.91E-02	0/1	1.17E+01	0/1	0/1	0.01 - 0.01
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.39E-01	0/1	1.02E+02	0/1	0/1	0.01 - 0.01
RADS	Americium-241	pCi/g	2.50E-03	2.50E-03	2.50E-03	0/1	1/1	0/1	n/a	0/1	1.28E+01	0/1	1.28E+03	0/1	0/1	0.0888 - 0.0888
RADS	Cesium-137	pCi/g	-3.90E-02	6.21E-02	1.16E-02	0/2	2/2	0/2	4.90E-01	0/2	1.98E-01	0/2	1.98E+01	0/2	0/2	0.027 - 0.084
RADS	Cobalt-60	pCi/g	4.58E-03	4.58E-03	4.58E-03	0/1	1/1	0/1	n/a	0/1	4.06E-02	0/1	4.06E+00	0/1	0/1	0.0346 - 0.0346
RADS	Neptunium-237	pCi/g	6.81E-03	6.81E-03	6.81E-03	0/1	1/1	0/1	1.00E-01	0/1	6.26E-01	0/1	6.26E+01	0/1	1/1	0.0493 - 0.0493
RADS	Plutonium-238	pCi/g	-7.61E-02	-7.61E-02	-7.61E-02	0/1	1/1	0/1	7.30E-02	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.00969 - 0.00969
RADS	Plutonium-239/240	pCi/g	1.07E-02	1.07E-02	1.07E-02	0/1	1/1	0/1	2.50E-02	0/1	3.56E+01	0/1	3.56E+03	0/1	0/1	0.0252 - 0.0252
RADS	Technetium-99	pCi/g	-6.00E-01	4.94E-01	-5.30E-02	0/2	2/2	0/2	2.50E+00	0/2	1.11E+03	0/2	1.11E+05	0/2	1/2	2.5 - 2.5
RADS	Thorium-228	pCi/g	1.61E-01	1.61E-01	1.61E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.0122 - 0.0122
RADS	Thorium-230	pCi/g	1.49E-01	1.49E-01	1.49E-01	0/1	1/1	0/1	1.50E+00	0/1	4.49E+01	0/1	4.49E+03	0/1	0/1	0.0157 - 0.0157
RADS	Thorium-232	pCi/g	1.28E-01	1.28E-01	1.28E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.0157 - 0.0157
RADS	Uranium-234	pCi/g	5.70E-01	5.70E-01	5.70E-01	1/1	1/1	0/1	1.20E+00	0/1	6.25E+01	0/1	6.25E+03	0/1	0/1	0.08 - 0.08
RADS	Uranium-235	pCi/g	1.10E-02	1.75E-02	1.43E-02	0/2	2/2	0/2	6.00E-02	0/2	9.12E-01	0/2	9.12E+01	0/2	0/2	0.0417 - 0.068
RADS	Uranium-238	pCi/g	5.90E-01	5.90E-01	5.90E-01	1/1	1/1	0/1	1.20E+00	0/1	4.02E+00	0/1	4.02E+02	0/1	0/1	0.08 - 0.08

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.3.2. Surface Soil Historical Data Summary: SWMU 194 DUF_6 Facility McGraw Construction Facilities (South Side)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	2.23E+03	1.19E+04	7.84E+03	0/29	29/29	0/29	1.30E+04	0/29	2.77E+04	0/29	8.91E+06	0/29	29/29	5.3 - 6.6
METAL	Antimony	mg/kg	1.50E-01	1.50E+00	4.61E-01	0/29	29/29	26/29	2.10E-01	0/29	1.78E+00	0/29	1.90E+03	0/29	25/29	0.53 - 0.66
METAL	Arsenic	mg/kg	3.20E+00	2.86E+01	8.49E+00	0/339	143/339	14/339	1.20E+01	143/339	1.02E+00	0/339	1.02E+02	3/339	143/339	1.1 - 11
METAL	Barium	mg/kg	3.07E+01	3.26E+02	1.17E+02	0/29	29/29	2/29	2.00E+02	0/29	4.15E+02	0/29	4.58E+05	0/29	22/29	2.1 - 2.7
METAL	Beryllium	mg/kg	2.30E-01	1.10E+00	5.40E-01	0/29	29/29	5/29	6.70E-01	29/29	1.29E-02	0/29	8.65E+00	0/29	0/29	0.11 - 0.13
METAL	Cadmium	mg/kg	2.50E-02	1.10E+00	1.60E-01	0/29	29/29	5/29	2.10E-01	0/29	3.14E+00	0/29	3.14E+02	0/29	2/29	0.053 - 0.066
METAL	Calcium	mg/kg	2.14E+02	2.62E+05	3.25E+04	0/29	29/29	2/29	2.00E+05	0/29	n/a	0/29	n/a	n/a	n/a	55.6 - 596
METAL	Chromium	mg/kg	8.80E+00	7.23E+01	3.79E+01	0/339	160/339	147/339	1.60E+01	1/339	7.15E+01	0/339	7.15E+03	0/339	0/339	1.1 - 85
METAL	Cobalt	mg/kg	3.00E+00	2.11E+01	7.79E+00	0/29	29/29	1/29	1.40E+01	11/29	8.45E+00	0/29	3.29E+03	29/29	29/29	0.21 - 0.27
METAL	Copper	mg/kg	4.80E+00	4.23E+01	1.59E+01	0/339	55/339	25/339	1.90E+01	0/339	1.13E+03	0/339	4.75E+05	0/339	0/339	1.1 - 35
METAL	Iron	mg/kg	1.57E+03	3.39E+04	1.19E+04	0/339	339/339	1/339	2.80E+04	10/339	1.98E+04	0/339	8.31E+06	339/339	339/339	5.3 - 100
METAL	Lead	mg/kg	6.38E+00	3.58E+02	1.91E+01	0/339	331/339	18/339	3.60E+01	0/339	4.00E+02	0/339	4.00E+02	0/339	182/339	0.32 - 13
METAL	Magnesium	mg/kg	6.78E+02	1.28E+04	2.16E+03	0/29	29/29	1/29	7.70E+03	0/29	n/a	0/29	n/a	n/a	n/a	52.8 - 66.5
METAL	Manganese	mg/kg	7.77E+01	4.67E+03	4.47E+02	0/339	336/339	6/339	1.50E+03	1/339	3.47E+03	0/339	2.94E+05	332/339	336/339	0.21 - 85
METAL	Mercury	mg/kg	1.69E-02	8.92E+00	1.17E+00	0/339	35/339	8/339	2.00E-01	8/339	6.25E-01	0/339	7.88E+02	8/339	8/339	0.0352 - 10
METAL	Molybdenum	mg/kg	2.10E-01	1.96E+01	1.13E+00	0/339	30/339	0/339	n/a	0/339	1.42E+02	0/339	5.94E+04	1/339	30/339	0.53 - 15
METAL	Nickel	mg/kg	6.40E+00	1.01E+02	3.93E+01	0/339	75/339	48/339	2.10E+01	48/339	2.98E+01	0/339	3.07E+04	11/339	75/339	0.53 - 65
METAL	Selenium	mg/kg	5.70E-01	4.03E+00	1.28E+00	0/339	31/339	29/339	8.00E-01	0/339	1.42E+02	0/339	5.93E+04	0/339	31/339	0.53 - 20
METAL	Silver	mg/kg	2.90E-02	1.55E+01	3.91E+00	0/339	56/339	28/339	2.30E+00	28/339	7.45E+00	0/339	8.07E+03	28/339	42/339	0.21 - 10
METAL	Sodium	mg/kg	2.41E+01	4.40E+02	8.19E+01	0/29	29/29	1/29	3.20E+02	0/29	n/a	0/29	n/a	n/a	n/a	21.1 - 26.6
METAL	Thallium	mg/kg	7.50E-02	6.40E-01	2.19E-01	0/29	24/29	7/29	2.10E-01	0/29	2.27E+00	0/29	9.50E+02	0/29	18/29	0.21 - 0.27
METAL	Uranium	mg/kg	2.02E+00	3.36E+01	4.02E+00	0/341	42/341	13/341	4.90E+00	0/341	8.49E+01	0/341	3.50E+04	0/341	1/341	0.02 - 20
METAL	Vanadium	mg/kg	1.21E+01	4.11E+01	2.69E+01	0/29	29/29	3/29	3.80E+01	29/29	1.04E-01	0/29	7.61E+01	29/29	29/29	1.1 - 1.3
METAL	Zinc	mg/kg	1.95E+01	6.40E+02	4.96E+01	0/339	338/339	35/339	6.50E+01	0/339	8.50E+03	0/339	3.56E+06	0/339	337/339	2.1 - 25
PPCB	PCB, Total	mg/kg	8.40E-02	8.40E-02	8.40E-02	1/333	1/333	0/333	n/a	0/333	1.83E-01	0/333	1.83E+01	0/333	1/333	0.32 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	0/30	0/30	0.35 - 0.44
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	0/30	0/30	0.35 - 0.44
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	0/30	0/30	0.35 - 0.44
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	1.7 - 2.1
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	1.7 - 2.1
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	3.35E+00	0/30	1.00E+02	0/30	0/30	1.7 - 2.1
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	1.7 - 2.1
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	1.7 - 2.1
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	1.7 - 2.1
SVOA	Acenaphthene	mg/kg	4.30E-02	1.10E-01	7.65E-02	2/30	2/30	0/30	n/a	0/30	5.87E+02	0/30	1.76E+04	0/30	0/30	0.35 - 0.44
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Anthracene	mg/kg	9.50E-02	2.30E-01	1.63E-01	2/30	2/30	0/30	n/a	0/30	3.25E+03	0/30	9.74E+04	0/30	0/30	0.35 - 0.44
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Benzo(ghi)perylene	mg/kg	5.40E-02	6.20E-01	2.35E-01	3/30	4/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Benzoic acid	mg/kg	4.80E-01	4.80E-01	4.80E-01	1/30	1/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	1.7 - 2.1

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.3.2. Surface Soil Historical Data Summary: SWMU 194 DUF_6 Facility McGraw Construction Facilities (South Side) (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.007 - 0.0088
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	9.40E-02	1.50E+01	5.11E+00	4/30	5/30	0/30	n/a	0/30	n/a	0/30	n/a	0/30	1/30	0.35 - 2.1
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Di-n-butyl phthalate	mg/kg	8.20E-01	8.20E-01	8.20E-01	0/30	1/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Di-n-octylphthalate	mg/kg	5.40E-02	5.40E-02	5.40E-02	1/30	1/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Fluoranthene	mg/kg	5.20E-02	1.90E+00	4.41E-01	6/30	8/30	0/30	n/a	0/30	4.47E+02	0/30	1.34E+04	0/30	1/30	0.35 - 0.44
SVOA	Fluorene	mg/kg	5.60E-02	8.40E-02	7.00E-02	2/30	2/30	0/30	n/a	0/30	4.19E+02	0/30	1.26E+04	0/30	0/30	0.35 - 0.44
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	1.78E-01	0/30	1.78E+01	0/30	0/30	0.35 - 0.44
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	1.7 - 2.1
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.7 - 0.88
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	5.27E+00	0/30	5.27E+02	0/30	0/30	0.35 - 0.44
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	1.7 - 2.1
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	6.10E-02	0/30	6.10E+00	0/30	0/30	0.007 - 0.0088
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	0/30	0/30	1.7 - 2.1
SVOA	Phenanthrene	mg/kg	6.40E-02	1.00E+00	3.19E-01	4/30	6/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.35 - 0.44
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	1.7 - 2.1
SVOA	Pyrene	mg/kg	4.90E-02	1.60E+00	3.94E-01	5/30	7/30	0/30	n/a	0/30	3.35E+02	0/30	1.00E+04	0/30	1/30	0.35 - 0.44
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	n/a	0/30	n/a	n/a	n/a	0.7 - 0.88
SVOA	Total PAH	mg/kg	5.10E-03	8.91E-01	1.05E-01	0/30	22/30	0/30	n/a	7/30	5.57E-02	0/30	5.57E+00	3/30	22/30	-
RADS	Alpha activity	pCi/g	1.74E+01	4.11E+01	2.88E+01	0/31	31/31	0/31	n/a	0/31	n/a	0/31	n/a	n/a	n/a	4.3 - 6.6
RADS	Americium-241	pCi/g	-4.00E-03	3.30E-02	6.18E-03	0/31	31/31	0/31	n/a	0/31	1.28E+01	0/31	1.28E+03	0/31	0/31	0.012 - 0.054
RADS	Beta activity	pCi/g	2.08E+01	4.52E+01	3.26E+01	0/31	31/31	0/31	n/a	0/31	n/a	0/31	n/a	n/a	n/a	2.5 - 7.7
RADS	Cesium-137	pCi/g	-1.20E-02	5.81E-01	2.10E-01	0/31	31/31	2/31	4.90E-01	18/31	1.98E-01	0/31	1.98E+01	0/31	0/31	0.027 - 0.16
RADS	Neptunium-237	pCi/g	-6.20E-03	5.10E-02	3.67E-03	0/31	31/31	0/31	1.00E-01	0/31	6.26E-01	0/31	6.26E+01	0/31	7/31	0.009 - 0.048
RADS	Plutonium-238	pCi/g	4.00E-04	4.10E-02	1.34E-02	11/31	31/31	0/31	7.30E-02	0/31	3.64E+01	0/31	3.64E+03	0/31	0/31	0.0032 - 0.035
RADS	Plutonium-239/240	pCi/g	-1.30E-03	4.80E-02	1.25E-02	15/31	31/31	1/31	2.50E-02	0/31	3.56E+01	0/31	3.56E+03	0/31	0/31	0.0033 - 0.023
RADS	Technetium-99	pCi/g	-1.05E+00	5.00E-01	1.40E-01	1/31	31/31	0/31	2.50E+00	0/31	1.11E+03	0/31	1.11E+05	0/31	5/31	0.3 - 0.56
RADS	Thorium-228	pCi/g	1.56E-01	1.30E+00	8.55E-01	0/31	31/31	0/31	1.60E+00	0/31	n/a	0/31	n/a	n/a	n/a	0.009 - 0.13
RADS	Thorium-230	pCi/g	6.80E-01	1.29E+00	1.02E+00	0/31	31/31	0/31	1.50E+00	0/31	4.49E+01	0/31	4.49E+03	0/31	31/31	0.005 - 0.11
RADS	Thorium-232	pCi/g	1.79E-01	1.14E+00	8.56E-01	0/31	31/31	0/31	1.50E+00	0/31	n/a	0/31	n/a	n/a	n/a	0.004 - 0.07
RADS	Uranium-234	pCi/g	5.99E-01	1.29E+00	9.02E-01	0/31	31/31	2/31	1.20E+00	0/31	6.25E+01	0/31	6.25E+03	0/31	0/31	0.01 - 0.05
RADS	Uranium-235/236	pCi/g	2.00E-02	9.00E-02	4.81E-02	15/31	31/31	6/31	6.00E-02	0/31	9.12E-01	0/31	9.12E+01	0/31	0/31	0.008 - 0.041
RADS	Uranium-238	pCi/g	6.77E-01	1.73E+00	1.09E+00	0/31	31/31	9/31	1.20E+00	0/31	4.02E+00	0/31	4.02E+02	0/31	0/31	0.007 - 0.04

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

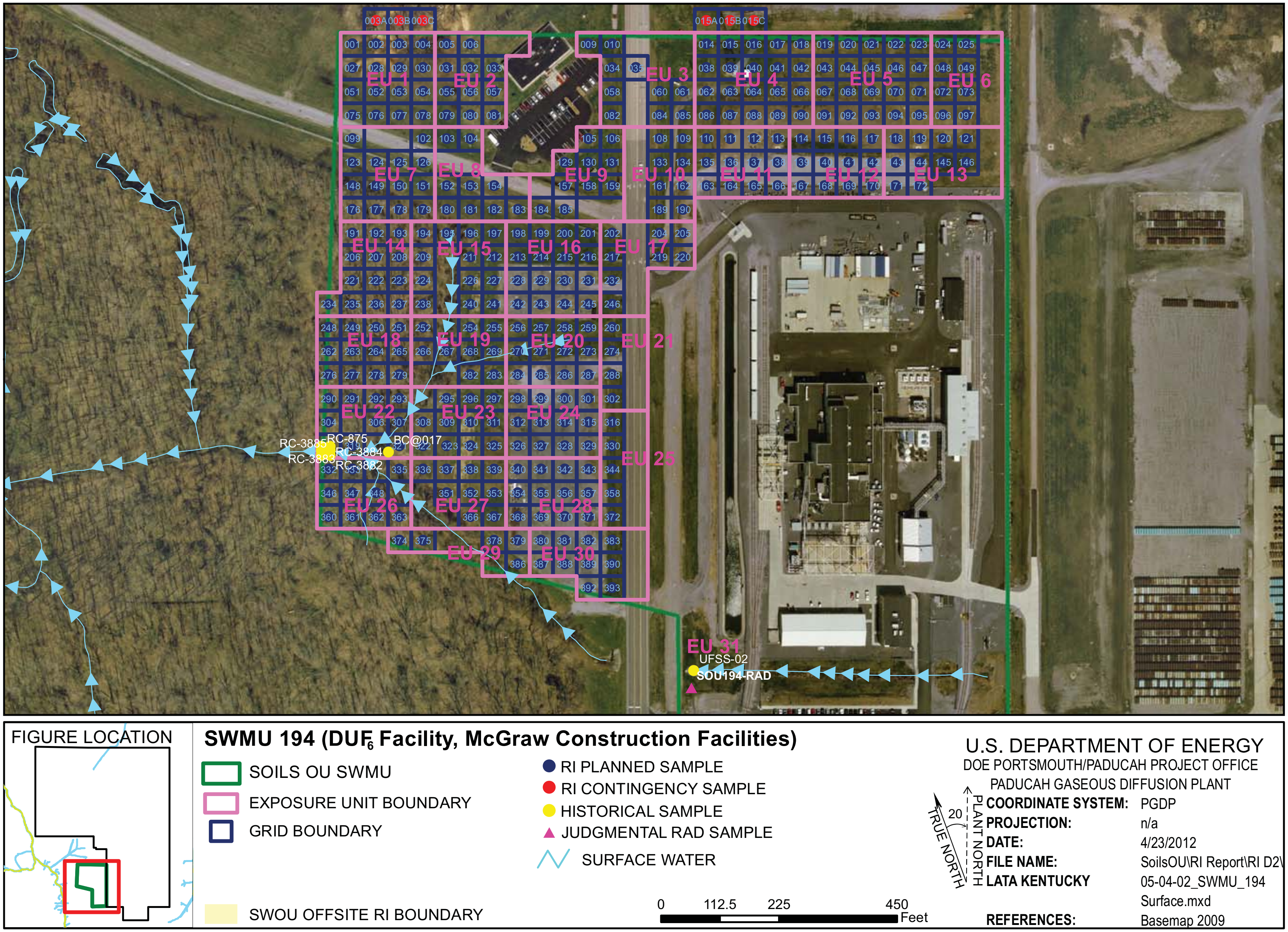


Figure 5.3.2. SWMU 194 Sample Locations - Surface Soil

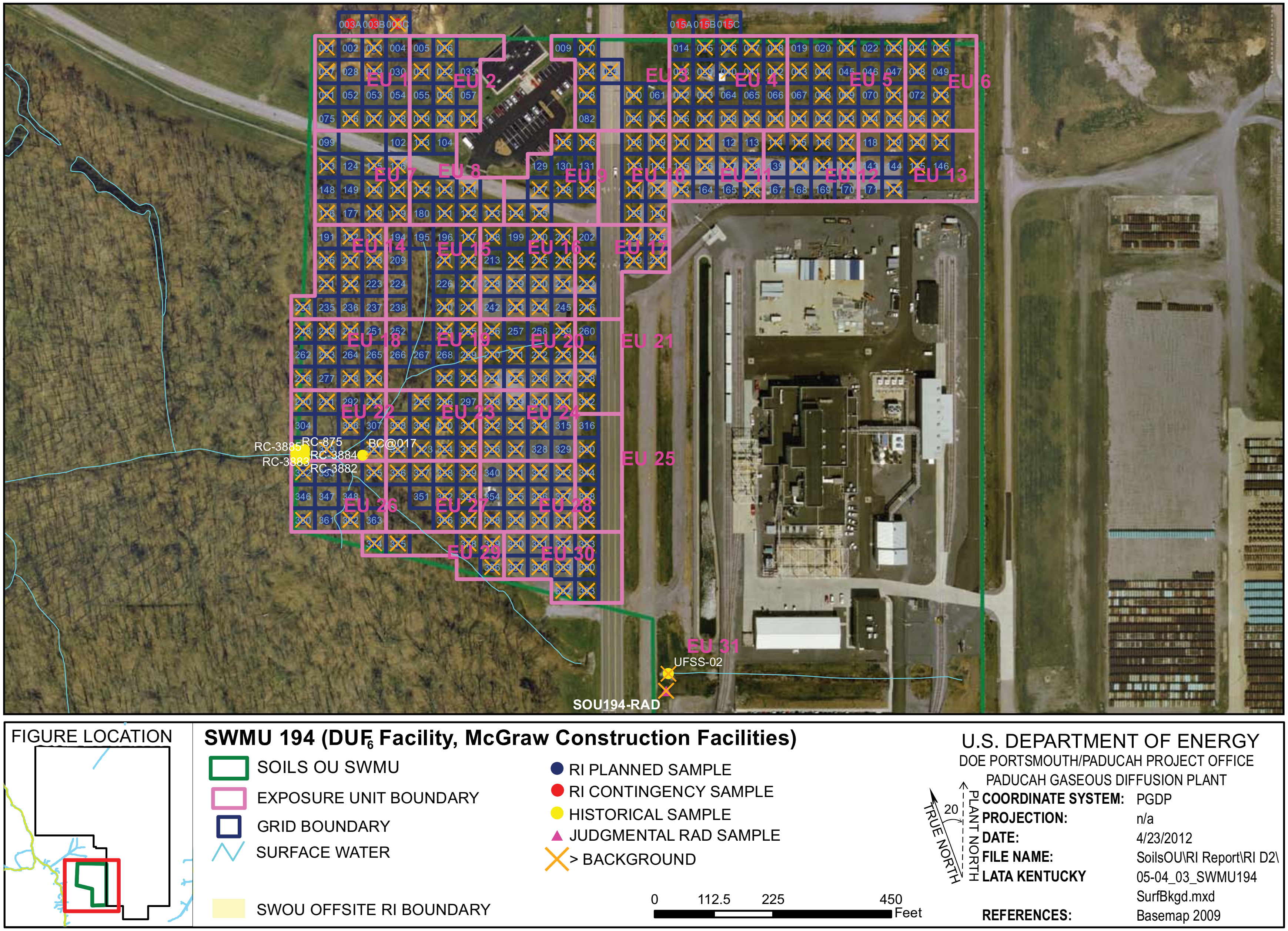


Figure 5.3.3. SWMU 194 Background Exceedances - Surface Soil

Station	Results Exceeding Background
SOU194-00	Nickel 58.42 (mg/kg)

Station	Results Exceeding Background
SOU194-00	Chromium 34.38 (mg/kg)
	Lead 47.39 (mg/kg)

Station	Results Exceeding Background
SOU194-00	Chromium 32.65 (mg/kg)
	Copper 21.24 (mg/kg)

Station	Results Exceeding Background
SOU194-00	Chromium 37.55 (mg/kg)

Station	Results Exceeding Background
SOU194-01	Chromium 33.6 (mg/kg)
	Lead 50.21 (mg/kg)

Station	Results Exceeding Background
SOU194-01	Uranium 5.8 (mg/kg)
	Zinc 108.97 (mg/kg)

Station	Results Exceeding Background
SOU194-01	Chromium 40.73 (mg/kg)

Station	Results Exceeding Background
SOU194-01	Nickel 59.36 (mg/kg)
	Selenium 1 (mg/kg)
	Uranium 6.4 (mg/kg)
	Uranium-235/236 0.068 (pCi/g)
	Uranium-238 1.73 (pCi/g)

Station	Results Exceeding Background
SOU194-01	Chromium 48.41 (mg/kg)
	Nickel 81.11 (mg/kg)

Station	Results Exceeding Background
SOU194-02	Chromium 42.4 (mg/kg)
	Nickel 59.82 (mg/kg)

Station	Results Exceeding Background
SOU194-02	Chromium 38.04 (mg/kg)

Station	Results Exceeding Background
SOU194-02	Chromium 37.01 (mg/kg)

Station	Results Exceeding Background
SOU194-02	Silver 9.89 (mg/kg)

Station	Results Exceeding Background
SOU194-02	Antimony 1.5 (mg/kg)
	Chromium 33.42 (mg/kg)
	Selenium 1.1 (mg/kg)

Station	Results Exceeding Background
SOU194-02	Mercury 6.71 (mg/kg)

Station	Results Exceeding Background
SOU194-03	Chromium 49.06 (mg/kg)
	Uranium 33.64 (mg/kg)

Station	Results Exceeding Background
SOU194-03	Chromium 31.23 (mg/kg)

Station	Results Exceeding Background
SOU194-03	Antimony 0.69 (mg/kg)
	Lead 41.7 (mg/kg)
	Selenium 1.3 (mg/kg)
	Sodium 440 (mg/kg)
	Uranium-238 1.25 (pCi/g)
	Uranium-238 1.31 (pCi/g)

Station	Results Exceeding Background
SOU194-03	Nickel 72.5 (mg/kg)
	Zinc 74.93 (mg/kg)

Station	Results Exceeding Background
SOU194-03	Zinc 169.07 (mg/kg)

Station	Results Exceeding Background
SOU194-04	Silver 10.78 (mg/kg)

Station	Results Exceeding Background
SOU194-04	Silver 10.02 (mg/kg)

Station	Results Exceeding Background
SOU194-04	Nickel 55.68 (mg/kg)

Station	Results Exceeding Background
SOU194-04	Uranium 6.84 (mg/kg)

Station	Results Exceeding Background
SOU194-04	Uranium 9.55 (mg/kg)

Station	Results Exceeding Background
SOU194-04	Manganese 2806.97 (mg/kg)

Station	Results Exceeding Background
SOU194-05	Chromium 38.71 (mg/kg)

Station	Results Exceeding Background
SOU194-05	Silver 13.91 (mg/kg)

Station	Results Exceeding Background
SOU194-05	Arsenic 14.9 (mg/kg)
	Chromium 38.98 (mg/kg)
	Lead 129.58 (mg/kg)

Station	Results Exceeding Background
SOU194-06	Arsenic 28.55 (mg/kg)
	Chromium 38.61 (mg/kg)
	Lead 357.64 (mg/kg)
	Nickel 60.28 (mg/kg)
	Zinc 74.95 (mg/kg)

Station	Results Exceeding Background
SOU194-06	Zinc 65.28 (mg/kg)

Station	Results Exceeding Background
SOU194-06	Zinc 82.51 (mg/kg)

Station	Results Exceeding Background
SOU194-06	Chromium 34.87 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.3. SWMU 194 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU194-06	Antimony 0.53 (mg/kg) Selenium 1.2 (mg/kg) Zinc 66.01 (mg/kg) Uranium-235/236 0.063 (pCi/g) Uranium-238 1.38 (pCi/g)

Station	Results Exceeding Background
SOU194-07	Chromium 45.8 (mg/kg)

Station	Results Exceeding Background
SOU194-07	Antimony 0.28 (mg/kg) Selenium 1.3 (mg/kg) Uranium-234 1.21 (pCi/g) Uranium-238 1.32 (pCi/g)

Station	Results Exceeding Background
SOU194-07	Chromium 38.21 (mg/kg)

Station	Results Exceeding Background
SOU194-07	Silver 9.99 (mg/kg)

Station	Results Exceeding Background
SOU194-07	Silver 10.93 (mg/kg)

Station	Results Exceeding Background
SOU194-07	Chromium 53.93 (mg/kg)

Station	Results Exceeding Background
SOU194-08	Antimony 0.4 (mg/kg) Chromium 59.6 (mg/kg) Selenium 1.1 (mg/kg) Uranium-235/236 0.066 (pCi/g) Uranium-238 1.42 (pCi/g)

Station	Results Exceeding Background
SOU194-08	Copper 26.02 (mg/kg)

Station	Results Exceeding Background
SOU194-08	Lead 57.91 (mg/kg)

Station	Results Exceeding Background
SOU194-08	Nickel 66.58 (mg/kg)

NOTE: maximum detections only shown for location.

Station	Results Exceeding Background
SOU194-08	Zinc 66.1 (mg/kg)

Station	Results Exceeding Background
SOU194-08	Silver 12.35 (mg/kg) Zinc 71.04 (mg/kg)

Station	Results Exceeding Background
SOU194-08	Chromium 32.2 (mg/kg)

Station	Results Exceeding Background
SOU194-08	Nickel 91.72 (mg/kg) Zinc 77.42 (mg/kg)

Station	Results Exceeding Background
SOU194-09	Mercury 8.92 (mg/kg) Silver 11.63 (mg/kg) Zinc 84.71 (mg/kg)

Station	Results Exceeding Background
SOU194-09	Nickel 75.64 (mg/kg) Silver 11.52 (mg/kg)

Station	Results Exceeding Background
SOU194-09	Copper 33.01 (mg/kg)

Station	Results Exceeding Background
SOU194-09	Chromium 41.17 (mg/kg) Silver 10.63 (mg/kg)

Station	Results Exceeding Background
SOU194-09	Copper 22.8 (mg/kg) Mercury 8.69 (mg/kg) Silver 15.49 (mg/kg)

Station	Results Exceeding Background
SOU194-09	Copper 32.19 (mg/kg) Zinc 69.28 (mg/kg)

Station	Results Exceeding Background
SOU194-09	Copper 29.69 (mg/kg) Nickel 77.34 (mg/kg)

Station	Results Exceeding Background
SOU194-09	Copper 42.29 (mg/kg) Nickel 80.6 (mg/kg) Zinc 71.73 (mg/kg)

Station	Results Exceeding Background
SOU194-10	Manganese 1822.56 (mg/kg)

Station	Results Exceeding Background
SOU194-10	Chromium 51.65 (mg/kg) Uranium 9.89 (mg/kg)

Station	Results Exceeding Background
SOU194-10	Lead 53.16 (mg/kg) Zinc 211.57 (mg/kg)

Station	Results Exceeding Background
SOU194-10	Arsenic 14.08 (mg/kg)

Station	Results Exceeding Background
SOU194-10	Chromium 36.29 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Zinc 79.76 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Nickel 92.28 (mg/kg) Silver 10.93 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Chromium 36.3 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Silver 11.98 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Chromium 63.36 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Antimony 0.39 (mg/kg) Selenium 1.2 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Copper 41.61 (mg/kg)

Figure 5.3.3. SWMU 194 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU194-12	Antimony 0.32 (mg/kg) Cadmium 0.26 (mg/kg) Copper 28.7 (mg/kg) Selenium 1.3 (mg/kg)
SOU194-12	Chromium 47.65 (mg/kg)
SOU194-12	Chromium 44.75 (mg/kg)
SOU194-12	Zinc 274.99 (mg/kg)
SOU194-12	Silver 13.53 (mg/kg)
SOU194-13	Arsenic 13.98 (mg/kg) Lead 86.43 (mg/kg) Uranium 7.21 (mg/kg) Zinc 128.42 (mg/kg)
SOU194-13	Lead 47.32 (mg/kg) Zinc 97.26 (mg/kg)
SOU194-13	Chromium 32.68 (mg/kg) Nickel 82.49 (mg/kg)
SOU194-13	Cadmium 0.5 (mg/kg) Calcium 262000 (mg/kg) Magnesium 12800 (mg/kg)
SOU194-13	Nickel 99.43 (mg/kg)
SOU194-13	Nickel 100.68 (mg/kg)
SOU194-14	Nickel 78.6 (mg/kg)
SOU194-14	Chromium 38.01 (mg/kg)
SOU194-14	Nickel 76.7 (mg/kg)
SOU194-14	Chromium 45.53 (mg/kg) Nickel 60.31 (mg/kg)
SOU194-15	Chromium 41.11 (mg/kg) Selenium 3.46 (mg/kg)
SOU194-15	Chromium 38.86 (mg/kg) Silver 10.33 (mg/kg)
SOU194-15	Chromium 47.08 (mg/kg) Zinc 102.57 (mg/kg)
SOU194-15	Chromium 46.79 (mg/kg)
SOU194-15	Chromium 41.83 (mg/kg)
SOU194-15	Chromium 48.23 (mg/kg)
SOU194-15	Chromium 43.26 (mg/kg)
SOU194-15	Lead 39.15 (mg/kg)
SOU194-16	Antimony 0.3 (mg/kg) Cadmium 0.29 (mg/kg) Lead 98.86 (mg/kg) Selenium 0.93 (mg/kg) Zinc 315.61 (mg/kg) Cesium-137 0.581 (pCi/g) Plutonium-239/240 0.048 (pCi/g) Uranium-238 1.49 (pCi/g)
SOU194-16	Nickel 75.99 (mg/kg) Zinc 174.05 (mg/kg)
SOU194-16	Chromium 28.39 (mg/kg) Copper 26.6 (mg/kg) Nickel 79.84 (mg/kg) Zinc 368.09 (mg/kg)
SOU194-16	Mercury 8.09 (mg/kg) Silver 13.29 (mg/kg)
SOU194-17	Chromium 33.1 (mg/kg)
SOU194-17	Antimony 0.3 (mg/kg) Selenium 0.85 (mg/kg)
SOU194-17	Chromium 53.2 (mg/kg) Copper 22.31 (mg/kg)
SOU194-17	Nickel 77.14 (mg/kg)
SOU194-18	Chromium 53.58 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.3. SWMU 194 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU194-18	Antimony 0.46 (mg/kg) Selenium 1.2 (mg/kg) Zinc 67.7 (mg/kg) Uranium-235/236 0.086 (pCi/g) Uranium-238 1.39 (pCi/g)

Station	Results Exceeding Background
SOU194-18	Chromium 47.23 (mg/kg) Zinc 130.64 (mg/kg)

Station	Results Exceeding Background
SOU194-18	Antimony 0.4 (mg/kg) Arsenic 14 (mg/kg) Chromium 35.65 (mg/kg) Selenium 1.4 (mg/kg) Zinc 70.8 (mg/kg)

Station	Results Exceeding Background
SOU194-18	Chromium 44.03 (mg/kg) Zinc 65.91 (mg/kg)

Station	Results Exceeding Background
SOU194-18	Nickel 68.65 (mg/kg) Zinc 160.01 (mg/kg)

Station	Results Exceeding Background
SOU194-19	Zinc 70.66 (mg/kg)

Station	Results Exceeding Background
SOU194-19	Chromium 42.04 (mg/kg)

Station	Results Exceeding Background
SOU194-19	Chromium 42.98 (mg/kg)

Station	Results Exceeding Background
SOU194-19	Chromium 44.87 (mg/kg)

Station	Results Exceeding Background
SOU194-19	Chromium 33.9 (mg/kg)

Station	Results Exceeding Background
SOU194-20	Chromium 47.22 (mg/kg)

Station	Results Exceeding Background
SOU194-20	Chromium 39.55 (mg/kg)

Station	Results Exceeding Background
SOU194-20	Lead 95.15 (mg/kg) Uranium 7.51 (mg/kg) Zinc 150.33 (mg/kg)

Station	Results Exceeding Background
SOU194-20	Chromium 29.53 (mg/kg) Zinc 130.49 (mg/kg)

Station	Results Exceeding Background
SOU194-20	Chromium 45.49 (mg/kg)

Station	Results Exceeding Background
SOU194-20	Chromium 34.01 (mg/kg)

Station	Results Exceeding Background
SOU194-20	Chromium 40.37 (mg/kg)

Station	Results Exceeding Background
SOU194-21	Chromium 39.11 (mg/kg)

Station	Results Exceeding Background
SOU194-21	Chromium 48.51 (mg/kg)

Station	Results Exceeding Background
SOU194-21	Chromium 44.28 (mg/kg)

Station	Results Exceeding Background
SOU194-21	Nickel 57.58 (mg/kg)

Station	Results Exceeding Background
SOU194-21	Zinc 69.31 (mg/kg)

Station	Results Exceeding Background
SOU194-21	Chromium 45.63 (mg/kg)

Station	Results Exceeding Background
SOU194-21	Arsenic 13.96 (mg/kg) Copper 24.27 (mg/kg) Lead 101.67 (mg/kg) Zinc 640.18 (mg/kg)

Station	Results Exceeding Background
SOU194-22	Cadmium 1.1 (mg/kg) Chromium 16.4 (mg/kg) Lead 96.7 (mg/kg) Zinc 410 (mg/kg)

Station	Results Exceeding Background
SOU194-22	Mercury 8.14 (mg/kg)

Station	Results Exceeding Background
SOU194-22	Antimony 0.39 (mg/kg) Chromium 39.12 (mg/kg) Selenium 1 (mg/kg) Thallium 0.25 (mg/kg)

Station	Results Exceeding Background
SOU194-22	Chromium 53.33 (mg/kg)

Station	Results Exceeding Background
SOU194-22	Chromium 53.24 (mg/kg)

Station	Results Exceeding Background
SOU194-22	Chromium 37.26 (mg/kg)

Station	Results Exceeding Background
SOU194-23	Chromium 35.65 (mg/kg) Nickel 72.03 (mg/kg)

Station	Results Exceeding Background
SOU194-23	Nickel 65.83 (mg/kg)

Station	Results Exceeding Background
SOU194-23	Chromium 46.48 (mg/kg)

Station	Results Exceeding Background
SOU194-23	Chromium 52.12 (mg/kg)

Station	Results Exceeding Background
SOU194-24	Chromium 40.08 (mg/kg)

Station	Results Exceeding Background
SOU194-24	Silver 11.68 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.3. SWMU 194 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU194-24	Antimony 0.74 (mg/kg)
	Arsenic 17.8 (mg/kg)
	Beryllium 0.87 (mg/kg)
	Chromium 17.1 (mg/kg)
	Selenium 1.4 (mg/kg)
	Thallium 0.63 (mg/kg)
	Vanadium 41.1 (mg/kg)

Station	Results Exceeding Background
SOU194-24	Chromium 44.83 (mg/kg)

Station	Results Exceeding Background
SOU194-24	Chromium 35.62 (mg/kg)

Station	Results Exceeding Background
SOU194-24	Chromium 35.68 (mg/kg)

Station	Results Exceeding Background
SOU194-24	Arsenic 13.34 (mg/kg)
	Chromium 68.48 (mg/kg)

Station	Results Exceeding Background
SOU194-25	Chromium 54.59 (mg/kg)

Station	Results Exceeding Background
SOU194-25	Chromium 48.35 (mg/kg)

Station	Results Exceeding Background
SOU194-25	Antimony 0.49 (mg/kg)
	Nickel 58.38 (mg/kg)
	Selenium 1.3 (mg/kg)

Station	Results Exceeding Background
SOU194-25	Chromium 44.49 (mg/kg)

Station	Results Exceeding Background
SOU194-25	Silver 12.22 (mg/kg)

Station	Results Exceeding Background
SOU194-26	Chromium 54.41 (mg/kg)
	Nickel 57.79 (mg/kg)

Station	Results Exceeding Background
SOU194-26	Chromium 36.79 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Chromium 47.58 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Arsenic 12.96 (mg/kg)
	Copper 27.02 (mg/kg)
	Uranium 7.17 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Chromium 35.29 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Mercury 7.28 (mg/kg)
	Nickel 65.7 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Chromium 34.7 (mg/kg)
	Nickel 70.12 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Uranium 7.93 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Copper 31.21 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Antimony 0.49 (mg/kg)
	Arsenic 13.5 (mg/kg)
	Beryllium 0.74 (mg/kg)
	Chromium 17.2 (mg/kg)
	Selenium 1 (mg/kg)

Station	Results Exceeding Background
SOU194-28	Chromium 38.21 (mg/kg)
	Nickel 55.62 (mg/kg)

Station	Results Exceeding Background
SOU194-28	Chromium 38.18 (mg/kg)
	Copper 25.1 (mg/kg)
	Lead 38.22 (mg/kg)

Station	Results Exceeding Background
SOU194-28	Chromium 32.59 (mg/kg)

Station	Results Exceeding Background
SOU194-28	Antimony 0.37 (mg/kg)
	Arsenic 16.4 (mg/kg)
	Barium 326 (mg/kg)
	Beryllium 1.1 (mg/kg)
	Cadmium 0.25 (mg/kg)
	Chromium 52.36 (mg/kg)
	Cobalt 21.1 (mg/kg)
	Copper 29.4 (mg/kg)
	Lead 46.5 (mg/kg)
	Manganese 4670 (mg/kg)
	Selenium 2.4 (mg/kg)
	Thallium 0.22 (mg/kg)
	Vanadium 38.1 (mg/kg)

Station	Results Exceeding Background
SOU194-28	Chromium 34.55 (mg/kg)

Station	Results Exceeding Background
SOU194-28	Chromium 37.51 (mg/kg)

Station	Results Exceeding Background
SOU194-28	Chromium 55.09 (mg/kg)
	Mercury 6.62 (mg/kg)
	Selenium 4.03 (mg/kg)

Station	Results Exceeding Background
SOU194-29	Chromium 42.5 (mg/kg)
	Copper 21.81 (mg/kg)

Station	Results Exceeding Background
SOU194-29	Antimony 0.38 (mg/kg)
	Chromium 48.98 (mg/kg)
	Manganese 1700 (mg/kg)
	Selenium 1.1 (mg/kg)
	Thallium 0.23 (mg/kg)

Station	Results Exceeding Background
SOU194-29	Chromium 34.27 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.3. SWMU 194 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU194-29	Nickel 62.38 (mg/kg)

Station	Results Exceeding Background
SOU194-29	Nickel 88.92 (mg/kg)

Station	Results Exceeding Background
SOU194-29	Chromium 42.46 (mg/kg)

Station	Results Exceeding Background
SOU194-29	Chromium 37.95 (mg/kg) Copper 21.79 (mg/kg)

Station	Results Exceeding Background
SOU194-30	Chromium 39.6 (mg/kg)

Station	Results Exceeding Background
SOU194-30	Chromium 39.65 (mg/kg) Copper 19.84 (mg/kg)

Station	Results Exceeding Background
SOU194-30	Antimony 0.93 (mg/kg) Calcium 226000 (mg/kg) Selenium 1 (mg/kg) Thallium 0.64 (mg/kg)

Station	Results Exceeding Background
SOU194-30	Chromium 43.84 (mg/kg)

Station	Results Exceeding Background
SOU194-30	Chromium 46.62 (mg/kg) Copper 21.98 (mg/kg)

Station	Results Exceeding Background
SOU194-30	Chromium 57.4 (mg/kg) Nickel 87.79 (mg/kg)

Station	Results Exceeding Background
SOU194-31	Chromium 65.97 (mg/kg) Lead 53.74 (mg/kg) Nickel 54.15 (mg/kg) Uranium 8 (mg/kg)

Station	Results Exceeding Background
SOU194-31	Arsenic 18.03 (mg/kg) Copper 29.31 (mg/kg) Iron 33875.03 (mg/kg) Lead 44.37 (mg/kg) Silver 11.48 (mg/kg) Zinc 226.89 (mg/kg)

Station	Results Exceeding Background
SOU194-31	Nickel 84.13 (mg/kg)

Station	Results Exceeding Background
SOU194-31	Chromium 40.54 (mg/kg)

Station	Results Exceeding Background
SOU194-31	Antimony 0.55 (mg/kg) Chromium 39.45 (mg/kg) Selenium 1.4 (mg/kg)

Station	Results Exceeding Background
SOU194-31	Chromium 37.78 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Chromium 39.82 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Chromium 41.23 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Chromium 36.93 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Chromium 44.53 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Antimony 0.41 (mg/kg) Chromium 38.64 (mg/kg) Selenium 1.4 (mg/kg) Uranium-235/236 0.081 (pCi/g)

Station	Results Exceeding Background
SOU194-32	Chromium 50.21 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Chromium 43.24 (mg/kg) Uranium 6.43 (mg/kg)

Station	Results Exceeding Background
SOU194-33	Chromium 54.42 (mg/kg)

Station	Results Exceeding Background
SOU194-33	Chromium 41.82 (mg/kg)

Station	Results Exceeding Background
SOU194-33	Chromium 36.79 (mg/kg) Copper 19.14 (mg/kg)

Station	Results Exceeding Background
SOU194-33	Chromium 51.91 (mg/kg)

Station	Results Exceeding Background
SOU194-33	Silver 10.12 (mg/kg)

Station	Results Exceeding Background
SOU194-33	Chromium 42.55 (mg/kg)

Station	Results Exceeding Background
SOU194-33	Chromium 46.33 (mg/kg)

Station	Results Exceeding Background
SOU194-34	Chromium 47.82 (mg/kg) Nickel 69.74 (mg/kg) Silver 11.83 (mg/kg)

Station	Results Exceeding Background
SOU194-34	Antimony 0.48 (mg/kg) Arsenic 14.8 (mg/kg) Beryllium 0.71 (mg/kg) Chromium 17.2 (mg/kg) Manganese 2400 (mg/kg) Selenium 1.5 (mg/kg) Silver 10.74 (mg/kg) Vanadium 40.6 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.3. SWMU 194 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU194-34	Chromium 35.39 (mg/kg) Nickel 69.31 (mg/kg)
SOU194-34	Chromium 39.22 (mg/kg)
SOU194-35	Chromium 39.28 (mg/kg)
SOU194-35	Chromium 52.17 (mg/kg)
SOU194-35	Chromium 72.27 (mg/kg) Nickel 66.13 (mg/kg)
SOU194-35	Chromium 44.86 (mg/kg)
SOU194-35	Chromium 43 (mg/kg)
SOU194-35	Antimony 0.33 (mg/kg) Barium 300 (mg/kg) Chromium 42.86 (mg/kg) Manganese 1800 (mg/kg) Selenium 1.4 (mg/kg)
SOU194-36	Silver 10.27 (mg/kg)
SOU194-36	Antimony 0.45 (mg/kg) Beryllium 0.7 (mg/kg) Selenium 1 (mg/kg) Thallium 0.39 (mg/kg)
SOU194-36	Chromium 51.76 (mg/kg) Nickel 65.5 (mg/kg)

Station	Results Exceeding Background
SOU194-36	Antimony 0.27 (mg/kg) Chromium 46.91 (mg/kg) Selenium 1.2 (mg/kg)
SOU194-36	Chromium 38.83 (mg/kg)
SOU194-36	Chromium 47.32 (mg/kg) Silver 10.84 (mg/kg)
SOU194-37	Arsenic 13.75 (mg/kg) Chromium 35.46 (mg/kg)
SOU194-37	Chromium 48.14 (mg/kg) Silver 11.71 (mg/kg)
SOU194-37	Chromium 61.25 (mg/kg) Nickel 63.32 (mg/kg)
SOU194-37	Chromium 50.56 (mg/kg)
SOU194-37	Antimony 0.71 (mg/kg) Chromium 40.25 (mg/kg) Selenium 1.2 (mg/kg) Thallium 0.29 (mg/kg)
SOU194-37	Nickel 60.47 (mg/kg) Silver 9.77 (mg/kg)
SOU194-37	Chromium 40.88 (mg/kg) Nickel 65.1 (mg/kg)

Station	Results Exceeding Background
SOU194-38	Chromium 37.64 (mg/kg) Copper 19.36 (mg/kg)
SOU194-38	Chromium 56.57 (mg/kg)
SOU194-38	Chromium 53.35 (mg/kg)
SOU194-38	Chromium 39.18 (mg/kg)
SOU194-38	Chromium 41.54 (mg/kg)
SOU194-38	Nickel 66.95 (mg/kg)
SOU194-38	Chromium 46.95 (mg/kg) Copper 19.24 (mg/kg) Nickel 60.54 (mg/kg) Silver 9.69 (mg/kg)
SOU194-38	Nickel 65.09 (mg/kg)
SOU194-39	Chromium 44.71 (mg/kg)
SOU194-39	Nickel 69.87 (mg/kg) Silver 9.76 (mg/kg)
SOU194-39	Antimony 0.31 (mg/kg) Chromium 45.81 (mg/kg) Copper 23.12 (mg/kg) Mercury 8.8 (mg/kg) Selenium 1.2 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.3. SWMU 194 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU194-RA	Uranium 5.15 (mg/kg) Cesium-137 0.57 (pCi/g) Uranium-234 1.29 (pCi/g) Uranium-235/236 0.09 (pCi/g) Uranium-238 1.72 (pCi/g)

Station	Results Exceeding Background
UFSS-02	Zinc 134 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.3. SWMU 194 Background Exceedances – Surface (Continued)

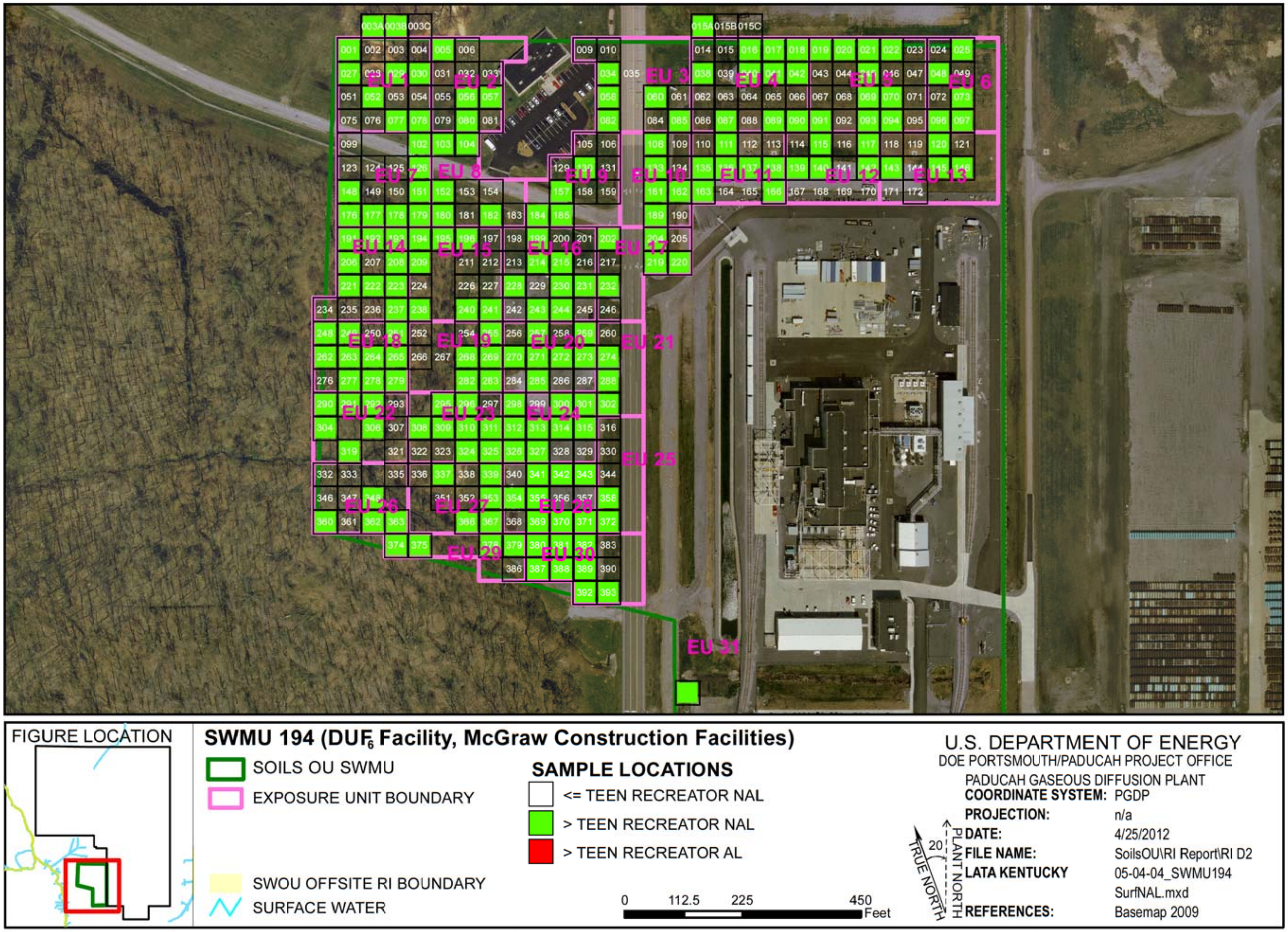


Figure 5.3.4. SWMU 194 NAL Exceedances - Surface Soil

SOU194-001	Nickel 58.42 (mg/kg)
SOU194-003A	Arsenic 7.03 (mg/kg)
SOU194-003B	Arsenic 6.52 (mg/kg)
SOU194-005	Arsenic 8.07 (mg/kg)
SOU194-015A	Arsenic 7.86 (mg/kg)
SOU194-016	Arsenic 6.01 (mg/kg)
SOU194-017	Arsenic 3.2 (mg/kg) Beryllium 0.34 (mg/kg) Nickel 59.36 (mg/kg) Vanadium 14.7 (mg/kg) Cesium-137 0.348 (pCi/g) Total PAH 0.072955 (mg/kg
SOU194-018	Nickel 81.11 (mg/kg)
SOU194-019	Arsenic 7.04 (mg/kg)
SOU194-020	Arsenic 7.91 (mg/kg)
SOU194-021	Arsenic 6.82 (mg/kg) Nickel 59.82 (mg/kg)
SOU194-022	Arsenic 8.3 (mg/kg)
SOU194-025	Silver 9.89 (mg/kg)
SOU194-027	Arsenic 8 (mg/kg) Beryllium 0.5 (mg/kg) Vanadium 29.3 (mg/kg)
SOU194-029	Mercury 6.71 (mg/kg)
SOU194-030	Arsenic 6.02 (mg/kg)
SOU194-034	Arsenic 7.2 (mg/kg) Beryllium 0.6 (mg/kg) Vanadium 28.1 (mg/kg) Cesium-137 0.327 (pCi/g)
SOU194-038	Arsenic 10.54 (mg/kg) Nickel 72.5 (mg/kg)
SOU194-040	Silver 10.78 (mg/kg)

SOU194-041	Arsenic 5.98 (mg/kg) Silver 10.02 (mg/kg)
SOU194-042	Nickel 55.68 (mg/kg)
SOU194-045	Arsenic 6.85 (mg/kg)
SOU194-048	Arsenic 7.82 (mg/kg)
SOU194-052	Arsenic 7.9 (mg/kg)
SOU194-056	Silver 13.91 (mg/kg)
SOU194-057	Arsenic 6.36 (mg/kg)
SOU194-058	Arsenic 14.9 (mg/kg)
SOU194-060	Arsenic 28.55 (mg/kg) Nickel 60.28 (mg/kg)
SOU194-069	Arsenic 4 (mg/kg) Beryllium 0.38 (mg/kg) Vanadium 17.5 (mg/kg)
SOU194-070	Arsenic 5.79 (mg/kg)
SOU194-073	Arsenic 4.9 (mg/kg) Beryllium 0.53 (mg/kg) Vanadium 26.3 (mg/kg) Cesium-137 0.259 (pCi/g)
SOU194-077	Silver 9.99 (mg/kg)
SOU194-078	Silver 10.93 (mg/kg)
SOU194-080	Arsenic 6.1 (mg/kg) Beryllium 0.55 (mg/kg) Vanadium 25.6 (mg/kg)
SOU194-082	Arsenic 9.32 (mg/kg)
SOU194-085	Nickel 66.58 (mg/kg)
SOU194-087	Silver 12.35 (mg/kg)
SOU194-089	Nickel 91.72 (mg/kg)
SOU194-090	Mercury 8.92 (mg/kg) Silver 11.63 (mg/kg)

SOU194-091	Arsenic 7.69 (mg/kg) Nickel 75.64 (mg/kg) Silver 11.52 (mg/kg)
SOU194-093	Silver 10.63 (mg/kg)
SOU194-094	Mercury 8.69 (mg/kg) Silver 15.49 (mg/kg)
SOU194-096	Nickel 77.34 (mg/kg)
SOU194-097	Nickel 80.6 (mg/kg)
SOU194-102	Arsenic 9.34 (mg/kg)
SOU194-103	Arsenic 9.29 (mg/kg)
SOU194-104	Arsenic 8.16 (mg/kg)
SOU194-108	Arsenic 14.08 (mg/kg)
SOU194-111	Nickel 92.28 (mg/kg) Silver 10.93 (mg/kg)
SOU194-115	Silver 11.98 (mg/kg)
SOU194-117	Arsenic 7.9 (mg/kg) Beryllium 0.52 (mg/kg) Vanadium 25.2 (mg/kg) Total PAH 0.89142 (mg/kg)
SOU194-120	Arsenic 9.9 (mg/kg) Beryllium 0.55 (mg/kg) Cobalt 8.5 (mg/kg) Iron 24000 (mg/kg) Vanadium 26.3 (mg/kg) Total PAH 0.091347 (mg/kg
SOU194-126	Silver 13.53 (mg/kg)
SOU194-130	Arsenic 11.49 (mg/kg)
SOU194-133	Arsenic 13.98 (mg/kg)
SOU194-135	Nickel 82.49 (mg/kg)

NOTE: maximum detections only shown for location

Figure 5.3.4. SWMU 194 NAL Exceedances – Surface (Continued)

Location	NAL Exceedances
SOU194-136	Arsenic 4.3 (mg/kg) Beryllium 0.23 (mg/kg) Vanadium 12.1 (mg/kg) Total PAH 0.079526 (mg/kg
SOU194-137	Nickel 99.43 (mg/kg)
SOU194-138	Nickel 100.68 (mg/kg)
SOU194-139	Arsenic 6.41 (mg/kg)
SOU194-140	Arsenic 6.69 (mg/kg) Nickel 78.6 (mg/kg)
SOU194-142	Nickel 76.7 (mg/kg)
SOU194-143	Arsenic 7.49 (mg/kg)
SOU194-145	Nickel 60.31 (mg/kg)
SOU194-146	Arsenic 6.89 (mg/kg)
SOU194-148	Arsenic 10.89 (mg/kg)
SOU194-151	Silver 10.33 (mg/kg)
SOU194-152	Arsenic 5.3 (mg/kg)
SOU194-157	Arsenic 6.78 (mg/kg)
SOU194-161	Arsenic 4.6 (mg/kg) Beryllium 0.36 (mg/kg) Vanadium 18.5 (mg/kg) Cesium-137 0.581 (pCi/g) Total PAH 0.25715 (mg/kg)
SOU194-162	Nickel 75.99 (mg/kg)
SOU194-163	Arsenic 9.45 (mg/kg) Nickel 79.84 (mg/kg)
SOU194-166	Mercury 8.09 (mg/kg) Silver 13.29 (mg/kg)
SOU194-176	Arsenic 7.7 (mg/kg) Beryllium 0.43 (mg/kg) Cobalt 9.5 (mg/kg) Vanadium 27.2 (mg/kg)
SOU194-177	Arsenic 9.68 (mg/kg)

NOTE: maximum detections only shown for location

Location	NAL Exceedances
SOU194-178	Arsenic 8.29 (mg/kg)
SOU194-179	Arsenic 6.02 (mg/kg) Nickel 77.14 (mg/kg)
SOU194-180	Arsenic 8.09 (mg/kg)
SOU194-182	Arsenic 6.7 (mg/kg) Beryllium 0.46 (mg/kg) Vanadium 25.1 (mg/kg) Cesium-137 0.36 (pCi/g) Total PAH 0.48503 (mg/kg)
SOU194-184	Arsenic 14 (mg/kg) Beryllium 0.64 (mg/kg) Cobalt 12.8 (mg/kg) Iron 21000 (mg/kg) Vanadium 33.6 (mg/kg) Cesium-137 0.26 (pCi/g)
SOU194-185	Arsenic 5.75 (mg/kg)
SOU194-189	Nickel 68.65 (mg/kg)
SOU194-191	Arsenic 8.83 (mg/kg)
SOU194-192	Arsenic 6.33 (mg/kg)
SOU194-193	Arsenic 6.82 (mg/kg)
SOU194-194	Arsenic 11.74 (mg/kg)
SOU194-195	Arsenic 6.17 (mg/kg)
SOU194-196	Arsenic 7.09 (mg/kg)
SOU194-199	Arsenic 6.35 (mg/kg)
SOU194-202	Arsenic 6.41 (mg/kg)
SOU194-204	Arsenic 11.47 (mg/kg)
SOU194-206	Arsenic 7.63 (mg/kg)
SOU194-208	Arsenic 7.74 (mg/kg)
SOU194-209	Arsenic 10.07 (mg/kg)
SOU194-214	Arsenic 9.06 (mg/kg)
SOU194-215	Nickel 57.58 (mg/kg)

Location	NAL Exceedances
SOU194-219	Arsenic 13.96 (mg/kg)
SOU194-220	Arsenic 9.48 (mg/kg) Beryllium 0.26 (mg/kg) Vanadium 15.8 (mg/kg) Cesium-137 0.332 (pCi/g) Total PAH 0.15866 (mg/kg
SOU194-221	Mercury 8.14 (mg/kg)
SOU194-222	Arsenic 8.5 (mg/kg) Beryllium 0.53 (mg/kg) Cobalt 11.2 (mg/kg) Vanadium 30.8 (mg/kg)
SOU194-223	Arsenic 10.15 (mg/kg)
SOU194-228	Arsenic 9.02 (mg/kg)
SOU194-230	Nickel 72.03 (mg/kg)
SOU194-231	Arsenic 7.26 (mg/kg) Nickel 65.83 (mg/kg)
SOU194-232	Arsenic 11.04 (mg/kg) Iron 20461.47 (mg/kg)
SOU194-237	Arsenic 7.08 (mg/kg)
SOU194-238	Arsenic 8.1 (mg/kg)
SOU194-240	Arsenic 6.19 (mg/kg)
SOU194-241	Silver 11.68 (mg/kg)
SOU194-243	Arsenic 17.8 (mg/kg) Beryllium 0.87 (mg/kg) Iron 26700 (mg/kg) Vanadium 41.1 (mg/kg) Cesium-137 0.239 (pCi/g)
SOU194-244	Arsenic 6.14 (mg/kg)
SOU194-248	Arsenic 8.95 (mg/kg)
SOU194-249	Arsenic 13.34 (mg/kg)
SOU194-251	Arsenic 7.14 (mg/kg)

Figure 5.3.4. SWMU 194 NAL Exceedances – Surface (Continued)

SOU194-255	Arsenic 6 (mg/kg) Beryllium 0.54 (mg/kg) Nickel 58.38 (mg/kg) Vanadium 25.2 (mg/kg) Cesium-137 0.206 (pCi/g)
SOU194-257	Arsenic 6.65 (mg/kg)
SOU194-259	Arsenic 5.67 (mg/kg) Silver 12.22 (mg/kg)
SOU194-262	Arsenic 8.77 (mg/kg)
SOU194-263	Arsenic 6.05 (mg/kg) Nickel 57.79 (mg/kg)
SOU194-264	Arsenic 6.51 (mg/kg)
SOU194-265	Arsenic 10.15 (mg/kg)
SOU194-268	Arsenic 6.74 (mg/kg)
SOU194-269	Arsenic 9.46 (mg/kg)
SOU194-270	Arsenic 9.15 (mg/kg)
SOU194-271	Arsenic 12.96 (mg/kg)
SOU194-272	Arsenic 7 (mg/kg)
SOU194-273	Mercury 7.28 (mg/kg) Nickel 65.7 (mg/kg)
SOU194-274	Arsenic 6.97 (mg/kg) Nickel 70.12 (mg/kg)
SOU194-277	Arsenic 7.38 (mg/kg)
SOU194-278	Arsenic 7.02 (mg/kg)
SOU194-279	Arsenic 13.5 (mg/kg) Beryllium 0.74 (mg/kg) Cobalt 9.9 (mg/kg) Iron 21300 (mg/kg) Vanadium 35.8 (mg/kg)
SOU194-282	Nickel 55.62 (mg/kg)
SOU194-283	Arsenic 12 (mg/kg)
SOU194-285	Arsenic 16.4 (mg/kg) Beryllium 1.1 (mg/kg) Cobalt 21.1 (mg/kg) Iron 27800 (mg/kg) Manganese 4670 (mg/kg) Vanadium 38.1 (mg/kg) Cesium-137 0.217 (pCi/g)
SOU194-288	Mercury 6.62 (mg/kg)
SOU194-290	Arsenic 6.81 (mg/kg)
SOU194-291	Arsenic 9.4 (mg/kg) Beryllium 0.61 (mg/kg) Cobalt 13.9 (mg/kg) Vanadium 31.7 (mg/kg) Cesium-137 0.288 (pCi/g)
SOU194-292	Arsenic 10.16 (mg/kg)
SOU194-295	Nickel 62.38 (mg/kg)
SOU194-296	Arsenic 7.76 (mg/kg) Nickel 88.92 (mg/kg)
SOU194-298	Arsenic 6.25 (mg/kg)
SOU194-300	Arsenic 9.37 (mg/kg)
SOU194-301	Arsenic 9.35 (mg/kg)
SOU194-302	Arsenic 3.9 (mg/kg) Beryllium 0.3 (mg/kg) Vanadium 15.2 (mg/kg) Cesium-137 0.226 (pCi/g)
SOU194-304	Arsenic 6.4 (mg/kg)
SOU194-306	Arsenic 10.62 (mg/kg)
SOU194-308	Arsenic 5.82 (mg/kg)
SOU194-309	Arsenic 8.78 (mg/kg) Nickel 87.79 (mg/kg)
SOU194-310	Arsenic 8.45 (mg/kg) Nickel 54.15 (mg/kg)
SOU194-311	Arsenic 18.03 (mg/kg) Iron 33875.03 (mg/kg) Silver 11.48 (mg/kg)
SOU194-312	Nickel 84.13 (mg/kg)
SOU194-313	Arsenic 8.66 (mg/kg)
SOU194-314	Arsenic 9 (mg/kg) Beryllium 0.63 (mg/kg) Cobalt 9 (mg/kg) Iron 20100 (mg/kg) Vanadium 29.9 (mg/kg) Cesium-137 0.32 (pCi/g)
SOU194-315	Arsenic 6.77 (mg/kg)
SOU194-318	PCB, Total 18 (mg/kg)
SOU194-319	Arsenic 8.86 (mg/kg)
SOU194-324	Arsenic 6.82 (mg/kg)
SOU194-325	Arsenic 8.5 (mg/kg) Beryllium 0.55 (mg/kg) Vanadium 31.5 (mg/kg) Cesium-137 0.283 (pCi/g)
SOU194-326	Arsenic 9.04 (mg/kg)
SOU194-327	Arsenic 6.2 (mg/kg)
SOU194-337	Silver 10.12 (mg/kg)
SOU194-339	Arsenic 5.73 (mg/kg)
SOU194-341	Nickel 69.74 (mg/kg) Silver 11.83 (mg/kg)
SOU194-342	Arsenic 14.8 (mg/kg) Beryllium 0.71 (mg/kg) Cobalt 11.3 (mg/kg) Iron 21800 (mg/kg) Silver 10.74 (mg/kg) Vanadium 40.6 (mg/kg)
SOU194-343	Nickel 69.31 (mg/kg)

NOTE: maximum detections only shown for location

Figure 5.3.4. SWMU 194 NAL Exceedances – Surface (Continued)

SOU194-348	Arsenic 7.29 (mg/kg)
SOU194-353	Arsenic 5.84 (mg/kg)
SOU194-354	Arsenic 7.11 (mg/kg)
SOU194-355	Arsenic 7.43 (mg/kg) Chromium 72.27 (mg/kg) Nickel 66.13 (mg/kg)
SOU194-358	Arsenic 10.9 (mg/kg) Beryllium 0.65 (mg/kg) Cobalt 9.6 (mg/kg) Vanadium 29.8 (mg/kg)
SOU194-360	Arsenic 7.76 (mg/kg) Silver 10.27 (mg/kg)
SOU194-362	Arsenic 7.5 (mg/kg) Beryllium 0.7 (mg/kg) Cobalt 9.4 (mg/kg) Vanadium 29.5 (mg/kg)
SOU194-363	Arsenic 9.09 (mg/kg)
SOU194-366	Nickel 65.5 (mg/kg)
SOU194-367	Arsenic 10.71 (mg/kg) Beryllium 0.48 (mg/kg) Vanadium 25 (mg/kg) Cesium-137 0.22 (pCi/g)
SOU194-369	Silver 10.84 (mg/kg)
SOU194-370	Arsenic 13.75 (mg/kg)
SOU194-371	Silver 11.71 (mg/kg)
SOU194-372	Nickel 63.32 (mg/kg)
SOU194-374	Arsenic 6.76 (mg/kg)
SOU194-375	Arsenic 9.8 (mg/kg) Beryllium 0.56 (mg/kg) Iron 20200 (mg/kg) Vanadium 34.6 (mg/kg)

SOU194-378	Nickel 60.47 (mg/kg) Silver 9.77 (mg/kg)
SOU194-379	Arsenic 6.07 (mg/kg) Nickel 65.1 (mg/kg)
SOU194-380	Arsenic 6.8 (mg/kg)
SOU194-381	Arsenic 9.11 (mg/kg)
SOU194-382	Arsenic 6.63 (mg/kg)
SOU194-387	Arsenic 7.72 (mg/kg) Nickel 66.95 (mg/kg)
SOU194-388	Nickel 60.54 (mg/kg) Silver 9.69 (mg/kg)
SOU194-389	Arsenic 8.09 (mg/kg) Nickel 65.09 (mg/kg)
SOU194-392	Arsenic 6.27 (mg/kg) Nickel 69.87 (mg/kg) Silver 9.76 (mg/kg)
SOU194-393	Arsenic 5.89 (mg/kg) Beryllium 0.34 (mg/kg) Mercury 8.8 (mg/kg) Vanadium 16.8 (mg/kg) Cesium-137 0.262 (pCi/g)
SOU194-RAD	Vanadium 11.6 (mg/kg) Cesium-137 0.57 (pCi/g)

NOTE: maximum detections only shown for location

Figure 5.3.4. SWMU 194 NAL Exceedances – Surface (Continued)

No metals were detected above the teen recreator ALs in the SWMU 194 surface soil.

The following metals were detected in the SWMU 194 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater.

Metal	Grid	EU
Antimony	27, 34, 69, 73 ,80, 117, 120, 161, 176, 182, 184, 222, 243, 255, 279, 285, 291, 302, 314, 325, 342, 358, 362, 375, 393	1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 13, 14, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 28, 29, 30
Arsenic	58, 60, 108, 133, 184, 219, 243, 249, 271, 279, 285, 311, 342, 370	3, 9, 10, 16, 17, 18, 20, 23, 28
Barium	285, 358	20, 25
Cadmium	136, 220	11, 17
Cobalt	285	20
Iron	311	23
Lead	3, 10, 34, 58, 60, 84, 106, 133, 134, 159, 161, 204, 219, 220, 283, 285, 310, 311	1, 3, 9, 10, 17, 19, 20, 23
Manganese	48, 103, 185, 291, 358, 342	6, 8, 20, 22, 25, 28
Mercury	29, 90, 94, 166, 221, 273, 288, 393	1, 4, 5, 11, 14, 20, 21, 30
Molybdenum[1]	17, 27, 34, 69, 73, 80, 117, 120, 136, 161, 176, 182, 184, 220, 222, 243, 252, 255, 279, 291, 302, 314, 325, 342, 358, 362, 367, 393	All except 15 and 31
Nickel	1, 17, 18, 21, 38, 42, 60, 85, 89, 91, 96, 97, 111, 135, 137, 138, 140, 142, 145, 162, 163, 179, 189, 215, 230, 231, 255, 263, 273, 274, 282,295, 296, 309, 310, 312, 341, 343, 355, 366, 372, 378, 379, 387, 388, 389, 392	All except 8, 9, 14, 15, 17, 22, 26, and 31
Selenium	27, 34, 69, 73, 80, 117, 120, 150, 161, 176, 182, 184, 222, 243, 255, 279, 285, 288, 291, 302, 314, 325, 342, 358, 362, 367, 375, 393	All except 11, 15, 17, and 31
Silver	25, 40, 41, 56, 77, 78, 87, 90, 93, 94, 111, 115, 126, 151, 166, 241, 259, 311, 337, 341, 342, 360, 369, 371, 378, 388, 392	1, 2, 4 5, 6, 7, 11, 12, 15, 20, 23, 26, 27, 28, 29, 30
Thallium	222, 243, 285, 291, 302, 362, 375	14, 16, 20, 21, 22, 26, 29
Uranium	31	2
Vanadium	243, 285, 342	16, 20, 28
Zinc	15, 38, 39, 60, 62, 63, 69, 86, 87, 89, 90, 95, 97, 106, 110, 125, 133, 134, 152, 161, 162, 163, 182, 183, 184, 189, 190, 204, 205, 216,219, 220, 311, RAD (EU 31)	3, 4, 5, 6, 7, 8, 9, 10, 11, 16, 17, 23, 31

[1] No background value is available.

The following were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

Metal	Grid	EU
Arsenic	60, 243, 311	3, 16, 23
Cobalt	285	20
Iron	311	23
Manganese	48, 103, 285, 291, 342, 358	6, 8, 20, 22, 25, 28
Mercury	29, 90, 94, 166, 221, 273, 288, 393	1, 4, 5, 11, 14, 20, 21, 30
Molybdenum[1]	252	19
Nickel	18, 89, 97, 11, 135, 137, 138, 163, 296, 309, 312	4, 6, 11, 23, 24
Silver	25, 40, 41, 56, 77, 78, 87, 91, 93, 94, 111, 115, 126, 151, 166, 241, 259, 311, 337, 341, 342, 360, 369, 371, 378, 388, 392	1, 2, 4, 5, 6, 7, 11, 12, 15, 20, 23, 26, 27, 28, 29 30
Vanadium	243, 285, 342	16, 20, 28

[1] No background value is available.

PCBs

Total PCBs were detected above the teen recreator NAL in one surface soil sample, which was a historical sample collected in grid 318 (EU 22). Grid 318 is on the western boundary of the SWMU on the banks of a tributary to Bayou Creek.

PCBs were not detected above the teen recreator AL in the SWMU 194 surface soil.

Total PCBs were detected in grid 136, EU 11, and grid 318, EU 22, above the SSL for the protection of UCRS groundwater and above the SSLs for the protection of RGA groundwater in grid 318, EU 22.

SVOCs

Total PAHs were detected above the teen recreator NAL in the surface soil of grids 17, 117, 120, 136, 161, 182, and 220 (EUs 4, 12, 13, 11, 10, 8, and 17, respectively). Each of these grids is associated with either a parking lot or road.

No SVOCs were detected above the teen recreator ALs in the SWMU 194 surface soil.

The following were detected above the SSLs for the protection of UCRS groundwater.

SVOC	Grid	EU
Bis(2-ethylhexyl)phthalate	182	8
Fluoranthene	117	12
Pyrene	117	12
Total PAHs	17, 34, 69, 73, 117, 120, 136, 161, 182, 184, 220, 243, 255, 285, 302, 314, 325, 342, 358, 367, 393	3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 30

Total PAHs were detected above the SSL for the protection of RGA groundwater in grid 117 (EU 12), grid 161 (EU 10), grid 182 (EU 8), and grid 318 (EU 22).

VOCs

No VOCs were detected in the SWMU 194 surface soil.

Radionuclides

Cesium-137 was detected above both the background screening level and the teen recreator NAL in the surface soil sample from grid 161 (EU 10) and in the judgmental grab sample collected in EU 31.

No radionuclides were detected above the teen recreator ALs in the SWMU 194 surface soil.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

5.3.4 Nature and Extent of Contamination—Subsurface Soils

The representative data set for SWMU 194 subsurface soils presented in Tables 5.3.3 and 5.3.4 provides the nature of the contamination in SWMU 194 subsurface soils. Figures 5.3.5–5.3.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 194 subsurface soil contamination is considered adequately defined for supporting the baseline risk assessment and FS.

Metals

Metals were detected above the teen recreator NALs in the SWMU 194 subsurface soil. The following are the metals detected above both background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	3A, 6, 10, 15, 15A, 15C, 30, 34, 38, 40, 54, 56, 61, 66, 68, 77, 78, 89, 92, 92, 103, 104, 126, 136, 137,140, 151, 152, 161, 165, 172, 180, 192, 193, 194, 200, 208, 220, 221, 223, 227, 231, 235, 236, 243, 244, 245, 249, 250, 251, 264, 270, 271, 278, 279, 284, 290, 292, 293, 301, 302, 304, 306, 309, 312, 313, 314, 319, 324, 327, 330, 338, 339, 347, 352, 354, 357, 369, 370, 375, 378, 381, 387, 388	1, 2, 3, 4, 5, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30
Barium	302	21
Beryllium	40, 56, 91, 302, 326, 347, 354, 358, 375, 390	2, 4 5, 21, 24, 25, 26, 28, 29, 30
Cadmium	296	23
Chromium	272, 340, 370	20, 28
Cobalt	104, 302, 347, 375	8, 21, 26, 29
Iron	40, 249, 302, 312	4, 18, 21, 24
Manganese	95, 231, 302	5, 16, 21
Mercury	79, 109, 136, 221, 136, 322, 327, 392	2, 10, 11, 14, 23, 24, 30
Nickel	10, 14, 18, 52, 61, 64, 66, 73, 88, 89, 92, 94, 96, 97, 103, 111, 112, 113, 116, 117, 119, 121, 135, 138, 149, 145, 166, 178, 184, 204, 221, 231, 240, 250, 263, 264, 276, 277, 278, 282, 296, 302, 306, 312, 315, 325, 328, 329, 351, 352, 354, 375, 381, 383	1, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 27, 28, 29, 30
Silver	33, 41, 43, 47, 56, 64, 80, 87, 88, 105, 116, 170, 215, 228, 231, 242, 269, 270, 285, 321, 325, 336, 352, 341, 342, 356, 380	2, 4, 5, 9, 12, 16, 19, 20, 22, 23, 27, 28, 30
Vanadium	54, 56, 40, 92, 192, 249, 302, 347, 375	1, 2, 4, 5, 14, 18, 21, 26, 29

Table 5.3.3. Subsurface Soil Historical Data Summary: SWMU 194 DUF_6 Facility McGraw Construction Facilities (South Side)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.38E+03	1.45E+04	9.61E+03	0/7	7/7	2/7	1.20E+04	0/7	2.77E+04	0/7	8.91E+06	0/7	7/7	20 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	2.10E-01	0/7	1.78E+00	0/7	1.90E+03	0/7	0/7	13 - 20
METAL	Arsenic	mg/kg	4.40E+00	4.40E+00	4.40E+00	0/7	1/7	0/7	7.90E+00	1/7	1.02E+00	0/7	1.02E+02	0/7	1/7	5 - 5
METAL	Barium	mg/kg	2.05E+01	1.25E+02	7.40E+01	0/7	7/7	0/7	1.70E+02	0/7	4.15E+02	0/7	4.58E+05	0/7	3/7	1 - 1
METAL	Beryllium	mg/kg	8.00E-01	4.80E+00	2.14E+00	0/7	3/7	3/7	6.90E-01	3/7	1.29E-02	0/7	8.65E+00	0/7	1/7	0.4 - 0.5
METAL	Boron	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.66E+03	0/6	2.34E+06	0/6	0/6	100 - 100
METAL	Cadmium	mg/kg	8.55E+00	8.55E+00	8.55E+00	0/28	1/28	1/28	2.10E-01	1/28	3.14E+00	0/28	3.14E+02	0/28	1/28	0.8 - 2
METAL	Calcium	mg/kg	5.68E+02	2.11E+03	1.18E+03	0/7	7/7	0/7	6.10E+03	0/7	n/a	0/7	n/a	n/a	n/a	50 - 50
METAL	Chromium	mg/kg	8.24E+00	1.03E+02	2.21E+01	0/28	28/28	3/28	4.30E+01	1/28	7.15E+01	0/28	7.15E+03	0/28	0/28	2 - 2
METAL	Cobalt	mg/kg	3.00E+00	9.46E+00	5.08E+00	0/7	7/7	0/7	1.30E+01	1/7	8.45E+00	0/7	3.29E+03	7/7	7/7	1 - 1.4
METAL	Copper	mg/kg	2.41E+00	1.67E+01	7.36E+00	0/7	7/7	0/7	2.50E+01	0/7	1.13E+03	0/7	4.75E+05	0/7	0/7	2 - 2
METAL	Iron	mg/kg	6.41E+03	2.00E+04	1.17E+04	0/7	7/7	0/7	2.80E+04	1/7	1.98E+04	0/7	8.31E+06	7/7	7/7	5 - 5
METAL	Lead	mg/kg	5.03E+00	3.60E+02	2.91E+01	0/28	18/28	1/28	2.30E+01	0/28	4.00E+02	0/28	4.00E+02	0/28	3/28	20 - 20
METAL	Magnesium	mg/kg	4.15E+02	2.34E+03	1.30E+03	0/7	7/7	2/7	2.10E+03	0/7	n/a	0/7	n/a	n/a	n/a	15 - 15
METAL	Manganese	mg/kg	3.49E+01	6.91E+02	2.07E+02	0/7	7/7	0/7	8.20E+02	0/7	3.47E+03	0/7	2.94E+05	4/7	7/7	1 - 1
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	1.30E-01	0/7	6.25E-01	0/7	7.88E+02	0/7	0/7	0.1 - 0.2
METAL	Nickel	mg/kg	7.26E+00	1.19E+01	1.00E+01	0/7	3/7	0/7	2.20E+01	0/7	2.98E+01	0/7	3.07E+04	0/7	3/7	5 - 8.5
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	7.00E-01	0/7	1.42E+02	0/7	5.93E+04	0/7	0/7	1 - 1
METAL	Silver	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	2.70E+00	0/7	7.45E+00	0/7	8.07E+03	0/7	0/7	2.2 - 4
METAL	Sodium	mg/kg	6.21E+01	3.69E+02	3.00E+02	0/7	6/7	3/7	3.40E+02	0/7	n/a	0/7	n/a	n/a	n/a	200 - 200
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	3.40E-01	0/7	2.27E+00	0/7	9.50E+02	0/7	0/7	0.8 - 15
METAL	Vanadium	mg/kg	1.50E+01	2.39E+01	1.95E+01	0/7	7/7	0/7	3.70E+01	7/7	1.04E-01	0/7	7.61E+01	7/7	7/7	2 - 2
METAL	Zinc	mg/kg	1.81E+01	6.76E+01	3.48E+01	0/7	6/7	1/7	6.00E+01	0/7	8.50E+03	0/7	3.56E+06	0/7	5/7	15 - 15
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	1.83E-01	0/6	1.83E+01	0/6	0/6	0.2 - 0.2
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.42 - 0.42
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.42 - 0.42
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.42 - 0.42
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.1 - 2.1
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.1 - 2.1
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.1 - 2.1
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.35E+00	0/1	1.00E+02	0/1	0/1	2.1 - 2.1
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.83 - 0.83
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.1 - 2.1
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.1 - 2.1
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.87E+02	0/1	1.76E+04	0/1	0/1	0.42 - 0.42
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.25E+03	0/1	9.74E+04	0/1	0/1	0.42 - 0.42
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.3.3. Subsurface Soil Historical Data Summary: SWMU 194 DUF_6 Facility McGraw Construction Facilities (South Side) (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.1 - 2.1
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.84 - 0.84
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.47E+02	0/1	1.34E+04	0/1	0/1	0.42 - 0.42
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.19E+02	0/1	1.26E+04	0/1	0/1	0.42 - 0.42
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.78E-01	0/1	1.78E+01	0/1	0/1	0.42 - 0.42
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.27E+00	0/1	5.27E+02	0/1	0/1	0.42 - 0.42
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.10E-02	0/1	6.10E+00	0/1	0/1	0.42 - 0.42
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	2.1 - 2.1
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.42 - 0.42
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.1 - 2.1
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.35E+02	0/1	1.00E+04	0/1	0/1	0.42 - 0.42
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.57E-02	0/1	5.57E+00	0/1	0/1	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	0/20	0.006 - 0.006
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.006 - 0.006
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.006 - 0.006
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.006 - 0.006
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	9.45E-02	0/1	1.29E+01	0/1	0/1	0.006 - 0.006
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.006 - 0.006
VOA	1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/21	0/21	0/21	n/a	0/21	1.20E+01	0/21	4.57E+02	0/21	0/21	0.006 - 0.006
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.006 - 0.006
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/21	0/21	0/21	n/a	0/21	1.28E+00	0/21	1.91E+02	0/21	0/21	0.006 - 0.006
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.006 - 0.006
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.006 - 0.006
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.006 - 0.006
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	9.30E-01	0/1	1.34E+02	0/1	0/1	0.006 - 0.006
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.006 - 0.006
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.38E-01	0/1	5.85E+01	0/1	0/1	0.006 - 0.006
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.006 - 0.006
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.006 - 0.006
VOA	Ethylbenzene	mg/kg	1.50E-02	1.50E-02	1.50E-02	0/21	1/21	0/21	n/a	0/21	6.11E+00	0/21	8.90E+02	0/21	0/21	0.006 - 0.006
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.006 - 0.006

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.3.3. Subsurface Soil Historical Data Summary: SWMU 194 DUF$_6$ Facility McGraw Construction Facilities (South Side) (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.006 - 0.006
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.26E-01	0/1	1.48E+02	0/1	0/1	0.006 - 0.006
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/21	0/21	0/21	n/a	0/21	n/a	0/21	n/a	0/21	0/21	0.006 - 0.006
VOA	Total Xylene	mg/kg	5.00E-03	5.00E-03	5.00E-03	0/21	1/21	0/21	n/a	0/21	8.66E+01	0/21	2.79E+03	0/21	0/21	0.006 - 0.006
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.006 - 0.006
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/21	0/21	0/21	n/a	0/21	9.91E-02	0/21	1.17E+01	0/21	0/21	0.006 - 0.006
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.39E-01	0/1	1.02E+02	0/1	0/1	0.012 - 0.012

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.3.4. Subsurface Soil RI Data Summary: SWMU 194 DUF_6 Facility McGraw Construction Facilities (South Side)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	4.25E+03	1.98E+04	9.65E+03	0/40	40/40	7/40	1.20E+04	0/40	2.77E+04	0/40	8.91E+06	0/40	40/40	5.6 - 6.4
METAL	Antimony	mg/kg	1.40E-01	9.70E-01	4.19E-01	0/40	40/40	37/40	2.10E-01	0/40	1.78E+00	0/40	1.90E+03	0/40	32/40	0.56 - 0.64
METAL	Arsenic	mg/kg	2.40E+00	3.52E+01	8.56E+00	0/395	202/395	92/395	7.90E+00	202/395	1.02E+00	0/395	1.02E+02	2/395	202/395	1.1 - 11
METAL	Barium	mg/kg	6.48E+01	2.96E+03	1.84E+02	0/40	40/40	2/40	1.70E+02	1/40	4.15E+02	0/40	4.58E+05	0/40	33/40	2.2 - 124
METAL	Beryllium	mg/kg	3.30E-01	1.80E+00	6.06E-01	0/40	40/40	7/40	6.90E-01	40/40	1.29E-02	0/40	8.65E+00	0/40	0/40	0.11 - 0.13
METAL	Cadmium	mg/kg	1.30E-02	6.00E-01	9.21E-02	0/40	39/40	2/40	2.10E-01	0/40	3.14E+00	0/40	3.14E+02	0/40	2/40	0.056 - 0.064
METAL	Calcium	mg/kg	3.78E+02	1.80E+05	1.46E+04	0/40	40/40	9/40	6.10E+03	0/40	n/a	0/40	n/a	n/a	n/a	55.6 - 311
METAL	Chromium	mg/kg	8.40E+00	8.64E+01	3.82E+01	0/395	194/395	86/395	4.30E+01	2/395	7.15E+01	0/395	7.15E+03	0/395	0/395	1.1 - 85
METAL	Cobalt	mg/kg	4.10E+00	8.31E+01	9.33E+00	0/40	40/40	4/40	1.30E+01	9/40	8.45E+00	0/40	3.29E+03	40/40	40/40	0.22 - 0.26
METAL	Copper	mg/kg	5.70E+00	3.49E+01	1.46E+01	0/395	69/395	5/395	2.50E+01	0/395	1.13E+03	0/395	4.75E+05	0/395	0/395	1.1 - 35
METAL	Iron	mg/kg	6.33E+03	4.73E+04	1.35E+04	0/395	395/395	4/395	2.80E+04	35/395	1.98E+04	0/395	8.31E+06	395/395	395/395	5.6 - 310
METAL	Lead	mg/kg	6.00E+00	1.30E+02	1.37E+01	0/395	366/395	19/395	2.30E+01	0/395	4.00E+02	0/395	4.00E+02	0/395	109/395	0.33 - 13
METAL	Magnesium	mg/kg	4.49E+02	7.19E+03	1.74E+03	0/40	40/40	8/40	2.10E+03	0/40	n/a	0/40	n/a	n/a	n/a	55.6 - 64.3
METAL	Manganese	mg/kg	5.50E+01	3.11E+04	5.31E+02	0/395	391/395	23/395	8.20E+02	3/395	3.47E+03	0/395	2.94E+05	359/395	391/395	0.22 - 85
METAL	Mercury	mg/kg	8.80E-03	8.94E+00	7.53E-01	0/395	44/395	7/395	1.30E-01	7/395	6.25E-01	0/395	7.88E+02	7/395	8/395	0.0371 - 10
METAL	Molybdenum	mg/kg	2.10E-01	4.50E+00	8.22E-01	0/395	40/395	0/395	n/a	0/395	1.42E+02	0/395	5.94E+04	0/395	40/395	0.56 - 15
METAL	Nickel	mg/kg	4.50E+00	1.08E+02	4.23E+01	0/395	89/395	59/395	2.20E+01	59/395	2.98E+01	0/395	3.07E+04	10/395	89/395	0.56 - 65
METAL	Selenium	mg/kg	6.80E-01	2.80E+00	1.33E+00	0/395	40/395	39/395	7.00E-01	0/395	1.42E+02	0/395	5.93E+04	0/395	40/395	0.56 - 20
METAL	Silver	mg/kg	1.90E-02	1.70E+01	3.02E+00	0/395	66/395	27/395	2.70E+00	27/395	7.45E+00	0/395	8.07E+03	27/395	37/395	0.22 - 10
METAL	Sodium	mg/kg	2.55E+01	3.85E+02	1.06E+02	0/40	40/40	1/40	3.40E+02	0/40	n/a	0/40	n/a	n/a	n/a	22.2 - 25.7
METAL	Thallium	mg/kg	8.30E-02	1.40E+00	2.83E-01	0/40	29/40	6/40	3.40E-01	0/40	2.27E+00	0/40	9.50E+02	0/40	24/40	0.22 - 0.26
METAL	Uranium	mg/kg	1.60E+00	1.81E+01	2.92E+00	0/395	45/395	6/395	4.60E+00	0/395	8.49E+01	0/395	3.50E+04	0/395	1/395	0.02 - 20
METAL	Vanadium	mg/kg	1.76E+01	8.63E+01	3.22E+01	0/40	40/40	9/40	3.70E+01	40/40	1.04E-01	1/40	7.61E+01	40/40	40/40	1.1 - 1.3
METAL	Zinc	mg/kg	1.07E+01	1.85E+02	3.58E+01	0/395	394/395	15/395	6.00E+01	0/395	8.50E+03	0/395	3.56E+06	0/395	373/395	2.2 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/390	0/390	0/390	n/a	0/390	1.83E-01	0/390	1.83E+01	0/390	0/390	0.33 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	0/41	0/41	0.37 - 0.42
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	0/41	0/41	0.37 - 0.42
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	0/41	0/41	0.37 - 0.42
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	1.8 - 2.1
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	1.8 - 2.1
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	3.35E+00	0/41	1.00E+02	0/41	0/41	1.8 - 2.1
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	1.8 - 2.1
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	1.8 - 2.1
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	1.8 - 2.1
SVOA	Acenaphthene	mg/kg	5.80E-02	9.80E-02	7.40E-02	3/41	3/41	0/41	n/a	0/41	5.87E+02	0/41	1.76E+04	0/41	0/41	0.37 - 0.42
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Anthracene	mg/kg	1.20E-01	1.30E-01	1.23E-01	3/41	3/41	0/41	n/a	0/41	3.25E+03	0/41	9.74E+04	0/41	0/41	0.37 - 0.42
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Benzo(ghi)perylene	mg/kg	1.10E-01	2.90E-01	2.10E-01	3/41	3/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Benzoic acid	mg/kg	4.00E-01	4.00E-01	4.00E-01	1/41	1/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	1.8 - 2.1

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.3.4. Subsurface Soil RI Data Summary: SWMU 194 DUF_6 Facility McGraw Construction Facilities (South Side) (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.0073 - 0.0085
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	6.70E-02	5.90E-01	2.29E-01	5/41	6/41	0/41	n/a	0/41	n/a	0/41	n/a	0/41	0/41	0.37 - 0.42
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Dibenzofuran	mg/kg	4.80E-02	4.80E-02	4.80E-02	1/41	1/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Fluoranthene	mg/kg	6.90E-02	1.10E+00	7.95E-01	1/41	4/41	0/41	n/a	0/41	4.47E+02	0/41	1.34E+04	0/41	0/41	0.37 - 0.42
SVOA	Fluorene	mg/kg	4.70E-02	7.30E-02	5.70E-02	3/41	3/41	0/41	n/a	0/41	4.19E+02	0/41	1.26E+04	0/41	0/41	0.37 - 0.42
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	1.78E-01	0/41	1.78E+01	0/41	0/41	0.37 - 0.42
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	1.8 - 2.1
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.73 - 0.85
SVOA	Naphthalene	mg/kg	4.80E-02	4.80E-02	4.80E-02	1/41	1/41	0/41	n/a	0/41	5.27E+00	0/41	5.27E+02	1/41	1/41	0.37 - 0.42
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	1.8 - 2.1
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	6.10E-02	0/41	6.10E+00	0/41	0/41	0.0073 - 0.0085
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	0/41	0/41	1.8 - 2.1
SVOA	Phenanthrene	mg/kg	5.10E-01	6.90E-01	5.87E-01	0/41	3/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.37 - 0.42
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	1.8 - 2.1
SVOA	Pyrene	mg/kg	5.30E-02	8.30E-01	5.63E-01	1/41	4/41	0/41	n/a	0/41	3.35E+02	0/41	1.00E+04	0/41	2/41	0.37 - 0.42
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	0.73 - 0.85
SVOA	Total PAH	mg/kg	4.60E-03	7.78E-01	1.52E-01	0/41	13/41	0/41	n/a	3/41	5.57E-02	0/41	5.57E+00	3/41	13/41	-
RADS	Alpha activity	pCi/g	1.91E+01	3.68E+01	2.70E+01	0/41	41/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	3.9 - 7.9
RADS	Americium-241	pCi/g	-1.20E-02	2.70E-02	6.66E-03	1/41	41/41	0/41	n/a	0/41	1.28E+01	0/41	1.28E+03	0/41	0/41	0.011 - 0.055
RADS	Beta activity	pCi/g	1.55E+01	4.02E+01	2.84E+01	0/41	41/41	0/41	n/a	0/41	n/a	0/41	n/a	n/a	n/a	2.3 - 5.9
RADS	Cesium-137	pCi/g	-6.00E-02	1.90E-01	1.18E-02	0/41	41/41	0/41	2.80E-01	0/41	1.98E-01	0/41	1.98E+01	0/41	0/41	0.031 - 0.18
RADS	Neptunium-237	pCi/g	-1.01E-02	1.90E-02	-1.24E-03	0/41	41/41	0/41	n/a	0/41	6.26E-01	0/41	6.26E+01	0/41	2/41	0.0088 - 0.047
RADS	Plutonium-238	pCi/g	-4.00E-03	3.20E-02	1.24E-02	9/41	41/41	0/41	n/a	0/41	3.64E+01	0/41	3.64E+03	0/41	0/41	0.006 - 0.048
RADS	Plutonium-239/240	pCi/g	-2.80E-03	1.40E-02	4.48E-03	3/41	41/41	0/41	n/a	0/41	3.56E+01	0/41	3.56E+03	0/41	0/41	0.0033 - 0.024
RADS	Technetium-99	pCi/g	-3.30E-01	6.40E-01	7.88E-02	1/41	41/41	0/41	2.80E+00	0/41	1.11E+03	0/41	1.11E+05	0/41	1/41	0.36 - 0.53
RADS	Thorium-228	pCi/g	2.58E-01	1.23E+00	9.40E-01	0/41	41/41	0/41	1.60E+00	0/41	n/a	0/41	n/a	n/a	n/a	0.01 - 0.17
RADS	Thorium-230	pCi/g	6.96E-01	1.57E+00	1.03E+00	0/41	41/41	1/41	1.40E+00	0/41	4.49E+01	0/41	4.49E+03	0/41	41/41	0.005 - 0.09
RADS	Thorium-232	pCi/g	2.70E-01	1.16E+00	9.32E-01	0/41	41/41	0/41	1.50E+00	0/41	n/a	0/41	n/a	n/a	n/a	0.004 - 0.09
RADS	Uranium-234	pCi/g	5.21E-01	9.00E-01	7.24E-01	0/41	41/41	0/41	1.20E+00	0/41	6.25E+01	0/41	6.25E+03	0/41	0/41	0.007 - 0.06
RADS	Uranium-235/236	pCi/g	1.90E-02	7.30E-02	3.80E-02	27/41	41/41	3/41	6.00E-02	0/41	9.12E-01	0/41	9.12E+01	0/41	0/41	0.008 - 0.042
RADS	Uranium-238	pCi/g	5.35E-01	1.22E+00	8.02E-01	0/41	41/41	1/41	1.20E+00	0/41	4.02E+00	0/41	4.02E+02	0/41	0/41	0.007 - 0.05

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

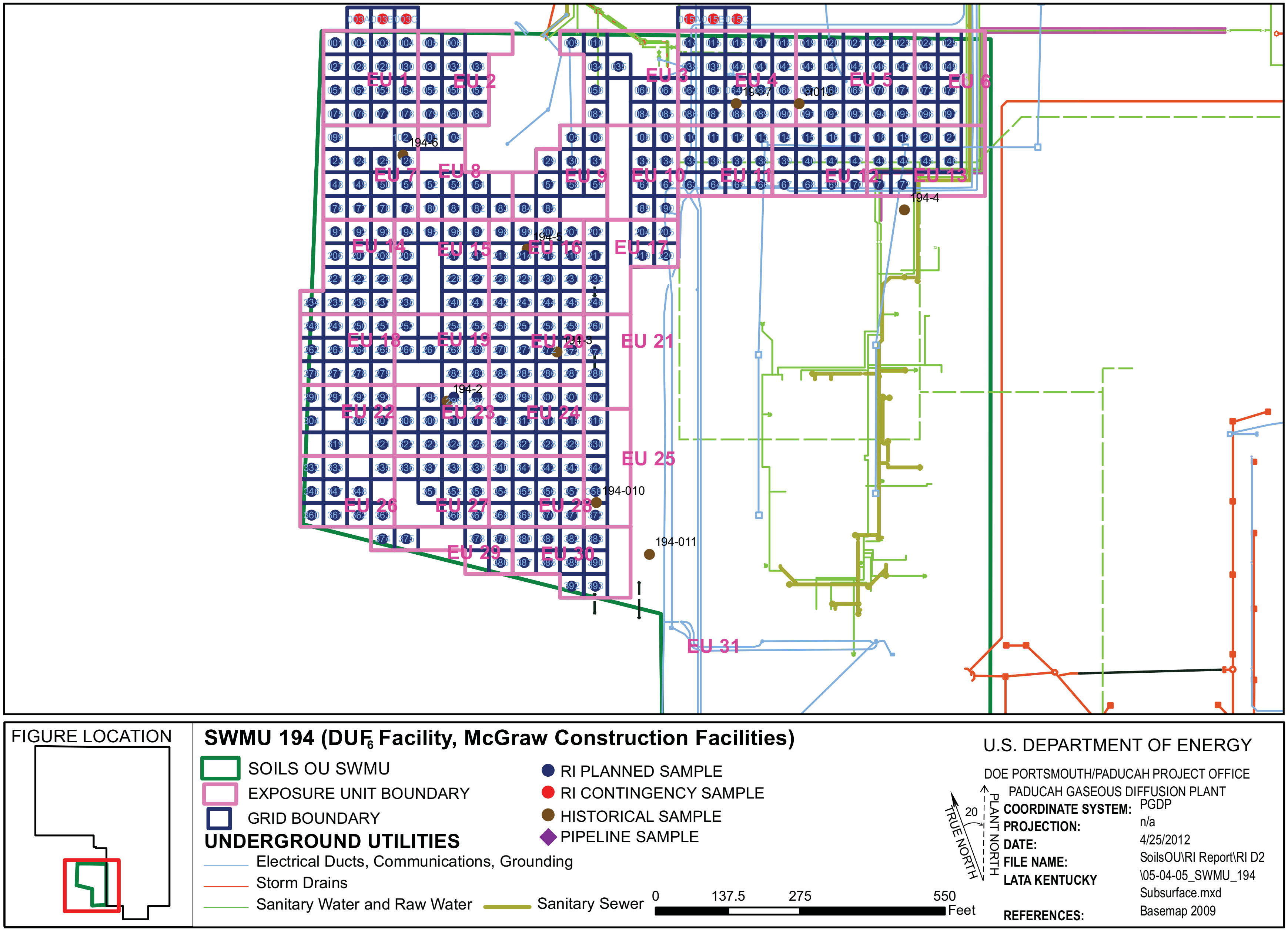


Figure 5.3.5. SWMU 194 Sample Locations - Subsurface Soil

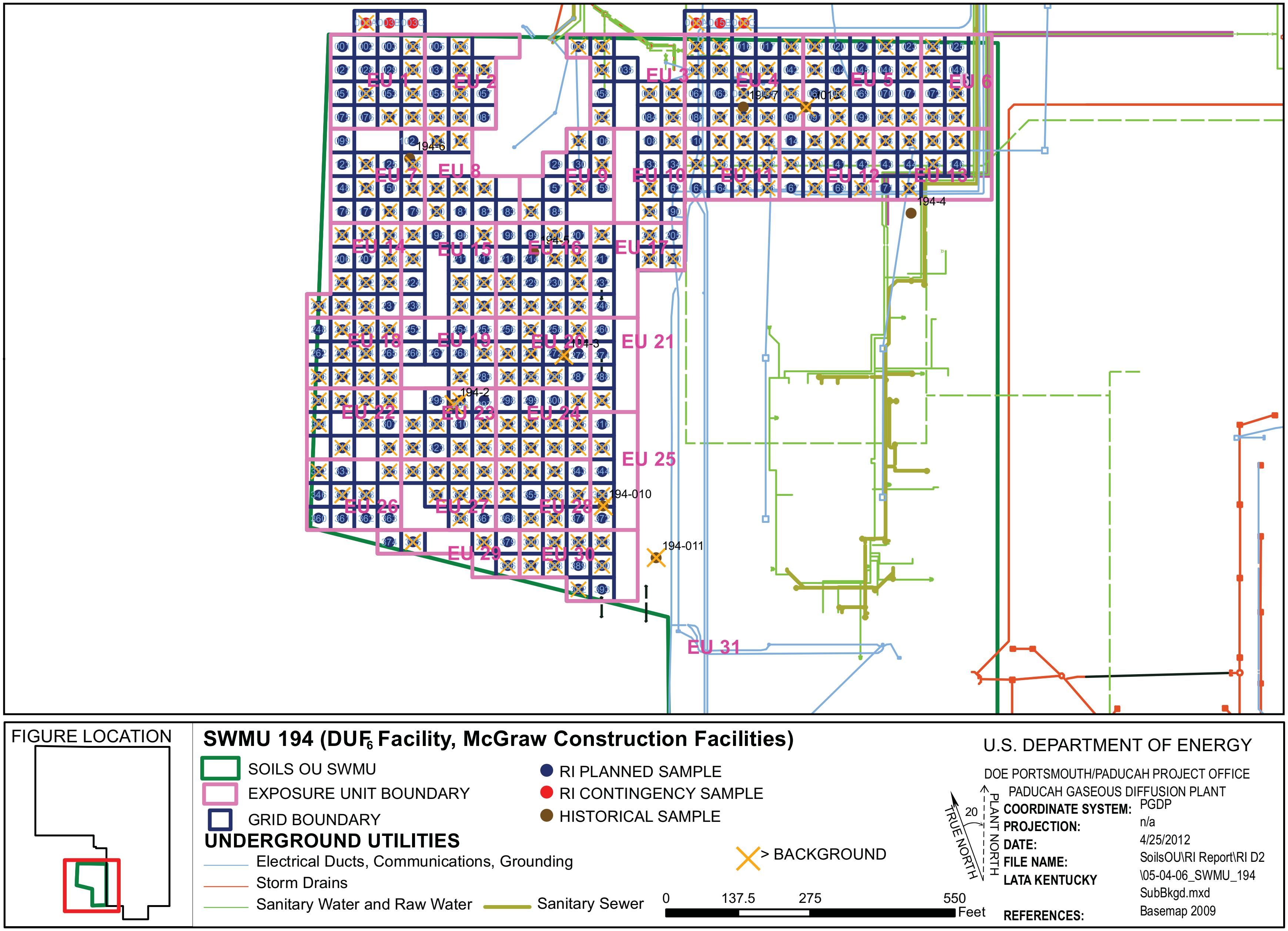


Figure 5.3.6. SWMU 194 Background Exceedances - Subsurface Soil

Station	Results Exceeding Background
194-010	Aluminum 14500 (mg/kg) Beryllium 0.83 (mg/kg) Magnesium 2330 (mg/kg) Sodium 364 (mg/kg) Zinc 67.6 (mg/kg)

Station	Results Exceeding Background
194-011	Beryllium 4.8 (mg/kg) Magnesium 2340 (mg/kg) Sodium 369 (mg/kg)

Station	Results Exceeding Background
194-2	Cadmium 8.55 (mg/kg) Chromium 67.6 (mg/kg)

Station	Results Exceeding Background
194-3	Chromium 103 (mg/kg) Lead 360 (mg/kg)

Station	Results Exceeding Background
H015	Beryllium 0.8 (mg/kg)

Station	Results Exceeding Background
SOU194-00	Arsenic 8.35 (mg/kg)

Station	Results Exceeding Background
SOU194-00	Chromium 51.07 (mg/kg)

Station	Results Exceeding Background
SOU194-00	Antimony 0.41 (mg/kg) Arsenic 9.2 (mg/kg) Selenium 1.2 (mg/kg) Uranium-238 1.22 (pCi/g)

Station	Results Exceeding Background
SOU194-00	Chromium 49.77 (mg/kg)

Station	Results Exceeding Background
SOU194-01	Arsenic 8.46 (mg/kg) Nickel 60.77 (mg/kg)

Station	Results Exceeding Background
SOU194-01	Chromium 50.06 (mg/kg) Nickel 59.46 (mg/kg)

Station	Results Exceeding Background
SOU194-01	Arsenic 8.11 (mg/kg) Chromium 52.94 (mg/kg)

Station	Results Exceeding Background
SOU194-01	Arsenic 9.7 (mg/kg) Selenium 1.5 (mg/kg)

Station	Results Exceeding Background
SOU194-01	Arsenic 10.83 (mg/kg)

Station	Results Exceeding Background
SOU194-01	Nickel 67.42 (mg/kg)

Station	Results Exceeding Background
SOU194-01	Chromium 53.94 (mg/kg)

Station	Results Exceeding Background
SOU194-02	Uranium 7.66 (mg/kg)

Station	Results Exceeding Background
SOU194-02	Zinc 63.83 (mg/kg)

Station	Results Exceeding Background
SOU194-03	Antimony 0.49 (mg/kg) Arsenic 11.4 (mg/kg) Selenium 2.8 (mg/kg) Thallium 0.64 (mg/kg)

Station	Results Exceeding Background
SOU194-03	Manganese 822.11 (mg/kg)

Station	Results Exceeding Background
SOU194-03	Silver 11.63 (mg/kg) Uranium 18.06 (mg/kg)

Station	Results Exceeding Background
SOU194-03	Arsenic 9.4 (mg/kg)

Station	Results Exceeding Background
SOU194-03	Antimony 0.35 (mg/kg) Arsenic 9.72 (mg/kg) Selenium 1.1 (mg/kg)

Station	Results Exceeding Background
SOU194-03	Chromium 51.91 (mg/kg)

Station	Results Exceeding Background
SOU194-04	Aluminum 13000 (mg/kg) Antimony 0.23 (mg/kg) Arsenic 16 (mg/kg) Beryllium 0.92 (mg/kg) Iron 46652.57 (mg/kg) Manganese 1129.98 (mg/kg) Selenium 2.3 (mg/kg) Vanadium 47.5 (mg/kg)

Station	Results Exceeding Background
SOU194-04	Silver 10.63 (mg/kg)

Station	Results Exceeding Background
SOU194-04	Silver 12.07 (mg/kg)

Station	Results Exceeding Background
SOU194-04	Silver 9.74 (mg/kg)

Station	Results Exceeding Background
SOU194-04	Antimony 0.38 (mg/kg) Selenium 1.6 (mg/kg)

Station	Results Exceeding Background
SOU194-05	Nickel 61.16 (mg/kg)

Station	Results Exceeding Background
SOU194-05	Antimony 0.7 (mg/kg) Arsenic 14.4 (mg/kg) Selenium 1.3 (mg/kg) Vanadium 46.5 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.6. SWMU 194 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU194-05	Antimony 0.97 (mg/kg) Arsenic 14.9 (mg/kg) Beryllium 0.88 (mg/kg) Selenium 1.4 (mg/kg) Silver 11.56 (mg/kg) Vanadium 42.5 (mg/kg)

Station	Results Exceeding Background
SOU194-06	Chromium 49.57 (mg/kg)

Station	Results Exceeding Background
SOU194-06	Antimony 0.46 (mg/kg) Arsenic 9.3 (mg/kg) Calcium 53000 (mg/kg) Nickel 62.34 (mg/kg)

Station	Results Exceeding Background
SOU194-06	Chromium 53.82 (mg/kg) Nickel 103.98 (mg/kg) Silver 10.18 (mg/kg)

Station	Results Exceeding Background
SOU194-06	Chromium 43.3 (mg/kg)

Station	Results Exceeding Background
SOU194-06	Arsenic 9.66 (mg/kg) Nickel 53.72 (mg/kg)

Station	Results Exceeding Background
SOU194-06	Arsenic 13.45 (mg/kg)

Station	Results Exceeding Background
SOU194-07	Nickel 58.89 (mg/kg)

Station	Results Exceeding Background
SOU194-07	Arsenic 8.36 (mg/kg) Chromium 48.71 (mg/kg)

Station	Results Exceeding Background
SOU194-07	Antimony 0.44 (mg/kg) Arsenic 8.9 (mg/kg) Selenium 1.2 (mg/kg) Uranium 7.51 (mg/kg)

Station	Results Exceeding Background
SOU194-07	Mercury 6.9 (mg/kg)

Station	Results Exceeding Background
SOU194-08	Silver 11.63 (mg/kg)

Station	Results Exceeding Background
SOU194-08	Uranium 7.35 (mg/kg)

Station	Results Exceeding Background
SOU194-08	Lead 69.62 (mg/kg)

Station	Results Exceeding Background
SOU194-08	Silver 9.35 (mg/kg)

Station	Results Exceeding Background
SOU194-08	Nickel 76.61 (mg/kg) Silver 11.35 (mg/kg)

Station	Results Exceeding Background
SOU194-08	Arsenic 10.83 (mg/kg) Chromium 55.91 (mg/kg) Lead 24.79 (mg/kg) Nickel 71.73 (mg/kg)

Station	Results Exceeding Background
SOU194-09	Antimony 0.52 (mg/kg) Arsenic 8.3 (mg/kg) Calcium 37700 (mg/kg) Lead 26.9 (mg/kg) Magnesium 2570 (mg/kg) Manganese 1070 (mg/kg) Nickel 68.17 (mg/kg) Selenium 0.96 (mg/kg) Vanadium 45.2 (mg/kg)

Station	Results Exceeding Background
SOU194-09	Arsenic 9.26 (mg/kg) Nickel 63.78 (mg/kg)

Station	Results Exceeding Background
SOU194-09	Aluminum 15200 (mg/kg) Antimony 0.22 (mg/kg) Chromium 55.4 (mg/kg) Lead 27.94 (mg/kg) Manganese 4146.45 (mg/kg) Selenium 2.1 (mg/kg) Zinc 60.3 (mg/kg)

Station	Results Exceeding Background
SOU194-09	Nickel 70.42 (mg/kg)

Station	Results Exceeding Background
SOU194-09	Manganese 1703.53 (mg/kg) Nickel 70.45 (mg/kg)

Station	Results Exceeding Background
SOU194-10	Arsenic 10.88 (mg/kg) Chromium 43.69 (mg/kg) Nickel 60.07 (mg/kg)

Station	Results Exceeding Background
SOU194-10	Antimony 0.62 (mg/kg) Arsenic 8.6 (mg/kg) Cobalt 18.7 (mg/kg) Manganese 2810 (mg/kg) Selenium 1.3 (mg/kg) Uranium-235/236 0.061 (pCi/g)

Station	Results Exceeding Background
SOU194-10	Silver 10.73 (mg/kg)

Station	Results Exceeding Background
SOU194-10	Mercury 8.07 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Nickel 96.39 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.6. SWMU 194 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU194-11	Chromium 56.55 (mg/kg)
	Nickel 65.11 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Nickel 73.48 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Chromium 48.99 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Antimony 0.25 (mg/kg)
	Calcium 35600 (mg/kg)
	Chromium 47 (mg/kg)
	Magnesium 2240 (mg/kg)
	Nickel 67.22 (mg/kg)
	Selenium 0.79 (mg/kg)
	Silver 13.2 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Chromium 52.34 (mg/kg)
	Manganese 1487.85 (mg/kg)
	Nickel 70.03 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Chromium 54.93 (mg/kg)

Station	Results Exceeding Background
SOU194-11	Nickel 62.04 (mg/kg)

Station	Results Exceeding Background
SOU194-12	Antimony 0.3 (mg/kg)
	Calcium 119000 (mg/kg)
	Lead 29.8 (mg/kg)
	Magnesium 5300 (mg/kg)
	Selenium 0.83 (mg/kg)

Station	Results Exceeding Background
SOU194-12	Antimony 0.23 (mg/kg)
	Calcium 7230 (mg/kg)
	Chromium 62.45 (mg/kg)
	Lead 26.6 (mg/kg)
	Nickel 62.93 (mg/kg)
	Selenium 1.2 (mg/kg)

Station	Results Exceeding Background
SOU194-12	Chromium 45.57 (mg/kg)

Station	Results Exceeding Background
SOU194-12	Antimony 0.47 (mg/kg)
	Arsenic 10.84 (mg/kg)
	Lead 23.29 (mg/kg)
	Manganese 930.99 (mg/kg)
	Selenium 1.2 (mg/kg)
	Zinc 144 (mg/kg)

Station	Results Exceeding Background
SOU194-13	Antimony 0.43 (mg/kg)
	Selenium 1.3 (mg/kg)
	Uranium 7.13 (mg/kg)

Station	Results Exceeding Background
SOU194-13	Nickel 70.17 (mg/kg)

Station	Results Exceeding Background
SOU194-13	Antimony 0.38 (mg/kg)
	Arsenic 10.3 (mg/kg)
	Calcium 21900 (mg/kg)
	Mercury 6.57 (mg/kg)
	Selenium 1 (mg/kg)
	Thallium 0.37 (mg/kg)

Station	Results Exceeding Background
SOU194-13	Arsenic 9.19 (mg/kg)
	Chromium 55.08 (mg/kg)
	Zinc 185.38 (mg/kg)

Station	Results Exceeding Background
SOU194-13	Lead 30.94 (mg/kg)
	Nickel 61.24 (mg/kg)

Station	Results Exceeding Background
SOU194-13	Chromium 43.16 (mg/kg)
	Zinc 71.43 (mg/kg)

Station	Results Exceeding Background
SOU194-14	Arsenic 9.18 (mg/kg)

Station	Results Exceeding Background
SOU194-14	Chromium 49.22 (mg/kg)
	Nickel 85.52 (mg/kg)

Station	Results Exceeding Background
SOU194-14	Nickel 58.63 (mg/kg)

Station	Results Exceeding Background
SOU194-15	Arsenic 10.34 (mg/kg)

Station	Results Exceeding Background
SOU194-15	Arsenic 14.03 (mg/kg)
	Chromium 60.93 (mg/kg)
	Lead 24.28 (mg/kg)

Station	Results Exceeding Background
SOU194-15	Chromium 46.34 (mg/kg)

Station	Results Exceeding Background
SOU194-15	Chromium 48.59 (mg/kg)

Station	Results Exceeding Background
SOU194-15	Chromium 49.47 (mg/kg)

Station	Results Exceeding Background
SOU194-16	Arsenic 8 (mg/kg)
	Calcium 63000 (mg/kg)
	Chromium 49.95 (mg/kg)
	Magnesium 2310 (mg/kg)
	Selenium 1.1 (mg/kg)
	Thallium 0.45 (mg/kg)
	Zinc 69.2 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.6. SWMU 194 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU194-16	Arsenic 12.46 (mg/kg)

Station	Results Exceeding Background
SOU194-16	Nickel 73.58 (mg/kg)

Station	Results Exceeding Background
SOU194-16	Antimony 0.4 (mg/kg)
	Cadmium 0.6 (mg/kg)
	Calcium 180000 (mg/kg)
	Lead 59.1 (mg/kg)
	Magnesium 7190 (mg/kg)
	Selenium 0.87 (mg/kg)
	Zinc 108 (mg/kg)

Station	Results Exceeding Background
SOU194-17	Silver 16.99 (mg/kg)

Station	Results Exceeding Background
SOU194-17	Arsenic 8.37 (mg/kg)
	Manganese 1411.47 (mg/kg)

Station	Results Exceeding Background
SOU194-17	Chromium 45.35 (mg/kg)
	Nickel 59.78 (mg/kg)

Station	Results Exceeding Background
SOU194-18	Arsenic 8.5 (mg/kg)

Station	Results Exceeding Background
SOU194-18	Nickel 59.82 (mg/kg)

Station	Results Exceeding Background
SOU194-18	Chromium 48.97 (mg/kg)

Station	Results Exceeding Background
SOU194-19	Chromium 44.99 (mg/kg)

Station	Results Exceeding Background
SOU194-19	Aluminum 13400 (mg/kg)
	Antimony 0.36 (mg/kg)
	Arsenic 11.9 (mg/kg)
	Lead 23.1 (mg/kg)
	Selenium 1.1 (mg/kg)
	Vanadium 38 (mg/kg)

Station	Results Exceeding Background
SOU194-19	Arsenic 11.66 (mg/kg)

Station	Results Exceeding Background
SOU194-19	Arsenic 10.93 (mg/kg)
	Chromium 60.57 (mg/kg)
	Copper 26.67 (mg/kg)

Station	Results Exceeding Background
SOU194-19	Antimony 0.43 (mg/kg)
	Manganese 899 (mg/kg)
	Selenium 1.1 (mg/kg)
	Uranium-235/236 0.062 (pCi/g)

Station	Results Exceeding Background
SOU194-20	Arsenic 8.58 (mg/kg)

Station	Results Exceeding Background
SOU194-20	Antimony 0.3 (mg/kg)
	Chromium 54.01 (mg/kg)
	Selenium 1 (mg/kg)

Station	Results Exceeding Background
SOU194-20	Chromium 55.85 (mg/kg)
	Nickel 69.36 (mg/kg)

Station	Results Exceeding Background
SOU194-20	Arsenic 12.53 (mg/kg)

Station	Results Exceeding Background
SOU194-20	Chromium 43.99 (mg/kg)

Station	Results Exceeding Background
SOU194-21	Silver 10.09 (mg/kg)

Station	Results Exceeding Background
SOU194-21	Antimony 0.43 (mg/kg)
	Selenium 1.3 (mg/kg)

Station	Results Exceeding Background
SOU194-21	Zinc 61.32 (mg/kg)

Station	Results Exceeding Background
SOU194-22	Arsenic 8.4 (mg/kg)

Station	Results Exceeding Background
SOU194-22	Arsenic 10.32 (mg/kg)
	Mercury 8.94 (mg/kg)
	Nickel 70.85 (mg/kg)

Station	Results Exceeding Background
SOU194-22	Chromium 66.72 (mg/kg)

Station	Results Exceeding Background
SOU194-22	Arsenic 8.94 (mg/kg)

Station	Results Exceeding Background
SOU194-22	Chromium 48.67 (mg/kg)

Station	Results Exceeding Background
SOU194-22	Arsenic 8.88 (mg/kg)

Station	Results Exceeding Background
SOU194-22	Silver 12.32 (mg/kg)
	Uranium 8.72 (mg/kg)

Station	Results Exceeding Background
SOU194-23	Antimony 0.23 (mg/kg)
	Arsenic 14.33 (mg/kg)
	Chromium 44.2 (mg/kg)
	Lead 129.9 (mg/kg)
	Manganese 3860.98 (mg/kg)
	Nickel 108.4 (mg/kg)
	Selenium 1.1 (mg/kg)
	Silver 11.53 (mg/kg)
	Sodium 385 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.6. SWMU 194 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU194-23	Chromium 47.47 (mg/kg)

Station	Results Exceeding Background
SOU194-23	Arsenic 9.13 (mg/kg)

Station	Results Exceeding Background
SOU194-23	Arsenic 10.53 (mg/kg) Chromium 64.09 (mg/kg)

Station	Results Exceeding Background
SOU194-24	Nickel 88.34 (mg/kg)

Station	Results Exceeding Background
SOU194-24	Chromium 45.86 (mg/kg) Manganese 929.67 (mg/kg)

Station	Results Exceeding Background
SOU194-24	Silver 10.64 (mg/kg)

Station	Results Exceeding Background
SOU194-24	Arsenic 9.44 (mg/kg) Chromium 45.05 (mg/kg) Manganese 1879.79 (mg/kg)

Station	Results Exceeding Background
SOU194-24	Arsenic 11.23 (mg/kg)

Station	Results Exceeding Background
SOU194-24	Arsenic 10.35 (mg/kg)

Station	Results Exceeding Background
SOU194-24	Aluminum 19800 (mg/kg) Antimony 0.66 (mg/kg) Arsenic 13.1 (mg/kg) Chromium 43.27 (mg/kg) Iron 30000 (mg/kg) Magnesium 3350 (mg/kg) Selenium 1.2 (mg/kg) Thallium 0.37 (mg/kg) Vanadium 41.1 (mg/kg) Zinc 62.4 (mg/kg)

Station	Results Exceeding Background
SOU194-25	Arsenic 8.86 (mg/kg) Nickel 63.42 (mg/kg)

Station	Results Exceeding Background
SOU194-25	Arsenic 9.7 (mg/kg)

Station	Results Exceeding Background
SOU194-25	Chromium 48.21 (mg/kg)

Station	Results Exceeding Background
SOU194-25	Antimony 0.31 (mg/kg) Selenium 1.2 (mg/kg)

Station	Results Exceeding Background
SOU194-26	Nickel 61.96 (mg/kg)

Station	Results Exceeding Background
SOU194-26	Arsenic 16.81 (mg/kg) Chromium 47.59 (mg/kg) Manganese 833.79 (mg/kg) Nickel 105.31 (mg/kg) Zinc 60.73 (mg/kg)

Station	Results Exceeding Background
SOU194-26	Silver 9.44 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Arsenic 8.21 (mg/kg) Chromium 47.05 (mg/kg) Silver 11.34 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Arsenic 9.87 (mg/kg) Lead 25.05 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Manganese 1336.71 (mg/kg) Nickel 77.91 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Arsenic 8.1 (mg/kg) Nickel 103.52 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Arsenic 11.48 (mg/kg) Nickel 64.13 (mg/kg)

Station	Results Exceeding Background
SOU194-27	Arsenic 10.06 (mg/kg) Chromium 48.88 (mg/kg) Copper 26.09 (mg/kg)

Station	Results Exceeding Background
SOU194-28	Antimony 0.47 (mg/kg) Arsenic 9.18 (mg/kg) Chromium 46.55 (mg/kg) Nickel 78.79 (mg/kg) Selenium 1.4 (mg/kg)

Station	Results Exceeding Background
SOU194-28	Arsenic 12.39 (mg/kg) Lead 28.46 (mg/kg) Zinc 60.27 (mg/kg)

Station	Results Exceeding Background
SOU194-28	Silver 11.01 (mg/kg)

Station	Results Exceeding Background
SOU194-28	Chromium 54.5 (mg/kg)

Station	Results Exceeding Background
SOU194-29	Arsenic 13.73 (mg/kg) Zinc 62.9 (mg/kg)

Station	Results Exceeding Background
SOU194-29	Arsenic 11.68 (mg/kg) Chromium 43.61 (mg/kg)

Station	Results Exceeding Background
SOU194-29	Arsenic 8.19 (mg/kg) Chromium 44.52 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.6. SWMU 194 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU194-29	Antimony 0.66 (mg/kg)
	Arsenic 8.84 (mg/kg)
	Chromium 51.52 (mg/kg)
	Manganese 1510.6 (mg/kg)
	Selenium 1.5 (mg/kg)

Station	Results Exceeding Background
SOU194-29	Manganese 1301.73 (mg/kg)
	Nickel 78.82 (mg/kg)

Station	Results Exceeding Background
SOU194-30	Arsenic 8.15 (mg/kg)

Station	Results Exceeding Background
SOU194-30	Antimony 0.56 (mg/kg)
	Arsenic 35.2 (mg/kg)
	Barium 2960 (mg/kg)
	Beryllium 1.8 (mg/kg)
	Cadmium 0.48 (mg/kg)
	Cobalt 83.1 (mg/kg)
	Iron 47300 (mg/kg)
	Lead 60.8 (mg/kg)
	Manganese 31100 (mg/kg)
	Nickel 43.1 (mg/kg)
	Selenium 2.6 (mg/kg)
	Thallium 1.4 (mg/kg)
	Vanadium 86.3 (mg/kg)
	Zinc 63.5 (mg/kg)

Station	Results Exceeding Background
SOU194-30	Aluminum 13300 (mg/kg)
	Antimony 0.45 (mg/kg)
	Arsenic 11.2 (mg/kg)
	Magnesium 2440 (mg/kg)
	Selenium 1.1 (mg/kg)

Station	Results Exceeding Background
SOU194-30	Arsenic 8.79 (mg/kg)
	Chromium 55.27 (mg/kg)
	Nickel 70.76 (mg/kg)

Station	Results Exceeding Background
SOU194-30	Chromium 46.96 (mg/kg)

Station	Results Exceeding Background
SOU194-30	Arsenic 10.68 (mg/kg)

Station	Results Exceeding Background
SOU194-31	Chromium 43.18 (mg/kg)

Station	Results Exceeding Background
SOU194-31	Antimony 0.42 (mg/kg)
	Arsenic 18.79 (mg/kg)
	Calcium 14400 (mg/kg)
	Chromium 57.42 (mg/kg)
	Copper 34.9 (mg/kg)
	Iron 45721.84 (mg/kg)
	Magnesium 2600 (mg/kg)
	Nickel 62.36 (mg/kg)
	Selenium 1.6 (mg/kg)
	Uranium-235/236 0.073 (pCi/g)

Station	Results Exceeding Background
SOU194-31	Arsenic 9.44 (mg/kg)

Station	Results Exceeding Background
SOU194-31	Arsenic 10.22 (mg/kg)
	Copper 26.8 (mg/kg)
	Lead 23.33 (mg/kg)
	Zinc 61.93 (mg/kg)

Station	Results Exceeding Background
SOU194-31	Nickel 84.08 (mg/kg)

Station	Results Exceeding Background
SOU194-31	Arsenic 10.04 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Silver 11.35 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Mercury 7.75 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Arsenic 9.42 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Nickel 66.28 (mg/kg)
	Silver 9.87 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Antimony 0.44 (mg/kg)
	Arsenic 12.3 (mg/kg)
	Beryllium 0.7 (mg/kg)
	Selenium 1.5 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Arsenic 9.84 (mg/kg)
	Chromium 43.46 (mg/kg)
	Mercury 7.03 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Chromium 51.6 (mg/kg)
	Nickel 70.93 (mg/kg)

Station	Results Exceeding Background
SOU194-32	Nickel 73.68 (mg/kg)

Station	Results Exceeding Background
SOU194-33	Arsenic 9.49 (mg/kg)
	Chromium 60.36 (mg/kg)

Station	Results Exceeding Background
SOU194-33	Chromium 48.1 (mg/kg)

Station	Results Exceeding Background
SOU194-33	Chromium 46.87 (mg/kg)

Station	Results Exceeding Background
SOU194-33	Silver 10.3 (mg/kg)

Station	Results Exceeding Background
SOU194-33	Chromium 45.22 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.6. SWMU 194 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU194-33	Antimony 0.64 (mg/kg)
	Arsenic 8.32 (mg/kg)
	Selenium 1.4 (mg/kg)
	Thorium-230 1.57 (pCi/g)

Station	Results Exceeding Background
SOU194-33	Arsenic 8.13 (mg/kg)

Station	Results Exceeding Background
SOU194-34	Chromium 86.43 (mg/kg)

Station	Results Exceeding Background
SOU194-34	Chromium 63.72 (mg/kg)
	Silver 9.66 (mg/kg)

Station	Results Exceeding Background
SOU194-34	Chromium 44.22 (mg/kg)
	Silver 15.2 (mg/kg)

Station	Results Exceeding Background
SOU194-34	Aluminum 12500 (mg/kg)
	Antimony 0.36 (mg/kg)
	Arsenic 8.7 (mg/kg)
	Beryllium 0.75 (mg/kg)
	Cobalt 16 (mg/kg)
	Lead 25.9 (mg/kg)
	Manganese 904 (mg/kg)
	Selenium 1 (mg/kg)
	Vanadium 44.1 (mg/kg)

Station	Results Exceeding Background
SOU194-34	Chromium 44.32 (mg/kg)

Station	Results Exceeding Background
SOU194-35	Chromium 46.97 (mg/kg)
	Nickel 58.01 (mg/kg)

Station	Results Exceeding Background
SOU194-35	Arsenic 16.08 (mg/kg)
	Chromium 57.43 (mg/kg)
	Nickel 64.18 (mg/kg)
	Silver 10.26 (mg/kg)

Station	Results Exceeding Background
SOU194-35	Chromium 46.15 (mg/kg)

Station	Results Exceeding Background
SOU194-35	Antimony 0.37 (mg/kg)
	Arsenic 10.1 (mg/kg)
	Beryllium 0.76 (mg/kg)
	Chromium 57.46 (mg/kg)
	Manganese 1200 (mg/kg)
	Nickel 58.8 (mg/kg)
	Selenium 1.3 (mg/kg)

Station	Results Exceeding Background
SOU194-35	Silver 10.57 (mg/kg)

Station	Results Exceeding Background
SOU194-35	Arsenic 8.88 (mg/kg)

Station	Results Exceeding Background
SOU194-35	Manganese 865.49 (mg/kg)
	Selenium 1.4 (mg/kg)

Station	Results Exceeding Background
SOU194-36	Chromium 55.23 (mg/kg)

Station	Results Exceeding Background
SOU194-36	Arsenic 10.65 (mg/kg)

Station	Results Exceeding Background
SOU194-37	Arsenic 9.95 (mg/kg)
	Chromium 78.2 (mg/kg)

Station	Results Exceeding Background
SOU194-37	Aluminum 13200 (mg/kg)
	Antimony 0.41 (mg/kg)
	Arsenic 14.29 (mg/kg)
	Barium 188 (mg/kg)
	Beryllium 0.82 (mg/kg)
	Chromium 44.01 (mg/kg)
	Cobalt 14.1 (mg/kg)
	Copper 25.42 (mg/kg)
	Lead 28.71 (mg/kg)
	Manganese 2650.3 (mg/kg)
	Nickel 84.65 (mg/kg)
	Selenium 1.5 (mg/kg)
	Thallium 0.44 (mg/kg)
	Vanadium 41.2 (mg/kg)
	Zinc 63.17 (mg/kg)

Station	Results Exceeding Background
SOU194-37	Arsenic 9.5 (mg/kg)

Station	Results Exceeding Background
SOU194-38	Silver 10.38 (mg/kg)

Station	Results Exceeding Background
SOU194-38	Arsenic 13.19 (mg/kg)
	Chromium 45.98 (mg/kg)
	Nickel 60.71 (mg/kg)

Station	Results Exceeding Background
SOU194-38	Chromium 46.46 (mg/kg)

Station	Results Exceeding Background
SOU194-38	Nickel 66.37 (mg/kg)

Station	Results Exceeding Background
SOU194-38	Chromium 57.58 (mg/kg)

Station	Results Exceeding Background
SOU194-38	Arsenic 9.87 (mg/kg)
	Chromium 58.6 (mg/kg)
	Lead 33.92 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.6. SWMU 194 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU194-38	Antimony 0.48 (mg/kg) Arsenic 10 (mg/kg) Selenium 1.3 (mg/kg)

Station	Results Exceeding Background
SOU194-39	Chromium 46.77 (mg/kg)

Station	Results Exceeding Background
SOU194-39	Mercury 7.84 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 5.3.6. SWMU 194 Background Exceedances – Subsurface (Continued)

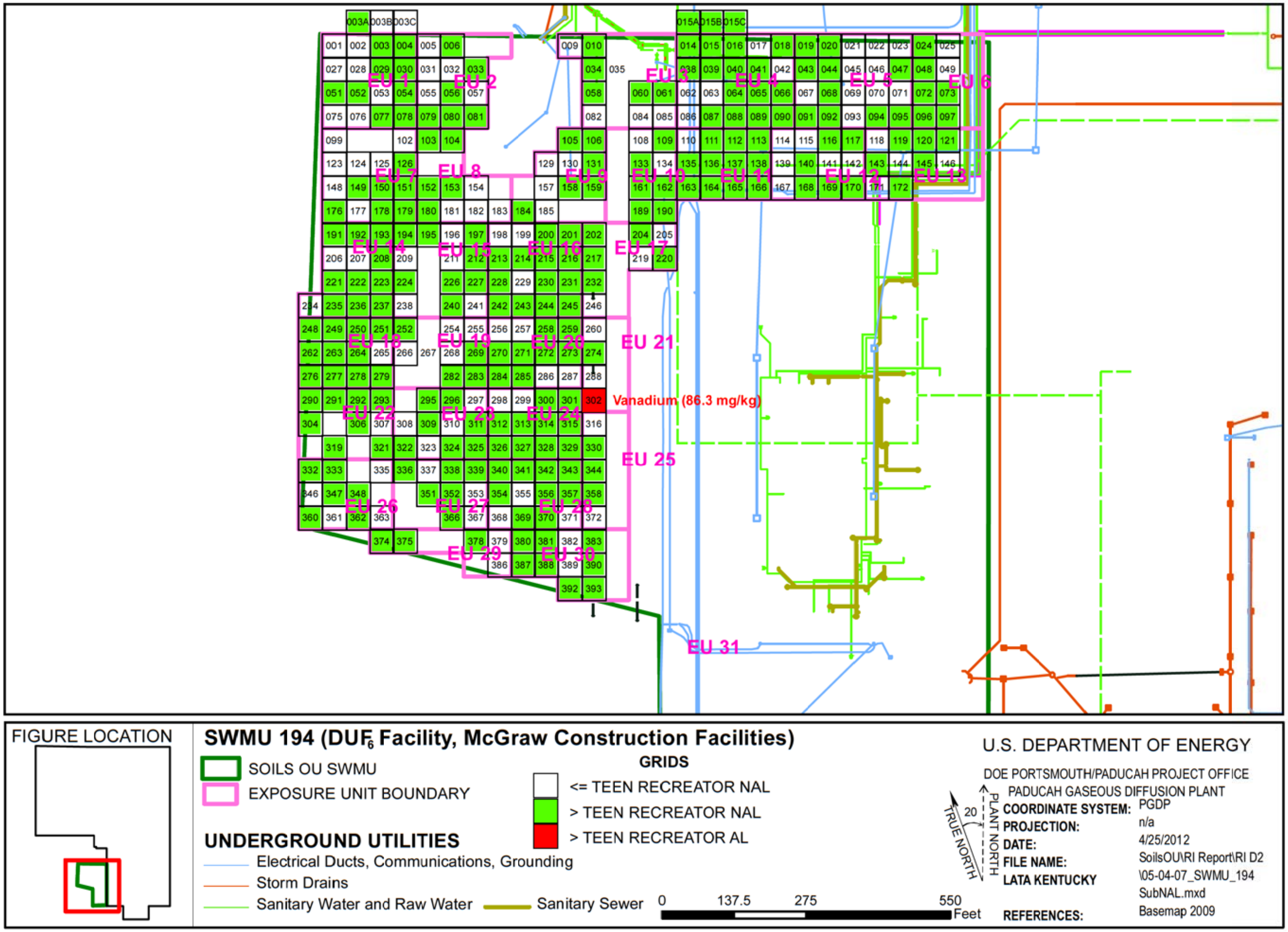


Figure 5.3.7. SWMU 194 NAL Exceedances - Subsurface Soil

SOU194-003	Arsenic 5.69 (mg/kg)
SOU194-003A	Arsenic 8.35 (mg/kg)
SOU194-004	Arsenic 5.65 (mg/kg)
SOU194-006	Arsenic 9.2 (mg/kg) Beryllium 0.54 (mg/kg) Vanadium 33.2 (mg/kg)
SOU194-010	Arsenic 8.46 (mg/kg) Nickel 60.77 (mg/kg)
SOU194-014	Nickel 59.46 (mg/kg)
SOU194-015	Arsenic 8.11 (mg/kg)
SOU194-015A	Arsenic 9.7 (mg/kg) Beryllium 0.54 (mg/kg) Vanadium 30.1 (mg/kg)
SOU194-015B	Arsenic 7.7 (mg/kg)
SOU194-015C	Arsenic 10.83 (mg/kg)
SOU194-016	Arsenic 5.43 (mg/kg)
SOU194-018	Nickel 67.42 (mg/kg)
SOU194-019	Arsenic 7.68 (mg/kg)
SOU194-020	Arsenic 6.06 (mg/kg)
SOU194-024	Arsenic 6.06 (mg/kg)
SOU194-029	Arsenic 7.13 (mg/kg)
SOU194-030	Arsenic 11.4 (mg/kg) Beryllium 0.64 (mg/kg) Vanadium 36.7 (mg/kg)
SOU194-033	Arsenic 7.71 (mg/kg) Silver 11.63 (mg/kg)
SOU194-034	Arsenic 9.4 (mg/kg)
SOU194-038	Arsenic 9.72 (mg/kg) Beryllium 0.41 (mg/kg) Vanadium 23.1 (mg/kg)
SOU194-039	Arsenic 6.46 (mg/kg)

NOTE: maximum detections only shown for location

SOU194-040	Arsenic 16 (mg/kg) Beryllium 0.92 (mg/kg) Iron 46652.57 (mg/kg) Vanadium 47.5 (mg/kg)
SOU194-041	Arsenic 4.96 (mg/kg) Silver 10.63 (mg/kg)
SOU194-043	Silver 12.07 (mg/kg)
SOU194-044	Arsenic 5.3 (mg/kg)
SOU194-047	Silver 9.74 (mg/kg)
SOU194-048	Arsenic 6 (mg/kg) Beryllium 0.62 (mg/kg) Vanadium 26.3 (mg/kg)
SOU194-051	Arsenic 5.8 (mg/kg)
SOU194-052	Nickel 61.16 (mg/kg)
SOU194-054	Arsenic 14.4 (mg/kg) Beryllium 0.69 (mg/kg) Iron 22900 (mg/kg) Vanadium 46.5 (mg/kg)
SOU194-056	Arsenic 14.9 (mg/kg) Beryllium 0.88 (mg/kg) Iron 21300 (mg/kg) Silver 11.56 (mg/kg) Vanadium 42.5 (mg/kg)
SOU194-058	Arsenic 7.84 (mg/kg)
SOU194-060	Arsenic 5.49 (mg/kg)
SOU194-061	Arsenic 9.3 (mg/kg) Beryllium 0.35 (mg/kg) Nickel 62.34 (mg/kg) Vanadium 17.6 (mg/kg)
SOU194-064	Arsenic 6.77 (mg/kg) Nickel 103.98 (mg/kg) Silver 10.18 (mg/kg)
SOU194-065	Arsenic 5.55 (mg/kg)

SOU194-066	Arsenic 9.66 (mg/kg) Nickel 53.72 (mg/kg)
SOU194-068	Arsenic 13.45 (mg/kg)
SOU194-072	Arsenic 5.36 (mg/kg)
SOU194-073	Nickel 58.89 (mg/kg)
SOU194-077	Arsenic 8.36 (mg/kg)
SOU194-078	Arsenic 8.9 (mg/kg) Beryllium 0.49 (mg/kg) Cobalt 8.6 (mg/kg) Vanadium 32.4 (mg/kg)
SOU194-079	Arsenic 6.58 (mg/kg) Mercury 6.9 (mg/kg)
SOU194-080	Silver 11.63 (mg/kg)
SOU194-081	Arsenic 6.28 (mg/kg)
SOU194-087	Silver 9.35 (mg/kg)
SOU194-088	Nickel 76.61 (mg/kg) Silver 11.35 (mg/kg)
SOU194-089	Arsenic 10.83 (mg/kg) Nickel 71.73 (mg/kg)
SOU194-090	Arsenic 6.97 (mg/kg)
SOU194-091	Arsenic 4.4 (mg/kg) Beryllium 0.8 (mg/kg) Vanadium 20.8 (mg/kg)
SOU194-092	Arsenic 8.3 (mg/kg) Beryllium 0.6 (mg/kg) Nickel 68.17 (mg/kg) Vanadium 45.2 (mg/kg) Total PAH 0.77791 (mg/kg)
SOU194-094	Arsenic 9.26 (mg/kg) Nickel 63.78 (mg/kg)

Figure 5.3.7. SWMU 194 NAL Exceedances – Subsurface (Continued)

SOU194-095	Arsenic 6.8 (mg/kg)
	Beryllium 0.62 (mg/kg)
	Iron 24800 (mg/kg)
	Manganese 4146.45 (mg/k
	Vanadium 36.1 (mg/kg)
SOU194-096	Nickel 70.42 (mg/kg)
SOU194-097	Nickel 70.45 (mg/kg)
SOU194-103	Arsenic 10.88 (mg/kg)
	Nickel 60.07 (mg/kg)
SOU194-104	Arsenic 8.6 (mg/kg)
	Beryllium 0.57 (mg/kg)
	Cobalt 18.7 (mg/kg)
	Vanadium 28.9 (mg/kg)
SOU194-105	Silver 10.73 (mg/kg)
SOU194-106	Arsenic 5.75 (mg/kg)
SOU194-109	Mercury 8.07 (mg/kg)
SOU194-111	Nickel 96.39 (mg/kg)
SOU194-112	Arsenic 6.09 (mg/kg)
	Nickel 65.11 (mg/kg)
SOU194-113	Nickel 73.48 (mg/kg)
SOU194-116	Arsenic 6.1 (mg/kg)
	Beryllium 0.53 (mg/kg)
	Iron 20400 (mg/kg)
	Nickel 67.22 (mg/kg)
	Silver 13.2 (mg/kg)
	Vanadium 23.9 (mg/kg)
	Total PAH 0.39406 (mg/kg)
SOU194-117	Arsenic 6.04 (mg/kg)
	Nickel 70.03 (mg/kg)
SOU194-119	Nickel 62.04 (mg/kg)
SOU194-120	Arsenic 6.7 (mg/kg)
	Beryllium 0.5 (mg/kg)
	Iron 20500 (mg/kg)
	Vanadium 27.6 (mg/kg)
SOU194-121	Arsenic 4.7 (mg/kg)
	Beryllium 0.52 (mg/kg)
	Nickel 62.93 (mg/kg)
	Vanadium 26 (mg/kg)
SOU194-126	Arsenic 10.84 (mg/kg)
	Beryllium 0.41 (mg/kg)
	Vanadium 21.7 (mg/kg)
SOU194-131	Arsenic 6.5 (mg/kg)
	Beryllium 0.44 (mg/kg)
	Vanadium 30 (mg/kg)
SOU194-133	Arsenic 5.8 (mg/kg)
SOU194-135	Nickel 70.17 (mg/kg)
SOU194-136	Arsenic 10.3 (mg/kg)
	Beryllium 0.59 (mg/kg)
	Cobalt 9.7 (mg/kg)
	Iron 21900 (mg/kg)
	Mercury 6.57 (mg/kg)
	Vanadium 31.4 (mg/kg)
SOU194-137	Arsenic 9.19 (mg/kg)
SOU194-138	Arsenic 7.4 (mg/kg)
	Nickel 61.24 (mg/kg)
SOU194-140	Arsenic 9.18 (mg/kg)
SOU194-143	Arsenic 5.77 (mg/kg)
SOU194-145	Nickel 85.52 (mg/kg)
SOU194-149	Arsenic 6.76 (mg/kg)
	Nickel 58.63 (mg/kg)
SOU194-150	Arsenic 5.88 (mg/kg)
SOU194-151	Arsenic 10.34 (mg/kg)
SOU194-152	Arsenic 14.03 (mg/kg)
SOU194-153	Arsenic 6.43 (mg/kg)
SOU194-158	Arsenic 5.2 (mg/kg)
SOU194-159	Arsenic 6.95 (mg/kg)
SOU194-161	Arsenic 8 (mg/kg)
	Beryllium 0.54 (mg/kg)
	Vanadium 27.5 (mg/kg)
SOU194-162	Arsenic 5.65 (mg/kg)
SOU194-163	Arsenic 6.21 (mg/kg)
SOU194-164	Arsenic 7.22 (mg/kg)
SOU194-165	Arsenic 12.46 (mg/kg)
SOU194-166	Nickel 73.58 (mg/kg)
SOU194-168	Arsenic 5.8 (mg/kg)
	Beryllium 0.33 (mg/kg)
	Vanadium 18.8 (mg/kg)
	Total PAH 0.66974 (mg/kg
SOU194-169	Arsenic 7.84 (mg/kg)
SOU194-170	Silver 16.99 (mg/kg)
SOU194-172	Arsenic 8.37 (mg/kg)
	Iron 24875.84 (mg/kg)
SOU194-176	Arsenic 6.17 (mg/kg)
SOU194-178	Arsenic 7.47 (mg/kg)
	Nickel 59.78 (mg/kg)
SOU194-179	Arsenic 7.46 (mg/kg)
	Iron 20872.11 (mg/kg)
SOU194-180	Arsenic 8.5 (mg/kg)
SOU194-184	Nickel 59.82 (mg/kg)
SOU194-189	Arsenic 5.33 (mg/kg)
SOU194-190	Arsenic 7.72 (mg/kg)
SOU194-191	Arsenic 6.18 (mg/kg)

NOTE: maximum detections only shown for location

Figure 5.3.7. SWMU 194 NAL Exceedances – Subsurface (Continued)

SOU194-192	Arsenic 11.9 (mg/kg) Beryllium 0.64 (mg/kg) Iron 22000 (mg/kg) Vanadium 38 (mg/kg)
SOU194-193	Arsenic 11.66 (mg/kg)
SOU194-194	Arsenic 10.93 (mg/kg) Iron 20531.44 (mg/kg)
SOU194-195	Arsenic 5.89 (mg/kg)
SOU194-197	Arsenic 5.55 (mg/kg) Beryllium 0.37 (mg/kg) Cobalt 12.3 (mg/kg) Vanadium 21.3 (mg/kg)
SOU194-200	Arsenic 8.58 (mg/kg)
SOU194-201	Arsenic 5.48 (mg/kg)
SOU194-202	Arsenic 5.6 (mg/kg) Beryllium 0.44 (mg/kg) Iron 21100 (mg/kg) Vanadium 24.5 (mg/kg)
SOU194-204	Nickel 69.36 (mg/kg)
SOU194-208	Arsenic 12.53 (mg/kg)
SOU194-212	Arsenic 6.03 (mg/kg)
SOU194-213	Arsenic 5.33 (mg/kg)
SOU194-214	Arsenic 6.42 (mg/kg)
SOU194-215	Silver 10.09 (mg/kg)
SOU194-216	Arsenic 7 (mg/kg) Beryllium 0.45 (mg/kg) Vanadium 27 (mg/kg)
SOU194-217	Arsenic 6.05 (mg/kg)
SOU194-220	Arsenic 8.4 (mg/kg)
SOU194-221	Arsenic 10.32 (mg/kg) Mercury 8.94 (mg/kg) Nickel 70.85 (mg/kg)
SOU194-222	Arsenic 7.73 (mg/kg)
SOU194-223	Arsenic 8.94 (mg/kg)
SOU194-224	Arsenic 6.46 (mg/kg)
SOU194-226	Arsenic 6.84 (mg/kg)
SOU194-227	Arsenic 8.88 (mg/kg)
SOU194-228	Silver 12.32 (mg/kg)
SOU194-230	Arsenic 6.47 (mg/kg)
SOU194-231	Arsenic 14.33 (mg/kg) Beryllium 0.51 (mg/kg) Iron 24294.13 (mg/kg) Manganese 3860.98 (mg/k Nickel 108.4 (mg/kg) Silver 11.53 (mg/kg) Vanadium 24.9 (mg/kg)
SOU194-232	Arsenic 7.13 (mg/kg)
SOU194-235	Arsenic 9.13 (mg/kg)
SOU194-236	Arsenic 10.53 (mg/kg)
SOU194-237	Arsenic 7.57 (mg/kg)
SOU194-240	Arsenic 5.86 (mg/kg) Nickel 88.34 (mg/kg)
SOU194-242	Arsenic 7.49 (mg/kg) Silver 10.64 (mg/kg)
SOU194-243	Arsenic 9.44 (mg/kg)
SOU194-244	Arsenic 11.23 (mg/kg)
SOU194-245	Arsenic 10.35 (mg/kg)
SOU194-248	Arsenic 6.01 (mg/kg)
SOU194-249	Arsenic 13.1 (mg/kg) Beryllium 0.69 (mg/kg) Iron 30000 (mg/kg) Vanadium 41.1 (mg/kg)
SOU194-250	Arsenic 8.86 (mg/kg) Nickel 63.42 (mg/kg)
SOU194-251	Arsenic 9.7 (mg/kg)
SOU194-252	Arsenic 6.7 (mg/kg)
SOU194-258	Arsenic 6.02 (mg/kg)
SOU194-259	Arsenic 6.7 (mg/kg) Beryllium 0.5 (mg/kg) Vanadium 24.7 (mg/kg)
SOU194-262	Arsenic 6.05 (mg/kg)
SOU194-263	Arsenic 7.29 (mg/kg) Nickel 61.96 (mg/kg)
SOU194-264	Arsenic 16.81 (mg/kg) Iron 24287.63 (mg/kg) Nickel 105.31 (mg/kg)
SOU194-269	Arsenic 6.56 (mg/kg) Silver 9.44 (mg/kg)
SOU194-270	Arsenic 8.21 (mg/kg) Silver 11.34 (mg/kg)
SOU194-271	Arsenic 9.87 (mg/kg)
SOU194-272	Arsenic 5.9 (mg/kg) Chromium 103 (mg/kg)
SOU194-273	Arsenic 6.91 (mg/kg)
SOU194-274	Arsenic 7.6 (mg/kg)
SOU194-276	Arsenic 7.68 (mg/kg) Nickel 77.91 (mg/kg)
SOU194-277	Arsenic 8.1 (mg/kg) Iron 20994.6 (mg/kg) Nickel 103.52 (mg/kg)
SOU194-278	Arsenic 11.48 (mg/kg) Iron 20837.72 (mg/kg) Nickel 64.13 (mg/kg)
SOU194-279	Arsenic 10.06 (mg/kg)

NOTE: maximum detections only shown for location

Figure 5.3.7. SWMU 194 NAL Exceedances – Subsurface (Continued)

SOU194-282	Arsenic 9.18 (mg/kg) Beryllium 0.59 (mg/kg) Iron 20700 (mg/kg) Nickel 78.79 (mg/kg) Vanadium 29.1 (mg/kg)
SOU194-283	Arsenic 7.48 (mg/kg)
SOU194-284	Arsenic 12.39 (mg/kg) Iron 25593.65 (mg/kg)
SOU194-285	Silver 11.01 (mg/kg)
SOU194-290	Arsenic 13.73 (mg/kg) Iron 27027.06 (mg/kg)
SOU194-291	Arsenic 11.68 (mg/kg)
SOU194-292	Arsenic 8.19 (mg/kg)
SOU194-293	Arsenic 8.84 (mg/kg) Beryllium 0.55 (mg/kg) Vanadium 18.8 (mg/kg)
SOU194-295	Arsenic 6.32 (mg/kg)
SOU194-296	Arsenic 6.4 (mg/kg) Cadmium 8.55 (mg/kg) Nickel 78.82 (mg/kg)
SOU194-300	Arsenic 6.98 (mg/kg)
SOU194-301	Arsenic 8.15 (mg/kg)
SOU194-302	Arsenic 35.2 (mg/kg) Barium 2960 (mg/kg) Beryllium 1.8 (mg/kg) Cobalt 83.1 (mg/kg) Iron 47300 (mg/kg) Manganese 31100 (mg/kg) Nickel 43.1 (mg/kg) Vanadium 86.3 (mg/kg)
SOU194-304	Arsenic 11.2 (mg/kg) Beryllium 0.68 (mg/kg) Cobalt 10.5 (mg/kg) Iron 24400 (mg/kg) Vanadium 35.6 (mg/kg)
SOU194-306	Arsenic 8.79 (mg/kg) Nickel 70.76 (mg/kg)
SOU194-309	Arsenic 10.68 (mg/kg)
SOU194-311	Arsenic 5.77 (mg/kg)
SOU194-312	Arsenic 18.79 (mg/kg) Beryllium 0.58 (mg/kg) Iron 45721.84 (mg/kg) Nickel 62.36 (mg/kg) Vanadium 28.6 (mg/kg)
SOU194-313	Arsenic 9.44 (mg/kg)
SOU194-314	Arsenic 10.22 (mg/kg) Iron 23674.47 (mg/kg)
SOU194-315	Nickel 84.08 (mg/kg)
SOU194-319	Arsenic 10.04 (mg/kg)
SOU194-321	Silver 11.35 (mg/kg)
SOU194-322	Arsenic 7.45 (mg/kg) Mercury 7.75 (mg/kg)
SOU194-324	Arsenic 9.42 (mg/kg)
SOU194-325	Nickel 66.28 (mg/kg) Silver 9.87 (mg/kg)
SOU194-326	Arsenic 12.3 (mg/kg) Beryllium 0.7 (mg/kg) Iron 23000 (mg/kg) Vanadium 33.4 (mg/kg)
SOU194-327	Arsenic 9.84 (mg/kg) Mercury 7.03 (mg/kg)
SOU194-328	Nickel 70.93 (mg/kg)
SOU194-329	Arsenic 6.41 (mg/kg) Nickel 73.68 (mg/kg)
SOU194-330	Arsenic 9.49 (mg/kg)
SOU194-332	Arsenic 7.09 (mg/kg)
SOU194-333	Arsenic 5.82 (mg/kg)
SOU194-336	Silver 10.3 (mg/kg)
SOU194-338	Arsenic 8.32 (mg/kg) Beryllium 0.62 (mg/kg) Vanadium 23.1 (mg/kg)
SOU194-339	Arsenic 8.13 (mg/kg)
SOU194-340	Arsenic 5.93 (mg/kg) Chromium 86.43 (mg/kg)
SOU194-341	Arsenic 7.19 (mg/kg) Iron 20313.31 (mg/kg) Silver 9.66 (mg/kg)
SOU194-342	Arsenic 6.15 (mg/kg) Silver 15.2 (mg/kg)
SOU194-343	Arsenic 5.96 (mg/kg)
SOU194-344	Arsenic 5.91 (mg/kg)
SOU194-347	Arsenic 8.7 (mg/kg) Beryllium 0.75 (mg/kg) Cobalt 16 (mg/kg) Iron 27100 (mg/kg) Vanadium 44.1 (mg/kg)
SOU194-348	Arsenic 5.97 (mg/kg)
SOU194-351	Arsenic 5.38 (mg/kg) Nickel 58.01 (mg/kg)
SOU194-352	Arsenic 16.08 (mg/kg) Nickel 64.18 (mg/kg) Silver 10.26 (mg/kg)

NOTE: maximum detections only shown for location

Figure 5.3.7. SWMU 194 NAL Exceedances – Subsurface (Continued)

SOU194-354	Arsenic 10.1 (mg/kg) Beryllium 0.76 (mg/kg) Cobalt 9.9 (mg/kg) Iron 20600 (mg/kg) Nickel 58.8 (mg/kg) Vanadium 35.2 (mg/kg)
SOU194-356	Silver 10.57 (mg/kg)
SOU194-357	Arsenic 8.88 (mg/kg)
SOU194-358	Arsenic 7.59 (mg/kg) Beryllium 0.83 (mg/kg) Cobalt 9.46 (mg/kg) Iron 20000 (mg/kg) Vanadium 23.9 (mg/kg)
SOU194-360	Arsenic 5.31 (mg/kg)
SOU194-362	Arsenic 6.36 (mg/kg)
SOU194-366	Arsenic 5.53 (mg/kg)
SOU194-369	Arsenic 10.65 (mg/kg)
SOU194-370	Arsenic 9.95 (mg/kg) Chromium 78.2 (mg/kg) Iron 21200.46 (mg/kg)
SOU194-374	Arsenic 7.69 (mg/kg)
SOU194-375	Arsenic 14.29 (mg/kg) Beryllium 0.82 (mg/kg) Cobalt 14.1 (mg/kg) Iron 25800 (mg/kg) Nickel 84.65 (mg/kg) Vanadium 41.2 (mg/kg)
SOU194-378	Arsenic 9.5 (mg/kg)
SOU194-380	Silver 10.38 (mg/kg)
SOU194-381	Arsenic 13.19 (mg/kg) Nickel 60.71 (mg/kg)
SOU194-383	Nickel 66.37 (mg/kg)

SOU194-387	Arsenic 9.87 (mg/kg) Iron 20694.26 (mg/kg)
SOU194-388	Arsenic 10 (mg/kg) Beryllium 0.67 (mg/kg) Vanadium 37 (mg/kg)
SOU194-390	Beryllium 4.8 (mg/kg) Vanadium 23.6 (mg/kg)
SOU194-392	Mercury 7.84 (mg/kg)
SOU194-393	Arsenic 6.56 (mg/kg)

NOTE: maximum detections only shown for location

Figure 5.3.7. SWMU 194 NAL Exceedances – Subsurface (Continued)

Grids 3A, 15A, and 15C are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 194, as described in the Work Plan (DOE 2010a). These step-out grids are located at the northern border of the SWMU.

The maximum depth at which metals were detected (in samples associated with this RI Report) above both background screening levels and the teen recreator NALs was 15 ft bgs. The end depths of the boreholes taken from the grids listed above ranged from 1 to 15.5 ft bgs. The dataset for this RI Report includes results for samples taken at or above 16 ft bgs, per the Work Plan (DOE 2010a). The Soils OU is defined in the SMP as soils to 10 ft bgs (or 16 ft bgs at pipelines).

Vanadium was detected above the AL for the teen recreator in the subsurface soil of grid 302 (EU 21). It should be noted, however, that the AL was based on an uncertain toxicity value (i.e., reference dose; see Appendix D) that likely is not representative of the vanadium compounds native to the soils at PGDP.

The following metals were detected in the SWMU 194 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater.

Metal	Grid	EU
Aluminum	40, 95, 192, 249, 304, 347, 358, 375	4, 5, 14, 18, 22, 26, 25, 25, 29
Antimony	6, 30, 38, 48, 54, 56, 61, 78, 92, 104, 120, 126, 131, 136, 168, 192, 197, 202, 216, 249, 259, 282, 293, 302, 304, 312, 326, 338, 347, 354, 375, 388	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 26, 27, 28, 29, 30
Arsenic	3A, 6, 10, 15, 15A, 15C, 30, 34, 38, 40, 54, 56, 61, 66, 68, 77, 78, 89, 92, 94, 103, 104, 126, 136, 137, 140, 151, 152, 161, 165, 172, 180, 192, 193, 194, 200, 208, 220, 221, 223, 227, 231, 235, 236, 243, 244, 245, 249, 250, 251, 264, 270, 271, 277, 278, 279, 282, 284, 290, 291, 292, 293, 301, 302, 304, 306, 309, 312, 313, 314, 319, 324, 326, 327, 330, 338, 339, 347, 352, 354, 357, 369, 370, 375, 378, 381, 387, 388	All except 6 and 31
Barium	302, 375	21, 29
Beryllium	390	30
Cadmium	168, 296, 302	12, 21, 23
Cobalt	104, 302, 347, 375	8, 21, 26, 29
Iron	40, 249, 302, 312	4, 18, 21, 24
Lead	85, 89, 92, 95, 120, 121, 126, 138, 152, 168, 192, 231, 271, 272, 284, 302, 314, 347, 375, 387	3, 4, 5, 7, 8, 11, 12, 13, 14, 16, 20, 21, 24, 26, 29, 30
Manganese	32, 40, 92, 95, 97, 104, 117, 126, 172, 197, 231, 243, 264, 276, 293, 296, 302, 347, 354, 358, 375	2, 4, 5, 6, 7, 8, 12, 13, 15, 16, 18, 21, 22, 23, 25, 26, 28, 29
Mercury	79, 109, 136, 221, 322, 327, 392	2, 10, 11, 14, 23, 24, 30
Molybdenum[1]	6, 15A, 30, 38, 40, 48, 54, 56, 61, 78, 92, 95, 104, 116, 120, 121, 126, 131, 136, 161, 168, 192, 197, 202, 216, 231, 249, 259, 282, 293, 302, 304, 312, 326, 338, 347, 354, 358, 375, 388	All except 7, 23, 31

Metal	Grid	EU
Nickel	10, 14, 18, 52, 61, 64, 66, 73, 88, 89, 92, 94, 96, 97, 103, 111, 112, 113, 116, 117, 119, 121, 135, 138, 145, 149, 166, 178, 184, 204, 221, 231, 240, 250, 263, 264, 276, 277, 278, 282, 296, 302, 312, 315, 325, 328, 329, 351, 352, 354, 375, 381, 383	All except 2, 10, 20, 25, 26, and 31
Selenium	6, 15A, 30, 38, 40, 48, 54, 56, 78, 92, 95, 104, 116, 120, 121, 126, 131, 136, 161, 168, 192, 197, 202, 216, 231, 249, 259, 282, 293, 302, 304, 312, 326, 338, 347, 358, 375, 388	All except 3, 23. 31
Silver	33, 41, 43, 47, 56, 64, 80, 87, 88, 105, 116, 170, 215, 228, 231, 242, 269, 270, 285, 321, 325, 336, 341, 342, 352, 356, 380	2, 4, 5, 9, 12, 16, 19, 20, 22, 23, 27, 28, 30
Thallium	30, 136, 161, 249, 302, 375	1, 10, 11, 18, 21, 29
Uranium	33	2
Vanadium	40, 54, 56, 92, 192, 249, 302, 347, 375	1, 2, 4, 5, 14, 18, 21, 26, 29
Zinc	24, 95, 126, 137, 139, 161, 168, 219, 249, 264, 284, 290, 302, 214, 358, 375	5, 6, 7, 10, 11, 12, 17, 18, 20, 22, 21, 24, 25, 29

[1] No background value is available.

The following were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

Metal	Grid	EU
Arsenic	302, 312	21, 24
Cobalt	302, 347, 375	21, 26, 29
Iron	40, 249, 302, 312	4, 18, 21, 24
Manganese	32, 40, 92, 95, 104, 117, 126, 172, 197, 241, 231, 243, 264, 276, 302, 293, 296, 347, 354, 358, 375	2, 4, 5, 6, 7, 8, 12, 13, 15,k 16, 18, 21, 22, 23, 25, 26, 28, 29
Mercury	79, 109, 136, 221, 322, 327, 392	2,10,11,14,23, 24, 30
Nickel	64, 111, 145, 231, 240, 264, 277, 315, 375	4, 11, 13, 15, 16, 18, 24, 29
Silver	33, 41, 43, 56, 64, 80, 87, 88, 105, 116, 170, 215, 228, 231, 242, 269, 270, 285, 321, 325, 336, 352, 341, 342, 356, 380	2, 4, 5, 9, 12, 16, 19, 20, 22, 23, 27, 28, 30
Vanadium	40, 54, 56, 92, 192, 249, 302, 347, 375	1, 2, 4, 5, 14, 18, 21, 26, 29

PCBs

No PCBs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 194 subsurface soil.

SVOCs

Of the SVOCs, Total PAHs were detected above the teen recreator NAL in the subsurface soil of grids 92, 116, and 168 (Grids 5, 12 and 12, respectively). No SVOCs were detected above the teen recreator ALs in the SWMU 194 subsurface soil.

The maximum depth at which Total PAHs were detected above the teen recreator NAL was 4 ft bgs, which also was the end depth of the sample boreholes.

No SVOCs were detected above the teen recreator ALs in the SWMU 194 subsurface soil.

The following were detected above the SSLs for the protection of UCRS groundwater.

SVOC	Grid	EU
Naphthalene	116	12
Pyrene	92, 168	5, 12
Total PAHs	6, 61, 92, 161, 136, 116, 120, 202, 259, 302, 338, 388	2, 3, 5, 10, 11, 12, 13, 17, 20, 21, 27, 30

Naphthalene (grid 116, EU 12) and Total PAHs (grid 92 in EU 5 and grids 116, 168 in EU 12) were detected above the SSL for the protection of RGA groundwater.

VOCs

No VOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 194 subsurface soil.

Radionuclides

No radionuclides were detected above the teen recreator NALs or ALs in the SWMU 194 subsurface soil.

Neptunium-237 (no background value available) (grids 6 and 56, EU 2) and thorium-230 (grid 338, EU 27) were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

5.3.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). The groundwater screening identified molybdenum, silver, and naphthalene; however, none of these are a contributor to RGA groundwater contamination at PGDP. A review of the historical results does not identify a potential soil to groundwater contaminant source. In addition, this SWMU is located above the Porters Creek Clay; thus, it does not allow significant groundwater infiltration into the RGA. Consistent with these observations, the Northeast Plume investigation did not identify SWMU 194 as a groundwater source (DOE 1995c).

SWMU 194 is a grass-covered or otherwise stabilized SWMU, which, due to the physical cover at the SWMU, limits the potential for particulate transport through sheet flow (DOE 2008), as discussed in Chapter 4. There is potential for runoff to Outfall 017, but it is not considered significant. A response action for Outfall 017 will be addressed by the GDP Lagoons and Ditches OU, as described in the SMP (DOE 2012a). In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs/AOCs to surrounding ditches.

5.3.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 194 were evaluated for each of the EUs for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI. COPCs for the teen recreator for this SWMU include metals, radionuclides, and organics.

The cumulative ELCR and the cumulative HI for one or more EUs at SWMU 194 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a, (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 5.3.5 for the outdoor worker (exposed to surface soils), excavation worker, the hypothetical resident, and teen recreational user. Table 5.3.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Additional site characterization was conducted in 2000 in support of the DUF_6 Conversion Project. The results are documented in *Baseline Human Health Risk Assessment and Screening Ecological Risk Assessment for the Proposed Site of the UF_6 Conversion Facility, Including the Eastern Portion of SWMU 194, McGraw Construction Facilities (South Side), at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 2001b). Significant results of the BHHRA were the soil at the proposed site of the DUF_6 Conversion Facility and that portion of SWMU 194 overlain by the proposed site have been well characterized, the risks to the health of the most likely future users of the proposed site from exposure to soil containing site-related COCs fall within the acceptable risk range, and adverse impacts from contamination in soil to ecological receptors are not expected. The risk assessment supported an NFA recommendation for the proposed site of the DUF_6 Conversion Facility if the site were developed and maintained as an industrial area.

Ecological Screening. COPECs for SWMU 194 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 5.3.6.

Table 5.3.5. RGOs for SWMU 194

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Outdoor Worker (exposed to surface soil)											
1	None	n/a	n/a	<1E-06	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2	Chromium	5.96E+01	mg/kg	1.5E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Uranium-238	1.42E+00	pCi/g	1.2E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**2.7E-06**				**< 1**			
3	Arsenic	1.46E+01	mg/kg	3.5E-05	4.15E-01	4.15E+00	4.15E+01	n/a	n/a	n/a	n/a
	Uranium-238	1.28E+00	pCi/G	1.1E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**3.6E-05**				**< 1**			
4	Chromium	4.84E+01	mg/kg	1.2E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Total PAH	7.30E-02	mg/kg	1.5E-06	4.85E-02	4.85E-01	4.85E+00	n/a	n/a	n/a	n/a
	Uranium-238	1.73E+00	pCi/g	1.5E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**4.2E-06**				**< 1**			
5	Chromium	4.58E+01	mg/kg	1.1E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Uranium-238	1.38E+00	pCi/g	1.2E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**2.3E-06**				**< 1**			
6	Uranium-238	1.32E+00	pCi/g	1.1E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.1E-06**				**< 1**			
7	Chromium	5.32E+01	mg/kg	1.3E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.3E-06**				**< 1**			
8	Chromium	5.36E+01	mg/kg	1.3E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Total PAH	4.85E-01	mg/kg	1.0E-05	4.85E-02	4.85E-01	4.85E+00	n/a	n/a	n/a	n/a
	Uranium-238	1.39E+00	pCi/g	1.2E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.2E-05**				**< 1**			
9	Arsenic	1.14E+01	mg/kg	2.8E-05	4.15E-01	4.15E+00	4.15E+01	n/a	n/a	n/a	n/a
	Chromium	5.17E+01	mg/kg	1.3E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**2.9E-05**				**< 1**			
10	Arsenic	1.22E+01	mg/kg	2.9E-05	4.15E-01	4.15E+00	4.15E+01	n/a	n/a	n/a	n/a
	Cesium-137	5.81E-01	pCi/g	5.0E-06	1.15E-01	1.15E+00	1.15E+01	n/a	n/a	n/a	n/a
	Total PAH	2.57E-01	mg/kg	5.3E-06	4.85E-02	4.85E-01	4.85E+00	n/a	n/a	n/a	n/a
	Uranium-238	1.49E+00	pCi/g	1.3E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**4.1E-05**				**< 1**			

Table 5.3.5. RGOs for SWMU 194 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]				RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}	HI[4]	0.1	1	3
11	Total PAH	7.95E-02	mg/kg	1.6E-06	4.85E-02	4.85E-01	4.85E+00	n/a	n/a	n/a	n/a
	Cumulative			**1.6E-06**				**< 1**			
12	Chromium	6.34E+01	mg/kg	1.6E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Total PAH	8.91E-01	mg/kg	1.8E-05	4.85E-02	4.85E-01	4.85E+00	n/a	n/a	n/a	n/a
	Cumulative			**2.0E-05**				**< 1**			
13	Chromium	4.77E+01	mg/kg	1.2E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Total PAH	9.13E-02	mg/kg	1.9E-06	4.85E-02	4.85E-01	4.85E+00	n/a	n/a	n/a	n/a
	Cumulative			**3.1E-06**				**< 1**			
14	Chromium	5.21E+01	mg/kg	1.3E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.3E-06**				**< 1**			
15	Chromium	5.33E+01	mg/kg	1.3E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.3E-06**				**< 1**			
16	Arsenic	1.15E+01	mg/kg	2.8E-05	4.15E-01	4.15E+00	4.15E+01	n/a	n/a	n/a	n/a
	Chromium	5.32E+01	mg/kg	1.3E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**2.9E-05**				**< 1**			
17	Arsenic	1.16E+01	mg/kg	2.8E-05	4.15E-01	4.15E+00	4.15E+01	n/a	n/a	n/a	n/a
	Chromium	4.65E+01	mg/kg	1.1E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Total PAH	1.59E-01	mg/kg	3.3E-06	4.85E-02	4.85E-01	4.85E+00	n/a	n/a	n/a	n/a
	Cumulative			**3.2E-05**				**< 1**			
18	Arsenic	1.06E+01	mg/kg	2.5E-05	4.15E-01	4.15E+00	4.15E+01	n/a	n/a	n/a	n/a
	Chromium	6.85E+01	mg/kg	1.7E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**2.7E-05**				**< 1**			
19	Arsenic	1.07E+01	mg/kg	2.6E-05	4.15E-01	4.15E+00	4.15E+01	n/a	n/a	n/a	n/a
	Chromium	4.84E+01	mg/kg	1.2E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**2.7E-05**				**< 1**			
20	Arsenic	1.18E+01	mg/kg	2.9E-05	4.15E-01	4.15E+00	4.15E+01	n/a	n/a	n/a	n/a
	Chromium	5.24E+01	mg/kg	1.3E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**3.0E-05**				**< 1**			

Table 5.3.5. RGOs for SWMU 194 (Continued)

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	COC	EPC[1]	Units	ELCR[2]	1×10^{-6}	1×10^{-5}	1×10^{-4}	HI[4]	0.1	1	3
21	Chromium	5.51E+01	mg/kg	1.4E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.4E-06**				**< 1**			
22	Chromium	4.90E+01	mg/kg	1.2E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	PCB, Total	1.09E+01	mg/kg	6.7E-05	1.62E-01	1.62E+00	1.62E+01	n/a	n/a	n/a	n/a
	Cumulative			**6.8E-05**				**< 1**			
23	Arsenic	1.16E+01	mg/kg	2.8E-05	4.15E-01	4.15E+00	4.15E+01	n/a	n/a	n/a	n/a
	Chromium	6.60E+01	mg/kg	1.6E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**3.0E-05**				**< 1**			
24	Chromium	5.02E+01	mg/kg	1.2E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.2E-06**				**< 1**			
25	Chromium	6.13E+01	mg/kg	1.5E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.5E-06**				**< 1**			
26	Chromium	4.18E+01	mg/kg	1.0E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.0E-06**				**< 1**			
27	Chromium	5.22E+01	mg/kg	1.3E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.3E-06**				**< 1**			
28	Arsenic	1.20E+01	mg/kg	2.9E-05	4.15E-01	4.15E+00	4.15E+01	n/a	n/a	n/a	n/a
	Chromium	6.07E+01	mg/kg	1.5E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**3.1E-05**				**< 1**			
29	Chromium	5.06E+01	mg/kg	1.2E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.2E-06**				**< 1**			
30	Chromium	5.66E+01	mg/kg	1.4E-06	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.4E-06**				**< 1**			
31	Cesium-137	5.70E-01	pCi/g	4.9E-06	1.15E-01	1.15E+00	1.15E+01	n/a	n/a	n/a	n/a
	Uranium-238	1.72E+00	pCi/g	1.5E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.4E-06**				**< 1**			

Table 5.3.5. RGOs for SWMU 194 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Excavation Worker											
21	Arsenic	3.52E+01	mg/kg	1.1E-06	3.32E+01	3.32E+02	3.32E+03	0.2	2.12E+01	2.12E+02	6.37E+02
	Cobalt	8.31E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	2.73E+01	2.73E+02	8.18E+02
	Manganese	3.11E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.4	7.76E+03	7.76E+04	2.33E+05
	Cumulative			**1.1E-06**				**0.9**			
Hypothetical Resident[5]											
1	Chromium	3.87E+01	mg/kg	2.5E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**2.5E-06**				**< 1**			
2	Chromium	5.96E+01	mg/kg	3.8E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Uranium-238	1.42E+00	pCi/g	4.1E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**7.9E-06**				**< 1**			
3	Uranium-238	1.28E+00	pCi/g	3.7E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Total PAH	3.93E-02	mg/kg	2.0E-06	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	n/a
	Arsenic	1.46E+01	mg/kg	6.2E-05	2.35E-01	2.35E+00	2.35E+01	n/a	n/a	n/a	n/a
	Chromium	3.90E+01	mg/kg	2.5E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**7.0E-05**				**< 1**			
4	Chromium	4.84E+01	mg/kg	3.1E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Uranium-238	1.73E+00	pCi/g	5.0E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Total PAH	7.30E-02	mg/kg	3.8E-06	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	n/a
	Cumulative			**1.2E-05**				**< 1**			
5	Total PAH	2.37E-02	mg/kg	1.2E-06	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	n/a
	Chromium	4.58E+01	mg/kg	2.9E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Uranium-238	1.38E+00	pCi/g	4.0E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**8.2E-06**				**< 1**			
6	Uranium-238	1.32E+00	pCi/g	3.8E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Chromium	3.70E+01	mg/kg	2.4E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**6.2E-06**				**< 1**			
7	Chromium	5.32E+01	mg/kg	3.4E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**3.4E-06**				**< 1**			

Table 5.3.5. RGOs for SWMU 194 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]				RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}	HI[4]	0.1	1	3
8	Bis(2-ethylhexyl)phthalate	1.50E+01	mg/kg	1.2E-06	1.24E+01	1.24E+02	1.24E+03	n/a	n/a	n/a	n/a
	Uranium-238	1.39E+00	pCi/g	4.0E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Total PAH	4.85E-01	mg/kg	2.5E-05	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	n/a
	Chromium	5.36E+01	mg/kg	3.4E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**3.4E-05**				**< 1**			
9	Chromium	5.17E+01	mg/kg	3.3E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Arsenic	1.14E+01	mg/kg	4.8E-05	2.35E-01	2.35E+00	2.35E+01	n/a	n/a	n/a	n/a
	Cumulative			**5.2E-05**				**< 1**			
10	Cesium-137	5.81E-01	pCi/g	3.4E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Arsenic	1.22E+01	mg/kg	5.2E-05	2.35E-01	2.35E+00	2.35E+01	n/a	n/a	n/a	n/a
	Chromium	3.63E+01	mg/kg	2.3E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Total PAH	2.57E-01	mg/kg	1.3E-05	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	n/a
	Uranium-238	1.49E+00	pCi/g	4.3E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.1E-04**				**< 1**			
11	Chromium	3.27E+01	mg/kg	2.1E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Total PAH	7.95E-02	mg/kg	4.1E-06	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	n/a
	PCB, Total	8.40E-02	mg/kg	1.3E-06	6.38E-02	6.38E-01	6.38E+00	n/a	n/a	n/a	n/a
	Cumulative			**7.5E-06**				**< 1**			
12	Chromium	6.34E+01	mg/kg	4.1E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Total PAH	8.91E-01	mg/kg	4.6E-05	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	n/a
	Cumulative			**5.0E-05**				**< 1**			
13	Chromium	4.77E+01	mg/kg	3.1E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Total PAH	9.13E-02	mg/kg	4.7E-06	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	n/a
	Cumulative			**7.8E-06**				**< 1**			
14	Chromium	5.21E+01	mg/kg	3.4E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**3.4E-06**				**< 1**			
15	Chromium	5.33E+01	mg/kg	3.4E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**3.4E-06**				**< 1**			

Table 5.3.5. RGOs for SWMU 194 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
16	Arsenic	1.15E+01	mg/kg	4.9E-05	2.35E-01	2.35E+00	2.35E+01	n/a	n/a	n/a	n/a
	Chromium	5.32E+01	mg/kg	3.4E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**5.2E-05**				**< 1**			
17	Chromium	4.65E+01	mg/kg	3.0E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Total PAH	1.59E-01	mg/kg	8.2E-06	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	n/a
	Arsenic	1.16E+01	mg/kg	4.9E-05	2.35E-01	2.35E+00	2.35E+01	n/a	n/a	n/a	n/a
	Cumulative			**6.0E-05**				**< 1**			
18	Chromium	6.85E+01	mg/kg	4.4E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Arsenic	1.06E+01	mg/kg	4.5E-05	2.35E-01	2.35E+00	2.35E+01	n/a	n/a	n/a	n/a
	Cumulative			**4.9E-05**				**< 1**			
19	Arsenic	1.07E+01	mg/kg	4.5E-05	2.35E-01	2.35E+00	2.35E+01	n/a	n/a	n/a	n/a
	Chromium	4.84E+01	mg/kg	3.1E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**4.9E-05**				**< 1**			
20	Arsenic	1.18E+01	mg/kg	5.0E-05	2.35E-01	2.35E+00	2.35E+01	0.7	1.64E+00	1.64E+01	4.93E+01
	Chromium	5.24E+01	mg/kg	3.4E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cobalt	2.11E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.9	2.30E+00	2.30E+01	6.91E+01
	Manganese	2.29E+03	mg/kg	< 1E-06	n/a	n/a	n/a	0.4	5.34E+02	5.34E+03	1.60E+04
	Mercury	7.28E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	2.35E+00	2.35E+01	7.04E+01
	Total PAH	3.10E-02	mg/kg	1.6E-06	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	n/a
	Cumulative			**5.5E-05**				**2.4**			
21	Chromium	5.51E+01	mg/kg	3.5E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**3.5E-06**				**< 1**			
22	Chromium	4.90E+01	mg/kg	3.2E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	PCB, Total	1.09E+01	mg/kg	1.7E-04	6.38E-02	6.38E-01	6.38E+00	n/a	n/a	n/a	n/a
	Cumulative			**1.7E-04**				**< 1**			

Table 5.3.5. RGOs for SWMU 194 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]				RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}	HI[4]	0.1	1	3
23	Iron	1.83E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	5.48E+03	5.48E+04	1.64E+05
	Chromium	6.60E+01	mg/kg	4.2E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Arsenic	1.16E+01	mg/kg	4.9E-05	2.35E-01	2.35E+00	2.35E+01	0.7	1.64E+00	1.64E+01	4.93E+01
	Cumulative			**5.3E-05**				**1**			
24	Chromium	5.02E+01	mg/kg	3.2E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Total PAH	2.28E-02	mg/kg	1.2E-06	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	n/a
	Cumulative			**4.4E-06**				**< 1**			
25	Chromium	6.13E+01	mg/kg	3.9E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Total PAH	2.06E-02	mg/kg	1.1E-06	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	n/a
	Cumulative			**5.0E-06**				**< 1**			
26	Chromium	4.18E+01	mg/kg	2.7E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**2.7E-06**				**< 1**			
27	Chromium	5.22E+01	mg/kg	3.4E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**3.4E-06**				**< 1**			
28	Arsenic	1.20E+01	mg/kg	5.1E-05	2.35E-01	2.35E+00	2.35E+01	0.7	1.64E+00	1.64E+01	4.93E+01
	Chromium	6.07E+01	mg/kg	3.9E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Manganese	1.14E+03	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	5.34E+02	5.34E+03	1.60E+04
	Vanadium	4.06E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	3.91E+01	3.91E+02	1.17E+03
	Cumulative			**5.5E-05**				**1**			
29	Chromium	5.06E+01	mg/kg	3.3E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**3.3E-06**				**< 1**			
30	Chromium	5.66E+01	mg/kg	3.6E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**3.6E-06**				**< 1**			
31	Uranium-238	1.72E+00	pCi/g	5.0E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cesium-137	5.70E-01	pCi/g	3.3E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Cumulative			**3.8E-05**				**< 1**			

Table 5.3.5. RGOs for SWMU 194 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]				RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}	HI[4]	0.1	1	3
	Teen Recreational User										
3	Arsenic	1.46E+01	mg/kg	8.3E-06	1.77E+00	1.77E+01	1.77E+02	n/a	n/a	n/a	n/a
	Cumulative			**8.3E-06**				**< 1**			
8	Total PAH	4.85E-01	mg/kg	5.4E-06	8.99E-02	8.99E-01	8.99E+00	n/a	n/a	n/a	n/a
	Cumulative			**5.4E-06**				**< 1**			
9	Arsenic	1.14E+01	mg/kg	6.4E-06	1.77E+00	1.77E+01	1.77E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.4E-06**				**< 1**			
10	Arsenic	1.22E+01	mg/kg	6.9E-06	1.77E+00	1.77E+01	1.77E+02	n/a	n/a	n/a	n/a
	Cesium-137	5.81E-01	pCi/g	1.4E-06	4.10E-01	4.10E+00	4.10E+01	n/a	n/a	n/a	n/a
	Total PAH	2.57E-01	mg/kg	2.9E-06	8.99E-02	8.99E-01	8.99E+00	n/a	n/a	n/a	n/a
	Cumulative			**1.1E-05**				**< 1**			
12	Total PAH	8.91E-01	mg/kg	9.9E-06	8.99E-02	8.99E-01	8.99E+00	n/a	n/a	n/a	n/a
	Cumulative			**9.9E-06**				**< 1**			
13	Total PAH	9.13E-02	mg/kg	1.0E-06	8.99E-02	8.99E-01	8.99E+00	n/a	n/a	n/a	n/a
	Cumulative			**1.0E-06**				**< 1**			
16	Arsenic	1.15E+01	mg/kg	6.5E-06	1.77E+00	1.77E+01	1.77E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.5E-06**				**< 1**			
17	Arsenic	1.16E+01	mg/kg	6.5E-06	1.77E+00	1.77E+01	1.77E+02	n/a	n/a	n/a	n/a
	Total PAH	1.59E-01	mg/kg	1.8E-06	8.99E-02	8.99E-01	8.99E+00	n/a	n/a	n/a	n/a
	Cumulative			**8.3E-06**				**< 1**			
18	Arsenic	1.06E+01	mg/kg	6.0E-06	1.77E+00	1.77E+01	1.77E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.0E-06**				**< 1**			
19	Arsenic	1.07E+01	mg/kg	6.0E-06	1.77E+00	1.77E+01	1.77E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.0E-06**				**< 1**			
20	Arsenic	1.18E+01	mg/kg	6.7E-06	1.77E+00	1.77E+01	1.77E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.7E-06**				**< 1**			

Table 5.3.5. RGOs for SWMU 194 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]				RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}	HI[4]	0.1	1	3
22	PCB, Total	1.09E+01	mg/kg	3.7E-05	2.99E-01	2.99E+00	2.99E+01	n/a	n/a	n/a	n/a
	Cumulative			**3.7E-05**				**< 1**			
23	Arsenic	1.16E+01	mg/kg	6.5E-06	1.77E+00	1.77E+01	1.77E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.5E-06**				**< 1**			
28	Arsenic	1.20E+01	mg/kg	6.8E-06	1.77E+00	1.77E+01	1.77E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.8E-06**				**< 1**			
31	Cesium-137	5.70E-01	pCi/g	1.4E-06	4.10E-01	4.10E+00	4.10E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.4E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.9, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.9, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 5.3.6 Ecological Screening for SWMU 194

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Wooded area, mix of mostly soil/grass, and concrete/buildings	Yes	1152	Antimony	2.10E-01	1.00E+01	2.70E-01	37
			Lead	3.60E+01	3.58E+02	1.10E+01	33
			Manganese	1.50E+03	4.67E+03	2.20E+02	21
			Mercury	2.00E-01	8.92E+00	1.00E-01	89
			PCB, Total	n/a	1.80E+01	2.00E-02	900
			Selenium	8.00E-01	1.00E+01	5.20E-01	19
			Zinc	6.50E+01	6.40E+02	4.60E+01	14

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b) n/a = not applicable

5.3.7 SWMU 194 Summary

The following text summarizes the results for SWMU 194 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

COPCs for surface and subsurface soils from SWMU 194 are shown on Tables 5.3.1–5.3.4 as those analytes with green boxes under the "Teen Recreator/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. A complete list of sampling results is provided in Appendix G.

The following are the types of contaminants that comprise COPCs for SWMU 194 for each EU.

- EU 1
  - Surface—metals
  - Subsurface—metals
- EU 2
  - Surface—metals
  - Subsurface—metals, radionuclides
- EU 3
  - Surface—metals
  - Subsurface—metals
- EU 4
  - Surface—metals, SVOCs
  - Subsurface—metals
- EU 5
  - Surface—metals
  - Subsurface—metals, SVOCs
- EU 6
  - Surface—metals
  - Subsurface—metals
- EU 7
  - Surface—metals
  - Subsurface—metals

- EU 8
  - Surface—SVOCs
  - Subsurface—metals
- EU 9
  - Surface—metals
  - Subsurface—metals
- EU 10
  - Surface—metals, SVOCs
  - Subsurface—metals
- EU 11
  - Surface—metals, SVOCs
  - Subsurface—metals
- EU 12
  - Surface—metals, SVOCs
  - Subsurface—metals, SVOCs
- EU 13
  - Surface—metals, SVOCs
  - Subsurface—metals
- EU 14
  - Surface—metals
  - Subsurface—metals
- EU 15
  - Surface—metals
  - Subsurface—metals
- EU 16
  - Surface—metals
  - Subsurface—metals
- EU 17
  - Surface—metals, SVOCs
  - Subsurface—metals

- EU 18
  - Surface—metals
  - Subsurface—metals
- EU 19
  - Surface—metals
  - Subsurface—metals
- EU 20
  - Surface—metals
  - Subsurface—metals
- EU 21
  - Surface—metals
  - Subsurface—metals
- EU 22
  - Surface—metals, PCBs
  - Subsurface—metals, PCBs
- EU 23
  - Surface—metals
  - Subsurface—metals
- EU 24
  - Surface—metals
  - Subsurface—metals
- EU 25
  - Surface—metals
  - Subsurface—metals
- EU 26
  - Surface—metals
  - Subsurface—metals
- EU 27
  - Surface—metals
  - Subsurface—metals, radionuclides

- EU 28
  - Surface—metals
  - Subsurface—metals
- EU 29
  - Surface—metals
  - Subsurface—metals
- EU 30
  - Surface—metals
  - Subsurface—metals
- EU 31
  - Surface—radionuclides
  - Subsurface—none

The historic operations at SWMU 194, administration, boiler house, hospital, and purchasing buildings, are not associated with contaminant disbursement, usually; therefore, the sources of contaminants in this SWMU remain unknown. The operations at SWMU were active from 1951 until PGDP began enrichment operations in 1954.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The metal and radiological contamination at SWMU 194 is not likely to migrate away from its current locations. There are no known pipelines that would contribute to contaminant migration in SWMU 194. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soils), excavation worker, teen recreational user, and hypothetical residential scenarios. These are the COCs for these scenarios for SWMU 194.

- Outdoor worker (exposed to surface soils)
  - Arsenic
  - Cesium-137
  - Chromium
  - Total PAHs
  - Total PCBs
  - Uranium-238
- Excavation worker
  - Arsenic
  - Cobalt
  - Manganese

- Hypothetical Resident (hazards evaluated against the child resident)

  — Arsenic
  — Bis(2-ethylhexyl)phthalate
  — Cesium-137
  — Chromium
  — Cobalt
  — Iron
  — Manganese
  — Mercury
  — Total PCBs
  — Total PAHs
  — Uranium-238
  — Vanadium

- Teen Recreational User

  — Arsenic
  — Cesium-137
  — Total PCBs
  — Total PAHs

Of the above, Total PCBs for the hypothetical resident is a priority COC (i.e., HQ > 1 or chemical-specific ELCR > 1E-04). Priority COCs for other scenarios are described in Appendix D.

For SWMU 194, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Antimony
- Lead
- Manganese
- Mercury
- Total PCBs
- Selenium
- Zinc

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 194 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. The DUF_6 conversion facility covers the eastern portion of this SWMU. A response action on this SWMU could impact operations at this facility. SWMU 536 is within the limits of SWMU 194. SWMU 536, the Concrete Truck Washout Area is an NFA SWMU in the 2012 SMP. An action on SWMU 194 is not likely to impact other integrator units.

5.3.8 SWMU 194 Conclusion

The surface soils contamination at SWMU 194 has been adequately defined. An FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark (DOE 2010a) for scenarios including outdoor worker (exposed to surface soils), excavation worker, hypothetical residential, and teen recreational user.

The reasonably anticipated future land use for this SWMU is recreational land use as shown in the SMP (DOE 2012a).

5.4 SWMU 196, C-746-A SEPTIC SYSTEM

5.4.1 Background

The C-746-A Septic System (SWMU 196) is located in the northwest portion of the plant site. The C-746-A Septic System consists of two systems: System 1, on the northwest corner of C-746-A, is a 500-gal tank; and System 2, on the northeast corner of C-746-A, is a 950-gal concrete tank and a drainage field 60 ft by 20 ft. This SWMU is underground; therefore, it has no direct connection to surface water.

Both systems were used to process the sanitary waste coming from C-746-A. The systems were abandoned in place in the 1980s. The contents of the septic tanks were removed. The empty tanks were backfilled with clean sand and the site was graded to the surface.

Subsurface soil samples and groundwater samples were obtained during the WAG 27 RI/FS. The COCs from WAG 27 RI Report are metals (DOE 1999a).

5.4.2 Fieldwork Summary

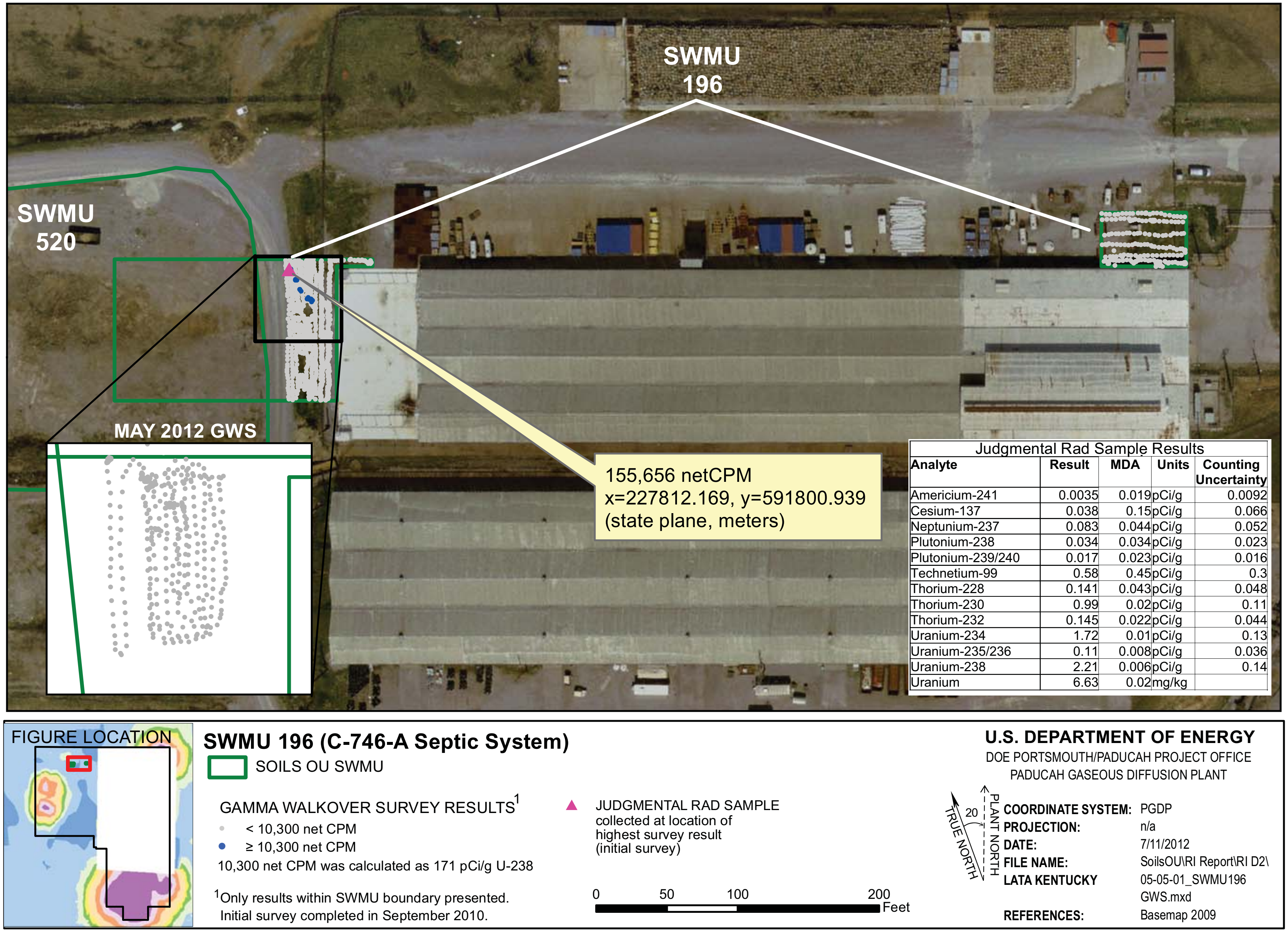
Two grid samples were planned and collected for the unit. Two planned pipeline samples were not collected due to dense underground utilities.

No step-out grid sampling was required for SWMU 196. The western portion of the SWMU was characterized as part of SWMU 520. Figure A.3 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey using a FIDLER (Figure 5.4.1); the total of 1,170 measurements collected from both areas ranged from 4,651 to 166,656 gross cpm. SWMU 196 is two areas at the west end and northeast corner of the C-746-A Building. The area at the northwest corner is a soil/gravel mix while the area at the northeast corner is mostly gravel. A judgmental grab sample was collected for radiological constituents at the northwest corner. The GWS instrumentation experienced interference during portions of the survey resulting in questionable position information for a portion of the data set. This occurred primarily on the northwest corner of SWMU 196. A follow-up GWS in the northwest corner of the SWMU did not find any points exceeding the project action limit.

5.4.3 Nature and Extent of Contamination—Surface Soils

The representative data set for SWMU 196 surface soils is presented in Tables 5.4.1 and 5.4.2 and provides the nature of the contamination in SWMU 196 surface soils. Figures 5.4.2–5.4.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.0035	0.019	pCi/g	0.0092
Cesium-137	0.038	0.15	pCi/g	0.066
Neptunium-237	0.083	0.044	pCi/g	0.052
Plutonium-238	0.034	0.034	pCi/g	0.023
Plutonium-239/240	0.017	0.023	pCi/g	0.016
Technetium-99	0.58	0.45	pCi/g	0.3
Thorium-228	0.141	0.043	pCi/g	0.048
Thorium-230	0.99	0.02	pCi/g	0.11
Thorium-232	0.145	0.022	pCi/g	0.044
Uranium-234	1.72	0.01	pCi/g	0.13
Uranium-235/236	0.11	0.008	pCi/g	0.036
Uranium-238	2.21	0.006	pCi/g	0.14
Uranium	6.63	0.02	mg/kg	

Figure 5.4.1. SWMU 196 Gamma Walkover Survey

Table 5.4.1. Surface Soil Historical Data Summary: SWMU 196 C-746-A Septic System

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	6.06E+03	1.13E+04	8.68E+03	0/2	2/2	0/2	1.30E+04	0/2	3.32E+04	0/2	3.97E+06	0/2	2/2	1.6328 - 1.6328
METAL	Antimony	mg/kg	2.92E-01	3.74E-01	3.33E-01	0/2	2/2	2/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	2/2	0.2298 - 0.2298
METAL	Arsenic	mg/kg	4.44E+00	7.33E+00	5.58E+00	0/8	4/8	0/8	1.20E+01	4/8	9.97E-01	0/8	9.97E+01	0/8	4/8	0.0827 - 0.0827
METAL	Barium	mg/kg	7.62E+01	2.02E+02	1.20E+02	0/8	8/8	1/8	2.00E+02	0/8	5.92E+02	0/8	3.78E+05	0/8	7/8	0.1709 - 0.1709
METAL	Beryllium	mg/kg	2.58E-01	2.58E-01	2.58E-01	0/2	1/2	0/2	6.70E-01	1/2	1.40E-02	0/2	9.22E+00	0/2	0/2	0.1811 - 0.1811
METAL	Cadmium	mg/kg	1.83E+00	2.53E+00	2.18E+00	0/8	2/8	2/8	2.10E-01	0/8	3.16E+00	0/8	3.16E+02	0/8	2/8	0.2453 - 0.2453
METAL	Calcium	mg/kg	3.67E+03	2.25E+04	1.31E+04	0/2	2/2	0/2	2.00E+05	0/2	n/a	0/2	n/a	n/a	n/a	6.6323 - 6.6323
METAL	Chromium	mg/kg	8.26E+00	2.07E+01	1.61E+01	0/8	8/8	5/8	1.60E+01	0/8	3.02E+01	0/8	3.02E+03	0/8	0/8	0.3826 - 0.3826
METAL	Cobalt	mg/kg	3.45E+00	6.53E+00	4.99E+00	0/2	2/2	0/2	1.40E+01	0/2	1.05E+01	0/2	1.52E+03	2/2	2/2	0.3725 - 0.3725
METAL	Copper	mg/kg	1.61E+01	2.09E+01	1.85E+01	0/2	2/2	1/2	1.90E+01	0/2	1.43E+03	0/2	2.24E+05	0/2	0/2	0.2113 - 0.2113
METAL	Iron	mg/kg	9.49E+03	1.49E+04	1.22E+04	0/2	2/2	0/2	2.80E+04	0/2	2.51E+04	0/2	3.92E+06	2/2	2/2	0.6677 - 0.6677
METAL	Lead	mg/kg	1.93E+01	2.75E+01	2.39E+01	0/8	3/8	0/8	3.60E+01	0/8	4.00E+02	0/8	4.00E+02	0/8	3/8	2.4842 - 2.4842
METAL	Magnesium	mg/kg	1.78E+03	1.86E+03	1.82E+03	0/2	2/2	0/2	7.70E+03	0/2	n/a	0/2	n/a	n/a	n/a	6.7902 - 6.7902
METAL	Manganese	mg/kg	2.64E+02	2.78E+02	2.71E+02	0/2	2/2	0/2	1.50E+03	0/2	2.58E+03	0/2	1.16E+05	2/2	2/2	0.2014 - 0.2014
METAL	Mercury	mg/kg	4.13E-02	5.21E-02	4.67E-02	0/8	2/8	0/8	2.00E-01	0/8	9.00E-01	0/8	7.85E+02	0/8	0/8	0.0078 - 0.0078
METAL	Nickel	mg/kg	3.17E+01	7.36E+01	5.27E+01	0/2	2/2	2/2	2.10E+01	1/2	4.28E+01	0/2	3.18E+04	0/2	2/2	1.2834 - 1.2834
METAL	Selenium	mg/kg	3.52E-01	3.52E-01	3.52E-01	0/8	1/8	0/8	8.00E-01	0/8	1.79E+02	0/8	2.80E+04	0/8	1/8	0.0891 - 0.0891
METAL	Silver	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	2.30E+00	0/8	1.08E+01	0/8	9.15E+03	0/8	0/8	0.2914 - 0.2914
METAL	Sodium	mg/kg	3.22E+02	4.23E+02	3.73E+02	0/2	2/2	2/2	3.20E+02	0/2	n/a	0/2	n/a	n/a	n/a	11.074 - 11.074
METAL	Thallium	mg/kg	1.47E-01	1.57E-01	1.52E-01	0/2	2/2	0/2	2.10E-01	0/2	2.87E+00	0/2	4.48E+02	0/2	2/2	0.1164 - 0.1164
METAL	Vanadium	mg/kg	1.54E+01	1.73E+01	1.64E+01	0/2	2/2	0/2	3.80E+01	2/2	1.51E-01	0/2	9.30E+01	2/2	2/2	0.6021 - 0.6021
METAL	Zinc	mg/kg	1.48E+02	2.22E+02	1.85E+02	0/2	2/2	2/2	6.50E+01	0/2	1.08E+04	0/2	1.68E+06	0/2	2/2	0.1438 - 0.1438
PPCB	PCB, Total	mg/kg	6.75E-01	1.51E+00	9.53E-01	1/11	2/11	0/11	n/a	2/11	1.88E-01	0/11	1.88E+01	0/11	2/11	0.13 - 0.13
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/15	0/15	0/15	n/a	0/15	6.02E+02	0/15	1.81E+04	0/15	0/15	0.17 - 0.17
SVOA	Acenaphthylene	mg/kg	3.47E-01	3.47E-01	3.47E-01	0/15	1/15	0/15	n/a	0/15	n/a	0/15	n/a	n/a	n/a	0.17 - 0.17
SVOA	Anthracene	mg/kg	1.34E+00	1.34E+00	1.34E+00	0/15	1/15	0/15	n/a	0/15	4.05E+03	0/15	1.22E+05	0/15	0/15	0.17 - 0.17
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	n/a	0/8	n/a	n/a	n/a	0.17 - 0.17
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/15	0/15	0/15	n/a	0/15	6.01E+02	0/15	1.80E+04	0/15	0/15	0.17 - 0.17
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/15	0/15	0/15	n/a	0/15	4.87E+02	0/15	1.46E+04	0/15	0/15	0.17 - 0.17
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/15	0/15	0/15	n/a	0/15	2.24E+00	0/15	2.24E+02	0/15	0/15	0.17 - 0.17
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/15	0/15	0/15	n/a	0/15	n/a	0/15	n/a	n/a	n/a	0.17 - 0.17
SVOA	Pyrene	mg/kg	3.30E-01	3.30E-01	3.30E-01	1/15	1/15	0/15	n/a	0/15	4.49E+02	0/15	1.35E+04	0/15	0/15	0.17 - 0.17
SVOA	Total PAH	mg/kg	6.80E-01	6.80E-01	6.80E-01	1/15	1/15	0/15	n/a	1/15	5.92E-02	0/15	5.92E+00	1/15	1/15	-
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	6.98E-01	0/8	8.22E+01	0/8	0/8	-
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	3.29E+00	0/8	3.84E+02	0/8	0/8	-
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	n/a	0/8	n/a	0/8	0/8	-
VOA	Total Xylene	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	3.50E+01	0/8	1.07E+03	0/8	0/8	-
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	4.69E-02	0/9	4.98E+00	0/9	0/9	-
RADS	Alpha activity	pCi/g	8.46E+00	1.66E+01	1.25E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	10.469333802 - 10.516303399

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.4.2. Surface Soil RI Data Summary: SWMU 196, C-746-A Septic System

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	1.09E+04	1.09E+04	1.09E+04	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.8 - 5.8
METAL	Antimony	mg/kg	5.90E-01	5.90E-01	5.90E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.58 - 0.58
METAL	Arsenic	mg/kg	5.10E+00	5.10E+00	5.10E+00	0/1	1/1	0/1	1.20E+01	1/1	9.97E-01	0/1	9.97E+01	0/1	1/1	1.2 - 11
METAL	Barium	mg/kg	1.43E+02	1.43E+02	1.43E+02	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.3 - 2.3
METAL	Beryllium	mg/kg	4.00E-01	4.00E-01	4.00E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.12 - 0.12
METAL	Cadmium	mg/kg	4.00E-01	4.00E-01	4.00E-01	0/1	1/1	1/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	1/1	0.058 - 0.058
METAL	Calcium	mg/kg	2.12E+05	2.12E+05	2.12E+05	0/1	1/1	1/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	288 - 288
METAL	Chromium	mg/kg	1.96E+01	1.96E+01	1.96E+01	0/1	1/1	1/1	1.60E+01	0/1	3.02E+01	0/1	3.02E+03	0/1	0/1	1.2 - 85
METAL	Cobalt	mg/kg	8.30E+00	8.30E+00	8.30E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.23 - 0.23
METAL	Copper	mg/kg	1.20E+01	1.20E+01	1.20E+01	0/1	1/1	0/1	1.90E+01	0/1	1.43E+03	0/1	2.24E+05	0/1	0/1	1.2 - 35
METAL	Iron	mg/kg	1.12E+04	1.12E+04	1.12E+04	0/1	1/1	0/1	2.80E+04	0/1	2.51E+04	0/1	3.92E+06	1/1	1/1	5.8 - 100
METAL	Lead	mg/kg	1.06E+01	1.06E+01	1.06E+01	0/1	1/1	0/1	3.60E+01	0/1	4.00E+02	0/1	4.00E+02	0/1	0/1	0.35 - 13
METAL	Magnesium	mg/kg	1.13E+04	1.13E+04	1.13E+04	0/1	1/1	1/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	57.6 - 57.6
METAL	Manganese	mg/kg	6.80E+02	6.80E+02	6.80E+02	0/1	1/1	0/1	1.50E+03	0/1	2.58E+03	0/1	1.16E+05	1/1	1/1	0.23 - 85
METAL	Mercury	mg/kg	2.72E-02	2.72E-02	2.72E-02	0/1	1/1	0/1	2.00E-01	0/1	9.00E-01	0/1	7.85E+02	0/1	0/1	0.0384 - 10
METAL	Molybdenum	mg/kg	1.30E+00	1.30E+00	1.30E+00	0/1	1/1	0/1	n/a	0/1	1.79E+02	0/1	2.80E+04	0/1	1/1	0.58 - 15
METAL	Nickel	mg/kg	5.56E+02	5.56E+02	5.56E+02	0/1	1/1	1/1	2.10E+01	1/1	4.28E+01	0/1	3.18E+04	1/1	1/1	2.9 - 65
METAL	Selenium	mg/kg	9.30E-01	9.30E-01	9.30E-01	0/1	1/1	1/1	8.00E-01	0/1	1.79E+02	0/1	2.80E+04	0/1	1/1	0.58 - 20
METAL	Silver	mg/kg	9.40E-02	9.40E-02	9.40E-02	0/1	1/1	0/1	2.30E+00	0/1	1.08E+01	0/1	9.15E+03	0/1	1/1	0.23 - 10
METAL	Sodium	mg/kg	3.57E+02	3.57E+02	3.57E+02	0/1	1/1	1/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	23 - 23
METAL	Thallium	mg/kg	1.90E-01	1.90E-01	1.90E-01	0/1	1/1	0/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.23 - 0.23
METAL	Uranium	mg/kg	6.63E+00	2.33E+01	1.91E+01	0/2	2/2	2/2	4.90E+00	0/2	1.07E+02	0/2	1.65E+04	0/2	1/2	0.02 - 20
METAL	Vanadium	mg/kg	2.56E+01	2.56E+01	2.56E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.2 - 1.2
METAL	Zinc	mg/kg	7.80E+01	7.80E+01	7.80E+01	0/1	1/1	1/1	6.50E+01	0/1	1.08E+04	0/1	1.68E+06	0/1	1/1	2.3 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.88E-01	0/1	1.88E+01	0/1	0/1	0.35 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.8 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.38 - 0.38
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.38 - 0.38
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.4.2. Surface Soil RI Data Summary: SWMU 196, C-746-A Septic System (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0076 - 0.0076
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	1.20E-01	1.20E-01	1.20E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.38 - 0.38
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.76 - 0.76
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.38 - 0.38
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0076 - 0.0076
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.8 - 1.8
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.38 - 0.38
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.76 - 0.76
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	0/1	-
RADS	Alpha activity	pCi/g	1.49E+01	2.92E+01	2.21E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.5 - 5.1
RADS	Americium-241	pCi/g	3.50E-03	6.00E-03	4.75E-03	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.019 - 0.021
RADS	Beta activity	pCi/g	1.81E+01	2.75E+01	2.28E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.5 - 2.8
RADS	Cesium-137	pCi/g	0.00E+00	3.80E-02	1.90E-02	0/2	2/2	0/2	4.90E-01	0/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.087 - 0.15
RADS	Neptunium-237	pCi/g	8.30E-02	3.11E-01	1.97E-01	0/2	2/2	1/2	1.00E-01	1/2	2.71E-01	0/2	2.71E+01	1/2	2/2	0.018 - 0.044
RADS	Plutonium-238	pCi/g	1.30E-02	3.40E-02	2.35E-02	0/2	2/2	0/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.034 - 0.034
RADS	Plutonium-239/240	pCi/g	1.70E-02	3.20E-02	2.45E-02	0/2	2/2	1/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.023 - 0.03
RADS	Technetium-99	pCi/g	5.80E-01	7.31E+00	3.95E+00	0/2	2/2	1/2	2.50E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	2/2	0.45 - 0.47
RADS	Thorium-228	pCi/g	1.41E-01	5.86E-01	3.64E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.021 - 0.043
RADS	Thorium-230	pCi/g	8.90E-01	9.90E-01	9.40E-01	0/2	2/2	0/2	1.50E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.02 - 0.02
RADS	Thorium-232	pCi/g	1.45E-01	6.32E-01	3.89E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.005 - 0.022
RADS	Uranium-234	pCi/g	1.29E+00	1.72E+00	1.51E+00	0/2	2/2	2/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.01 - 0.02
RADS	Uranium-235/236	pCi/g	8.30E-02	1.10E-01	9.65E-02	0/2	2/2	2/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.008 - 0.009
RADS	Uranium-238	pCi/g	1.54E+00	2.21E+00	1.88E+00	0/2	2/2	2/2	1.20E+00	1/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.006 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

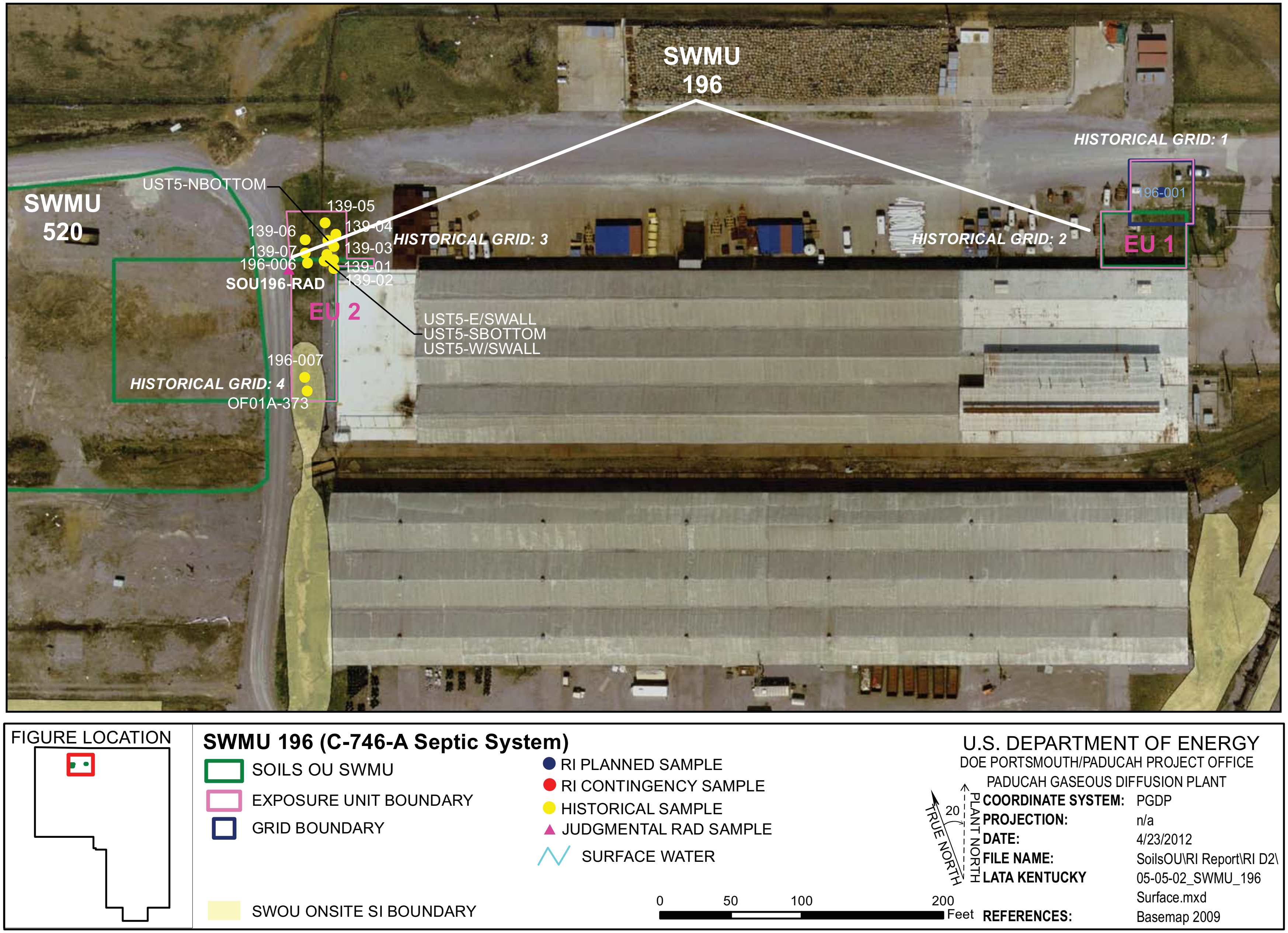


Figure 5.4.2. SWMU 196 Sample Locations - Surface Soil

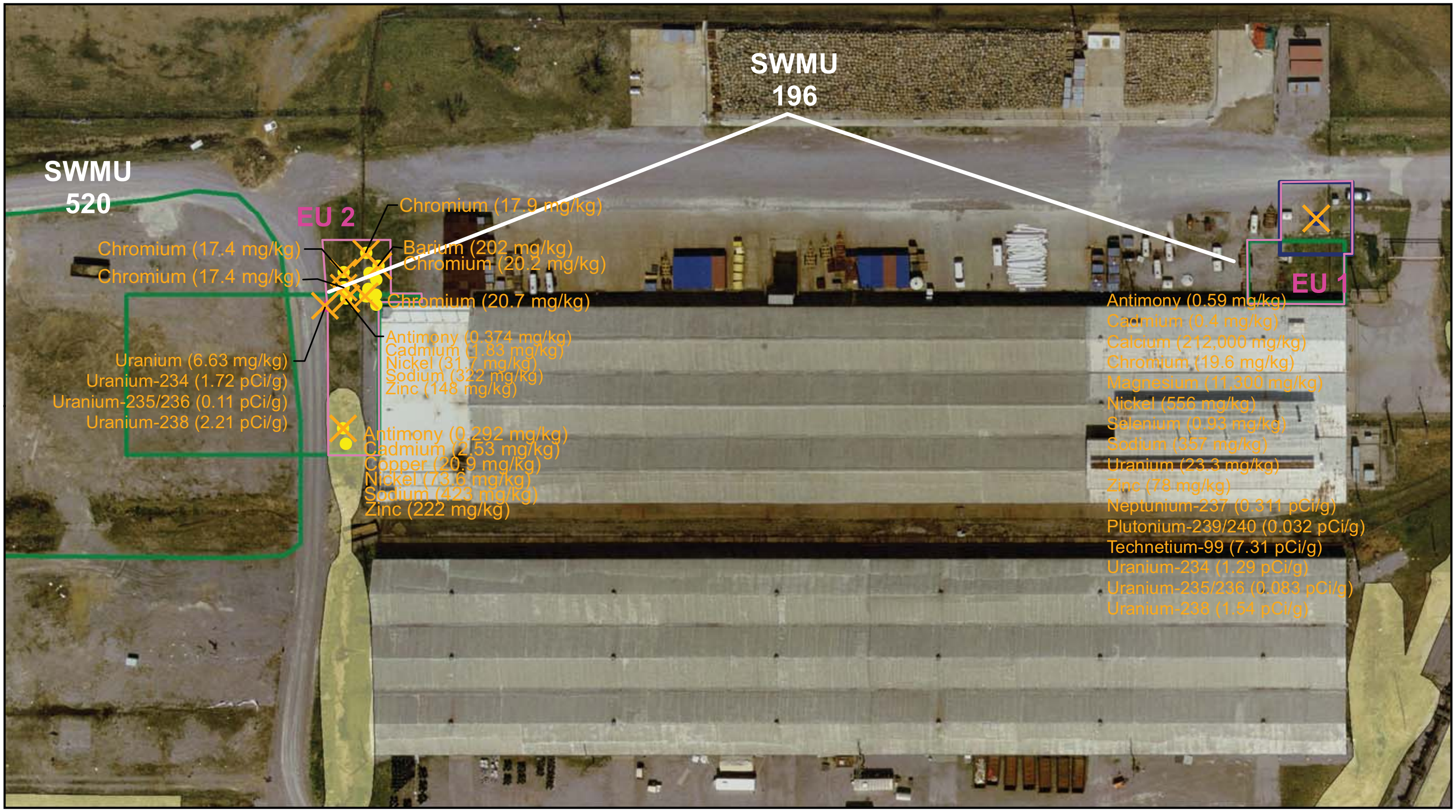
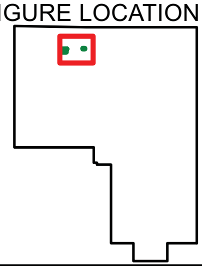


FIGURE LOCATION



SWMU 196 (C-746-A Septic System)

SOILS OU SWMU
EXPOSURE UNIT BOUNDARY
GRID BOUNDARY
SURFACE WATER
SWOU ONSITE SI BOUNDARY

RI PLANNED SAMPLE
RI CONTINGENCY SAMPLE
HISTORICAL SAMPLE
JUDGMENTAL RAD SAMPLE
> BACKGROUND

0 50 100 200 Feet

TRUE NORTH 20 PLANT NORTH

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT
LATA KENTUCKY

COORDINATE SYSTEM: PGDP
PROJECTION: n/a
DATE: 4/24/2012
FILE NAME: SoilsOU\RI Report\RI D2\05-05_03_SWMU196SurfBkgd.mxd
REFERENCES: Basemap 2009

Figure 5.4.3. SWMU 196 Background Exceedances - Surface Soil

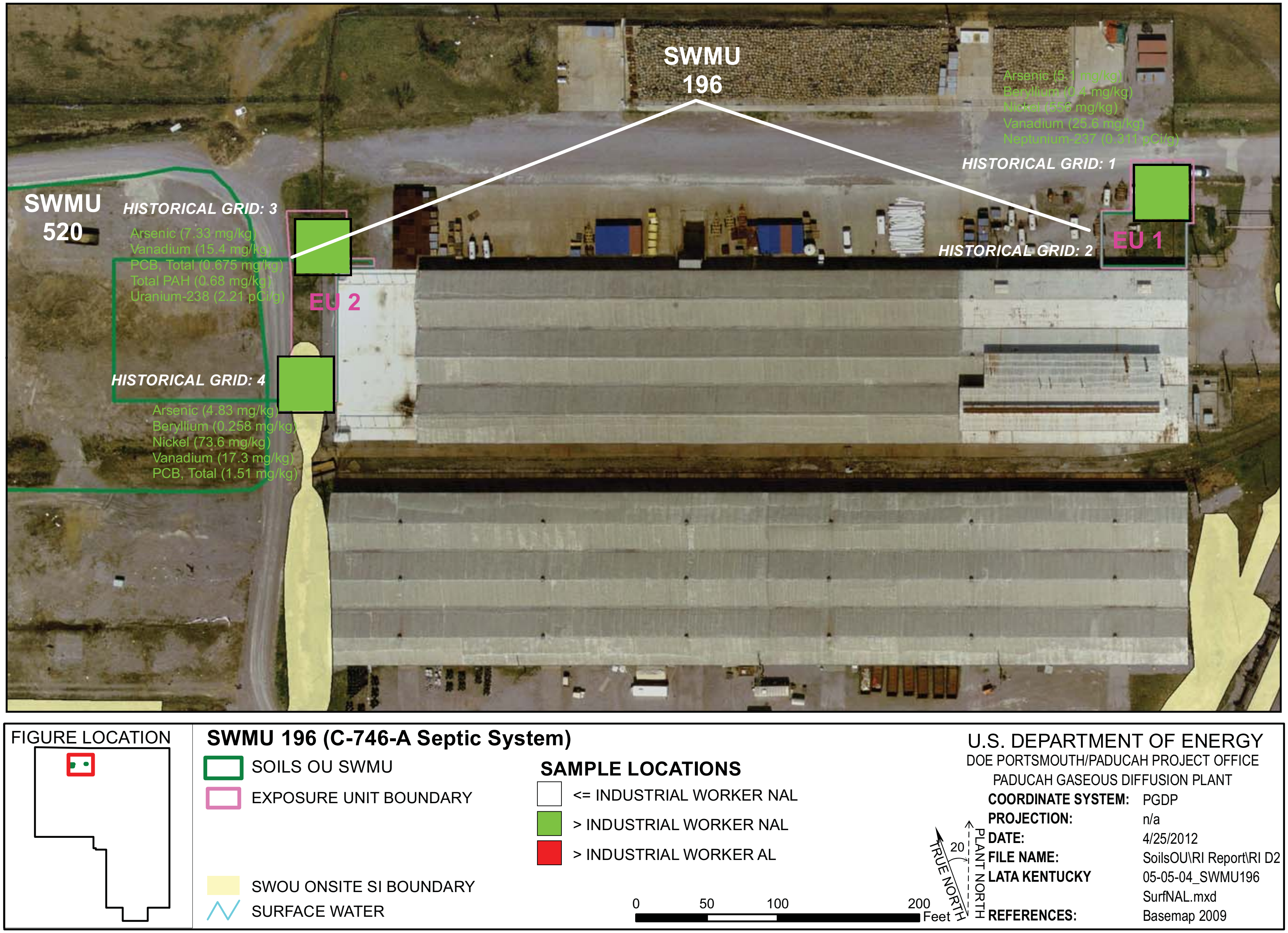


Figure 5.4.4. SWMU 196 NAL Exceedances - Surface Soil

The horizontal extent of SWMU 196 surface soil contamination is considered adequately defined for supporting the baseline risk assessment and FS. EU 1 consists of grids 1 and 2 and is associated with System 2, on the northeast corner of C-746-A. EU 2 consists of grids 3 and 4 and is associated with System 1, on the northwest corner of C-746-A.

Metals

Metals were detected above the industrial worker NALs in the SWMU 196 surface soil. Of those metals, only nickel was detected above both the background screening level and the industrial worker NAL. These detections were in grids 1 and 4 (EUs 1 and 2, respectively). No metals were detected above the industrial worker ALs in the SWMU 196 surface soil.

The following metals were detected in the SWMU 196 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater.

Metal	Grid	EU
Antimony	1, 3, 4	1, 2
Barium	3	2
Cadmium	1, 3, 4	1, 2
Molybdenum[1]	1	1
Nickel	1, 3, 4	1, 2
Selenium	1	1
Uranium	1	1
Zinc	1, 3, 4	1, 2

[1] No background value is available.

Nickel was detected in grid 1, EU 1 above both the background screening level and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above industrial worker NALs and the SSLs for the protection of UCRS groundwater in the surface soil of grids 3 and 4 (EU 2). Total PCBs were not detected above the industrial worker ALs or the SSLs for the protection of RGA groundwater.

SVOCs

Total PAHs were detected above the industrial worker NAL in the surface soil of grid 3 (EU 2). No SVOCs were detected above the industrial worker ALs in the SWMU 196 surface soil.

Total PAHs were detected above the SSLs for the protection of UCRS and RGA groundwater in grid 3, EU 2.

VOCs

There were no VOCs detected in the SWMU 196 surface soil.

Radionuclides

One surface soil sample was collected from grid 1 (EU 1) during the RI. Neptunium-237 was detected above both the background screening level and the industrial worker NAL in the sample. No radionuclides were detected above the industrial worker ALs in the sample.

One judgmental grab sample was collected from EU 2. Uranium-238 was detected above both the background screening level the industrial worker NAL in the sample. No radionuclides were detected above the industrial worker ALs in the sample.

Neptunium-237 and technetium-99 were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater in grid 1, EU 1. Neptunium-237 was detected above both the background screening level and the SSLs for the protection of RGA groundwater in grid 1, EU 1.

5.4.4 Nature and Extent of Contamination—Subsurface Soils

The representative data set for SWMU 196 subsurface soils is presented in Tables 5.4.3 and 5.4.4 and provides the nature of the contamination in SWMU 196 subsurface soils. Figures 5.4.5–5.4.7 illustrate the horizontal extent. A complete list of detailed sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 196 subsurface soil contamination is considered adequately defined for supporting the baseline risk assessment and FS. SWMU 196 consists of two EUs.

Metals

Metals were detected above the industrial worker NALs in the SWMU 196 subsurface soil. The following are metals detected at or above both background screening levels and the industrial worker NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Antimony	2, 3, 4	1, 2
Arsenic	2, 3	1, 2
Beryllium	2	1
Cadmium	2. 3	1. 2
Chromium	2	1
Cobalt	2	1
Iron	2	1
Nickel	2, 3, 4	1, 2
Silver	2	1
Thallium	2	1
Vanadium	2	1

The maximum depth at which metals were detected (in samples associated with this RI Report) at or above both background screening levels and the industrial worker NALs was 10 ft bgs. The end depths of the boreholes taken from grids 2, 3, and 4 ranged from 2 to 20 ft bgs; however, the dataset for this RI Report includes results for samples taken only at or above 16 ft bgs, per the Work Plan (DOE 2010a). The Soils OU is defined in the SMP as soils to 10 ft bgs (or 16 ft bgs at pipelines).

Beryllium was detected above both the background screening level and the AL in the subsurface soil of grid 2, EU 1, for the industrial worker.

Table 5.4.3. Subsurface Soil Historical Data Summary: SWMU 196 C-746-A Septic System

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	6.21E+02	1.79E+04	8.30E+03	0/70	70/70	10/70	1.20E+04	0/70	3.32E+04	0/70	3.97E+06	0/70	69/70	1.3135 - 27
METAL	Antimony	mg/kg	7.66E-01	1.21E+02	2.12E+01	0/70	26/70	26/70	2.10E-01	11/70	2.53E+00	0/70	1.51E+03	9/70	26/70	0.2298 - 18.4
METAL	Arsenic	mg/kg	1.76E+00	1.05E+01	4.03E+00	0/70	68/70	3/70	7.90E+00	68/70	9.97E-01	0/70	9.97E+01	0/70	68/70	0.0827 - 17.4
METAL	Barium	mg/kg	1.84E+01	3.89E+02	9.94E+01	0/70	70/70	5/70	1.70E+02	0/70	5.92E+02	0/70	3.78E+05	0/70	40/70	0.0242 - 1.41
METAL	Beryllium	mg/kg	4.90E-02	1.13E+02	2.11E+00	0/68	68/68	6/68	6.90E-01	68/68	1.40E-02	1/68	9.22E+00	0/68	1/68	0.0188 - 0.1811
METAL	Cadmium	mg/kg	5.50E-02	1.16E+02	3.85E+00	0/70	36/70	19/70	2.10E-01	3/70	3.16E+00	0/70	3.16E+02	1/70	14/70	0.0489 - 2.21
METAL	Calcium	mg/kg	5.89E+02	2.23E+05	2.23E+04	0/68	68/68	21/68	6.10E+03	0/68	n/a	0/68	n/a	n/a	n/a	0.5097 - 663.23
METAL	Chromium	mg/kg	3.07E+00	1.12E+02	1.45E+01	0/70	70/70	1/70	4.30E+01	2/70	3.02E+01	0/70	3.02E+03	0/70	0/70	0.1325 - 3.52
METAL	Cobalt	mg/kg	1.97E-01	1.12E+02	6.53E+00	0/68	68/68	3/68	1.30E+01	3/68	1.05E+01	0/68	1.52E+03	66/68	68/68	0.0847 - 0.3725
METAL	Copper	mg/kg	1.68E+00	1.12E+02	1.12E+01	0/68	68/68	2/68	2.50E+01	0/68	1.43E+03	0/68	2.24E+05	0/68	1/68	0.1067 - 0.2113
METAL	Iron	mg/kg	1.10E+02	2.96E+04	1.23E+04	0/68	68/68	1/68	2.80E+04	1/68	2.51E+04	0/68	3.92E+06	67/68	68/68	0.6677 - 23.597
METAL	Lead	mg/kg	9.37E-01	1.16E+02	1.11E+01	0/70	69/70	2/70	2.30E+01	0/70	4.00E+02	0/70	4.00E+02	0/70	7/70	0.2401 - 18.3
METAL	Magnesium	mg/kg	4.76E+02	1.00E+04	2.10E+03	0/70	70/70	22/70	2.10E+03	0/70	n/a	0/70	n/a	n/a	n/a	3.7451 - 40.2
METAL	Manganese	mg/kg	5.68E+01	1.98E+03	3.41E+02	0/68	68/68	2/68	8.20E+02	0/68	2.58E+03	0/68	1.16E+05	67/68	68/68	0.03 - 0.2014
METAL	Mercury	mg/kg	9.40E-03	9.30E-02	2.68E-02	0/70	68/70	0/70	1.30E-01	0/70	9.00E-01	0/70	7.85E+02	0/70	0/70	0.0078 - 0.025
METAL	Nickel	mg/kg	3.66E+00	5.87E+02	3.13E+01	0/70	70/70	9/70	2.20E+01	7/70	4.28E+01	0/70	3.18E+04	5/70	70/70	0.1277 - 4.95
METAL	Selenium	mg/kg	1.39E-03	6.29E+01	1.63E+00	0/70	47/70	3/70	7.00E-01	0/70	1.79E+02	0/70	2.80E+04	1/70	14/70	0.0008 - 35.8
METAL	Silver	mg/kg	1.93E-01	6.54E+01	4.49E+00	0/70	16/70	1/70	2.70E+00	1/70	1.08E+01	0/70	9.15E+03	1/70	16/70	0.1799 - 4.48
METAL	Sodium	mg/kg	8.71E+01	5.92E+03	3.00E+02	0/68	68/68	6/68	3.40E+02	0/68	n/a	0/68	n/a	n/a	n/a	2.7264 - 11.074
METAL	Thallium	mg/kg	1.23E-01	1.14E+02	1.91E+01	0/68	6/68	1/68	3.40E-01	1/68	2.87E+00	0/68	4.48E+02	1/68	2/68	0.1164 - 0.534
METAL	Vanadium	mg/kg	2.49E+00	4.38E+01	2.12E+01	0/68	68/68	2/68	3.70E+01	68/68	1.51E-01	0/68	9.30E+01	67/68	68/68	0.1449 - 0.6021
METAL	Zinc	mg/kg	7.12E+00	1.65E+03	7.96E+01	2/70	70/70	19/70	6.00E+01	0/70	1.08E+04	0/70	1.68E+06	1/70	57/70	0.0806 - 1.7
SVOA	Acenaphthene	mg/kg	1.70E-01	1.50E+00	6.48E-01	0/14	6/14	0/14	n/a	0/14	6.02E+02	0/14	1.81E+04	0/14	6/14	0.17 - 0.5
SVOA	Acenaphthylene	mg/kg	4.30E-01	4.30E-01	4.30E-01	0/14	1/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.17 - 0.5
SVOA	Anthracene	mg/kg	8.50E-01	2.90E+00	1.61E+00	0/14	4/14	0/14	n/a	0/14	4.05E+03	0/14	1.22E+05	0/14	1/14	0.17 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	4.40E-01	4.40E+00	1.76E+00	0/14	4/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.17 - 0.5
SVOA	Fluoranthene	mg/kg	1.50E-01	1.80E+01	4.81E+00	0/14	10/14	0/14	n/a	0/14	6.01E+02	0/14	1.80E+04	0/14	5/14	0.17 - 0.5
SVOA	Fluorene	mg/kg	2.50E-01	2.30E+00	1.05E+00	0/14	8/14	0/14	n/a	0/14	4.87E+02	0/14	1.46E+04	0/14	8/14	0.17 - 0.5
SVOA	Naphthalene	mg/kg	4.30E-01	1.10E+00	7.65E-01	0/14	2/14	0/14	n/a	0/14	2.24E+00	0/14	2.24E+02	2/14	2/14	0.17 - 0.5
SVOA	Phenanthrene	mg/kg	3.60E-01	1.40E+01	4.23E+00	0/14	8/14	0/14	n/a	0/14	n/a	0/14	n/a	n/a	n/a	0.17 - 0.5
SVOA	Pyrene	mg/kg	1.30E-01	1.60E+01	3.73E+00	0/14	10/14	0/14	n/a	0/14	4.49E+02	0/14	1.35E+04	0/14	6/14	0.17 - 0.5
SVOA	Total PAH	mg/kg	2.96E-01	9.04E+00	3.80E+00	0/14	5/14	0/14	n/a	5/14	5.92E-02	1/14	5.92E+00	5/14	5/14	-
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	-
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/35	0/35	0/35	n/a	0/35	4.89E-02	0/35	5.53E+00	0/35	0/35	0.6 - 1.3
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/35	0/35	0/35	n/a	0/35	4.74E+00	0/35	1.93E+02	0/35	0/35	0.6 - 1.3
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/35	0/35	0/35	n/a	0/35	1.07E+01	0/35	3.42E+02	0/35	0/35	0.6 - 1.3
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/35	0/35	0/35	n/a	0/35	4.69E-02	0/35	4.98E+00	0/35	0/35	0.6 - 1.3
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/35	0/35	0/35	n/a	0/35	2.04E-01	0/35	4.83E+01	0/35	0/35	0.6 - 1.3
RADS	Alpha activity	pCi/g	-3.54E-01	1.77E+01	1.00E+01	0/68	68/68	0/68	n/a	0/68	n/a	0/68	n/a	n/a	n/a	9.3929517535 - 10.595841094

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.

[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.

Thallium metal results are compared to thallium chloride action levels/no action levels.

Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).

Field replicates, or separate samples are counted independently.

The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.4.4. Subsurface Soil RI Data Summary: SWMU 196, C-746-A Septic System

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Industrial Worker FOE	Industrial Worker NAL	Industrial Worker FOE	Industrial Worker AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
METAL	Aluminum	mg/kg	6.62E+03	6.62E+03	6.62E+03	0/1	1/1	0/1	1.20E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.8 - 5.8
METAL	Antimony	mg/kg	2.90E-01	2.90E-01	2.90E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.58 - 0.58
METAL	Arsenic	mg/kg	5.10E+00	5.10E+00	5.10E+00	0/1	1/1	0/1	7.90E+00	1/1	9.97E-01	0/1	9.97E+01	0/1	1/1	1.2 - 11
METAL	Barium	mg/kg	8.97E+01	8.97E+01	8.97E+01	0/1	1/1	0/1	1.70E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.3 - 2.3
METAL	Beryllium	mg/kg	3.60E-01	3.60E-01	3.60E-01	0/1	1/1	0/1	6.90E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.12 - 0.12
METAL	Cadmium	mg/kg	1.90E-02	1.90E-02	1.90E-02	0/1	1/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.058 - 0.058
METAL	Calcium	mg/kg	1.87E+03	1.87E+03	1.87E+03	0/1	1/1	0/1	6.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	57.8 - 57.8
METAL	Chromium	mg/kg	9.10E+00	9.10E+00	9.10E+00	0/1	1/1	0/1	4.30E+01	0/1	3.02E+01	0/1	3.02E+03	0/1	0/1	1.2 - 85
METAL	Cobalt	mg/kg	5.60E+00	5.60E+00	5.60E+00	0/1	1/1	0/1	1.30E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.23 - 0.23
METAL	Copper	mg/kg	6.80E+00	6.80E+00	6.80E+00	0/1	1/1	0/1	2.50E+01	0/1	1.43E+03	0/1	2.24E+05	0/1	0/1	1.2 - 35
METAL	Iron	mg/kg	1.17E+04	1.17E+04	1.17E+04	0/1	1/1	0/1	2.80E+04	0/1	2.51E+04	0/1	3.92E+06	1/1	1/1	5.8 - 100
METAL	Lead	mg/kg	1.16E+01	1.16E+01	1.16E+01	0/1	1/1	0/1	2.30E+01	0/1	4.00E+02	0/1	4.00E+02	0/1	0/1	0.35 - 13
METAL	Magnesium	mg/kg	8.06E+02	8.06E+02	8.06E+02	0/1	1/1	0/1	2.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	57.8 - 57.8
METAL	Manganese	mg/kg	4.69E+02	4.69E+02	4.69E+02	0/1	1/1	0/1	8.20E+02	0/1	2.58E+03	0/1	1.16E+05	1/1	1/1	0.23 - 85
METAL	Mercury	mg/kg	2.08E-02	2.08E-02	2.08E-02	0/1	1/1	0/1	1.30E-01	0/1	9.00E-01	0/1	7.85E+02	0/1	0/1	0.0385 - 10
METAL	Molybdenum	mg/kg	2.60E-01	2.60E-01	2.60E-01	0/1	1/1	0/1	n/a	0/1	1.79E+02	0/1	2.80E+04	0/1	1/1	0.58 - 15
METAL	Nickel	mg/kg	7.50E+00	7.50E+00	7.50E+00	0/1	1/1	0/1	2.20E+01	0/1	4.28E+01	0/1	3.18E+04	0/1	1/1	0.58 - 65
METAL	Selenium	mg/kg	9.40E-01	9.40E-01	9.40E-01	0/1	1/1	1/1	7.00E-01	0/1	1.79E+02	0/1	2.80E+04	0/1	1/1	0.58 - 20
METAL	Silver	mg/kg	2.70E-02	2.70E-02	2.70E-02	0/1	1/1	0/1	2.70E+00	0/1	1.08E+01	0/1	9.15E+03	0/1	0/1	0.23 - 10
METAL	Sodium	mg/kg	5.64E+01	5.64E+01	5.64E+01	0/1	1/1	0/1	3.40E+02	0/1	n/a	0/1	n/a	n/a	n/a	23.1 - 23.1
METAL	Thallium	mg/kg	1.30E-01	1.30E-01	1.30E-01	0/1	1/1	0/1	3.40E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	0/1	0.23 - 0.23
METAL	Uranium	mg/kg	2.09E+00	2.09E+00	2.09E+00	0/1	1/1	0/1	4.60E+00	0/1	1.07E+02	0/1	1.65E+04	0/1	0/1	0.05 - 20
METAL	Vanadium	mg/kg	1.87E+01	1.87E+01	1.87E+01	0/1	1/1	0/1	3.70E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.2 - 1.2
METAL	Zinc	mg/kg	2.65E+01	2.65E+01	2.65E+01	0/1	1/1	0/1	6.00E+01	0/1	1.08E+04	0/1	1.68E+06	0/1	1/1	2.3 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.88E-01	0/1	1.88E+01	0/1	0/1	0.35 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.8 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.38 - 0.38
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.38 - 0.38
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.4.4. Subsurface Soil RI Data Summary: SWMU 196, C-746-A Septic System (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0076 - 0.0076
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.38 - 0.38
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.76 - 0.76
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.38 - 0.38
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0076 - 0.0076
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.8 - 1.8
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.38 - 0.38
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.76 - 0.76
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	0/1	-
RADS	Alpha activity	pCi/g	2.63E+01	2.63E+01	2.63E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.4 - 5.4
RADS	Americium-241	pCi/g	8.00E-03	8.00E-03	8.00E-03	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.012 - 0.012
RADS	Beta activity	pCi/g	2.06E+01	2.06E+01	2.06E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.7 - 2.7
RADS	Cesium-137	pCi/g	-5.00E-03	-5.00E-03	-5.00E-03	0/1	1/1	0/1	2.80E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.13 - 0.13
RADS	Neptunium-237	pCi/g	4.20E-03	4.20E-03	4.20E-03	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.011 - 0.011
RADS	Plutonium-238	pCi/g	8.00E-03	8.00E-03	8.00E-03	0/1	1/1	0/1	n/a	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.026 - 0.026
RADS	Plutonium-239/240	pCi/g	3.00E-03	3.00E-03	3.00E-03	0/1	1/1	0/1	n/a	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.026 - 0.026
RADS	Technetium-99	pCi/g	6.20E-01	6.20E-01	6.20E-01	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	1/1	0.47 - 0.47
RADS	Thorium-228	pCi/g	1.04E+00	1.04E+00	1.04E+00	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.008 - 0.008
RADS	Thorium-230	pCi/g	1.08E+00	1.08E+00	1.08E+00	0/1	1/1	0/1	1.40E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.01 - 0.01
RADS	Thorium-232	pCi/g	1.05E+00	1.05E+00	1.05E+00	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.008 - 0.008
RADS	Uranium-234	pCi/g	7.50E-01	7.50E-01	7.50E-01	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.01 - 0.01
RADS	Uranium-235/236	pCi/g	2.40E-02	2.40E-02	2.40E-02	0/1	1/1	0/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.018 - 0.018
RADS	Uranium-238	pCi/g	6.98E-01	6.98E-01	6.98E-01	0/1	1/1	0/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.016 - 0.016

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

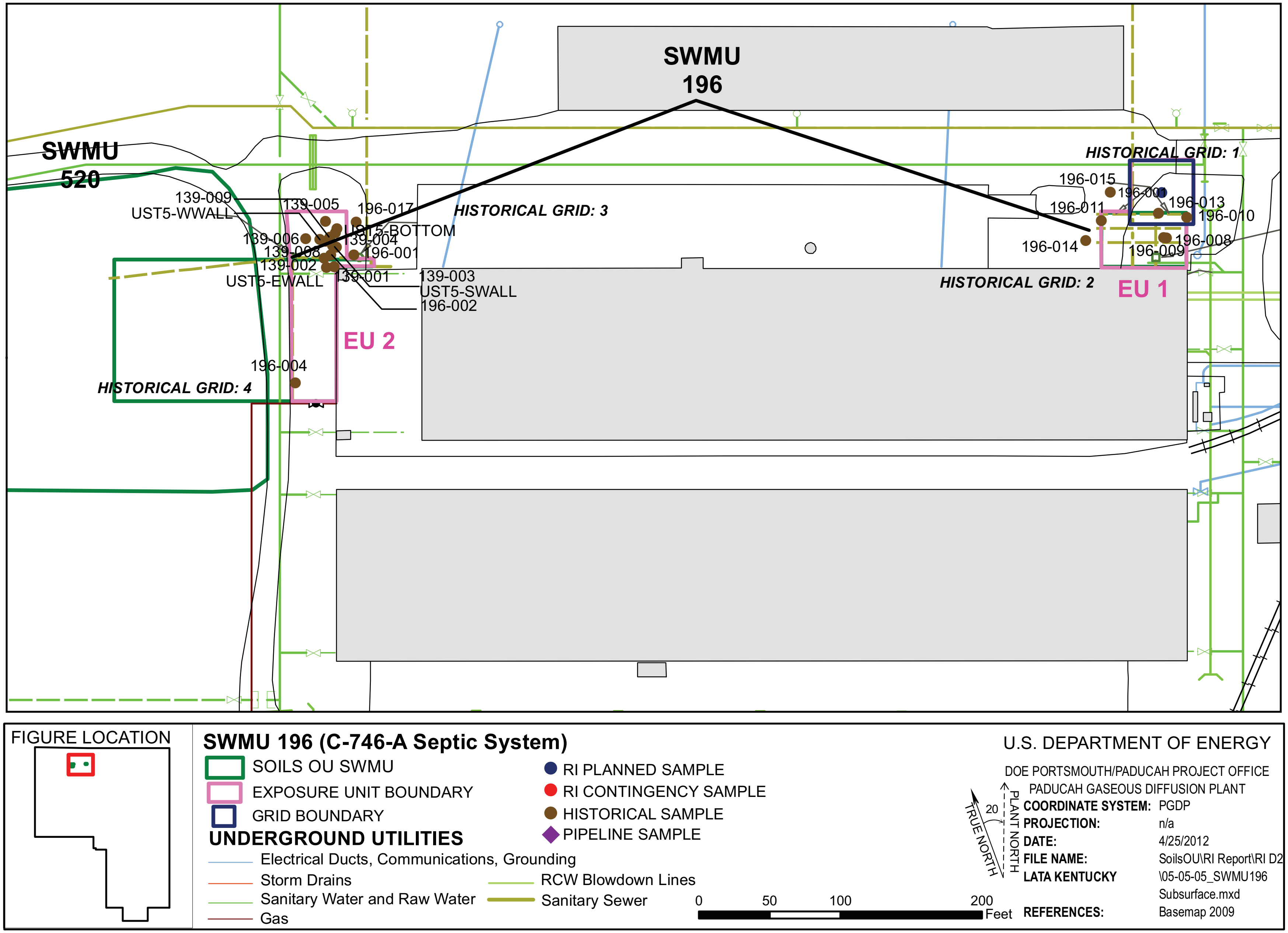


Figure 5.4.5. SWMU 196 Sample Locations - Subsurface Soil

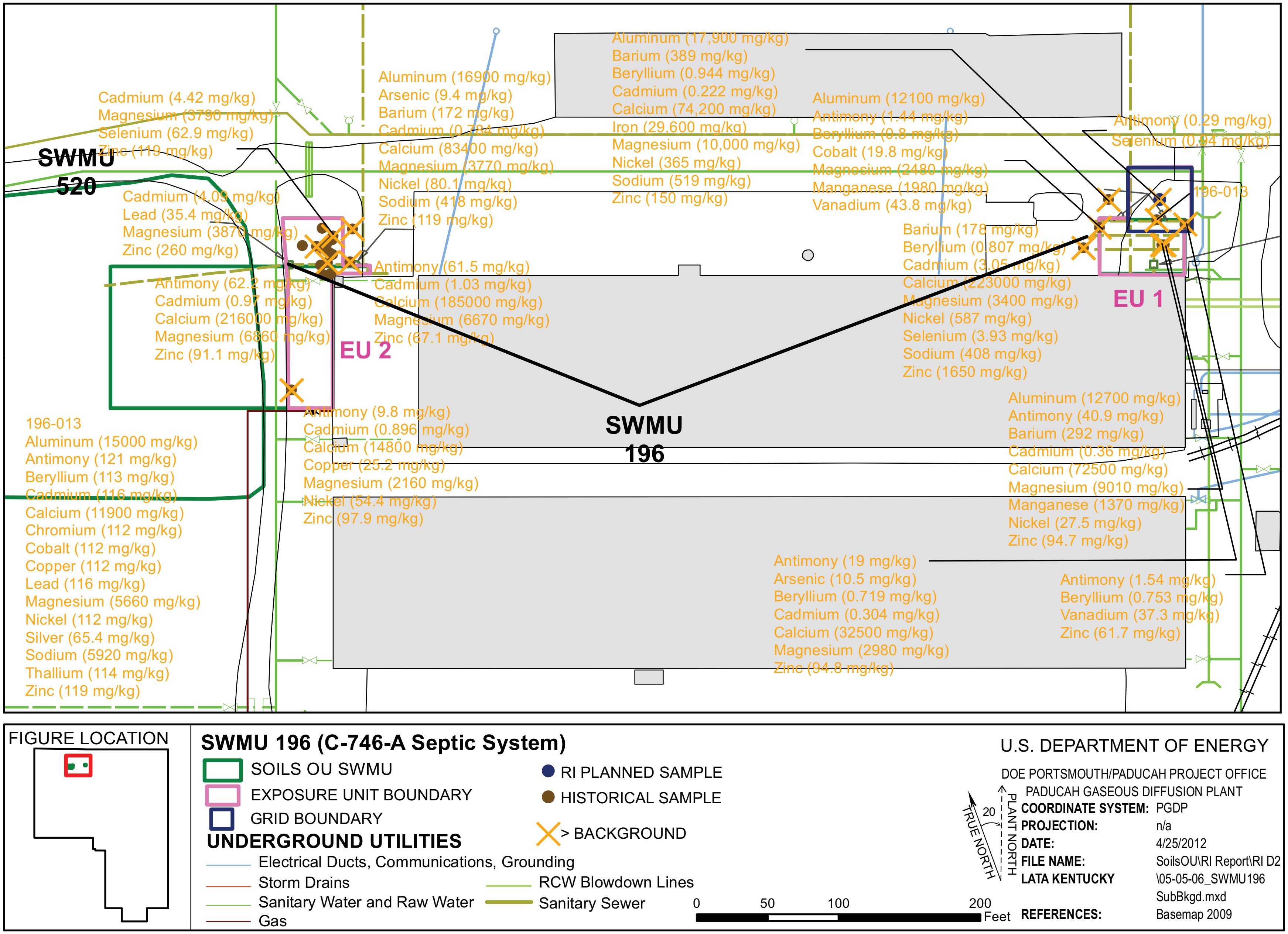


Figure 5.4.6. SWMU 196 Background Exceedances - Subsurface Soil

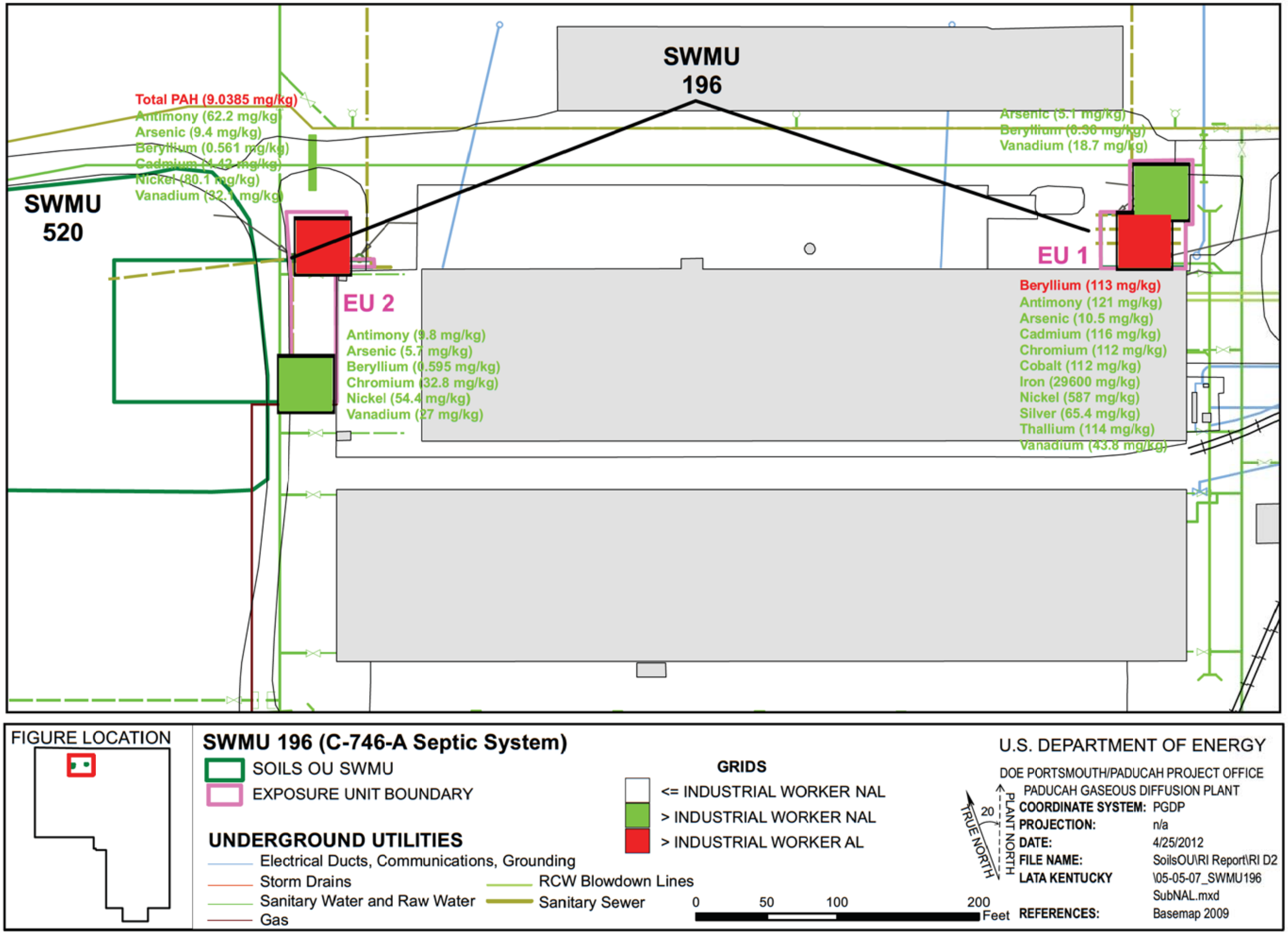


Figure 5.4.7. SWMU 196 NAL Exceedances - Subsurface Soil

The following metals were detected in the SWMU 196 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater.

Metal	Grid	EU
Aluminum	2, 3	1, 2
Antimony	1, 2, 3, 4	1, 2
Arsenic	2, 3	1, 2
Barium	2, 3	1, 2
Beryllium	2	1
Cadmium	2, 3, 4	1, 2
Cobalt	2	1
Copper	2	1
Iron	2	1
Lead	2, 3	1, 2
Manganese	2	1
Molybdenum[1]	1	1
Nickel	2, 3, 4	1, 2
Selenium	1, 2, 3	1, 2
Silver	2	1
Thallium	2, 3	1, 2
Vanadium	2	1
Zinc	2, 3, 4	1, 2

[1]No background value is available.

The following were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

Metal	Grid	EU
Antimony	1, 2, 3, 4	1, 2
Cadmium	2	1
Cobalt	2	1
Iron	2	1
Manganese	2	1
Nickel	2, 3	1, 2
Selenium	3	2
Silver	2	1
Thallium	2	1
Vanadium	2	1
Zinc	2	1

PCBs

One subsurface soil sample, taken from grid 1, EU 1, was analyzed for PCBs. No PCBs were detected in the sample.

SVOCs

Of the SVOCs, Total PAHs in grid 3, EU 2 were detected above both the industrial worker NAL and industrial worker AL in the subsurface soil of SWMU 196.

Acenaphthene, anthracene, fluorine, fluoranthene, naphthalene, pyrene, and Total PAHs in grid 3, EU 2, were detected above the SSLs for the protection of UCRS groundwater.

Naphthalene and Total PAHs in grid 3, EU 2 were detected above the SSLs for the protection of RGA groundwater.

VOCs

No VOCs were detected in the SWMU 196 subsurface soil.

Radionuclides

One subsurface soil sample was collected, in grid 1, EU 1, during the RI. No radionuclides were detected above the industrial worker NALs or ALs in the subsurface soil of SWMU 196.

No radionuclides were detected above both the background screening levels and SSLs for the protection of UCRS and RGA groundwater.

5.4.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no concern for significant potential runoff from SWMU 196. This SWMU is underground; therefore, it has no direct connection to surface water. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs/AOCs to surrounding ditches.

5.4.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 196 were evaluated for each of the EUs for direct contact. These results are summarized in Appendix D and in the following subsections, including the COCs and relative contributions to the overall ELCR/HI. COCs for this SWMU include metals, organics, and radionuclides.

The cumulative ELCR and the cumulative HI for one or more EUs at SWMU 196 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 5.4.5 for the future industrial worker, excavation worker, and the hypothetical resident. Table 5.4.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 196 include metals and PCBs: PCBs had an average HQ $\geq$ 10 or greater. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 5.4.6.

Table 5.4.5. RGOs for SWMU 196

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	**COC**	**EPC[1]**	**Units**	**ELCR[2]**	**1 x 10^{-6}**	**1 x 10^{-5}**	**1 x 10^{-4}**	**HI[4]**	**0.1**	**1**	**3**
Future Industrial Worker											
1	Neptunium-237	3.11E-01	pCi/g	1.1E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.1E-06**				**< 1**			
2	PCB, Total	1.51E+00	mg/kg	8.0E-06	1.88E-01	1.88E+00	1.88E+01	n/a	n/a	n/a	n/a
	Total PAH	6.80E-01	mg/kg	1.1E-05	5.92E-02	5.92E-01	5.92E+00	n/a	n/a	n/a	n/a
	Uranium-238	2.21E+00	pCi/g	1.3E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**2.1E-05**				**< 1**			
Excavation Worker											
1[5]	Antimony	1.21E+02	mg/kg	< 1.0E-06	n/a	n/a	n/a	0.3	3.68E+01	3.68E+02	1.10E+03
	Cadmium	1.16E+02	mg/kg	< 1.0E-06	n/a	n/a	n/a	0.2	6.50E+01	6.50E+02	1.95E+03
	Cobalt	1.12E+02	mg/kg	< 1.0E-06	n/a	n/a	n/a	0.4	2.73E+01	2.73E+02	8.18E+02
	Thallium	1.14E+02	mg/kg	< 1.0E-06	n/a	n/a	n/a	1.6	7.35E+00	7.35E+01	2.21E+02
	Cumulative			**< 1.0E-06**				**2.5**			
2	Total PAH	9.04E+00	mg/kg	2.3E-06	3.88E+00	3.88E+01	3.88E+02	n/a	n/a	n/a	n/a
	Cumulative			**2.3E-06**				**< 1**			
Hypothetical Resident[6]											
1	Chromium	1.96E+01	mg/kg	1.3E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Neptunium-237	3.11E-01	pCi/g	5.8E-06	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Uranium-238	1.54E+00	pCi/g	4.5E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.2E-05**				**< 1**			
2	PCB, Total	1.51E+00	mg/kg	2.4E-05	6.38E-02	6.38E-01	6.38E+00	n/a	n/a	n/a	n/a
	Total PAH	6.80E-01	mg/kg	3.5E-05	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	n/a
	Uranium-238	2.21E+00	pCi/g	6.4E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Chromium	2.07E+01	mg/kg	1.3E-06	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	n/a
	Cumulative			**6.6E-05**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
Note: Subsurface VOC-contaminated soil at SWMU 1 is being addressed by the VOC Sources for the Southwest Plume project, as defined in the VOC Sources for the Southwest Plumes ROD (DOE 2012).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.11, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.11, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] EPC is based on maximum results from one sample within the grid Other samples within the grid show much lower results for these metals.
[6] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 5.4.6 Ecological Screening for SWMU 196

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Grassy	No	186	Nickel	2.10E+01	5.56E+02	3.80E+01	15
			PCB, Total	n/a	2.50E+00	2.00E-02	125
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

5.4.7 SWMU 196 Summary

The following text summarizes the results for SWMU 196 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

This SWMU consists of two septic tanks that were just outside the C-746-A Building. The septic tanks could have received discharges from the processes that took place in the C-746-A Building, which included metal smelting, and most of that was radiologically contaminated.

The nature and extent of SWMU 196 surface and subsurface soil contamination is considered adequately defined for supporting the baseline risk assessment and FS.

COPCs for surface and subsurface soils from SWMU 196 are shown on Tables 5.4.1–5.4.4 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. A complete list of sampling results is provided in Appendix G.

The types of contaminants that comprise COPCs for SWMU 196 for each EU are as follows:

- EU 1 (northeast corner)
    - Surface—metals, radionuclides
    - Subsurface—metals, radionuclides
- EU 2 (northwest corner)
    - Surface—metals, PCBs, SVOCs, radionuclides
    - Subsurface—metals, SVOCs

Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 16 ft bgs.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

SWMU 196 consists of two septic systems. Historical sampling extended to a depth of 16 ft bgs (Appendix G) and is located close to the proposed RI pipeline samples. The septic pipeline is located at approximately 10 ft bgs; therefore, the migration pathway is defined adequately. Contamination in these two septic tanks is unlikely to migrate because the contaminants are readily adsorbed onto soil particles, and there is no direct connection to surface water from either of these two tanks. There are no additional underground pipelines that provide a migration pathway from the area of these two SWMUs. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker, excavation worker, and hypothetical residential scenarios. The following are COCs for these scenarios for SWMU 196.

- Future Industrial worker

  - Neptunum-237
  - Total PAHs
  - Total PCBs
  - Uranium-238

- Excavation worker

  - Antimony
  - Cadmium
  - Cobalt
  - Thallium
  - Total PAHs

Note: COC data from EU 1 was collected from the subsurface and appear to have been collected from a hot spot for the metals. Other samples within the grid in EU 1 show much lower results.

- Hypothetical Resident (hazards evaluated against the child resident)

  - Chromium
  - Neptunium-237
  - Total PAHs
  - Total PCBs
  - Uranium-238

Of the above, there are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04). Priority COCs for other scenarios are described in Appendix D.

For SWMU 196, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Nickel
- Total PCBs
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 196 is sufficient to support decision making and indicates that a FS is appropriate. Possible remedial technologies for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. Response actions could be impacted by the C-746-A Waste Storage Facility (SWMU 144) immediately south of this SWMU. The former C-746-A East End Smelter (SWMU 463) also is south of SWMU 196, but it was demolished during the summer of 2010. A response action at this SWMU is unlikely to impact integrator OUs. A response action at the west portion of SWMU 196 would impact SWMU 520.

5.4.8 SWMU 196 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 196; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker, excavation worker, and hypothetical residential (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial as shown in the SMP (DOE 2012a).

5.5 SWMU 489, C-710 NORTH SEPTIC TANK, NORTH OF C-710

5.5.1 Background

The septic tank north of C-710 (SWMU 489) is constructed of cement blocks and located in the central portion of the plant site. SWMU 489 is approximately 200 ft^3 (8 ft x 5 ft x 5 ft). The tank is below a doublewide trailer. This SWMU has no direct connection to surface water.

Due to the construction materials and the manner in which it was constructed, it is believed that the septic tank was associated with the original construction activities of the PGDP in the early 1950s. SWMU 489 was discovered on June 1, 2001, as a result of a construction project for the DOE Materials Storage Areas (DMSA) trailers in the field north of the C-710 Laboratory. During excavation, what appeared to be an abandoned septic tank was discovered. The tank appeared to have had the top and contents removed, and backfilled with sand prior to being left in place. When the septic tank was uncovered, water was present in the interior of the tank from past rainfall events. The septic tank has been backfilled, the backfill has been compacted and graded, and 9–10 inches of dense grade aggregate was on top of the tank area.

Prior to excavation in May 2001, radiological surveys of this area were performed. Results of these surveys indicated no radiological contamination was present. Additionally, a sample of the sand showed no results above background.

5.5.2 Fieldwork Summary

Two grid samples were planned and collected for the unit.

The SWMU underwent a gamma radiological walkover survey using a FIDLER (Figure 5.5.1); the 27 measurements ranged from 4,201 to 5,889 gross cpm. This SWMU is now in the C-412 Trailer Park and is covered entirely of gravel. The GWS instrumentation encountered interference in close proximity to the trailer resulting in a shift of survey point positional data toward the north, as evidenced in Figure 5.5.1. Due to the media surveyed (i.e., gravel), the project-wide background count rate was higher than the actual ambient background. A judgmental grab sample was not collected for radiological constituents because no project exceedances were identified.

Figure 5.5.1. SWMU 489 Gamma Walkover Survey

5.5.3 Nature and Extent of Contamination—Surface Soils

The representative data set for SWMU 489 surface soils is presented in Table 5.5.1 and provides the nature of the contamination in SWMU 489 surface soils. Figures 5.5.2–5.5.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 489 surface soil contamination is considered adequately defined for supporting the baseline risk assessment and FS. SWMU 489 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 489 surface soil sample. Metals detected at or above both background screening levels and the industrial worker NALs were chromium and nickel.

No metals were detected above the industrial worker ALs in the SWMU 489 surface soil sample.

The following metals were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater: molybdenum (no background value available), nickel, selenium, and thallium. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

No PCBs were detected in the SWMU 489 surface soil sample.

SVOCs

Total PAHs were detected above the industrial worker NALs and the SSLs for the protection of UCRS groundwater in the SWMU 489 surface soil. The PAHs may be due to vehicular traffic around the C-412 Trailer Park. Total PAHs were not detected above the industrial worker ALs or the SSLs for the protection of RGA groundwater in the SWMU 489 surface soil.

VOCs

No VOCs were detected above the industrial worker NALs or ALs in the SWMU 489 surface soil.

Methylene chloride was detected above the SSLs for the protection of UCRS groundwater. No VOCs were detected above the SSLs for the protection of RGA groundwater in SWMU 489 surface soil.

Radionuclides

No radionuclides were detected above the industrial worker NALs or the industrial worker ALs in the SWMU 489 surface soil. No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

Table 5.5.1. Surface Soil RI Data Summary: SWMU 489 C-710 North Septic Tank

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	7.08E+03	7.08E+03	7.08E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.7 - 5.7
METAL	Antimony	mg/kg	2.70E-01	2.70E-01	2.70E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	0/1	0.57 - 0.57
METAL	Arsenic	mg/kg	5.00E+00	6.86E+00	5.62E+00	0/2	2/2	0/2	1.20E+01	2/2	9.97E-01	0/2	9.97E+01	0/2	2/2	1.1 - 11
METAL	Barium	mg/kg	1.00E+02	1.00E+02	1.00E+02	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.3 - 2.3
METAL	Beryllium	mg/kg	4.40E-01	4.40E-01	4.40E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.11 - 0.11
METAL	Cadmium	mg/kg	8.50E-02	8.50E-02	8.50E-02	0/1	1/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.057 - 0.057
METAL	Calcium	mg/kg	1.27E+04	1.27E+04	1.27E+04	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	57.5 - 57.5
METAL	Chromium	mg/kg	4.16E+01	4.16E+01	4.16E+01	0/2	1/2	1/2	1.60E+01	1/2	3.02E+01	0/2	3.02E+03	0/2	0/2	1.1 - 85
METAL	Cobalt	mg/kg	6.50E+00	6.50E+00	6.50E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.23 - 0.23
METAL	Copper	mg/kg	9.50E+00	9.50E+00	9.50E+00	0/2	1/2	0/2	1.90E+01	0/2	1.43E+03	0/2	2.24E+05	0/2	0/2	1.1 - 35
METAL	Iron	mg/kg	1.19E+04	1.26E+04	1.24E+04	0/2	2/2	0/2	2.80E+04	0/2	2.51E+04	0/2	3.92E+06	2/2	2/2	5.7 - 100
METAL	Lead	mg/kg	1.23E+01	1.39E+01	1.28E+01	0/2	2/2	0/2	3.60E+01	0/2	4.00E+02	0/2	4.00E+02	0/2	1/2	0.34 - 13
METAL	Magnesium	mg/kg	1.33E+03	1.33E+03	1.33E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	57.5 - 57.5
METAL	Manganese	mg/kg	2.48E+02	3.83E+02	3.38E+02	0/2	2/2	0/2	1.50E+03	0/2	2.58E+03	0/2	1.16E+05	2/2	2/2	0.23 - 85
METAL	Mercury	mg/kg	3.39E-02	3.39E-02	3.39E-02	0/2	1/2	0/2	2.00E-01	0/2	9.00E-01	0/2	7.85E+02	0/2	0/2	0.0383 - 10
METAL	Molybdenum	mg/kg	5.00E-01	5.00E-01	5.00E-01	0/2	1/2	0/2	n/a	0/2	1.79E+02	0/2	2.80E+04	0/2	1/2	0.57 - 15
METAL	Nickel	mg/kg	5.97E+01	7.88E+01	6.61E+01	0/2	2/2	2/2	2.10E+01	2/2	4.28E+01	0/2	3.18E+04	0/2	2/2	0.57 - 65
METAL	Selenium	mg/kg	1.40E+00	1.40E+00	1.40E+00	0/2	1/2	1/2	8.00E-01	0/2	1.79E+02	0/2	2.80E+04	0/2	1/2	0.57 - 20
METAL	Silver	mg/kg	4.10E-02	4.10E-02	4.10E-02	0/2	1/2	0/2	2.30E+00	0/2	1.08E+01	0/2	9.15E+03	0/2	0/2	0.23 - 10
METAL	Sodium	mg/kg	2.27E+02	2.27E+02	2.27E+02	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	23 - 23
METAL	Thallium	mg/kg	2.70E-01	2.70E-01	2.70E-01	0/1	1/1	1/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.23 - 0.23
METAL	Uranium	mg/kg	4.41E+00	4.41E+00	4.41E+00	0/2	1/2	0/2	4.90E+00	0/2	1.07E+02	0/2	1.65E+04	0/2	0/2	0.04 - 20
METAL	Vanadium	mg/kg	2.35E+01	2.35E+01	2.35E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	4.35E+01	4.43E+01	4.40E+01	0/2	2/2	0/2	6.50E+01	0/2	1.08E+04	0/2	1.68E+06	0/2	2/2	2.3 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.88E-01	0/2	1.88E+01	0/2	0/2	0.34 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.8 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.38 - 0.38
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.38 - 0.38
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.5.1. Surface Soil RI Data Summary: SWMU 489 C-710 North Septic Tank (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0076 - 0.0076
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Fluoranthene	mg/kg	1.40E-01	1.40E-01	1.40E-01	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.38 - 0.38
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.76 - 0.76
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.38 - 0.38
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0076 - 0.0076
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.8 - 1.8
SVOA	Phenanthrene	mg/kg	8.10E-02	8.10E-02	8.10E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Pyrene	mg/kg	1.20E-01	1.20E-01	1.20E-01	1/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.38 - 0.38
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.76 - 0.76
SVOA	Total PAH	mg/kg	8.22E-02	8.22E-02	8.22E-02	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
VOA	1,1,1,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0057 - 0.0057
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0057 - 0.0057
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.89E-02	0/1	5.53E+00	0/1	0/1	0.0057 - 0.0057
VOA	1,2,3-Trichloropropane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	1,2-Dibromoethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0057 - 0.0057
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.38E+02	0/1	8.21E+03	0/1	0/1	0.0057 - 0.0057
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023
VOA	2-Chloroethyl vinyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023
VOA	Acrolein	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.057 - 0.057
VOA	Acrylonitrile	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.70E-01	0/1	2.67E+01	n/a	n/a	0.057 - 0.057
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.98E-01	0/1	8.22E+01	0/1	0/1	0.0057 - 0.0057
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.011 - 0.011
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.97E-01	0/1	5.76E+01	0/1	0/1	0.0057 - 0.0057
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0057 - 0.0057
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.011 - 0.011
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.42E-01	0/1	2.49E+01	0/1	0/1	0.0057 - 0.0057

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.5.1. Surface Soil RI Data Summary: SWMU 489 C-710 North Septic Tank (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.011 - 0.011
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.74E+00	0/1	1.93E+02	0/1	0/1	0.0057 - 0.0057
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0057 - 0.0057
VOA	Dibromomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	Dichlorodifluoromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.011 - 0.011
VOA	Ethyl methacrylate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.29E+00	0/1	3.84E+02	0/1	0/1	0.0057 - 0.0057
VOA	Iodomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.50E+01	0/1	1.07E+03	0/1	0/1	0.0057 - 0.0057
VOA	Methylene chloride	mg/kg	1.80E-02	1.80E-02	1.80E-02	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	1/1	0.0057 - 0.0057
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0057 - 0.0057
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.82E-01	0/1	7.08E+01	0/1	0/1	0.0057 - 0.0057
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0057 - 0.0057
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.07E+01	0/1	3.42E+02	0/1	0/1	0.0057 - 0.0057
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	Trans-1,4-Dichloro-2-butene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.011 - 0.011
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.69E-02	0/1	4.98E+00	0/1	0/1	0.0057 - 0.0057
VOA	Trichlorofluoromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0057 - 0.0057
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.04E-01	0/1	4.83E+01	0/1	0/1	0.0057 - 0.0057
RADS	Alpha activity	pCi/g	3.01E+01	3.01E+01	3.01E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.1 - 5.1
RADS	Americium-241	pCi/g	1.10E-02	1.10E-02	1.10E-02	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.02 - 0.02
RADS	Beta activity	pCi/g	3.07E+01	3.07E+01	3.07E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.9 - 3.9
RADS	Cesium-137	pCi/g	3.20E-02	3.20E-02	3.20E-02	0/1	1/1	0/1	4.90E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.052 - 0.052
RADS	Neptunium-237	pCi/g	7.00E-03	7.00E-03	7.00E-03	0/1	1/1	0/1	1.00E-01	0/1	2.71E-01	0/1	2.71E+01	0/1	1/1	0.023 - 0.023
RADS	Plutonium-238	pCi/g	1.00E-02	1.00E-02	1.00E-02	0/1	1/1	0/1	7.30E-02	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.016 - 0.016
RADS	Plutonium-239/240	pCi/g	1.10E-02	1.10E-02	1.10E-02	0/1	1/1	0/1	2.50E-02	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.014 - 0.014
RADS	Technetium-99	pCi/g	2.80E-01	2.80E-01	2.80E-01	0/1	1/1	0/1	2.50E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	0/1	0.51 - 0.51
RADS	Thorium-228	pCi/g	8.80E-01	8.80E-01	8.80E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.03 - 0.03
RADS	Thorium-230	pCi/g	9.50E-01	9.50E-01	9.50E-01	0/1	1/1	0/1	1.50E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.01 - 0.01
RADS	Thorium-232	pCi/g	9.90E-01	9.90E-01	9.90E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
RADS	Uranium-234	pCi/g	1.26E+00	1.26E+00	1.26E+00	0/1	1/1	1/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	8.40E-02	8.40E-02	8.40E-02	0/1	1/1	1/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.009 - 0.009
RADS	Uranium-238	pCi/g	1.47E+00	1.47E+00	1.47E+00	0/1	1/1	1/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.01 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

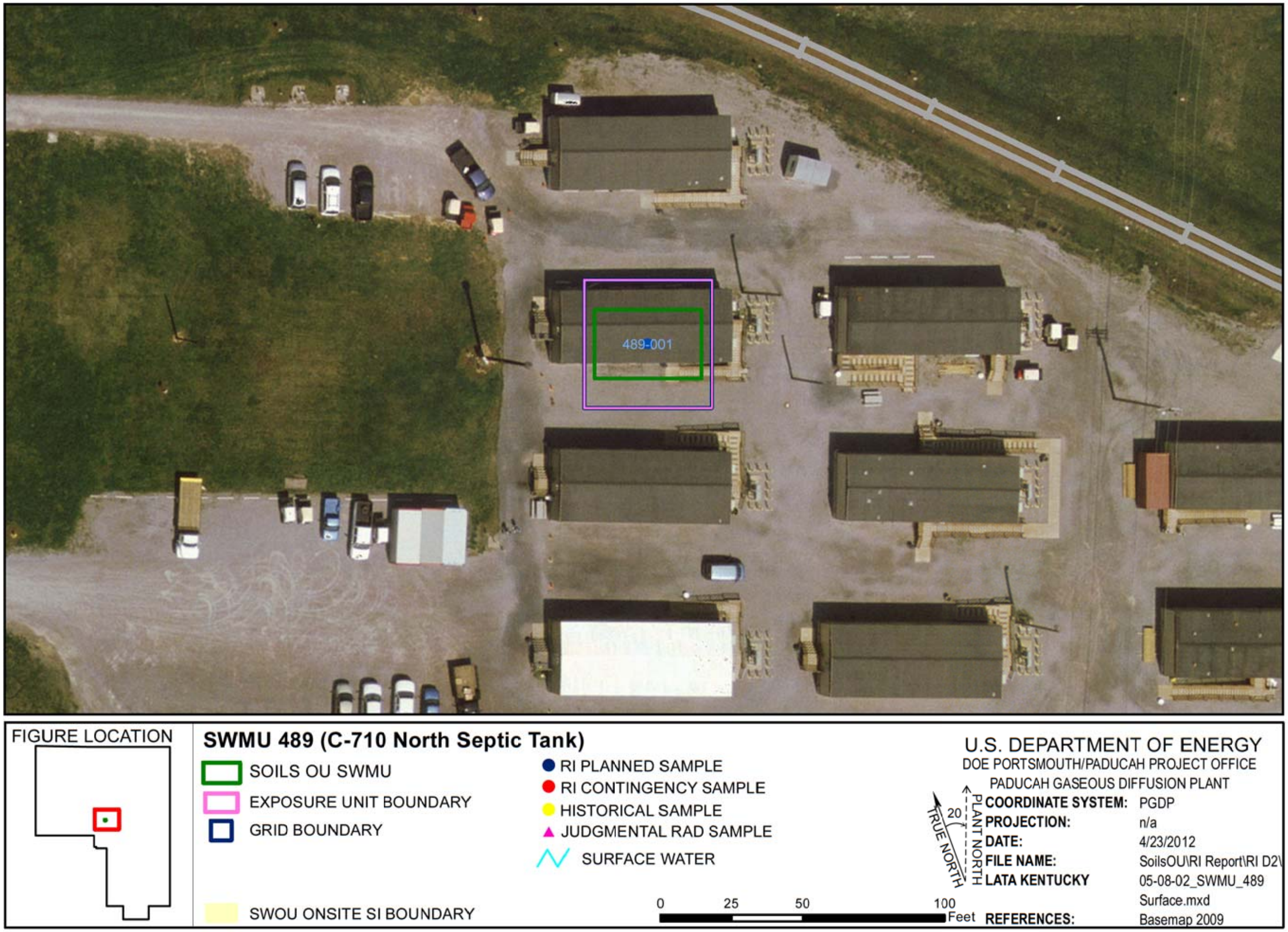


Figure 5.5.2. SWMU 489 Sample Locations - Surface Soil

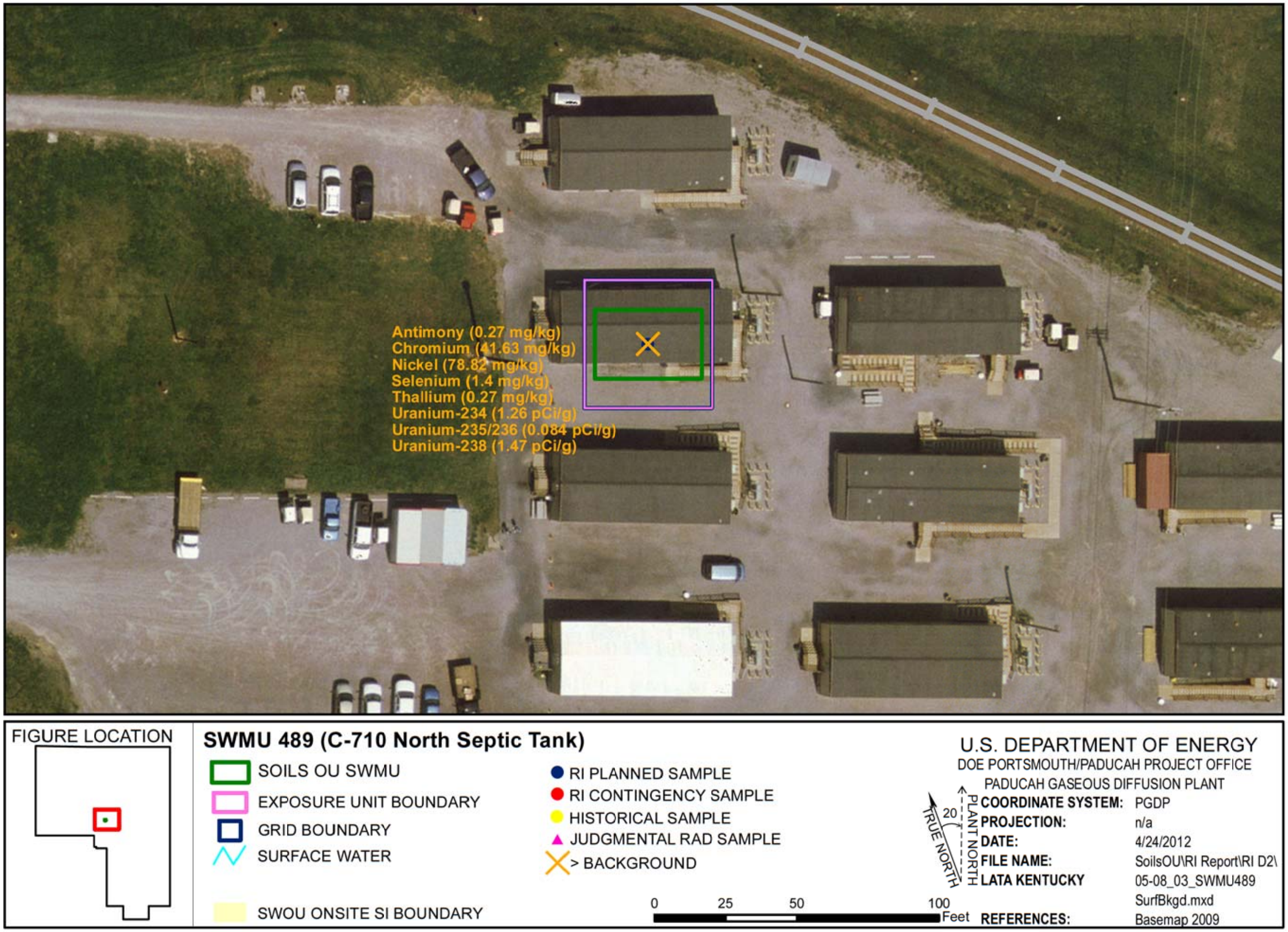


Figure 5.5.3. SWMU 489 Background Exceedances - Surface Soil

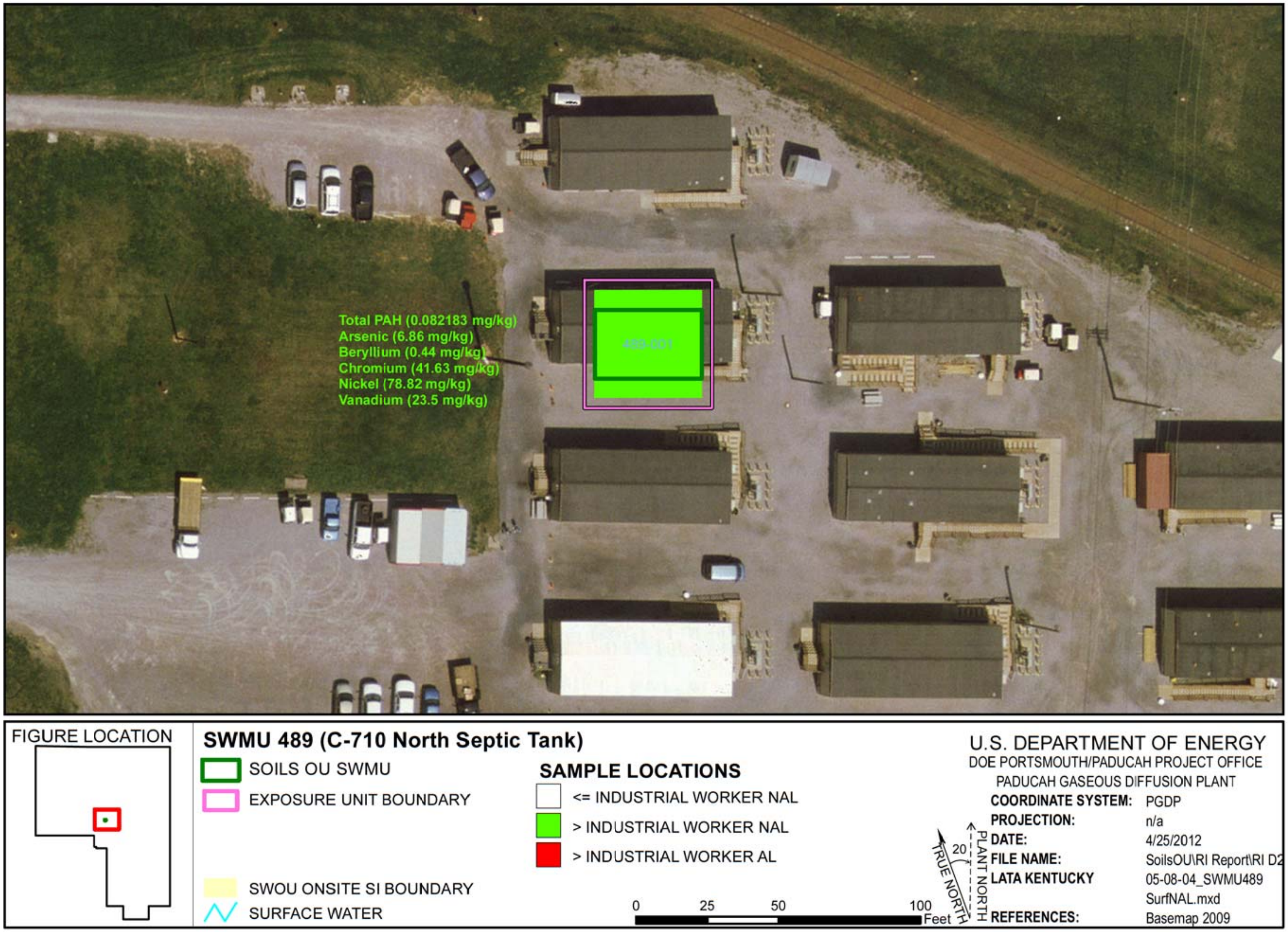


Figure 5.5.4. SWMU 489 NAL Exceedances - Surface Soil

5.5.4 Nature and Extent of Contamination—Subsurface Soils

The representative data set for SWMU 489 subsurface soils is presented in Table 5.5.2 and provides the nature of the contamination in SWMU 489 subsurface soils. Figures 5.5.5–5.5.7 illustrate the horizontal extent. A complete list of detailed sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 489 subsurface soil contamination is considered adequately defined for supporting the baseline risk assessment and FS. SWMU 489 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 489 surface soil sample. Arsenic was detected above both the background screening level and the industrial worker NAL. The detection was at 4 ft bgs, which also was the end depth of the borehole.

No metals were detected above the industrial worker ALs in the SWMU 489 subsurface soil.

The following metals were detected in the SWMU 489 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater: antimony, arsenic, cadmium, molybdenum (no background value available), selenium, and zinc. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

No PCBs were detected above industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 489 subsurface soil.

SVOCs

No SVOCs were detected above industrial worker NALs or ALs. Total PAHs were detected above the SSLs for the protection of UCRS groundwater; none were detected above the SSLs for the protection of RGA groundwater in the SWMU 489 subsurface soil.

VOCs

No VOCs were detected above industrial worker NALs or ALs in the SWMU 489 subsurface soil.

Of the VOCs, methylene chloride was detected above the SSLs for the protection of UCRS groundwater. No VOCs were detected above the SSLs for the protection of RGA groundwater in the SWMU 489 subsurface soil.

Radionuclides

No radionuclides were detected above the industrial worker NALs or ALs in the SWMU 489 subsurface soil.

Neptunium-237 (no background value available) was detected above the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

Table 5.5.2. Subsurface Soil RI Data Summary: SWMU 489 C-710 North Septic Tank

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.69E+03	5.69E+03	5.69E+03	0/1	1/1	0/1	1.20E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.9 - 5.9
METAL	Antimony	mg/kg	3.10E-01	3.10E-01	3.10E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.59 - 0.59
METAL	Arsenic	mg/kg	1.00E+01	1.00E+01	1.00E+01	0/1	1/1	1/1	7.90E+00	1/1	9.97E-01	0/1	9.97E+01	0/1	1/1	1.2 - 11
METAL	Barium	mg/kg	1.09E+02	1.09E+02	1.09E+02	0/1	1/1	0/1	1.70E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.3 - 2.3
METAL	Beryllium	mg/kg	4.70E-01	4.70E-01	4.70E-01	0/1	1/1	0/1	6.90E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.12 - 0.12
METAL	Cadmium	mg/kg	8.70E-01	8.70E-01	8.70E-01	0/1	1/1	1/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	1/1	0.059 - 0.059
METAL	Calcium	mg/kg	1.84E+04	1.84E+04	1.84E+04	0/1	1/1	1/1	6.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	58.7 - 58.7
METAL	Chromium	mg/kg	1.81E+01	1.81E+01	1.81E+01	0/1	1/1	0/1	4.30E+01	0/1	3.02E+01	0/1	3.02E+03	0/1	0/1	1.2 - 85
METAL	Cobalt	mg/kg	7.30E+00	7.30E+00	7.30E+00	0/1	1/1	0/1	1.30E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.23 - 0.23
METAL	Copper	mg/kg	9.20E+00	9.20E+00	9.20E+00	0/1	1/1	0/1	2.50E+01	0/1	1.43E+03	0/1	2.24E+05	0/1	0/1	1.2 - 35
METAL	Iron	mg/kg	1.71E+04	1.71E+04	1.71E+04	0/1	1/1	0/1	2.80E+04	0/1	2.51E+04	0/1	3.92E+06	1/1	1/1	5.9 - 100
METAL	Lead	mg/kg	1.27E+01	1.27E+01	1.27E+01	0/1	1/1	0/1	2.30E+01	0/1	4.00E+02	0/1	4.00E+02	0/1	0/1	0.35 - 13
METAL	Magnesium	mg/kg	1.33E+03	1.33E+03	1.33E+03	0/1	1/1	0/1	2.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	58.7 - 58.7
METAL	Manganese	mg/kg	6.80E+02	6.80E+02	6.80E+02	0/1	1/1	0/1	8.20E+02	0/1	2.58E+03	0/1	1.16E+05	1/1	1/1	0.23 - 85
METAL	Mercury	mg/kg	1.56E-02	1.56E-02	1.56E-02	0/1	1/1	0/1	1.30E-01	0/1	9.00E-01	0/1	7.85E+02	0/1	0/1	0.0391 - 10
METAL	Molybdenum	mg/kg	7.40E-01	7.40E-01	7.40E-01	0/1	1/1	0/1	n/a	0/1	1.79E+02	0/1	2.80E+04	0/1	1/1	0.59 - 15
METAL	Nickel	mg/kg	8.10E+00	8.10E+00	8.10E+00	0/1	1/1	0/1	2.20E+01	0/1	4.28E+01	0/1	3.18E+04	0/1	1/1	0.59 - 65
METAL	Selenium	mg/kg	1.20E+00	1.20E+00	1.20E+00	0/1	1/1	1/1	7.00E-01	0/1	1.79E+02	0/1	2.80E+04	0/1	1/1	0.59 - 20
METAL	Silver	mg/kg	3.20E-02	3.20E-02	3.20E-02	0/1	1/1	0/1	2.70E+00	0/1	1.08E+01	0/1	9.15E+03	0/1	0/1	0.23 - 10
METAL	Sodium	mg/kg	8.07E+01	8.07E+01	8.07E+01	0/1	1/1	0/1	3.40E+02	0/1	n/a	0/1	n/a	n/a	n/a	23.5 - 23.5
METAL	Thallium	mg/kg	1.80E-01	1.80E-01	1.80E-01	0/1	1/1	0/1	3.40E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.23 - 0.23
METAL	Uranium	mg/kg	1.24E+01	1.24E+01	1.24E+01	0/1	1/1	1/1	4.60E+00	0/1	1.07E+02	0/1	1.65E+04	0/1	0/1	0.05 - 20
METAL	Vanadium	mg/kg	2.70E+01	2.70E+01	2.70E+01	0/1	1/1	0/1	3.70E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.2 - 1.2
METAL	Zinc	mg/kg	2.12E+02	2.12E+02	2.12E+02	0/1	1/1	1/1	6.00E+01	0/1	1.08E+04	0/1	1.68E+06	0/1	1/1	2.3 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.88E-01	0/1	1.88E+01	0/1	0/1	0.35 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.9 - 1.9
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.39 - 0.39
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.39 - 0.39
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.5.2. Subsurface Soil RI Data Summary: SWMU 489 C-710 North Septic Tank (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0077 - 0.0077
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	1.90E-01	1.90E-01	1.90E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Fluoranthene	mg/kg	4.10E-02	4.10E-02	4.10E-02	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.39 - 0.39
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.39 - 0.39
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.39 - 0.39
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.77 - 0.77
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.39 - 0.39
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0077 - 0.0077
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.9 - 1.9
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.39 - 0.39
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.77 - 0.77
SVOA	Total PAH	mg/kg	2.20E-02	2.20E-02	2.20E-02	0/1	1/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
VOA	1,1,1,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0059 - 0.0059
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0059 - 0.0059
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.89E-02	0/1	5.53E+00	0/1	0/1	0.0059 - 0.0059
VOA	1,2,3-Trichloropropane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	1,2-Dibromoethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0059 - 0.0059
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.38E+02	0/1	8.21E+03	0/1	0/1	0.0059 - 0.0059
VOA	2-Butanone	mg/kg	1.40E-02	1.40E-02	1.40E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023
VOA	2-Chloroethyl vinyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023
VOA	Acetone	mg/kg	1.40E-01	1.40E-01	1.40E-01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023
VOA	Acrolein	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.059 - 0.059
VOA	Acrylonitrile	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.70E-01	0/1	2.67E+01	n/a	n/a	0.059 - 0.059
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.98E-01	0/1	8.22E+01	0/1	0/1	0.0059 - 0.0059
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.97E-01	0/1	5.76E+01	0/1	0/1	0.0059 - 0.0059
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0059 - 0.0059
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.42E-01	0/1	2.49E+01	0/1	0/1	0.0059 - 0.0059

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.5.2. Subsurface Soil RI Data Summary: SWMU 489 C-710 North Septic Tank (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.74E+00	0/1	1.93E+02	0/1	0/1	0.0059 - 0.0059
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0059 - 0.0059
VOA	Dibromomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Dichlorodifluoromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	Ethyl methacrylate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.29E+00	0/1	3.84E+02	0/1	0/1	0.0059 - 0.0059
VOA	Iodomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.50E+01	0/1	1.07E+03	0/1	0/1	0.0059 - 0.0059
VOA	Methylene chloride	mg/kg	2.00E-02	2.00E-02	2.00E-02	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	1/1	0.0059 - 0.0059
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0059 - 0.0059
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.82E-01	0/1	7.08E+01	0/1	0/1	0.0059 - 0.0059
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0059 - 0.0059
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.07E+01	0/1	3.42E+02	0/1	0/1	0.0059 - 0.0059
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Trans-1,4-Dichloro-2-butene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.69E-02	0/1	4.98E+00	0/1	0/1	0.0059 - 0.0059
VOA	Trichlorofluoromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.04E-01	0/1	4.83E+01	0/1	0/1	0.0059 - 0.0059
RADS	Alpha activity	pCi/g	3.05E+01	3.05E+01	3.05E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	4.6 - 4.6
RADS	Americium-241	pCi/g	6.70E-03	6.70E-03	6.70E-03	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.014 - 0.014
RADS	Beta activity	pCi/g	3.07E+01	3.07E+01	3.07E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.6 - 3.6
RADS	Cesium-137	pCi/g	7.30E-02	7.30E-02	7.30E-02	1/1	1/1	0/1	2.80E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.036 - 0.036
RADS	Neptunium-237	pCi/g	1.10E-02	1.10E-02	1.10E-02	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	1/1	0.018 - 0.018
RADS	Plutonium-238	pCi/g	9.00E-03	9.00E-03	9.00E-03	0/1	1/1	0/1	n/a	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.019 - 0.019
RADS	Plutonium-239/240	pCi/g	7.30E-03	7.30E-03	7.30E-03	0/1	1/1	0/1	n/a	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.015 - 0.015
RADS	Technetium-99	pCi/g	3.10E-01	3.10E-01	3.10E-01	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	0/1	0.51 - 0.51
RADS	Thorium-228	pCi/g	1.00E+00	1.00E+00	1.00E+00	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.04 - 0.04
RADS	Thorium-230	pCi/g	9.30E-01	9.30E-01	9.30E-01	0/1	1/1	0/1	1.40E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.01 - 0.01
RADS	Thorium-232	pCi/g	9.30E-01	9.30E-01	9.30E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
RADS	Uranium-234	pCi/g	1.06E+00	1.06E+00	1.06E+00	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.03 - 0.03
RADS	Uranium-235/236	pCi/g	4.60E-02	4.60E-02	4.60E-02	1/1	1/1	0/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.009 - 0.009
RADS	Uranium-238	pCi/g	1.23E+00	1.23E+00	1.23E+00	0/1	1/1	1/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.02 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

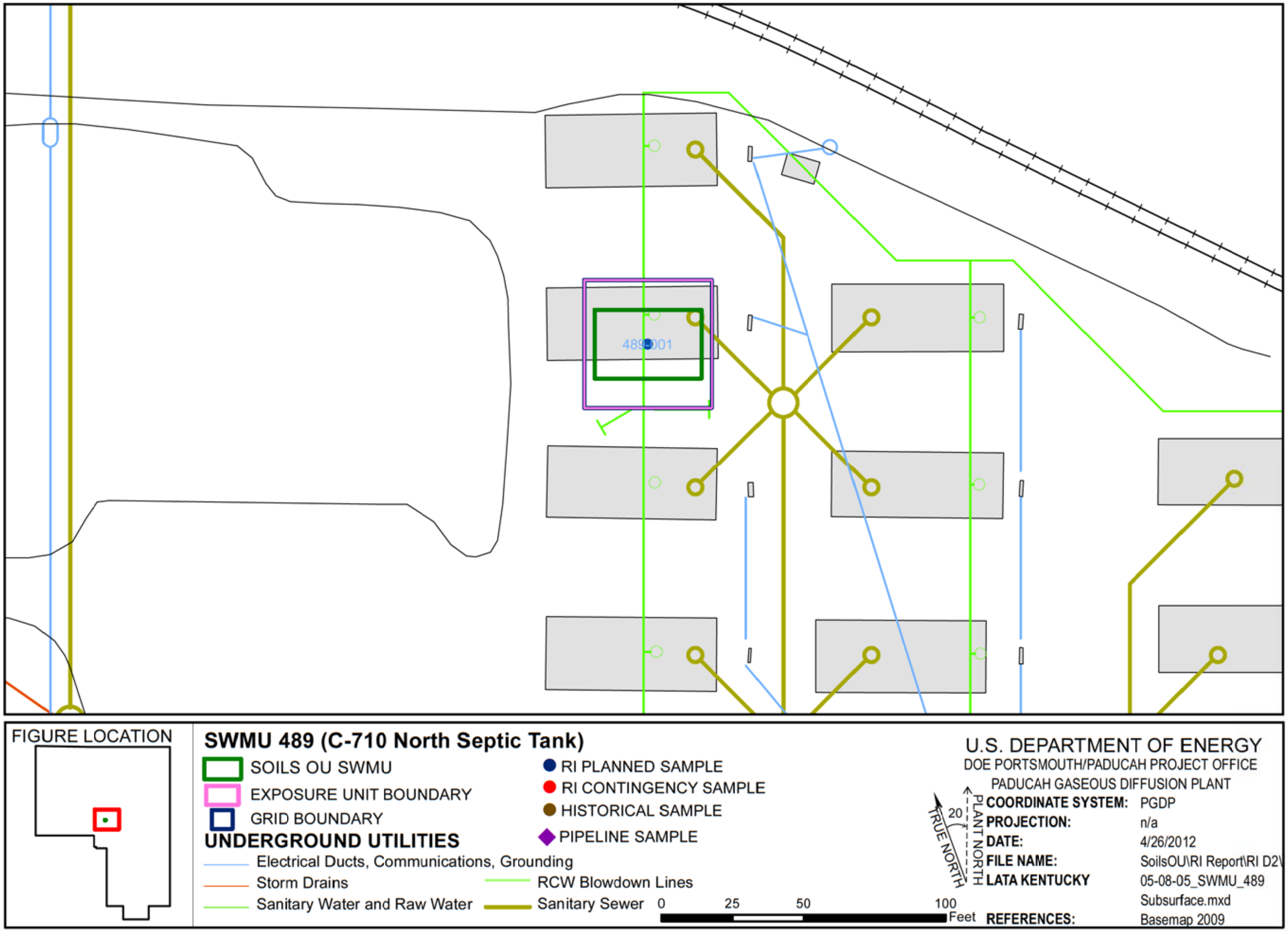


Figure 5.5.5. SWMU 489 Sample Locations - Subsurface Soil

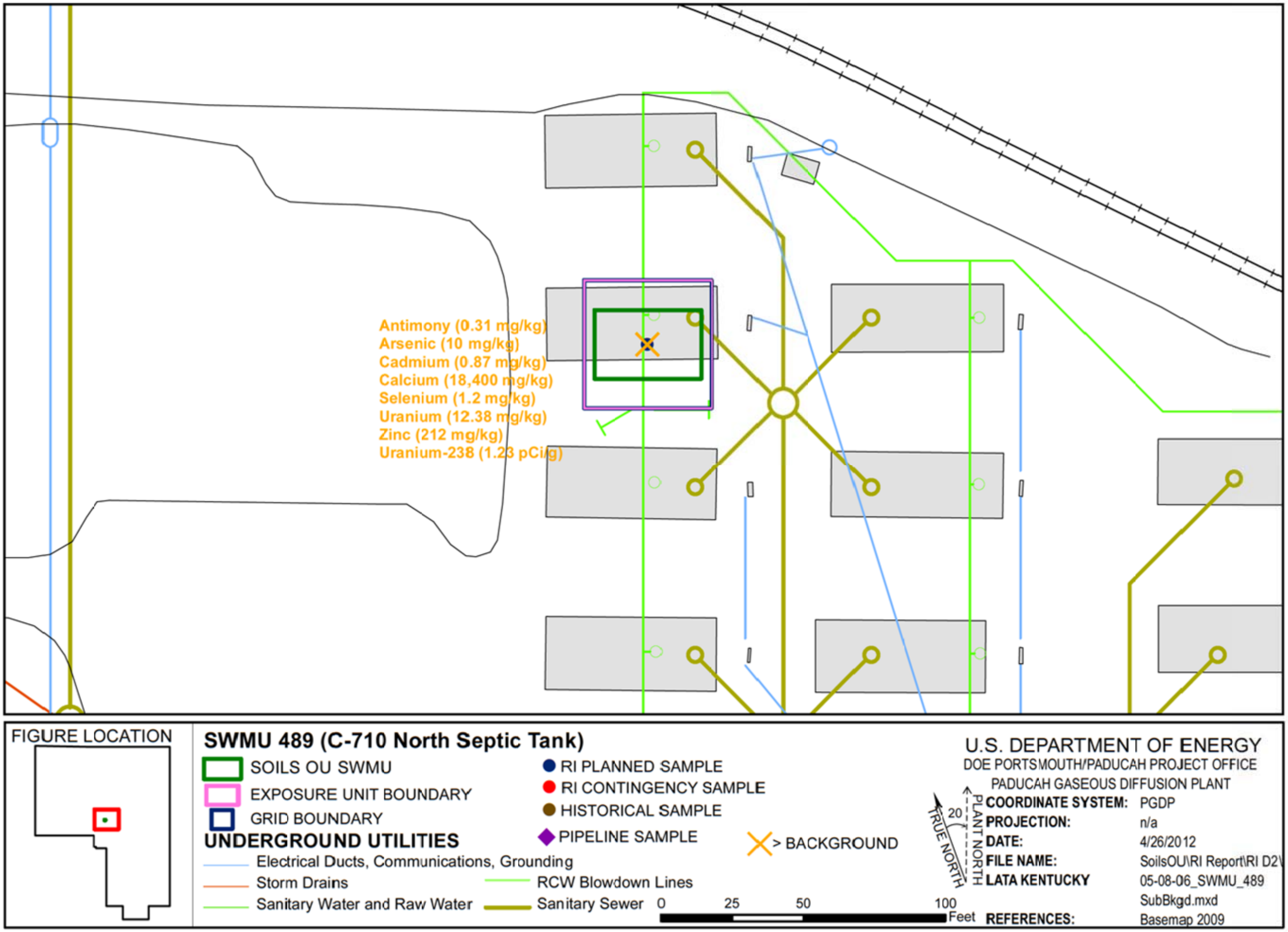


Figure 5.5.6. SWMU 498 Background Exceedances - Subsurface Soil

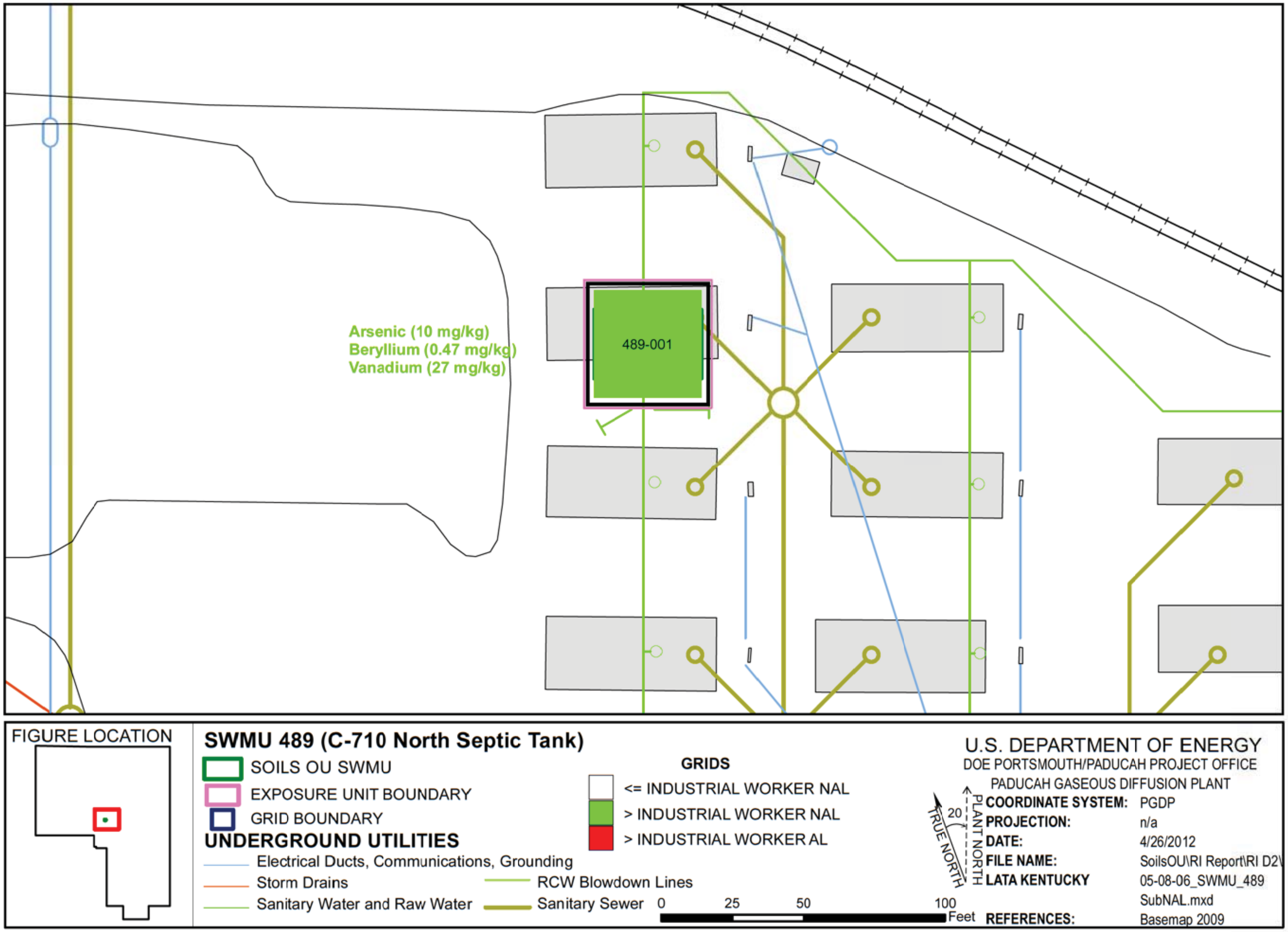


Figure 5.5.7. SWMU 489 NAL Exceedances - Subsurface Soil

5.5.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no concern for significant potential runoff for SWMU 489. This SWMU is underground; therefore, it has no direct connection to surface water. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs/AOCs to surrounding ditches.

5.5.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 489 were evaluated for direct contact. These results are summarized in Appendix D and in the following subsections, including the COCs and relative contributions to the overall ELCR/HI. COCs for this SWMU include metals and radionuclides.

The cumulative ELCR for SWMU 489 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 5.5.3 for the future industrial worker and the hypothetical resident. There were no identified COCs for the excavation worker. Table 5.5.3 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 489 include metals. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 5.5.4.

5.5.7 SWMU 489 Summary

The following text summarizes the results for SWMU 489 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

Processes that could have contributed to contamination at this area are discharges to the septic tank that was located here. The SWMU encompasses only one grid area; there are NAL exceedances in both the surface and subsurface soil samples collected from that grid.

COPCs for surface and subsurface soils from SWMU 489 are shown on Tables 5.5.1 and 5.5.2 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The types of contaminants that comprise COPCs for SWMU 489 are metals, SVOCs and VOCs for the surface soil and metals, SVOCs, VOCs, and radionuclides for the subsurface soils.

Table 5.5.3. RGOs for SWMU 489

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	**COC**	**EPC[1]**	**Units**	**ELCR[2]**	**1 x 10^{-6}**	**1 x 10^{-5}**	**1 x 10^{-4}**	**HI[4]**	**0.1**	**1**	**3**
Future Industrial Worker											
1	Chromium[5]	4.16E+01	mg/kg	1.4E-06	3.02E+01	3.02E+02	3.02E+03	n/a	n/a	n/a	n/a
	Total PAH	8.22E-02	mg/kg	1.4E-06	5.92E-02	5.92E-01	5.92E+00	n/a	n/a	n/a	n/a
	Cumulative			**2.8E-06**				**< 1**			
Hypothetical Resident[6]											
1	Chromium[5]	4.16E+01	mg/kg	2.7E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Uranium-238	1.47E+00	pCi/g	4.2E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Total PAH	8.22E-02	mg/kg	4.2E-06	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Cumulative			**1.1E-05**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.

n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).

[1] See Table D.6 (Appendix D) for EPC values.

[2] See Appendix D, Exhibit D.13, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.

[3] See Table D.41 for RGOs.

[4] See Appendix D, Exhibit D.13, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.

[5] The EPC value for chromium is from a field lab analysis and reported below the detection limit.

[6] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 5.5.4 Ecological Screening for SWMU 489

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Gravel	No	29	Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

It is unlikely that contamination will migrate from the SWMU; it has no direct connection to surface water and is above the water table. There are no known underground pipelines from this SWMU. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. These are the COCs for these scenarios for SWMU 489.

- Future Industrial worker
  - Chromium
  - Total PAHs
- Hypothetical Resident (hazards evaluated against the child resident)
  - Chromium
  - Total PAHs
  - Uranium-238

Of the above, there are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04), nor are there priority COCs for other scenarios. It should be noted that the EPC value for chromium is from a field lab analysis and reported below the detection limit.

For SWMU 489, COPECs exceed ESVs. The priority COPEC (i.e., maximum HQ ≥ 10) is the following:

- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 489 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), and *in situ* treatment, excavation. This SWMU is located under C-412-T02, which is currently in use for DOE remediation contractor offices. An action on this SWMU would not have an impact on other integrator OUs.

5.5.8 SWMU 489 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 489; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical residential (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial as shown in the SMP (DOE 2012a).

5.6 SWMU 531, C-746-A SOUTH ALUMINUM SLAG REACTING AREA

5.6.1 Background

The Aluminum Slag Reacting Area (SWMU 531) is a concrete pad located adjacent to the south side of the C-746-A Hazardous and Mixed Waste Storage Facility, which is located in the northwestern portion of PGDP. SWMU 531 is approximately 9,000 ft^2 (30 ft x 300 ft). This SWMU has no direct connection to surface water.

The Aluminum Slag Reacting Area was used for treatment of stored aluminum slag from the aluminum smelter. Aluminum slag was brought from a sweat furnace in the west end of C-746-A Smelter. Water was slowly added to dumpsters and possibly drums to react with the aluminum slag. Slag was allowed to react with no agitation for several days. Hydrogen that was produced from the reaction escaped to the atmosphere. The slag was dewatered, and the resulting waste was placed in the C-746-F Landfill. It is unknown how long this operation was in practice.

From analyses of samples collected from SWMUs 139 and 196A, which are located near SWMU 531, some elevated concentrations of metals in soils were noted as presented in the 1992 SWMU Assessment Report (SAR).

5.6.2 Fieldwork Summary

Fourteen grid samples were planned and collected for the unit. Field laboratory results indicated that contingency samples were required to define the extent of contamination due to concentrations of arsenic, iron, lead, nickel, and zinc; however, they were not collected because ongoing plant operations made the area inaccessible. Figure A.4 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey using a FIDLER (Figure 5.6.1); the 1,255 measurements ranged from 4,019 to 7,215 gross cpm. This SWMU is on the railroad spur between C-746-A and C-746-B. It is a posted contamination area and is comprised entirely of gravel rail ballast that reduced the ambient background count rate to levels less than the project-wide background count rate. A grab sample was not collected for radiological constituents because no project exceedances were identified.

5.6.3 Nature and Extent of Contamination—Surface Soils

The representative data set for SWMU 531 surface soils is presented in Table 5.6.1 and provides the nature of the contamination in the SWMU 531 surface soils. Figures 5.6.2–5.6.4 illustrate the horizontal extent of the surface soil contamination. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

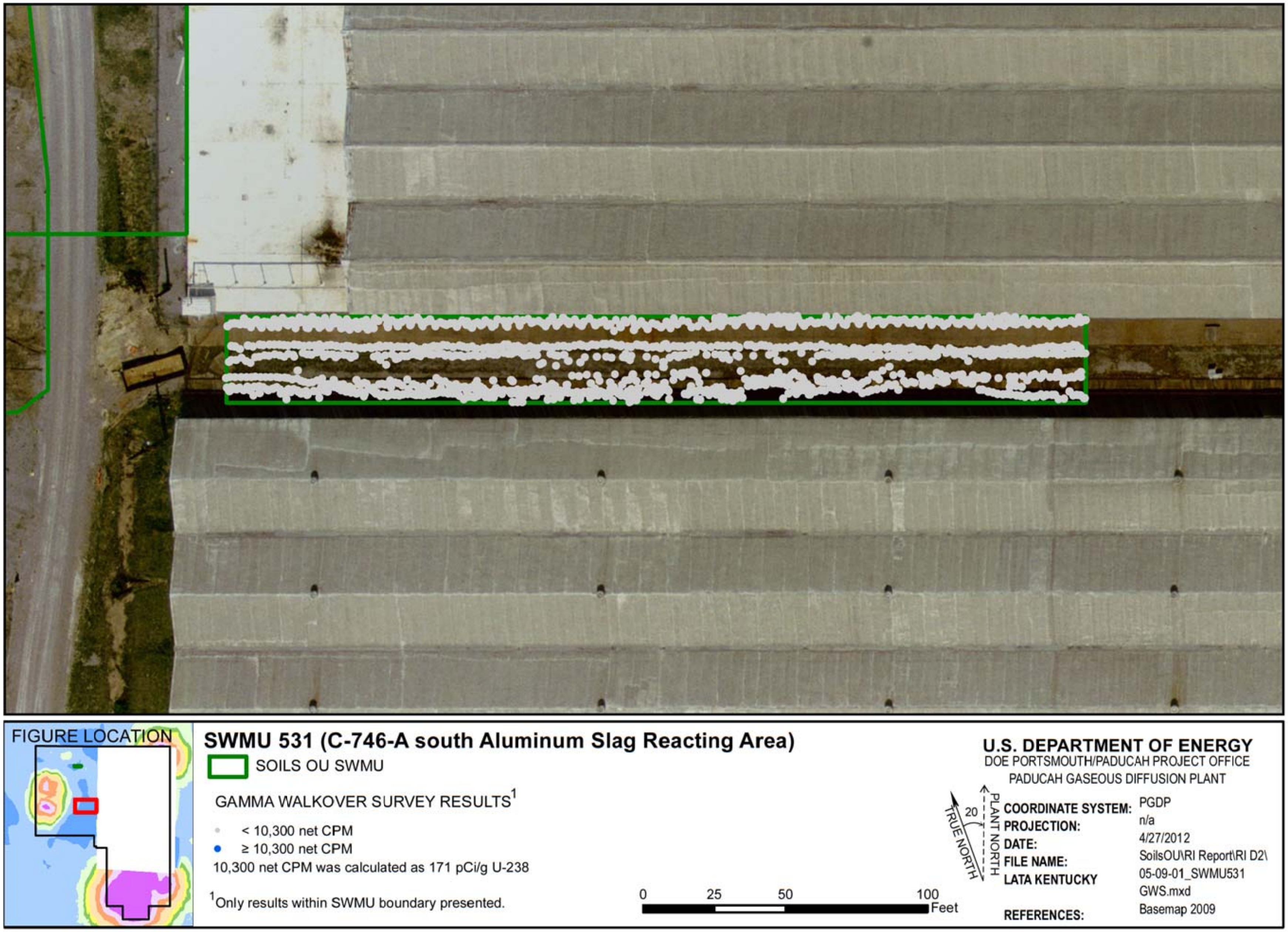


Figure 5.6.1. SWMU 531 Gamma Walkover Survey

Table 5.6.1. Surface Soil OU RI Data Summary: SWMU 531C-746-A South Aluminum Slag Reacting Area

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	1.09E+03	1.09E+03	1.09E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	0/1	5.3 - 5.3
METAL	Antimony	mg/kg	1.00E+00	1.00E+00	1.00E+00	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.53 - 0.53
METAL	Arsenic	mg/kg	5.90E+00	4.68E+01	1.61E+01	0/7	5/7	2/7	1.20E+01	5/7	9.97E-01	0/7	9.97E+01	2/7	5/7	1.1 - 11
METAL	Barium	mg/kg	2.47E+01	2.47E+01	2.47E+01	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	0/1	2.1 - 2.1
METAL	Beryllium	mg/kg	3.20E-01	3.20E-01	3.20E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.11 - 0.11
METAL	Cadmium	mg/kg	3.10E+00	3.10E+00	3.10E+00	0/1	1/1	1/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	1/1	0.053 - 0.053
METAL	Calcium	mg/kg	1.04E+05	1.04E+05	1.04E+05	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	263 - 263
METAL	Chromium	mg/kg	1.50E+01	5.05E+01	2.68E+01	0/7	2/7	1/7	1.60E+01	1/7	3.02E+01	0/7	3.02E+03	0/7	0/7	1.1 - 85
METAL	Cobalt	mg/kg	3.20E+00	3.20E+00	3.20E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.21 - 0.21
METAL	Copper	mg/kg	7.80E+00	7.80E+00	7.80E+00	0/7	1/7	0/7	1.90E+01	0/7	1.43E+03	0/7	2.24E+05	0/7	0/7	1.1 - 35
METAL	Iron	mg/kg	6.64E+03	5.68E+04	1.85E+04	0/7	7/7	2/7	2.80E+04	2/7	2.51E+04	0/7	3.92E+06	7/7	7/7	5.3 - 100
METAL	Lead	mg/kg	3.97E+01	5.31E+02	1.27E+02	0/7	7/7	7/7	3.60E+01	1/7	4.00E+02	1/7	4.00E+02	0/7	7/7	0.32 - 13
METAL	Magnesium	mg/kg	3.55E+03	3.55E+03	3.55E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	52.6 - 52.6
METAL	Manganese	mg/kg	1.03E+02	8.65E+02	3.36E+02	0/7	7/7	0/7	1.50E+03	0/7	2.58E+03	0/7	1.16E+05	7/7	7/7	0.21 - 85
METAL	Mercury	mg/kg	1.40E-02	1.40E-02	1.40E-02	0/7	1/7	0/7	2.00E-01	0/7	9.00E-01	0/7	7.85E+02	0/7	0/7	0.035 - 10
METAL	Molybdenum	mg/kg	1.10E+00	1.10E+00	1.10E+00	0/7	1/7	0/7	n/a	0/7	1.79E+02	0/7	2.80E+04	0/7	1/7	0.53 - 15
METAL	Nickel	mg/kg	7.99E+01	1.62E+02	1.03E+02	0/7	4/7	4/7	2.10E+01	4/7	4.28E+01	0/7	3.18E+04	4/7	4/7	0.53 - 65
METAL	Selenium	mg/kg	5.60E-01	5.60E-01	5.60E-01	0/7	1/7	0/7	8.00E-01	0/7	1.79E+02	0/7	2.80E+04	0/7	1/7	0.53 - 20
METAL	Silver	mg/kg	1.00E-01	1.00E-01	1.00E-01	0/7	1/7	0/7	2.30E+00	0/7	1.08E+01	0/7	9.15E+03	0/7	1/7	0.21 - 10
METAL	Sodium	mg/kg	1.34E+02	1.34E+02	1.34E+02	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	21 - 21
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	0/1	0.21 - 0.21
METAL	Uranium	mg/kg	7.95E+00	2.41E+01	1.26E+01	0/7	3/7	3/7	4.90E+00	0/7	1.07E+02	0/7	1.65E+04	0/7	1/7	0.05 - 20
METAL	Vanadium	mg/kg	9.00E+00	9.00E+00	9.00E+00	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	8.28E+02	2.45E+03	1.53E+03	0/7	7/7	7/7	6.50E+01	0/7	1.08E+04	0/7	1.68E+06	6/7	7/7	2.1 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	1.88E-01	0/7	1.88E+01	0/7	0/7	0.32 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.7 - 1.7
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.35 - 0.35
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.35 - 0.35
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.6.1. Surface Soil OU RI Data Summary: SWMU 531C-746-A South Aluminum Slag Reacting Area (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0069 - 0.0069
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	4.70E-02	4.70E-02	4.70E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Fluoranthene	mg/kg	6.80E-02	6.80E-02	6.80E-02	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.35 - 0.35
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.35 - 0.35
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.35 - 0.35
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.69 - 0.69
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.35 - 0.35
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0069 - 0.0069
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.7 - 1.7
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Pyrene	mg/kg	6.00E-02	6.00E-02	6.00E-02	1/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.35 - 0.35
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.69 - 0.69
SVOA	Total PAH	mg/kg	5.34E-02	5.34E-02	5.34E-02	0/1	1/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	2.10E+01	2.10E+01	2.10E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	4 - 4
RADS	Americium-241	pCi/g	1.50E-02	1.50E-02	1.50E-02	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.023 - 0.023
RADS	Beta activity	pCi/g	1.63E+01	1.63E+01	1.63E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.2 - 2.2
RADS	Cesium-137	pCi/g	2.26E-01	2.26E-01	2.26E-01	0/1	1/1	0/1	4.90E-01	1/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.015 - 0.015
RADS	Neptunium-237	pCi/g	3.30E-02	3.30E-02	3.30E-02	0/1	1/1	0/1	1.00E-01	0/1	2.71E-01	0/1	2.71E+01	0/1	1/1	0.017 - 0.017
RADS	Plutonium-238	pCi/g	2.00E-02	2.00E-02	2.00E-02	0/1	1/1	0/1	7.30E-02	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.015 - 0.015
RADS	Plutonium-239/240	pCi/g	1.30E-02	1.30E-02	1.30E-02	0/1	1/1	0/1	2.50E-02	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.021 - 0.021
RADS	Technetium-99	pCi/g	1.17E+00	1.17E+00	1.17E+00	0/1	1/1	0/1	2.50E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	1/1	0.46 - 0.46
RADS	Thorium-228	pCi/g	1.36E-01	1.36E-01	1.36E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.018 - 0.018
RADS	Thorium-230	pCi/g	4.53E-01	4.53E-01	4.53E-01	0/1	1/1	0/1	1.50E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.008 - 0.008
RADS	Thorium-232	pCi/g	1.34E-01	1.34E-01	1.34E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.008 - 0.008
RADS	Uranium-234	pCi/g	3.12E+00	3.12E+00	3.12E+00	0/1	1/1	1/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	1.38E-01	1.38E-01	1.38E-01	0/1	1/1	1/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.01 - 0.01
RADS	Uranium-238	pCi/g	3.48E+00	3.48E+00	3.48E+00	0/1	1/1	1/1	1.20E+00	1/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.02 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

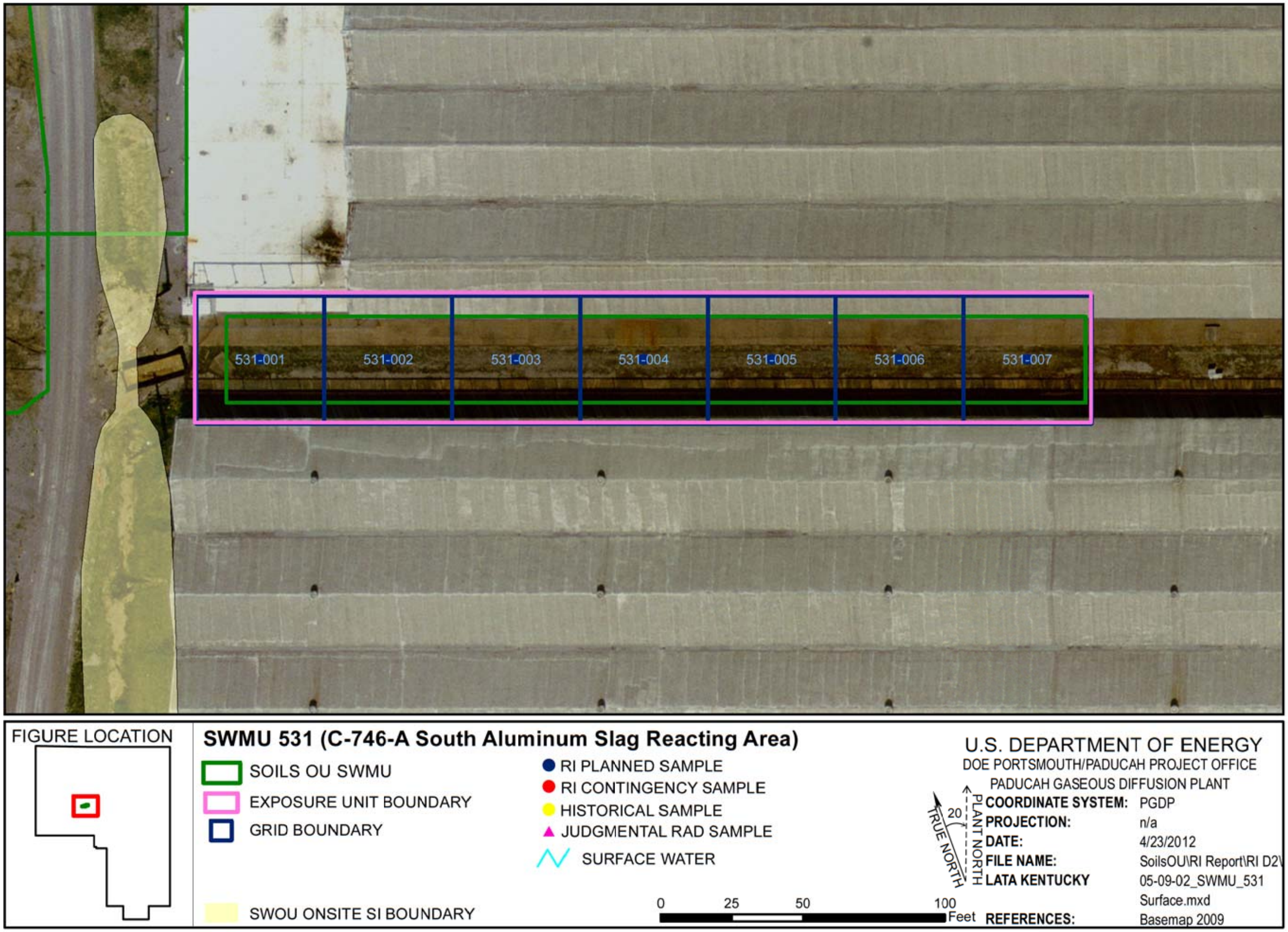


Figure 5.6.2. SWMU 531 Sample Locations - Surface Soil

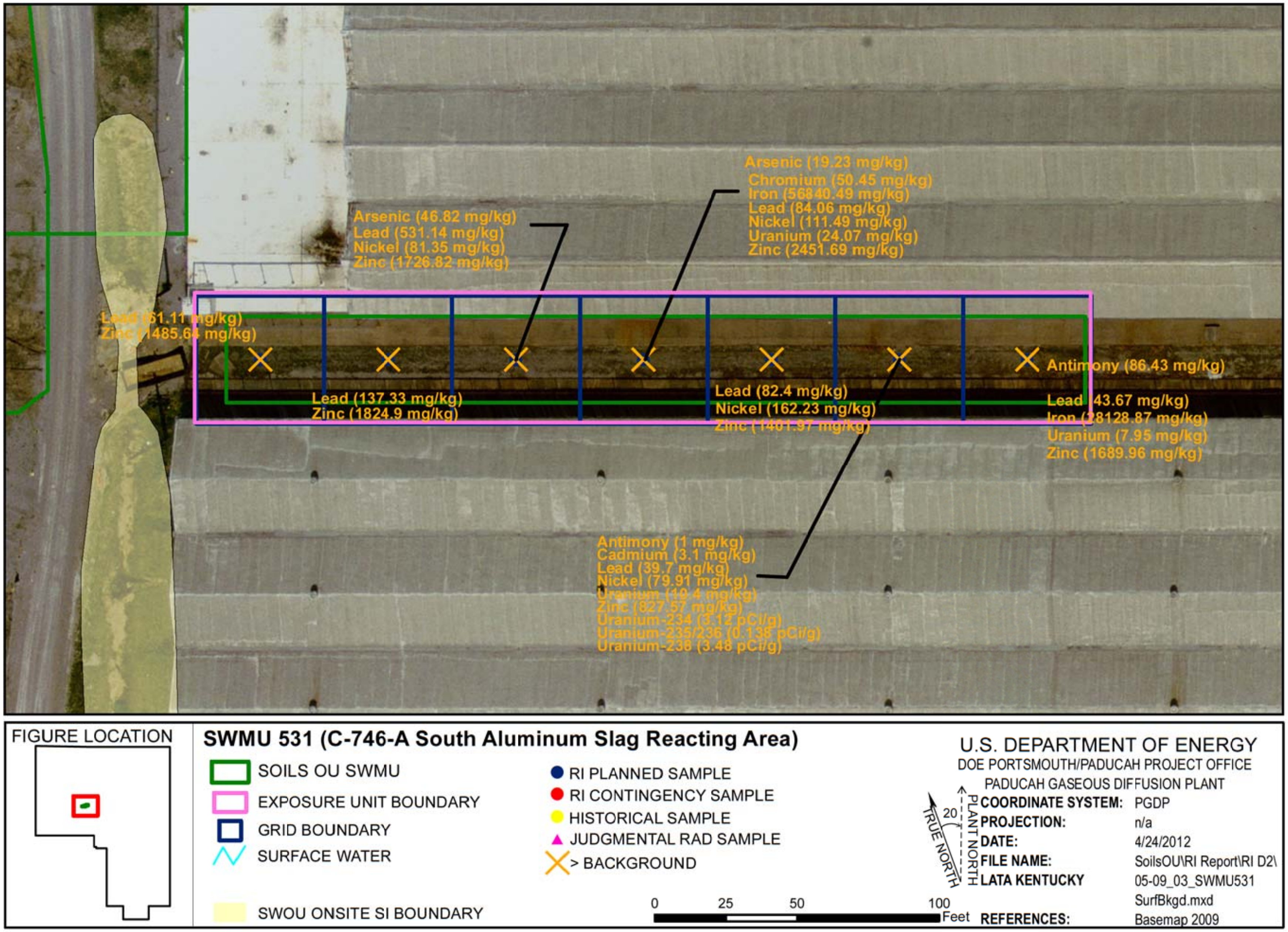


Figure 5.6.3. SWMU 531 Background Exceedances - Surface Soil

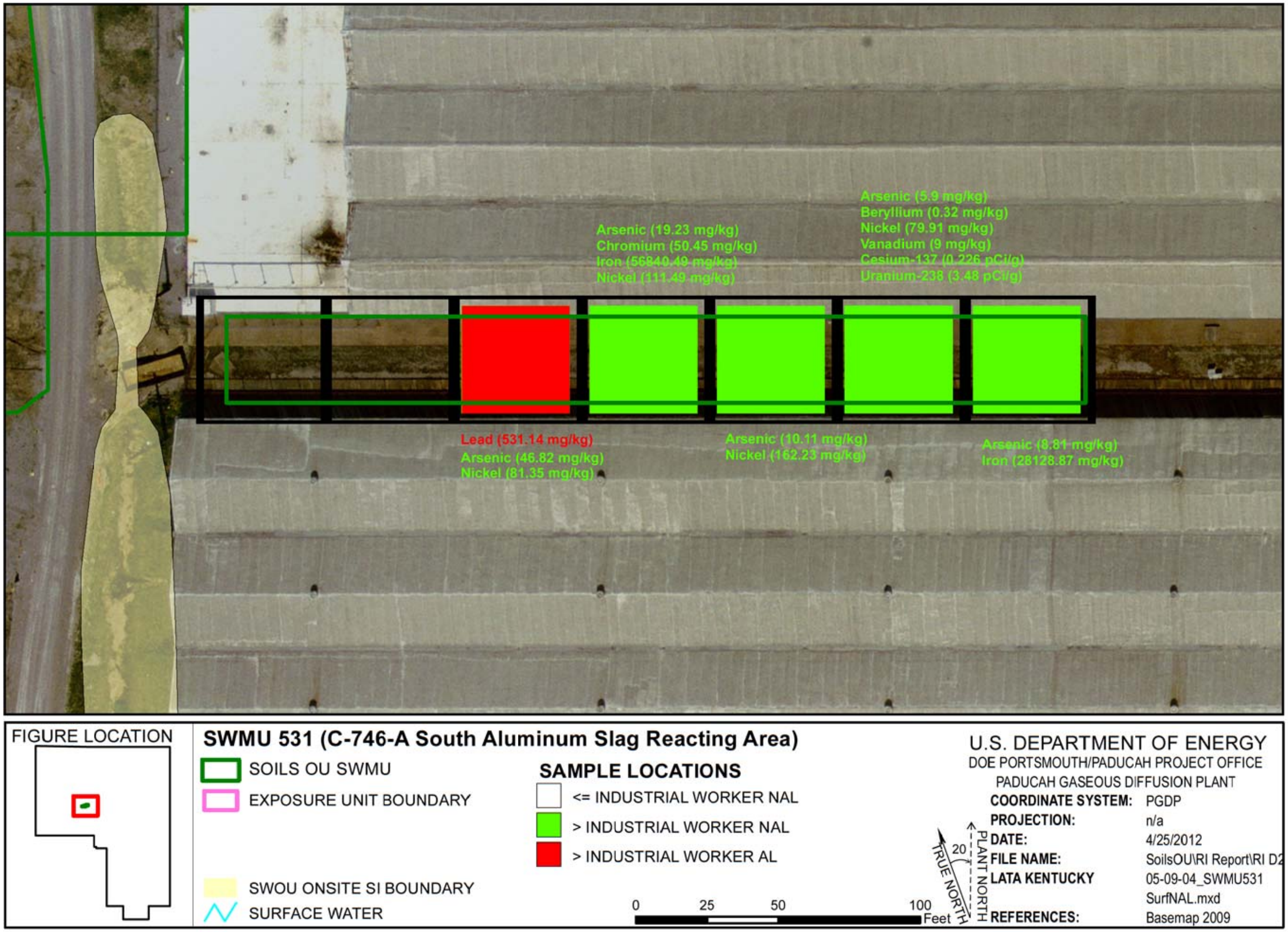


Figure 5.6.4. SWMU 531 NAL Exceedances - Surface Soil

The horizontal extent of SWMU 531 surface soil contamination is considered adequately defined for supporting the baseline risk assessment and FS. SWMU 531 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 531 surface soil. These are the metals detected at or above background screening levels and the industrial worker NALs, as well as the grids and EUs in which they were detected.

Metal	Grid
Arsenic	3, 4
Chromium	4
Iron	4, 7
Lead	3
Nickel	3, 4, 5, 6

* SWMU 531 consists of one EU.

Grids 3, 4, 5, 6, and 7 are located within the administrative boundary of SWMU 531.

Lead was detected above both the background screening level and the industrial worker ALs in SWMU 531 surface soil.

The following metals were detected in the SWMU 531 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater: antimony, arsenic, cadmium, cobalt, iron, lead, molybdenum (no background value available), nickel, uranium, and zinc. Arsenic, iron, nickel, and zinc were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 531 surface soil.

SVOCs

No SVOCs were detected above the industrial worker NALs or ALs in the SWMU 531 surface soil. Total PAHs were detected above the SSLs for the protection of UCRS groundwater. No SVOCs were detected above the SSLs for the protection of RGA groundwater in the SWMU 531 surface soil.

VOCs

No surface soil samples from SWMU 531 were analyzed for VOCs.

Radionuclides

One surface soil sample from SWMU 531 (in grid 6) was analyzed for radionuclides. Uranium-238 was detected above both the background screening level and the industrial worker NAL.

No radionuclides were detected above both the background screening levels and the industrial worker ALs or both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

5.6.4 Nature and Extent of Contamination—Subsurface Soils

The representative data set for SWMU 531 subsurface soils is presented in Table 5.6.2 and provides the nature of the contamination in SWMU 531 subsurface soils. Figures 5.6.5–5.6.7 illustrate the horizontal extent. A complete list of detailed sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 531 subsurface soil contamination is considered adequately defined for supporting the baseline risk assessment and FS. SWMU 531 is comprised of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 531 subsurface soil. These are the metals detected at or above both the background screening levels and the industrial worker NALs, as well as the grids and EUs in which they were detected.

Metal	Grid
Arsenic	7
Chromium	2
Nickel	1, 3

* SWMU 531 consists of one EU.

Grids 1, 2, 3, and 7 are located within the administrative boundary of SWMU 531.

The maximum depth at which metals were detected at or above both background screening levels and the industrial worker NALs was 4 ft bgs, which also was the end depth of each borehole.

No metals were detected above the industrial worker ALs in the SWMU 531 subsurface soil.

Table 5.6.2. Subsurface Soil OU RI Data Summary: SWMU 531C-746-A South Aluminum Slag Reacting Area

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	8.72E+03	8.72E+03	8.72E+03	0/1	1/1	0/1	1.20E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	6 - 6
METAL	Antimony	mg/kg	4.40E-01	4.40E-01	4.40E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.6 - 0.6
METAL	Arsenic	mg/kg	5.64E+00	1.06E+01	7.47E+00	0/7	4/7	1/7	7.90E+00	4/7	9.97E-01	0/7	9.97E+01	0/7	4/7	1.2 - 11
METAL	Barium	mg/kg	9.11E+01	9.11E+01	9.11E+01	0/1	1/1	0/1	1.70E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.4 - 2.4
METAL	Beryllium	mg/kg	4.80E-01	4.80E-01	4.80E-01	0/1	1/1	0/1	6.90E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.12 - 0.12
METAL	Cadmium	mg/kg	2.00E-01	2.00E-01	2.00E-01	0/1	1/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.06 - 0.06
METAL	Calcium	mg/kg	3.87E+04	3.87E+04	3.87E+04	0/1	1/1	1/1	6.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	59.8 - 59.8
METAL	Chromium	mg/kg	3.48E+01	5.33E+01	3.97E+01	0/7	3/7	1/7	4.30E+01	3/7	3.02E+01	0/7	3.02E+03	0/7	0/7	1.2 - 85
METAL	Cobalt	mg/kg	6.60E+00	6.60E+00	6.60E+00	0/1	1/1	0/1	1.30E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.24 - 0.24
METAL	Copper	mg/kg	1.14E+01	1.83E+01	1.37E+01	0/7	2/7	0/7	2.50E+01	0/7	1.43E+03	0/7	2.24E+05	0/7	0/7	1.2 - 35
METAL	Iron	mg/kg	8.22E+03	2.06E+04	1.36E+04	0/7	7/7	0/7	2.80E+04	0/7	2.51E+04	0/7	3.92E+06	7/7	7/7	6 - 100
METAL	Lead	mg/kg	6.91E+00	1.51E+01	1.19E+01	0/7	7/7	0/7	2.30E+01	0/7	4.00E+02	0/7	4.00E+02	0/7	2/7	0.36 - 13
METAL	Magnesium	mg/kg	7.48E+03	7.48E+03	7.48E+03	0/1	1/1	1/1	2.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	59.8 - 59.8
METAL	Manganese	mg/kg	8.12E+01	5.57E+02	2.62E+02	0/7	7/7	0/7	8.20E+02	0/7	2.58E+03	0/7	1.16E+05	5/7	7/7	0.24 - 85
METAL	Mercury	mg/kg	3.65E-02	3.65E-02	3.65E-02	0/7	1/7	0/7	1.30E-01	0/7	9.00E-01	0/7	7.85E+02	0/7	0/7	0.0399 - 10
METAL	Molybdenum	mg/kg	5.00E-01	5.00E-01	5.00E-01	0/7	1/7	0/7	n/a	0/7	1.79E+02	0/7	2.80E+04	0/7	1/7	0.6 - 15
METAL	Nickel	mg/kg	5.86E+01	7.14E+01	6.72E+01	0/7	2/7	2/7	2.20E+01	2/7	4.28E+01	0/7	3.18E+04	0/7	2/7	0.6 - 65
METAL	Selenium	mg/kg	1.10E+00	1.10E+00	1.10E+00	0/7	1/7	1/7	7.00E-01	0/7	1.79E+02	0/7	2.80E+04	0/7	1/7	0.6 - 20
METAL	Silver	mg/kg	2.50E-02	2.50E-02	2.50E-02	0/7	1/7	0/7	2.70E+00	0/7	1.08E+01	0/7	9.15E+03	0/7	0/7	0.24 - 10
METAL	Sodium	mg/kg	1.26E+02	1.26E+02	1.26E+02	0/1	1/1	0/1	3.40E+02	0/1	n/a	0/1	n/a	n/a	n/a	23.9 - 23.9
METAL	Thallium	mg/kg	1.80E-01	1.80E-01	1.80E-01	0/1	1/1	0/1	3.40E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.24 - 0.24
METAL	Uranium	mg/kg	5.49E+00	7.90E+00	6.09E+00	0/7	2/7	2/7	4.60E+00	0/7	1.07E+02	0/7	1.65E+04	0/7	0/7	0.02 - 20
METAL	Vanadium	mg/kg	2.52E+01	2.52E+01	2.52E+01	0/1	1/1	0/1	3.70E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.2 - 1.2
METAL	Zinc	mg/kg	2.54E+01	8.23E+01	5.13E+01	0/7	7/7	3/7	6.00E+01	0/7	1.08E+04	0/7	1.68E+06	0/7	7/7	2.4 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	1.88E-01	0/7	1.88E+01	0/7	0/7	0.36 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.9 - 1.9
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.39 - 0.39
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.39 - 0.39
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 5.6.2. Subsurface Soil OU RI Data Summary: SWMU 531C-746-A South Aluminum Slag Reacting Area (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0079 - 0.0079
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	4.10E-01	4.10E-01	4.10E-01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.39 - 0.39
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.39 - 0.39
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.39 - 0.39
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.79 - 0.79
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.39 - 0.39
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0079 - 0.0079
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.9 - 1.9
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.39 - 0.39
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.79 - 0.79
SVOA	Total PAH	mg/kg	7.80E-03	7.80E-03	7.80E-03	0/1	1/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	2.48E+01	2.48E+01	2.48E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.8 - 5.8
RADS	Americium-241	pCi/g	1.70E-02	1.70E-02	1.70E-02	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.033 - 0.033
RADS	Beta activity	pCi/g	2.12E+01	2.12E+01	2.12E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.1 - 3.1
RADS	Cesium-137	pCi/g	-2.00E-02	-2.00E-02	-2.00E-02	0/1	1/1	0/1	2.80E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.1 - 0.1
RADS	Neptunium-237	pCi/g	2.00E-03	2.00E-03	2.00E-03	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.026 - 0.026
RADS	Plutonium-238	pCi/g	1.50E-02	1.50E-02	1.50E-02	0/1	1/1	0/1	n/a	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.03 - 0.03
RADS	Plutonium-239/240	pCi/g	4.00E-03	4.00E-03	4.00E-03	0/1	1/1	0/1	n/a	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.019 - 0.019
RADS	Technetium-99	pCi/g	2.50E-01	2.50E-01	2.50E-01	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	0/1	0.45 - 0.45
RADS	Thorium-228	pCi/g	8.50E-01	8.50E-01	8.50E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	9.20E-01	9.20E-01	9.20E-01	0/1	1/1	0/1	1.40E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	7.70E-01	7.70E-01	7.70E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
RADS	Uranium-234	pCi/g	1.76E+00	1.76E+00	1.76E+00	0/1	1/1	1/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.01 - 0.01
RADS	Uranium-235/236	pCi/g	1.02E-01	1.02E-01	1.02E-01	0/1	1/1	1/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.019 - 0.019
RADS	Uranium-238	pCi/g	1.83E+00	1.83E+00	1.83E+00	0/1	1/1	1/1	1.20E+00	1/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.008 - 0.008

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

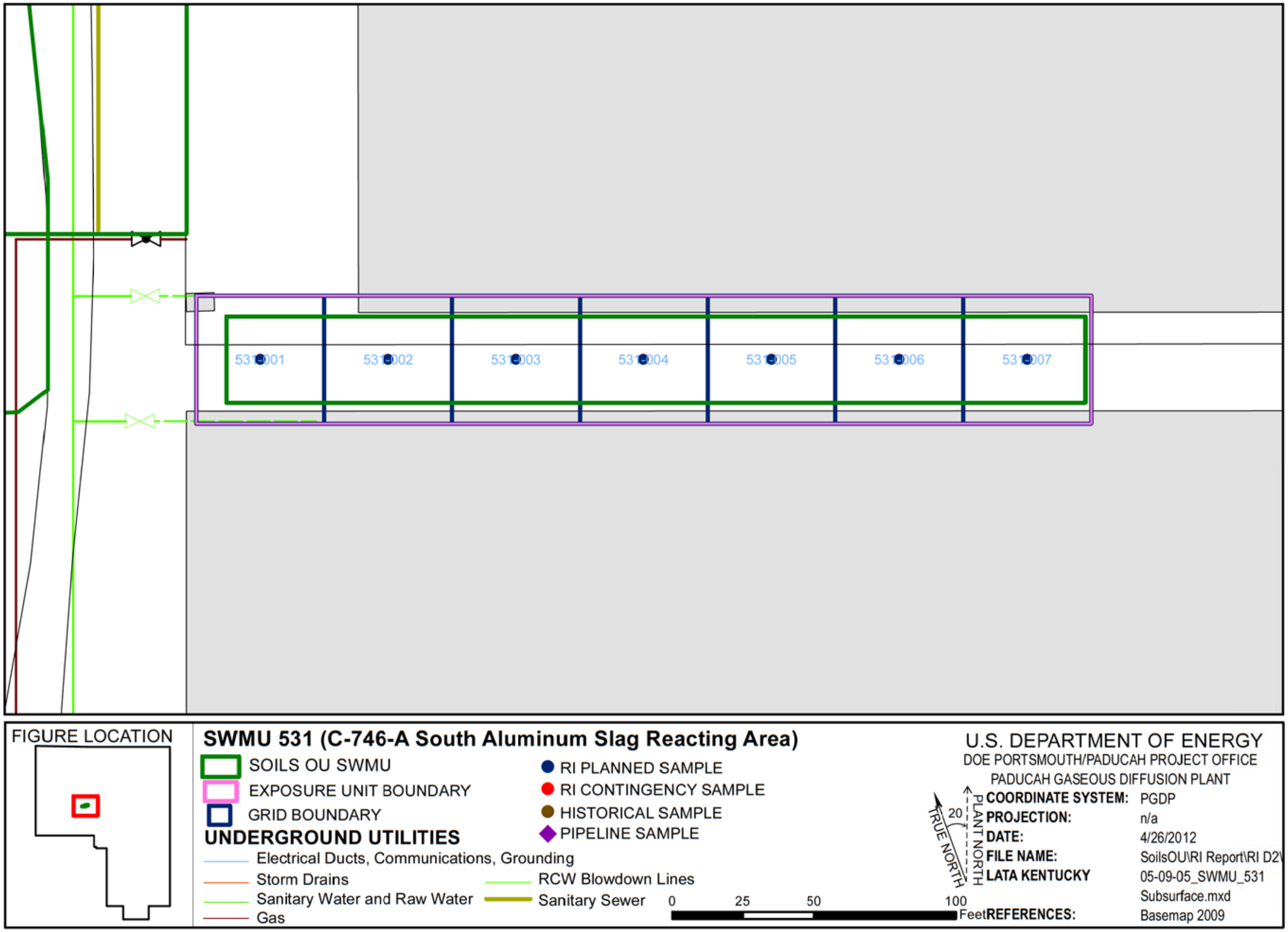


Figure 5.6.5. SWMU 531 Sample Locations - Subsurface Soil

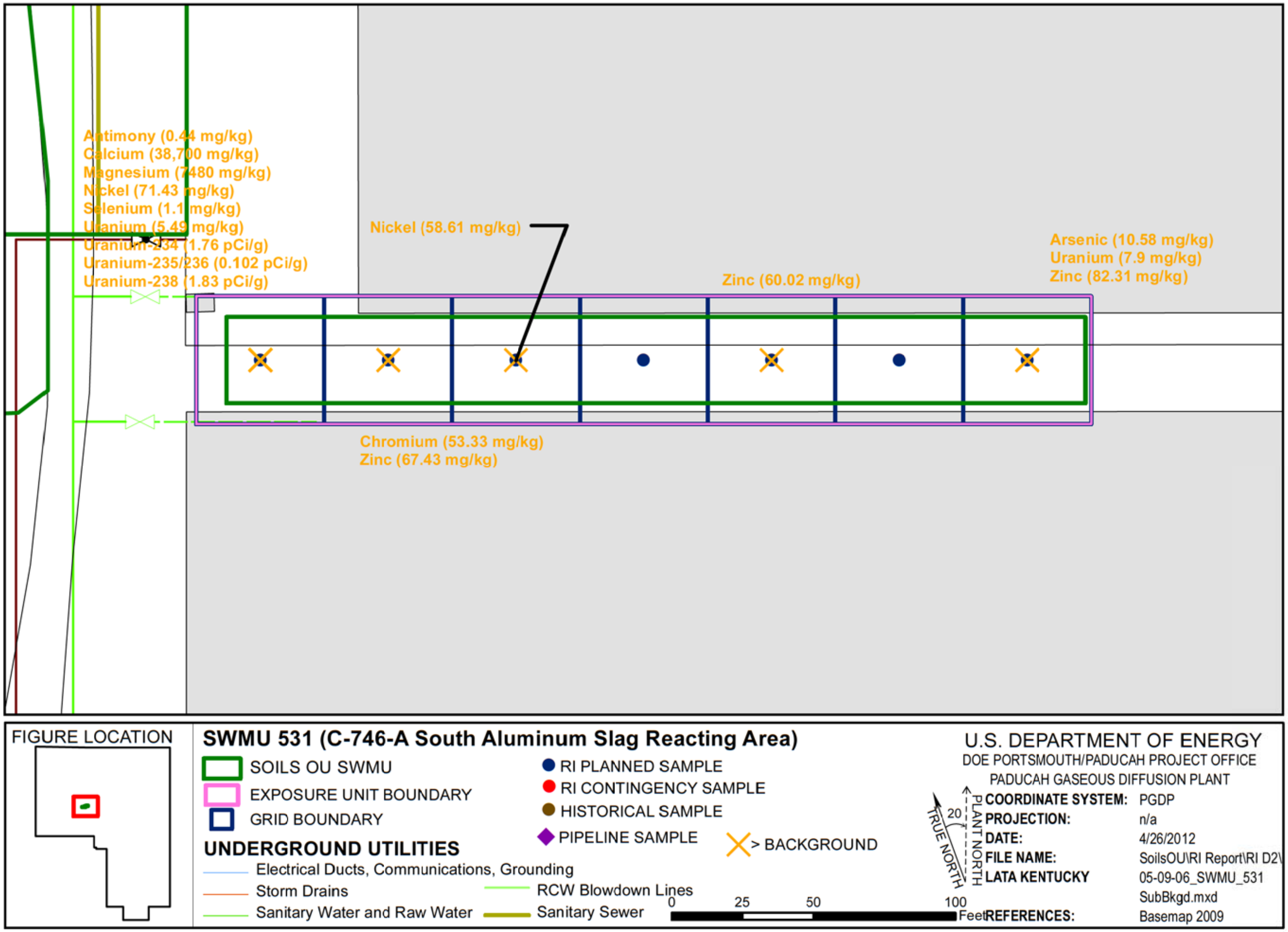


Figure 5.6.6. SWMU 531 Background Exceedances - Subsurface Soil

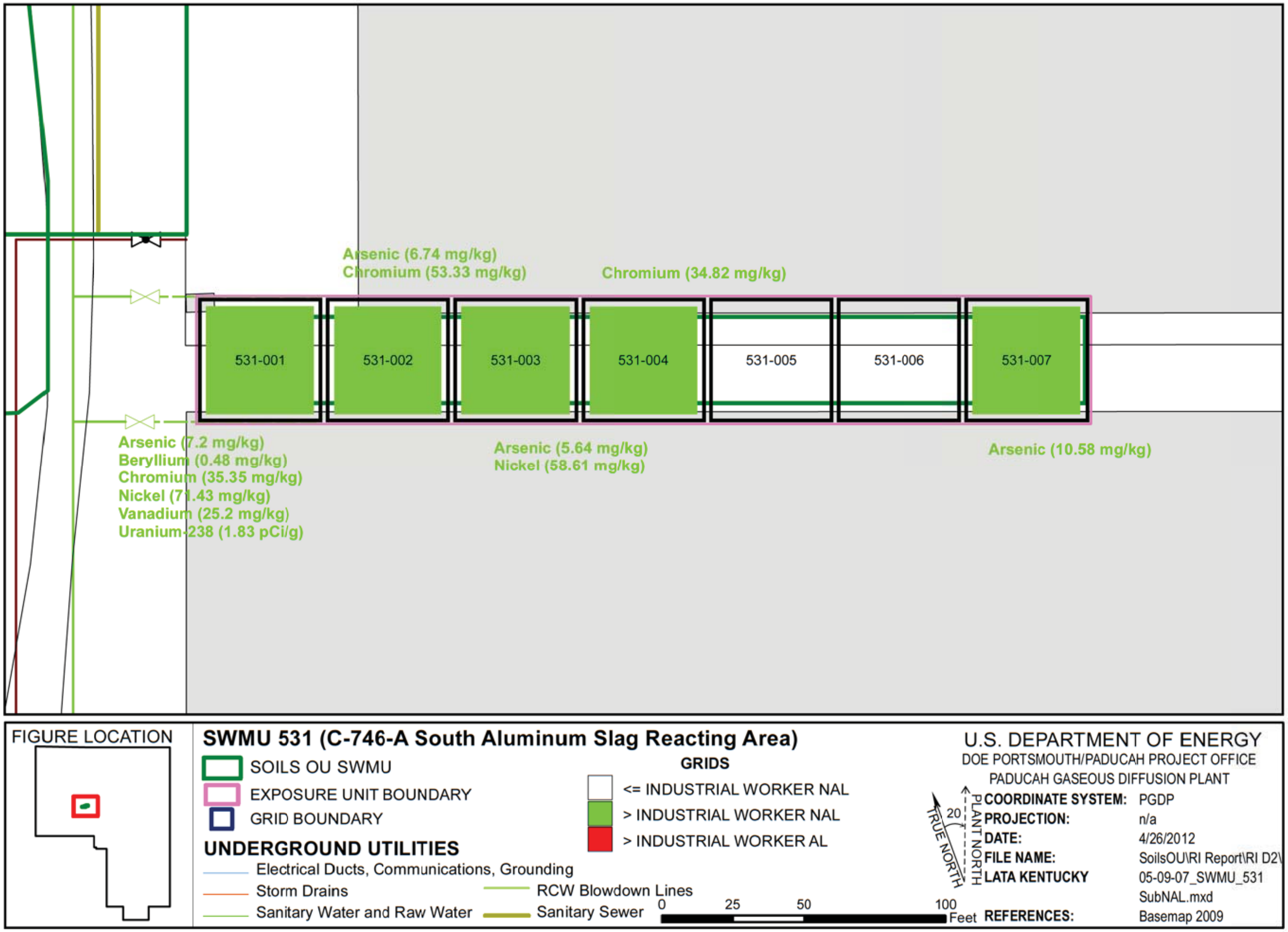


Figure 5.6.7. SWMU 531 NAL Exceedances - Subsurface Soil

The following metals were detected in the SWMU 531 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater: antimony, arsenic, molybdenum (no background value available), nickel, selenium, and zinc. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 531 subsurface soil.

SVOCs

No SVOCs were detected above the industrial worker NALs or ALs. Total PAHs were detected above the SSLs for the protection of UCRS groundwater. No SVOCs were detected above the SSLs for the protection of RGA groundwater in the SWMU 531 subsurface soil.

VOCs

No subsurface soil samples from SWMU 531 were analyzed for VOCs.

Radionuclides

One subsurface soil sample from SWMU 531 (in grid 1) was analyzed for radionuclides. Uranium-238 was detected above both the background screening level and the industrial worker NAL in the grid 1 sample. No radionuclides were detected above the industrial worker ALs in the sample.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

5.6.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no concern for significant potential runoff for SWMU 531. This SWMU has no direct connection to surface water. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs/AOCs to surrounding ditches.

5.6.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 531 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI. COCs for this SWMU include metals, organics, and radionuclides.

The cumulative ELCR and cumulative HI for SWMU 531 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a, this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 5.6.3 for the future industrial worker, excavation

Table 5.6.3. RGOs for SWMU 531

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Future Industrial Worker											
1	Arsenic	4.68E+01	mg/kg	4.7E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Chromium	5.05E+01	mg/kg	1.7E-06	3.02E+01	3.02E+02	3.02E+03	< 0.1	n/a	n/a	n/a
	Uranium-238	3.48E+00	pCi/g	2.0E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**5.1E-05**				**< 1**			
Excavation Worker											
1	Arsenic	4.68E+01	mg/kg	1.4E-06	3.32E+01	3.32E+02	3.32E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.4E-06**				**< 1**			
Hypothetical Resident[5]											
1	Arsenic	4.68E+01	mg/kg	2.0E-04	2.35E-01	2.35E+00	2.35E+01	2.8	1.64E+00	1.64E+01	4.93E+01
	Chromium	5.05E+01	mg/kg	3.2E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Iron	5.68E+04	mg/kg	< 1E-06	n/a	n/a	n/a	1	5.48E+03	5.48E+04	1.64E+05
	Nickel	1.62E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	1.44E+02	1.44E+03	4.33E+03
	Total PAH	5.34E-02	mg/kg	2.7E-06	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	2.41E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	2.34E+01	2.34E+02	7.01E+02
	Uranium-235	1.38E-01	pCi/g	1.8E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	3.48E+00	pCi/g	1.0E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Zinc	2.45E+03	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	2.35E+03	2.35E+04	7.04E+04
	Cumulative			**2.2E-04**				**4.2**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.15, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.15, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

worker, and the hypothetical resident. Table 5.6.3 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 531 include metals. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 5.6.4.

Table 5.6.4 Ecological Screening for SWMU 531

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Gravel	No	152	Selenium	3.60E+01	5.31E+02	1.10E+01	48
			Zinc	8.00E-01	1.00E+01	5.20E-01	19
			Lead	6.50E+01	2.45E+03	4.60E+01	53

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

5.6.7 SWMU 531 Summary

The following text summarizes the results for SWMU 531 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

Plant processes that could have contributed to contamination in this area are discharges from the aluminum slag reactions. These contaminants would not have migrated because metals are bound up in soil particles. Also, this SWMU does not have a direct connection to surface water, and it is covered by a railroad bed.

COPCs for surface and subsurface soils from SWMU 531 are shown on Tables 5.6.1 and 5.6.2 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The types of contaminants that comprise COPCs for SWMU 531 are metals, SVOCs, and radionuclides for both surface and subsurface soils.

Contaminants were detected greater than background screening levels and greater than industrial worker NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

There are no known underground pipelines at this SWMU and no direct connection to surface water. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker, excavation worker, and hypothetical residential scenarios. These are the COCs for these scenarios for SWMU 531.

- Future Industrial worker
  - Arsenic
  - Chromium
  - Uranium-238
- Excavation worker
  - Arsenic
- Hypothetical Resident (hazards evaluated against the child resident)
  - Arsenic
  - Chromium
  - Iron
  - Nickel
  - Total PAHs
  - Uranium
  - Uranium-235
  - Uranium-238
  - Zinc

Of the above, arsenic and iron for the hypothetical resident are priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04). Priority COCs for other scenarios are described in Appendix D.

For SWMU 531, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Lead
- Selenium
- Zinc

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 531 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. The SWMU is covered by a railroad bed and is between two active waste storage facilities, C-746-A (SWMU 144, a RCRA-permitted unit) and C-746-B (SWMU 39, an NFA SWMU in the 2012 SMP.) An action on SWMU 531 would not have an impact on other integrator OUs.

5.6.8 SWMU 531 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 531; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark (DOE 2010a) for scenarios including future industrial worker, excavation worker, and hypothetical residential. The reasonably anticipated future land use for this SWMU is industrial as shown in the SMP (DOE 2012a).

6. GROUP 1, STORAGE AREAS

This chapter includes a discussion of the storage area SWMUs, which includes the following 11 SWMUs:

- SWMU 200, TSCA Waste Storage Facility, sampled during RI
- SWMU 212, Radiological Contamination Area, sampled during RI
- SWMU 213, DMSA OS-02, sampled during RI
- SWMU 214, DMSA OS-03, sampled during RI
- SWMU 215, DMSA OS-04, rail tank car, sampled during RI
- SWMU 216, DMSA OS-05, sampled during RI
- SWMU 217, DMSA OS-06, sampled during RI
- SWMU 221, DMSA OS-10, sampled during RI
- SWMU 222, DMSA OS-11, sampled during RI
- SWMU 227, DMSA OS-16, sampled during RI
- SWMU 228, DMSA OS-17, sampled during RI

The SWMU-specific discussions highlight the current understanding of each SWMU's impacts. Chapter 4 describes the overall evaluation approach that was used for each SWMU. Figures display the 45 ft grids that were used for the composite sampling and historical sample assignments. There are approximately 10 grids for each EU for SWMUs that are larger than 0.5 acres. If a SWMU is smaller than 0.5 acres, it is considered one EU. If contingency "step-out" grids were deemed necessary by field laboratory results to define extent, the step-out grids are displayed on the figures.

All of these sites are located within the industrial area of the facility, as shown in Figure 6.1, and fieldwork was conducted in accordance with the Work Plan (DOE 2010a).

The nature and extent is divided into surface and subsurface sections that summarize the representative data set and describe the future industrial worker scenario for SWMUs located inside the limited area and teen recreator scenario for SWMUs located outside the limited area. The evaluation of the XRF data with fixed-base laboratory data indicates the use of XRF results for copper, iron, lead, nickel, uranium and zinc has good correlation and, therefore, is reliable for use in determining nature and extent and hot spots. Molybdenum, mercury, selenium, and silver XRF results are generally below the reporting limits and will not lead to incorrect decisions in the risk assessment; however, these results may not provide much useful information for nature and extent determination. Use of XRF results for arsenic, chromium, and manganese has uncertainties; however, higher values in the complete data set indicate overall patterns of these constituents present in the soils at the SWMUs/AOCs. Uncertainties associated with arsenic will be managed in the FS, because detections at high concentrations from the fixed-base laboratory were detected at lower concentrations by the XRF and may lead to underestimating risk. For vanadium, comparison with the fixed-base laboratory data indicates XRF data are much higher; therefore, risks may be overestimated when using the XRF data. See Appendix B for additional information.

For the fate and transport section, the process for evaluating surface water runoff and groundwater modeling is described in Chapter 4 and Appendix C and only conclusions are provided in the SWMU/AOC-specific sections.

The human health risk assessment narrative discusses the future industrial worker (for SWMU 214, which is outside the limited area, the outdoor worker exposed to surface soil is discussed instead of the future industrial worker), the excavation worker, and the hypothetical future resident. For SWMUs/AOCs

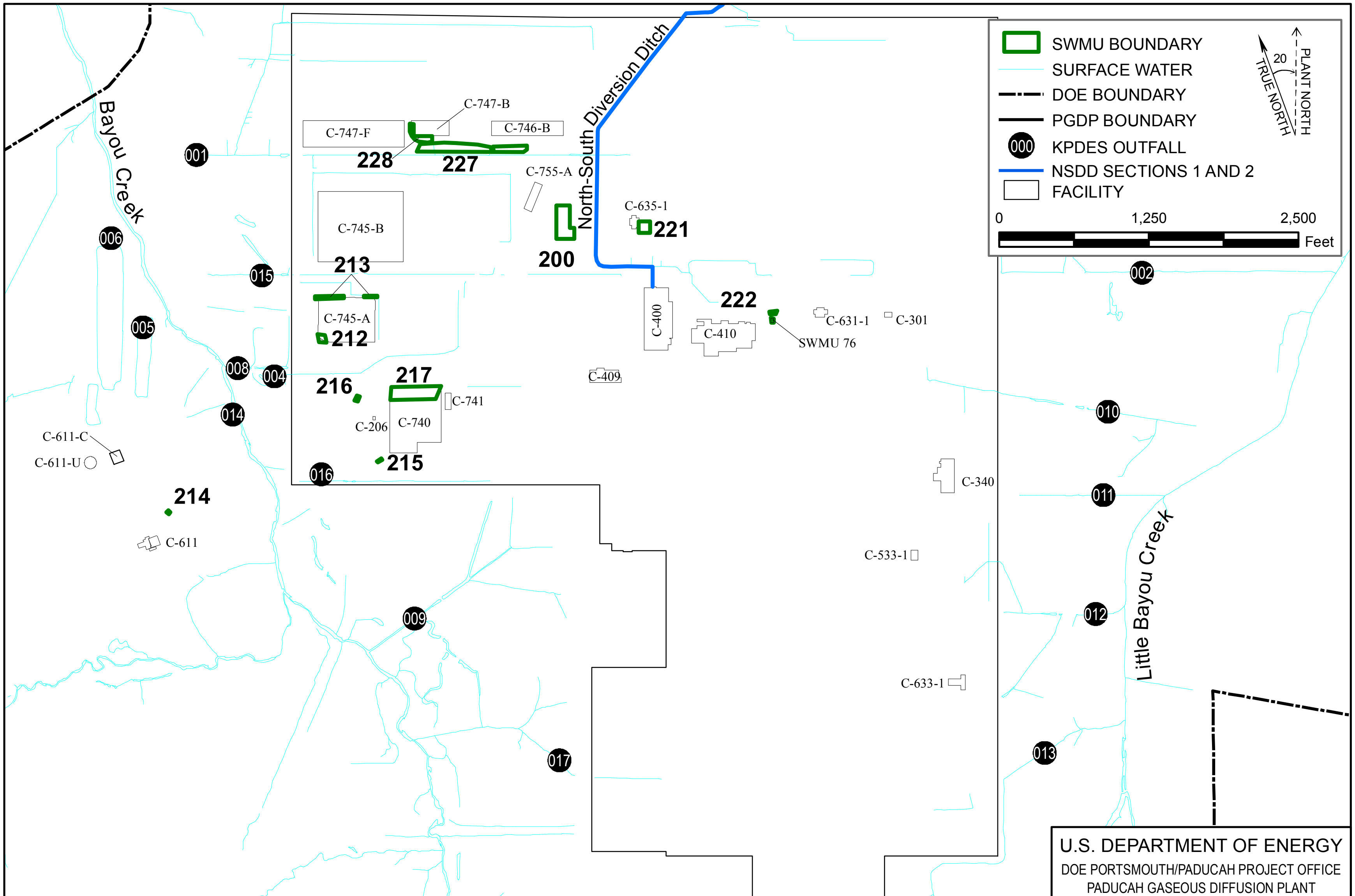


Figure 6.1. SWMU Locations and Features for Storage Areas

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outside the limited area, the teen recreational user also is discussed. Each SWMU/AOC was evaluated for receptors listed below. Additional discussion of scenarios is presented in Appendix D.

- Current on-site industrial worker (This assumes exposure to surface soils only.)

- Future on-site industrial worker (This assumes exposure to surface soils only.)

- Outdoor worker (surface and subsurface soils: 0-16 ft bgs) [This assumes exposure to surface (0-1 ft bgs) and a mixture of the surface (0-1 ft bgs) and subsurface soils (1-16 ft bgs), as appropriate, following a future construction activity. As a subset of the outdoor worker exposed to surface and subsurface soils, the potential risks and hazards for shorter-term exposure for workers during excavation also are provided.]

- Hypothetical future adult and child residents (This assumes exposure to surface soils only.)

- Future teen recreational users (This assumes exposure to surface soils only.)

The following are the uncertainties in the human health risk assessment that may affect SWMUs/AOCs in Chapter 6.

- The range of background was not considered beyond the initial screening against site-specific background.

- Overly conservative dermal toxicity factors potentially lead to an overestimation of risk.

- Concentration of total cancerous PAHs were used to estimate risk and the minimum detection limit of the PAHs with toxicity equivalency factors were used when PAHs were not detected.

- Some detection limits for XRF data are above background concentrations and NALs; the COPCs identified using these data are expected to overstate the presence of these metals.

- For those constituents that never were detected within an EU, even if the detection limit is greater than the NAL, the constituent was not considered a COPC.

- UCL concentrations were used as EPCs if there were a sufficient number of samples and distinct results to calculate a UCL. This likely will lead to an overestimation of actual exposure because receptors are assumed to be exposed to the UCL concentration for the entire exposure duration.

- Conservative (i.e., health protective) exposure factors are used when information available is limited in the form of using RME assumptions, per the Risk Methods Document (DOE 2011a). This may result in an overestimation of potential risk.

- Many of the SWMUs/AOCs (especially SWMUs 214 and 216) evaluated in this assessment are very small, and the assumptions used for the levels of exposures (duration, frequency) overstate potential chronic exposures in these units.

- The risk assessment does not consider that concentrations of some COCs may be lower or higher in the future because of processes such as degradation and attenuation.

- Additivity of multiple chemicals is assumed. Whether assuming additivity can lead to an underestimation or overestimation of risk is unknown.

- Most of the assumptions about exposure and toxicity used in this BHHRA are representative of statistical upper-bounds or even maximums for each parameter. The result of combining several such upper-bound assumptions is that the final estimate of potential exposure or potential risk is conservative.

Additional information can be found in Appendix D.

For the ecological screening, the priority chemicals that exceeded their respective screening values are shown in tables within each subsection (maximum HQ $\geq$ 10) and the overall HI for the constituents detected. This allows for comparison of the HIs, SWMU sizes, and other factors such as proximity to a surface water body. Additional information is contained in Appendix E.

6.1 SWMU 200, CENTRAL PGDP SOIL CONTAMINATION SOUTH OF TSCA WASTE STORAGE FACILITY

6.1.1 Background

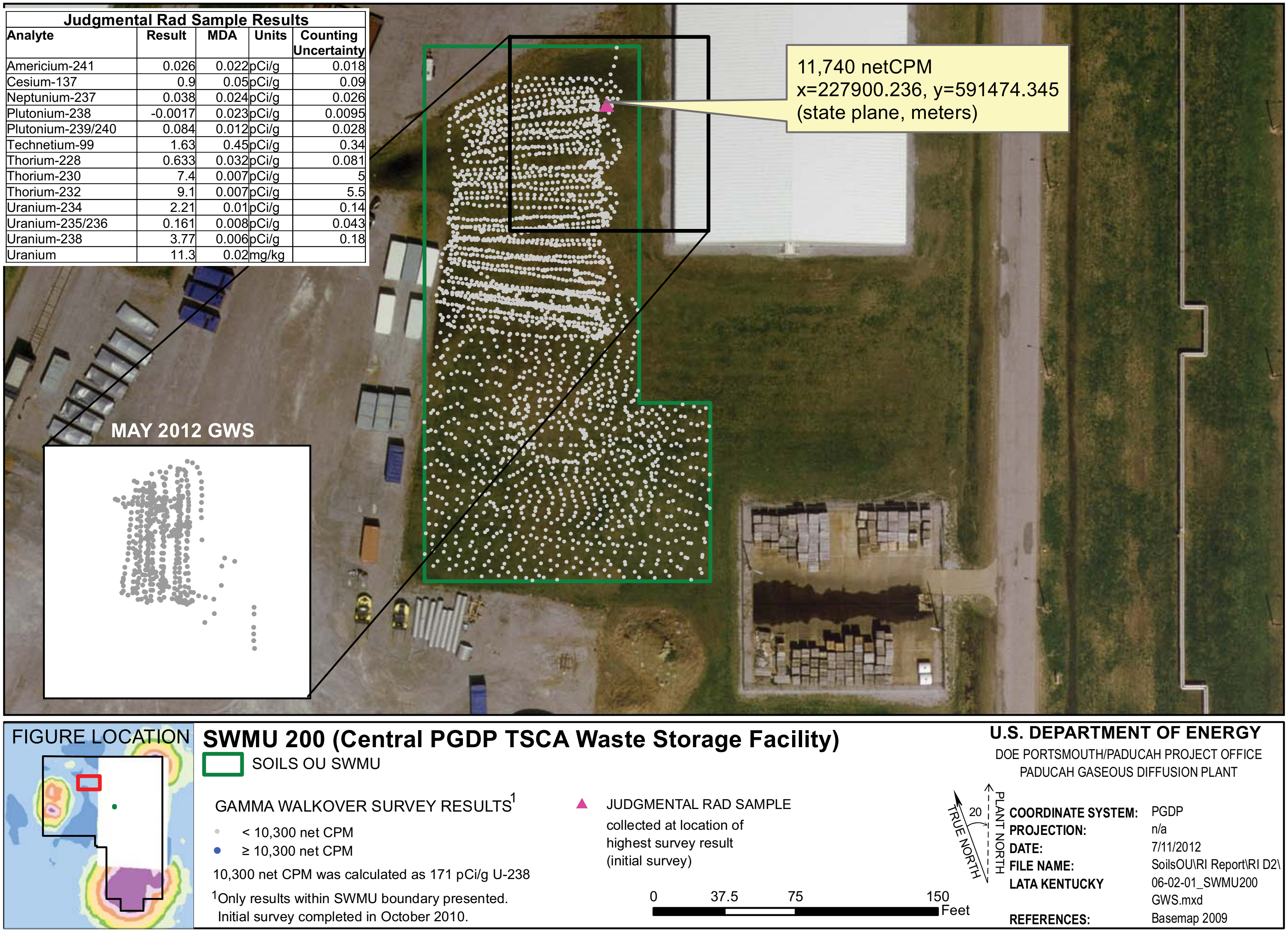
The soil contamination south of TSCA Waste Storage Facility (SWMU 200) is located in the central portion of the plant site. This area is approximately 282-ft wide by 304-ft long. This SWMU was used in the past for placement of dredged material from the NSDD. This area does not have a connection to a surface water body.

Site characterization sampling was performed prior to construction of the C-755-A TSCA Waste Storage Facility. The surface sampling showed elevated levels of PCBs and radiological contaminants to be present.

6.1.2 Fieldwork Summary

Twenty-eight grid samples were planned for the unit. One of the 14 grids was not collected resulting in 26 of the 28 samples for the SWMU being collected. Field laboratory results indicated that contingency samples were needed for concentrations of cadmium, lead, nickel, uranium, and zinc. There were 34 out of 66 contingency samples collected. Samples not collected were due to the presence of underground utilities, concrete, dense gravel, shallow refusal, and inaccessibility. Figure A.5 in Appendix A is the sample rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 6.1.1) using a FIDLER; the 6,546 measurement ranged from 3,796 to 22,740 gross cpm. The SWMU cover is mostly soil and grass with a few patches of gravel. A judgmental grab sample was collected for radiological constituents. In the area where the grab sample was collected, the number of GWS measurements tended to be greater in concentration than elsewhere in the SWMU. The reason for the greater number of measurements in this area is unknown. Figure 6.1.1 also includes an inset of a 2012 survey in the area where the judgmental grab sample was collected. Results of the 2012 survey found that all results in the vicinity of the sampled area were less than the project action limit.



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.026	0.022	pCi/g	0.018
Cesium-137	0.9	0.05	pCi/g	0.09
Neptunium-237	0.038	0.024	pCi/g	0.026
Plutonium-238	-0.0017	0.023	pCi/g	0.0095
Plutonium-239/240	0.084	0.012	pCi/g	0.028
Technetium-99	1.63	0.45	pCi/g	0.34
Thorium-228	0.633	0.032	pCi/g	0.081
Thorium-230	7.4	0.007	pCi/g	5
Thorium-232	9.1	0.007	pCi/g	5.5
Uranium-234	2.21	0.01	pCi/g	0.14
Uranium-235/236	0.161	0.008	pCi/g	0.043
Uranium-238	3.77	0.006	pCi/g	0.18
Uranium	11.3	0.02	mg/kg	

Figure 6.1.1. SWMU 200 Gamma Walkover Survey

6.1.3 Nature and Extent of Contamination—Surface Soils

For SWMU 200, the representative data set for surface soils is presented in Tables 6.1.1 and 6.1.2 and provides the nature of the contamination in SWMU 200 surface soils. Figures 6.1.2–6.1.4 illustrate the horizontal extent of the surface soil contamination. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 200 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 200 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 200 surface soil. The following are the metals detected above both the background screening levels and the industrial worker NALs the grids in which they were detected.

Metal	Grid
Chromium	5, 6, 8, 12, 5A, 6A, 8A, 9A, 9B, 11H
Mercury	4A
Nickel	6, 7, 8, 9, 10, 11, 5A, 5B, 7A, 9A, 9B, 11A, 11H

* SWMU 200 consists of one EU.

Grids 4A, 5A, 5B, 6A, 7A, 8A, 9A, 9B, 11A, and 11H are not located within the administrative boundary of SWMU 200; instead they are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 200, as described in the Work Plan (DOE 2010a). Grids 5A, 5B, 7A, 9A, and 9B border the western edge of the SWMU, and grids 11A and 11H border the eastern edge of SWMU 200.

No metals were detected above the industrial worker ALs in the SWMU 200 surface soil.

The following are the metals detected in the SWMU 200 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	13
Mercury	4A
Molybdenum[1]	13
Nickel	5A, 5B, 6, 7, 7A, 8, 9, 9A, 9B, 10, 11, 11A, 11H
Selenium	11C, 11K, 12
Thallium	13
Uranium	2, 7, 8, 9, 10, 11
Zinc	5, 8, 10, 11B, 11C

* SWMU 200 consists of one EU.
[1] No background value is available.

Table 6.1.1. Surface Soil Historical Data Summary: SWMU 200 TSCA Waste Storage Facility

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
PPCB	PCB, Total	mg/kg	3.00E-01	2.60E+00	1.45E+00	0/2	2/2	0/2	n/a	2/2	1.88E-01	0/2	1.88E+01	0/2	2/2	-

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.1.2. Surface Soil RI Data Summary: SWMU 200 Central PGDP Soil Contamination South of TSCA Waste Storage Facility

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	4.14E+03	4.14E+03	4.14E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.5 - 5.5
METAL	Antimony	mg/kg	5.60E-01	5.60E-01	5.60E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.55 - 0.55
METAL	Arsenic	mg/kg	4.60E+00	1.02E+01	7.67E+00	0/32	10/32	0/32	1.20E+01	10/32	9.97E-01	0/32	9.97E+01	0/32	10/32	1.1 - 11
METAL	Barium	mg/kg	4.63E+01	4.63E+01	4.63E+01	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	0/1	2.2 - 2.2
METAL	Beryllium	mg/kg	3.00E-01	3.00E-01	3.00E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.11 - 0.11
METAL	Cadmium	mg/kg	3.10E-01	3.10E-01	3.10E-01	0/1	1/1	1/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.055 - 0.055
METAL	Calcium	mg/kg	1.73E+05	1.73E+05	1.73E+05	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	555 - 555
METAL	Chromium	mg/kg	1.24E+01	5.75E+01	4.05E+01	0/32	11/32	10/32	1.60E+01	10/32	3.02E+01	0/32	3.02E+03	0/32	0/32	1.1 - 85
METAL	Cobalt	mg/kg	4.10E+00	4.10E+00	4.10E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.22 - 0.22
METAL	Copper	mg/kg	1.26E+01	4.42E+01	2.80E+01	0/32	18/32	16/32	1.90E+01	0/32	1.43E+03	0/32	2.24E+05	0/32	0/32	1.1 - 35
METAL	Iron	mg/kg	6.22E+03	1.94E+04	1.26E+04	0/32	32/32	0/32	2.80E+04	0/32	2.51E+04	0/32	3.92E+06	32/32	32/32	5.5 - 100
METAL	Lead	mg/kg	1.12E+01	3.20E+01	1.80E+01	0/32	31/32	0/32	3.60E+01	0/32	4.00E+02	0/32	4.00E+02	0/32	26/32	0.33 - 13
METAL	Magnesium	mg/kg	5.02E+03	5.02E+03	5.02E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	55.5 - 55.5
METAL	Manganese	mg/kg	6.95E+01	4.39E+02	2.52E+02	0/32	32/32	0/32	1.50E+03	0/32	2.58E+03	0/32	1.16E+05	31/32	32/32	0.22 - 85
METAL	Mercury	mg/kg	1.68E-02	6.71E+00	2.25E+00	0/32	2/32	1/32	2.00E-01	1/32	9.00E-01	0/32	7.85E+02	1/32	1/32	0.037 - 10
METAL	Molybdenum	mg/kg	5.70E-01	5.70E-01	5.70E-01	0/32	1/32	0/32	n/a	0/32	1.79E+02	0/32	2.80E+04	0/32	1/32	0.55 - 15
METAL	Nickel	mg/kg	1.08E+01	2.60E+02	1.05E+02	0/32	14/32	13/32	2.10E+01	13/32	4.28E+01	0/32	3.18E+04	8/32	14/32	0.55 - 65
METAL	Selenium	mg/kg	1.00E+00	5.84E+00	3.21E+00	0/32	4/32	4/32	8.00E-01	0/32	1.79E+02	0/32	2.80E+04	0/32	4/32	0.55 - 20
METAL	Silver	mg/kg	8.40E-02	8.40E-02	8.40E-02	0/32	1/32	0/32	2.30E+00	0/32	1.08E+01	0/32	9.15E+03	0/32	1/32	0.22 - 10
METAL	Sodium	mg/kg	7.69E+01	7.69E+01	7.69E+01	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	22.2 - 22.2
METAL	Thallium	mg/kg	3.00E-01	3.00E-01	3.00E-01	0/1	1/1	1/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.22 - 0.22
METAL	Uranium	mg/kg	6.62E+00	4.93E+01	1.68E+01	0/33	16/33	16/33	4.90E+00	0/33	1.07E+02	0/33	1.65E+04	0/33	6/33	0.02 - 20
METAL	Vanadium	mg/kg	1.44E+01	1.44E+01	1.44E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	3.03E+01	2.48E+02	5.59E+01	0/32	32/32	5/32	6.50E+01	0/32	1.08E+04	0/32	1.68E+06	0/32	32/32	2.2 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	1.88E-01	0/13	1.88E+01	0/13	0/13	5 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.8 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.37 - 0.37
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.37 - 0.37
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.1.2. Surface Soil RI Data Summary: SWMU 200 Central PGDP Soil Contamination South of TSCA Waste Storage Facility (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0073 - 0.0073
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.37 - 0.37
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.37 - 0.37
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.37 - 0.37
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.73 - 0.73
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.37 - 0.37
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0073 - 0.0073
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.8 - 1.8
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.37 - 0.37
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.73 - 0.73
SVOA	Total PAH	mg/kg	2.84E-02	2.84E-02	2.84E-02	0/1	1/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	3.38E+01	4.06E+01	3.72E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.3 - 5.5
RADS	Americium-241	pCi/g	2.60E-02	2.90E-02	2.75E-02	1/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.022 - 0.024
RADS	Beta activity	pCi/g	3.72E+01	3.98E+01	3.85E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	3.3 - 4.4
RADS	Cesium-137	pCi/g	1.90E-01	9.00E-01	5.45E-01	0/2	2/2	1/2	4.90E-01	2/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.05 - 0.06
RADS	Neptunium-237	pCi/g	3.80E-02	4.50E-02	4.15E-02	0/2	2/2	0/2	1.00E-01	0/2	2.71E-01	0/2	2.71E+01	0/2	2/2	0.021 - 0.024
RADS	Plutonium-238	pCi/g	-1.70E-03	1.80E-02	8.15E-03	1/2	2/2	0/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.013 - 0.023
RADS	Plutonium-239/240	pCi/g	8.40E-02	1.27E-01	1.06E-01	0/2	2/2	2/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	2/2	0.005 - 0.012
RADS	Technetium-99	pCi/g	1.63E+00	2.42E+00	2.03E+00	0/2	2/2	0/2	2.50E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	2/2	0.45 - 0.5
RADS	Thorium-228	pCi/g	5.80E-01	6.33E-01	6.07E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.032 - 0.07
RADS	Thorium-230	pCi/g	1.13E+00	3.75E+00	2.44E+00	0/2	2/2	1/2	1.50E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.007 - 0.05
RADS	Thorium-232	pCi/g	5.67E-01	7.40E-01	6.54E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.007 - 0.01
RADS	Uranium-234	pCi/g	1.62E+00	2.21E+00	1.92E+00	0/2	2/2	2/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.007 - 0.01
RADS	Uranium-235/236	pCi/g	1.22E-01	1.61E-01	1.42E-01	0/2	2/2	2/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.008 - 0.009
RADS	Uranium-238	pCi/g	3.35E+00	3.77E+00	3.56E+00	0/2	2/2	2/2	1.20E+00	2/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.006 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

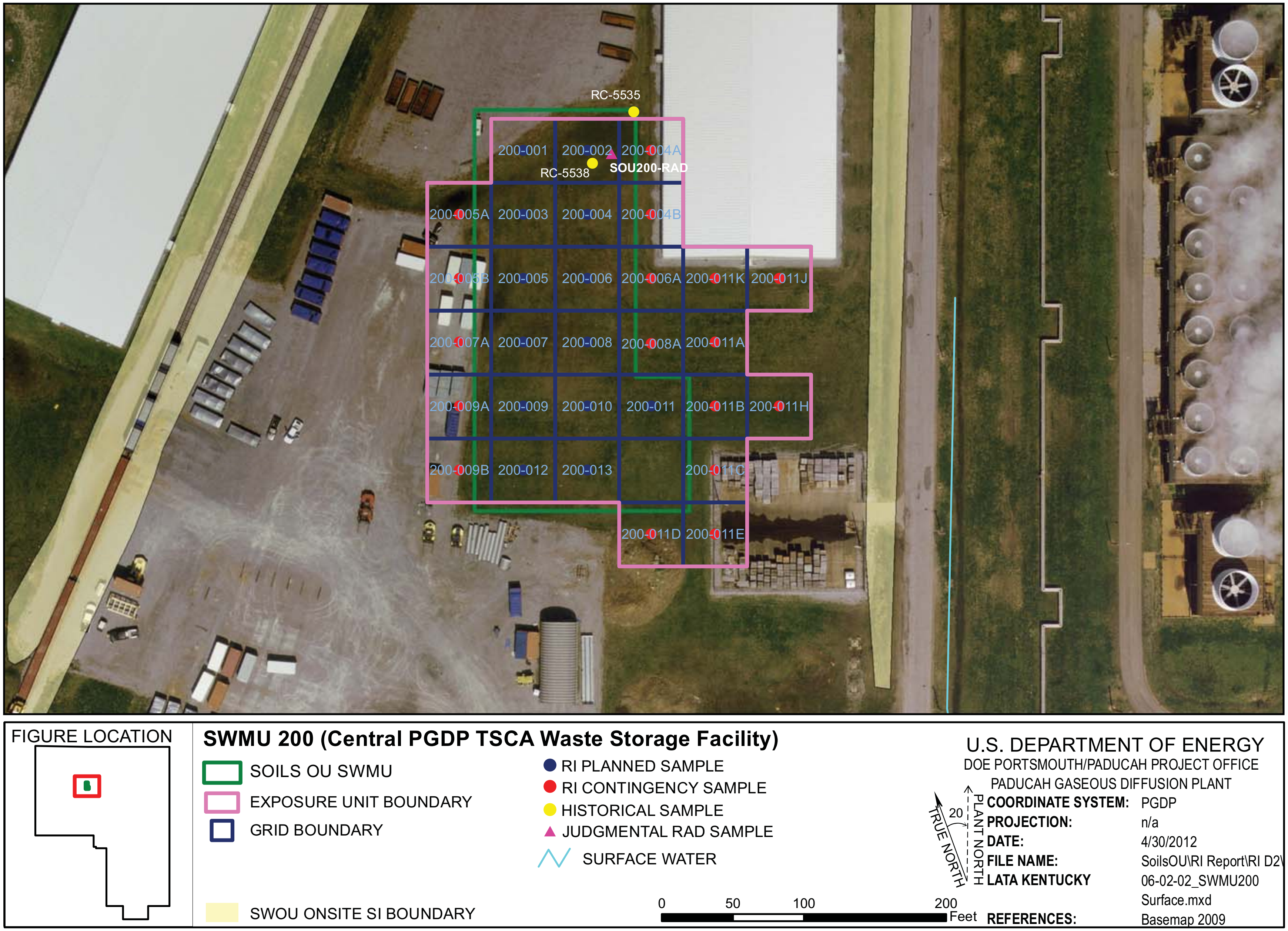


Figure 6.1.2. SWMU 200 Sample Locations - Surface Soil

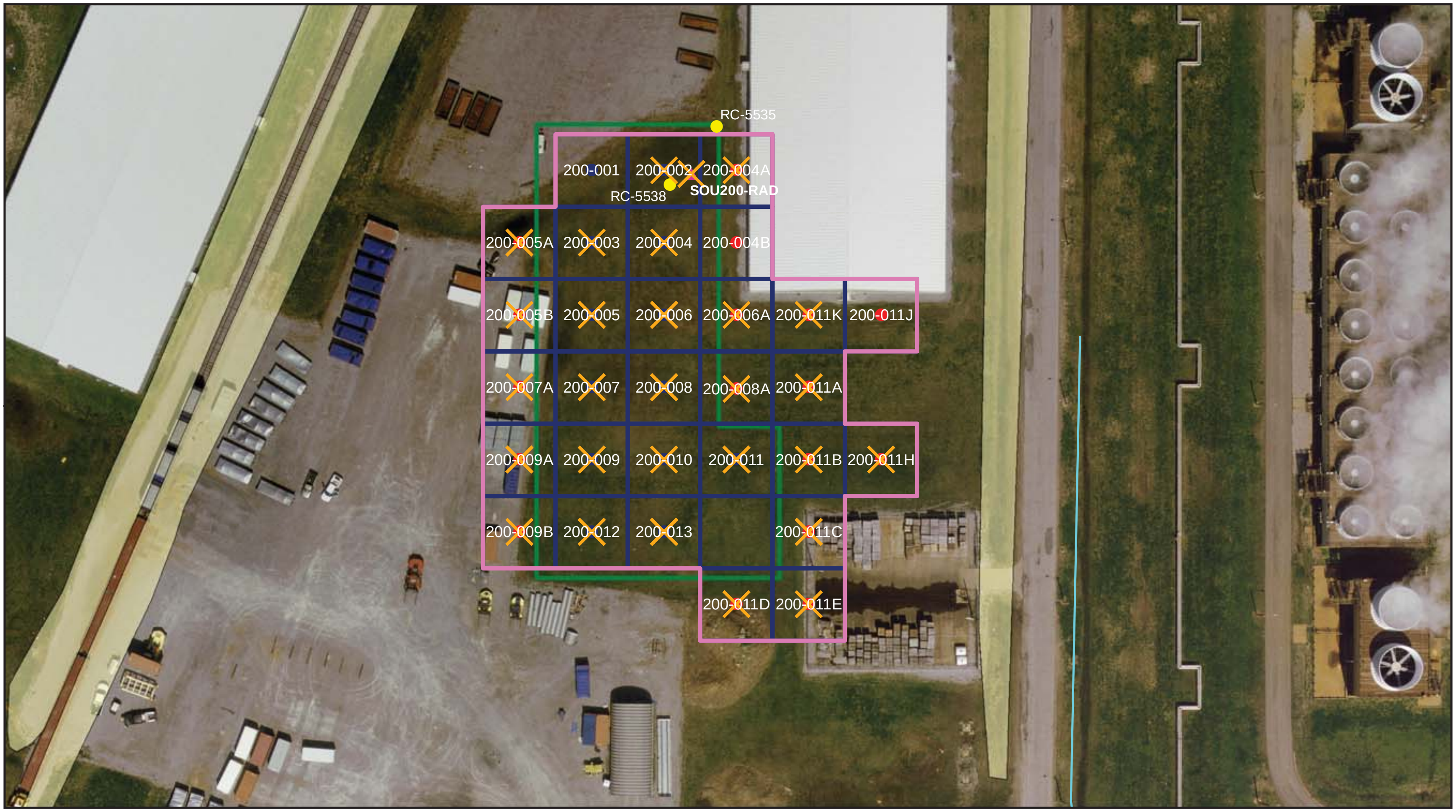


FIGURE LOCATION

SWMU 200 (Central PGDP TSCA Waste Storage Facility)

SOILS OU SWMU
EXPOSURE UNIT BOUNDARY
GRID BOUNDARY
SURFACE WATER
SWOU ONSITE SI BOUNDARY

RI PLANNED SAMPLE
RI CONTINGENCY SAMPLE
HISTORICAL SAMPLE
JUDGMENTAL RAD SAMPLE
> BACKGROUND

0 50 100 200 Feet

TRUE NORTH 20 PLANT NORTH

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT
LATA KENTUCKY

COORDINATE SYSTEM:	PGDP
PROJECTION:	n/a
DATE:	5/2/2012
FILE NAME:	SoilsOU\RI Report\RI D2\ 06-02-03_SWMU_200 SurfBkgd.mxd
REFERENCES:	Basemap 2009

Figure 6.1.3. SWMU 200 Background Exceedances - Surface Soil

Station	Results Exceeding Background
SOU200-002	Uranium 18.91 (mg/kg)

Station	Results Exceeding Background
SOU200-003	Uranium 6.62 (mg/kg)

Station	Results Exceeding Background
SOU200-004	Copper 24.53 (mg/kg)

Station	Results Exceeding Background
SOU200-004A	Mercury 6.71 (mg/kg)

Station	Results Exceeding Background
SOU200-005	Chromium 42.32 (mg/kg)
	Uranium 6.85 (mg/kg)
	Zinc 71.64 (mg/kg)

Station	Results Exceeding Background
SOU200-005A	Chromium 47.34 (mg/kg)
	Nickel 64.34 (mg/kg)

Station	Results Exceeding Background
SOU200-005B	Nickel 83.74 (mg/kg)

Station	Results Exceeding Background
SOU200-006	Chromium 55.3 (mg/kg)
	Copper 32.31 (mg/kg)
	Nickel 59.16 (mg/kg)

Station	Results Exceeding Background
SOU200-006A	Chromium 32.67 (mg/kg)

Station	Results Exceeding Background
SOU200-007	Copper 19.67 (mg/kg)
	Nickel 259.54 (mg/kg)
	Uranium 16.74 (mg/kg)

Station	Results Exceeding Background
SOU200-007A	Copper 29.59 (mg/kg)
	Nickel 151.22 (mg/kg)

Station	Results Exceeding Background
SOU200-008	Chromium 35 (mg/kg)
	Copper 24.2 (mg/kg)
	Nickel 111.59 (mg/kg)
	Uranium 24.4 (mg/kg)
	Zinc 67.47 (mg/kg)

Station	Results Exceeding Background
SOU200-008A	Chromium 32.89 (mg/kg)

Station	Results Exceeding Background
SOU200-009	Copper 41.25 (mg/kg)
	Nickel 196.6 (mg/kg)
	Uranium 49.25 (mg/kg)

Station	Results Exceeding Background
SOU200-009A	Chromium 53.29 (mg/kg)
	Copper 21.08 (mg/kg)
	Nickel 197.88 (mg/kg)
	Uranium 12.27 (mg/kg)

Station	Results Exceeding Background
SOU200-009B	Chromium 53.67 (mg/kg)
	Nickel 68.64 (mg/kg)
	Uranium 8.84 (mg/kg)

Station	Results Exceeding Background
SOU200-010	Copper 42.71 (mg/kg)
	Nickel 119.46 (mg/kg)
	Uranium 48.73 (mg/kg)
	Zinc 66.83 (mg/kg)

Station	Results Exceeding Background
SOU200-011	Copper 31.83 (mg/kg)
	Nickel 61.16 (mg/kg)
	Uranium 35.69 (mg/kg)

Station	Results Exceeding Background
SOU200-011A	Copper 25.23 (mg/kg)
	Nickel 70.74 (mg/kg)

Station	Results Exceeding Background
SOU200-011B	Copper 42.52 (mg/kg)
	Zinc 76.97 (mg/kg)

Station	Results Exceeding Background
SOU200-011C	Selenium 4.52 (mg/kg)
	Uranium 8.86 (mg/kg)
	Zinc 248.34 (mg/kg)

Station	Results Exceeding Background
SOU200-011D	Copper 22.47 (mg/kg)
	Uranium 8.26 (mg/kg)

Station	Results Exceeding Background
SOU200-011E	Copper 29.64 (mg/kg)
	Uranium 8.11 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 6.1.3. SWMU 200 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU200-011H	Chromium 57.53 (mg/kg)
	Copper 44.22 (mg/kg)
	Nickel 115.28 (mg/kg)

Station	Results Exceeding Background
SOU200-011K	Selenium 5.84 (mg/kg)

Station	Results Exceeding Background
SOU200-012	Chromium 51.66 (mg/kg)
	Copper 23.55 (mg/kg)
	Selenium 3.69 (mg/kg)
	Uranium 7.67 (mg/kg)

Station	Results Exceeding Background
SOU200-013	Antimony 0.56 (mg/kg)
	Cadmium 0.31 (mg/kg)
	Selenium 1 (mg/kg)
	Thallium 0.3 (mg/kg)
	Uranium 10 (mg/kg)
	Plutonium-239/240 0.127 (pCi/g)
	Thorium-230 3.75 (pCi/g)
	Uranium-234 1.62 (pCi/g)
	Uranium-235/236 0.122 (pCi/g)
	Uranium-238 3.35 (pCi/g)

Station	Results Exceeding Background
SOU200-RAD	Uranium 11.3 (mg/kg)
	Cesium-137 0.9 (pCi/g)
	Plutonium-239/240 0.084 (pCi/g)
	Uranium-234 2.21 (pCi/g)
	Uranium-235/236 0.161 (pCi/g)
	Uranium-238 3.77 (pCi/g)

NOTE: maximum detections only shown for location.

Figure 6.1.3. SWMU 200 Background Exceedances – Surface (Continued)

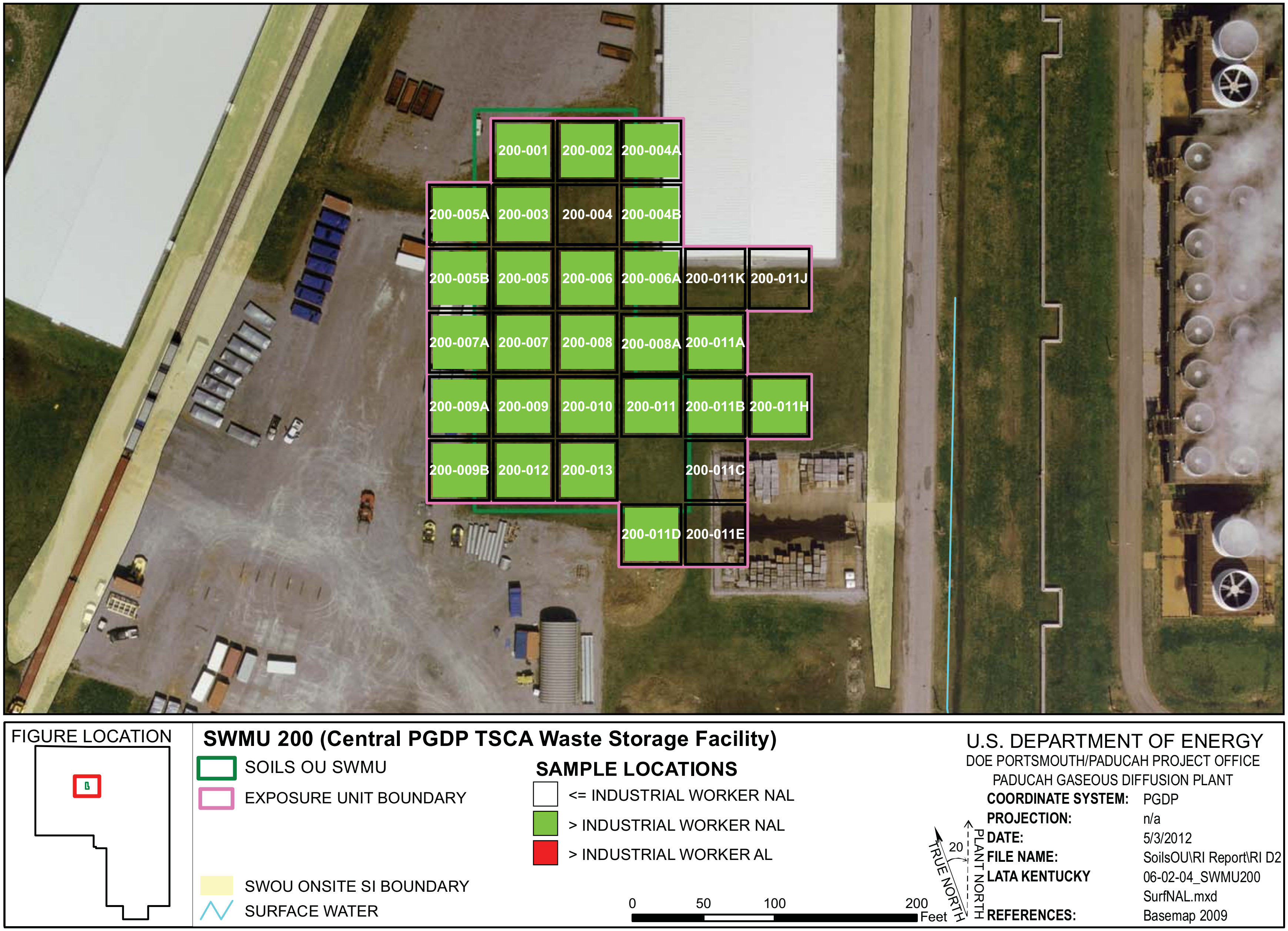


Figure 6.1.4. SWMU 200 NAL Exceedances - Surface Soil

Grid	Results Exceeding NAL
200-001	Arsenic 9.35 (mg/kg)
200-002	PCB, Total 2.6 (mg/kg)
	Cesium-137 0.9 (pCi/g)
	Uranium-238 3.77 (pCi/g)
200-003	Arsenic 6.56 (mg/kg)
200-004A	Mercury 6.71 (mg/kg)
	PCB, Total 0.3 (mg/kg)
200-004B	Arsenic 10.17 (mg/kg)
200-005	Arsenic 7.32 (mg/kg)
	Chromium 42.32 (mg/kg)
200-005A	Chromium 47.34 (mg/kg)
	Nickel 64.34 (mg/kg)
200-005B	Nickel 83.74 (mg/kg)
200-006	Chromium 55.3 (mg/kg)
	Nickel 59.16 (mg/kg)
200-006A	Chromium 32.67 (mg/kg)
200-007	Nickel 259.54 (mg/kg)
200-007A	Nickel 151.22 (mg/kg)

Grid	Results Exceeding NAL
200-008	Chromium 35 (mg/kg)
	Nickel 111.59 (mg/kg)
200-008A	Chromium 32.89 (mg/kg)
200-009	Nickel 196.6 (mg/kg)
200-009A	Chromium 53.29 (mg/kg)
	Nickel 197.88 (mg/kg)
200-009B	Arsenic 9.35 (mg/kg)
	Chromium 53.67 (mg/kg)
	Nickel 68.64 (mg/kg)
200-010	Nickel 119.46 (mg/kg)
200-011	Arsenic 5.41 (mg/kg)
	Nickel 61.16 (mg/kg)
200-011A	Arsenic 9.41 (mg/kg)
	Nickel 70.74 (mg/kg)
200-011B	Arsenic 7.67 (mg/kg)
200-011D	Arsenic 9.9 (mg/kg)
200-011H	Chromium 57.53 (mg/kg)
	Nickel 115.28 (mg/kg)
200-012	Chromium 51.66 (mg/kg)

Grid	Results Exceeding NAL
200-013	Arsenic 4.6 (mg/kg)
	Beryllium 0.3 (mg/kg)
	Vanadium 14.4 (mg/kg)
	Cesium-137 0.19 (pCi/g)
	Uranium-238 3.35 (pCi/g)

NOTE: maximum detections only shown for location.

Figure 6.1.4. SWMU 200 NAL Exceedances – Surface (Continued)

Mercury (grid 4A) and nickel (grids 5B, 7, 7A, 8, 9, 10, and 11H) were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the industrial worker NAL in the surface soil of grids 2 and 4A. These two grids are located at the northeastern corner of SWMU 200. PCBs were not detected above the industrial worker ALs in the SWMU 200 surface soil.

Total PCBs were detected above the SSL for the protection of UCRS groundwater in grids 2 and 4A, but not above the SSL for the protection of RGA groundwater. Further definition of the extent of contamination to the northeast is prevented by the C-746-A TSCA Waste Storage facility.

SVOCs

No SVOCs were detected above the industrial worker NALs or ALs in the SWMU 200 surface soil.

Total PAHs in grid 13 were detected above the SSLs for the protection of UCRS groundwater.

No SVOCs were detected above the SSLs for the protection of RGA groundwater in the SWMU 200 surface soil.

VOCs

There are no surface soil samples for VOC analysis from SWMU 200.

Radionuclides

Uranium-238 was detected above both the background screening level and the industrial worker NAL in grids 2 and 13. Cesium-137 was detected above both the background screening level and the industrial worker NAL in grid 2 (judgmental grab sample).

No radionuclides were detected above the industrial worker ALs in the surface soil samples.

Plutonium-239/240 and thorium-230 were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

6.1.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 200, the representative data set for subsurface soils is presented in Tables 6.1.3 and 6.1.4 provides the nature of the contamination in SWMU 200 subsurface soils. Figures 6.1.5–6.1.7 illustrate the horizontal extent. A complete list of sampling results, including the sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 200 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 200 consists of one EU.

Table 6.1.3. Subsurface Soil Historical Data Summary: SWMU 200 TSCA Waste Storage Facility

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range

There is no subsurface historical data.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.1.4. Subsurface Soil RI Data Summary: SWMU 200 Central PGDP Soil Contamination South of TSCA Waste Storage Facility

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	3.97E+03	7.30E+03	6.34E+03	0/5	5/5	0/5	1.20E+04	0/5	3.32E+04	0/5	3.97E+06	0/5	5/5	5.3 - 6
METAL	Antimony	mg/kg	3.00E-01	3.70E-01	3.32E-01	0/5	5/5	5/5	2.10E-01	0/5	2.53E+00	0/5	1.51E+03	0/5	5/5	0.53 - 0.6
METAL	Arsenic	mg/kg	4.60E+00	1.02E+01	7.22E+00	0/32	15/32	5/32	7.90E+00	15/32	9.97E-01	0/32	9.97E+01	0/32	15/32	1.1 - 11
METAL	Barium	mg/kg	6.69E+01	1.07E+02	8.84E+01	0/5	5/5	0/5	1.70E+02	0/5	5.92E+02	0/5	3.78E+05	0/5	3/5	2.1 - 2.4
METAL	Beryllium	mg/kg	3.50E-01	6.40E-01	4.86E-01	0/5	5/5	0/5	6.90E-01	5/5	1.40E-02	0/5	9.22E+00	0/5	0/5	0.11 - 0.12
METAL	Cadmium	mg/kg	1.90E-02	2.60E-01	9.36E-02	0/5	5/5	1/5	2.10E-01	0/5	3.16E+00	0/5	3.16E+02	0/5	0/5	0.053 - 0.06
METAL	Calcium	mg/kg	2.63E+03	4.08E+04	1.37E+04	0/5	5/5	3/5	6.10E+03	0/5	n/a	0/5	n/a	n/a	n/a	53 - 59.8
METAL	Chromium	mg/kg	9.50E+00	6.19E+01	3.40E+01	0/32	16/32	6/32	4.30E+01	12/32	3.02E+01	0/32	3.02E+03	0/32	0/32	1.1 - 85
METAL	Cobalt	mg/kg	4.70E+00	8.20E+00	6.32E+00	0/5	5/5	0/5	1.30E+01	0/5	1.05E+01	0/5	1.52E+03	5/5	5/5	0.21 - 0.24
METAL	Copper	mg/kg	6.80E+00	2.04E+01	9.24E+00	0/32	6/32	0/32	2.50E+01	0/32	1.43E+03	0/32	2.24E+05	0/32	0/32	1.1 - 35
METAL	Iron	mg/kg	7.80E+03	2.07E+04	1.16E+04	0/32	32/32	0/32	2.80E+04	0/32	2.51E+04	0/32	3.92E+06	32/32	32/32	5.3 - 100
METAL	Lead	mg/kg	6.66E+00	2.59E+01	1.20E+01	0/32	29/32	1/32	2.30E+01	0/32	4.00E+02	0/32	4.00E+02	0/32	8/32	0.32 - 13
METAL	Magnesium	mg/kg	8.75E+02	3.19E+03	1.55E+03	0/5	5/5	1/5	2.10E+03	0/5	n/a	0/5	n/a	n/a	n/a	53 - 59.8
METAL	Manganese	mg/kg	6.83E+01	1.21E+03	3.97E+02	0/32	32/32	1/32	8.20E+02	0/32	2.58E+03	0/32	1.16E+05	31/32	32/32	0.21 - 85
METAL	Mercury	mg/kg	1.54E-02	6.93E+00	6.53E-01	0/32	6/32	1/32	1.30E-01	1/32	9.00E-01	0/32	7.85E+02	1/32	1/32	0.0353 - 10
METAL	Molybdenum	mg/kg	3.30E-01	7.30E-01	5.64E-01	0/32	5/32	0/32	n/a	0/32	1.79E+02	0/32	2.80E+04	0/32	5/32	0.53 - 15
METAL	Nickel	mg/kg	6.20E+00	9.06E+01	3.10E+01	0/32	11/32	6/32	2.20E+01	6/32	4.28E+01	0/32	3.18E+04	1/32	11/32	0.53 - 65
METAL	Selenium	mg/kg	6.20E-01	1.40E+00	1.08E+00	0/32	5/32	4/32	7.00E-01	0/32	1.79E+02	0/32	2.80E+04	0/32	5/32	0.53 - 20
METAL	Silver	mg/kg	3.00E-02	9.47E+00	8.97E-01	0/32	6/32	1/32	2.70E+00	0/32	1.08E+01	0/32	9.15E+03	1/32	3/32	0.21 - 10
METAL	Sodium	mg/kg	6.15E+01	1.06E+02	7.43E+01	0/5	5/5	0/5	3.40E+02	0/5	n/a	0/5	n/a	n/a	n/a	21.2 - 23.9
METAL	Thallium	mg/kg	7.40E-02	2.30E-01	1.59E-01	0/5	5/5	0/5	3.40E-01	0/5	2.87E+00	0/5	4.48E+02	0/5	3/5	0.21 - 0.24
METAL	Uranium	mg/kg	9.10E-01	3.00E+00	1.94E+00	0/33	6/33	0/33	4.60E+00	0/33	1.07E+02	0/33	1.65E+04	0/33	0/33	0.04 - 20
METAL	Vanadium	mg/kg	1.54E+01	3.57E+01	2.48E+01	0/5	5/5	0/5	3.70E+01	5/5	1.51E-01	0/5	9.30E+01	5/5	5/5	1.1 - 1.2
METAL	Zinc	mg/kg	1.56E+01	2.30E+02	3.30E+01	0/32	32/32	1/32	6.00E+01	0/32	1.08E+04	0/32	1.68E+06	0/32	28/32	2.1 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	1.88E-01	0/13	1.88E+01	0/13	0/13	0.36 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.39 - 0.39
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.39 - 0.39
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.39 - 0.39
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.30E+00	0/2	3.91E+01	0/2	0/2	1.9 - 1.9
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.02E+02	0/2	1.81E+04	0/2	0/2	0.39 - 0.39
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.05E+03	0/2	1.22E+05	0/2	0/2	0.39 - 0.39
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.1.4. Subsurface Soil RI Data Summary: SWMU 200 Central PGDP Soil Contamination South of TSCA Waste Storage Facility (Continued)

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.0078 - 0.0078
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.39 - 0.39
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.01E+02	0/2	1.80E+04	0/2	0/2	0.39 - 0.39
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.87E+02	0/2	1.46E+04	0/2	0/2	0.39 - 0.39
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.17E-01	0/2	1.17E+01	0/2	0/2	0.39 - 0.39
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.78 - 0.78
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.24E+00	0/2	2.24E+02	0/2	0/2	0.39 - 0.39
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.22E-02	0/2	5.22E+00	0/2	0/2	0.0078 - 0.0078
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	1.9 - 1.9
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.49E+02	0/2	1.35E+04	0/2	0/2	0.39 - 0.39
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.78 - 0.78
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.92E-02	0/2	5.92E+00	0/2	0/2	-
RADS	Alpha activity	pCi/g	2.60E+01	2.93E+01	2.77E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.6 - 5.3
RADS	Americium-241	pCi/g	1.20E-02	2.10E-02	1.65E-02	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.027 - 0.029
RADS	Beta activity	pCi/g	2.96E+01	3.70E+01	3.33E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.2 - 6.2
RADS	Cesium-137	pCi/g	5.00E-03	2.30E-02	1.40E-02	0/2	2/2	0/2	2.80E-01	0/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.068 - 0.075
RADS	Neptunium-237	pCi/g	-1.00E-03	8.00E-03	3.50E-03	0/2	2/2	0/2	n/a	0/2	2.71E-01	0/2	2.71E+01	0/2	1/2	0.011 - 0.019
RADS	Plutonium-238	pCi/g	3.00E-03	1.30E-02	8.00E-03	0/2	2/2	0/2	n/a	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.018 - 0.029
RADS	Plutonium-239/240	pCi/g	6.50E-03	7.80E-03	7.15E-03	0/2	2/2	0/2	n/a	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.011 - 0.013
RADS	Technetium-99	pCi/g	3.60E-01	3.70E-01	3.65E-01	0/2	2/2	0/2	2.80E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	1/2	0.42 - 0.42
RADS	Thorium-228	pCi/g	9.10E-01	1.03E+00	9.70E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.03 - 0.05
RADS	Thorium-230	pCi/g	9.00E-01	9.30E-01	9.15E-01	0/2	2/2	0/2	1.40E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.01 - 0.03
RADS	Thorium-232	pCi/g	9.20E-01	9.70E-01	9.45E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.03
RADS	Uranium-234	pCi/g	6.68E-01	9.00E-01	7.84E-01	0/2	2/2	0/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.01 - 0.022
RADS	Uranium-235/236	pCi/g	4.40E-02	4.40E-02	4.40E-02	2/2	2/2	0/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.016 - 0.017
RADS	Uranium-238	pCi/g	7.90E-01	8.80E-01	8.35E-01	0/2	2/2	0/2	1.20E+00	0/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.01 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

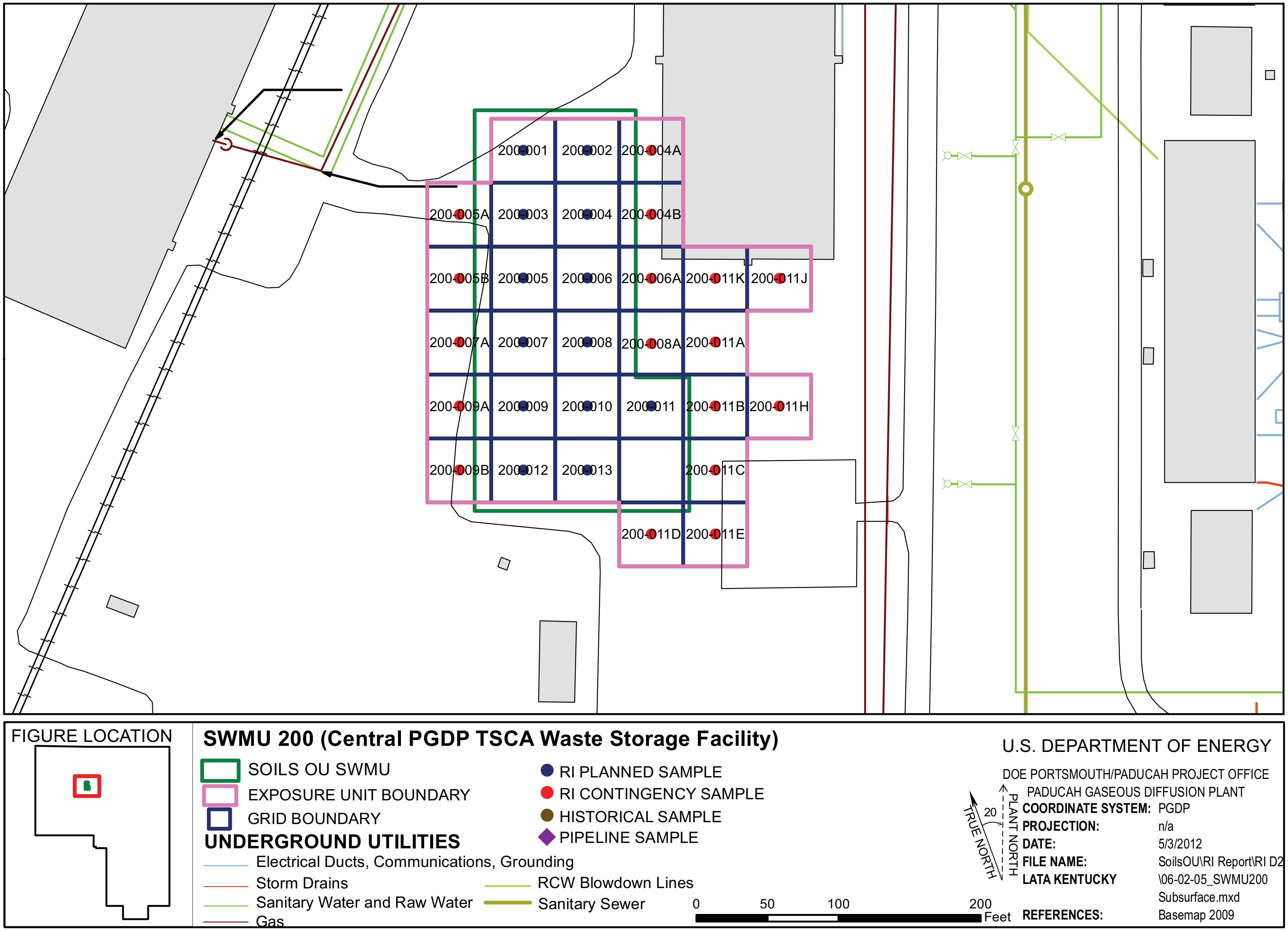


Figure 6.1.5. SWMU 200 Sample Locations - Subsurface Soil

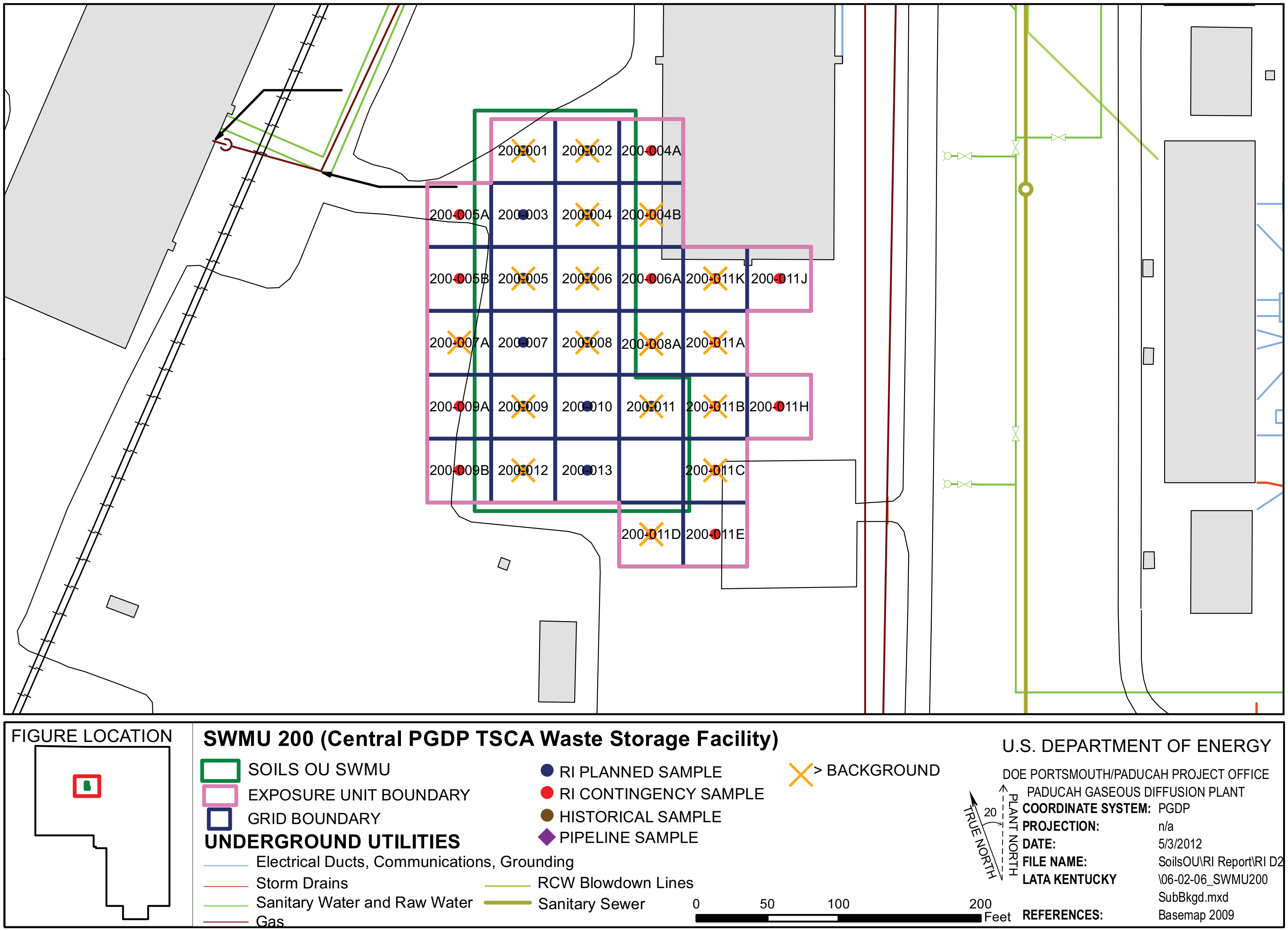


Figure 6.1.6. SWMU 200 Background Exceedances - Subsurface Soil

Station	Results Exceeding Background
SOU200-001	Chromium 58.08 (mg/kg)

Station	Results Exceeding Background
SOU200-002	Chromium 57.59 (mg/kg)

Station	Results Exceeding Background
SOU200-004	Nickel 65.39 (mg/kg)

Station	Results Exceeding Background
SOU200-004B	Antimony 0.35 (mg/kg)
	Selenium 1.4 (mg/kg)

Station	Results Exceeding Background
SOU200-005	Antimony 0.33 (mg/kg)
	Selenium 1.1 (mg/kg)

Station	Results Exceeding Background
SOU200-006	Arsenic 9.02 (mg/kg)

Station	Results Exceeding Background
SOU200-007A	Nickel 56.94 (mg/kg)

Station	Results Exceeding Background
SOU200-008	Nickel 62.2 (mg/kg)

Station	Results Exceeding Background
SOU200-008A	Antimony 0.37 (mg/kg)
	Arsenic 8.5 (mg/kg)
	Calcium 13100 (mg/kg)
	Chromium 53.47 (mg/kg)
	Selenium 1.3 (mg/kg)

Station	Results Exceeding Background
SOU200-009	Chromium 46.1 (mg/kg)
	Nickel 70.03 (mg/kg)

Station	Results Exceeding Background
SOU200-011	Mercury 6.93 (mg/kg)

Station	Results Exceeding Background
SOU200-011A	Arsenic 8.05 (mg/kg)
	Lead 25.89 (mg/kg)

Station	Results Exceeding Background
SOU200-011B	Silver 9.47 (mg/kg)

Station	Results Exceeding Background
SOU200-011C	Chromium 61.91 (mg/kg)
	Nickel 90.57 (mg/kg)
	Zinc 230 (mg/kg)

Station	Results Exceeding Background
SOU200-011D	Antimony 0.31 (mg/kg)
	Arsenic 10.2 (mg/kg)
	Cadmium 0.26 (mg/kg)
	Calcium 40800 (mg/kg)
	Magnesium 3190 (mg/kg)
	Manganese 1209.96 (mg/kg)

Station	Results Exceeding Background
SOU200-011K	Antimony 0.3 (mg/kg)
	Arsenic 9.8 (mg/kg)
	Calcium 9270 (mg/kg)
	Selenium 1 (mg/kg)

Station	Results Exceeding Background
SOU200-012	Chromium 51.65 (mg/kg)
	Nickel 63.58 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 6.1.6. SWMU 200 Background Exceedances – Subsurface (Continued)

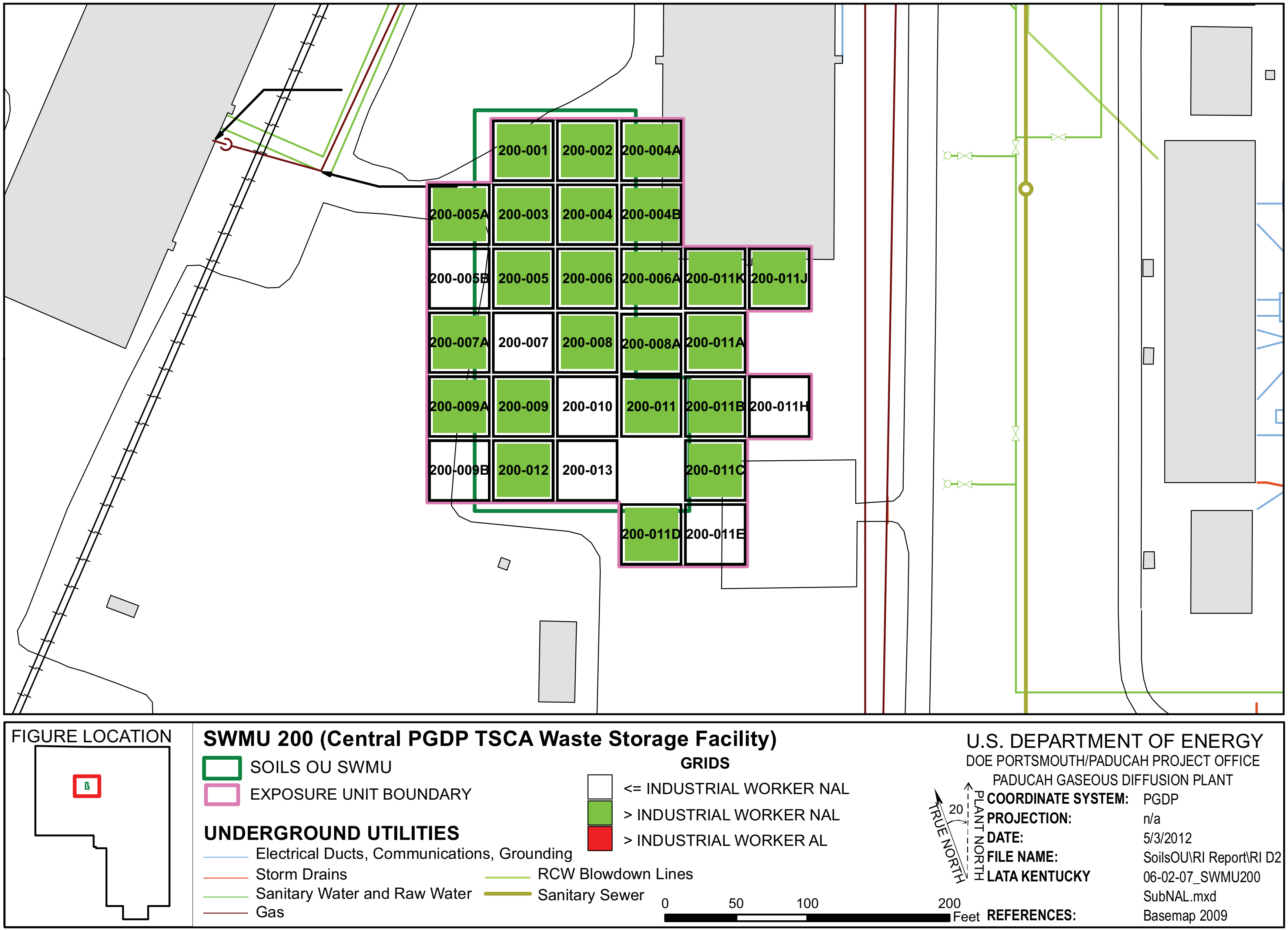


Figure 6.1.7. SWMU 200 NAL Exceedances - Subsurface Soil

Grid	Results Exceeding NAL
200-001	Arsenic 5.38 (mg/kg) Chromium 58.08 (mg/kg)
200-002	Arsenic 7.42 (mg/kg) Chromium 57.59 (mg/kg)
200-003	Chromium 40.15 (mg/kg)
200-004	Chromium 33.29 (mg/kg) Nickel 65.39 (mg/kg)
200-004A	Chromium 36.99 (mg/kg)
200-004B	Arsenic 4.6 (mg/kg) Beryllium 0.45 (mg/kg) Vanadium 22.6 (mg/kg)
200-005	Arsenic 5.92 (mg/kg) Beryllium 0.35 (mg/kg) Vanadium 20.5 (mg/kg)
200-005A	Chromium 42.81 (mg/kg)
200-006	Arsenic 9.02 (mg/kg)
200-006A	Arsenic 6.42 (mg/kg)
200-007A	Nickel 56.94 (mg/kg)
200-008	Nickel 62.2 (mg/kg)
200-008A	Arsenic 8.5 (mg/kg) Beryllium 0.64 (mg/kg) Chromium 53.47 (mg/kg) Vanadium 35.7 (mg/kg)
200-009	Arsenic 6.08 (mg/kg) Chromium 46.1 (mg/kg) Nickel 70.03 (mg/kg)
200-009A	Chromium 37.03 (mg/kg)
200-011	Mercury 6.93 (mg/kg)
200-011A	Arsenic 8.05 (mg/kg)
200-011B	Arsenic 7.15 (mg/kg)
200-011C	Chromium 61.91 (mg/kg) Nickel 90.57 (mg/kg)
200-011D	Arsenic 10.2 (mg/kg) Beryllium 0.38 (mg/kg) Vanadium 15.4 (mg/kg)
200-011J	Arsenic 6.62 (mg/kg) Chromium 32.52 (mg/kg)
200-011K	Arsenic 9.8 (mg/kg) Beryllium 0.61 (mg/kg) Vanadium 29.7 (mg/kg)
200-012	Arsenic 6.92 (mg/kg) Chromium 51.65 (mg/kg) Nickel 63.58 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 6.1.7. SWMU 200 NAL Exceedances – Subsurface (Continued)

Metals

Metals were detected above the industrial worker NALs in the SWMU 200 subsurface soil. The following are the metals detected at or above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Arsenic	6, 8A, 11A, 11D, 11K
Chromium	1, 2, 8A, 9, 11C 12
Mercury	11
Nickel	4, 7A, 8, 9, 11C, 12

* SWMU 200 consists of one EU.

Grids 7A, 8A, 11A, 11C, 11D, and 11K are not located within the administrative boundary of SWMU 200; instead, they are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 200, as described in the Work Plan (DOE 2010a). Grid 7A borders the western edge of the SWMU; grids 8A, 11A, 11C, 11H, and 11K border the eastern edge of SWMU 200; and 11D borders the southern edge of the SWMU.

The maximum depth at which metals were detected at or above both background screening levels and the industrial worker NALs was 4 ft bgs. The end depths of the boreholes taken from grids 7A, 8A, 11A, 11C, 11D, and 11K range from 4ft to 10 ft bgs.

No metals were detected above the industrial worker ALs in the SWMU 200 subsurface soil.

The following are the metals detected in the SWMU 200 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	4B, 5, 8A, 11D, 11K
Arsenic	6, 8A, 11A, 11D, 11K
Lead	11A
Manganese	11D
Mercury	11
Molybdenum[1]	4B, 5, 8A, 11D, 11K
Nickel	7A, 8, 9, 11C, 12
Selenium	4B, 5, 8A, 11K
Silver	11B
Zinc	11C

* SWMU 200 consists of one EU.
[1] No background value is available.

Manganese in grid 11D, mercury in grid 11, nickel in grid 11C, and silver in grid 11B were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

No PCBs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 200 subsurface soil.

SVOCs

No SVOCs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 200 subsurface soil.

VOCs

No subsurface soil samples from SWMU 200 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above the industrial worker NALs or industrial worker ALs in the SWMU 200 subsurface soil.

Neptunium-237 (no background value available) in grid 5 was detected above the SSL for the protection of UCRS groundwater. No radionuclides were detected above background screening levels and the SSLs for the protection of RGA groundwater.

6.1.5 Fate and Transport

No target chemicals were identified for further evaluation of impacts to the RGA (Chapter 4). There is no concern for significant potential runoff from SWMU 200 due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow. Ditches located to the northwest and southeast were sampled during the SWOU SI (DOE 2008a). A final response action for internal ditches will be addressed by the SWOU, as described in the SMP (DOE 2012a). In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

6.1.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 200 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 200 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 6.1.5 for the future industrial worker and the hypothetical resident. The excavation worker scenario did not identify COCs. Table 6.1.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Table 6.1.5. RGOs for SWMU 200

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Future Industrial Worker											
1	Cesium-137	5.74E-01	pCi/g	6.7E-06	8.61E-02	8.61E-01	8.61E+00	n/a	n/a	n/a	n/a
	Chromium	5.75E+01	mg/kg	1.9E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	PCB, Total	2.60E+00	mg/kg	1.4E-05	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Uranium-238	3.58E+00	pCi/g	2.1E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**2.4E-05**				**< 1**			
Hypothetical Resident[5]											
1	Cesium-137	5.74E-01	pCi/g	3.4E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Chromium	5.75E+01	mg/kg	3.7E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	PCB, Total	2.60E+00	mg/kg	4.1E-05	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Total PAH	2.84E-02	mg/kg	1.5E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-235	1.43E-01	pCi/g	1.8E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	3.58E+00	pCi/g	1.0E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**9.2E-05**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.17, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.17, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30- year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Ecological Screening. COPECs for SWMU 200 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 6.1.6.

Table 6.1.6. Ecological Screening for SWMU 200

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Mostly soil/grass with a few patches of gravel	No	251	Mercury	2.00E-01	6.71E+00	1.00E-01	67
			PCB, Total	n/a	2.60E+00	2.00E-02	130
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

6.1.7 SWMU 200 Summary

The following text summarizes the results for SWMU 200 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Contamination may have resulted at this site from placing the dredged soils from the NSDD before it was remediated.

COPCs for surface and subsurface soils from SWMU 200 are shown on Tables 6.1.1–6.1.4 as those analytes with green boxes under the “Industrial Worker/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater.

The investigation for SWMU 200 revealed that metals, PCBs, SVOCs, and radionuclides are the types of COPCs found in the surface soils, and metals and radionuclides are the types of COPCs found in the subsurface soils. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 200 are unlikely to have migrated because they are adsorbed onto soil particles. This site is grass covered; therefore, dispersement of soil from this by rainfall runoff is minimized and not considered significant. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 200.

- Future Industrial Worker
  - Cesium-137
  - Chromium
  - Total PCBs
  - Uranium-238
- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Cesium-137
  - Chromium
  - Total PAHs
  - Total PCBs
  - Uranium-235
  - Uranium-238

Of the above, there are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 200. There are no priority COCs for other scenarios.

For SWMU 200, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Mercury
- Total PCBs
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 200 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. A portion of the eastern boundary of this SWMU is formed by the C-755-A TSCA Waste Storage Building, SWMU 206, an NFA site in the 2012 SMP. The northwestern corner of SWMU 200 is formed by SWMU 470, west of C-752-A, which is to be addressed by the Soils and Slabs OU per the 2012 SMP. An action at this site would not have an impact on other integrator OUs.

6.1.8 SWMU 200 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 200; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial land use as shown in the SMP (DOE 2012a).

6.2 SWMU 212, C-745-A RADIOLOGICAL CONTAMINATION AREA

6.2.1 Background

The C-745-A Radiological Contamination Area (SWMU 212) is located in the west-central portion of the plant site. The area is approximately 2,500 ft^2. There is no direct connection to surface water from this SWMU.

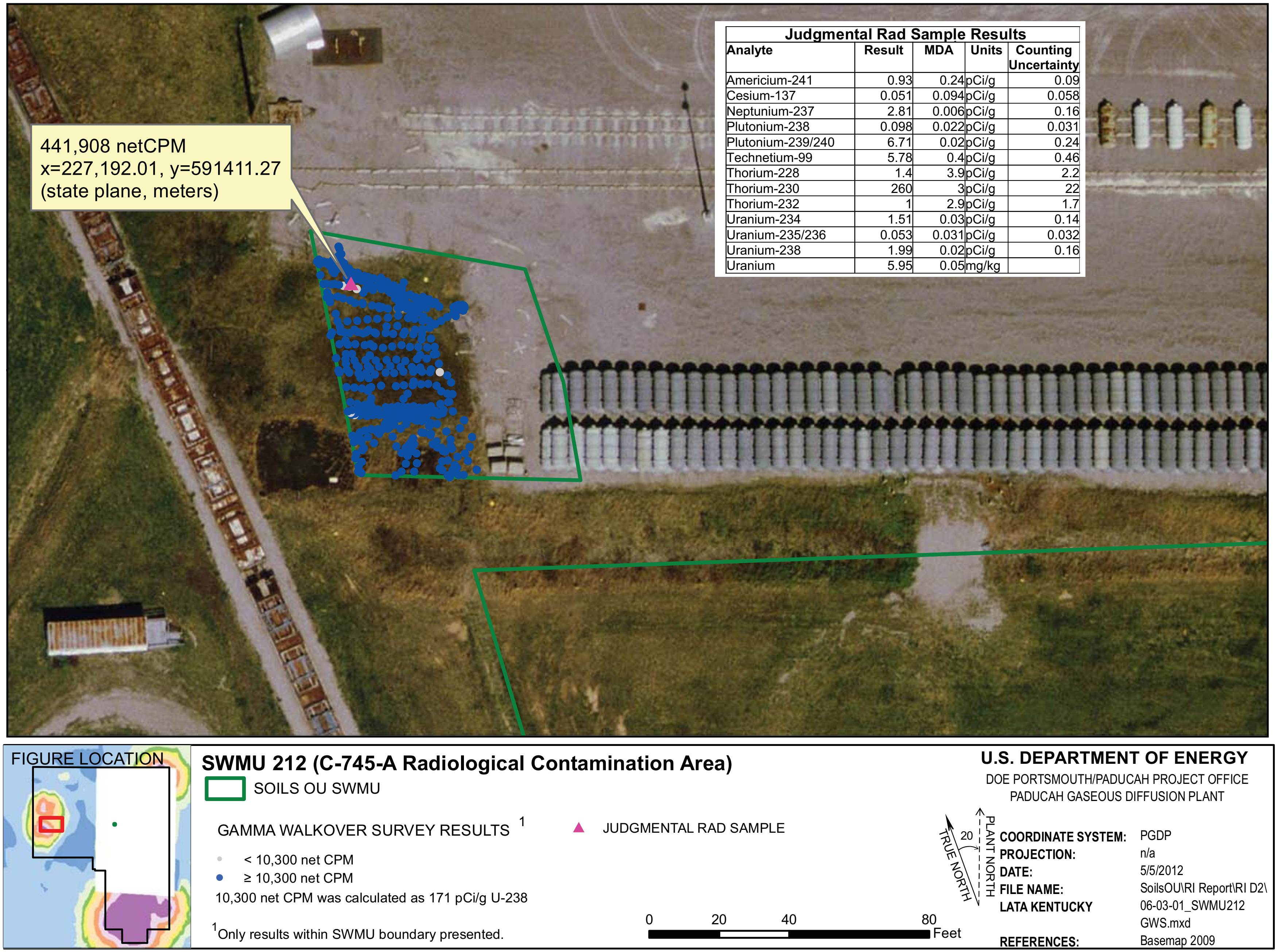
While the exact history is unknown, supposition is that the area may have been used as an unloading site near railroad tracks, and a release of radiological contaminants may have occurred.

Subsurface soil samples were obtained in support of the C-745-A Cylinder Storage Yard construction project. Results of the sampling effort indicated the radionuclides as contaminants.

6.2.2 Fieldwork Summary

Four grid samples were planned and collected for the unit. Field laboratory results indicated that contingency sampling was required for concentrations of cadmium and iron; however, only 2 of the 18 planned were collected due to the presence of utilities, cylinder yards, and standing water. Figure A.6 in Appendix A is the sample rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 6.2.1) using a FIDLER; the 539 measurements ranged from 13,656 to 452,908 gross cpm. The ground cover for this SWMU transitions from a grass and gravel mix to all gravel in the southwest corner of the C-746-A depleted uranium cylinder storage yard. The influence of background radiation from nearby cylinders does not allow a reliable determination for areas of contamination at the project action limit. A judgmental grab sample was collected for radiological constituents.



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.93	0.24	pCi/g	0.09
Cesium-137	0.051	0.094	pCi/g	0.058
Neptunium-237	2.81	0.006	pCi/g	0.16
Plutonium-238	0.098	0.022	pCi/g	0.031
Plutonium-239/240	6.71	0.02	pCi/g	0.24
Technetium-99	5.78	0.4	pCi/g	0.46
Thorium-228	1.4	3.9	pCi/g	2.2
Thorium-230	260	3	pCi/g	22
Thorium-232	1	2.9	pCi/g	1.7
Uranium-234	1.51	0.03	pCi/g	0.14
Uranium-235/236	0.053	0.031	pCi/g	0.032
Uranium-238	1.99	0.02	pCi/g	0.16
Uranium	5.95	0.05	mg/kg	

Figure 6.2.1. SWMU 212 Gamma Walkover Survey

6.2.3 Nature and Extent of Contamination—Surface Soils

For SWMU 212, the representative data set for surface soils is presented in Tables 6.2.1 and 6.2.2 and provides the nature of the contamination in SWMU 212 surface soils. Figures 6.2.2–6.2.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 212 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 212 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 212 surface soil. The following are the metals detected at or above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Arsenic	1, 1B
Beryllium	1, 2C
Chromium	1
Iron	1, 2
Nickel	2

* SWMU 212 consists of one EU.

Grids 1B and 2C are not located within the administrative boundary of SWMU 212; instead, they are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 212, as described in the Work Plan (DOE 2010a).

No metals were detected above the industrial worker ALs in the SWMU 212 surface soil.

The following are the metals detected in the SWMU 212 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	1
Arsenic	1, 1B
Iron	1, 2
Molybdenum[1]	1
Nickel	1, 2
Selenium	1
Uranium	1, 2
Zinc	1, 2C

* SWMU 212 consists of one EU.
[1] No background value is available.

Iron (grids 1 and 2) and nickel (grid 2) were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

Table 6.2.1. Surface Soil Historical Data Summary: SWMU 212 C-745-A Radiological Contamination Area

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	9.38E+03	9.89E+03	9.64E+03	0/2	2/2	0/2	1.30E+04	0/2	3.32E+04	0/2	3.97E+06	0/2	2/2	1.3135 - 19.5
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	0/2	0.5215 - 9.74
METAL	Arsenic	mg/kg	4.92E+00	5.60E+00	5.26E+00	0/2	2/2	0/2	1.20E+01	2/2	9.97E-01	0/2	9.97E+01	0/2	2/2	0.0827 - 4.87
METAL	Barium	mg/kg	8.10E+01	1.05E+02	9.30E+01	0/2	2/2	0/2	2.00E+02	0/2	5.92E+02	0/2	3.78E+05	0/2	1/2	0.0242 - 2.43
METAL	Beryllium	mg/kg	4.98E-01	4.98E-01	4.98E-01	0/2	1/2	0/2	6.70E-01	1/2	1.40E-02	0/2	9.22E+00	0/2	0/2	0.0188 - 0.48
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	3.16E+00	0/2	3.16E+02	0/2	0/2	0.0489 - 1.95
METAL	Calcium	mg/kg	1.69E+03	1.74E+03	1.72E+03	0/2	2/2	0/2	2.00E+05	0/2	n/a	0/2	n/a	n/a	n/a	0.5097 - 97.4
METAL	Chromium	mg/kg	1.23E+01	1.41E+01	1.32E+01	0/2	2/2	0/2	1.60E+01	0/2	3.02E+01	0/2	3.02E+03	0/2	0/2	0.1325 - 2.43
METAL	Cobalt	mg/kg	4.51E+00	5.48E+00	5.00E+00	0/2	2/2	0/2	1.40E+01	0/2	1.05E+01	0/2	1.52E+03	2/2	2/2	0.0847 - 2.43
METAL	Copper	mg/kg	8.81E+00	1.27E+01	1.08E+01	0/2	2/2	0/2	1.90E+01	0/2	1.43E+03	0/2	2.24E+05	0/2	0/2	0.1067 - 2.43
METAL	Iron	mg/kg	1.24E+04	1.67E+04	1.46E+04	0/2	2/2	0/2	2.80E+04	0/2	2.51E+04	0/2	3.92E+06	2/2	2/2	0.6677 - 19.5
METAL	Lead	mg/kg	7.73E+00	7.73E+00	7.73E+00	0/2	1/2	0/2	3.60E+01	0/2	4.00E+02	0/2	4.00E+02	0/2	0/2	0.2401 - 19.5
METAL	Magnesium	mg/kg	1.31E+03	1.69E+03	1.50E+03	0/2	2/2	0/2	7.70E+03	0/2	n/a	0/2	n/a	n/a	n/a	3.7451 - 4.87
METAL	Manganese	mg/kg	1.75E+02	5.90E+02	3.83E+02	0/2	2/2	0/2	1.50E+03	0/2	2.58E+03	0/2	1.16E+05	2/2	2/2	0.03 - 2.43
METAL	Mercury	mg/kg	2.99E-02	2.99E-02	2.99E-02	0/2	1/2	0/2	2.00E-01	0/2	9.00E-01	0/2	7.85E+02	0/2	0/2	0.0078 - 0.09
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.79E+02	0/1	2.80E+04	0/1	0/1	4.87 - 4.87
METAL	Nickel	mg/kg	8.17E+00	1.19E+01	1.00E+01	0/2	2/2	0/2	2.10E+01	0/2	4.28E+01	0/2	3.18E+04	0/2	2/2	0.1277 - 4.87
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	8.00E-01	0/2	1.79E+02	0/2	2.80E+04	0/2	0/2	0.0891 - 19.5
METAL	Silver	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.30E+00	0/2	1.08E+01	0/2	9.15E+03	0/2	0/2	0.1799 - 2.43
METAL	Sodium	mg/kg	5.36E+01	5.36E+01	5.36E+01	0/2	1/2	0/2	3.20E+02	0/2	n/a	0/2	n/a	n/a	n/a	2.7264 - 97.4
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	2.87E+00	0/2	4.48E+02	0/2	0/2	0.534 - 19.5
METAL	Uranium	mg/kg	3.58E+00	3.58E+00	3.58E+00	0/1	1/1	0/1	4.90E+00	0/1	1.07E+02	0/1	1.65E+04	0/1	0/1	0.45 - 0.97
METAL	Vanadium	mg/kg	2.14E+01	2.45E+01	2.30E+01	0/2	2/2	0/2	3.80E+01	2/2	1.51E-01	0/2	9.30E+01	2/2	2/2	0.1449 - 2.43
METAL	Zinc	mg/kg	3.91E+01	6.70E+01	5.31E+01	0/2	2/2	1/2	6.50E+01	0/2	1.08E+04	0/2	1.68E+06	0/2	2/2	0.0806 - 19.5
PPCB	PCB, Total	mg/kg	1.80E-01	1.80E-01	1.80E-01	0/11	1/11	0/11	n/a	0/11	1.88E-01	0/11	1.88E+01	0/11	1/11	0.12 - 1
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.33 - 0.33
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.33 - 0.33
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.33 - 0.33
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.65 - 1.65
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.65 - 1.65
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.65 - 1.65
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.65 - 1.65
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.65 - 1.65
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.02E+02	0/2	1.81E+04	0/2	0/2	0.33 - 0.49
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 0.49
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.05E+03	0/2	1.22E+05	0/2	0/2	0.33 - 0.49
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.2.1. Surface Soil Historical Data Summary: SWMU 212 C-745-A Radiological Contamination Area (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 0.49
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.65 - 1.65
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.33 - 0.33
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.01E+02	0/2	1.80E+04	0/2	0/2	0.33 - 0.49
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.87E+02	0/2	1.46E+04	0/2	0/2	0.33 - 0.49
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.33 - 0.33
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.24E+00	0/2	2.24E+02	0/2	0/2	0.33 - 0.49
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.33 - 0.33
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.65 - 1.65
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 0.49
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.33 - 0.33
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.65 - 1.65
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.49E+02	0/2	1.35E+04	0/2	0/2	0.33 - 0.49
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.92E-02	0/2	5.92E+00	0/2	0/2	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.005 - 0.005
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.69E-02	0/1	4.98E+00	0/1	0/1	0.005 - 0.005
RADS	Americium-241	pCi/g	1.19E-02	1.19E-02	1.19E-02	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.03 - 0.03
RADS	Cesium-137	pCi/g	6.01E-01	6.01E-01	6.01E-01	0/1	1/1	1/1	4.90E-01	1/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.11 - 0.11
RADS	Cobalt-60	pCi/g	8.76E-03	8.76E-03	8.76E-03	0/1	1/1	0/1	n/a	0/1	1.77E-02	0/1	1.77E+00	0/1	0/1	0.1 - 0.1
RADS	Neptunium-237	pCi/g	1.23E-02	1.23E-02	1.23E-02	0/1	1/1	0/1	1.00E-01	0/1	2.71E-01	0/1	2.71E+01	0/1	1/1	0.02 - 0.02
RADS	Plutonium-238	pCi/g	-5.59E-03	-5.59E-03	-5.59E-03	0/1	1/1	0/1	7.30E-02	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.04 - 0.04
RADS	Plutonium-239/240	pCi/g	3.65E-01	3.65E-01	3.65E-01	0/1	1/1	1/1	2.50E-02	0/1	1.07E+01	0/1	1.07E+03	0/1	1/1	0.02 - 0.02
RADS	Technetium-99	pCi/g	1.05E+00	1.05E+00	1.05E+00	0/1	1/1	0/1	2.50E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	1/1	2.81 - 2.81
RADS	Thorium-228	pCi/g	3.77E-01	3.77E-01	3.77E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.05 - 0.05
RADS	Thorium-230	pCi/g	3.61E+00	3.61E+00	3.61E+00	0/1	1/1	1/1	1.50E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.18 - 0.18
RADS	Thorium-232	pCi/g	4.35E-01	4.35E-01	4.35E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.03 - 0.03
RADS	Uranium-234	pCi/g	4.87E-01	4.87E-01	4.87E-01	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.13 - 0.13
RADS	Uranium-235	pCi/g	3.73E-02	3.73E-02	3.73E-02	0/1	1/1	0/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.02 - 0.02
RADS	Uranium-238	pCi/g	6.76E-01	6.76E-01	6.76E-01	0/1	1/1	0/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.15 - 0.15

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.2.2. Surface Soil RI Data Summary: SWMU 212 C-745-A Radiological Contamination Area

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	4.36E+03	4.36E+03	4.36E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.2 - 5.2
METAL	Antimony	mg/kg	5.20E-01	5.20E-01	5.20E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.52 - 0.52
METAL	Arsenic	mg/kg	1.26E+01	1.44E+01	1.38E+01	0/3	2/3	2/3	1.20E+01	2/3	9.97E-01	0/3	9.97E+01	0/3	2/3	1 - 11
METAL	Barium	mg/kg	5.97E+01	5.97E+01	5.97E+01	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	0/1	2.1 - 2.1
METAL	Beryllium	mg/kg	8.10E-01	8.10E-01	8.10E-01	0/1	1/1	1/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.1 - 0.1
METAL	Cadmium	mg/kg	2.80E-01	2.80E-01	2.80E-01	0/1	1/1	1/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.052 - 0.052
METAL	Calcium	mg/kg	2.19E+04	2.19E+04	2.19E+04	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	52.3 - 52.3
METAL	Chromium	mg/kg	3.58E+01	3.58E+01	3.58E+01	0/3	1/3	1/3	1.60E+01	1/3	3.02E+01	0/3	3.02E+03	0/3	0/3	1 - 85
METAL	Cobalt	mg/kg	9.90E+00	9.90E+00	9.90E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.21 - 0.21
METAL	Copper	mg/kg	1.59E+01	2.09E+01	1.76E+01	0/3	2/3	1/3	1.90E+01	0/3	1.43E+03	0/3	2.24E+05	0/3	0/3	1 - 35
METAL	Iron	mg/kg	1.91E+04	4.14E+04	3.32E+04	0/3	3/3	2/3	2.80E+04	2/3	2.51E+04	0/3	3.92E+06	3/3	3/3	5.2 - 100
METAL	Lead	mg/kg	1.45E+01	1.71E+01	1.59E+01	0/3	3/3	0/3	3.60E+01	0/3	4.00E+02	0/3	4.00E+02	0/3	3/3	0.31 - 13
METAL	Magnesium	mg/kg	2.14E+03	2.14E+03	2.14E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	52.3 - 52.3
METAL	Manganese	mg/kg	4.49E+02	6.69E+02	5.21E+02	0/3	3/3	0/3	1.50E+03	0/3	2.58E+03	0/3	1.16E+05	3/3	3/3	0.21 - 85
METAL	Mercury	mg/kg	7.30E-03	7.30E-03	7.30E-03	0/3	1/3	0/3	2.00E-01	0/3	9.00E-01	0/3	7.85E+02	0/3	0/3	0.0348 - 10
METAL	Molybdenum	mg/kg	1.30E+00	1.30E+00	1.30E+00	0/3	1/3	0/3	n/a	0/3	1.79E+02	0/3	2.80E+04	0/3	1/3	0.52 - 15
METAL	Nickel	mg/kg	2.31E+01	8.69E+01	4.44E+01	0/3	2/3	2/3	2.10E+01	1/3	4.28E+01	0/3	3.18E+04	1/3	2/3	0.52 - 65
METAL	Selenium	mg/kg	8.50E-01	8.50E-01	8.50E-01	0/3	1/3	1/3	8.00E-01	0/3	1.79E+02	0/3	2.80E+04	0/3	1/3	0.52 - 20
METAL	Silver	mg/kg	3.50E-02	3.50E-02	3.50E-02	0/3	1/3	0/3	2.30E+00	0/3	1.08E+01	0/3	9.15E+03	0/3	0/3	0.21 - 10
METAL	Sodium	mg/kg	4.98E+01	4.98E+01	4.98E+01	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	20.9 - 20.9
METAL	Thallium	mg/kg	1.00E-01	1.00E-01	1.00E-01	0/1	1/1	0/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	0/1	0.21 - 0.21
METAL	Uranium	mg/kg	5.95E+00	2.30E+01	1.43E+01	0/4	3/4	3/4	4.90E+00	0/4	1.07E+02	0/4	1.65E+04	0/4	2/4	0.04 - 20
METAL	Vanadium	mg/kg	2.36E+01	2.36E+01	2.36E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1 - 1
METAL	Zinc	mg/kg	4.59E+01	6.88E+01	5.79E+01	0/3	3/3	1/3	6.50E+01	0/3	1.08E+04	0/3	1.68E+06	0/3	3/3	2.1 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.88E-01	0/3	1.88E+01	0/3	0/3	0.31 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.34 - 0.34
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.34 - 0.34
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.34 - 0.34
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.7 - 1.7
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.34 - 0.34
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.34 - 0.34
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.2.2. Surface Soil RI Data Summary: SWMU 212 C-745-A Radiological Contamination Area (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0069 - 0.0069
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.34 - 0.34
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.34 - 0.34
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.34 - 0.34
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.34 - 0.34
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.69 - 0.69
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.34 - 0.34
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0069 - 0.0069
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.7 - 1.7
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.34 - 0.34
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.69 - 0.69
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	0/1	-
RADS	Alpha activity	pCi/g	7.93E+02	1.28E+03	1.04E+03	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	5 - 6
RADS	Americium-241	pCi/g	8.40E-01	9.30E-01	8.85E-01	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	2/2	0.01 - 0.24
RADS	Beta activity	pCi/g	8.17E+01	1.20E+02	1.01E+02	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2 - 3
RADS	Cesium-137	pCi/g	5.10E-02	1.00E-01	7.55E-02	0/2	2/2	0/2	4.90E-01	1/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.052 - 0.094
RADS	Neptunium-237	pCi/g	2.81E+00	4.00E+00	3.41E+00	0/2	2/2	2/2	1.00E-01	2/2	2.71E-01	0/2	2.71E+01	2/2	2/2	0.006 - 0.8
RADS	Plutonium-238	pCi/g	6.40E-02	9.80E-02	8.10E-02	0/2	2/2	1/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	1/2	0.022 - 0.036
RADS	Plutonium-239/240	pCi/g	6.18E+00	6.71E+00	6.45E+00	0/2	2/2	2/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	2/2	2/2	0.02 - 0.02
RADS	Technetium-99	pCi/g	3.10E+00	5.78E+00	4.44E+00	0/2	2/2	2/2	2.50E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	2/2	0.38 - 0.4
RADS	Thorium-228	pCi/g	9.10E-01	1.40E+00	1.16E+00	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.008 - 3.9
RADS	Thorium-230	pCi/g	9.10E-01	2.60E+02	1.30E+02	0/2	2/2	1/2	1.50E+00	1/2	1.38E+01	0/2	1.38E+03	1/2	2/2	0.02 - 3
RADS	Thorium-232	pCi/g	9.50E-01	1.00E+00	9.75E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.02 - 2.9
RADS	Uranium-234	pCi/g	1.51E+00	2.59E+00	2.05E+00	0/2	2/2	2/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.01 - 0.03
RADS	Uranium-235/236	pCi/g	5.30E-02	2.09E-01	1.31E-01	0/2	2/2	1/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.009 - 0.031
RADS	Uranium-238	pCi/g	1.99E+00	3.17E+00	2.58E+00	0/2	2/2	2/2	1.20E+00	2/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.01 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

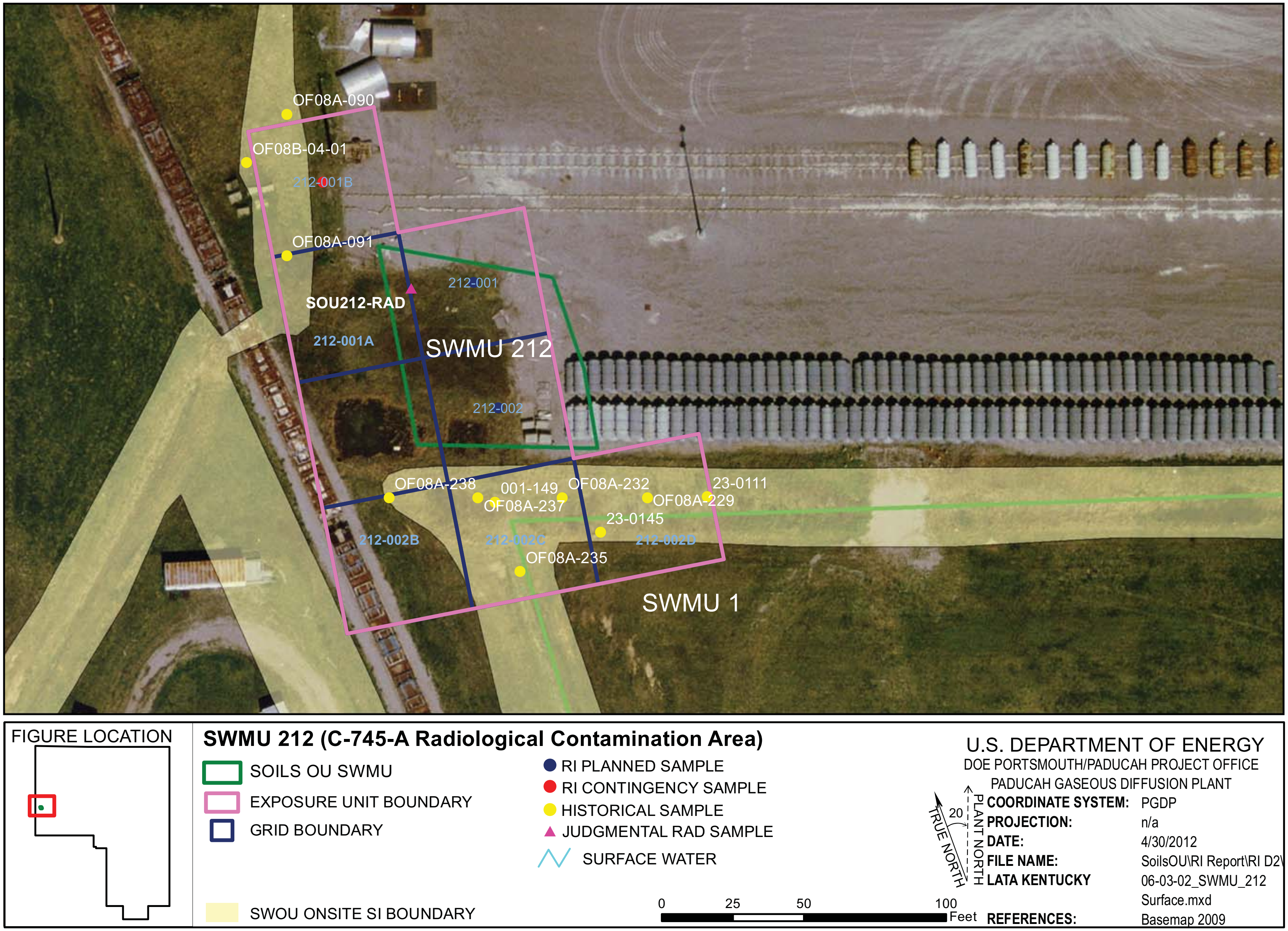


Figure 6.2.2. SWMU 212 Sample Locations - Surface Soil

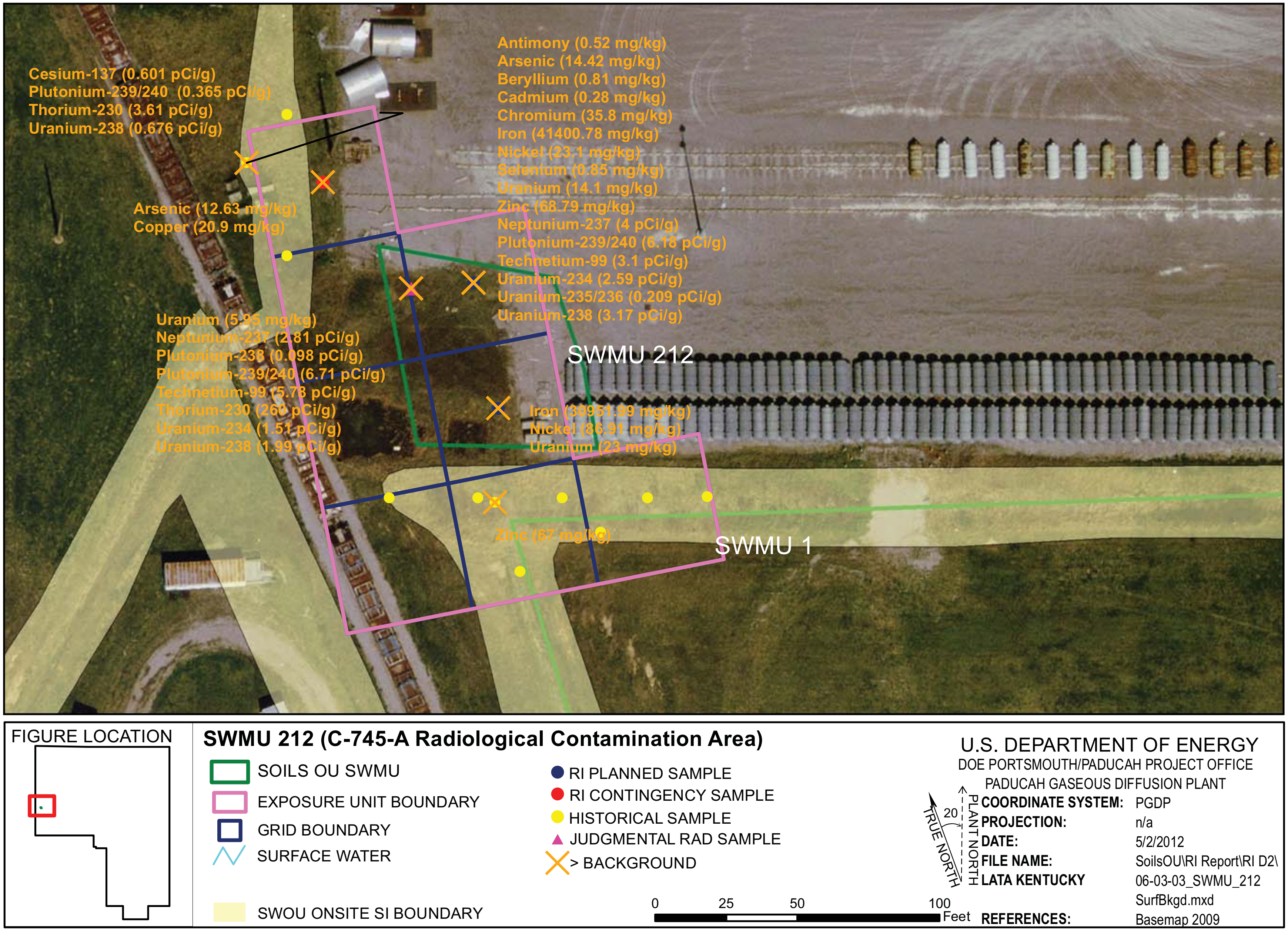


Figure 6.2.3. SWMU 212 Background Exceedances - Surface Soil

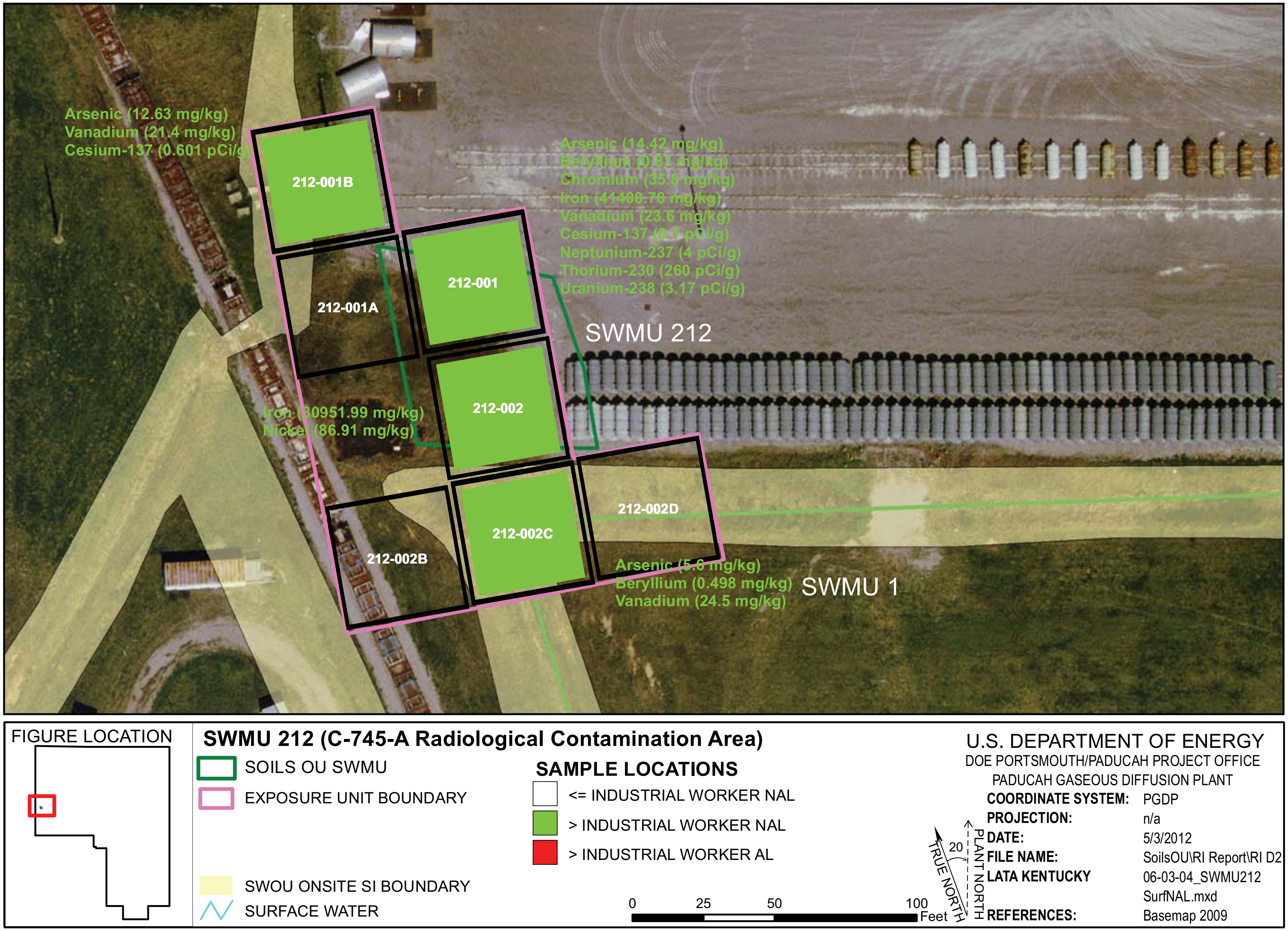


Figure 6.2.4. SWMU 212 NAL Exceedances - Surface Soil

PCBs

Total PCBs were not detected above the industrial worker NALs, the industrial worker ALs, or the SSLs for the protection of RGA groundwater in the SWMU 212 surface soil.

Total PCBs in grid 1B were detected above the SSLs for the protection of UCRS groundwater in the SWMU 212 surface soil.

SVOCs

No SVOCs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 212 surface soil.

VOCs

No VOCs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 212 surface soil.

Radionuclides

Radionuclides were detected above the industrial worker NALs. The following are the radionuclides detected at or above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Radionuclide	Grid
Cesium-137	1, 1B
Neptunium-237	1
Thorium-230	1
Uranium-238	1

* SWMU 212 consists of one EU.

Grid 1B is not located within the administrative boundary of SWMU 212; instead, it a grid in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 212, as described in the Work Plan (DOE 2010a). Grid 1B is located on the northwestern corner of grid 1.

No radionuclides were detected above the industrial worker ALs in the SWMU 212 surface soil.

The following are the radionuclides detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Radionuclide	Grid
Americium-241[1]	1
Neptunium-237	1
Plutonium-238	1
Plutonium-239/240	1, 1B
Technetium-99	1
Thorium-230	1, 1B

* SWMU 212 consists of one EU.
[1] No background value is available.

Neptunium-237 (grid 1), plutonium-239-240 (grid 1), and thorium-230 (grid 1) were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

6.2.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 212, the representative data set for subsurface soils is presented in Tables 6.2.3 and 6.2.4 and provides the nature of the contamination in SWMU 212 subsurface soils. Figures 6.2.5–6.2.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 212 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 212 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 212 subsurface soil. The following are the metals detected at or above the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Arsenic	1
Beryllium	1, 2C
Chromium	1, 2C
Cobalt	1
Iron	1
Mercury	1
Nickel	2
Silver	1
Vanadium	1, 2C

* SWMU 212 consists of one EU.

Grid 2C is not located within the administrative boundary of SWMU 212; instead, it is a grid in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 212, as described in the Work Plan (DOE 2010a).

The maximum depth at which metals were detected at or above background screening levels and the industrial worker NALs was 4 ft bgs. The end depths of the boreholes taken from grids 1, 2, and 2C range from 1 to 4 ft bgs.

No metals were detected above the industrial worker ALs in the SWMU 212 subsurface soil.

Table 6.2.3. Subsurface Soil Historical Data Summary: SWMU 212 C-745-A Radiological Contamination Area

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	6.63E+03	9.47E+03	8.05E+03	0/3	3/3	0/3	1.20E+04	0/3	3.32E+04	0/3	3.97E+06	0/3	3/3	1.3135 - 1.3135
METAL	Antimony	mg/kg	5.52E-01	1.40E+00	1.02E+00	0/3	3/3	3/3	2.10E-01	0/3	2.53E+00	0/3	1.51E+03	0/3	3/3	0.5215 - 0.5215
METAL	Arsenic	mg/kg	1.63E+00	3.93E+00	2.98E+00	0/3	3/3	0/3	7.90E+00	3/3	9.97E-01	0/3	9.97E+01	0/3	3/3	0.0827 - 0.0827
METAL	Barium	mg/kg	2.87E+01	1.52E+02	8.62E+01	0/3	3/3	0/3	1.70E+02	0/3	5.92E+02	0/3	3.78E+05	0/3	1/3	0.0242 - 0.0242
METAL	Beryllium	mg/kg	4.54E-01	6.99E-01	5.75E-01	0/3	3/3	1/3	6.90E-01	3/3	1.40E-02	0/3	9.22E+00	0/3	0/3	0.0188 - 0.0188
METAL	Cadmium	mg/kg	1.27E-01	2.87E-01	2.07E-01	0/3	2/3	1/3	2.10E-01	0/3	3.16E+00	0/3	3.16E+02	0/3	0/3	0.0489 - 0.0489
METAL	Calcium	mg/kg	6.04E+02	1.64E+03	1.10E+03	0/3	3/3	0/3	6.10E+03	0/3	n/a	0/3	n/a	n/a	n/a	0.5097 - 0.5097
METAL	Chromium	mg/kg	1.34E+01	5.62E+01	2.81E+01	0/3	3/3	1/3	4.30E+01	1/3	3.02E+01	0/3	3.02E+03	0/3	0/3	0.1325 - 0.1325
METAL	Cobalt	mg/kg	5.10E+00	9.87E+00	6.78E+00	0/3	3/3	0/3	1.30E+01	0/3	1.05E+01	0/3	1.52E+03	3/3	3/3	0.0847 - 0.0847
METAL	Copper	mg/kg	6.62E+00	1.35E+01	8.94E+00	0/3	3/3	0/3	2.50E+01	0/3	1.43E+03	0/3	2.24E+05	0/3	0/3	0.1067 - 0.1067
METAL	Iron	mg/kg	1.04E+04	2.35E+04	1.61E+04	0/3	3/3	0/3	2.80E+04	0/3	2.51E+04	0/3	3.92E+06	3/3	3/3	0.6677 - 0.6677
METAL	Lead	mg/kg	6.25E+00	1.02E+01	8.12E+00	0/3	3/3	0/3	2.30E+01	0/3	4.00E+02	0/3	4.00E+02	0/3	0/3	0.2401 - 0.2401
METAL	Magnesium	mg/kg	3.51E+02	2.16E+03	1.29E+03	0/3	3/3	1/3	2.10E+03	0/3	n/a	0/3	n/a	n/a	n/a	3.7451 - 3.7451
METAL	Manganese	mg/kg	1.25E+02	5.25E+02	3.36E+02	0/3	3/3	0/3	8.20E+02	0/3	2.58E+03	0/3	1.16E+05	3/3	3/3	0.03 - 0.03
METAL	Mercury	mg/kg	2.43E-02	2.46E-02	2.45E-02	0/3	2/3	0/3	1.30E-01	0/3	9.00E-01	0/3	7.85E+02	0/3	0/3	0.0078 - 0.0078
METAL	Nickel	mg/kg	4.61E+00	2.68E+01	1.30E+01	0/3	3/3	1/3	2.20E+01	0/3	4.28E+01	0/3	3.18E+04	0/3	3/3	0.1277 - 0.1277
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	7.00E-01	0/3	1.79E+02	0/3	2.80E+04	0/3	0/3	0.0891 - 0.0891
METAL	Silver	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.70E+00	0/3	1.08E+01	0/3	9.15E+03	0/3	0/3	0.1799 - 0.1799
METAL	Sodium	mg/kg	8.21E+01	4.31E+02	3.02E+02	0/3	3/3	2/3	3.40E+02	0/3	n/a	0/3	n/a	n/a	n/a	2.7264 - 2.7264
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	3.40E-01	0/3	2.87E+00	0/3	4.48E+02	0/3	0/3	0.1164 - 0.534
METAL	Vanadium	mg/kg	2.15E+01	5.33E+01	3.25E+01	0/3	3/3	1/3	3.70E+01	3/3	1.51E-01	0/3	9.30E+01	3/3	3/3	0.1449 - 0.1449
METAL	Zinc	mg/kg	1.92E+01	3.80E+01	2.64E+01	0/3	3/3	0/3	6.00E+01	0/3	1.08E+04	0/3	1.68E+06	0/3	2/3	0.0806 - 0.1438
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.88E-01	0/2	1.88E+01	0/2	0/2	0.017 - 1
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.33 - 0.33
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.33 - 0.33
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.33 - 0.33
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.65 - 1.65
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.65 - 1.65
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.30E+00	0/3	3.91E+01	0/3	0/3	1.65 - 1.65
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.65 - 1.65
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.65 - 1.65
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	6.02E+02	0/3	1.81E+04	0/3	0/3	0.33 - 0.33
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.05E+03	0/3	1.22E+05	0/3	0/3	0.33 - 0.33
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.65 - 1.65

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.2.3. Subsurface Soil Historical Data Summary: SWMU 212 C-745-A Radiological Contamination Area (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.33 - 0.33
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	6.01E+02	0/3	1.80E+04	0/3	0/3	0.33 - 0.33
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.87E+02	0/3	1.46E+04	0/3	0/3	0.33 - 0.33
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.17E-01	0/3	1.17E+01	0/3	0/3	0.33 - 0.33
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	2.24E+00	0/3	2.24E+02	0/3	0/3	0.33 - 0.33
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.22E-02	0/3	5.22E+00	0/3	0/3	0.33 - 0.33
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	1.65 - 1.65
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.33 - 0.33
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.65 - 1.65
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.49E+02	0/3	1.35E+04	0/3	0/3	0.33 - 0.33
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.92E-02	0/3	5.92E+00	0/3	0/3	-
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	4.89E-02	0/5	5.53E+00	0/5	0/5	0.5 - 0.8
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	4.74E+00	0/5	1.93E+02	0/5	0/5	0.5 - 0.8
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	1.07E+01	0/5	3.42E+02	0/5	0/5	0.5 - 0.8
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	4.69E-02	0/5	4.98E+00	0/5	0/5	0.5 - 0.8
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	2.04E-01	0/5	4.83E+01	0/5	0/5	0.5 - 0.8

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.2.4. Subsurface Soil RI Data Summary: SWMU 212 C-745-A Radiological Contamination Area

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	3.49E+03	9.39E+03	6.44E+03	0/2	2/2	0/2	1.20E+04	0/2	3.32E+04	0/2	3.97E+06	0/2	2/2	5.3 - 5.9
METAL	Antimony	mg/kg	1.10E-01	1.10E-01	1.10E-01	0/2	1/2	0/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	0/2	0.53 - 0.59
METAL	Arsenic	mg/kg	3.50E+00	1.10E+01	7.11E+00	0/10	6/10	1/10	7.90E+00	6/10	9.97E-01	0/10	9.97E+01	0/10	6/10	1.1 - 11
METAL	Barium	mg/kg	9.50E+00	1.92E+02	1.01E+02	0/2	2/2	1/2	1.70E+02	0/2	5.92E+02	0/2	3.78E+05	0/2	1/2	2.1 - 2.3
METAL	Beryllium	mg/kg	5.10E-01	8.90E-01	7.00E-01	0/2	2/2	1/2	6.90E-01	2/2	1.40E-02	0/2	9.22E+00	0/2	0/2	0.11 - 0.12
METAL	Cadmium	mg/kg	2.30E-02	1.30E-01	7.65E-02	0/2	2/2	0/2	2.10E-01	0/2	3.16E+00	0/2	3.16E+02	0/2	0/2	0.053 - 0.059
METAL	Calcium	mg/kg	3.69E+02	1.35E+03	8.60E+02	0/2	2/2	0/2	6.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	53.5 - 58.7
METAL	Chromium	mg/kg	1.72E+01	6.66E+01	3.20E+01	0/10	5/10	1/10	4.30E+01	3/10	3.02E+01	0/10	3.02E+03	0/10	0/10	1.1 - 85
METAL	Cobalt	mg/kg	3.90E+00	1.76E+01	1.08E+01	0/2	2/2	1/2	1.30E+01	1/2	1.05E+01	0/2	1.52E+03	2/2	2/2	0.21 - 0.23
METAL	Copper	mg/kg	3.10E+00	2.18E+01	1.02E+01	0/10	3/10	0/10	2.50E+01	0/10	1.43E+03	0/10	2.24E+05	0/10	0/10	1.1 - 35
METAL	Iron	mg/kg	8.59E+03	2.97E+04	1.76E+04	0/10	10/10	2/10	2.80E+04	2/10	2.51E+04	0/10	3.92E+06	10/10	10/10	5.3 - 100
METAL	Lead	mg/kg	7.67E+00	3.06E+01	1.47E+01	0/10	8/10	1/10	2.30E+01	0/10	4.00E+02	0/10	4.00E+02	0/10	2/10	0.32 - 13
METAL	Magnesium	mg/kg	1.50E+02	1.66E+03	9.05E+02	0/2	2/2	0/2	2.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	53.5 - 58.7
METAL	Manganese	mg/kg	9.68E+01	1.44E+03	3.99E+02	0/10	10/10	1/10	8.20E+02	0/10	2.58E+03	0/10	1.16E+05	10/10	10/10	0.21 - 85
METAL	Mercury	mg/kg	9.60E-03	6.94E+00	3.47E+00	0/10	2/10	1/10	1.30E-01	1/10	9.00E-01	0/10	7.85E+02	1/10	1/10	0.0357 - 10
METAL	Molybdenum	mg/kg	4.70E-01	1.30E+00	8.85E-01	0/10	2/10	0/10	n/a	0/10	1.79E+02	0/10	2.80E+04	0/10	2/10	0.53 - 15
METAL	Nickel	mg/kg	6.10E+00	6.39E+01	2.14E+01	0/10	3/10	1/10	2.20E+01	1/10	4.28E+01	0/10	3.18E+04	0/10	3/10	0.53 - 65
METAL	Selenium	mg/kg	4.70E-01	1.60E+00	1.04E+00	0/10	2/10	1/10	7.00E-01	0/10	1.79E+02	0/10	2.80E+04	0/10	2/10	0.53 - 20
METAL	Silver	mg/kg	1.80E-02	1.55E+01	5.34E+00	0/10	5/10	3/10	2.70E+00	2/10	1.08E+01	0/10	9.15E+03	3/10	4/10	0.21 - 10
METAL	Sodium	mg/kg	1.81E+01	4.28E+01	3.05E+01	0/2	2/2	0/2	3.40E+02	0/2	n/a	0/2	n/a	n/a	n/a	21.4 - 23.5
METAL	Thallium	mg/kg	1.50E-01	1.50E-01	1.50E-01	0/2	1/2	0/2	3.40E-01	0/2	2.87E+00	0/2	4.48E+02	0/2	1/2	0.21 - 0.23
METAL	Uranium	mg/kg	1.00E+00	2.69E+00	2.01E+00	0/10	2/10	0/10	4.60E+00	0/10	1.07E+02	0/10	1.65E+04	0/10	0/10	0.04 - 20
METAL	Vanadium	mg/kg	2.04E+01	3.80E+01	2.92E+01	0/2	2/2	1/2	3.70E+01	2/2	1.51E-01	0/2	9.30E+01	2/2	2/2	1.1 - 1.2
METAL	Zinc	mg/kg	1.95E+01	4.17E+01	3.19E+01	0/10	10/10	0/10	6.00E+01	0/10	1.08E+04	0/10	1.68E+06	0/10	10/10	2.1 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	1.88E-01	0/10	1.88E+01	0/10	0/10	0.32 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.35 - 0.39
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.35 - 0.39
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.35 - 0.39
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.9
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.9
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.30E+00	0/2	3.91E+01	0/2	0/2	1.7 - 1.9
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.9
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.9
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.9
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.02E+02	0/2	1.81E+04	0/2	0/2	0.35 - 0.39
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.05E+03	0/2	1.22E+05	0/2	0/2	0.35 - 0.39
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.9

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.2.4. Subsurface Soil RI Data Summary: SWMU 212 C-745-A Radiological Contamination Area (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.0071 - 0.0078
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.35 - 0.39
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.01E+02	0/2	1.80E+04	0/2	0/2	0.35 - 0.39
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.87E+02	0/2	1.46E+04	0/2	0/2	0.35 - 0.39
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.17E-01	0/2	1.17E+01	0/2	0/2	0.35 - 0.39
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.9
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.71 - 0.78
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.24E+00	0/2	2.24E+02	0/2	0/2	0.35 - 0.39
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.9
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.22E-02	0/2	5.22E+00	0/2	0/2	0.0071 - 0.0078
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	1.7 - 1.9
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.39
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.9
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.49E+02	0/2	1.35E+04	0/2	0/2	0.35 - 0.39
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.71 - 0.78
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.92E-02	0/2	5.92E+00	0/2	0/2	-
RADS	Alpha activity	pCi/g	2.05E+01	2.05E+01	2.05E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.1 - 5.1
RADS	Americium-241	pCi/g	1.10E-02	1.10E-02	1.10E-02	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.017 - 0.017
RADS	Beta activity	pCi/g	2.97E+01	2.97E+01	2.97E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.7 - 2.7
RADS	Cesium-137	pCi/g	6.00E-03	6.00E-03	6.00E-03	0/1	1/1	0/1	2.80E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.087 - 0.087
RADS	Neptunium-237	pCi/g	1.03E-01	1.03E-01	1.03E-01	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	1/1	0.064 - 0.064
RADS	Plutonium-238	pCi/g	1.70E-02	1.70E-02	1.70E-02	0/1	1/1	0/1	n/a	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.036 - 0.036
RADS	Plutonium-239/240	pCi/g	1.80E-02	1.80E-02	1.80E-02	0/1	1/1	0/1	n/a	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.022 - 0.022
RADS	Technetium-99	pCi/g	3.00E-02	3.00E-02	3.00E-02	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	0/1	0.43 - 0.43
RADS	Thorium-228	pCi/g	9.60E-01	9.60E-01	9.60E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
RADS	Thorium-230	pCi/g	8.80E-01	8.80E-01	8.80E-01	0/1	1/1	0/1	1.40E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	9.40E-01	9.40E-01	9.40E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Uranium-234	pCi/g	7.20E-01	7.20E-01	7.20E-01	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	4.60E-02	4.60E-02	4.60E-02	0/1	1/1	0/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.01 - 0.01
RADS	Uranium-238	pCi/g	9.00E-01	9.00E-01	9.00E-01	0/1	1/1	0/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.01 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

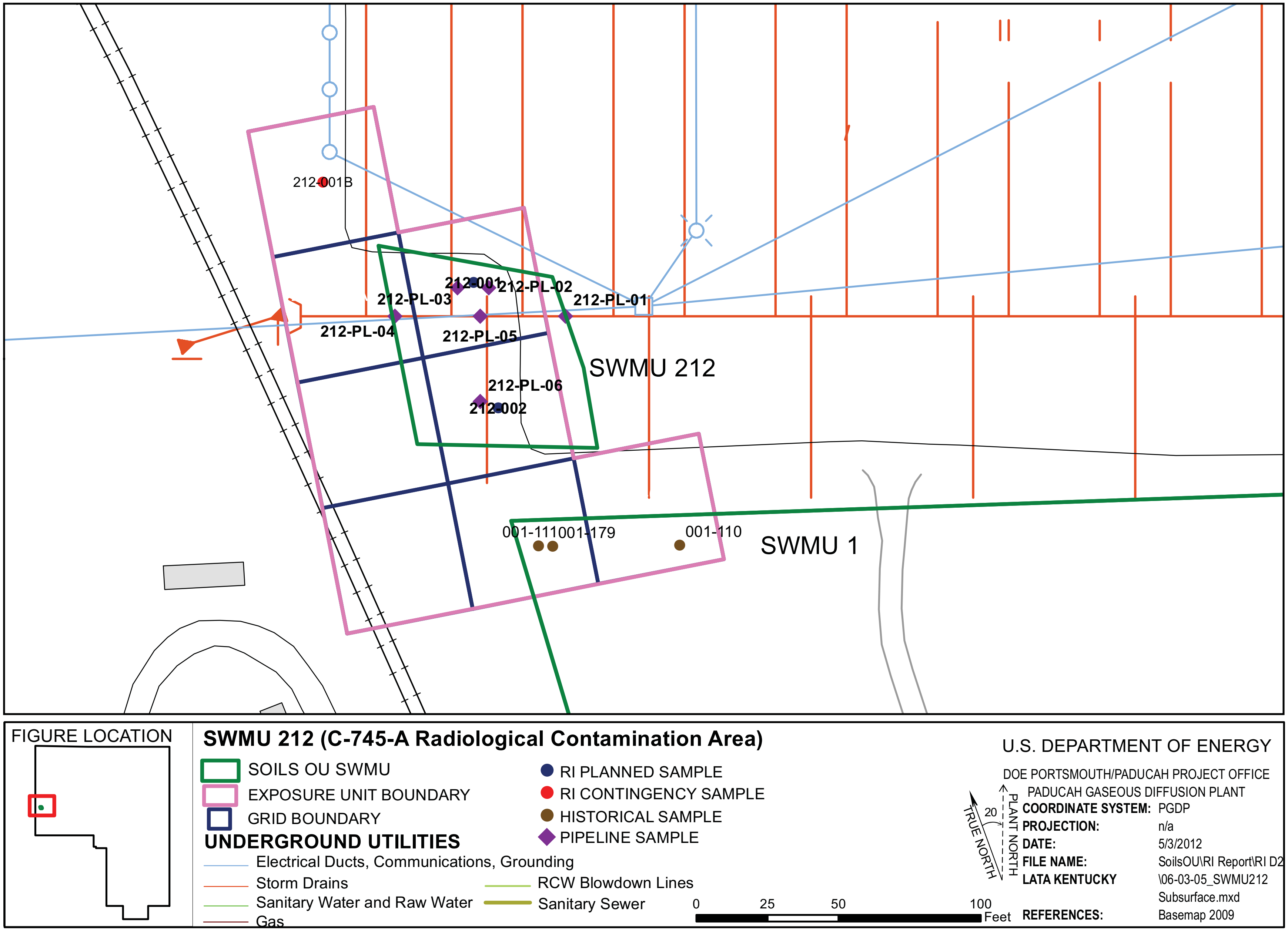


Figure 6.2.5. SWMU 212 Sample Locations - Subsurface Soil

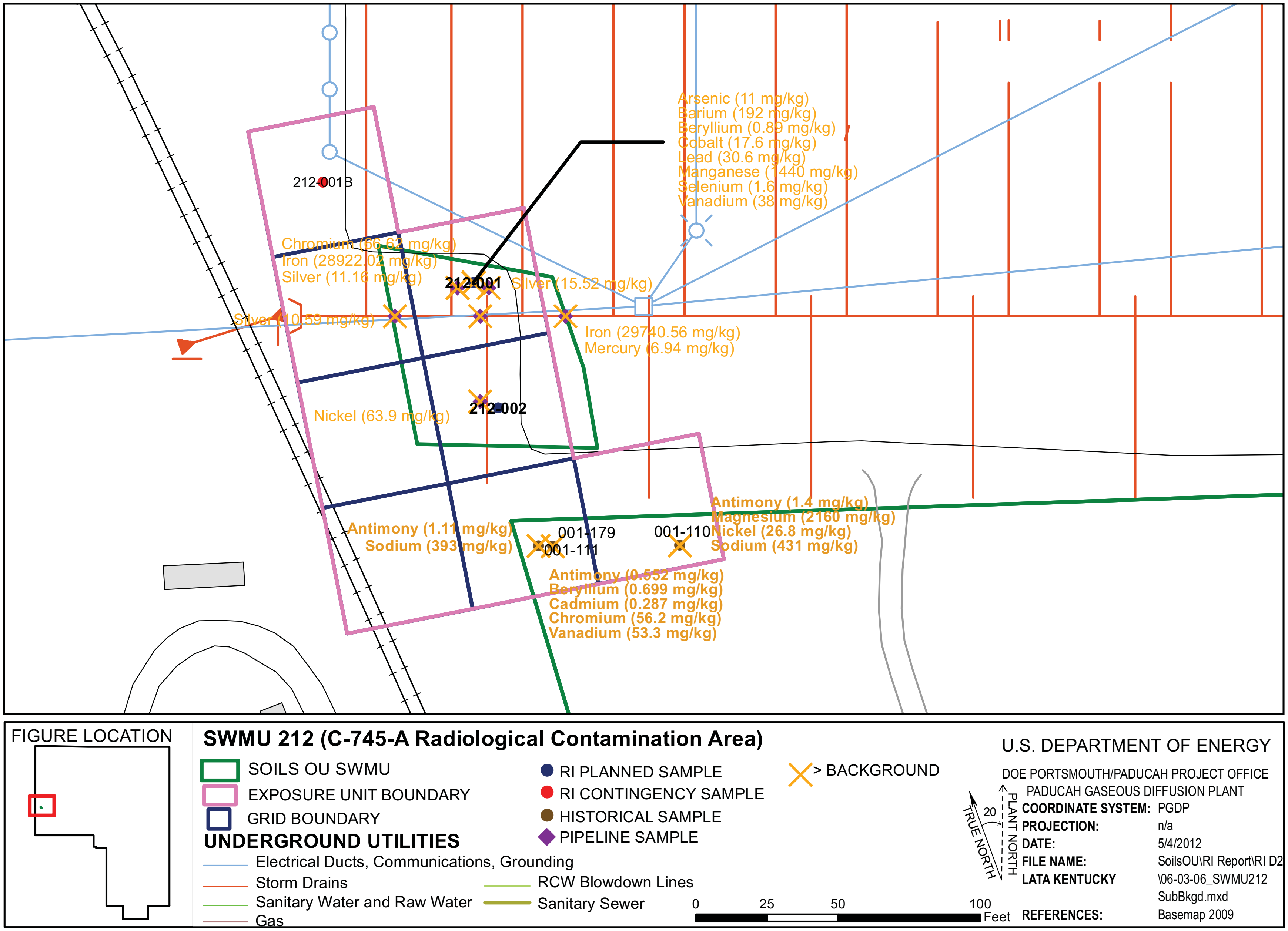


Figure 6.2.6. SWMU 212 Background Exceedances - Subsurface Soil

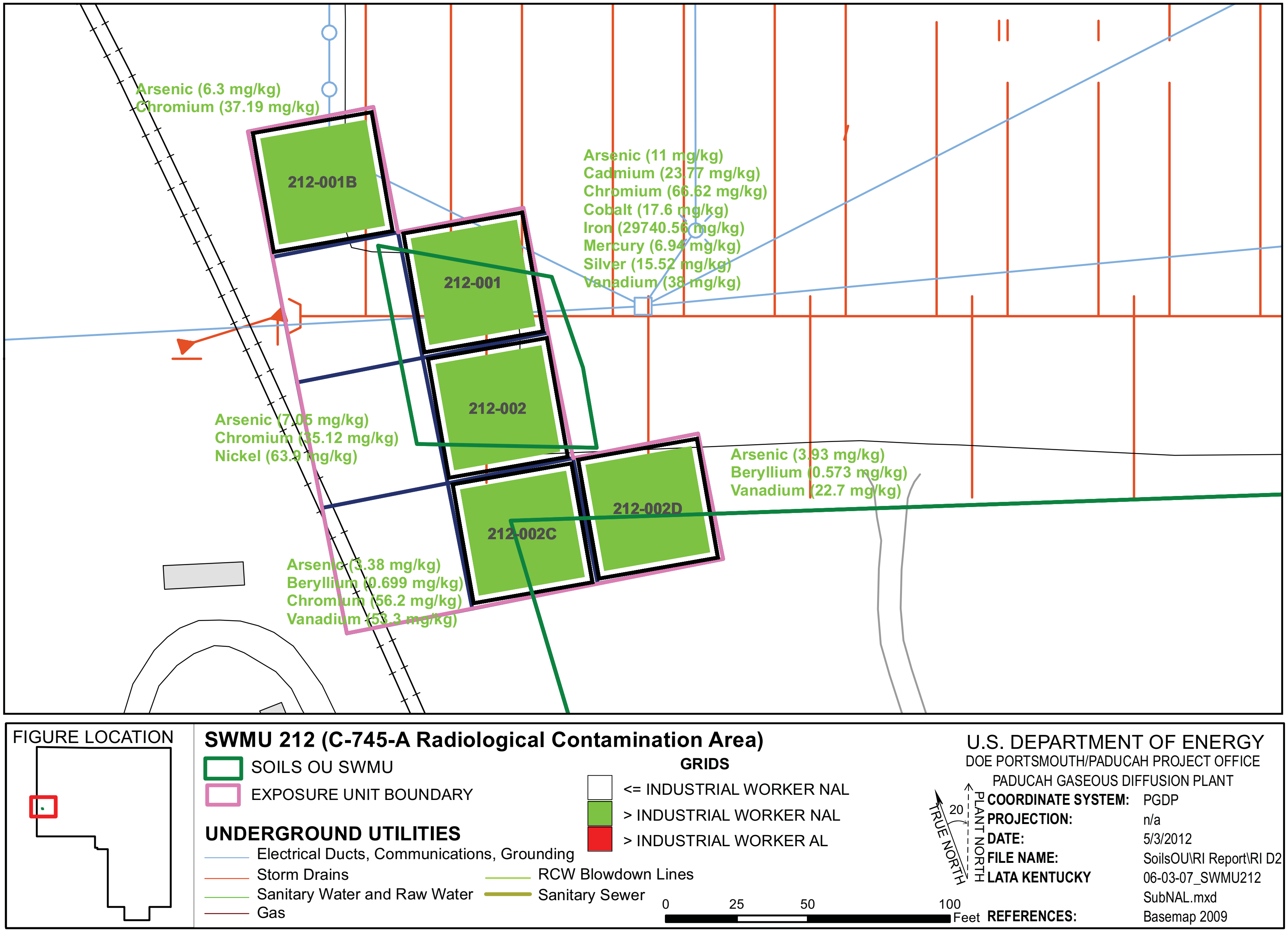


Figure 6.2.7. SWMU 212 NAL Exceedances - Subsurface Soil

The following are the metals detected in the SWMU 212 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	2C, 2D
Arsenic	1
Barium	1
Cobalt	1
Iron	1
Lead	1
Manganese	1
Mercury	1
Molybdenum[1]	1
Nickel	2, 2D
Selenium	1
Silver	1
Vanadium	1, 2C

* SWMU 212 consists of one EU.
[1]No background value is available.

Cobalt, iron, manganese, mercury, silver, and vanadium within grid 1 were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected above the industrial worker NALs, the industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 212 subsurface soil.

SVOCs

No SVOCs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 212 subsurface soil.

VOCs

No VOCs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 212 subsurface soil.

Radionuclides

No radionuclides were detected above the industrial worker NALs or industrial worker ALs in the SWMU 212 subsurface soil.

Neptunium-237 (no background value available) in grid 1 was detected above the SSL for the protection of UCRS groundwater.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

6.2.5 Fate and Transport

No target chemicals were identified for further evaluation of impacts to the RGA (Chapter 4). SWMU 212 has the potential of runoff to the south and west, which flows to Outfall 008, but is not considered significant due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow (DOE 2008a). Ditches located to the west and south were sampled during the SWOU SI (DOE 2008a). A final response action for internal ditches will be addressed by the SWOU, as described in the SMP (DOE 2012a). In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

6.2.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 212 were evaluated for direct contact. These results are summarized in Appendix D and the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI**.** COCs for this SWMU include metals, radionuclides, and SVOCs.

The cumulative ELCR and the cumulative HI for SWMU 212 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 6.2.5 for the future industrial worker, excavation worker, and the hypothetical resident. Table 6.2.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 212 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ≥ 10) are summarized in Table 6.2.6.

6.2.7 SWMU 212 Summary

The following text summarizes the results for SWMU 212 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

It is speculated that SWMU 212 was contaminated by spills or discharges of contaminated wastes being loaded onto railroad cars.

Table 6.2.5. RGOs for SWMU 212

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3] 1 x 10^{-6}	RGOs for ELCR[3] 1 x 10^{-5}	RGOs for ELCR[3] 1 x 10^{-4}	HI[4]	RGOs for HI[3] 0.1	RGOs for HI[3] 1	RGOs for HI[3] 3
Future Industrial Worker											
1	Arsenic	1.44E+01	mg/kg	1.4E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Cesium-137	6.01E-01	pCi/g	7.0E-06	8.61E-02	8.61E-01	8.61E+00	n/a	n/a	n/a	n/a
	Chromium	3.58E+01	mg/kg	1.2E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Neptunium-237	4.00E+00	pCi/g	1.5E-05	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	Thorium-230	2.60E+02	pCi/g	1.9E-05	1.38E+01	1.38E+02	1.38E+03	n/a	n/a	n/a	n/a
	Uranium-238	3.17E+00	pCi/g	1.9E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**5.8E-05**				**< 1**			
Excavation Worker											
1	Thorium-230	2.60E+02	pCi/g	1.5E-06	1.76E+02	1.76E+03	1.76E+04	n/a	n/a	n/a	n/a
	Cumulative			**1.5E-06**				**< 1**			
Hypothetical Resident[5]											
1	Arsenic	1.44E+01	mg/kg	6.1E-05	2.35E-01	2.35E+00	2.35E+01	0.9	1.64E+00	1.64E+01	4.93E+01
	Cesium-137	6.01E-01	pCi/g	3.5E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Chromium	3.58E+01	mg/kg	2.3E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Iron	4.14E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.8	5.48E+03	5.48E+04	1.64E+05
	Neptunium-237	4.00E+00	pCi/g	7.4E-05	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	PCB, Total	1.80E-01	mg/kg	2.8E-06	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Plutonium-239/240	6.71E+00	pCi/g	2.4E-06	2.78E+00	2.78E+01	2.78E+02	n/a	n/a	n/a	n/a
	Thorium-230	2.60E+02	pCi/g	7.3E-05	3.57E+00	3.57E+01	3.57E+02	n/a	n/a	n/a	n/a
	Uranium-235	2.09E-01	pCi/g	2.7E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	3.17E+00	pCi/g	9.2E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**2.6E-04**				**1.6**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.19. for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.19, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30- year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 6.2.6. Ecological Screening for SWMU 212

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Grass/soil/gravel mix to all gravel	No	180	Antimony	2.10E-01	4.87E+00	2.70E-01	18
			PCB, Total	n/a	2.50E+00	2.00E-02	125
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

COPCs for surface and subsurface soils from SWMU 212 are shown on Tables 6.2.1 through 6.2.4 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The investigation for SWMU 212 revealed that metals, PCBs, and radionuclides are the types of COPCs found in the surface soils and metals and radionuclides are the types of COPCs found in the subsurface soils. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants in soil at SWMU 212 are unlikely to migrate from the source. There are no known underground pipelines that might have contributed to contaminant migration from SWMU. This site is grass covered; therefore, dispersement of soil from this site by rainfall runoff is minimized and not considered significant. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker, excavation worker, and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 212.

- Future Industrial Worker
  - Arsenic
  - Cesium-137
  - Chromium
  - Neptunium-237
  - Thorium-230
  - Uranium-238
- Excavation worker
  - Thorium-230

- Hypothetical Resident (hazards evaluated against the child resident)

  — Arsenic
  — Cesium-137
  — Chromium
  — Iron
  — Neptunium-237
  — Total PCBs
  — Plutonium-239/240
  — Thorium-230
  — Uranium-235
  — Uranium-238

Of the above, there are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04). Priority COCs for other scenarios are described in Appendix D.

For SWMU 212, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Antimony
- Total PCBs
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 212 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 212 is close to SWMU 1, but is not adjacent to it. Approximately half of SWMU 212 lies within the C-747-C Cylinder Yard, but it is not adjacent to any other SWMUs. An action at SWMU 212 would not have an impact on other integrator OUs.

6.2.8 SWMU 212 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 212; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker, excavation worker, and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial land use as shown in the SMP (DOE 2012a).

6.3 SWMU 213, C-745-A, OS-02

6.3.1 Background

SWMU 213 is located north of C-745-A in the west-central portion of the plant site. This area was known formerly as DMSA Outside (OS)-02 and is approximately 7,000 ft^2. The western part of this SWMU abuts KPDES Outfall 015.

DMSA OS-02 was used to store excess or unused material. Items formerly stored at this location included a spill storage tank; an old “drop test” cylinder with over pack; metal parts from forklifts, cranes, cylinder slings, and carts; and wood to make cylinder saddles.

The spill tank had three closed valves located near the bottom. The tank was used extensively during a 1979 No. 2 fuel oil spill to “decant” the water from the fuel oil/water mixture and possibly utilized to contain other spills. The area is no longer a DMSA and the SWMU currently is empty.

The Final Inventory and Characterization Report (FI/CR) was submitted September 16, 2002, to KDWM and approved on July 21, 2005. RCRA closure was not required for SWMU 213 because no hazardous wastes were stored in this unit.

6.3.2 Fieldwork Summary

One grid sample for the surface only was planned and collected for the unit. Field laboratory results indicated that 22 contingency samples were needed to determine the lateral and vertical extent of contamination at this unit because concentrations of cadmium, magnesium, and zinc were above threshold levels. Of those 22, 18 were collected. Those not collected were due to the close proximity of a ditch and a cylinder yard. Figure A.7 in Appendix A is the sample rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 6.3.1) using a FIDLER; the 1,144 measurements ranged from 28,445 to 210,000 gross cpm. Both of the areas that comprise this SWMU are covered with a grass and gravel mix. The influence of background radiation from nearby cylinders does not allow a reliable determination for areas of contamination at the project action limit. A judgmental grab sample was collected for radiological constituents.

6.3.3 Nature and Extent of Contamination—Surface Soils

For SWMU 213 the representative data set for surface soils is presented in Table 6.3.1 and provides the nature of the contamination in SWMU 213 surface soils. Figures 6.3.2–6.3.4 illustrate the horizontal extent. A complete list of sampling results is included in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 213 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 213 consists of two EUs.

Metals

Metals were detected above the industrial worker NALs in the SWMU 213 surface soil. The following are the metals detected at or above both the background screening levels and the industrial worker NALs and grids and EUs in which they were detected.

Metal	Grid	EU
Chromium	1-1, 1-6, 1A	1, 2
Nickel	1, 1-7	1, 2
Silver	1-1, 1-3, 1-7	1, 2

Grids 1-1 and 1-3 are located within the administrative boundary of the western section of SWMU 213 and are in EU 1. Grids 1-6 and 1-7 are located within the administrative boundary of the eastern section of SWMU 213 and are in EU 2. Grid 1A (EU 2) is a grid in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 213, as described in the Work Plan (DOE 2010a).

No metals were detected above the industrial worker ALs in the SWMU 213 surface soil.

Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.002	0.025	pCi/g	0.012
Cesium-137	0.005	0.056	pCi/g	0.031
Neptunium-237	-0.0031	0.024	pCi/g	0.0077
Plutonium-238	0.01	0.026	pCi/g	0.015
Plutonium-239/240	0.007	0.019	pCi/g	0.011
Technetium-99	0.11	1.1	pCi/g	0.67
Thorium-228	0.065	0.015	pCi/g	0.026
Thorium-230	0.69	0.01	pCi/g	0.08
Thorium-232	0.069	0.007	pCi/g	0.026
Uranium-234	0.96	0.03	pCi/g	0.12
Uranium-235/236	0.053	0.012	pCi/g	0.031
Uranium-238	0.82	0.01	pCi/g	0.11
Uranium	2.46	0.03	mg/kg	

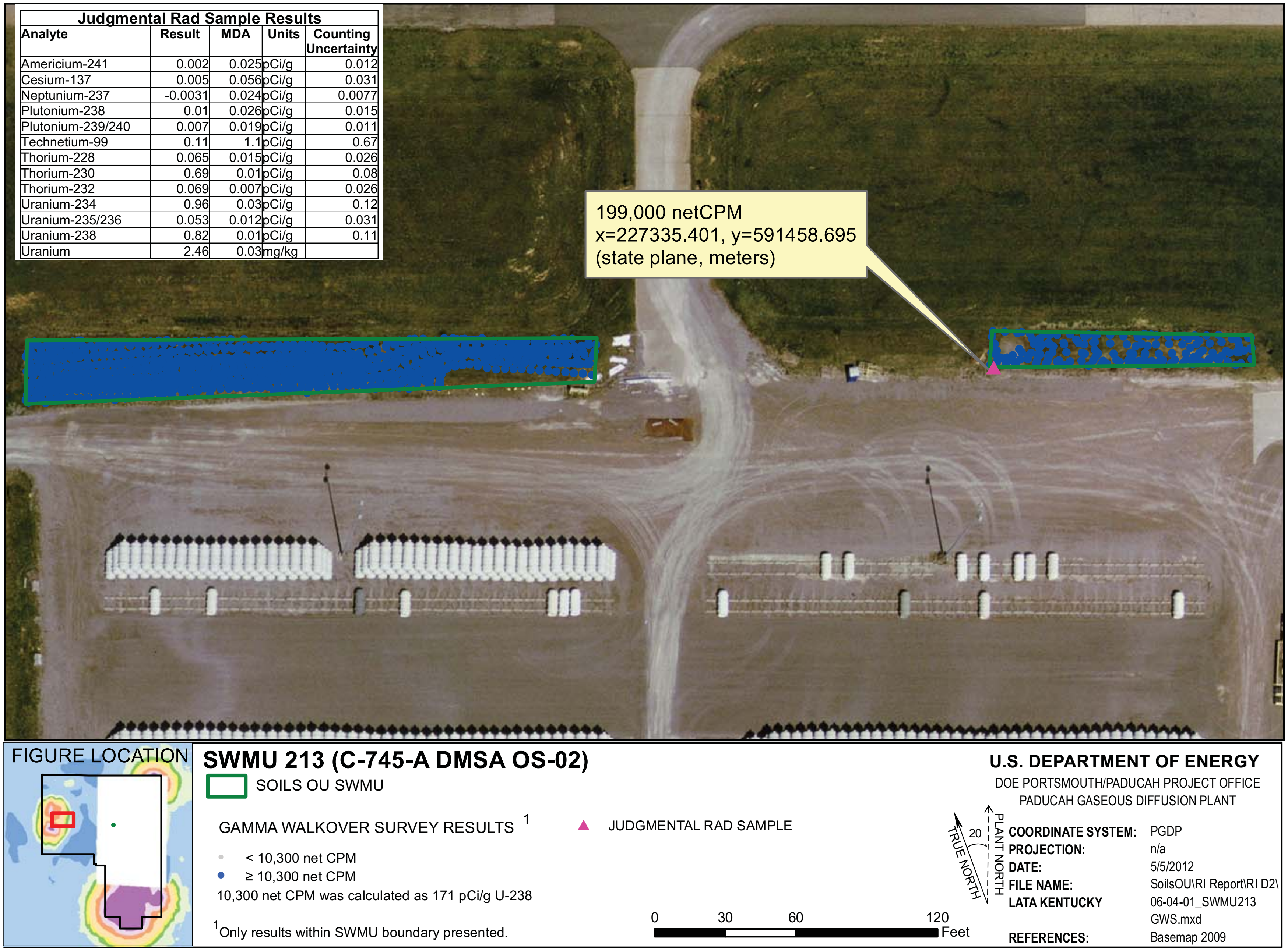


Figure 6.3.1. SWMU 213 Gamma Walkover Survey

Table 6.3.1. Surface Soil RI Data Summary: SWMU 213 C-745-A DMSA Outside-02

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	4.18E+03	4.18E+03	4.18E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.2 - 5.2
METAL	Antimony	mg/kg	8.50E-01	8.50E-01	8.50E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.52 - 0.52
METAL	Arsenic	mg/kg	4.20E+00	9.21E+00	6.22E+00	0/10	5/10	0/10	1.20E+01	5/10	9.97E-01	0/10	9.97E+01	0/10	5/10	1 - 11
METAL	Barium	mg/kg	7.85E+01	7.85E+01	7.85E+01	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	0/1	2.1 - 2.1
METAL	Beryllium	mg/kg	2.50E-01	2.50E-01	2.50E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.1 - 0.1
METAL	Cadmium	mg/kg	5.10E-01	5.10E-01	5.10E-01	0/1	1/1	1/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	1/1	0.052 - 0.052
METAL	Calcium	mg/kg	1.24E+05	1.24E+05	1.24E+05	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	261 - 261
METAL	Chromium	mg/kg	1.48E+01	4.78E+01	3.07E+01	0/10	4/10	3/10	1.60E+01	3/10	3.02E+01	0/10	3.02E+03	0/10	0/10	1 - 85
METAL	Cobalt	mg/kg	3.80E+00	3.80E+00	3.80E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.21 - 0.21
METAL	Copper	mg/kg	7.00E+00	2.64E+01	1.35E+01	0/10	2/10	1/10	1.90E+01	0/10	1.43E+03	0/10	2.24E+05	0/10	0/10	1 - 35
METAL	Iron	mg/kg	6.47E+03	2.46E+04	1.31E+04	0/10	10/10	0/10	2.80E+04	0/10	2.51E+04	0/10	3.92E+06	10/10	10/10	5.2 - 100
METAL	Lead	mg/kg	8.12E+00	1.84E+01	1.25E+01	0/10	6/10	0/10	3.60E+01	0/10	4.00E+02	0/10	4.00E+02	0/10	1/10	0.31 - 13
METAL	Magnesium	mg/kg	9.15E+03	9.15E+03	9.15E+03	0/1	1/1	1/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	52.3 - 52.3
METAL	Manganese	mg/kg	6.86E+01	9.06E+02	3.33E+02	0/10	10/10	0/10	1.50E+03	0/10	2.58E+03	0/10	1.16E+05	9/10	10/10	0.21 - 85
METAL	Mercury	mg/kg	3.75E-02	3.75E-02	3.75E-02	0/10	1/10	0/10	2.00E-01	0/10	9.00E-01	0/10	7.85E+02	0/10	0/10	0.0348 - 10
METAL	Molybdenum	mg/kg	6.10E-01	6.10E-01	6.10E-01	0/10	1/10	0/10	n/a	0/10	1.79E+02	0/10	2.80E+04	0/10	1/10	0.52 - 15
METAL	Nickel	mg/kg	9.50E+00	9.10E+01	4.42E+01	0/10	3/10	2/10	2.10E+01	2/10	4.28E+01	0/10	3.18E+04	1/10	3/10	0.52 - 65
METAL	Selenium	mg/kg	7.70E-01	7.70E-01	7.70E-01	0/10	1/10	0/10	8.00E-01	0/10	1.79E+02	0/10	2.80E+04	0/10	1/10	0.52 - 20
METAL	Silver	mg/kg	2.90E-02	1.32E+01	7.48E+00	0/10	4/10	3/10	2.30E+00	3/10	1.08E+01	0/10	9.15E+03	3/10	3/10	0.21 - 10
METAL	Sodium	mg/kg	1.44E+02	1.44E+02	1.44E+02	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	20.9 - 20.9
METAL	Thallium	mg/kg	1.70E-01	1.70E-01	1.70E-01	0/1	1/1	0/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.21 - 0.21
METAL	Uranium	mg/kg	2.46E+00	8.89E+00	6.76E+00	0/11	4/11	3/11	4.90E+00	0/11	1.07E+02	0/11	1.65E+04	0/11	0/11	0.02 - 20
METAL	Vanadium	mg/kg	1.31E+01	1.31E+01	1.31E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1 - 1
METAL	Zinc	mg/kg	2.58E+01	1.17E+02	6.30E+01	0/10	10/10	3/10	6.50E+01	0/10	1.08E+04	0/10	1.68E+06	0/10	10/10	2.1 - 25
PPCB	PCB, Total	mg/kg	7.30E-02	7.30E-02	7.30E-02	1/10	1/10	0/10	n/a	0/10	1.88E-01	0/10	1.88E+01	0/10	0/10	0.31 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.34 - 0.34
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.34 - 0.34
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.34 - 0.34
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.7 - 1.7
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.34 - 0.34
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.34 - 0.34
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Benzo(ghi)perylene	mg/kg	7.90E-02	7.90E-02	7.90E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.3.1. Surface Soil RI Data Summary: SWMU 213 C-745-A DMSA Outside-02 (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0069 - 0.0069
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.34 - 0.34
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Fluoranthene	mg/kg	6.60E-01	6.60E-01	6.60E-01	0/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.34 - 0.34
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.34 - 0.34
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.34 - 0.34
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.69 - 0.69
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.34 - 0.34
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0069 - 0.0069
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.7 - 1.7
SVOA	Phenanthrene	mg/kg	9.60E-02	9.60E-02	9.60E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Pyrene	mg/kg	4.90E-01	4.90E-01	4.90E-01	0/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.34 - 0.34
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.69 - 0.69
SVOA	Total PAH	mg/kg	1.72E-01	1.72E-01	1.72E-01	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	1.78E+01	3.14E+01	2.46E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.6 - 4.7
RADS	Americium-241	pCi/g	2.00E-03	1.00E-02	6.00E-03	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.025 - 0.026
RADS	Beta activity	pCi/g	9.90E+00	2.82E+01	1.91E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.1 - 4.5
RADS	Cesium-137	pCi/g	5.00E-03	2.73E-01	1.39E-01	0/2	2/2	0/2	4.90E-01	1/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.056 - 0.075
RADS	Neptunium-237	pCi/g	-3.10E-03	2.90E-02	1.30E-02	0/2	2/2	0/2	1.00E-01	0/2	2.71E-01	0/2	2.71E+01	0/2	1/2	0.013 - 0.024
RADS	Plutonium-238	pCi/g	1.00E-02	2.20E-02	1.60E-02	1/2	2/2	0/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.02 - 0.026
RADS	Plutonium-239/240	pCi/g	7.00E-03	5.10E-02	2.90E-02	0/2	2/2	1/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.015 - 0.019
RADS	Technetium-99	pCi/g	1.10E-01	2.60E-01	1.85E-01	0/2	2/2	0/2	2.50E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	0/2	0.49 - 1.1
RADS	Thorium-228	pCi/g	6.50E-02	2.63E-01	1.64E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.015 - 0.018
RADS	Thorium-230	pCi/g	6.90E-01	2.06E+00	1.38E+00	0/2	2/2	1/2	1.50E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.009 - 0.01
RADS	Thorium-232	pCi/g	6.90E-02	2.55E-01	1.62E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.007 - 0.018
RADS	Uranium-234	pCi/g	9.60E-01	1.99E+00	1.48E+00	0/2	2/2	1/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.02 - 0.03
RADS	Uranium-235/236	pCi/g	5.30E-02	1.10E-01	8.15E-02	0/2	2/2	1/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.009 - 0.012
RADS	Uranium-238	pCi/g	8.20E-01	2.33E+00	1.58E+00	0/2	2/2	1/2	1.20E+00	1/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.007 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

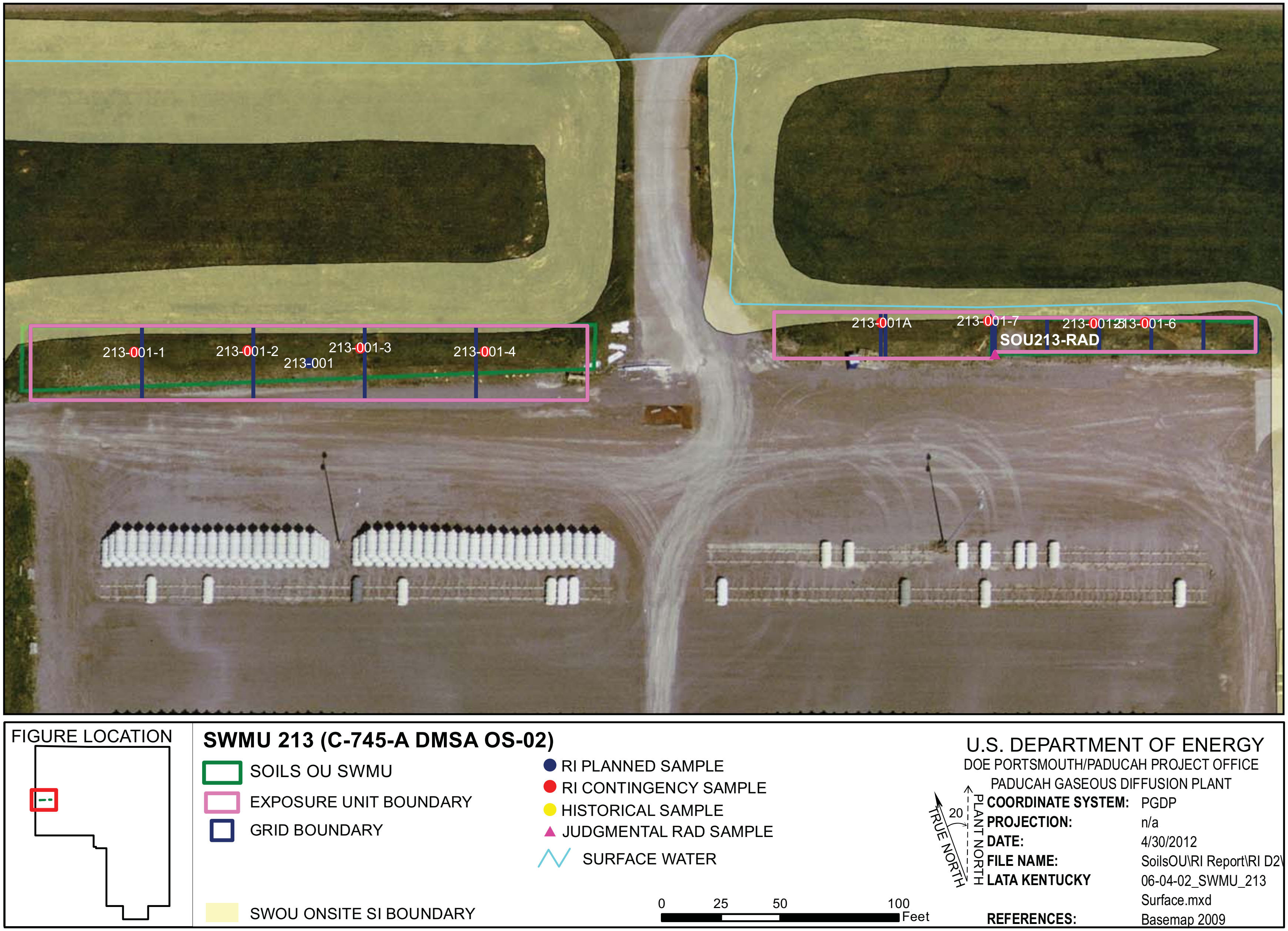


Figure 6.3.2. SWMU 213 Sample Locations - Surface Soil

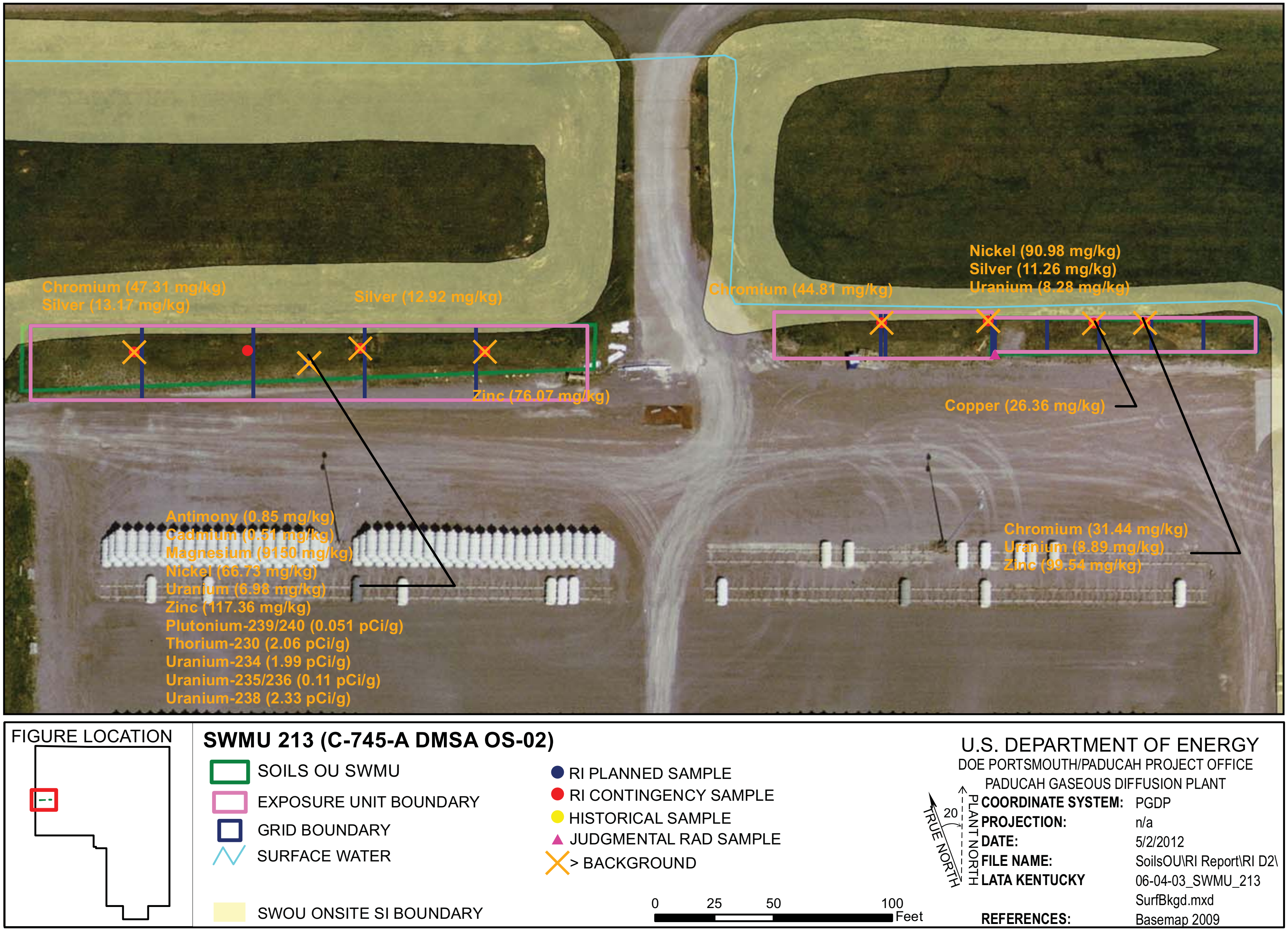


Figure 6.3.3. SWMU 213 Background Exceedances - Surface Soil

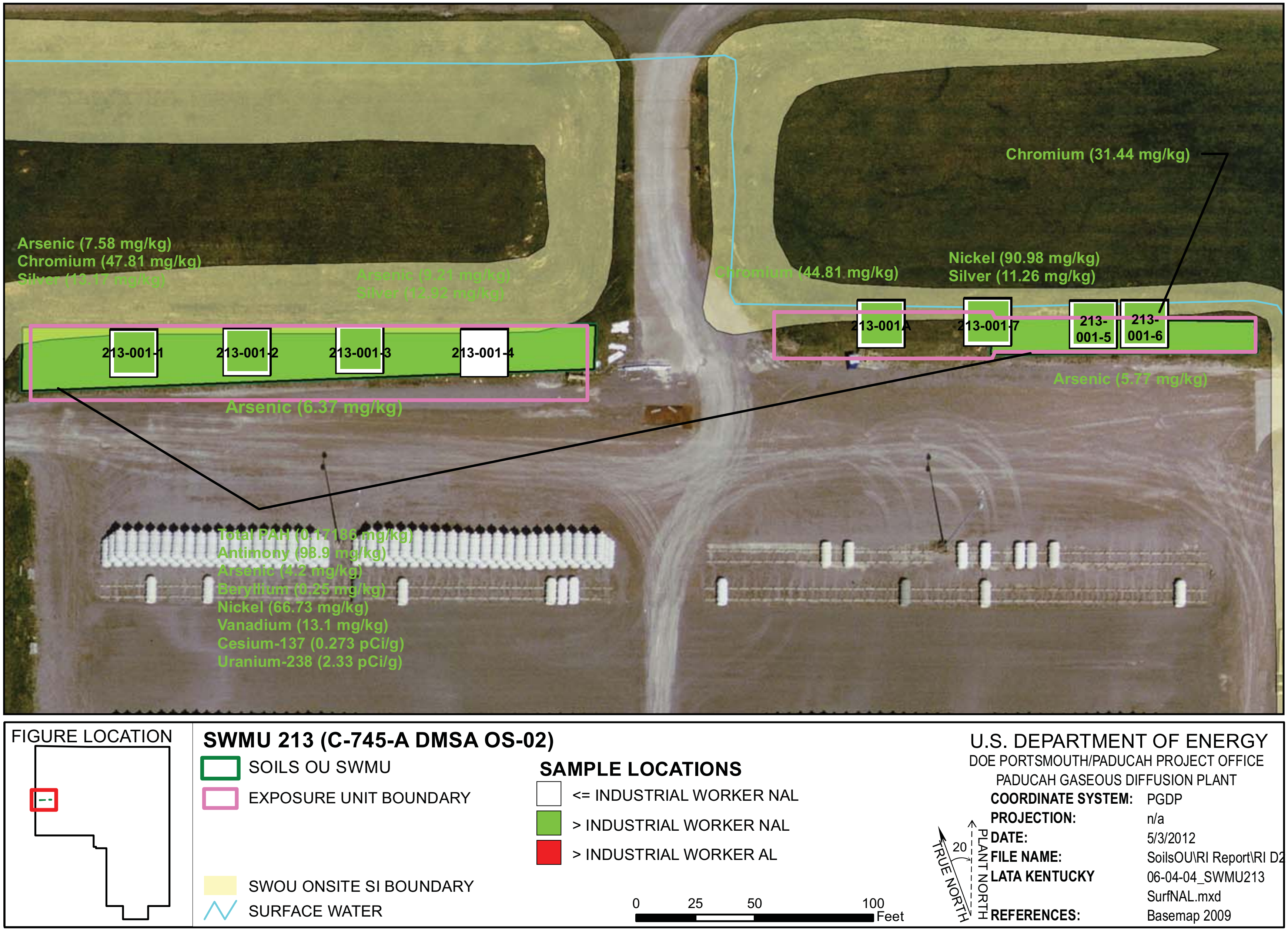


Figure 6.3.4. SWMU 213 NAL Exceedances - Surface Soil

The following are the metals detected in the SWMU 213 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Antimony	1	1
Cadmium	1	1
Molybdenum[1]	1	1
Nickel	1, 1-7	1, 2
Silver	1-1, 1-3, 1-7	1, 2
Zinc	1, 1-4, 1-6	1, 2

[1] No background value is available.

Nickel (grid 1-7, EU 2) and silver [grids 1-1, 1-3 (EU 1), and 1-7 (EU 2)] were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected above the industrial worker NALs, the industrial worker ALs, or the SSLs for the UCRS and RGA groundwater in the SWMU 213 surface soil.

SVOCs

Total PAHs in grid 1, EU 1, were detected above the industrial worker NALs in SWMU 213 surface soil.

No SVOCs were not detected above the industrial worker ALs or the SSLs for the protection of RGA groundwater.

Total PAHs in grid 1, EU 1, were detected above the SSLs for the protection of UCRS groundwater.

VOCs

There are no VOC data for SWMU 213.

Radionuclides

Uranium-238 was detected above both the background screening level and the industrial worker NAL in SWMU 213 surface soil in grid 1. No radionuclides were detected above both the background screening levels and the industrial worker ALs.

Thorium-230 in grid 1, EU 1, was detected above both the background screening level and the SSL for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

6.3.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 213, the representative data set for subsurface soils is presented in Table 6.3.2 and provides the nature of the contamination in SWMU 213 subsurface soils. Figures 6.3.5–6.3.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

Table 6.3.2. Subsurface Soil RI Data Summary: SWMU 213 C-745-A DMSA Outside-02

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Arsenic	mg/kg	6.19E+00	6.19E+00	6.19E+00	0/9	1/9	0/9	7.90E+00	1/9	9.97E-01	0/9	9.97E+01	0/9	1/9	11 - 11
METAL	Chromium	mg/kg	3.64E+01	6.77E+01	5.16E+01	0/9	5/9	3/9	4.30E+01	5/9	3.02E+01	0/9	3.02E+03	0/9	0/9	85 - 85
METAL	Copper	mg/kg	2.00E+01	2.00E+01	2.00E+01	0/9	1/9	0/9	2.50E+01	0/9	1.43E+03	0/9	2.24E+05	0/9	0/9	35 - 35
METAL	Iron	mg/kg	8.82E+03	1.90E+04	1.42E+04	0/9	9/9	0/9	2.80E+04	0/9	2.51E+04	0/9	3.92E+06	9/9	9/9	100 - 100
METAL	Lead	mg/kg	8.10E+00	1.65E+01	1.28E+01	0/9	9/9	0/9	2.30E+01	0/9	4.00E+02	0/9	4.00E+02	0/9	4/9	13 - 13
METAL	Manganese	mg/kg	6.58E+01	2.10E+03	4.27E+02	0/9	8/9	1/9	8.20E+02	0/9	2.58E+03	0/9	1.16E+05	7/9	8/9	85 - 85
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	1.30E-01	0/9	9.00E-01	0/9	7.85E+02	0/9	0/9	10 - 10
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	1.79E+02	0/9	2.80E+04	0/9	0/9	15 - 15
METAL	Nickel	mg/kg	6.92E+01	7.17E+01	7.05E+01	0/9	2/9	2/9	2.20E+01	2/9	4.28E+01	0/9	3.18E+04	0/9	2/9	65 - 65
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	7.00E-01	0/9	1.79E+02	0/9	2.80E+04	0/9	0/9	20 - 20
METAL	Silver	mg/kg	9.94E+00	9.94E+00	9.94E+00	0/9	1/9	1/9	2.70E+00	0/9	1.08E+01	0/9	9.15E+03	1/9	1/9	10 - 10
METAL	Uranium	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	4.60E+00	0/9	1.07E+02	0/9	1.65E+04	0/9	0/9	20 - 20
METAL	Zinc	mg/kg	3.06E+01	5.21E+01	3.92E+01	0/9	9/9	0/9	6.00E+01	0/9	1.08E+04	0/9	1.68E+06	0/9	9/9	25 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	1.88E-01	0/9	1.88E+01	0/9	0/9	5 - 5

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

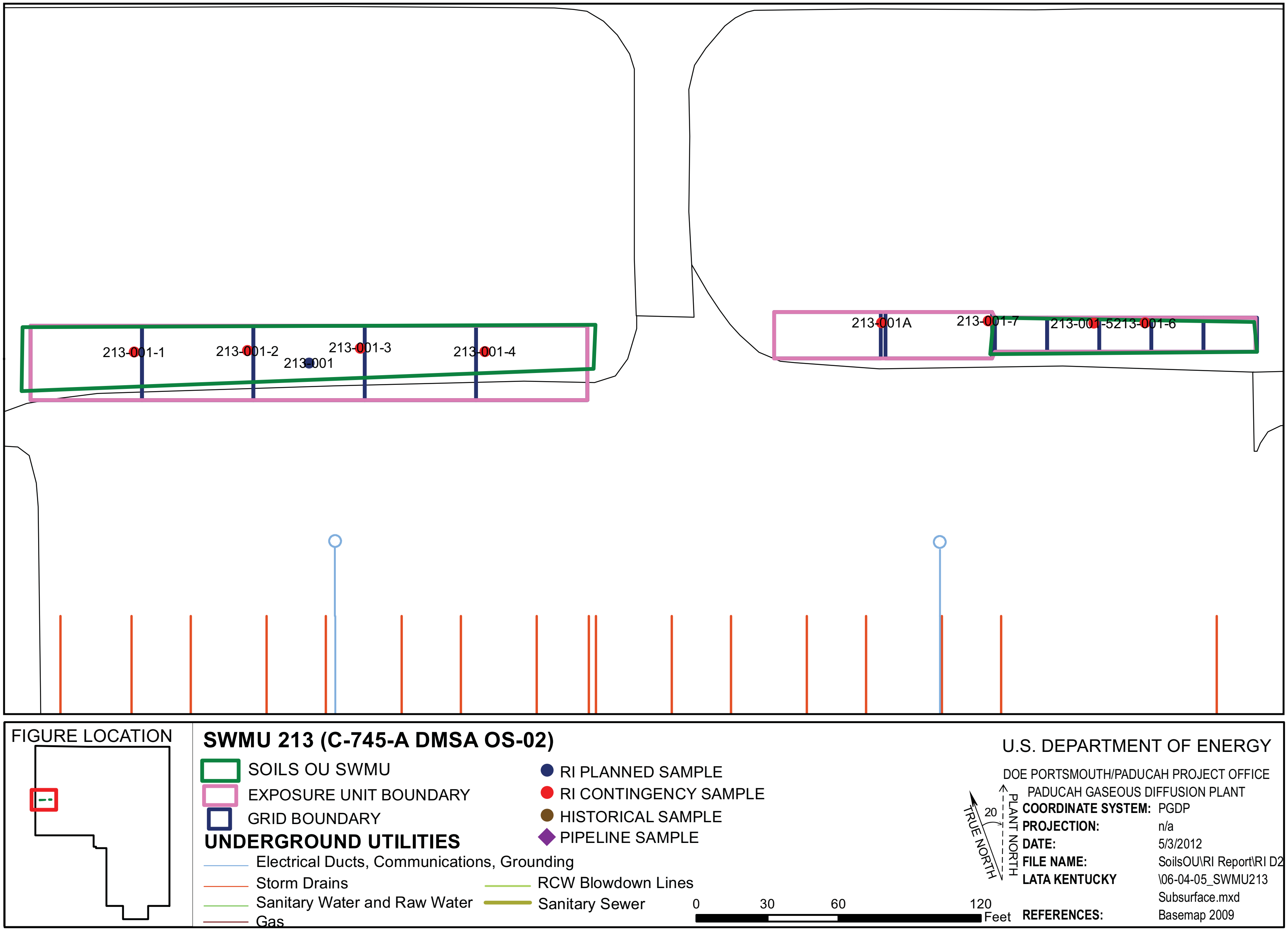


Figure 6.3.5. SWMU 213 Sample Locations - Subsurface Soil

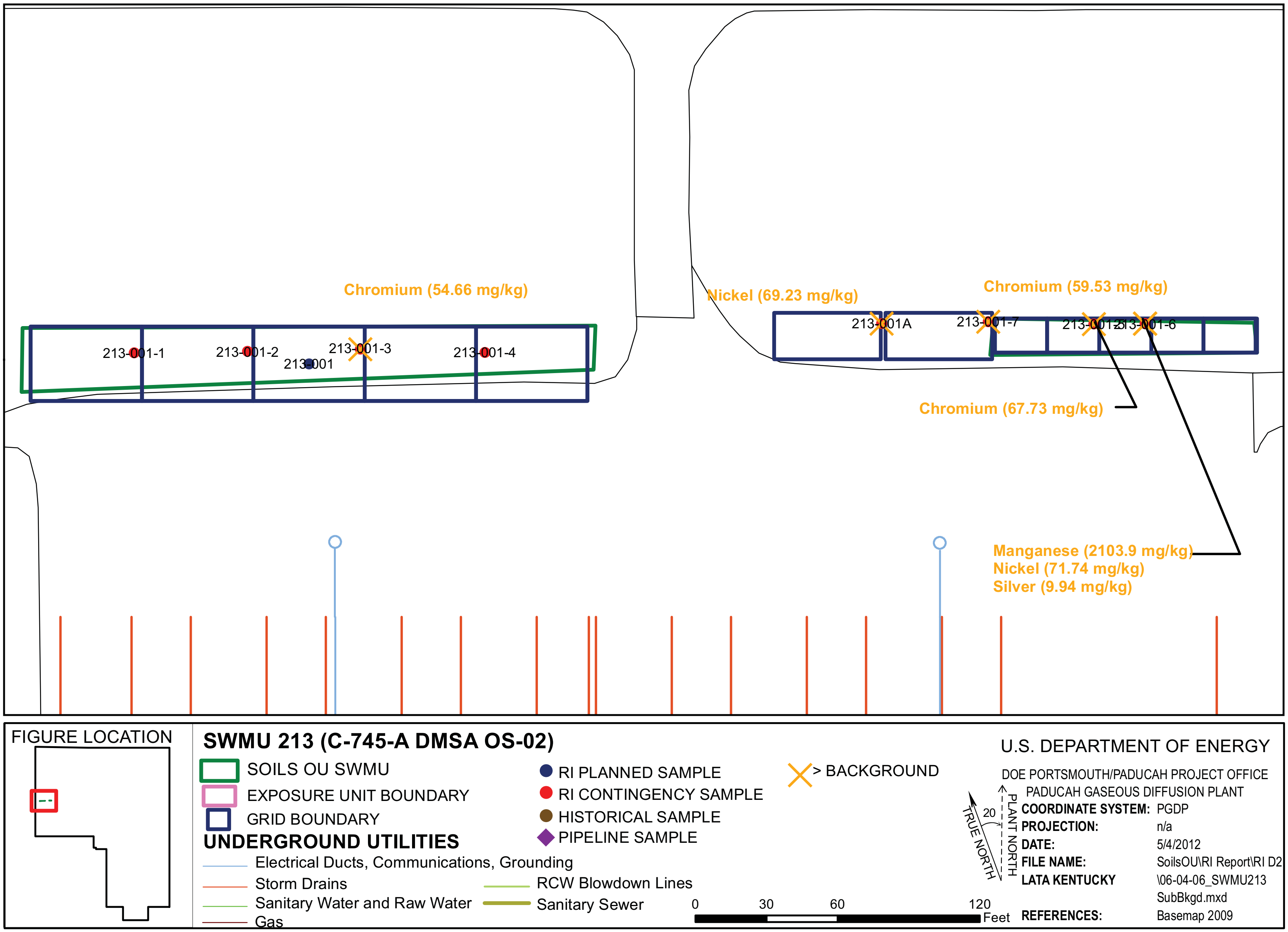


Figure 6.3.6. SWMU 213 Background Exceedances - Subsurface Soil

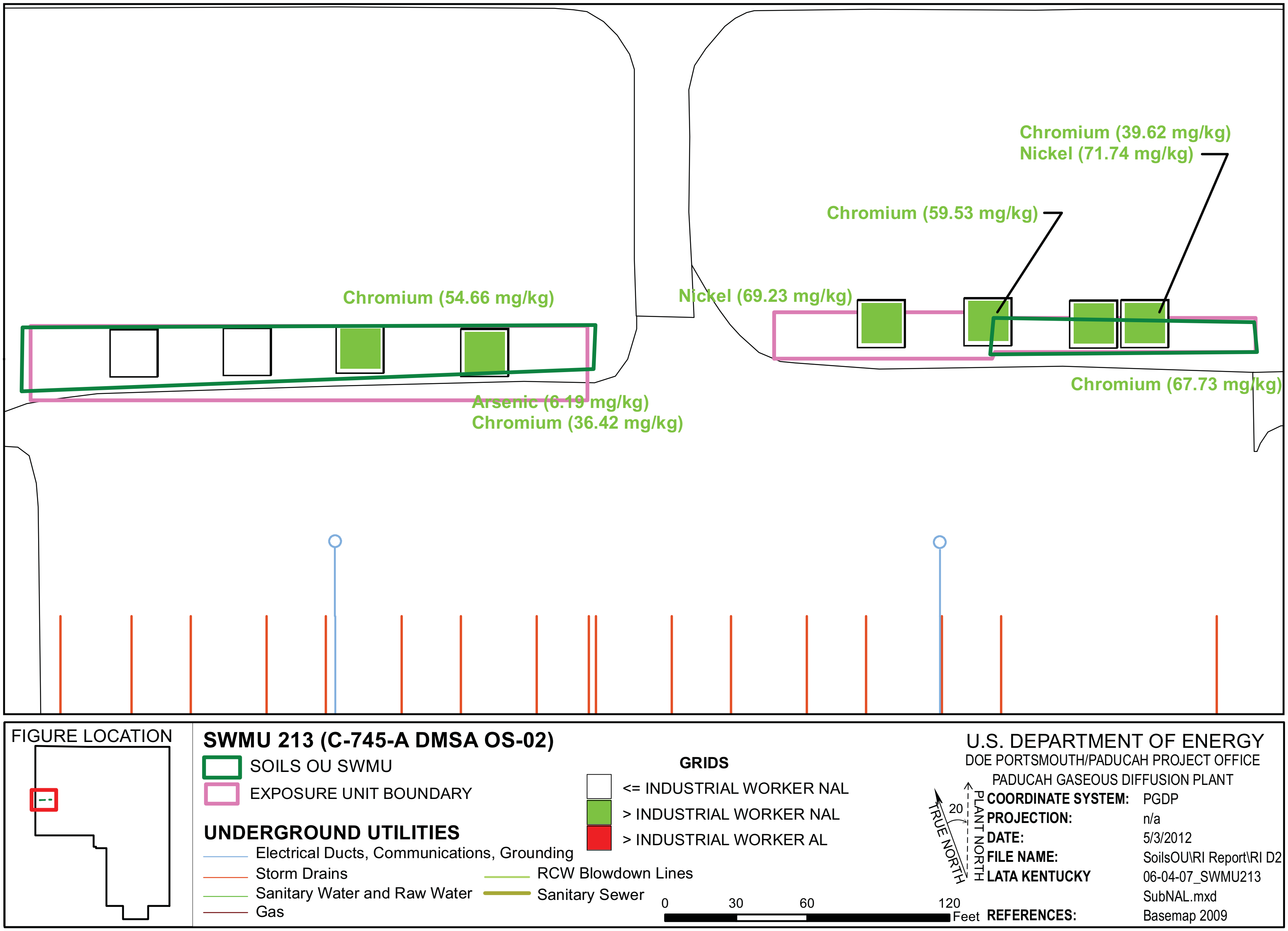


Figure 6.3.7. SWMU 213 NAL Exceedances - Subsurface Soil

The horizontal and vertical extent of SWMU 213 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 213 consists of two EUs.

Metals

Metals were detected above the industrial worker NALs in the SWMU 213 subsurface soil. The following are the metals detected at or above both the background screening levels and the industrial NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Chromium	1-3, 1-5, 1-7	1, 2
Nickel	1-6, 1A	2

Grid 1-3 is located within the administrative boundary of the western section of SWMU 213 and is in EU 1. Grids 1-5 and 1-7 are located within the administrative boundary of the eastern section of SWMU 213 and are in EU 2. Grid 1A, in EU 2, is a grid in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 213, as described in the Work Plan (DOE 2010a).

The maximum depth at which metals were detected at or above both background screening levels and the industrial worker NALs was 4 ft bgs. The end depths of the boreholes taken from grids 1-3, 1-5, 1-6, 1-7, and 1A range from 1 to 4 ft bgs.

No metals were detected above the industrial worker ALs in the SWMU 213 subsurface soil.

The following are the metals detected in the SWMU 213 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Manganese	1-6	2
Nickel	1-6, 1A	2
Silver	1-6	2

Manganese and silver, both in grids 1-6 of EU 2, were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 213 subsurface soil.

SVOCs

No subsurface soil samples from SWMU 213 were analyzed for SVOCs.

VOCs

No subsurface soil samples from SWMU 213 were analyzed for VOCs.

Radionuclides

No subsurface soil samples from SWMU 213 were analyzed for radionuclides.

6.3.5 Fate and Transport

No target chemicals were identified for further evaluation of impacts to the RGA (Chapter 4). SWMU 213 has the potential of runoff to the north, which flows to Outfall 015, but is not considered significant due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow (DOE 2008a). The ditch located to the north was sampled during the SWOU SI (DOE 2008a). A final response action for internal ditches will be addressed by the SWOU, as described in the SMP (DOE 2012a). In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

6.3.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 213 for each EU were evaluated for direct contact**.** These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI. COCs for this SWMU include metals, radionuclides, and SVOCs.

The cumulative ELCR and the cumulative HI for one or more EUs at SWMU 213 exceeds the cumulative ELCR benchmark of 1E-6 or a cumulative HI greater than 1; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 6.3.3 for the future industrial worker and the hypothetical resident. The excavation worker did not have any identified COCs. Table 6.3.3 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 213 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 6.3.4.

Table 6.3.3. RGOs for SWMU 213

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3] 1 x 10^{-6}	RGOs for ELCR[3] 1 x 10^{-5}	RGOs for ELCR[3] 1 x 10^{-4}	HI[4]	RGOs for HI[3] 0.1	RGOs for HI[3] 1	RGOs for HI[3] 3
Future Industrial Worker											
1	Chromium	4.78E+01	mg/kg	1.6E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Total PAH	1.72E-01	mg/kg	2.9E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-238	2.33E+00	pCi/g	1.4E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**5.9E-06**				**< 1**			
2	Chromium	4.48E+01	mg/kg	1.5E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.5E-06**				**< 1**			
Hypothetical Resident[5]											
1	Chromium	4.78E+01	mg/kg	3.1E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Uranium-238	2.33E+00	pCi/g	6.7E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Total PAH	1.72E-01	mg/kg	8.8E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	PCB, Total	7.30E-02	mg/kg	1.1E-06	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Cumulative			**2.0E-05**				**< 1**			
2	Chromium	4.48E+01	mg/kg	2.9E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**2.9E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.21, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.21, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 6.3.4. Ecological Screening for SWMU 213

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Grassy/gravel mix	Yes	168	PCB, Total	n/a	2.50E+00	2.00E-02	125
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

6.3.7 SWMU 213 Summary

The following text summarizes the results for SWMU 213 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Processes that may have caused contamination at SWMU 213 are spills of stored liquids of from equipment.

COPCs for surface and subsurface soils from SWMU 213 are shown on Tables 6.3.1 and 6.3.2 as those analytes with green boxes under the “Industrial Worker/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G. The COPCs identified for each EU in SWMU 213 are as follows:

- EU 1
  - Surface—metals, SVOCs, radionuclides
  - Subsurface—metals

- EU 2
  - Surface—metals
  - Subsurface—metals

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants present at SWMU 213 are readily bound up in soil particles; therefore, they are unlikely to migrate away from the SWMU. There are no known underground pipelines that may have contributed to contaminant migration from SWMU 213; however, the SWMU abuts a drainage ditch, although rainfall runoff is not considered significant. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 213.

- Future Industrial Worker

    — Chromium
    — Total PAHs
    — Uranium-238

- Excavation worker

    — None

- Hypothetical Resident (hazards evaluated against the child resident)

    — Chromium
    — Total PCBs
    — Total PAHs
    — Uranium-238

Of the above, there are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 213. There are no priority COCs for other scenarios.

For SWMU 213, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Total PCBs
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 213 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. This SWMU is on the northern edge of the C-747-C Cylinder Yard, but it is not adjacent to any other SWMUs. A response action at SWMU 213 would not impact any other integrator OUs.

6.3.8 SWMU 213 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 213; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial land use as shown in the SMP (DOE 2012a).

6.4 SWMU 214, C-611, OS-03

6.4.1 Background

SWMU 214 is located at the C-611 Water Treatment Plant west of the plant site. SWMU 214 is 384 ft^2 (16 ft x 24 ft). DMSA OS-03 was created by PGDP utilities operations for storage of DOE materials upon transition from DOE to USEC operations. Prior to 1994, the area was a gravel- and grass-covered. The material that was stored was covered by a 16 ft x 24 ft aluminum carport-type shed without walls. Materials stored within the SWMU were as follows:

- 55-gal drums of absorbent pads and other solid waste generated by PGDP utilities operations at C-611 and from a cleanup at KPDES Outfall 008;

- 55-gal drums of ferric sulfate marked for reuse;

- Fiberglass panels removed from either the C-611-C Flocculator or the C-611-U Chemical Storage Area in 1993;

- A small quantity of scrap metal banding material;

- One out-of-use fuel oil tank that was removed from the basement of C-611 that fed the backup diesel generators (empty);

- One pole type electrical disconnect;

- Scrap pieces of lumber;

- Several wooden pallets;

- Several 55-gal drums marked empty; and

- Two empty plastic oil containment dikes.

All RCRA-regulated items and other waste have been dispositioned properly (DOE 2002b).

There were no known spills or releases of materials from this DMSA to the environment. This SWMU does not have a direct connection to surface water. A certified RCRA Closure Report was approved by Kentucky on February 13, 2007, for this DMSA. KDWM "determined that the characterization, removal and disposal of hazardous waste meets the applicable requirements of the approved Agreed Order Closure Plan for DMSAs, dated December 23, 2005" (Webb 2007). The Closure Report documented that no sign of spill or release was found.

6.4.2 Fieldwork Summary

One grid sample for the surface only was planned and collected. Contingency/step-out samples were not needed based on field laboratory results.

The SWMU underwent a gamma radiological walkover survey (Figure 6.4.1) using a FIDLER; the 110 measurements ranged from 5,901 to 11,694 gross cpm. The cover for this SWMU is a gravel and grass mix. A judgmental grab sample was collected for radiological constituents, although results were not over the project action limit.

6.4.3 Nature and Extent of Contamination—Surface Soils

For SWMU 214, the representative data set for surface soils is presented in Table 6.4.1 and provides the nature of the contamination in SWMU 214 surface soils. Figures 6.4.2–6.4.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

Judgmental Rad Sample Results				
Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.006	0.019	pCi/g	0.01
Cesium-137	-0.012	0.068	pCi/g	0.038
Neptunium-237	0.001	0.018	pCi/g	0.0082
Plutonium-238	0.007	0.027	pCi/g	0.015
Plutonium-239/240	0.0019	0.018	pCi/g	0.0079
Technetium-99	0.17	0.41	pCi/g	0.25
Thorium-228	0.178	0.026	pCi/g	0.048
Thorium-230	0.87	0.02	pCi/g	0.1
Thorium-232	0.191	0.016	pCi/g	0.049
Uranium-234	0.661	0.02	pCi/g	0.08
Uranium-235/236	0.04	0.016	pCi/g	0.022
Uranium-238	0.75	0.006	pCi/g	0.08
Uranium	2.27	0.02	mg/kg	

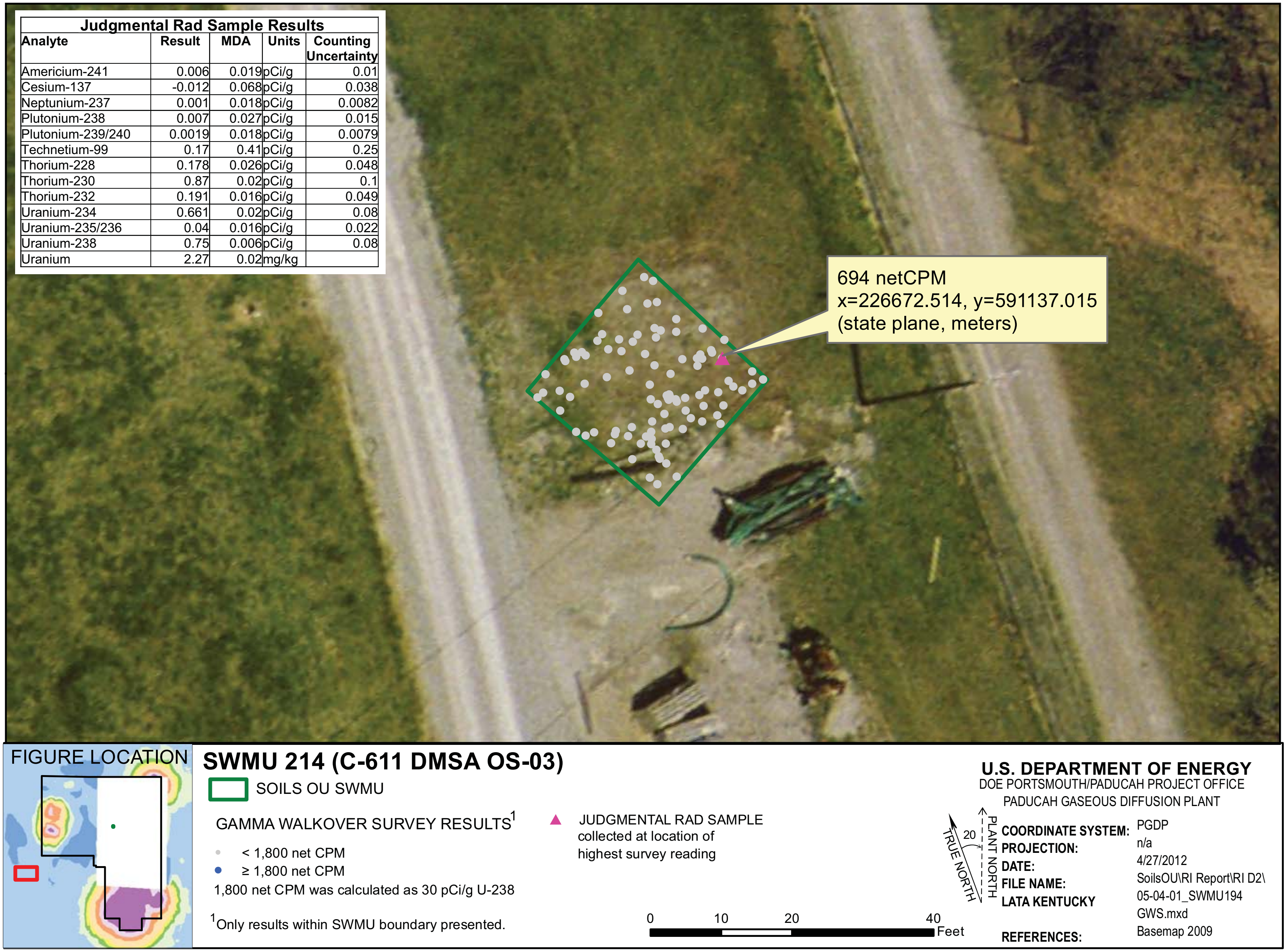


Figure 6.4.1. SWMU 214 Gamma Walkover Survey

Table 6.4.1. Surface Soil RI Data Summary: SWMU 214 C-611 DMSA Outside-03

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.23E+03	5.23E+03	5.23E+03	0/1	1/1	0/1	1.30E+04	0/1	2.77E+04	0/1	8.91E+06	0/1	1/1	5.7 - 5.7
METAL	Antimony	mg/kg	5.70E-01	5.70E-01	5.70E-01	0/1	1/1	1/1	2.10E-01	0/1	1.78E+00	0/1	1.90E+03	0/1	1/1	0.57 - 0.57
METAL	Arsenic	mg/kg	4.20E+00	1.15E+01	6.64E+00	0/2	2/2	0/2	1.20E+01	2/2	1.02E+00	0/2	1.02E+02	0/2	2/2	1.1 - 11
METAL	Barium	mg/kg	9.08E+01	9.08E+01	9.08E+01	0/1	1/1	0/1	2.00E+02	0/1	4.15E+02	0/1	4.58E+05	0/1	1/1	2.3 - 2.3
METAL	Beryllium	mg/kg	2.70E-01	2.70E-01	2.70E-01	0/1	1/1	0/1	6.70E-01	1/1	1.29E-02	0/1	8.65E+00	0/1	0/1	0.11 - 0.11
METAL	Cadmium	mg/kg	2.80E-01	2.80E-01	2.80E-01	0/1	1/1	1/1	2.10E-01	0/1	3.14E+00	0/1	3.14E+02	0/1	0/1	0.057 - 0.057
METAL	Calcium	mg/kg	2.14E+05	2.14E+05	2.14E+05	0/1	1/1	1/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	283 - 283
METAL	Chromium	mg/kg	1.43E+01	1.43E+01	1.43E+01	0/2	1/2	0/2	1.60E+01	0/2	7.15E+01	0/2	7.15E+03	0/2	0/2	1.1 - 85
METAL	Cobalt	mg/kg	4.70E+00	4.70E+00	4.70E+00	0/1	1/1	0/1	1.40E+01	0/1	8.45E+00	0/1	3.29E+03	1/1	1/1	0.23 - 0.23
METAL	Copper	mg/kg	4.20E+00	4.20E+00	4.20E+00	0/2	1/2	0/2	1.90E+01	0/2	1.13E+03	0/2	4.75E+05	0/2	0/2	1.1 - 35
METAL	Iron	mg/kg	1.17E+04	1.24E+04	1.21E+04	0/2	2/2	0/2	2.80E+04	0/2	1.98E+04	0/2	8.31E+06	2/2	2/2	5.7 - 100
METAL	Lead	mg/kg	1.39E+01	1.49E+01	1.43E+01	0/2	2/2	0/2	3.60E+01	0/2	4.00E+02	0/2	4.00E+02	0/2	2/2	0.34 - 13
METAL	Magnesium	mg/kg	1.26E+04	1.26E+04	1.26E+04	0/1	1/1	1/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	56.5 - 56.5
METAL	Manganese	mg/kg	5.79E+02	6.12E+02	5.90E+02	0/2	2/2	0/2	1.50E+03	0/2	3.47E+03	0/2	2.94E+05	2/2	2/2	0.23 - 85
METAL	Mercury	mg/kg	4.16E-02	4.16E-02	4.16E-02	0/2	1/2	0/2	2.00E-01	0/2	6.25E-01	0/2	7.88E+02	0/2	0/2	0.0377 - 10
METAL	Molybdenum	mg/kg	4.50E-01	4.50E-01	4.50E-01	0/2	1/2	0/2	n/a	0/2	1.42E+02	0/2	5.94E+04	0/2	1/2	0.57 - 15
METAL	Nickel	mg/kg	6.90E+00	6.90E+00	6.90E+00	0/2	1/2	0/2	2.10E+01	0/2	2.98E+01	0/2	3.07E+04	0/2	1/2	0.57 - 65
METAL	Selenium	mg/kg	6.70E-01	6.70E-01	6.70E-01	0/2	1/2	0/2	8.00E-01	0/2	1.42E+02	0/2	5.93E+04	0/2	1/2	0.57 - 20
METAL	Silver	mg/kg	2.10E-02	2.10E-02	2.10E-02	0/2	1/2	0/2	2.30E+00	0/2	7.45E+00	0/2	8.07E+03	0/2	0/2	0.23 - 10
METAL	Sodium	mg/kg	2.22E+02	2.22E+02	2.22E+02	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	22.6 - 22.6
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	2.27E+00	0/1	9.50E+02	0/1	0/1	0.23 - 0.23
METAL	Uranium	mg/kg	2.27E+00	2.96E+00	2.79E+00	0/3	2/3	0/3	4.90E+00	0/3	8.49E+01	0/3	3.50E+04	0/3	0/3	0.02 - 20
METAL	Vanadium	mg/kg	1.70E+01	1.70E+01	1.70E+01	0/1	1/1	0/1	3.80E+01	1/1	1.04E-01	0/1	7.61E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	4.45E+01	6.20E+01	5.62E+01	0/2	2/2	0/2	6.50E+01	0/2	8.50E+03	0/2	3.56E+06	0/2	2/2	2.3 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.83E-01	0/2	1.83E+01	0/2	0/2	0.34 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.35E+00	0/1	1.00E+02	0/1	0/1	1.8 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.87E+02	0/1	1.76E+04	0/1	0/1	0.37 - 0.37
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.25E+03	0/1	9.74E+04	0/1	0/1	0.37 - 0.37
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.4.1. Surface Soil RI Data Summary: SWMU 214 C-611 DMSA Outside-03 (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0075 - 0.0075
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	Butyl benzyl phthalate	mg/kg	4.40E-02	4.40E-02	4.40E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.47E+02	0/1	1.34E+04	0/1	0/1	0.37 - 0.37
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.19E+02	0/1	1.26E+04	0/1	0/1	0.37 - 0.37
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.78E-01	0/1	1.78E+01	0/1	0/1	0.37 - 0.37
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.75 - 0.75
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.27E+00	0/1	5.27E+02	0/1	0/1	0.37 - 0.37
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.10E-02	0/1	6.10E+00	0/1	0/1	0.0075 - 0.0075
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.8 - 1.8
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.35E+02	0/1	1.00E+04	0/1	0/1	0.37 - 0.37
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.75 - 0.75
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.57E-02	0/1	5.57E+00	0/1	0/1	-
RADS	Alpha activity	pCi/g	2.20E+01	2.76E+01	2.48E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.7 - 5.7
RADS	Americium-241	pCi/g	6.00E-03	7.00E-03	6.50E-03	0/2	2/2	0/2	n/a	0/2	1.28E+01	0/2	1.28E+03	0/2	0/2	0.018 - 0.019
RADS	Beta activity	pCi/g	1.20E+01	2.73E+01	1.97E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2 - 2.1
RADS	Cesium-137	pCi/g	-1.20E-02	2.00E-02	4.00E-03	0/2	2/2	0/2	4.90E-01	0/2	1.98E-01	0/2	1.98E+01	0/2	0/2	0.068 - 0.079
RADS	Neptunium-237	pCi/g	-1.90E-03	1.00E-03	-4.50E-04	0/2	2/2	0/2	1.00E-01	0/2	6.26E-01	0/2	6.26E+01	0/2	0/2	0.018 - 0.02
RADS	Plutonium-238	pCi/g	7.00E-03	1.90E-02	1.30E-02	0/2	2/2	0/2	7.30E-02	0/2	3.64E+01	0/2	3.64E+03	0/2	0/2	0.013 - 0.027
RADS	Plutonium-239/240	pCi/g	1.90E-03	9.00E-03	5.45E-03	0/2	2/2	0/2	2.50E-02	0/2	3.56E+01	0/2	3.56E+03	0/2	0/2	0.013 - 0.018
RADS	Technetium-99	pCi/g	-2.80E-01	1.70E-01	-5.50E-02	0/2	2/2	0/2	2.50E+00	0/2	1.11E+03	0/2	1.11E+05	0/2	0/2	0.41 - 0.49
RADS	Thorium-228	pCi/g	1.78E-01	8.50E-01	5.14E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.02 - 0.026
RADS	Thorium-230	pCi/g	8.70E-01	1.16E+00	1.02E+00	0/2	2/2	0/2	1.50E+00	0/2	4.49E+01	0/2	4.49E+03	0/2	2/2	0.01 - 0.02
RADS	Thorium-232	pCi/g	1.91E-01	9.50E-01	5.71E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.016 - 0.02
RADS	Uranium-234	pCi/g	6.61E-01	9.70E-01	8.16E-01	0/2	2/2	0/2	1.20E+00	0/2	6.25E+01	0/2	6.25E+03	0/2	0/2	0.01 - 0.02
RADS	Uranium-235/236	pCi/g	4.00E-02	6.60E-02	5.30E-02	0/2	2/2	1/2	6.00E-02	0/2	9.12E-01	0/2	9.12E+01	0/2	0/2	0.016 - 0.022
RADS	Uranium-238	pCi/g	7.50E-01	9.90E-01	8.70E-01	0/2	2/2	0/2	1.20E+00	0/2	4.02E+00	0/2	4.02E+02	0/2	0/2	0.006 - 0.007

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Figure 6.4.2. SWMU 214 Sample Locations - Surface Soil

Figure 6.4.3. SWMU 214 Background Exceedances - Surface Soil

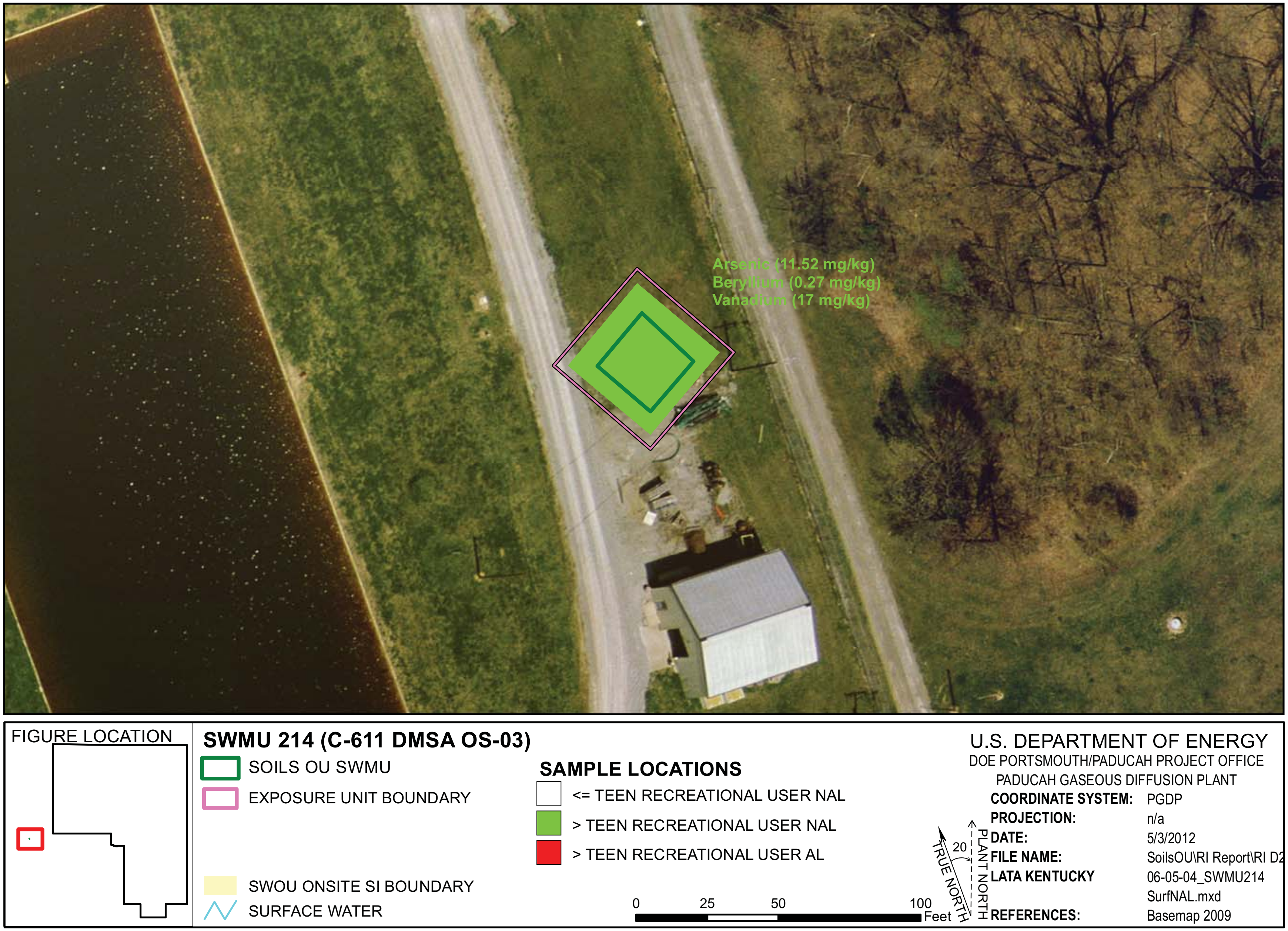


Figure 6.4.4. SWMU 214 NAL Exceedances - Surface Soil

The horizontal and vertical extent of SWMU 214 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 214 consists of one EU.

Metals

No metals were detected above both the background screening levels and the teen recreator NALs or the teen recreator ALs in the SWMU 214 surface soil samples.

The following metals were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater: antimony and molybdenum (no background value available), both in grid 1, EU1. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

There were no concentrations of PCBs above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 214 surface soil sample.

SVOCs

No SVOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 214 surface soil.

VOCs

No surface soil samples from SWMU 214 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the teen recreator NALs, teen recreator ALs or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 214 surface soil.

6.4.4 Nature and Extent of Contamination—Subsurface Soils

N/A (Table 6.4.2 denotes that no subsurface samples were taken.)

6.4.5 Fate and Transport

No target chemicals were identified for further evaluation of impacts to the RGA (Chapter 4). There is no concern for significant potential runoff from SWMU 214. There is no direct connection to surface water from SWMU 214, which is flat and grassy, so the possibility of migration is minimal due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

6.4.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 214 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

Table 6.4.2. Subsurface Soil RI Data Summary: SWMU 214 C-611 DMSA Outside-03

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range

There are no subsurface samples.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

The cumulative ELCR for SWMU 214 exceeds the cumulative ELCR benchmark of 1E-6 only for the outdoor worker exposed to surface and subsurface soil. The only COC for this scenario is arsenic. There were no identified COCs considered to contribute to the ELCR/HI for the outdoor worker exposed only to surface soil, the excavation worker, the hypothetical resident, or the teen recreational user. As stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

Ecological Screening. COPECs for SWMU 214 include metals; however, none had a maximum HQ ≥ 10 or greater. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 6.4.3.

Table 6.4.3 Ecological Screening for SWMU 214

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Mostly grassy/ some gravel	Yes	29	Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

6.4.7 SWMU 214 Summary

The following text summarizes the results for SWMU 214 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Plant processes that may have resulted in contamination at SWMU 214 are inadvertent releases of discharges of substances stored there.

COPCs for surface soils from SWMU 214 are shown on Table 6.4.1 (Table 6.4.2 denotes that no subsurface samples were taken) as those analytes with green boxes under the "Teen Recreator/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The investigation for SWMU 214 revealed that metals comprise the types of COPCs found in the surface. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants suspected of being present at SWMU 214 are readily bound onto soil particles; therefore, they do not migrate. There is no direct connection to surface water from SWMU 214, so the possibility of migration is further minimized. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for only the outdoor worker exposed to surface and subsurface soils. These COCs are listed in Appendix D, but are not discussed here because the scenario is unlikely for the SWMU. No other evaluated scenarios had identified COCs for SWMU 214. There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 214.

For SWMU 214, COPECs exceed ESVs. The priority COPEC (i.e., HQ ≥ 10) is the following:

- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 214 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 214 is near the C-611 Water Treatment Plant, but not adjacent to it. A response action at this SWMU would not impact any other integrator OUs.

6.4.8 SWMU 214 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 214; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for one scenario (DOE 2010a). The reasonably anticipated future land use for this SWMU is recreational use, as shown in the SMP (DOE 2012a).

6.5 SWMU 215, C-743, OS-04

6.5.1 Background

SWMU 215, which is the former location of DMSA OS-04, included a rail tank car located west of the C-743 Trailer Complex in the west-central portion of the plant site. The area of the DMSA was approximately 480 ft^2 (40 ft x 12 ft). The SWMU currently is empty, and the waste was dispositioned properly.

The history of this railcar could not be ascertained definitively. It likely was brought on-site to deliver an acid compound. Subsequent uses may have included water storage for firefighting, spill control (storage), and/or fire training. In August of 2005, as part of the DMSA Characterization and Remediation Project, the railcar was removed.

The railcar, valve, and ground beneath the rail car were surveyed for radiological contamination in April 1999. Results indicated contamination on some of the rock beneath the valve. In addition, results from sampling the liner of the railcar in February 2006 indicated uranium contamination. As part of the DMSA characterization, soil samples were collected based on the radiological survey of April and December 2002.

6.5.2 Fieldwork Summary

One grid sample for the surface only was planned and collected from this SWMU. Field laboratory results required contingency sampling to determine the nature and extent for concentrations of iron and zinc. Seventeen out of 17 contingency samples were collected.

The SWMU underwent a gamma radiological walkover survey (Figure 6.5.1) using a FIDLER; the 263 measurements ranged from 7,982 to 12,071 gross cpm. Gravel is the surface for this SWMU. A judgmental grab sample was collected for radiological constituents, although results were not over the project action limit.

6.5.3 Nature and Extent of Contamination—Surface Soils

For SWMU 215, the representative data set for surface soils is presented in Tables 6.5.1 and 6.5.2 and provides the nature of the contamination in SWMU 215 surface soils. Figures 6.5.2–6.5.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 215 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 215 consists of one EU.

<u>Metals</u>

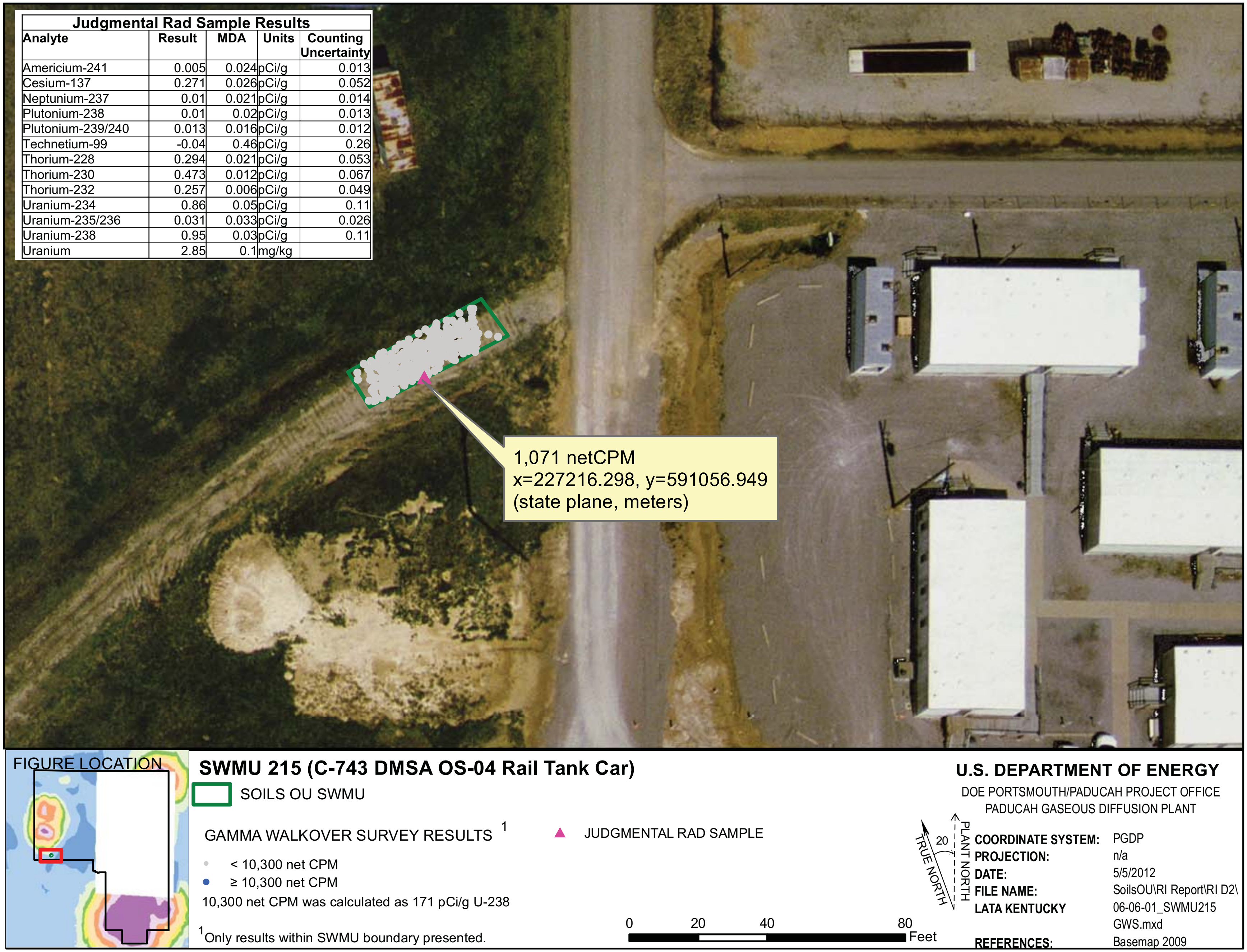
Metals were detected above the industrial worker NALs in the SWMU 215 surface soil. The following are the metals detected at or above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Chromium	1, 1A, 1G, 1H
Iron	1E
Nickel	1F

* SWMU 215 consists of one EU.

Grids 215A, 215G and 215H are not located within the administrative boundary of SWMU 215; instead, they are grids around the perimeter in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 215, as described in the Work Plan (DOE 2010a).

No metals were detected above the industrial worker ALs in the SWMU 215 surface soil.



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.005	0.024	pCi/g	0.013
Cesium-137	0.271	0.026	pCi/g	0.052
Neptunium-237	0.01	0.021	pCi/g	0.014
Plutonium-238	0.01	0.02	pCi/g	0.013
Plutonium-239/240	0.013	0.016	pCi/g	0.012
Technetium-99	-0.04	0.46	pCi/g	0.26
Thorium-228	0.294	0.021	pCi/g	0.053
Thorium-230	0.473	0.012	pCi/g	0.067
Thorium-232	0.257	0.006	pCi/g	0.049
Uranium-234	0.86	0.05	pCi/g	0.11
Uranium-235/236	0.031	0.033	pCi/g	0.026
Uranium-238	0.95	0.03	pCi/g	0.11
Uranium	2.85	0.1	mg/kg	

Figure 6.5.1. SWMU 215 Gamma Walkover Survey

Table 6.5.1. Surface Soil Historical Data Summary: SWMU 215 DMSA OS-04

Type	Analysis	Unit	Detected Results*			J-qualified	FOD	Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD		FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	

There is no surface data.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.5.2. Surface Soil RI Data Summary: SWMU 215 DMSA C-743 Outside-04

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	3.55E+03	4.37E+03	3.96E+03	0/2	2/2	0/2	1.30E+04	0/2	3.32E+04	0/2	3.97E+06	0/2	2/2	5.2 - 5.4
METAL	Antimony	mg/kg	2.80E-01	6.80E-01	4.80E-01	0/2	2/2	2/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	2/2	0.52 - 0.54
METAL	Arsenic	mg/kg	5.60E+00	8.30E+00	6.79E+00	0/11	7/11	0/11	1.20E+01	7/11	9.97E-01	0/11	9.97E+01	0/11	7/11	1 - 11
METAL	Barium	mg/kg	3.96E+01	6.19E+01	5.08E+01	0/2	2/2	0/2	2.00E+02	0/2	5.92E+02	0/2	3.78E+05	0/2	0/2	2.1 - 2.2
METAL	Beryllium	mg/kg	2.70E-01	3.10E-01	2.90E-01	0/2	2/2	0/2	6.70E-01	2/2	1.40E-02	0/2	9.22E+00	0/2	0/2	0.1 - 0.11
METAL	Cadmium	mg/kg	3.30E-01	3.90E-01	3.60E-01	0/2	2/2	2/2	2.10E-01	0/2	3.16E+00	0/2	3.16E+02	0/2	1/2	0.052 - 0.054
METAL	Calcium	mg/kg	1.31E+05	1.72E+05	1.52E+05	0/2	2/2	0/2	2.00E+05	0/2	n/a	0/2	n/a	n/a	n/a	270 - 525
METAL	Chromium	mg/kg	9.50E+00	5.73E+01	3.12E+01	0/11	6/11	4/11	1.60E+01	4/11	3.02E+01	0/11	3.02E+03	0/11	0/11	1 - 85
METAL	Cobalt	mg/kg	3.30E+00	5.10E+00	4.20E+00	0/2	2/2	0/2	1.40E+01	0/2	1.05E+01	0/2	1.52E+03	2/2	2/2	0.21 - 0.22
METAL	Copper	mg/kg	6.50E+00	2.40E+01	1.40E+01	0/11	3/11	1/11	1.90E+01	0/11	1.43E+03	0/11	2.24E+05	0/11	0/11	1 - 35
METAL	Iron	mg/kg	1.07E+04	3.87E+04	1.43E+04	0/11	11/11	1/11	2.80E+04	1/11	2.51E+04	0/11	3.92E+06	11/11	11/11	5.2 - 100
METAL	Lead	mg/kg	7.38E+00	1.96E+01	1.46E+01	0/11	11/11	0/11	3.60E+01	0/11	4.00E+02	0/11	4.00E+02	0/11	8/11	0.31 - 13
METAL	Magnesium	mg/kg	5.89E+03	9.95E+03	7.92E+03	0/2	2/2	1/2	7.70E+03	0/2	n/a	0/2	n/a	n/a	n/a	52.5 - 54
METAL	Manganese	mg/kg	1.35E+02	6.72E+02	3.79E+02	0/11	11/11	0/11	1.50E+03	0/11	2.58E+03	0/11	1.16E+05	11/11	11/11	0.21 - 85
METAL	Mercury	mg/kg	1.49E-02	2.83E-02	2.16E-02	0/11	2/11	0/11	2.00E-01	0/11	9.00E-01	0/11	7.85E+02	0/11	0/11	0.035 - 10
METAL	Molybdenum	mg/kg	6.70E-01	7.60E-01	7.15E-01	0/11	2/11	0/11	n/a	0/11	1.79E+02	0/11	2.80E+04	0/11	2/11	0.52 - 15
METAL	Nickel	mg/kg	8.80E+00	7.32E+01	2.23E+01	0/11	3/11	1/11	2.10E+01	1/11	4.28E+01	0/11	3.18E+04	0/11	3/11	0.52 - 65
METAL	Selenium	mg/kg	7.10E-01	9.20E-01	8.15E-01	0/11	2/11	1/11	8.00E-01	0/11	1.79E+02	0/11	2.80E+04	0/11	2/11	0.52 - 20
METAL	Silver	mg/kg	3.80E-02	6.40E-02	5.10E-02	0/11	2/11	0/11	2.30E+00	0/11	1.08E+01	0/11	9.15E+03	0/11	1/11	0.21 - 10
METAL	Sodium	mg/kg	1.30E+02	3.17E+02	2.24E+02	0/2	2/2	0/2	3.20E+02	0/2	n/a	0/2	n/a	n/a	n/a	21 - 21.6
METAL	Thallium	mg/kg	9.30E-02	2.10E-01	1.52E-01	0/2	2/2	0/2	2.10E-01	0/2	2.87E+00	0/2	4.48E+02	0/2	1/2	0.21 - 0.22
METAL	Uranium	mg/kg	1.20E+00	2.85E+00	1.95E+00	0/12	3/12	0/12	4.90E+00	0/12	1.07E+02	0/12	1.65E+04	0/12	0/12	0.04 - 20
METAL	Vanadium	mg/kg	1.37E+01	1.48E+01	1.43E+01	0/2	2/2	0/2	3.80E+01	2/2	1.51E-01	0/2	9.30E+01	2/2	2/2	1 - 1.1
METAL	Zinc	mg/kg	2.95E+01	5.73E+02	1.73E+02	0/11	11/11	4/11	6.50E+01	0/11	1.08E+04	0/11	1.68E+06	0/11	11/11	2.1 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.88E-01	0/3	1.88E+01	0/3	0/3	0.31 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.7 - 1.7
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.35 - 0.35
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.35 - 0.35
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Benzo(ghi)perylene	mg/kg	4.80E-02	4.80E-02	4.80E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.5.2. Surface Soil RI Data Summary: SWMU 215 DMSA C-743 Outside-04 (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0069 - 0.0069
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Fluoranthene	mg/kg	1.50E-01	1.50E-01	1.50E-01	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.35 - 0.35
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.35 - 0.35
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.35 - 0.35
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.69 - 0.69
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.35 - 0.35
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0069 - 0.0069
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.7 - 1.7
SVOA	Phenanthrene	mg/kg	8.50E-02	8.50E-02	8.50E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Pyrene	mg/kg	1.30E-01	1.30E-01	1.30E-01	1/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.35 - 0.35
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.69 - 0.69
SVOA	Total PAH	mg/kg	8.09E-02	8.09E-02	8.09E-02	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	1.54E+01	2.30E+01	1.92E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.7 - 5.6
RADS	Americium-241	pCi/g	5.00E-03	1.70E-02	1.10E-02	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.018 - 0.024
RADS	Beta activity	pCi/g	2.17E+01	3.02E+01	2.60E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	3.9 - 5.5
RADS	Cesium-137	pCi/g	2.40E-01	2.71E-01	2.56E-01	0/2	2/2	0/2	4.90E-01	2/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.017 - 0.026
RADS	Neptunium-237	pCi/g	6.00E-03	1.00E-02	8.00E-03	0/2	2/2	0/2	1.00E-01	0/2	2.71E-01	0/2	2.71E+01	0/2	2/2	0.015 - 0.021
RADS	Plutonium-238	pCi/g	6.20E-03	1.00E-02	8.10E-03	0/2	2/2	0/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.013 - 0.02
RADS	Plutonium-239/240	pCi/g	1.30E-02	2.90E-02	2.10E-02	1/2	2/2	1/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.006 - 0.016
RADS	Technetium-99	pCi/g	-4.00E-02	1.00E-02	-1.50E-02	0/2	2/2	0/2	2.50E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	0/2	0.46 - 0.49
RADS	Thorium-228	pCi/g	2.94E-01	4.13E-01	3.54E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.021 - 0.026
RADS	Thorium-230	pCi/g	4.73E-01	7.30E-01	6.02E-01	0/2	2/2	0/2	1.50E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.01 - 0.012
RADS	Thorium-232	pCi/g	2.57E-01	3.94E-01	3.26E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.008
RADS	Uranium-234	pCi/g	7.00E-01	8.60E-01	7.80E-01	0/2	2/2	0/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.02 - 0.05
RADS	Uranium-235/236	pCi/g	2.50E-02	3.10E-02	2.80E-02	1/2	2/2	0/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.019 - 0.033
RADS	Uranium-238	pCi/g	7.20E-01	9.50E-01	8.35E-01	0/2	2/2	0/2	1.20E+00	0/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.01 - 0.03

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

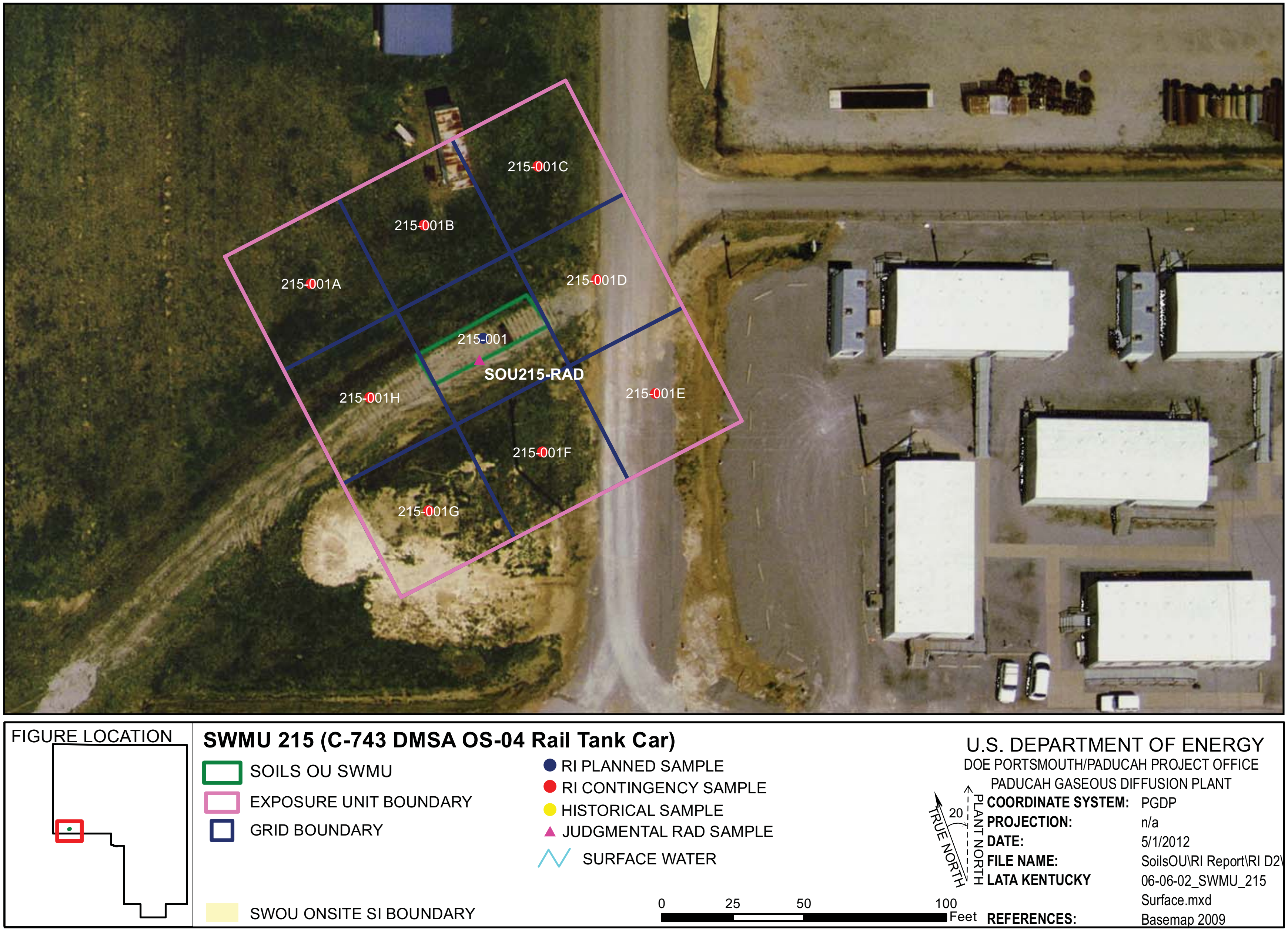


Figure 6.5.2. SWMU 215 Sample Locations - Surface Soil

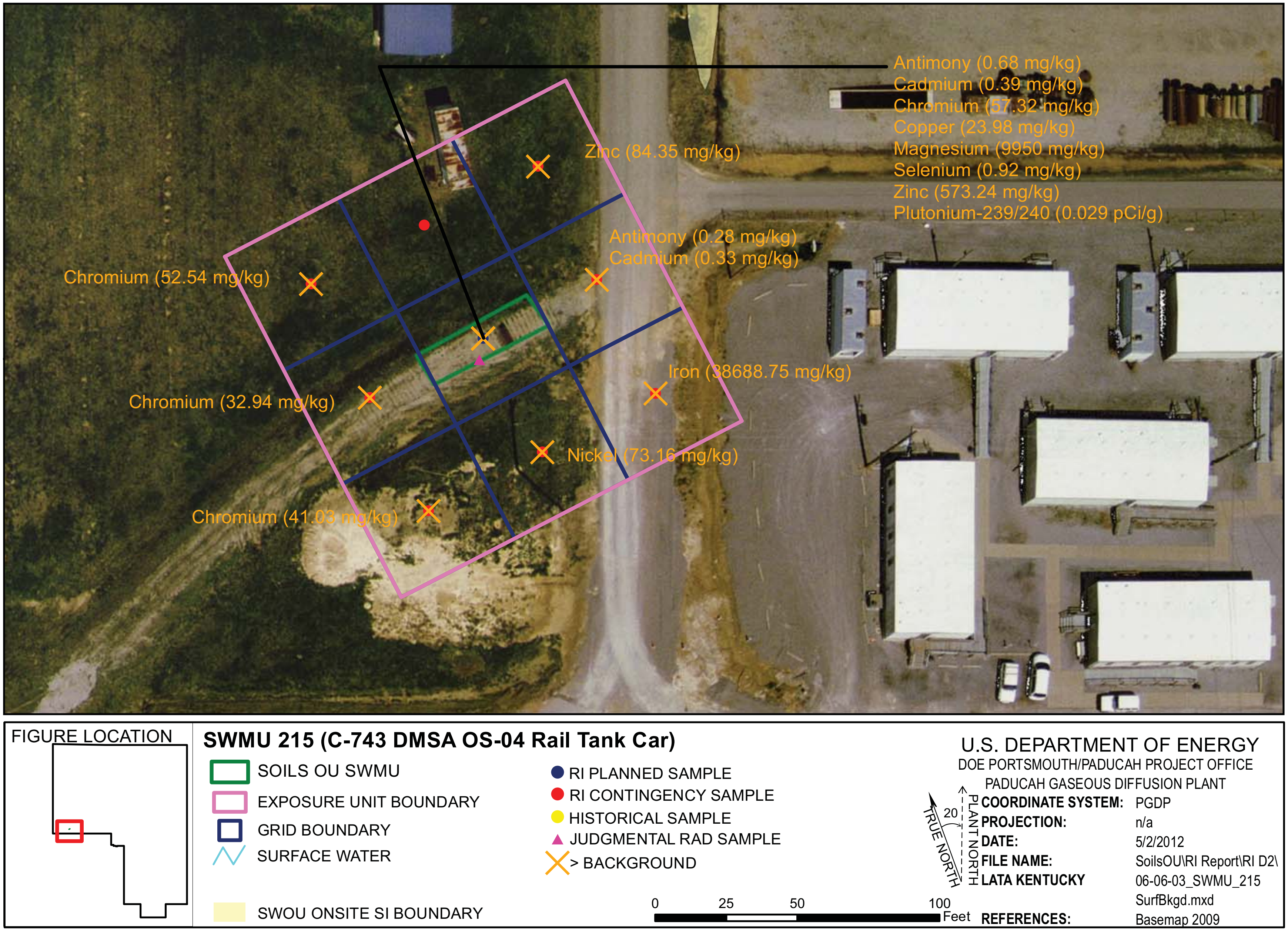


Figure 6.5.3. SWMU 215 Background Exceedances - Surface Soil

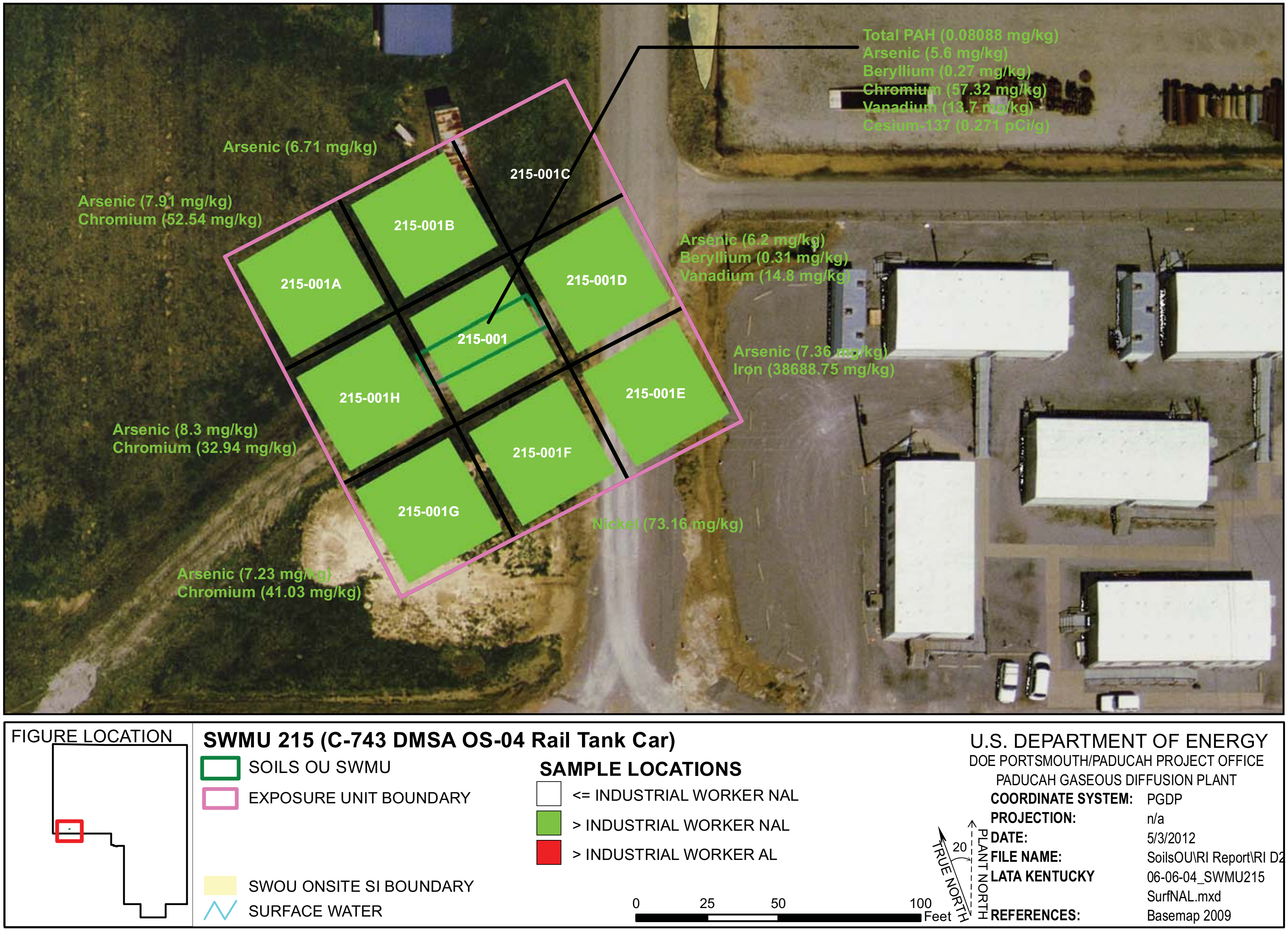


Figure 6.5.4. SWMU 215 NAL Exceedances - Surface Soil

The following are the metals detected in the SWMU 215 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	1, 1D
Cadmium	1
Iron	1
Molybdenum[1]	1, 1D
Nickel	1F
Selenium	1
Zinc	1, 1C

* SWMU 215 consists of one EU.
[1] No background value is available.

Iron in grid 1E was detected above both the background screening level and the SSL for the protection of RGA groundwater.

PCBs

There were no PCBs detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 215 surface soil samples.

SVOCs

Total PAHs were detected above the industrial worker NALs in grid 1 of the SWMU 215 surface soil. No SVOCs were detected above the industrial worker ALs.

Total PAHs were detected above the SSLs for the protection of UCRS groundwater in grid 1. No SVOCs were detected above the SSLs for the protection of RGA groundwater in the SWMU 215 surface soil.

VOCs

There are no VOC data available for SWMU 215.

Radionuclides

No radionuclides were detected above both the background screening levels and the industrial worker NALs, the industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 215 surface soil.

6.5.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 215 the representative data set for subsurface soils is presented in Tables 6.5.3 and 6.5.4 and provides the nature of the contamination in SWMU 215 subsurface soils. Figures 6.5.5–6.5.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 215 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 215 consists of one EU.

Table 6.5.3. Subsurface Soil Historical Data Summary: SWMU 215 DMSA OS-04

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	1.88E-01	0/10	1.88E+01	0/10	0/10	0.1 - 0.1
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.46 - 0.5
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.46 - 0.5
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.46 - 0.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	1.30E+00	0/10	3.91E+01	0/10	0/10	0.46 - 0.5
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	6.02E+02	0/10	1.81E+04	0/10	0/10	0.46 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	4.05E+03	0/10	1.22E+05	0/10	0/10	0.46 - 0.5
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.46 - 0.5
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	2.75E+01	0/10	2.75E+03	n/a	n/a	0.46 - 0.5
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Di-n-butyl phthalate	mg/kg	5.20E-01	9.90E-01	7.38E-01	0/10	5/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Fluoranthene	mg/kg	6.00E-01	6.00E-01	6.00E-01	0/10	1/10	0/10	n/a	0/10	6.01E+02	0/10	1.80E+04	0/10	0/10	0.46 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	4.87E+02	0/10	1.46E+04	0/10	0/10	0.46 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	1.17E-01	0/10	1.17E+01	0/10	0/10	0.46 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	2.24E+00	0/10	2.24E+02	0/10	0/10	0.46 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	5.22E-02	0/10	5.22E+00	0/10	0/10	0.46 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.5.3. Subsurface Soil Historical Data Summary: SWMU 215 DMSA OS-04 (Continued)

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.46 - 0.5
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pyrene	mg/kg	5.80E-01	5.80E-01	5.80E-01	0/10	1/10	0/10	n/a	0/10	4.49E+02	0/10	1.35E+04	0/10	0/10	0.46 - 0.5
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Total PAH	mg/kg	4.60E-02	5.00E-01	4.37E-01	0/10	10/10	0/10	n/a	9/10	5.92E-02	0/10	5.92E+00	9/10	10/10	-

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.5.4. Subsurface Soil RI Data Summary: SWMU 215 DMSA C-743 Outside-04

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	7.81E+03	7.81E+03	7.81E+03	0/1	1/1	0/1	1.20E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.4 - 5.4
METAL	Antimony	mg/kg	3.00E-01	3.00E-01	3.00E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.54 - 0.54
METAL	Arsenic	mg/kg	5.97E+00	1.02E+01	7.46E+00	0/10	7/10	1/10	7.90E+00	7/10	9.97E-01	0/10	9.97E+01	0/10	7/10	1.1 - 11
METAL	Barium	mg/kg	9.06E+01	9.06E+01	9.06E+01	0/1	1/1	0/1	1.70E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.2 - 2.2
METAL	Beryllium	mg/kg	4.30E-01	4.30E-01	4.30E-01	0/1	1/1	0/1	6.90E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.11 - 0.11
METAL	Cadmium	mg/kg	5.20E-02	5.20E-02	5.20E-02	0/1	1/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.054 - 0.054
METAL	Calcium	mg/kg	1.75E+04	1.75E+04	1.75E+04	0/1	1/1	1/1	6.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	54.2 - 54.2
METAL	Chromium	mg/kg	1.38E+01	5.42E+01	3.30E+01	0/10	4/10	2/10	4.30E+01	3/10	3.02E+01	0/10	3.02E+03	0/10	0/10	1.1 - 85
METAL	Cobalt	mg/kg	6.80E+00	6.80E+00	6.80E+00	0/1	1/1	0/1	1.30E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.22 - 0.22
METAL	Copper	mg/kg	2.36E+01	2.36E+01	2.36E+01	0/10	1/10	0/10	2.50E+01	0/10	1.43E+03	0/10	2.24E+05	0/10	0/10	1.1 - 35
METAL	Iron	mg/kg	9.12E+03	1.41E+04	1.25E+04	0/10	10/10	0/10	2.80E+04	0/10	2.51E+04	0/10	3.92E+06	10/10	10/10	5.4 - 100
METAL	Lead	mg/kg	7.22E+00	1.86E+01	1.31E+01	0/10	10/10	0/10	2.30E+01	0/10	4.00E+02	0/10	4.00E+02	0/10	4/10	0.33 - 13
METAL	Magnesium	mg/kg	1.75E+03	1.75E+03	1.75E+03	0/1	1/1	0/1	2.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	54.2 - 54.2
METAL	Manganese	mg/kg	1.53E+02	6.00E+02	3.63E+02	0/10	10/10	0/10	8.20E+02	0/10	2.58E+03	0/10	1.16E+05	10/10	10/10	0.22 - 85
METAL	Mercury	mg/kg	2.22E-02	2.22E-02	2.22E-02	0/10	1/10	0/10	1.30E-01	0/10	9.00E-01	0/10	7.85E+02	0/10	0/10	0.0361 - 10
METAL	Molybdenum	mg/kg	1.00E+00	1.00E+00	1.00E+00	0/10	1/10	0/10	n/a	0/10	1.79E+02	0/10	2.80E+04	0/10	1/10	0.54 - 15
METAL	Nickel	mg/kg	9.90E+00	6.24E+01	2.74E+01	0/10	2/10	1/10	2.20E+01	1/10	4.28E+01	0/10	3.18E+04	0/10	2/10	0.54 - 65
METAL	Selenium	mg/kg	1.10E+00	1.10E+00	1.10E+00	0/10	1/10	1/10	7.00E-01	0/10	1.79E+02	0/10	2.80E+04	0/10	1/10	0.54 - 20
METAL	Silver	mg/kg	2.90E-02	9.51E+00	3.19E+00	0/10	2/10	1/10	2.70E+00	0/10	1.08E+01	0/10	9.15E+03	1/10	1/10	0.22 - 10
METAL	Sodium	mg/kg	5.75E+01	5.75E+01	5.75E+01	0/1	1/1	0/1	3.40E+02	0/1	n/a	0/1	n/a	n/a	n/a	21.7 - 21.7
METAL	Thallium	mg/kg	1.50E-01	1.50E-01	1.50E-01	0/1	1/1	0/1	3.40E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.22 - 0.22
METAL	Uranium	mg/kg	1.20E+00	1.20E+00	1.20E+00	0/10	1/10	0/10	4.60E+00	0/10	1.07E+02	0/10	1.65E+04	0/10	0/10	0.11 - 20
METAL	Vanadium	mg/kg	2.05E+01	2.05E+01	2.05E+01	0/1	1/1	0/1	3.70E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	2.09E+01	8.56E+01	4.05E+01	0/10	10/10	1/10	6.00E+01	0/10	1.08E+04	0/10	1.68E+06	0/10	10/10	2.2 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.88E-01	0/2	1.88E+01	0/2	0/2	5 - 5

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

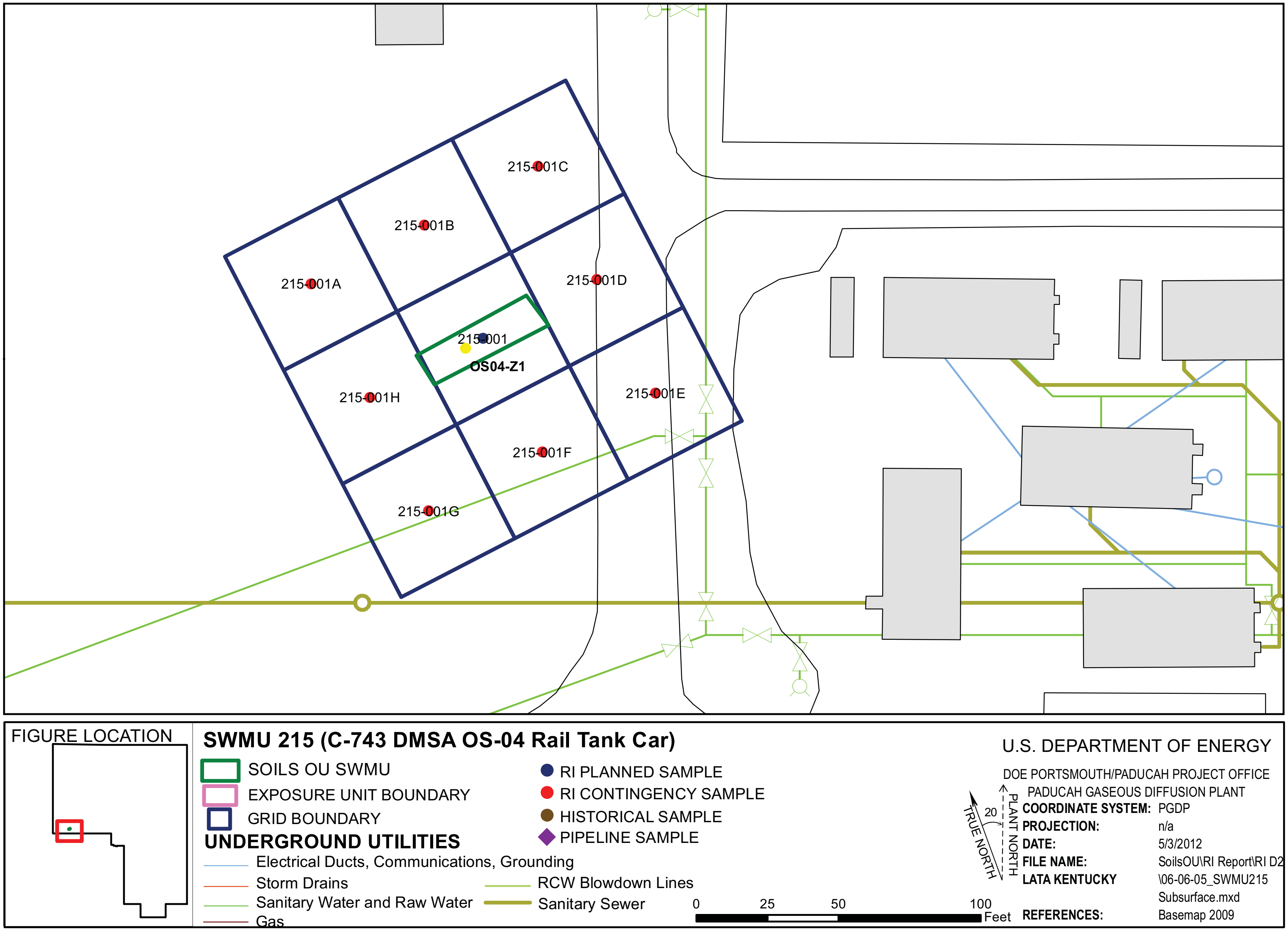


Figure 6.5.5. SWMU 215 Sample Locations - Subsurface Soil

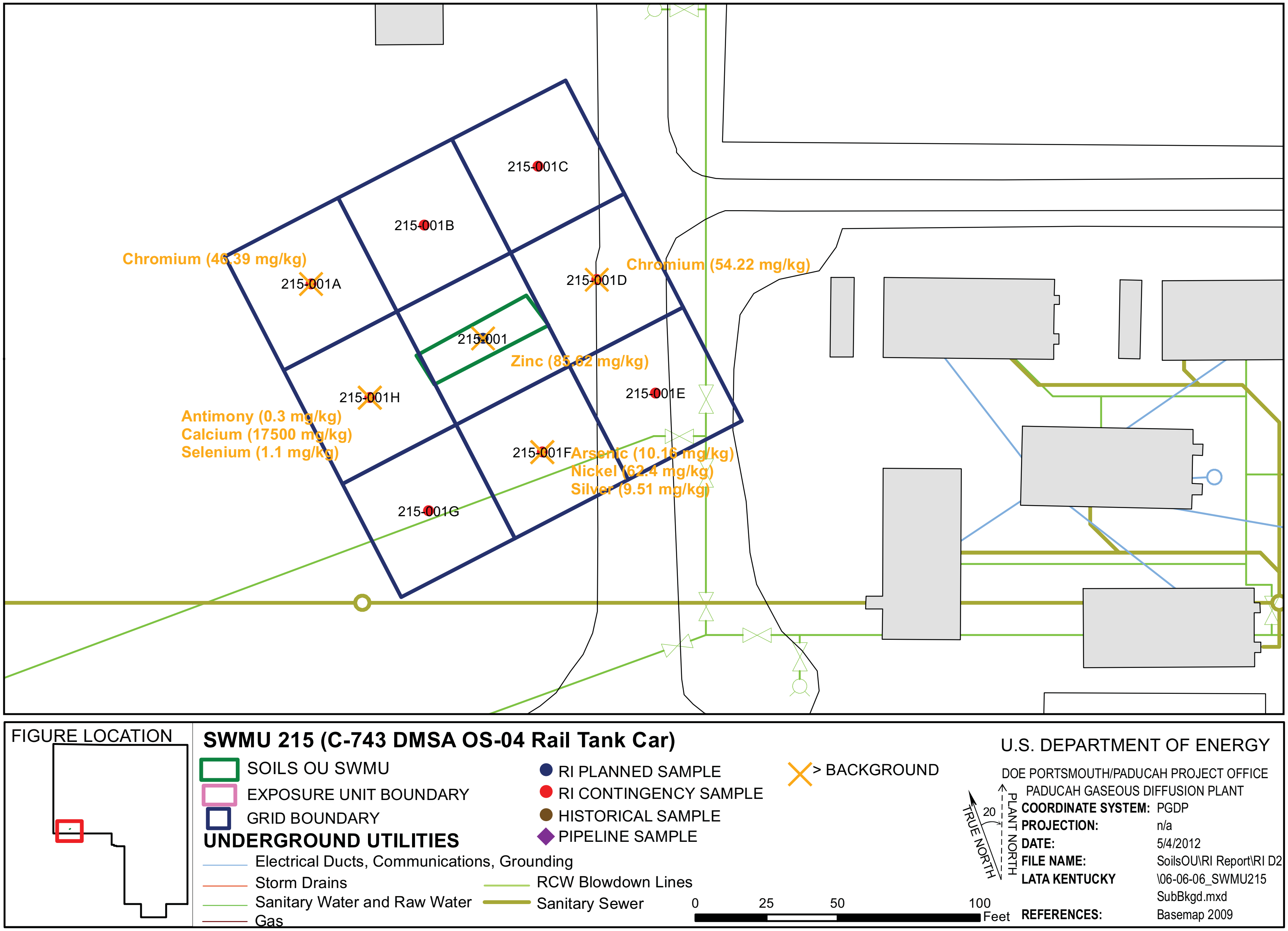


Figure 6.5.6. SWMU 215 Background Exceedances - Subsurface Soil

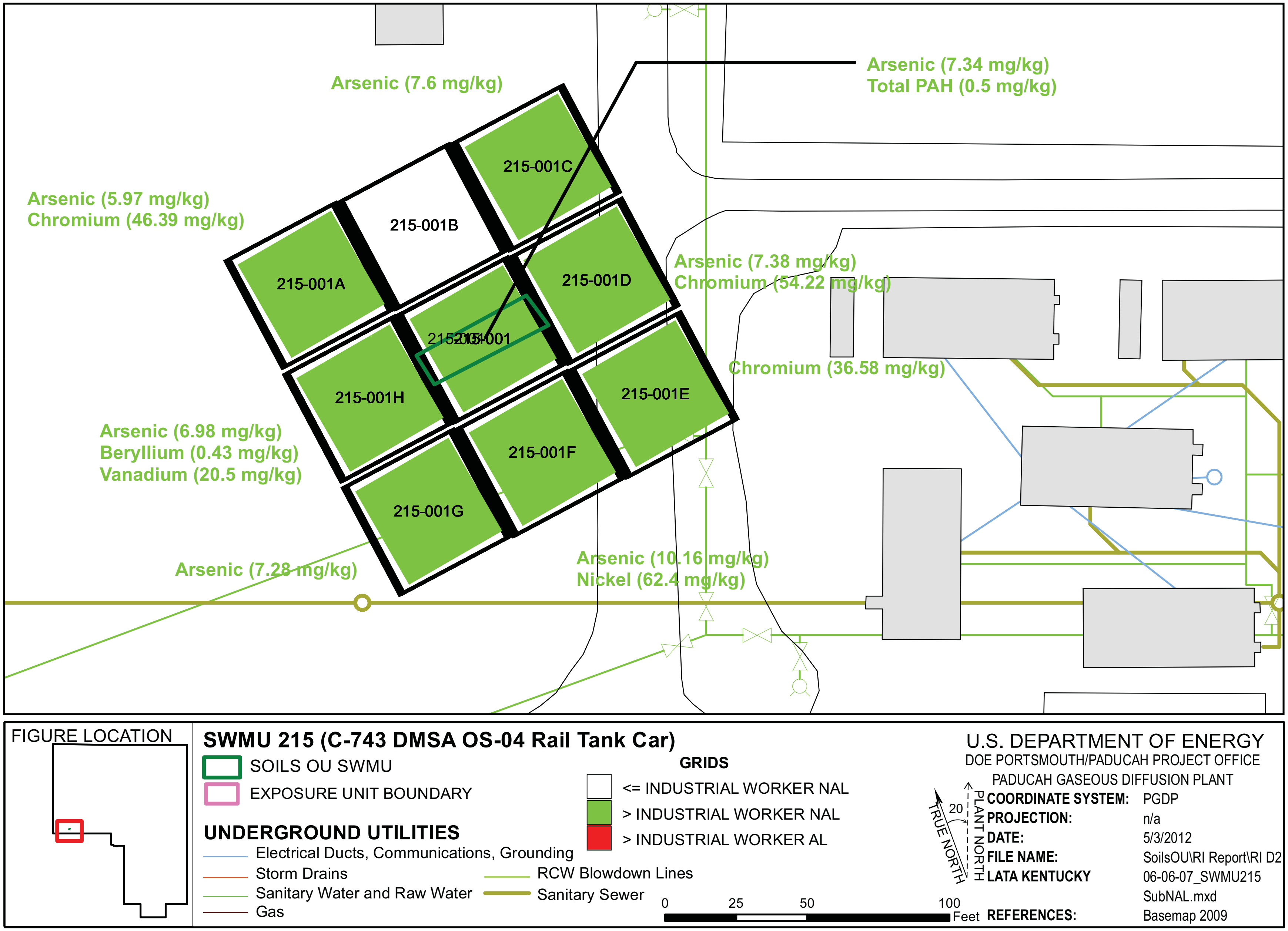


Figure 6.5.7. SWMU 215 NAL Exceedances - Subsurface Soil

Metals

Metals were detected above the industrial worker NAL in the SWMU 215 subsurface soil. The following are the metals detected at or above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Arsenic	1F
Chromium	1A, 1D
Nickel	1F

* SWMU 215 consists of one EU.

Grid 1A is on the northwest portion of the perimeter grid of SWMU 215, grid 1D is on the eastern border of SWMU 215, and 1F is on the southern border of SWMU 215.

The maximum depth at which metals were detected at or above both background screening levels and the industrial worker NALs was at 4 ft bgs, which also was the end depth of each borehole.

No metals were detected above the industrial worker ALs in the SWMU 215 subsurface soil.

The following are the metals detected in the SWMU 215 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	1H
Arsenic	1F
Molybdenum[1]	1H
Nickel	1F
Selenium	1H
Silver	1F
Zinc	1

* SWMU 215 consists of one EU.
[1]No background value is available.

Silver in grid 1F was detected above both the background screening level and the SSL for the protection of RGA groundwater.

PCBs

PCBs were not detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU subsurface soil.

SVOCs

Of the SVOCs, Total PAHs were detected above the industrial worker NAL in grid 1 at a maximum depth of 2 ft. Total PAHs were detected above the SSLs for the protection of UCRS and RGA groundwater in grid 1 of SWMU 215 subsurface soils.

No SVOCs were detected above the industrial worker NALs in the SWMU 215 subsurface soil.

VOCs

No subsurface soil samples from SWMU 215 were analyzed for VOCs.

Radionuclides

No subsurface soil samples from SWMU 215 were analyzed for radionuclides.

6.5.5 Fate and Transport

No target chemicals were identified for further evaluation of impacts to the RGA (Chapter 4). There is no concern for significant potential runoff from SWMU 215. Contaminants present at this SWMU are unlikely to migrate due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow, and there is no direct connection to surface water from this SWMU. There are no known underground pipelines at this SWMU. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

6.5.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 215 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 215 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 6.5.5 for the future industrial worker and the hypothetical resident. The excavation worker did not have any identified COCs. Table 6.5.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Table 6.5.5. RGOs for SWMU 215

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	**COC**	**EPC[1]**	**Units**	**ELCR[2]**	**1 x 10^{-6}**	**1 x 10^{-5}**	**1 x 10^{-4}**	**HI[4]**	**0.1**	**1**	**3**
Future Industrial Worker											
1	Chromium	5.73E+01	mg/kg	1.9E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Total PAH	8.09E-02	mg/kg	1.4E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Cumulative			**3.3E-06**				**< 1**			
Hypothetical Resident[5]											
1	Total PAH	8.09E-02	mg/kg	4.2E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Chromium	5.73E+01	mg/kg	3.7E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**7.8E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.25, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.25, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Ecological Screening. COPECs for SWMU 215 include metals. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 6.5.6.

Table 6.5.6. Ecological Screening for SWMU 215

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Gravel	No	46	Selenium	8.00E-01	1.00E+01	5.20E-01	19
			Zinc	6.50E+01	5.73E+02	4.60E+01	12

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

6.5.7 SWMU 215 Summary

The following text summarizes the results for SWMU 215 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Plant processes that could have contributed to contamination at SWMU 215 are releases from loading and unloading the railcar that was located there in the past.

COPCs for surface and subsurface soils from SWMU 215 are shown on Tables 6.5.1–6.5.4 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The investigation for SWMU 215 revealed that metals and SVOCs comprise the types of COPCs found there in the surface and subsurface soils. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

Contaminants present at this SWMU are unlikely to migrate. They are bound onto soil particles and there is no direct connection to surface water from this SWMU. There are no known underground pipelines at this SWMU. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 215.

- Future Industrial Worker

  — Chromium
  — Total PAHs

- Excavation worker

  — None

- Hypothetical Resident (hazards evaluated against the child resident)

  — Chromium
  — Total PAHs

Of the above, there are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 215. There are no priority COCs for other scenarios.

For SWMU 215, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Selenium
- Zinc

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 215 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. This SWMU is isolated; there would be no physical or cultural limitations to a response action at this location. An action at this site would not impact other integrator OUs.

6.5.8 SWMU 215 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 215; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial land use as shown in the SMP (DOE 2012a).

6.6 SWMU 216, C-206, OS-05

6.6.1 Background

SWMU 216 is located north of C-206 in the west central portion of the plant site at the location formerly known as DMSA OS-05. SWMU 216 is approximately 7,000 ft^2. There is no direct connection from the SWMU to surface water.

This area was controlled by fire services and used to store excess material and supplies, primarily fire extinguishers. The date that this area began to be used as a storage area for fire extinguishers is unknown; however, in 1997 or 1998, the majority of the fire extinguishers were placed in a covered metal bin located next to the roped portion of the DMSA.

Additional material stored within SWMU 216 included a motor, pallets, three 5-gal containers, three 55-gal drums (one labeled “metal-C-310”), wheels, and miscellaneous scrap metal and equipment. All RCRA-regulated items and other waste have been dispositioned properly (DOE 2002d).

No evidence of a release was found and process knowledge indicates none has occurred. Vegetation in the area is flourishing. A certified RCRA Closure Report was approved by Kentucky on February 13, 2007, for this DMSA. KDWM "determined that the characterization, removal and disposal of hazardous waste meets the applicable requirements of the approved Agreed Order Closure Plan for DMSAs, dated December 23, 2005" (Webb 2007). The Closure Report documented that no sign of spill or release was found. There have been no known spills or releases of materials from this SWMU to the environment.

6.6.2 Fieldwork Summary

One grid sample for the surface only was planned and collected at this SWMU. Contingency samples were not required.

The SWMU underwent a gamma radiological walkover survey (Figure 6.6.1) using a FIDLER; the 371 measurements ranged from 19,063 to 45,792 gross cpm. The cover for this SWMU is soil and grass. It is adjacent to a rail spur. The influence of background radiation from nearby cylinders does not allow a reliable determination for areas of contamination at the project action limit. A judgmental grab sample was collected for radiological constituents.

6.6.3 Nature and Extent of Contamination—Surface Soils

For SWMU 216, the representative data set for surface soils is presented in Tables 6.6.1 and 6.6.2 and provides the nature of the contamination in SWMU 216 surface soils. Figures 6.6.2–6.6.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 216 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 216 consists of one EU.

Metals

No metals were detected at or above both the background screening levels and industrial worker NALs or the industrial worker ALs in the SWMU 216 surface soil sample.

The following are the metals detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

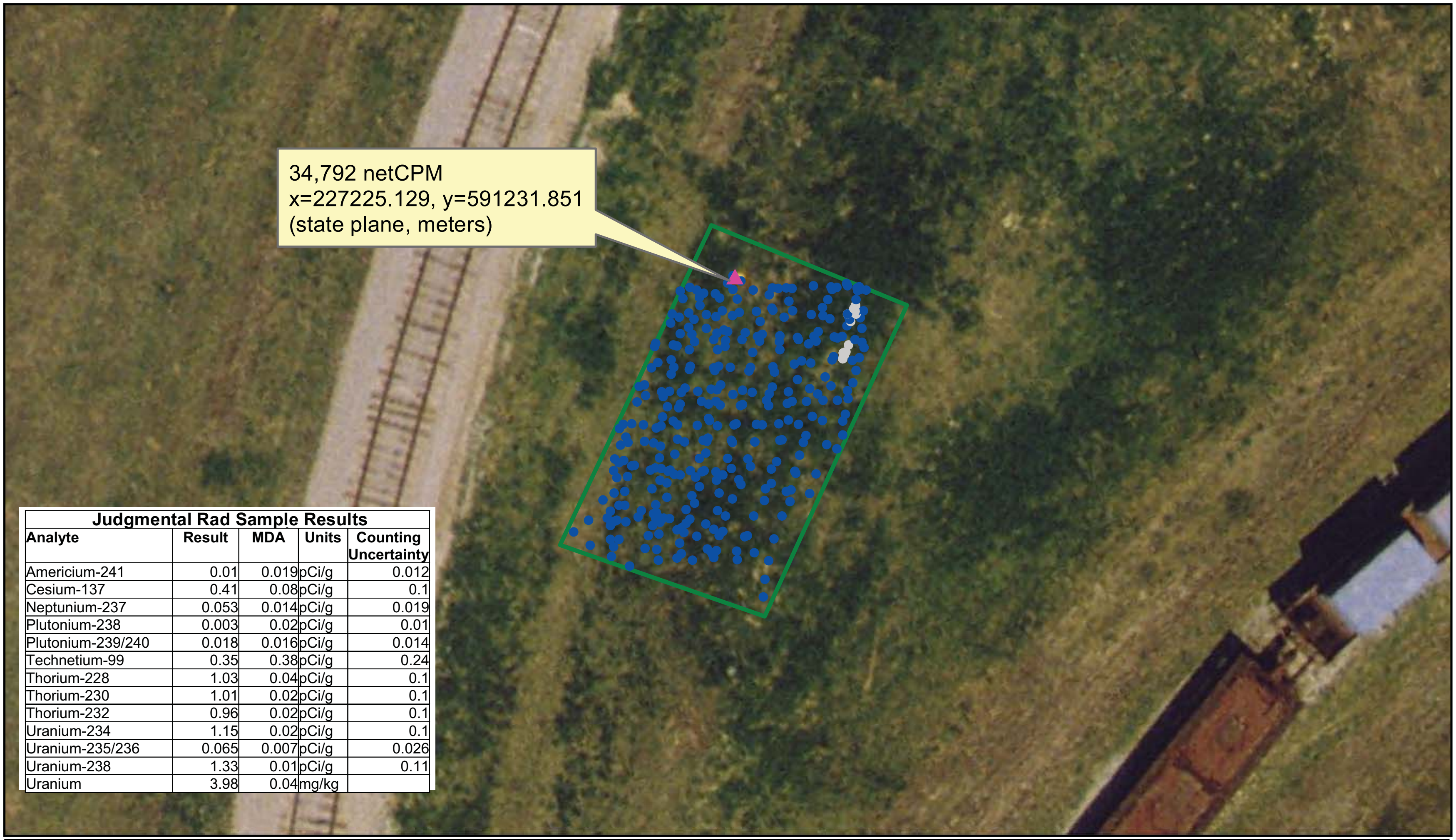
Metal	Grid
Antimony	1
Cadmium	1
Molybdenum[1]	1
Selenium	1

* SWMU 216 consists of one EU.
[1]No background value is available.

No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

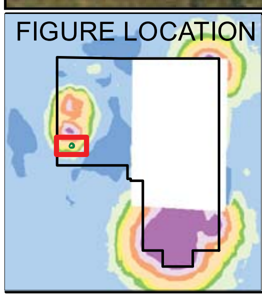
PCBs were not detected above industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater.



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.01	0.019	pCi/g	0.012
Cesium-137	0.41	0.08	pCi/g	0.1
Neptunium-237	0.053	0.014	pCi/g	0.019
Plutonium-238	0.003	0.02	pCi/g	0.01
Plutonium-239/240	0.018	0.016	pCi/g	0.014
Technetium-99	0.35	0.38	pCi/g	0.24
Thorium-228	1.03	0.04	pCi/g	0.1
Thorium-230	1.01	0.02	pCi/g	0.1
Thorium-232	0.96	0.02	pCi/g	0.1
Uranium-234	1.15	0.02	pCi/g	0.1
Uranium-235/236	0.065	0.007	pCi/g	0.026
Uranium-238	1.33	0.01	pCi/g	0.11
Uranium	3.98	0.04	mg/kg	

FIGURE LOCATION



SWMU 216 (C-206 DMSA OS-05)

SOILS OU SWMU

GAMMA WALKOVER SURVEY RESULTS [1]

< 10,300 net CPM

≥ 10,300 net CPM

10,300 net CPM was calculated as 171 pCi/g U-238

[1]Only results within SWMU boundary presented.

JUDGMENTAL RAD SAMPLE

0 10 20 40 Feet

TRUE NORTH 20 PLANT NORTH

U.S. DEPARTMENT OF ENERGY

DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

COORDINATE SYSTEM:	PGDP
PROJECTION:	n/a
DATE:	5/5/2012
FILE NAME:	SoilsOU\RI Report\RI D2\
LATA KENTUCKY	06-07-01_SWMU216 GWS.mxd
REFERENCES:	Basemap 2009

Figure 6.6.1. SWMU 216 Gamma Walkover Survey

Table 6.6.1. Surface Soil Historical Data Summary: SWMU 216 DMSA OS-05

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.88E-01	0/1	1.88E+01	0/1	0/1	0.13 - 0.13

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.6.2. Surface Soil RI Data Summary: SWMU 216 C-206 DMSA Outside-05

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	7.26E+03	7.26E+03	7.26E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.7 - 5.7
METAL	Antimony	mg/kg	3.40E-01	3.40E-01	3.40E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.57 - 0.57
METAL	Arsenic	mg/kg	8.60E+00	8.60E+00	8.60E+00	0/1	1/1	0/1	1.20E+01	1/1	9.97E-01	0/1	9.97E+01	0/1	1/1	1.1 - 11
METAL	Barium	mg/kg	7.93E+01	7.93E+01	7.93E+01	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	0/1	2.3 - 2.3
METAL	Beryllium	mg/kg	5.00E-01	5.00E-01	5.00E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.11 - 0.11
METAL	Cadmium	mg/kg	4.20E-01	4.20E-01	4.20E-01	0/1	1/1	1/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	1/1	0.057 - 0.057
METAL	Calcium	mg/kg	9.66E+03	9.66E+03	9.66E+03	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	57.5 - 57.5
METAL	Chromium	mg/kg	2.38E+01	2.38E+01	2.38E+01	0/1	1/1	1/1	1.60E+01	0/1	3.02E+01	0/1	3.02E+03	0/1	0/1	1.1 - 85
METAL	Cobalt	mg/kg	6.00E+00	6.00E+00	6.00E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.23 - 0.23
METAL	Copper	mg/kg	9.00E+00	9.00E+00	9.00E+00	0/1	1/1	0/1	1.90E+01	0/1	1.43E+03	0/1	2.24E+05	0/1	0/1	1.1 - 35
METAL	Iron	mg/kg	1.55E+04	1.55E+04	1.55E+04	0/1	1/1	0/1	2.80E+04	0/1	2.51E+04	0/1	3.92E+06	1/1	1/1	5.7 - 100
METAL	Lead	mg/kg	1.78E+01	1.78E+01	1.78E+01	0/1	1/1	0/1	3.60E+01	0/1	4.00E+02	0/1	4.00E+02	0/1	1/1	0.34 - 13
METAL	Magnesium	mg/kg	4.01E+03	4.01E+03	4.01E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	57.5 - 57.5
METAL	Manganese	mg/kg	6.64E+02	6.64E+02	6.64E+02	0/1	1/1	0/1	1.50E+03	0/1	2.58E+03	0/1	1.16E+05	1/1	1/1	0.23 - 85
METAL	Mercury	mg/kg	3.49E-02	3.49E-02	3.49E-02	0/1	1/1	0/1	2.00E-01	0/1	9.00E-01	0/1	7.85E+02	0/1	0/1	0.0383 - 10
METAL	Molybdenum	mg/kg	7.10E-01	7.10E-01	7.10E-01	0/1	1/1	0/1	n/a	0/1	1.79E+02	0/1	2.80E+04	0/1	1/1	0.57 - 15
METAL	Nickel	mg/kg	8.80E+00	8.80E+00	8.80E+00	0/1	1/1	0/1	2.10E+01	0/1	4.28E+01	0/1	3.18E+04	0/1	1/1	0.57 - 65
METAL	Selenium	mg/kg	1.30E+00	1.30E+00	1.30E+00	0/1	1/1	1/1	8.00E-01	0/1	1.79E+02	0/1	2.80E+04	0/1	1/1	0.57 - 20
METAL	Silver	mg/kg	3.40E-02	3.40E-02	3.40E-02	0/1	1/1	0/1	2.30E+00	0/1	1.08E+01	0/1	9.15E+03	0/1	0/1	0.23 - 10
METAL	Sodium	mg/kg	3.97E+01	3.97E+01	3.97E+01	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	23 - 23
METAL	Thallium	mg/kg	2.10E-01	2.10E-01	2.10E-01	0/1	1/1	0/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.23 - 0.23
METAL	Uranium	mg/kg	3.98E+00	8.43E+00	7.32E+00	0/2	2/2	1/2	4.90E+00	0/2	1.07E+02	0/2	1.65E+04	0/2	0/2	0.02 - 20
METAL	Vanadium	mg/kg	2.66E+01	2.66E+01	2.66E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	3.30E+01	3.30E+01	3.30E+01	0/1	1/1	0/1	6.50E+01	0/1	1.08E+04	0/1	1.68E+06	0/1	1/1	2.3 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.88E-01	0/1	1.88E+01	0/1	0/1	0.34 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.8 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.38 - 0.38
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.38 - 0.38
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Benzo(ghi)perylene	mg/kg	8.90E-02	8.90E-02	8.90E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.6.2. Surface Soil RI Data Summary: SWMU 216 C-206 DMSA Outside-05 (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0076 - 0.0076
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Fluoranthene	mg/kg	1.30E-01	1.30E-01	1.30E-01	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.38 - 0.38
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.76 - 0.76
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.38 - 0.38
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0076 - 0.0076
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.8 - 1.8
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Phenol	mg/kg	1.30E-01	1.30E-01	1.30E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Pyrene	mg/kg	1.20E-01	1.20E-01	1.20E-01	1/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.38 - 0.38
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.76 - 0.76
SVOA	Total PAH	mg/kg	1.49E-01	1.49E-01	1.49E-01	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	2.63E+01	3.94E+01	3.29E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.7 - 5.8
RADS	Americium-241	pCi/g	1.00E-02	1.60E-02	1.30E-02	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.019 - 0.021
RADS	Beta activity	pCi/g	2.78E+01	3.24E+01	3.01E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	3.2 - 6.6
RADS	Cesium-137	pCi/g	1.94E-01	4.10E-01	3.02E-01	0/2	2/2	0/2	4.90E-01	2/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.08 - 0.11
RADS	Neptunium-237	pCi/g	1.00E-02	5.30E-02	3.15E-02	0/2	2/2	0/2	1.00E-01	0/2	2.71E-01	0/2	2.71E+01	0/2	2/2	0.014 - 0.014
RADS	Plutonium-238	pCi/g	3.00E-03	6.00E-03	4.50E-03	0/2	2/2	0/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.02 - 0.033
RADS	Plutonium-239/240	pCi/g	2.90E-03	1.80E-02	1.05E-02	0/2	2/2	0/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.015 - 0.016
RADS	Technetium-99	pCi/g	1.80E-01	3.50E-01	2.65E-01	0/2	2/2	0/2	2.50E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	0/2	0.38 - 0.43
RADS	Thorium-228	pCi/g	9.40E-01	1.03E+00	9.85E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.02 - 0.04
RADS	Thorium-230	pCi/g	9.90E-01	1.01E+00	1.00E+00	0/2	2/2	0/2	1.50E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.02 - 0.02
RADS	Thorium-232	pCi/g	9.60E-01	9.60E-01	9.60E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.02
RADS	Uranium-234	pCi/g	8.80E-01	1.15E+00	1.02E+00	0/2	2/2	0/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	5.00E-02	6.50E-02	5.75E-02	0/2	2/2	1/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.007 - 0.017
RADS	Uranium-238	pCi/g	1.01E+00	1.33E+00	1.17E+00	0/2	2/2	1/2	1.20E+00	0/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.007 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

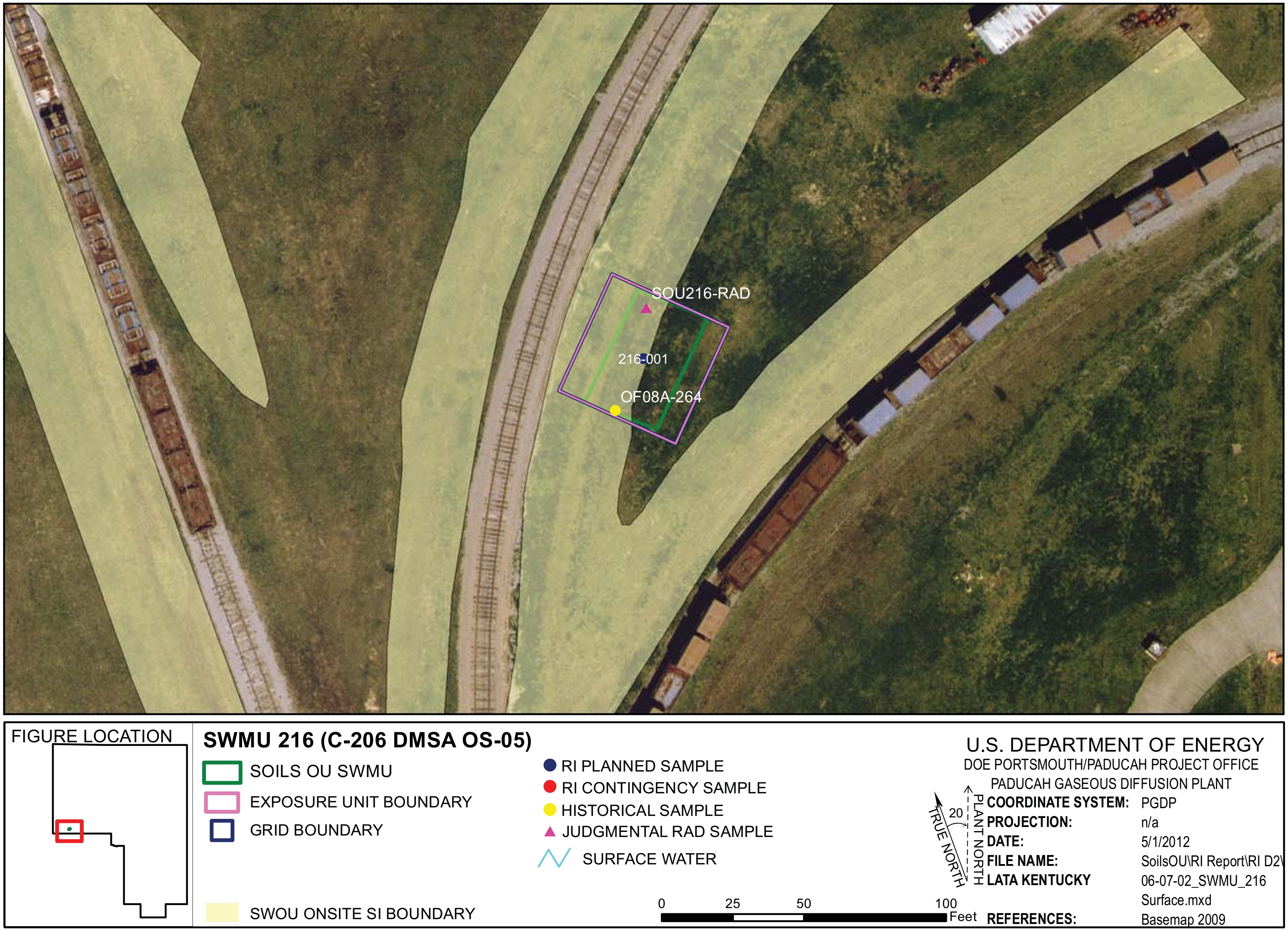


Figure 6.6.2. SWMU 216 Sample Locations - Surface Soil

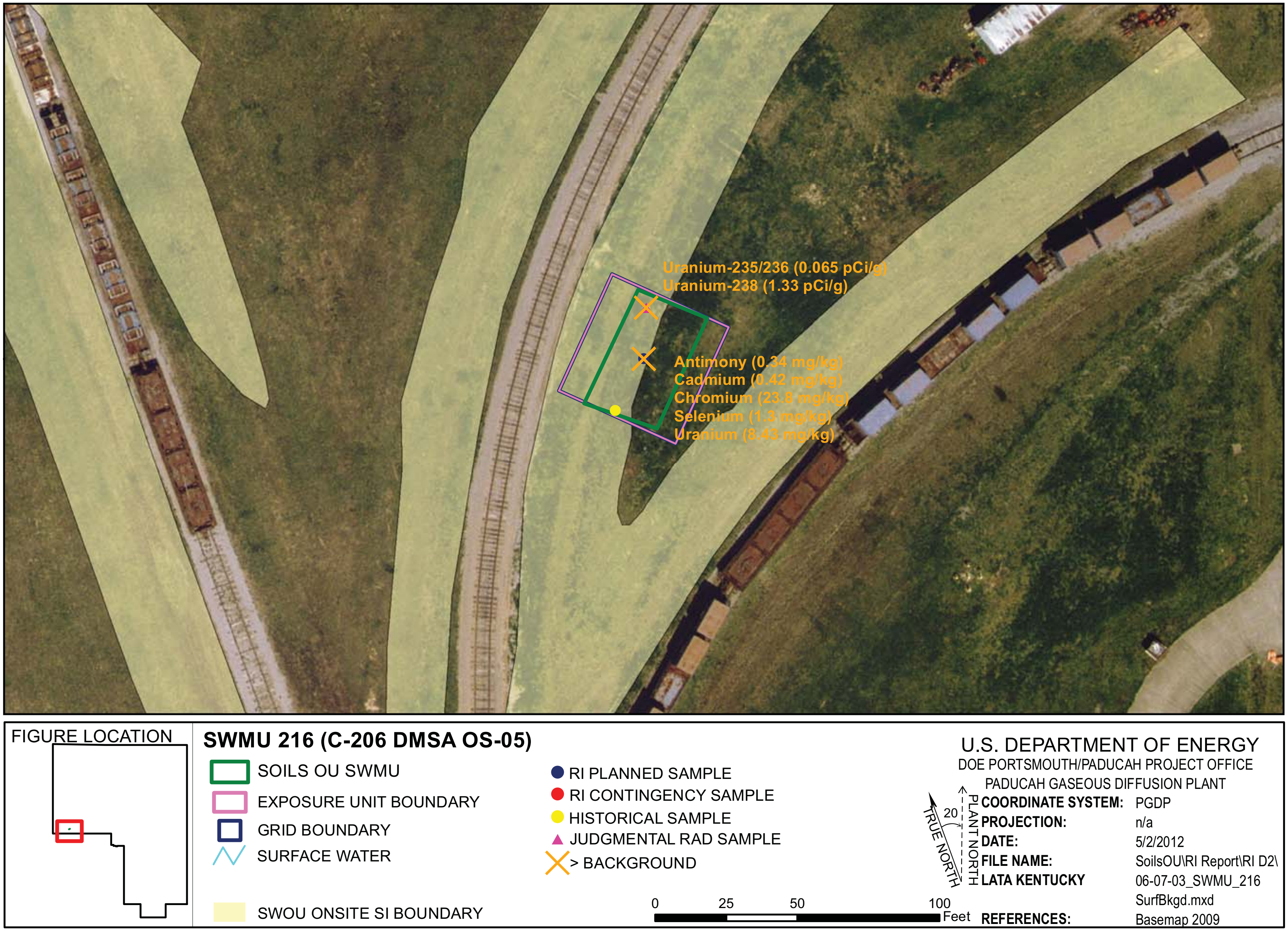


Figure 6.6.3. SWMU 216 Background Exceedances - Surface Soil

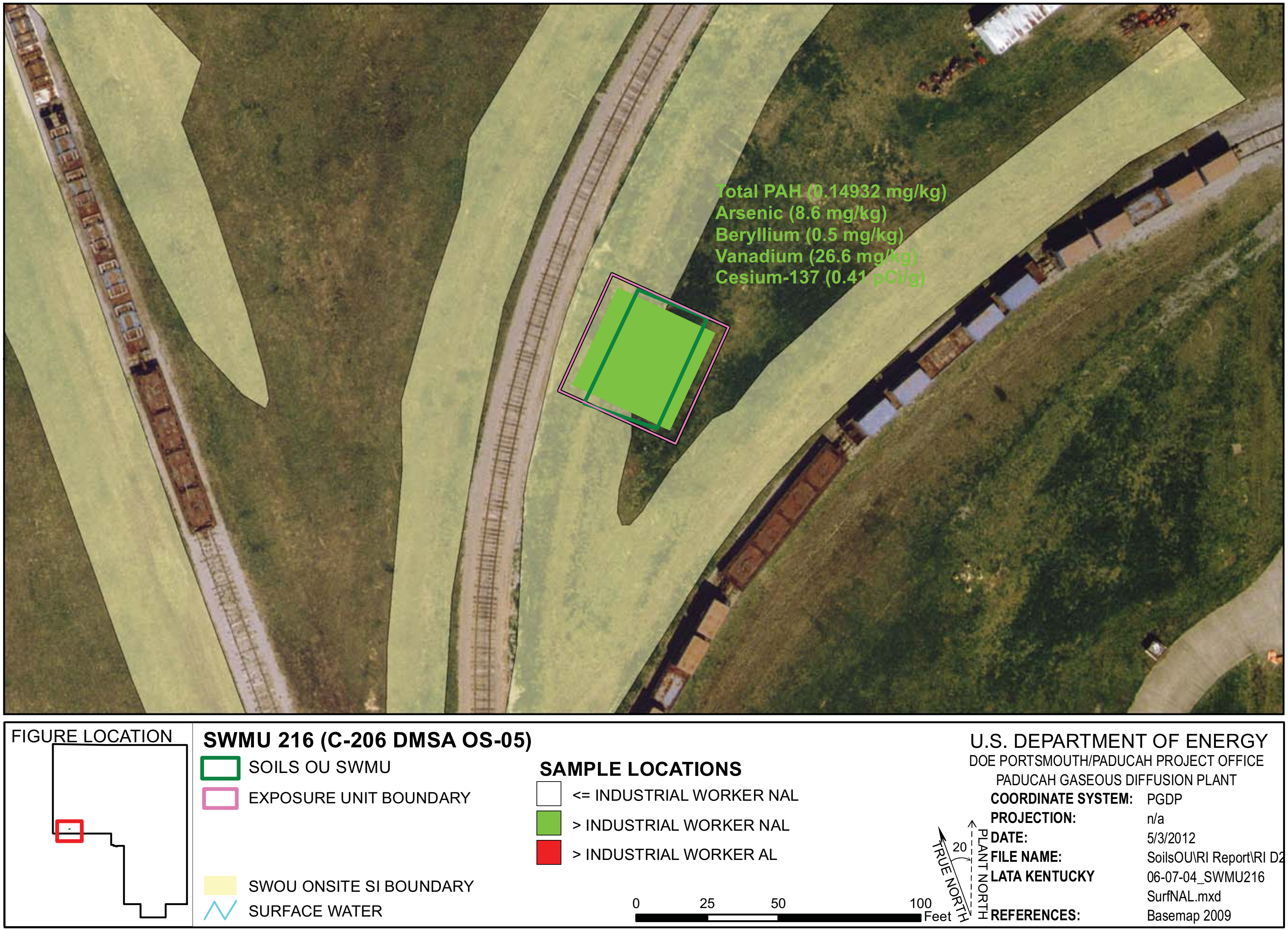


Figure 6.6.4. SWMU 216 NAL Exceedances - Surface Soil

SVOCs

Total PAHs in grid 1 were detected above the industrial worker NALs and the SSLs for the protection of UCRS groundwater in the SWMU 216 surface soil.

No SVOCs were detected above the industrial worker ALs or the SSLs for the protection of RGA groundwater.

VOCs

No surface soil samples from SWMU 216 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 216 surface soil.

6.6.4 Nature and Extent of Contamination—Subsurface Soils

N/A (As denoted in Tables 6.6.3 and 6.6.4).

6.6.5 Fate and Transport

No target chemicals were identified for further evaluation of impacts to the RGA (Chapter 4). SWMU 216 has the potential of runoff to the east, west, and south which flows to Outfall 008, but is not considered significant due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow (DOE 2008a). Ditches to the east, west, and south were sampled during the SWOU SI and a final response action for internal ditches will be addressed by the SWOU, as described in the SMP (DOE 2012a). There are no known underground pipelines at SWMU 216 that would contribute to migration away from the SWMU. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

6.6.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 216 were evaluated for direct contact**.** These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI. COCs for this SWMU include metals, radionuclides, and SVOCs.

The cumulative ELCR for SWMU 216 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 6.6.5 for the future industrial worker and the

Table 6.6.3. Subsurface Soil Historical Data Summary: SWMU 216 DMSA OS-05

Type	Analysis	Unit	Detected Results*			J-qualified	FOD	Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD		FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	

There is no subsurface data.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.6.4. Subsurface Soil RI Data Summary: SWMU 216 C-206 DMSA Outside-05

Type	Analysis	Unit	Detected Results*			J-qualified	FOD	Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD		FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	

There are no subsurface samples.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.6.5. RGOs for SWMU 216

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	**COC**	**EPC[1]**	**Units**	**ELCR[2]**	**1 x 10^{-6}**	**1 x 10^{-5}**	**1 x 10^{-4}**	**HI[4]**	**0.1**	**1**	**3**
Future Industrial Worker											
1	Total PAH	1.49E-01	mg/kg	2.5E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Cumulative			**2.5E-06**				**< 1**			
Hypothetical Resident[5]											
1	Uranium-238	1.33E+00	pCi/g	3.8E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Chromium	2.38E+01	mg/kg	1.5E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Total PAH	1.49E-01	mg/kg	7.7E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Cumulative			**1.3E-05**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.27, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.27, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

hypothetical resident. The excavation worker scenario did not identify COCs. Table 6.6.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 216 include metals. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 6.6.6.

Table 6.6.6. Ecological Screening for SWMU 216

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg) [b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Soil/gravel	No	34	Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

6.6.7 SWMU 216 Summary

The following text summarizes the results for SWMU 216 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Plant processes that could have contributed to contamination at this site are inadvertent spills or discharges from the fire extinguishers or containers that were stored there in the past.

COPCs for surface soils from SWMU 216 are shown on Tables 6.6.1 and 6.6.2 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The investigation for SWMU 216 revealed that metals and SVOCs comprise the types of COPCs found in the surface soil. There are no data for the subsurface soil. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 216 do not migrate in soil. This site is grass covered; therefore, dispersement of soil from this site by rainfall runoff is minimized and not considered significant. There are no known underground pipelines at SWMU 216 that would contribute to migration away from the SWMU. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 216.

- Future Industrial Worker
    - Total PAHs

- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Chromium
  - Total PAHs
  - Uranium-238

Of the above, there are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 216. There are no priority COCs for other scenarios.

For SWMU 216, COPECs exceed ESVs. The priority COPEC (i.e., maximum HQ ≥ 10) is the following:

- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 216 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. This SWMU is isolated, so there would be no physical or cultural limitation to a response action here. A response action at this SWMU would not have an impact on other integrator OUs.

6.6.8 SWMU 216 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 216; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial land use as shown in the SMP (DOE 2012a).

6.7 SWMU 217, C-740, OS-06

6.7.1 Background

SWMU 217 is located at C-740 in the west-central portion of the plant site at the location formerly known as DMSA OS-06. SWMU 217 is approximately 57,600 ft^2. There is no direct connection from this SWMU to surface water.

Beginning in the late 1970s, this area originally was used as an excess material and/or staging area for C-720. Over time, DMSA OS-06 became a storage area for excess materials from various areas within the plant. In 2001, DOE began characterization and remediation of the materials in the DMSA. Material stored within the SWMU included the following:

- Rechargeable batteries
- Nickel arc-welding rods
- Wood pallets
- Hoses
- Scrap metal
- Ingots
- Motors
- Gear boxes
- Piping
- Jib crane boom
- Water heaters
- A wash basin
- Commodes
- Grass seeder
- Scaffolding

- Empty buckets and containers
- Sump pumps
- A sand blasting tank
- Paint color mix machine

All RCRA-regulated items and other waste have been dispositioned properly (DOE 2004a). The area that is the former location of DMSA OS-06 currently is used as a hot shop and loading area. It is set up for size reducing large equipment and loading and staging shipping containers.

There were no known releases associated with DMSA OS-06. A certified RCRA Closure Report was approved by Kentucky on February 13, 2007, for this DMSA. KDWM "determined that the characterization, removal and disposal of hazardous waste meets the applicable requirements of the approved Agreed Order Closure Plan for DMSAs, dated December 23, 2005" (Webb 2007). The Closure Report documented that no sign of spill or release was found. There have been no known spills or releases of materials from this SWMU to the environment.

The area is a radiological material area and has a posted contamination area inside.

6.7.2 Fieldwork Summary

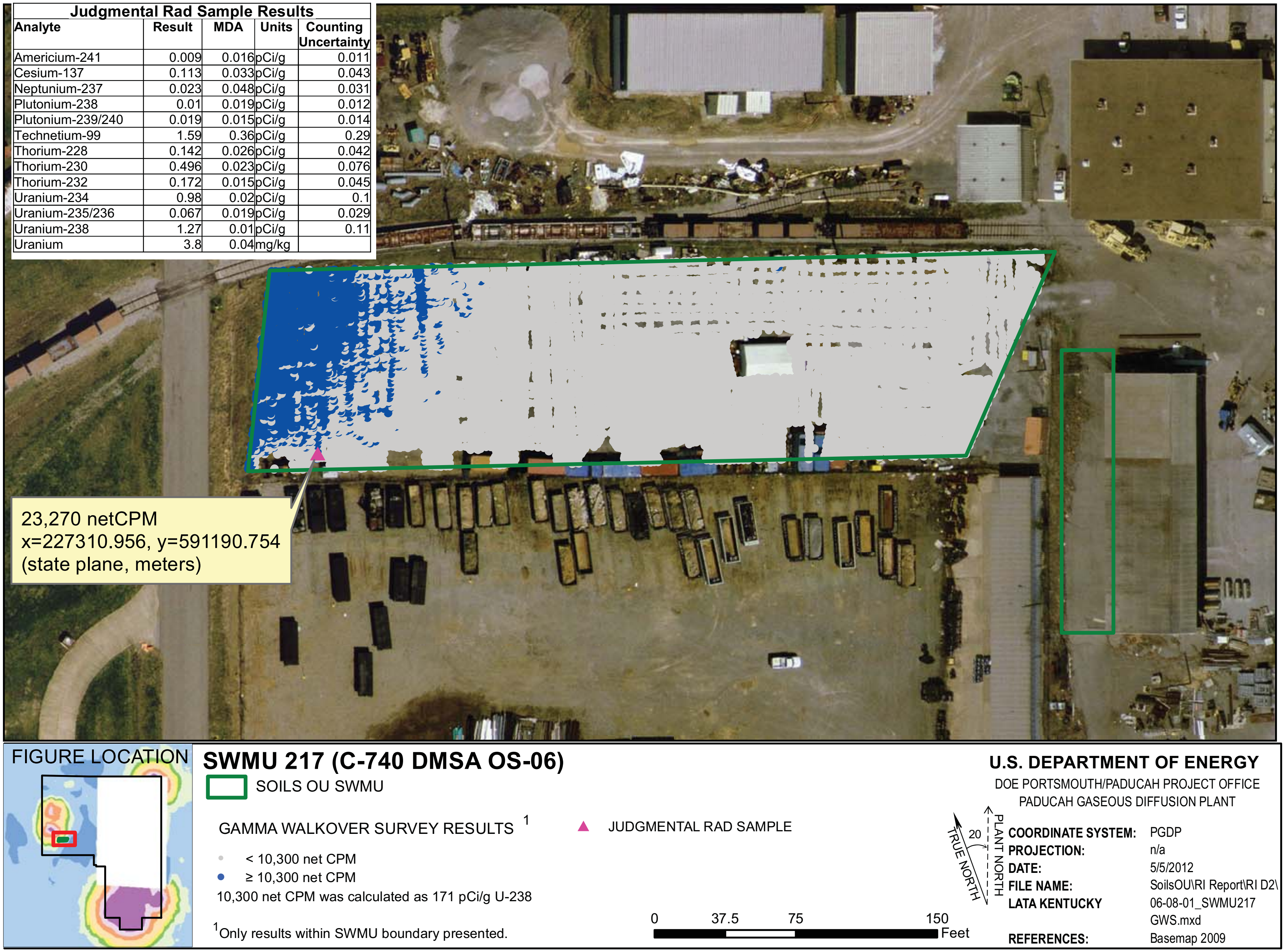
Thirty-six grid samples were planned and collected. There were 10 out of 10 pipeline samples planned and collected. The field laboratory results indicated high concentrations of cadmium, iron, magnesium, nickel, and zinc. Twenty out of 42 contingency samples were collected, remaining contingency samples were inaccessible. Figure A.8 in Appendix A is the sample rectification map.

The SWMU underwent a gamma radiological walkover (Figure 6.7.1) survey using a FIDLER; the 12,903 measurements ranged from 4,376 to 34,270 gross cpm. The ground cover at this SWMU is mostly gravel, but there is a grass, gravel, and soil mix on the west end of the SWMU. The influence of background radiation from nearby cylinders does not allow a reliable determination for areas of contamination at the project action limit. This is particularly noticeable in the western portion of the SWMU, near the cylinder yard. A judgmental grab sample was collected for radiological constituents.

6.7.3 Nature and Extent of Contamination—Surface Soils

For SWMU 217, the representative data set for surface soils is presented in Tables 6.7.1 and 6.7.2 and provides the nature of the contamination in SWMU 217 surface soils. Figures 6.7.2–6.7.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 217 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 217 consists of two EUs.



Judgmental Rad Sample Results				
Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.009	0.016	pCi/g	0.011
Cesium-137	0.113	0.033	pCi/g	0.043
Neptunium-237	0.023	0.048	pCi/g	0.031
Plutonium-238	0.01	0.019	pCi/g	0.012
Plutonium-239/240	0.019	0.015	pCi/g	0.014
Technetium-99	1.59	0.36	pCi/g	0.29
Thorium-228	0.142	0.026	pCi/g	0.042
Thorium-230	0.496	0.023	pCi/g	0.076
Thorium-232	0.172	0.015	pCi/g	0.045
Uranium-234	0.98	0.02	pCi/g	0.1
Uranium-235/236	0.067	0.019	pCi/g	0.029
Uranium-238	1.27	0.01	pCi/g	0.11
Uranium	3.8	0.04	mg/kg	

Figure 6.7.1. SWMU 217 Gamma Walkover Survey

Table 6.7.1. Surface Soil Historical Data Summary: SWMU 217 DMSA OS-06

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	3.84E+03	8.19E+03	5.96E+03	0/4	4/4	0/4	1.30E+04	0/4	3.32E+04	0/4	3.97E+06	0/4	4/4	20 - 20
METAL	Antimony	mg/kg	1.70E+00	1.70E+00	1.70E+00	0/4	1/4	1/4	2.10E-01	0/4	2.53E+00	0/4	1.51E+03	0/4	1/4	20 - 20
METAL	Arsenic	mg/kg	2.70E+00	6.10E+00	4.20E+00	0/4	3/4	0/4	1.20E+01	3/4	9.97E-01	0/4	9.97E+01	0/4	3/4	5 - 5
METAL	Barium	mg/kg	3.42E+01	8.66E+01	6.10E+01	0/4	4/4	0/4	2.00E+02	0/4	5.92E+02	0/4	3.78E+05	0/4	1/4	5 - 5
METAL	Beryllium	mg/kg	2.00E-01	4.30E-01	3.33E-01	0/4	3/4	0/4	6.70E-01	3/4	1.40E-02	0/4	9.22E+00	0/4	0/4	0.5 - 0.5
METAL	Cadmium	mg/kg	2.60E-01	2.60E-01	2.60E-01	0/4	1/4	1/4	2.10E-01	0/4	3.16E+00	0/4	3.16E+02	0/4	0/4	2 - 2
METAL	Calcium	mg/kg	7.59E+02	2.58E+04	7.33E+03	0/4	4/4	0/4	2.00E+05	0/4	n/a	0/4	n/a	n/a	n/a	200 - 200
METAL	Chromium	mg/kg	7.90E+00	2.90E+01	1.57E+01	0/4	4/4	1/4	1.60E+01	0/4	3.02E+01	0/4	3.02E+03	0/4	0/4	2.5 - 2.5
METAL	Cobalt	mg/kg	6.70E+00	2.70E+01	1.39E+01	0/4	4/4	2/4	1.40E+01	2/4	1.05E+01	0/4	1.52E+03	4/4	4/4	2.5 - 2.5
METAL	Copper	mg/kg	1.90E+00	7.40E+00	4.75E+00	0/4	4/4	0/4	1.90E+01	0/4	1.43E+03	0/4	2.24E+05	0/4	0/4	2.5 - 2.5
METAL	Iron	mg/kg	9.03E+03	2.13E+04	1.51E+04	0/4	4/4	0/4	2.80E+04	0/4	2.51E+04	0/4	3.92E+06	4/4	4/4	20 - 20
METAL	Lead	mg/kg	3.60E+00	6.50E+00	5.50E+00	0/4	3/4	0/4	3.60E+01	0/4	4.00E+02	0/4	4.00E+02	0/4	0/4	20 - 20
METAL	Magnesium	mg/kg	1.72E+02	1.21E+03	5.68E+02	0/4	4/4	0/4	7.70E+03	0/4	n/a	0/4	n/a	n/a	n/a	15 - 15
METAL	Manganese	mg/kg	2.61E+02	8.56E+02	5.26E+02	0/4	4/4	0/4	1.50E+03	0/4	2.58E+03	0/4	1.16E+05	4/4	4/4	10 - 10
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	2.00E-01	0/4	9.00E-01	0/4	7.85E+02	0/4	0/4	0.2 - 0.2
METAL	Nickel	mg/kg	2.40E+00	1.38E+01	7.80E+00	0/4	4/4	0/4	2.10E+01	0/4	4.28E+01	0/4	3.18E+04	0/4	4/4	5 - 5
METAL	Selenium	mg/kg	1.67E+00	1.67E+00	1.67E+00	0/2	1/2	1/2	8.00E-01	0/2	1.79E+02	0/2	2.80E+04	0/2	1/2	1 - 1
METAL	Silver	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	2.30E+00	0/4	1.08E+01	0/4	9.15E+03	0/4	0/4	4 - 4
METAL	Sodium	mg/kg	3.69E+01	8.67E+01	6.13E+01	0/3	3/3	0/3	3.20E+02	0/3	n/a	0/3	n/a	n/a	n/a	-
METAL	Thallium	mg/kg	1.40E-01	1.40E-01	1.40E-01	0/4	1/4	0/4	2.10E-01	0/4	2.87E+00	0/4	4.48E+02	0/4	0/4	20 - 20
METAL	Uranium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	4.90E+00	0/1	1.07E+02	0/1	1.65E+04	0/1	0/1	200 - 200
METAL	Vanadium	mg/kg	8.90E+00	2.43E+01	1.74E+01	0/4	4/4	0/4	3.80E+01	4/4	1.51E-01	0/4	9.30E+01	4/4	4/4	2.5 - 2.5
METAL	Zinc	mg/kg	1.02E+01	3.02E+01	2.07E+01	0/4	4/4	0/4	6.50E+01	0/4	1.08E+04	0/4	1.68E+06	0/4	3/4	20 - 20
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.88E-01	0/4	1.88E+01	0/4	0/4	0.1 - 0.1
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	-
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	-
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	-
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.30E+00	0/3	3.91E+01	0/3	0/3	-
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	6.02E+02	0/3	1.81E+04	0/3	0/3	-
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.05E+03	0/3	1.22E+05	0/3	0/3	-
SVOA	Benzo(ghi)perylene	mg/kg	2.70E-01	2.70E-01	2.70E-01	1/3	1/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.7.1. Surface Soil Historical Data Summary: SWMU 217 DMSA OS-06 (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	-
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	2.75E+01	0/3	2.75E+03	n/a	n/a	-
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Di-n-butyl phthalate	mg/kg	2.20E-01	2.20E-01	2.20E-01	1/3	1/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Fluoranthene	mg/kg	3.40E-01	3.40E-01	3.40E-01	1/3	1/3	0/3	n/a	0/3	6.01E+02	0/3	1.80E+04	0/3	0/3	-
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.87E+02	0/3	1.46E+04	0/3	0/3	-
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.17E-01	0/3	1.17E+01	0/3	0/3	-
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	2.24E+00	0/3	2.24E+02	0/3	0/3	-
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.22E-02	0/3	5.22E+00	0/3	0/3	-
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	-
SVOA	Phenanthrene	mg/kg	7.90E-02	7.90E-02	7.90E-02	1/3	1/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
SVOA	Pyrene	mg/kg	2.80E-01	2.80E-01	2.80E-01	1/3	1/3	0/3	n/a	0/3	4.49E+02	0/3	1.35E+04	0/3	0/3	-
SVOA	Total PAH	mg/kg	7.37E-01	7.37E-01	7.37E-01	0/3	1/3	0/3	n/a	1/3	5.92E-02	0/3	5.92E+00	1/3	1/3	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	-
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	-
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.89E-02	0/3	5.53E+00	0/3	0/3	-
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	-
VOA	1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.48E+00	0/3	1.76E+02	0/3	0/3	-
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	Benzene	mg/kg	2.00E-03	2.00E-03	2.00E-03	1/3	1/3	0/3	n/a	0/3	6.98E-01	0/3	8.22E+01	0/3	0/3	-
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.97E-01	0/3	5.76E+01	0/3	0/3	-
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	-
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	2.42E-01	0/3	2.49E+01	0/3	0/3	-
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	-
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	3.29E+00	0/3	3.84E+02	0/3	0/3	-
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	-
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	-

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.7.1. Surface Soil Historical Data Summary: SWMU 217 DMSA OS-06 (Continued)

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	2.82E-01	0/3	7.08E+01	0/3	0/3	-
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	-
VOA	Total Xylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	3.50E+01	0/3	1.07E+03	0/3	0/3	-
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	-
VOA	Trichloroethene	mg/kg	4.00E-03	4.00E-03	4.00E-03	1/3	1/3	0/3	n/a	0/3	4.69E-02	0/3	4.98E+00	0/3	1/3	-
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	2.04E-01	0/3	4.83E+01	0/3	0/3	-
RADS	Americium-241	pCi/g	1.81E-02	1.81E-02	1.81E-02	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.0685 - 0.0685
RADS	Cesium-137	pCi/g	-1.17E-02	-1.17E-02	-1.17E-02	0/1	1/1	0/1	4.90E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.0195 - 0.0195
RADS	Cobalt-60	pCi/g	-2.72E-03	-2.72E-03	-2.72E-03	0/1	1/1	0/1	n/a	0/1	1.77E-02	0/1	1.77E+00	0/1	0/1	0.0212 - 0.0212
RADS	Neptunium-237	pCi/g	1.46E-02	1.46E-02	1.46E-02	0/1	1/1	0/1	1.00E-01	0/1	2.71E-01	0/1	2.71E+01	0/1	1/1	0.0358 - 0.0358
RADS	Plutonium-238	pCi/g	-5.64E-02	-5.64E-02	-5.64E-02	0/1	1/1	0/1	7.30E-02	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.287 - 0.287
RADS	Plutonium-239/240	pCi/g	-5.54E-03	-5.54E-03	-5.54E-03	0/1	1/1	0/1	2.50E-02	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.0342 - 0.0342
RADS	Technetium-99	pCi/g	1.89E+00	1.89E+00	1.89E+00	0/1	1/1	0/1	2.50E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	1/1	2.16 - 2.16
RADS	Thorium-228	pCi/g	4.20E-01	4.20E-01	4.20E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.0736 - 0.0736
RADS	Thorium-230	pCi/g	4.38E-01	4.38E-01	4.38E-01	0/1	1/1	0/1	1.50E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.16 - 0.16
RADS	Thorium-232	pCi/g	4.04E-01	4.04E-01	4.04E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.0722 - 0.0722
RADS	Uranium-234	pCi/g	9.24E-01	9.24E-01	9.24E-01	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.581 - 0.581
RADS	Uranium-235	pCi/g	4.38E-02	4.38E-02	4.38E-02	0/1	1/1	0/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.0276 - 0.0276
RADS	Uranium-238	pCi/g	7.72E-01	7.72E-01	7.72E-01	0/1	1/1	0/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.486 - 0.486

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.7.2. Surface Soil RI Data Summary: SWMU 217 C-740 DMSA Outside-06

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	3.26E+03	7.09E+03	4.97E+03	0/4	4/4	0/4	1.30E+04	0/4	3.32E+04	0/4	3.97E+06	0/4	4/4	5.3 - 5.4
METAL	Antimony	mg/kg	2.30E-01	8.30E-01	4.50E-01	0/4	4/4	4/4	2.10E-01	0/4	2.53E+00	0/4	1.51E+03	0/4	3/4	0.53 - 0.54
METAL	Arsenic	mg/kg	5.00E+00	2.13E+01	8.87E+00	0/29	17/29	2/29	1.20E+01	17/29	9.97E-01	0/29	9.97E+01	1/29	17/29	1.1 - 11
METAL	Barium	mg/kg	5.03E+01	1.15E+02	7.00E+01	0/4	4/4	0/4	2.00E+02	0/4	5.92E+02	0/4	3.78E+05	0/4	1/4	2.1 - 2.2
METAL	Beryllium	mg/kg	3.20E-01	5.20E-01	4.08E-01	0/4	4/4	0/4	6.70E-01	4/4	1.40E-02	0/4	9.22E+00	0/4	0/4	0.11 - 0.11
METAL	Cadmium	mg/kg	8.80E-02	6.90E-01	3.67E-01	0/4	4/4	2/4	2.10E-01	0/4	3.16E+00	0/4	3.16E+02	0/4	2/4	0.053 - 0.054
METAL	Calcium	mg/kg	6.13E+03	2.11E+04	1.56E+04	0/4	4/4	0/4	2.00E+05	0/4	n/a	0/4	n/a	n/a	n/a	52.7 - 54.1
METAL	Chromium	mg/kg	1.58E+01	1.08E+02	5.70E+01	0/29	8/29	7/29	1.60E+01	6/29	3.02E+01	0/29	3.02E+03	0/29	0/29	1.1 - 85
METAL	Cobalt	mg/kg	1.14E+01	2.50E+01	1.83E+01	0/4	4/4	3/4	1.40E+01	4/4	1.05E+01	0/4	1.52E+03	4/4	4/4	0.21 - 0.22
METAL	Copper	mg/kg	4.80E+00	3.72E+01	2.31E+01	0/29	6/29	4/29	1.90E+01	0/29	1.43E+03	0/29	2.24E+05	0/29	0/29	1.1 - 35
METAL	Iron	mg/kg	9.98E+03	6.04E+04	2.27E+04	0/29	29/29	6/29	2.80E+04	8/29	2.51E+04	0/29	3.92E+06	29/29	29/29	5.3 - 100
METAL	Lead	mg/kg	6.00E+00	4.35E+01	1.22E+01	0/29	22/29	2/29	3.60E+01	0/29	4.00E+02	0/29	4.00E+02	0/29	2/29	0.32 - 13
METAL	Magnesium	mg/kg	6.51E+02	8.62E+02	7.42E+02	0/4	4/4	0/4	7.70E+03	0/4	n/a	0/4	n/a	n/a	n/a	52.7 - 54.1
METAL	Manganese	mg/kg	9.07E+01	2.05E+03	5.83E+02	0/29	29/29	2/29	1.50E+03	0/29	2.58E+03	0/29	1.16E+05	28/29	29/29	0.21 - 85
METAL	Mercury	mg/kg	6.70E-03	8.59E+00	9.70E-01	0/29	5/29	1/29	2.00E-01	1/29	9.00E-01	0/29	7.85E+02	1/29	1/29	0.0351 - 10
METAL	Molybdenum	mg/kg	7.70E-01	5.89E+00	2.48E+00	0/29	5/29	0/29	n/a	0/29	1.79E+02	0/29	2.80E+04	0/29	5/29	0.53 - 15
METAL	Nickel	mg/kg	1.14E+01	1.31E+02	6.41E+01	0/29	16/29	15/29	2.10E+01	12/29	4.28E+01	0/29	3.18E+04	7/29	16/29	0.53 - 65
METAL	Selenium	mg/kg	2.30E-01	5.40E-01	4.23E-01	0/29	4/29	0/29	8.00E-01	0/29	1.79E+02	0/29	2.80E+04	0/29	3/29	0.53 - 20
METAL	Silver	mg/kg	1.60E-02	1.61E+01	7.17E+00	0/29	9/29	6/29	2.30E+00	5/29	1.08E+01	0/29	9.15E+03	6/29	6/29	0.21 - 10
METAL	Sodium	mg/kg	2.65E+01	6.72E+01	4.34E+01	0/4	4/4	0/4	3.20E+02	0/4	n/a	0/4	n/a	n/a	n/a	21.1 - 21.6
METAL	Thallium	mg/kg	2.00E-01	2.50E-01	2.28E-01	0/4	4/4	3/4	2.10E-01	0/4	2.87E+00	0/4	4.48E+02	0/4	4/4	0.21 - 0.22
METAL	Uranium	mg/kg	1.50E+00	7.90E+00	4.22E+00	0/30	6/30	2/30	4.90E+00	0/30	1.07E+02	0/30	1.65E+04	0/30	0/30	0.04 - 20
METAL	Vanadium	mg/kg	1.63E+01	2.68E+01	2.02E+01	0/4	4/4	0/4	3.80E+01	4/4	1.51E-01	0/4	9.30E+01	4/4	4/4	1.1 - 1.1
METAL	Zinc	mg/kg	1.40E+01	5.89E+02	7.20E+01	0/29	29/29	9/29	6.50E+01	0/29	1.08E+04	0/29	1.68E+06	0/29	23/29	2.1 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	1.88E-01	0/19	1.88E+01	0/19	0/19	0.32 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.35 - 0.36
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.35 - 0.36
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.35 - 0.36
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.7
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.7
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.30E+00	0/2	3.91E+01	0/2	0/2	1.7 - 1.7
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.7
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.7
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.7
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.02E+02	0/2	1.81E+04	0/2	0/2	0.35 - 0.36
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.05E+03	0/2	1.22E+05	0/2	0/2	0.35 - 0.36
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.7

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.7.2. Surface Soil RI Data Summary: SWMU 217 C-740 DMSA Outside-06 (Continued)

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.0071 - 0.0071
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.35 - 0.36
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.01E+02	0/2	1.80E+04	0/2	0/2	0.35 - 0.36
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.87E+02	0/2	1.46E+04	0/2	0/2	0.35 - 0.36
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.17E-01	0/2	1.17E+01	0/2	0/2	0.35 - 0.36
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.7
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.71 - 0.71
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.24E+00	0/2	2.24E+02	0/2	0/2	0.35 - 0.36
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.7
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.22E-02	0/2	5.22E+00	0/2	0/2	0.0071 - 0.0071
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	1.7 - 1.7
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.35 - 0.36
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.7 - 1.7
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.49E+02	0/2	1.35E+04	0/2	0/2	0.35 - 0.36
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.71 - 0.71
SVOA	Total PAH	mg/kg	5.20E-03	9.70E-03	7.45E-03	0/2	2/2	0/2	n/a	0/2	5.92E-02	0/2	5.92E+00	0/2	2/2	-
RADS	Alpha activity	pCi/g	1.05E+01	2.34E+01	1.89E+01	0/3	3/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	4.7 - 4.8
RADS	Americium-241	pCi/g	-1.60E-03	1.10E-02	6.13E-03	0/3	3/3	0/3	n/a	0/3	5.01E+00	0/3	5.01E+02	0/3	0/3	0.012 - 0.018
RADS	Beta activity	pCi/g	1.67E+01	2.14E+01	1.88E+01	0/3	3/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	2.3 - 2.6
RADS	Cesium-137	pCi/g	1.40E-02	1.13E-01	4.93E-02	0/3	3/3	0/3	4.90E-01	1/3	8.61E-02	0/3	8.61E+00	0/3	0/3	0.033 - 0.044
RADS	Neptunium-237	pCi/g	0.00E+00	2.30E-02	9.00E-03	0/3	3/3	0/3	1.00E-01	0/3	2.71E-01	0/3	2.71E+01	0/3	1/3	0.011 - 0.048
RADS	Plutonium-238	pCi/g	-2.00E-04	1.00E-02	5.00E-03	0/3	3/3	0/3	7.30E-02	0/3	1.09E+01	0/3	1.09E+03	0/3	0/3	0.017 - 0.021
RADS	Plutonium-239/240	pCi/g	-1.50E-03	1.90E-02	6.47E-03	0/3	3/3	0/3	2.50E-02	0/3	1.07E+01	0/3	1.07E+03	0/3	0/3	0.015 - 0.018
RADS	Technetium-99	pCi/g	1.00E-02	1.59E+00	5.43E-01	0/3	3/3	0/3	2.50E+00	0/3	3.61E+02	0/3	3.61E+04	0/3	1/3	0.36 - 0.45
RADS	Thorium-228	pCi/g	1.42E-01	4.00E-01	2.62E-01	0/3	3/3	0/3	1.60E+00	0/3	n/a	0/3	n/a	n/a	n/a	0.018 - 0.032
RADS	Thorium-230	pCi/g	3.34E-01	4.96E-01	4.17E-01	0/3	3/3	0/3	1.50E+00	0/3	1.38E+01	0/3	1.38E+03	0/3	3/3	0.016 - 0.023
RADS	Thorium-232	pCi/g	1.72E-01	3.13E-01	2.49E-01	0/3	3/3	0/3	1.50E+00	0/3	n/a	0/3	n/a	n/a	n/a	0.007 - 0.017
RADS	Uranium-234	pCi/g	5.03E-01	9.80E-01	7.61E-01	0/3	3/3	0/3	1.20E+00	0/3	1.89E+01	0/3	1.89E+03	0/3	0/3	0.007 - 0.02
RADS	Uranium-235/236	pCi/g	2.20E-02	6.70E-02	4.70E-02	1/3	3/3	1/3	6.00E-02	0/3	3.95E-01	0/3	3.95E+01	0/3	0/3	0.009 - 0.019
RADS	Uranium-238	pCi/g	4.65E-01	1.27E+00	9.05E-01	0/3	3/3	1/3	1.20E+00	0/3	1.70E+00	0/3	1.70E+02	0/3	0/3	0.01 - 0.013

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

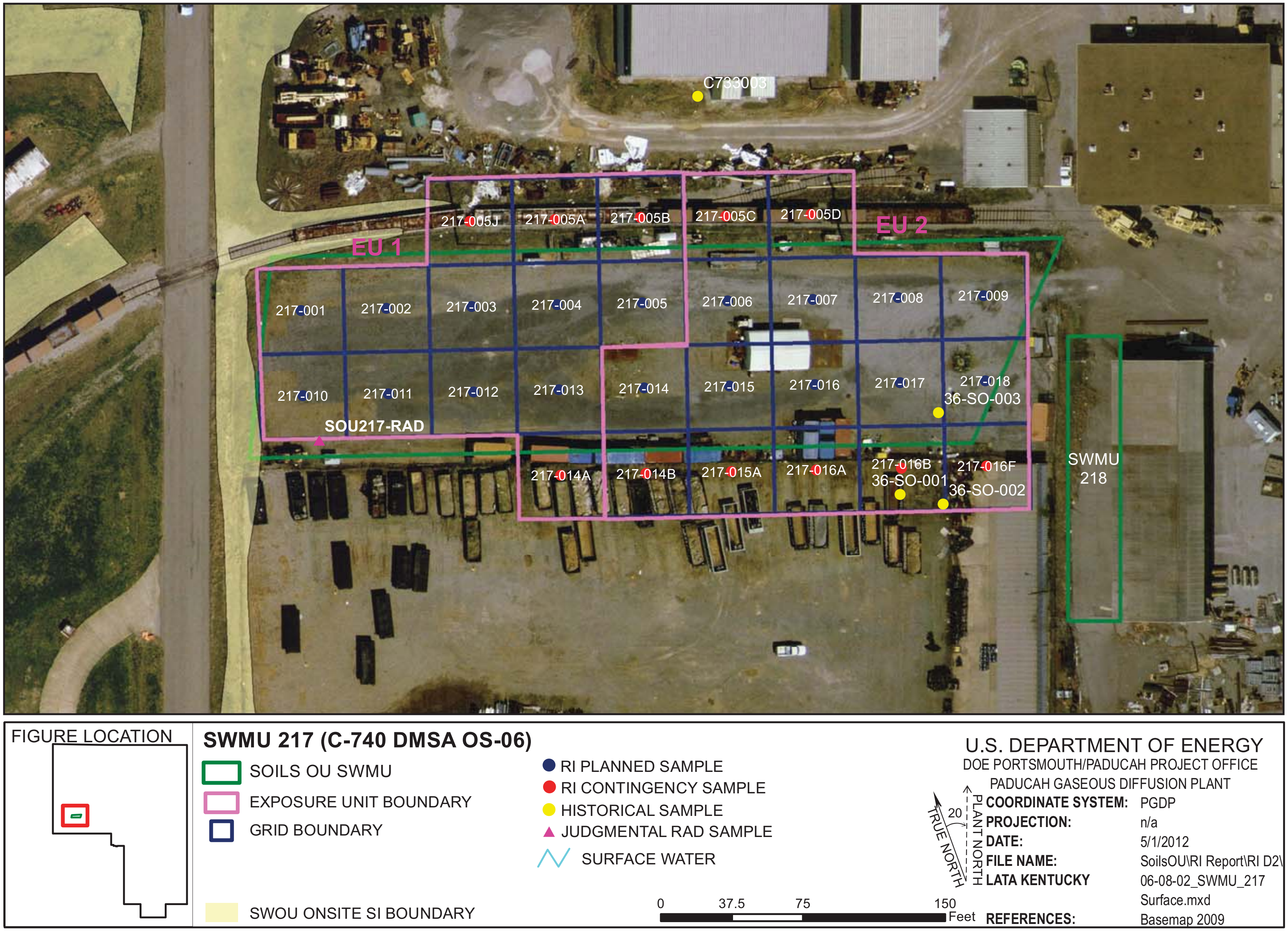


Figure 6.7.2. SWMU 217 Sample Locations - Surface Soil

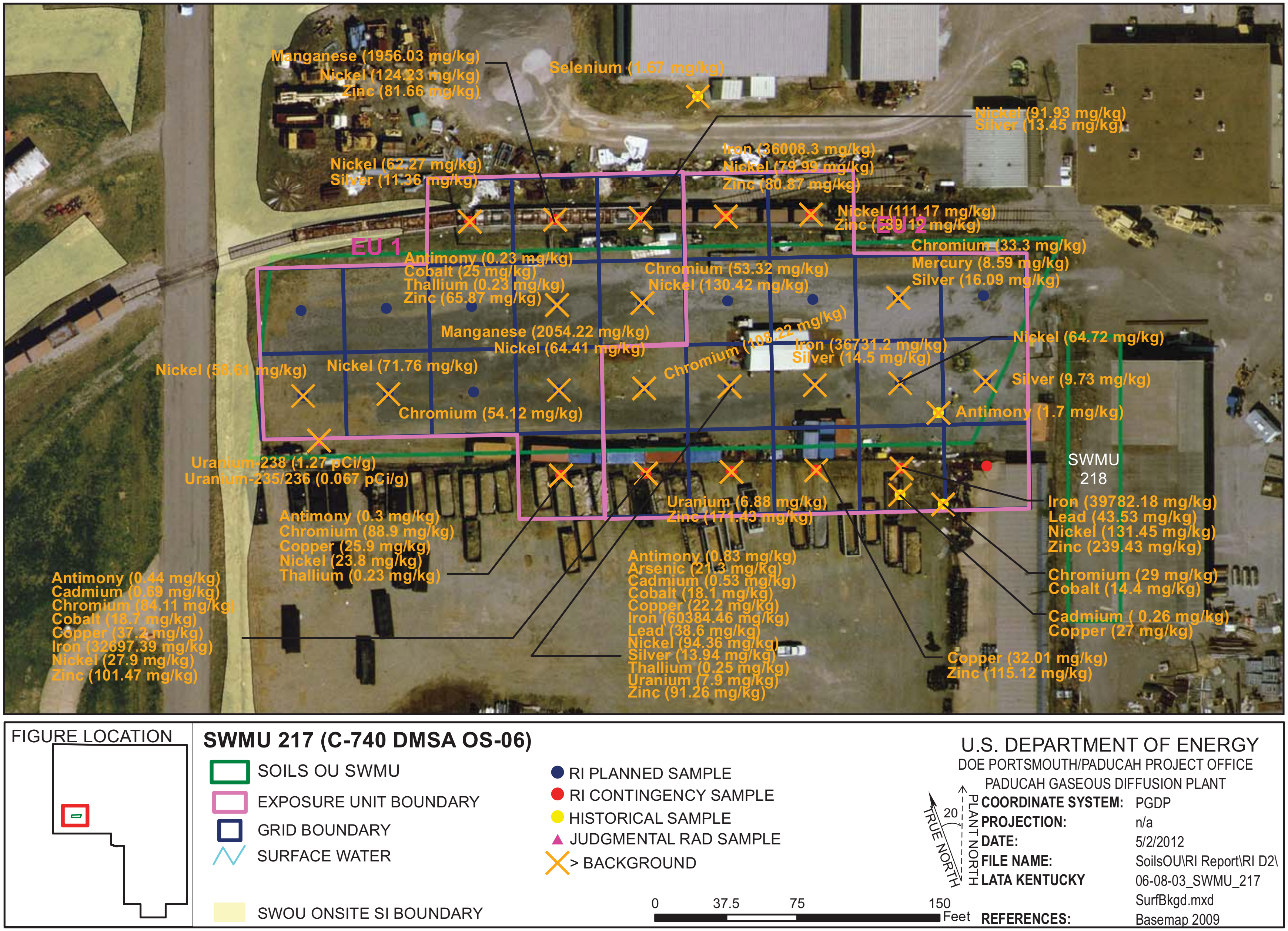


Figure 6.7.3. SWMU 217 Background Exceedances - Surface Soil

Station	Results Exceeding Background
36-SO-001	Cadmium 0.26 (mg/kg)
	Cobalt 27 (mg/kg)

Station	Results Exceeding Background
36-SO-002	Chromium 29 (mg/kg)
	Cobalt 14.4 (mg/kg)

Station	Results Exceeding Background
36-SO-003	Antimony 1.7 (mg/kg)

Station	Results Exceeding Background
C733003	Selenium 1.67 (mg/kg)

Station	Results Exceeding Background
SOU217-004	Antimony 0.23 (mg/kg)
	Cobalt 25 (mg/kg)
	Thallium 0.23 (mg/kg)
	Zinc 65.87 (mg/kg)

Station	Results Exceeding Background
SOU217-005	Chromium 53.32 (mg/kg)
	Nickel 130.42 (mg/kg)

Station	Results Exceeding Background
SOU217-005A	Manganese 1956.03 (mg/kg)
	Nickel 124.23 (mg/kg)
	Zinc 81.66 (mg/kg)

Station	Results Exceeding Background
SOU217-005B	Nickel 91.93 (mg/kg)
	Silver 13.45 (mg/kg)

Station	Results Exceeding Background
SOU217-005C	Iron 36008.3 (mg/kg)
	Nickel 79.99 (mg/kg)
	Zinc 80.87 (mg/kg)

Station	Results Exceeding Background
SOU217-005D	Nickel 111.17 (mg/kg)
	Zinc 589.19 (mg/kg)

Station	Results Exceeding Background
SOU217-005J	Nickel 62.27 (mg/kg)
	Silver 11.36 (mg/kg)

Station	Results Exceeding Background
SOU217-008	Chromium 33.3 (mg/kg)
	Mercury 8.59 (mg/kg)
	Silver 16.09 (mg/kg)

Station	Results Exceeding Background
SOU217-010	Nickel 58.61 (mg/kg)

Station	Results Exceeding Background
SOU217-011	Nickel 71.76 (mg/kg)

Station	Results Exceeding Background
SOU217-013	Chromium 54.12 (mg/kg)

Station	Results Exceeding Background
SOU217-014	Manganese 2054.22 (mg/kg)
	Nickel 64.41 (mg/kg)

Station	Results Exceeding Background
SOU217-014A	Antimony 0.3 (mg/kg)
	Chromium 88.9 (mg/kg)
	Copper 25.9 (mg/kg)
	Nickel 23.8 (mg/kg)
	Thallium 0.23 (mg/kg)

Station	Results Exceeding Background
SOU217-014B	Antimony 0.44 (mg/kg)
	Cadmium 0.69 (mg/kg)
	Chromium 84.11 (mg/kg)
	Cobalt 18.7 (mg/kg)
	Copper 37.2 (mg/kg)
	Iron 32697.39 (mg/kg)
	Nickel 27.9 (mg/kg)
	Zinc 101.47 (mg/kg)

Station	Results Exceeding Background
SOU217-015	Antimony 0.83 (mg/kg)
	Arsenic 21.3 (mg/kg)
	Cadmium 0.53 (mg/kg)
	Chromium 108.22 (mg/kg)
	Cobalt 18.1 (mg/kg)
	Copper 22.2 (mg/kg)
	Iron 60384.46 (mg/kg)
	Lead 38.6 (mg/kg)
	Nickel 94.36 (mg/kg)
	Silver 13.94 (mg/kg)
	Thallium 0.25 (mg/kg)
	Uranium 7.9 (mg/kg)
	Zinc 91.26 (mg/kg)

Station	Results Exceeding Background
SOU217-015A	Uranium 6.88 (mg/kg)
	Zinc 171.43 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 6.7.3. SWMU 217 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU217-016	Iron 36731.2 (mg/kg)
	Silver 14.5 (mg/kg)

Station	Results Exceeding Background
SOU217-016A	Copper 32.01 (mg/kg)
	Zinc 115.12 (mg/kg)

Station	Results Exceeding Background
SOU217-016B	Iron 39782.18 (mg/kg)
	Lead 43.53 (mg/kg)
	Nickel 131.45 (mg/kg)
	Zinc 239.43 (mg/kg)

Station	Results Exceeding Background
SOU217-017	Nickel 64.72 (mg/kg)

Station	Results Exceeding Background
SOU217-018	Silver 9.73 (mg/kg)

Station	Results Exceeding Background
SOU217-RAD	Uranium-235/236 0.067 (pCi/g)
	Uranium-238 1.27 (pCi/g)

NOTE: maximum detections only shown for location.

Figure 6.7.3. SWMU 217 Background Exceedances – Surface (Continued)

Figure 6.7.4. SWMU 217 NAL Exceedances - Surface Soil

Grid	Results Exceeding NAL
217-001	Arsenic 6.78 (mg/kg)

Grid	Results Exceeding NAL
217-002	Arsenic 5.42 (mg/kg)

Grid	Results Exceeding NAL
217-004	Arsenic 9.58 (mg/kg)
	Beryllium 0.38 (mg/kg)
	Cobalt 25 (mg/kg)
	Vanadium 21 (mg/kg)

Grid	Results Exceeding NAL
217-005	Arsenic 6.81 (mg/kg)
	Chromium 53.32 (mg/kg)
	Nickel 130.42 (mg/kg)

Grid	Results Exceeding NAL
217-005A	Nickel 124.23 (mg/kg)

Grid	Results Exceeding NAL
217-005B	Nickel 91.93 (mg/kg)
	Silver 13.45 (mg/kg)

Grid	Results Exceeding NAL
217-005C	Arsenic 6.41 (mg/kg)
	Iron 36008.3 (mg/kg)
	Nickel 79.99 (mg/kg)

Grid	Results Exceeding NAL
217-005D	Iron 25557.24 (mg/kg)
	Nickel 111.17 (mg/kg)

Grid	Results Exceeding NAL
217-005F	Vanadium 19.6 (mg/kg)

Grid	Results Exceeding NAL
217-005J	Arsenic 6.61 (mg/kg)
	Nickel 62.27 (mg/kg)
	Silver 11.36 (mg/kg)

Grid	Results Exceeding NAL
217-006	Arsenic 7.03 (mg/kg)

Grid	Results Exceeding NAL
217-008	Arsenic 8.49 (mg/kg)
	Chromium 33.3 (mg/kg)
	Mercury 8.59 (mg/kg)
	Silver 16.09 (mg/kg)

Grid	Results Exceeding NAL
217-009	Arsenic 5.86 (mg/kg)

Grid	Results Exceeding NAL
217-010	Nickel 58.61 (mg/kg)
	Cesium-137 0.113 (pCi/g)

Grid	Results Exceeding NAL
217-011	Arsenic 7.83 (mg/kg)
	Nickel 71.76 (mg/kg)

Grid	Results Exceeding NAL
217-012	Arsenic 8.38 (mg/kg)

Grid	Results Exceeding NAL
217-013	Arsenic 6.22 (mg/kg)
	Chromium 54.12 (mg/kg)

Grid	Results Exceeding NAL
217-014	Nickel 64.41 (mg/kg)

Grid	Results Exceeding NAL
217-014A	Arsenic 5 (mg/kg)
	Beryllium 0.32 (mg/kg)
	Chromium 88.9 (mg/kg)
	Cobalt 11.4 (mg/kg)
	Vanadium 16.3 (mg/kg)

Grid	Results Exceeding NAL
217-014B	Arsenic 7.41 (mg/kg)
	Beryllium 0.41 (mg/kg)
	Chromium 84.11 (mg/kg)
	Cobalt 18.7 (mg/kg)
	Iron 32697.39 (mg/kg)
	Vanadium 16.5 (mg/kg)

Grid	Results Exceeding NAL
217-015	Arsenic 21.3 (mg/kg)
	Beryllium 0.52 (mg/kg)
	Chromium 108.22 (mg/kg)
	Cobalt 18.1 (mg/kg)
	Iron 60384.46 (mg/kg)
	Nickel 94.36 (mg/kg)
	Silver 13.94 (mg/kg)
	Vanadium 26.8 (mg/kg)

Grid	Results Exceeding NAL
217-015A	Iron 26452.62 (mg/kg)

Grid	Results Exceeding NAL
217-016	Arsenic 11.72 (mg/kg)
	Iron 36731.2 (mg/kg)
	Silver 14.5 (mg/kg)

Grid	Results Exceeding NAL
217-016B	Arsenic 6.1 (mg/kg)
	Beryllium 0.43 (mg/kg)
	Cobalt 27 (mg/kg)
	Iron 39782.18 (mg/kg)
	Nickel 131.45 (mg/kg)
	Vanadium 24.3 (mg/kg)
	Total PAH 0.73675 (mg/kg)

Grid	Results Exceeding NAL
217-017	Arsenic 3.8 (mg/kg)
	Beryllium 0.2 (mg/kg)
	Nickel 64.72 (mg/kg)
	Vanadium 8.9 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 6.7.4. SWMU 217 NAL Exceedances – Surface (Continued)

Metals

Metals were detected above the industrial worker NALs in the SWMU 217 surface soil. The following are the metals detected at and above both the background screening levels and the industrial worker NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	15	2
Chromium	5, 8, 13, 14A, 14B, 15	1, 2
Cobalt	4, 14B, 15, 16B	1, 2
Iron	5C, 14B, 15, 16, 16B	2
Mercury	8	2
Nickel	5, 5A, 5B, 5C, 5D, 5J, 10, 11, 14, 15, 16B, 17	1, 2
Silver	5B, 5J, 8, 15, 16	1, 2

Grids 5A, 5B, 5J, 14A in EU 1 and 5C, 5D, 14B, and 16B in EU 2 are not located within the administrative boundary of SWMU 217; instead, they are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 217, as described in the Work Plan (DOE 2010a). Grids 5A, 5B, and 5J in EU 1 and 5C and 5D in EU 2 border the northern edge of SWMU 217. Grids 14A in EU 1 along with 14B and 16B in EU2 border the southern edge of SWMU 217.

No metals were detected above the industrial worker ALs in the SWMU 217 surface soil.

The following are the metals detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Antimony	14B, 15, 17	2
Arsenic	15	2
Cadmium	14B, 15	2
Cobalt	4, 14B, 15, 16B	1, 2
Iron	5C, 14B, 15, 16, 16B	2
Lead	11, 17, 26	1, 2
Manganese	5A, 14	1, 2
Mercury	8	2
Molybdenum[1]	4, 14A, 14B, 15	1, 2
Nickel	5, 5A, 5B, 5C, 5D, 5J, 10, 11, 14, 14A, 14B, 15, 16B, 17	1, 2
Selenium	5F	2
Silver	5B, 5J, 8, 15, 16, 18	1, 2
Thallium	4, 14A, 15	1, 2
Zinc	4, 5A, 5C, 5D, 14B, 15, 15A, 16A, 16B	1, 2

[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	15	2
Cobalt	4, 14B, 15, 16B,	1, 2
Iron	5C, 14B, 15, 16, 16B	2
Manganese	5A, 14	1, 2
Mercury	8	2
Nickel	5, 5A, 5B, 5C, 5D, 15, 16B	1, 2
Silver	5B, 5J, 8, 15, 16, 18	1, 2

PCBs

No PCBs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 217 surface soils.

SVOCs

Total PAHs were detected above the industrial worker NALs in grid 16B (EU 2) in the SWMU 217 surface soil. No SVOCs were detected above the industrial worker ALs in the SWMU 217 surface soil.

Total PAHs also were detected above the SSLs for the protection of UCRS (grid 4 in EU 1 and grids 15 and 16B in EU 2) and RGA (grid 16B in EU 2) groundwater.

VOCs

There were no concentrations of VOCs above the industrial worker NALs, the industrial worker ALs, or the SSLs for the protection of RGA groundwater in the surface soil samples from SWMU 217. TCE was detected above the SSL for the protection of UCRS groundwater in grid 17, EU 2, of SWMU 217 surface soil.

Radionuclides

No radionuclides were detected above the background screening levels and industrial worker NALs or ALs in the SWMU 217 surface soil.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

6.7.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 217 the representative data set for subsurface soils is presented in Tables 6.7.3 and 6.7.4 and provides the nature of the contamination in SWMU 217 subsurface soils. Figures 6.7.5–6.7.7 illustrate the horizontal extent. A complete list of sampling results, including sample depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 217 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 217 consists of two EUs.

Table 6.7.3. Subsurface Soil Historical Data Summary: SWMU 217 DMSA OS-06

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	4.99E+03	1.44E+04	1.02E+04	0/20	20/20	6/20	1.20E+04	0/20	3.32E+04	0/20	3.97E+06	0/20	20/20	-
METAL	Antimony	mg/kg	2.20E+00	3.10E+00	2.63E+00	0/19	4/19	4/19	2.10E-01	2/19	2.53E+00	0/19	1.51E+03	0/19	4/19	-
METAL	Arsenic	mg/kg	1.20E+00	5.00E+00	3.18E+00	0/15	12/15	0/15	7.90E+00	12/15	9.97E-01	0/15	9.97E+01	0/15	12/15	-
METAL	Barium	mg/kg	3.14E+01	1.53E+02	8.14E+01	0/20	20/20	0/20	1.70E+02	0/20	5.92E+02	0/20	3.78E+05	0/20	10/20	-
METAL	Beryllium	mg/kg	3.00E-01	8.80E-01	4.45E-01	0/20	19/20	1/20	6.90E-01	19/20	1.40E-02	0/20	9.22E+00	0/20	0/20	-
METAL	Cadmium	mg/kg	2.70E-01	2.70E-01	2.70E-01	0/20	1/20	1/20	2.10E-01	0/20	3.16E+00	0/20	3.16E+02	0/20	0/20	-
METAL	Calcium	mg/kg	4.84E+02	2.64E+03	1.23E+03	0/20	20/20	0/20	6.10E+03	0/20	n/a	0/20	n/a	n/a	n/a	-
METAL	Chromium	mg/kg	9.10E+00	1.79E+01	1.40E+01	0/20	20/20	0/20	4.30E+01	0/20	3.02E+01	0/20	3.02E+03	0/20	0/20	-
METAL	Cobalt	mg/kg	2.00E+00	1.72E+01	5.34E+00	0/20	19/20	1/20	1.30E+01	2/20	1.05E+01	0/20	1.52E+03	19/20	19/20	-
METAL	Copper	mg/kg	2.40E+00	1.74E+01	6.29E+00	0/20	20/20	0/20	2.50E+01	0/20	1.43E+03	0/20	2.24E+05	0/20	0/20	-
METAL	Iron	mg/kg	6.02E+03	2.89E+04	1.28E+04	0/20	20/20	1/20	2.80E+04	1/20	2.51E+04	0/20	3.92E+06	20/20	20/20	-
METAL	Lead	mg/kg	4.50E+00	1.29E+01	7.84E+00	0/20	20/20	0/20	2.30E+01	0/20	4.00E+02	0/20	4.00E+02	0/20	0/20	-
METAL	Magnesium	mg/kg	3.63E+02	2.05E+03	1.25E+03	0/20	20/20	0/20	2.10E+03	0/20	n/a	0/20	n/a	n/a	n/a	-
METAL	Manganese	mg/kg	3.94E+01	6.40E+02	1.99E+02	0/20	19/20	0/20	8.20E+02	0/20	2.58E+03	0/20	1.16E+05	13/20	19/20	-
METAL	Mercury	mg/kg	3.90E-01	3.20E+00	1.33E+00	0/20	3/20	3/20	1.30E-01	1/20	9.00E-01	0/20	7.85E+02	0/20	3/20	-
METAL	Nickel	mg/kg	4.30E+00	2.01E+01	8.66E+00	0/20	20/20	0/20	2.20E+01	0/20	4.28E+01	0/20	3.18E+04	0/20	20/20	-
METAL	Selenium	mg/kg	1.60E-01	1.00E+00	5.25E-01	0/13	4/13	1/13	7.00E-01	0/13	1.79E+02	0/13	2.80E+04	0/13	2/13	-
METAL	Silver	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	2.70E+00	0/20	1.08E+01	0/20	9.15E+03	0/20	0/20	-
METAL	Sodium	mg/kg	8.29E+01	6.30E+02	2.45E+02	0/20	20/20	2/20	3.40E+02	0/20	n/a	0/20	n/a	n/a	n/a	-
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	3.40E-01	0/20	2.87E+00	0/20	4.48E+02	0/20	0/20	-
METAL	Vanadium	mg/kg	1.22E+01	3.79E+01	2.10E+01	0/20	19/20	1/20	3.70E+01	19/20	1.51E-01	0/20	9.30E+01	19/20	19/20	-
METAL	Zinc	mg/kg	9.00E+00	4.01E+01	2.07E+01	0/20	20/20	0/20	6.00E+01	0/20	1.08E+04	0/20	1.68E+06	0/20	11/20	-
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	1.88E-01	0/20	1.88E+01	0/20	0/20	-
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	0/20	-
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	0/20	-
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	0/20	-
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	1.30E+00	0/20	3.91E+01	0/20	0/20	-
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	-
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	6.02E+02	0/20	1.81E+04	0/20	0/20	-
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	4.05E+03	0/20	1.22E+05	0/20	0/20	-
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.7.3. Subsurface Soil Historical Data Summary: SWMU 217 DMSA OS-06 (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	1.00E-01	1.00E-01	1.00E-01	1/20	1/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	0/20	-
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	2.75E+01	0/20	2.75E+03	n/a	n/a	-
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	6.01E+02	0/20	1.80E+04	0/20	0/20	-
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	4.87E+02	0/20	1.46E+04	0/20	0/20	-
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	1.17E-01	0/20	1.17E+01	0/20	0/20	-
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	2.24E+00	0/20	2.24E+02	0/20	0/20	-
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	5.22E-02	0/20	5.22E+00	0/20	0/20	-
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	0/20	-
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	4.49E+02	0/20	1.35E+04	0/20	0/20	-
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	5.92E-02	0/20	5.92E+00	0/20	0/20	-
VOA	1,1,1-Trichloroethane	mg/kg	6.10E-01	6.10E-01	6.10E-01	0/20	1/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	1/20	-
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	0/20	-
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	1,1-Dichloroethene	mg/kg	1.50E-02	3.00E-02	2.25E-02	0/20	2/20	0/20	n/a	0/20	4.89E-02	0/20	5.53E+00	0/20	2/20	-
VOA	1,2-Dichloroethane	mg/kg	1.20E-02	1.20E-02	1.20E-02	1/20	1/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	1/20	-
VOA	1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	5.48E+00	0/18	1.76E+02	0/18	0/18	-
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	2-Chloroethyl vinyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	Acetone	mg/kg	2.30E-02	7.10E-02	4.67E-02	2/20	3/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	Benzene	mg/kg	2.00E-03	1.00E-02	5.00E-03	3/20	4/20	0/20	n/a	0/20	6.98E-01	0/20	8.22E+01	0/20	3/20	-
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	4.97E-01	0/20	5.76E+01	0/20	0/20	-
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	0/20	-
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	2.42E-01	0/20	2.49E+01	0/20	0/20	-
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.74E+00	0/2	1.93E+02	0/2	0/2	-
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	0/20	-

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.7.3. Subsurface Soil Historical Data Summary: SWMU 217 DMSA OS-06 (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
VOA	Ethylbenzene	mg/kg	2.00E-03	2.00E-03	2.00E-03	1/20	1/20	0/20	n/a	0/20	3.29E+00	0/20	3.84E+02	0/20	0/20	-
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.50E+01	0/2	1.07E+03	0/2	0/2	-
VOA	Methylene chloride	mg/kg	1.20E-02	1.20E-02	1.20E-02	0/20	1/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	1/20	-
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	0/20	-
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	2.82E-01	0/20	7.08E+01	0/20	0/20	-
VOA	Toluene	mg/kg	7.00E-03	7.00E-03	7.00E-03	1/20	1/20	0/20	n/a	0/20	n/a	0/20	n/a	0/20	0/20	-
VOA	Total Xylene	mg/kg	1.70E-02	1.70E-02	1.70E-02	0/20	1/20	0/20	n/a	0/20	3.50E+01	0/20	1.07E+03	0/20	0/20	-
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.07E+01	0/2	3.42E+02	0/2	0/2	-
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	n/a	0/20	n/a	n/a	n/a	-
VOA	Trichloroethene	mg/kg	2.00E-03	1.40E-02	8.00E-03	2/20	2/20	0/20	n/a	0/20	4.69E-02	0/20	4.98E+00	0/20	2/20	-
VOA	Trichlorofluoromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	n/a	0/20	2.04E-01	0/20	4.83E+01	0/20	0/20	-

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.7.4. Subsurface Soil RI Data Summary: SWMU 217 C-740 DMSA Outside-06

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.69E+03	9.95E+03	8.09E+03	0/4	4/4	0/4	1.20E+04	0/4	3.32E+04	0/4	3.97E+06	0/4	4/4	5.6 - 6.3
METAL	Antimony	mg/kg	1.20E-01	5.40E-01	3.33E-01	0/4	4/4	3/4	2.10E-01	0/4	2.53E+00	0/4	1.51E+03	0/4	3/4	0.56 - 0.63
METAL	Arsenic	mg/kg	4.00E+00	1.07E+01	7.30E+00	0/42	16/42	6/42	7.90E+00	16/42	9.97E-01	0/42	9.97E+01	0/42	16/42	1.1 - 11
METAL	Barium	mg/kg	6.35E+01	1.38E+02	9.81E+01	0/4	4/4	0/4	1.70E+02	0/4	5.92E+02	0/4	3.78E+05	0/4	2/4	2.2 - 2.5
METAL	Beryllium	mg/kg	3.00E-01	6.70E-01	5.08E-01	0/4	4/4	0/4	6.90E-01	4/4	1.40E-02	0/4	9.22E+00	0/4	0/4	0.11 - 0.13
METAL	Cadmium	mg/kg	2.10E-02	4.30E-02	3.45E-02	0/4	4/4	0/4	2.10E-01	0/4	3.16E+00	0/4	3.16E+02	0/4	0/4	0.056 - 0.063
METAL	Calcium	mg/kg	3.88E+02	3.02E+03	1.61E+03	0/4	4/4	0/4	6.10E+03	0/4	n/a	0/4	n/a	n/a	n/a	56.2 - 62.7
METAL	Chromium	mg/kg	1.45E+01	5.42E+01	3.99E+01	0/42	25/42	9/42	4.30E+01	23/42	3.02E+01	0/42	3.02E+03	0/42	0/42	1.1 - 85
METAL	Cobalt	mg/kg	5.70E+00	1.90E+02	5.23E+01	0/4	4/4	1/4	1.30E+01	1/4	1.05E+01	0/4	1.52E+03	4/4	4/4	0.22 - 0.25
METAL	Copper	mg/kg	5.70E+00	2.32E+01	1.36E+01	0/42	5/42	0/42	2.50E+01	0/42	1.43E+03	0/42	2.24E+05	0/42	0/42	1.1 - 35
METAL	Iron	mg/kg	5.51E+03	2.41E+04	1.27E+04	0/42	42/42	0/42	2.80E+04	0/42	2.51E+04	0/42	3.92E+06	42/42	42/42	5.6 - 100
METAL	Lead	mg/kg	6.18E+00	1.71E+01	9.63E+00	0/42	35/42	0/42	2.30E+01	0/42	4.00E+02	0/42	4.00E+02	0/42	2/42	0.34 - 13
METAL	Magnesium	mg/kg	3.41E+02	2.61E+03	1.38E+03	0/4	4/4	1/4	2.10E+03	0/4	n/a	0/4	n/a	n/a	n/a	56.2 - 62.7
METAL	Manganese	mg/kg	8.02E+01	1.69E+03	3.25E+02	0/42	40/42	2/42	8.20E+02	0/42	2.58E+03	0/42	1.16E+05	38/42	40/42	0.22 - 85
METAL	Mercury	mg/kg	1.09E-02	9.20E+00	2.37E+00	0/42	7/42	3/42	1.30E-01	3/42	9.00E-01	0/42	7.85E+02	3/42	3/42	0.0375 - 10
METAL	Molybdenum	mg/kg	5.40E-01	1.90E+00	1.26E+00	0/42	4/42	0/42	n/a	0/42	1.79E+02	0/42	2.80E+04	0/42	4/42	0.56 - 15
METAL	Nickel	mg/kg	9.20E+00	8.55E+01	4.42E+01	0/42	11/42	8/42	2.20E+01	7/42	4.28E+01	0/42	3.18E+04	1/42	11/42	0.56 - 65
METAL	Selenium	mg/kg	2.70E-01	1.30E+00	7.80E-01	0/42	4/42	2/42	7.00E-01	0/42	1.79E+02	0/42	2.80E+04	0/42	4/42	0.56 - 20
METAL	Silver	mg/kg	1.20E-02	1.18E+01	3.18E+00	0/42	7/42	3/42	2.70E+00	1/42	1.08E+01	0/42	9.15E+03	3/42	4/42	0.22 - 10
METAL	Sodium	mg/kg	7.57E+01	3.44E+02	1.99E+02	0/4	4/4	1/4	3.40E+02	0/4	n/a	0/4	n/a	n/a	n/a	22.5 - 25.1
METAL	Thallium	mg/kg	1.00E-01	2.70E-01	1.55E-01	0/4	4/4	0/4	3.40E-01	0/4	2.87E+00	0/4	4.48E+02	0/4	1/4	0.22 - 0.25
METAL	Uranium	mg/kg	7.10E-01	2.75E+00	1.91E+00	0/43	5/43	0/43	4.60E+00	0/43	1.07E+02	0/43	1.65E+04	0/43	0/43	0.02 - 20
METAL	Vanadium	mg/kg	1.74E+01	4.38E+01	2.96E+01	0/4	4/4	1/4	3.70E+01	4/4	1.51E-01	0/4	9.30E+01	4/4	4/4	1.1 - 1.3
METAL	Zinc	mg/kg	1.48E+01	5.86E+01	2.88E+01	0/42	41/42	0/42	6.00E+01	0/42	1.08E+04	0/42	1.68E+06	0/42	31/42	2.2 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/30	0/30	0/30	n/a	0/30	1.88E-01	0/30	1.88E+01	0/30	0/30	0.36 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	0/5	0/5	0.39 - 0.41
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	0/5	0/5	0.39 - 0.41
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	0/5	0/5	0.39 - 0.41
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.9 - 2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.9 - 2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	1.30E+00	0/5	3.91E+01	0/5	0/5	1.9 - 2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.9 - 2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.9 - 2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.9 - 2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	6.02E+02	0/5	1.81E+04	0/5	0/5	0.39 - 0.41
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	4.05E+03	0/5	1.22E+05	0/5	0/5	0.39 - 0.41
SVOA	Benzenemethanol	mg/kg	7.30E-02	7.30E-02	7.30E-02	1/5	1/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.9 - 2

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.7.4. Subsurface Soil RI Data Summary: SWMU 217 C-740 DMSA Outside-06 (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.0077 - 0.0083
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	0/5	0/5	0.39 - 0.41
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	6.01E+02	0/5	1.80E+04	0/5	0/5	0.39 - 0.41
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	4.87E+02	0/5	1.46E+04	0/5	0/5	0.39 - 0.41
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	1.17E-01	0/5	1.17E+01	0/5	0/5	0.39 - 0.41
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.9 - 2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.77 - 0.83
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	2.24E+00	0/5	2.24E+02	0/5	0/5	0.39 - 0.41
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.9 - 2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	5.22E-02	0/5	5.22E+00	0/5	0/5	0.0077 - 0.0083
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	0/5	0/5	1.9 - 2
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.39 - 0.41
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.9 - 2
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	4.49E+02	0/5	1.35E+04	0/5	0/5	0.39 - 0.41
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.77 - 0.83
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	5.92E-02	0/5	5.92E+00	0/5	0/5	-
RADS	Alpha activity	pCi/g	1.97E+01	3.19E+01	2.69E+01	0/4	4/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	5.3 - 5.5
RADS	Americium-241	pCi/g	-4.00E-04	1.60E-02	6.35E-03	0/4	4/4	0/4	n/a	0/4	5.01E+00	0/4	5.01E+02	0/4	0/4	0.017 - 0.027
RADS	Beta activity	pCi/g	2.44E+01	3.39E+01	2.83E+01	0/4	4/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	3.1 - 4.2
RADS	Cesium-137	pCi/g	-4.00E-02	6.00E-03	-1.13E-02	0/4	4/4	0/4	2.80E-01	0/4	8.61E-02	0/4	8.61E+00	0/4	0/4	0.044 - 0.14
RADS	Neptunium-237	pCi/g	-2.10E-03	0.00E+00	-1.18E-03	0/4	4/4	0/4	n/a	0/4	2.71E-01	0/4	2.71E+01	0/4	0/4	0.013 - 0.029
RADS	Plutonium-238	pCi/g	9.00E-03	2.00E-02	1.55E-02	0/4	4/4	0/4	n/a	0/4	1.09E+01	0/4	1.09E+03	0/4	0/4	0.018 - 0.023
RADS	Plutonium-239/240	pCi/g	2.50E-03	1.60E-02	6.80E-03	0/4	4/4	0/4	n/a	0/4	1.07E+01	0/4	1.07E+03	0/4	0/4	0.0067 - 0.018
RADS	Technetium-99	pCi/g	0.00E+00	2.70E-01	8.75E-02	0/4	4/4	0/4	2.80E+00	0/4	3.61E+02	0/4	3.61E+04	0/4	0/4	0.42 - 0.47
RADS	Thorium-228	pCi/g	5.56E-01	9.20E-01	7.37E-01	0/4	4/4	0/4	1.60E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.027
RADS	Thorium-230	pCi/g	5.52E-01	8.60E-01	7.16E-01	0/4	4/4	0/4	1.40E+00	0/4	1.38E+01	0/4	1.38E+03	0/4	4/4	0.01 - 0.021
RADS	Thorium-232	pCi/g	5.07E-01	9.80E-01	7.10E-01	0/4	4/4	0/4	1.50E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.006 - 0.02
RADS	Uranium-234	pCi/g	4.77E-01	6.90E-01	5.83E-01	0/4	4/4	0/4	1.20E+00	0/4	1.89E+01	0/4	1.89E+03	0/4	0/4	0.017 - 0.023
RADS	Uranium-235/236	pCi/g	1.40E-02	6.20E-02	3.73E-02	2/4	4/4	1/4	6.00E-02	0/4	3.95E-01	0/4	3.95E+01	0/4	0/4	0.008 - 0.025
RADS	Uranium-238	pCi/g	5.34E-01	9.20E-01	6.74E-01	0/4	4/4	0/4	1.20E+00	0/4	1.70E+00	0/4	1.70E+02	0/4	0/4	0.008 - 0.022

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

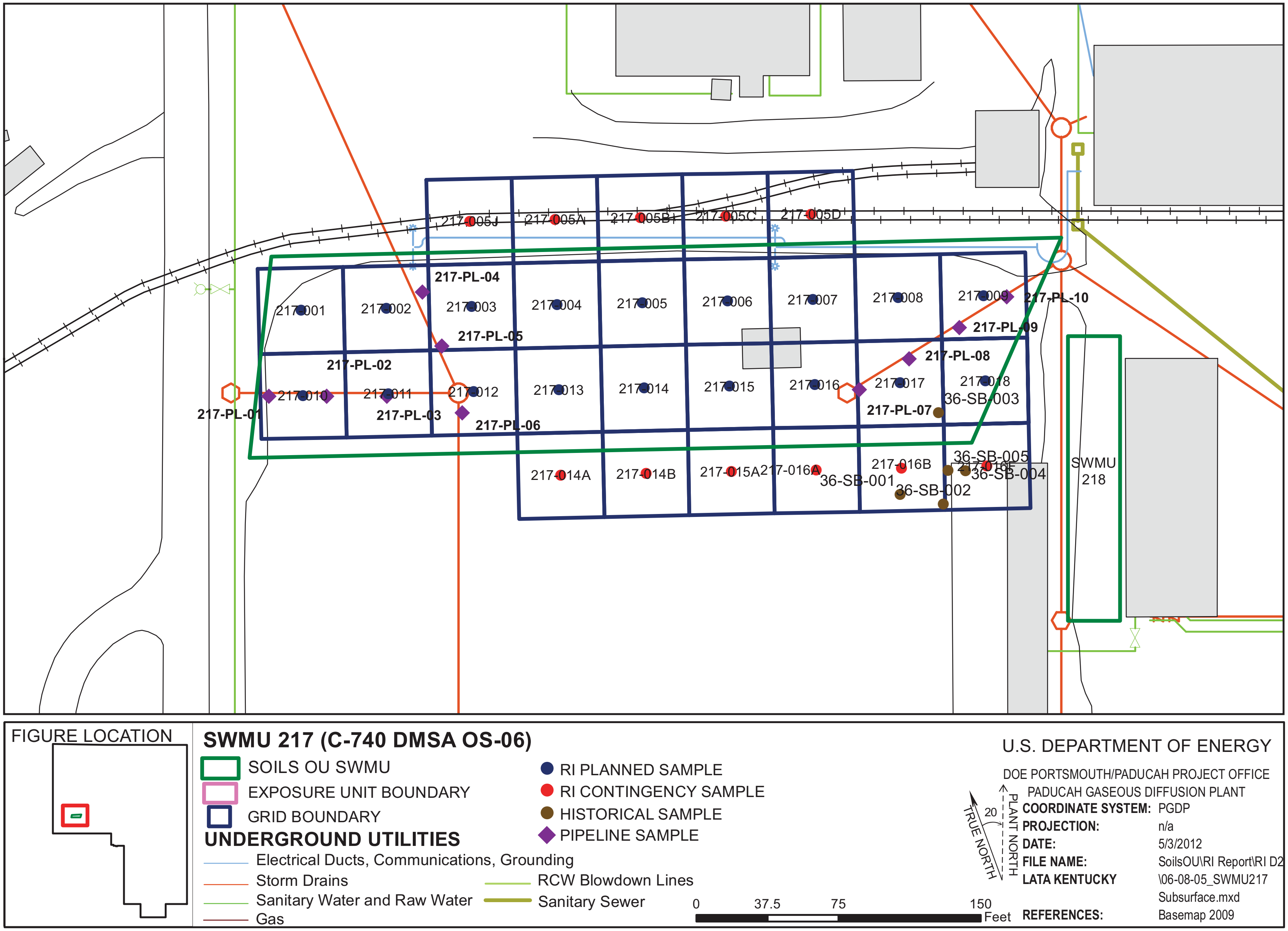


Figure 6.7.5. SWMU 217 Sample Locations - Subsurface Soil

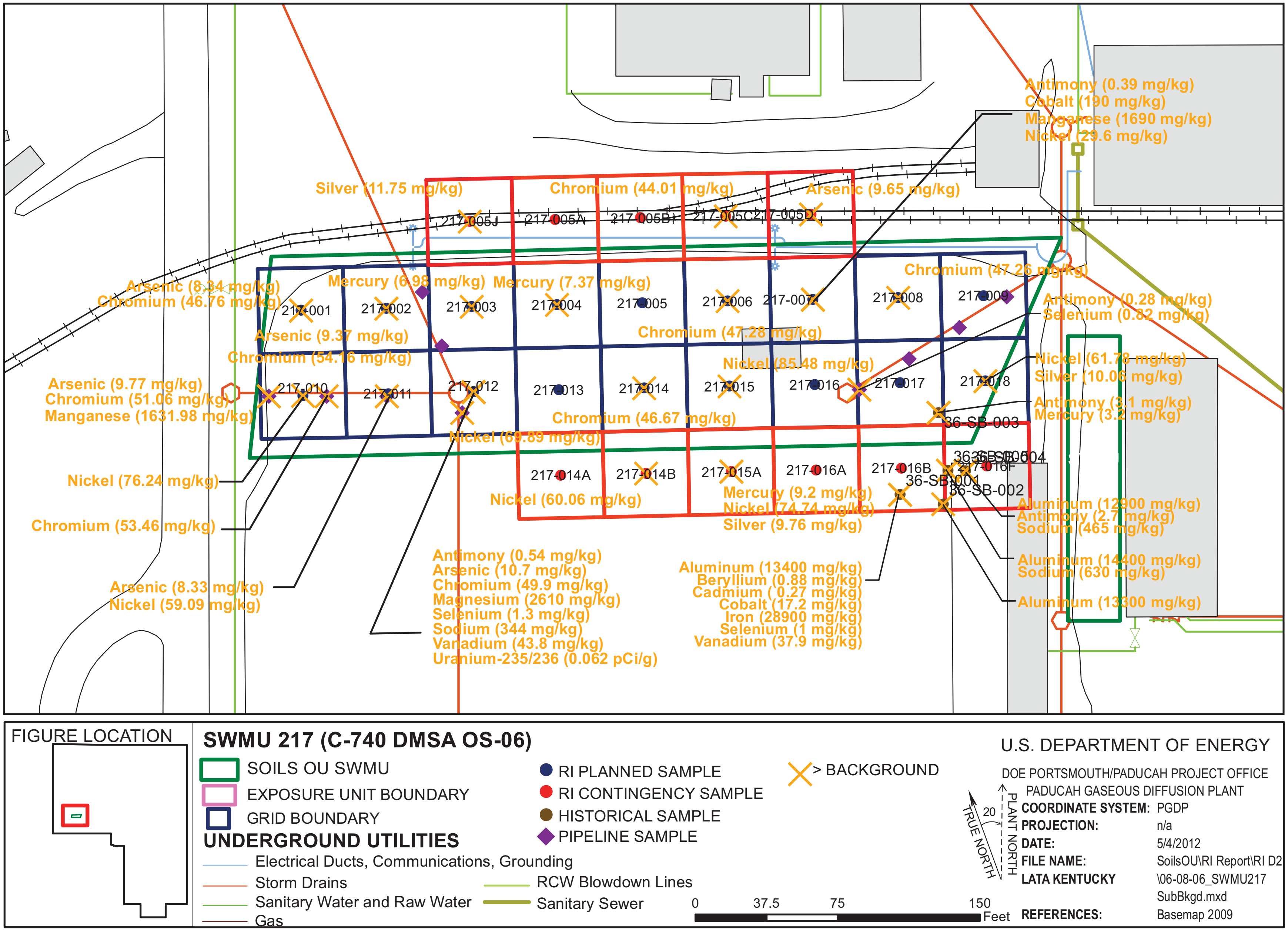


Figure 6.7.6. SWMU 217 Background Exceedances - Subsurface Soil

Station	Results Exceeding Background
217-PL-01	Arsenic 9.77 (mg/kg) Chromium 51.06 (mg/kg) Manganese 1631.98 (mg/kg)

Station	Results Exceeding Background
217-PL-02	Chromium 53.46 (mg/kg)

Station	Results Exceeding Background
217-PL-03	Arsenic 8.33 (mg/kg) Nickel 59.09 (mg/kg)

Station	Results Exceeding Background
217-PL-06	Nickel 69.89 (mg/kg)

Station	Results Exceeding Background
217-PL-07	Antimony 0.28 (mg/kg) Selenium 0.82 (mg/kg)

Station	Results Exceeding Background
36-SB-001	Aluminum 13400 (mg/kg) Beryllium 0.88 (mg/kg) Cadmium 0.27 (mg/kg) Cobalt 17.2 (mg/kg) Iron 28900 (mg/kg) Selenium 1 (mg/kg) Vanadium 37.9 (mg/kg)

Station	Results Exceeding Background
36-SB-002	Aluminum 13300 (mg/kg)

Station	Results Exceeding Background
36-SB-003	Antimony 3.1 (mg/kg) Mercury 3.2 (mg/kg)

Station	Results Exceeding Background
36-SB-004	Aluminum 12900 (mg/kg) Antimony 2.7 (mg/kg) Sodium 465 (mg/kg)

Station	Results Exceeding Background
36-SB-005	Aluminum 14400 (mg/kg) Sodium 630 (mg/kg)

Station	Results Exceeding Background
SOU217-001	Arsenic 8.34 (mg/kg) Chromium 46.76 (mg/kg)

Station	Results Exceeding Background
SOU217-002	Arsenic 9.37 (mg/kg) Chromium 54.16 (mg/kg)

Station	Results Exceeding Background
SOU217-003	Mercury 6.98 (mg/kg)

Station	Results Exceeding Background
SOU217-004	Mercury 7.37 (mg/kg)

Station	Results Exceeding Background
SOU217-005C	Chromium 44.01 (mg/kg)

Station	Results Exceeding Background
SOU217-005D	Arsenic 9.65 (mg/kg)

Station	Results Exceeding Background
SOU217-005J	Silver 11.75 (mg/kg)

Station	Results Exceeding Background
SOU217-006	Chromium 47.28 (mg/kg)

Station	Results Exceeding Background
SOU217-007	Antimony 0.39 (mg/kg) Cobalt 190 (mg/kg) Manganese 1690 (mg/kg) Nickel 29.6 (mg/kg)

Station	Results Exceeding Background
SOU217-008	Chromium 47.26 (mg/kg)

Station	Results Exceeding Background
SOU217-010	Nickel 76.24 (mg/kg)

Station	Results Exceeding Background
SOU217-012	Antimony 0.54 (mg/kg) Arsenic 10.7 (mg/kg) Chromium 49.9 (mg/kg) Magnesium 2610 (mg/kg) Selenium 1.3 (mg/kg) Sodium 344 (mg/kg) Vanadium 43.8 (mg/kg) Uranium-235/236 0.062 (pCi/g)

Station	Results Exceeding Background
SOU217-014	Chromium 46.67 (mg/kg)

Station	Results Exceeding Background
SOU217-014B	Nickel 60.06 (mg/kg)

Station	Results Exceeding Background
SOU217-015	Nickel 85.48 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 6.7.6. SWMU 217 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU217-015A	Mercury 9.2 (mg/kg)
	Nickel 74.74 (mg/kg)
	Silver 9.76 (mg/kg)

Station	Results Exceeding Background
SOU217-018	Nickel 61.78 (mg/kg)
	Silver 10.06 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 6.7.6. SWMU 217 Background Exceedances – Subsurface (Continued)

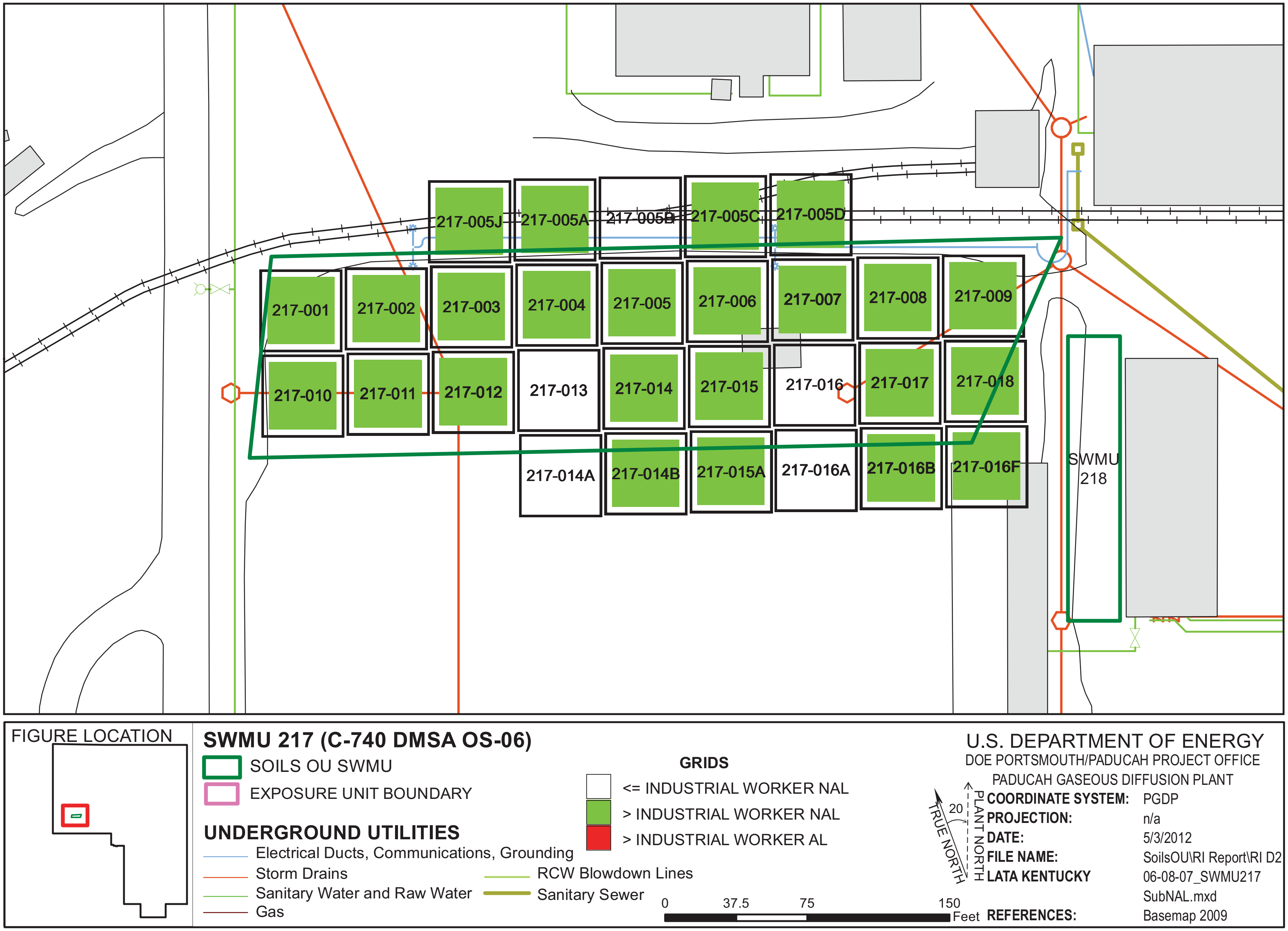


Figure 6.7.7. SWMU 217 NAL Exceedances - Subsurface Soil

Grid	Results Exceeding NAL
217-001	Arsenic 8.34 (mg/kg) Chromium 46.76 (mg/kg)
217-002	Arsenic 9.37 (mg/kg) Chromium 54.16 (mg/kg)
217-003	Chromium 40.74 (mg/kg) Mercury 6.98 (mg/kg)
217-004	Arsenic 6.7 (mg/kg) Chromium 39.6 (mg/kg) Mercury 7.37 (mg/kg)
217-005	Chromium 41.95 (mg/kg)
217-005A	Arsenic 7.07 (mg/kg)
217-005C	Chromium 44.01 (mg/kg)
217-005D	Arsenic 9.65 (mg/kg) Chromium 34.79 (mg/kg)
217-005J	Chromium 42.09 (mg/kg) Silver 11.75 (mg/kg)
217-006	Chromium 47.28 (mg/kg)
217-007	Arsenic 4.9 (mg/kg) Beryllium 0.3 (mg/kg) Chromium 36.82 (mg/kg) Cobalt 190 (mg/kg) Vanadium 17.4 (mg/kg)
217-008	Chromium 47.26 (mg/kg)
217-009	Chromium 42.83 (mg/kg)
217-010	Arsenic 9.77 (mg/kg) Chromium 53.46 (mg/kg) Nickel 76.24 (mg/kg)
217-011	Arsenic 8.33 (mg/kg) Chromium 41.33 (mg/kg) Nickel 59.09 (mg/kg)
217-012	Arsenic 10.7 (mg/kg) Beryllium 0.67 (mg/kg) Chromium 49.9 (mg/kg) Nickel 69.89 (mg/kg) Vanadium 43.8 (mg/kg)
217-014	Arsenic 6.94 (mg/kg) Chromium 46.67 (mg/kg)
217-014B	Nickel 60.06 (mg/kg)
217-015	Arsenic 6.84 (mg/kg) Nickel 85.48 (mg/kg)
217-015A	Chromium 39.36 (mg/kg) Mercury 9.2 (mg/kg) Nickel 74.74 (mg/kg)
217-016B	Arsenic 5 (mg/kg) Beryllium 0.88 (mg/kg) Chromium 32.95 (mg/kg) Cobalt 17.2 (mg/kg) Iron 28900 (mg/kg) Vanadium 37.9 (mg/kg)
217-016F	Antimony 2.7 (mg/kg) Arsenic 4.9 (mg/kg) Beryllium 0.51 (mg/kg) Vanadium 30.8 (mg/kg)
217-017	Antimony 3.1 (mg/kg) Arsenic 6.1 (mg/kg) Beryllium 0.64 (mg/kg) Chromium 35.59 (mg/kg) Cobalt 10.9 (mg/kg) Mercury 3.2 (mg/kg) Vanadium 35.9 (mg/kg)
217-018	Arsenic 7.66 (mg/kg) Nickel 61.78 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 6.7.7. SWMU 217 NAL Exceedances – Subsurface (Continued)

Metals

Metals were detected above the industrial worker NALs in the SWMU 217 subsurface soil. The following are the metals detected at or above both the background screening levels and the industrial worker NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Antimony	16F, 17	2
Arsenic	1, 2, 5D, 10, 11, 12	1, 2
Beryllium	16B	2
Chromium	1, 2, 5C, 6, 8, 10, 12, 14	1, 2
Cobalt	7, 16B	2
Iron	16B	2
Mercury	3, 4, 15A, 17	1, 2
Nickel	10, 11, 12, 14B, 15, 15A, 18	1, 2
Silver	5J	1
Vanadium	12, 16B	1, 2

Grids 5J in EU 1 and 5C, 5D, 14B, 15A, 16B and 16F in EU 2 are not located within the administrative boundary of SWMU 217; instead, they are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 217, as described in the Work Plan (DOE 2010a). Grids 5C and 5D (EU 2) and grid 5J (EU 1) border the northern edge of SWMU 217, and 14B, 15A and 16B (EU 2) border the southern edge of SWMU 217.

The maximum depth at which metals were detected at or above both background screening levels and the industrial worker NALs was 11 ft bgs. The end depths of the boreholes taken from grids 5C, 5D, 5J, 14B, 15A and 16B range from 1 to 14 ft bgs.

No metals were detected above the industrial worker ALs in the SWMU 217 subsurface soil.

The following are the metals detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Aluminum	16B, 16F	2
Antimony	7, 12, 16F, 17	1, 2
Arsenic	1, 2, 5D, 10, 11, 12	1, 2
Cobalt	7, 16B	2
Iron	16B	2
Manganese	7, 10	1, 2
Mercury	3, 4, 15A, 17	1, 2
Molybdenum[1]	7, 12, 16F, 17	1, 2
Nickel	7, 10, 11, 12, 14B, 15, 15A, 18	1, 2
Selenium	12, 16B, 17	1, 2
Silver	5J, 15A	1, 2
Vanadium	12, 16B	1, 2

[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Cobalt	7, 16B	2
Iron	16B	2
Manganese	7, 10	1, 2
Mercury	3, 4, 15A	1, 2
Nickel	15	2
Silver	15A, 15J, 18	1, 2
Vanadium	12, 16B	1, 2

PCBs

PCBs were not detected above the industrial worker NALs, the industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 217 subsurface soil.

SVOCs

No SVOCs were detected above the industrial worker NALs, the industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 217 subsurface soil.

VOCs

No VOCs were detected above the industrial worker NALs or the industrial worker ALs in the SWMU 217 subsurface soil.

The following are the VOCs detected in the SWMU 217 subsurface soil above the SSLs for the protection UCRS groundwater and the grids and EUs in which they were detected.

VOC	Grid	EU
1,1,1-trichloroethane	16B	2
1,1-dichloroethene	16B, 16F	2
1,2-dichloroethane	16B	2
Benzene	16B, 16F	2
Methylene chloride	17	2
Trichloroethene	16B, 16F	2

No VOCs were detected above the SSLs for the protection of RGA groundwater in the SWMU 217 subsurface soil.

Radionuclides

No radionuclides were detected above the industrial worker NALs, the industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 217 subsurface soil.

6.7.5 Fate and Transport

No target chemicals were identified for further evaluation of impacts to the RGA (Chapter 4). SWMU 217 has the potential of runoff to the west which flows to Outfall 008, but is not considered significant due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow (DOE 2008a). Ditches to the west were sampled as part of the SWOU SI and a final response action for internal ditches will be addressed by the SWOU, as described in the SMP (DOE 2012a). There are no underground pipelines at SWMU 217. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

6.7.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 217 for each EU were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and the cumulative HI for one or more EUs at SWMU 217 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 6.7.5 for the future industrial worker and the hypothetical resident. The excavation worker scenario did not identify COCs. Table 6.7.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 217 include metals. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 6.7.6.

6.7.7 SWMU 217 Summary

The following text summarizes the results for SWMU 217 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Plant processes that could have contributed to contamination at SWMU 217 are spills or discharges from the items that were stored that in the past, or leaching from hazardous substances that were stored exposed to the elements.

COPCs for surface and subsurface soils from SWMU 217 are shown on Tables 6.7.1–6.7.4 as those analytes with green boxes under the “Industrial Worker/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 11 ft bgs. A complete list of sampling results is provided in Appendix G. The COPCs identified for each EU in SWMU 217 are as follows:

- EU 1
  - Surface—metals, SVOCs
  - Subsurface—metals

Table 6.7.5. RGOs for SWMU 217

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3] 1 x 10^{-6}	RGOs for ELCR[3] 1 x 10^{-5}	RGOs for ELCR[3] 1 x 10^{-4}	HI[4]	RGOs for HI[3] 0.1	RGOs for HI[3] 1	RGOs for HI[3] 3
Future Industrial Worker											
1	Chromium	8.58E+01	mg/kg	2.8E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Cumulative			**2.8E-06**				**< 1**			
2	Arsenic	1.12E+01	mg/kg	1.1E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Chromium	1.02E+02	mg/kg	3.4E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Total PAH	5.05E-01	mg/kg	8.5E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Cumulative			**2.3E-05**				**< 1**			
Hypothetical Resident[5]											
1	Uranium-238	1.15E+00	pCi/g	3.3E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Manganese	7.70E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	5.34E+02	5.34E+03	1.60E+04
	Chromium	8.58E+01	mg/kg	5.5E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Cobalt	1.96E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.8	2.30E+00	2.30E+01	6.91E+01
	Cumulative			**8.8E-06**				**1**			
2	Arsenic	1.12E+01	mg/kg	4.7E-05	2.35E-01	2.35E+00	2.35E+01	0.7	1.64E+00	1.64E+01	4.93E+01
	Chromium	1.02E+02	mg/kg	6.5E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Cobalt	1.74E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.8	2.30E+00	2.30E+01	6.91E+01
	Iron	3.09E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.6	5.48E+03	5.48E+04	1.64E+05
	Manganese	8.44E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	5.34E+02	5.34E+03	1.60E+04
	Mercury	8.59E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.4	2.35E+00	2.35E+01	7.04E+01
	Total PAH	5.05E-01	mg/kg	2.6E-05	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Cumulative			**8.0E-05**				**2.5**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.29, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.29, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 6.7.6. Ecological Screening for SWMU 217

Ground Cover	Near a Surface Water Body?	Total HI (max) [a]	Priority COPECs	Background (mg/kg) [b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Mostly gravel	No	218	Antimony	2.10E-01	1.00E+01	2.70E-01	37
			Mercury	2.00E-01	8.59E+00	1.00E-01	86
			Selenium	8.00E-01	1.00E+01	5.20E-01	19
			Uranium	4.90E+00	1.00E+02	5.00E+00	20
			Zinc	6.50E+01	5.89E+02	4.60E+01	13

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

- EU 2
  - — Surface—metals, SVOCs, VOCs
  - — Subsurface—metals, VOCs

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

SWMU 217 has the potential of runoff to the west where it flows to Outfall 008, but this potential runoff is not considered significant. The contaminants at SWMU 217 are readily adsorbed to soil particles, so they do not migrate easily. There are no known underground pipelines at SWMU 217. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 217.

- Future Industrial Worker
  - — Arsenic
  - — Chromium
  - — Total PAHs
- Excavation worker
  - — None
- Hypothetical Resident (hazards evaluated against the child resident)
  - — Arsenic
  - — Chromium
  - — Cobalt
  - — Iron
  - — Manganese
  - — Mercury

— Total PAHs
— Uranium-238

Of the above, there are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 217. There are no priority COCs for other scenarios.

For SWMU 217, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Antimony
- Mercury
- Selenium
- Uranium
- Zinc

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 217 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 217 is adjacent to SWMU 136, the C-740 TCE Spill Site, which is an NFA site in the 2012 SMP. No other SWMUs abut SWMU 217. There are no physical or cultural obstacles or cultural resources that would affect to a response action at SWMU 217. A response action at SWMU 217 would not have an impact on other integrator OUs.

6.7.8 SWMU 217 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 217; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial land use as shown in the SMP (DOE 2012a).

6.8 SWMU 221, C-635, OS-10

6.8.1 Background

SWMU 221 is a 750 ft^2 area located east of the C-635 Recirculating Cooling Water (RCW) Pump House in the central portion of the plant site at the former location of DMSA OS-10. The area contained approximately 414 ft^3 of scrap metal and an empty sulfuric acid tank. The items were characterized and dispositioned properly.

A radiological survey of the area did not find anything above background levels (DOE 2002e). The Closure Report documented that no sign of a spill or release was found. The FI/CR was submitted September 18, 2002, to KDWM. KDWM approved the FI/CR on April 15, 2004. RCRA closure was not required for this SWMU, because no hazardous wastes were stored in this unit. The area currently is empty.

6.8.2 Fieldwork Summary

One grid sample for the surface only was planned and collected at this unit. Five pipeline samples were planned, of which 2 were collected. Field analytical results indicated that contingency samples were needed because of lead and zinc. Of those 70 planned contingency samples, only 28 were collected due to the presence of utilities and no recovery. Figure A.9 in Appendix A is the sample rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 6.8.1) using a FIDLER; the 2,014 measurements ranged from 5,631 to 12,435 gross cpm. The ground cover for this SWMU is mostly gravel in the northwest corner and gradually turning to a grass and soil mix in the southeast corner. A judgmental grab sample was not collected as no project action limit was exceeded.

6.8.3 Nature and Extent of Contamination—Surface Soils

For SWMU 221 the representative data set for surface soils is presented in Tables 6.8.1 and 6.8.2 and provides the nature of the contamination in SWMU 221 surface soils. Figures 6.8.2–6.8.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 221 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 221 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 221 surface soil. The following are the metals detected at or above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Chromium	3, 4, 5, 4A, 4B, 4C, 4D, 5A, 5B, 5C, 5E
Iron	5E
Nickel	4B, 4E

* SWMU 221 consists of one EU.

Grids 4A, 4B, 4C, 4D, 4E, 5A, 5B, 5C, and 5E are not located within the administrative boundary of SWMU 221; instead, they are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 221, as described in the Work Plan (DOE 2010a).

No metals were detected above the industrial worker ALs in the SWMU 221 surface soil.

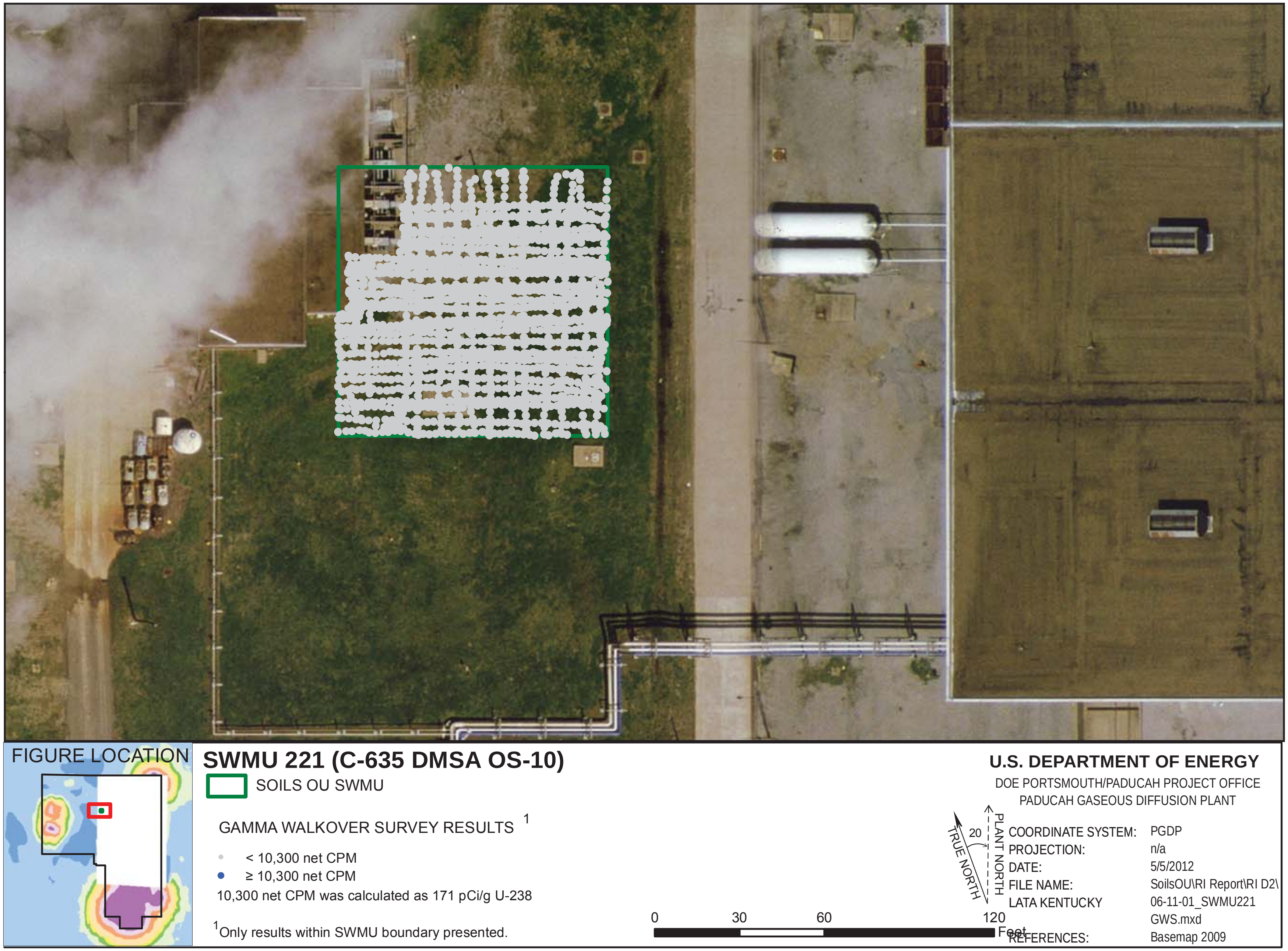


Figure 6.8.1. SWMU 221 Gamma Walkover Survey

Table 6.8.1. Surface Soil Historical Data Summary: SWMU 221 DMSA OS-10

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Industrial Worker FOE	Industrial Worker NAL	Industrial Worker FOE	Industrial Worker AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
PPCB	PCB, Total	mg/kg	5.00E-01	5.00E-01	5.00E-01	0/1	1/1	0/1	n/a	1/1	1.88E-01	0/1	1.88E+01	0/1	1/1	-

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.8.2. Surface Soil RI Data Summary: SWMU 221 C-635 DMSA Outside-10

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	4.17E+03	4.17E+03	4.17E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.3 - 5.3
METAL	Antimony	mg/kg	3.00E-01	3.00E-01	3.00E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.53 - 0.53
METAL	Arsenic	mg/kg	2.60E+00	1.08E+01	6.73E+00	0/18	8/18	0/18	1.20E+01	8/18	9.97E-01	0/18	9.97E+01	0/18	8/18	1.1 - 11
METAL	Barium	mg/kg	2.21E+02	2.21E+02	2.21E+02	0/1	1/1	1/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.1 - 2.1
METAL	Beryllium	mg/kg	1.70E-01	1.70E-01	1.70E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.11 - 0.11
METAL	Cadmium	mg/kg	3.90E-01	3.90E-01	3.90E-01	0/1	1/1	1/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	1/1	0.053 - 0.053
METAL	Calcium	mg/kg	2.43E+05	2.43E+05	2.43E+05	0/1	1/1	1/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	528 - 528
METAL	Chromium	mg/kg	1.89E+01	7.28E+01	5.24E+01	0/18	13/18	13/18	1.60E+01	12/18	3.02E+01	0/18	3.02E+03	0/18	0/18	1.1 - 85
METAL	Cobalt	mg/kg	2.20E+00	2.20E+00	2.20E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.21 - 0.21
METAL	Copper	mg/kg	5.70E+00	2.89E+01	1.88E+01	0/18	8/18	7/18	1.90E+01	0/18	1.43E+03	0/18	2.24E+05	0/18	0/18	1.1 - 35
METAL	Iron	mg/kg	6.67E+03	4.35E+04	1.48E+04	0/18	18/18	1/18	2.80E+04	1/18	2.51E+04	0/18	3.92E+06	18/18	18/18	5.3 - 100
METAL	Lead	mg/kg	7.00E+00	4.58E+01	1.78E+01	0/18	17/18	1/18	3.60E+01	0/18	4.00E+02	0/18	4.00E+02	0/18	12/18	0.32 - 13
METAL	Magnesium	mg/kg	1.38E+04	1.38E+04	1.38E+04	0/1	1/1	1/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	52.8 - 52.8
METAL	Manganese	mg/kg	9.95E+01	4.98E+02	2.56E+02	0/18	18/18	0/18	1.50E+03	0/18	2.58E+03	0/18	1.16E+05	18/18	18/18	0.21 - 85
METAL	Mercury	mg/kg	1.21E-02	1.21E-02	1.21E-02	0/18	1/18	0/18	2.00E-01	0/18	9.00E-01	0/18	7.85E+02	0/18	0/18	0.0352 - 10
METAL	Molybdenum	mg/kg	4.30E-01	4.30E-01	4.30E-01	0/18	1/18	0/18	n/a	0/18	1.79E+02	0/18	2.80E+04	0/18	1/18	0.53 - 15
METAL	Nickel	mg/kg	7.70E+00	8.03E+01	4.37E+01	0/18	3/18	2/18	2.10E+01	2/18	4.28E+01	0/18	3.18E+04	2/18	3/18	0.53 - 65
METAL	Selenium	mg/kg	7.70E-01	7.70E-01	7.70E-01	0/18	1/18	0/18	8.00E-01	0/18	1.79E+02	0/18	2.80E+04	0/18	1/18	0.53 - 20
METAL	Silver	mg/kg	4.30E-02	4.30E-02	4.30E-02	0/18	1/18	0/18	2.30E+00	0/18	1.08E+01	0/18	9.15E+03	0/18	0/18	0.21 - 10
METAL	Sodium	mg/kg	1.88E+02	1.88E+02	1.88E+02	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	21.1 - 21.1
METAL	Thallium	mg/kg	1.30E-01	1.30E-01	1.30E-01	0/1	1/1	0/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	0/1	0.21 - 0.21
METAL	Uranium	mg/kg	5.79E+00	1.64E+01	9.84E+00	0/18	10/18	10/18	4.90E+00	0/18	1.07E+02	0/18	1.65E+04	0/18	2/18	0.02 - 20
METAL	Vanadium	mg/kg	1.04E+01	1.04E+01	1.04E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	3.83E+01	1.61E+02	7.84E+01	0/18	18/18	12/18	6.50E+01	0/18	1.08E+04	0/18	1.68E+06	0/18	18/18	2.1 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	1.88E-01	0/11	1.88E+01	0/11	0/11	0.32 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.7 - 1.7
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.35 - 0.35
SVOA	Acenaphthylene	mg/kg	1.50E-01	1.50E-01	1.50E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Anthracene	mg/kg	9.50E-02	9.50E-02	9.50E-02	1/1	1/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.35 - 0.35
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Benzo(ghi)perylene	mg/kg	4.60E-01	4.60E-01	4.60E-01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.8.2. Surface Soil RI Data Summary: SWMU 221 C-635 DMSA Outside-10 (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.007 - 0.007
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	1.40E-01	1.40E-01	1.40E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Di-n-butyl phthalate	mg/kg	9.60E-02	9.60E-02	9.60E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Fluoranthene	mg/kg	7.60E-01	7.60E-01	7.60E-01	0/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.35 - 0.35
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.35 - 0.35
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.35 - 0.35
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.7 - 0.7
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.35 - 0.35
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.007 - 0.007
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.7 - 1.7
SVOA	Phenanthrene	mg/kg	9.60E-02	9.60E-02	9.60E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Pyrene	mg/kg	7.50E-01	7.50E-01	7.50E-01	0/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	1/1	0.35 - 0.35
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.7 - 0.7
SVOA	Total PAH	mg/kg	1.02E+00	1.02E+00	1.02E+00	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	1/1	1/1	-
RADS	Alpha activity	pCi/g	1.77E+01	1.77E+01	1.77E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	4.3 - 4.3
RADS	Americium-241	pCi/g	1.00E-02	1.00E-02	1.00E-02	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.029 - 0.029
RADS	Beta activity	pCi/g	2.75E+01	2.75E+01	2.75E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.7 - 3.7
RADS	Cesium-137	pCi/g	2.20E-02	2.20E-02	2.20E-02	0/1	1/1	0/1	4.90E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.067 - 0.067
RADS	Neptunium-237	pCi/g	7.00E-02	7.00E-02	7.00E-02	0/1	1/1	0/1	1.00E-01	0/1	2.71E-01	0/1	2.71E+01	0/1	1/1	0.03 - 0.03
RADS	Plutonium-238	pCi/g	1.60E-02	1.60E-02	1.60E-02	0/1	1/1	0/1	7.30E-02	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.027 - 0.027
RADS	Plutonium-239/240	pCi/g	1.70E-03	1.70E-03	1.70E-03	0/1	1/1	0/1	2.50E-02	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.017 - 0.017
RADS	Technetium-99	pCi/g	2.20E-01	2.20E-01	2.20E-01	0/1	1/1	0/1	2.50E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	0/1	0.49 - 0.49
RADS	Thorium-228	pCi/g	2.43E-01	2.43E-01	2.43E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.075 - 0.075
RADS	Thorium-230	pCi/g	8.40E-01	8.40E-01	8.40E-01	0/1	1/1	0/1	1.50E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.05 - 0.05
RADS	Thorium-232	pCi/g	2.63E-01	2.63E-01	2.63E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.016 - 0.016
RADS	Uranium-234	pCi/g	1.20E+00	1.20E+00	1.20E+00	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	6.70E-02	6.70E-02	6.70E-02	0/1	1/1	1/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.009 - 0.009
RADS	Uranium-238	pCi/g	1.93E+00	1.93E+00	1.93E+00	0/1	1/1	1/1	1.20E+00	1/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.007 - 0.007

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

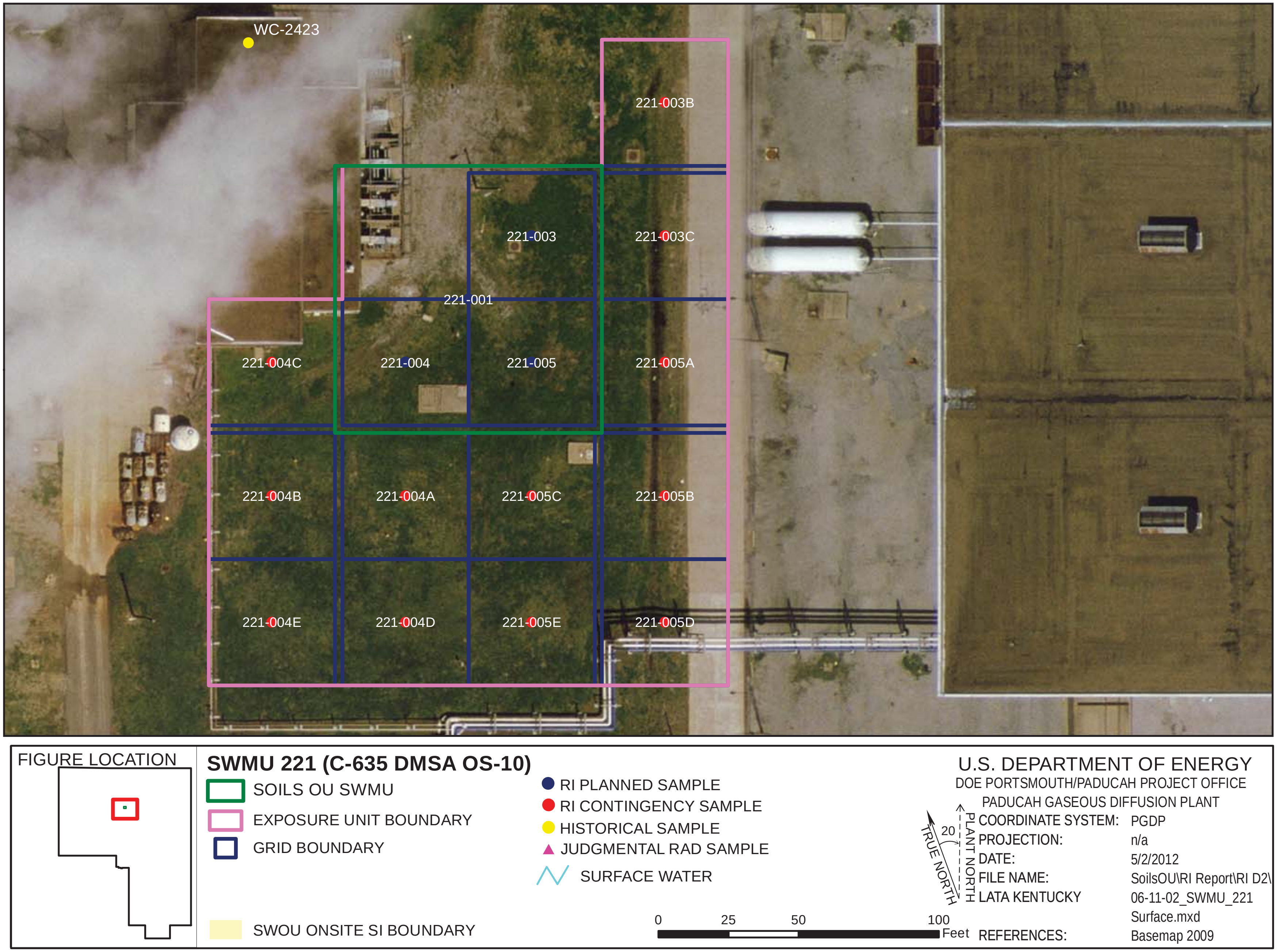


Figure 6.8.2. SWMU 221 Sample Locations - Surface Soil

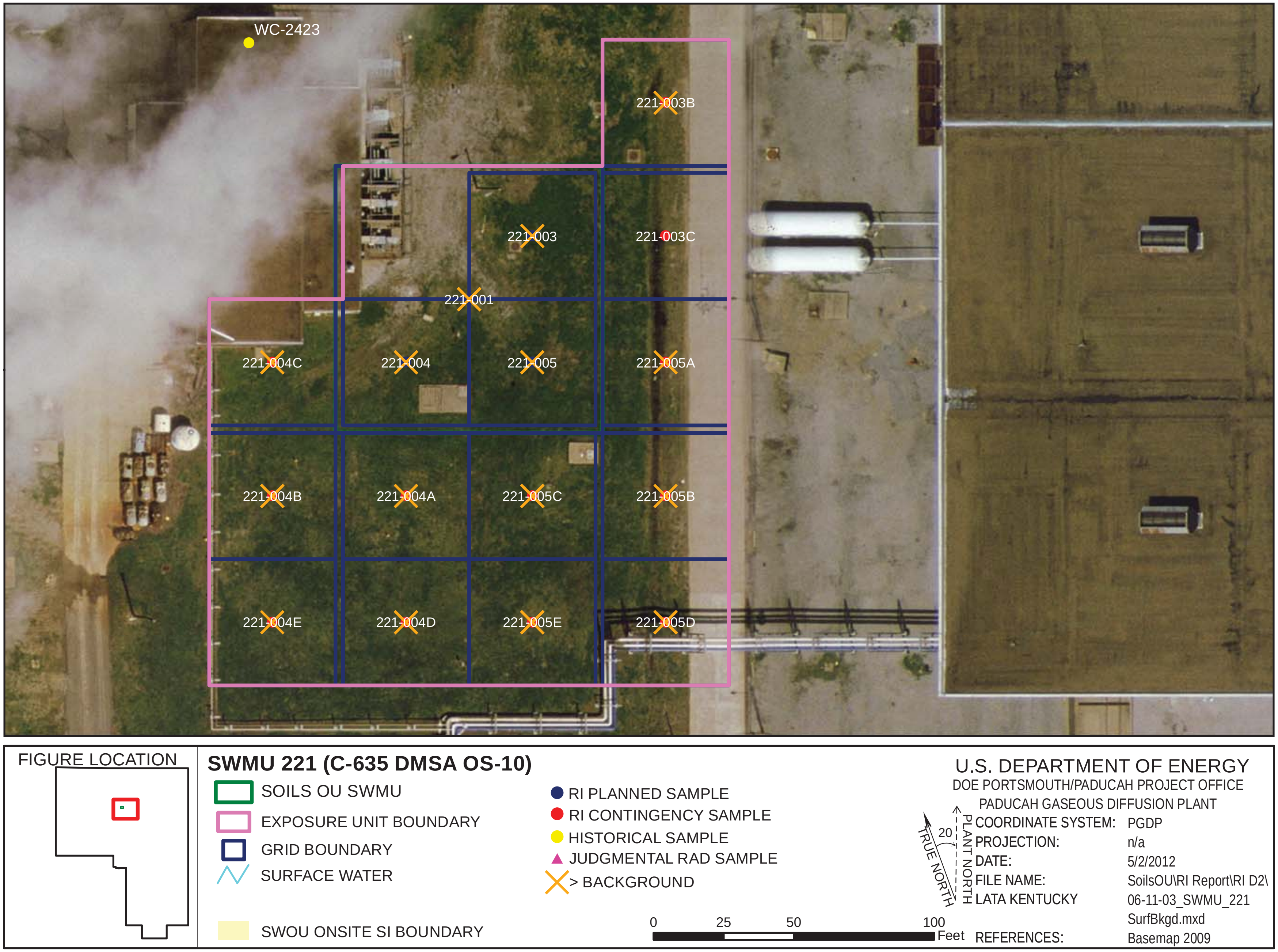


Figure 6.8.3. SWMU 221 Background Exceedances - Surface Soil

Station	Results Exceeding Background
SOU221-001	Antimony (0.3 mg/kg)
	Barium (221 mg/kg)
	Cadmium (0.39 mg/kg)
	Calcium (243000 mg/kg)
	Chromium (18.9 mg/kg)
	Magnesium (13800 mg/kg)
	Uranium (5.79 mg/kg)
	Zinc (161.35 mg/kg)
	Uranium-235/236 (0.067 pCi/g)
	Uranium-238 (1.93 pCi/g)

Station	Results Exceeding Background
SOU221-003	Chromium (59.44 mg/kg)
	Uranium (9.41 mg/kg)
	Zinc (71.9 mg/kg)

Station	Results Exceeding Background
SOU221-003B	Uranium (7.94 mg/kg)
	Zinc (70.18 mg/kg)

Station	Results Exceeding Background
SOU221-004	Chromium (46.42 mg/kg)
	Copper (19.95 mg/kg)

Station	Results Exceeding Background
SOU221-004A	Chromium (58.85 mg/kg)
	Uranium (13.57 mg/kg)
	Zinc (91.15 mg/kg)

Station	Results Exceeding Background
SOU221-004B	Chromium (72.04 mg/kg)
	Nickel (79.06 mg/kg)
	Zinc (84.05 mg/kg)

Station	Results Exceeding Background
SOU221-004C	Chromium (72.82 mg/kg)
	Copper (19.94 mg/kg)
	Uranium (12.98 mg/kg)
	Zinc (132.83 mg/kg)

Station	Results Exceeding Background
SOU221-004D	Chromium (50.93 mg/kg)
	Uranium (11.54 mg/kg)

Station	Results Exceeding Background
SOU221-004E	Nickel (80.29 mg/kg)

Station	Results Exceeding Background
SOU221-005	Chromium (62.18 mg/kg)
	Copper (19.43 mg/kg)
	Uranium (13.28 mg/kg)
	Zinc (91.59 mg/kg)

Station	Results Exceeding Background
SOU221-005A	Chromium (39.21 mg/kg)
	Copper (22.35 mg/kg)

Station	Results Exceeding Background
SOU221-005B	Chromium (48.07 mg/kg)

Station	Results Exceeding Background
SOU221-005C	Chromium (62.26 mg/kg)
	Copper (24.11 mg/kg)
	Uranium (7.91 mg/kg)
	Zinc (86.9 mg/kg)

Station	Results Exceeding Background
SOU221-005D	Lead (45.81 mg/kg)
	Uranium (7.68 mg/kg)
	Zinc (95.27 mg/kg)

Station	Results Exceeding Background
SOU221-005E	Chromium (67.4 mg/kg)
	Copper (28.92 mg/kg)
	Iron (43475.53 mg/kg)
	Uranium (16.37 mg/kg)
	Zinc (94.1 mg/kg)

NOTE: maximum detections only shown for location.

Figure 6.8.3. SWMU 221 Background Exceedances – Surface (Continued)

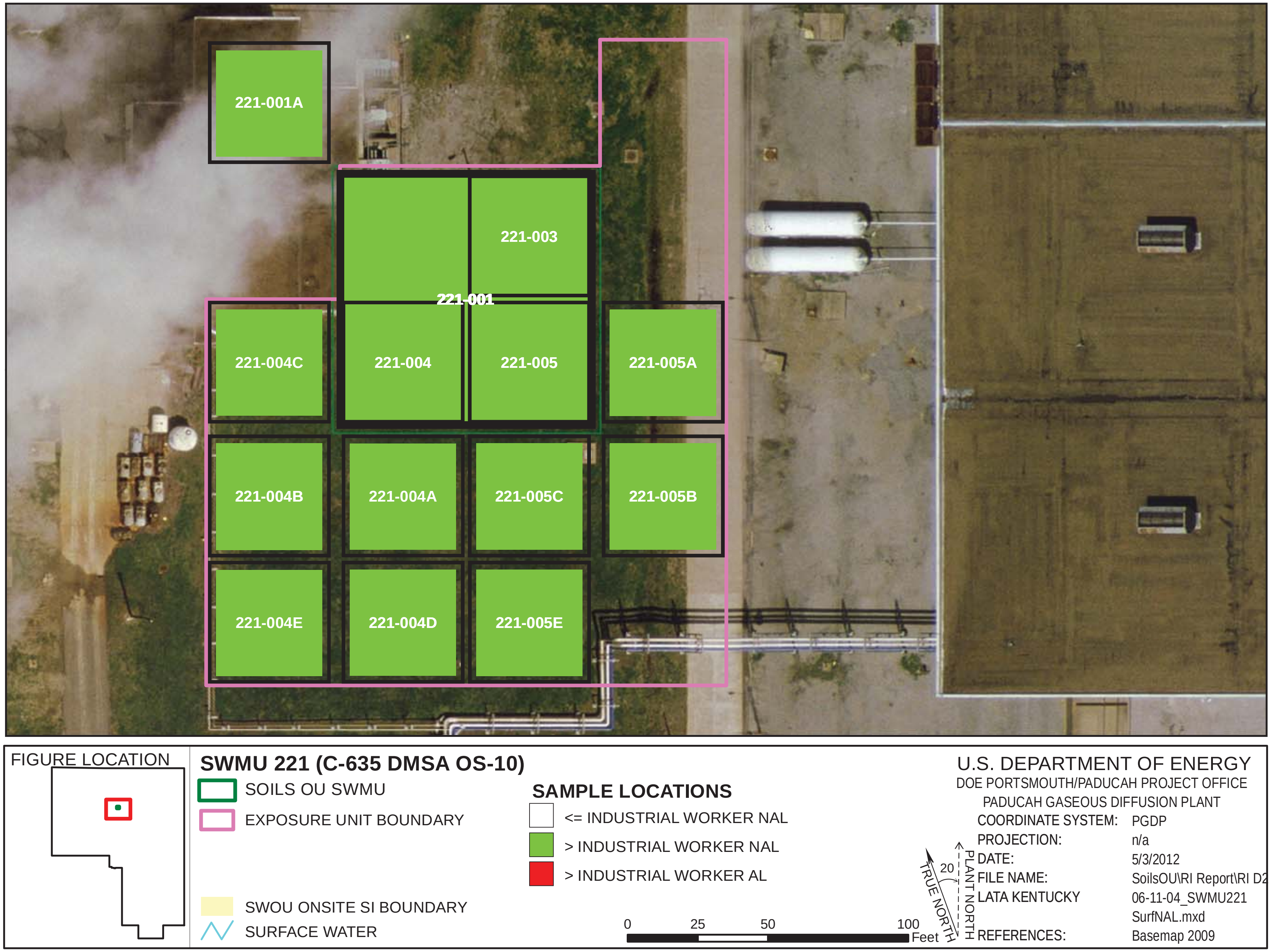


Figure 6.8.4. SWMU 221 NAL Exceedances - Surface Soil

Grid	Results Exceeding NAL
221-001	Arsenic (2.6 mg/kg)
	Beryllium (0.17 mg/kg)
	Vanadium (10.4 mg/kg)
	Uranium-238 (1.93 pCi/g)
	Total PAH (1.02258 mg/kg)

Grid	Results Exceeding NAL
221-001A	PCB, Total (0.5 mg/kg)

Grid	Results Exceeding NAL
221-003	Arsenic (6.69 mg/kg)
	Chromium (59.44 mg/kg)

Grid	Results Exceeding NAL
221-004	Arsenic (7.78 mg/kg)
	Chromium (46.42 mg/kg)

Grid	Results Exceeding NAL
221-004A	Chromium (58.85 mg/kg)

Grid	Results Exceeding NAL
221-004B	Chromium (72.04 mg/kg)
	Nickel (79.06 mg/kg)

Grid	Results Exceeding NAL
221-004C	Chromium (72.82 mg/kg)

Grid	Results Exceeding NAL
221-004D	Arsenic (8 mg/kg)
	Chromium (50.93 mg/kg)

Grid	Results Exceeding NAL
221-004E	Nickel (80.29 mg/kg)

Grid	Results Exceeding NAL
221-005	Arsenic (7.47 mg/kg)
	Chromium (62.18 mg/kg)

Grid	Results Exceeding NAL
221-005A	Arsenic (8.49 mg/kg)
	Chromium (39.21 mg/kg)

NOTE: maximum detections only shown for location.

Grid	Results Exceeding NAL
221-005B	Arsenic (6.2 mg/kg)
	Chromium (48.07 mg/kg)

Grid	Results Exceeding NAL
221-005C	Arsenic (10.78 mg/kg)
	Chromium (62.26 mg/kg)

Grid	Results Exceeding NAL
221-005E	Chromium (67.4 mg/kg)
	Iron (43475.53 mg/kg)

Figure 6.8.4. SWMU 221 NAL Exceedances – Surface (Continued)

The following are the metals detected in the SWMU 221 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	1
Barium	1
Cadmium	1
Iron	5E
Lead	5D
Molybdenum[1]	1
Nickel	4B, 4E
Uranium	4A, 5E
Zinc	1, 3, 3B, 4A, 4B, 4C, 5, 5C, 5D, 5E

* SWMU 221 consists of one EU.
[1] No background value is available.

Iron in grid 5E and nickel in grids 4B and 4E were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the industrial worker NALs and the SSLs for the protection of the UCRS groundwater in the surface soil of grid 1A of SWMU 221. This grid is located to the northeast of SWMU 221.

Total PCBs were not detected above the industrial worker ALs or the SSLs for the protection of RGA groundwater in the SWMU 221 surface soils.

SVOCs

Total PAHs were detected above the industrial worker NALs in the SWMU 221 surface soil in grid 1. No SVOCs were detected above the industrial worker ALs. Pyrene and Total PAHs (grid 1) were detected above the SSLs for the protection of UCRS groundwater and Total PAHs (grid 1) also were detected above the SSLs for the protection of RGA groundwater in the SWMU 221 surface soil.

VOCs

No surface soil samples from SWMU 221 were analyzed for VOCs.

Radionuclides

One surface soil sample from SWMU 221 was analyzed for radionuclides. Uranium-238 was detected above both the background screening level and the industrial worker NAL in the grid 1 sample.

No radionuclides were detected above both the background screening levels and the industrial worker ALs or the SSLs for the protection of UCRS and RGA groundwater.

6.8.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 221 the representative data set for subsurface soils is presented in Tables 6.8.3 and 6.8.4 and provides the nature of the contamination in SWMU 221 subsurface soils. Figures 6.8.5–6.8.7 illustrate the horizontal extent. A complete list of the sampling results, including sampling depths, is provided in

Table 6.8.3. Subsurface Soil Historical Data Summary: SWMU 221 DMSA OS-10

Type	Analysis	Unit	Detected Results*			J-qualified	FOD	Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD		FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	

This is no subsurface data.

(red)	One or more samples exceed AL value[1]
(green)	One or more samples exceed NAL value[2]
(orange)	One or more samples exceed background value
(light blue)	One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.8.4. Subsurface Soil RI Data Summary: SWMU 221 C-635 DMSA Outside-10

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	1.04E+04	5.28E+04	2.46E+04	0/3	3/3	1/3	1.20E+04	1/3	3.32E+04	0/3	3.97E+06	0/3	3/3	5.5 - 26
METAL	Antimony	mg/kg	2.50E-01	1.10E+00	5.73E-01	0/3	3/3	3/3	2.10E-01	0/3	2.53E+00	0/3	1.51E+03	0/3	2/3	0.55 - 2.6
METAL	Arsenic	mg/kg	5.77E+00	2.84E+01	1.16E+01	0/14	9/14	3/14	7.90E+00	9/14	9.97E-01	0/14	9.97E+01	1/14	9/14	1.1 - 11
METAL	Barium	mg/kg	1.21E+02	1.63E+03	6.29E+02	0/3	3/3	1/3	1.70E+02	1/3	5.92E+02	0/3	3.78E+05	0/3	3/3	2.2 - 10.4
METAL	Beryllium	mg/kg	4.10E-01	2.70E+00	1.31E+00	0/3	3/3	2/3	6.90E-01	3/3	1.40E-02	0/3	9.22E+00	0/3	0/3	0.11 - 0.52
METAL	Cadmium	mg/kg	2.90E-02	7.00E-01	2.58E-01	0/3	3/3	1/3	2.10E-01	0/3	3.16E+00	0/3	3.16E+02	0/3	1/3	0.055 - 0.26
METAL	Calcium	mg/kg	6.80E+02	1.41E+04	6.26E+03	0/3	3/3	1/3	6.10E+03	0/3	n/a	0/3	n/a	n/a	n/a	54.5 - 260
METAL	Chromium	mg/kg	3.54E+01	6.90E+01	4.63E+01	0/14	8/14	2/14	4.30E+01	8/14	3.02E+01	0/14	3.02E+03	0/14	0/14	1.1 - 85
METAL	Cobalt	mg/kg	5.10E+00	1.44E+02	5.33E+01	0/3	3/3	1/3	1.30E+01	2/3	1.05E+01	0/3	1.52E+03	3/3	3/3	0.22 - 1
METAL	Copper	mg/kg	1.02E+01	7.91E+01	3.43E+01	0/14	3/14	1/14	2.50E+01	0/14	1.43E+03	0/14	2.24E+05	0/14	1/14	1.1 - 35
METAL	Iron	mg/kg	9.40E+03	7.99E+04	2.26E+04	0/14	14/14	1/14	2.80E+04	2/14	2.51E+04	0/14	3.92E+06	14/14	14/14	5.5 - 100
METAL	Lead	mg/kg	7.15E+00	6.07E+01	1.95E+01	0/14	14/14	1/14	2.30E+01	0/14	4.00E+02	0/14	4.00E+02	0/14	7/14	0.33 - 13
METAL	Magnesium	mg/kg	1.36E+03	7.62E+03	3.57E+03	0/3	3/3	1/3	2.10E+03	0/3	n/a	0/3	n/a	n/a	n/a	54.5 - 260
METAL	Manganese	mg/kg	1.82E+02	1.31E+04	1.89E+03	0/14	14/14	1/14	8.20E+02	1/14	2.58E+03	0/14	1.16E+05	14/14	14/14	0.22 - 85
METAL	Mercury	mg/kg	6.42E-02	1.23E+01	6.09E+00	0/14	4/14	3/14	1.30E-01	3/14	9.00E-01	0/14	7.85E+02	3/14	3/14	0.0363 - 10
METAL	Molybdenum	mg/kg	5.60E-01	4.00E+00	1.81E+00	0/14	3/14	0/14	n/a	0/14	1.79E+02	0/14	2.80E+04	0/14	3/14	0.55 - 15
METAL	Nickel	mg/kg	1.37E+01	1.39E+02	7.34E+01	0/14	4/14	3/14	2.20E+01	3/14	4.28E+01	0/14	3.18E+04	2/14	4/14	0.55 - 65
METAL	Selenium	mg/kg	9.50E-01	9.80E+00	4.18E+00	0/14	3/14	3/14	7.00E-01	0/14	1.79E+02	0/14	2.80E+04	0/14	3/14	0.55 - 20
METAL	Silver	mg/kg	2.30E-02	9.74E+00	1.44E+00	0/14	4/14	1/14	2.70E+00	0/14	1.08E+01	0/14	9.15E+03	1/14	2/14	0.22 - 10
METAL	Sodium	mg/kg	6.14E+01	3.01E+02	1.99E+02	0/3	3/3	0/3	3.40E+02	0/3	n/a	0/3	n/a	n/a	n/a	21.8 - 104
METAL	Thallium	mg/kg	1.70E-01	2.40E+00	9.23E-01	0/3	3/3	1/3	3.40E-01	0/3	2.87E+00	0/3	4.48E+02	0/3	3/3	0.22 - 1
METAL	Uranium	mg/kg	1.30E+00	8.11E+00	4.33E+00	0/14	4/14	2/14	4.60E+00	0/14	1.07E+02	0/14	1.65E+04	0/14	0/14	0.11 - 20
METAL	Vanadium	mg/kg	2.62E+01	1.08E+02	5.74E+01	0/3	3/3	2/3	3.70E+01	3/3	1.51E-01	1/3	9.30E+01	3/3	3/3	1.1 - 5.2
METAL	Zinc	mg/kg	2.43E+01	2.33E+02	6.15E+01	0/14	14/14	1/14	6.00E+01	0/14	1.08E+04	0/14	1.68E+06	0/14	14/14	2.2 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.88E-01	0/3	1.88E+01	0/3	0/3	5 - 5

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

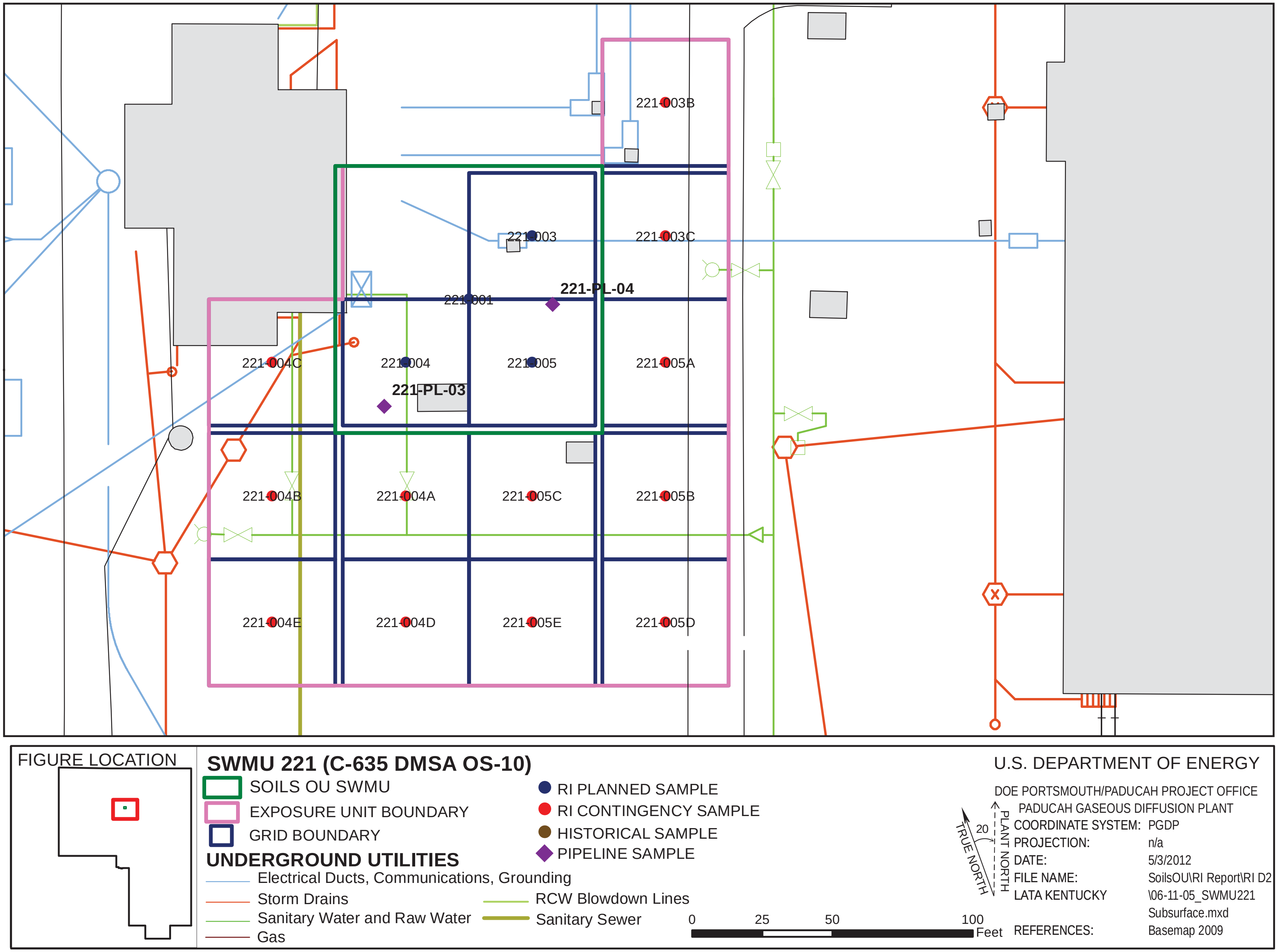


Figure 6.8.5. SWMU 221 Sample Locations - Subsurface Soil

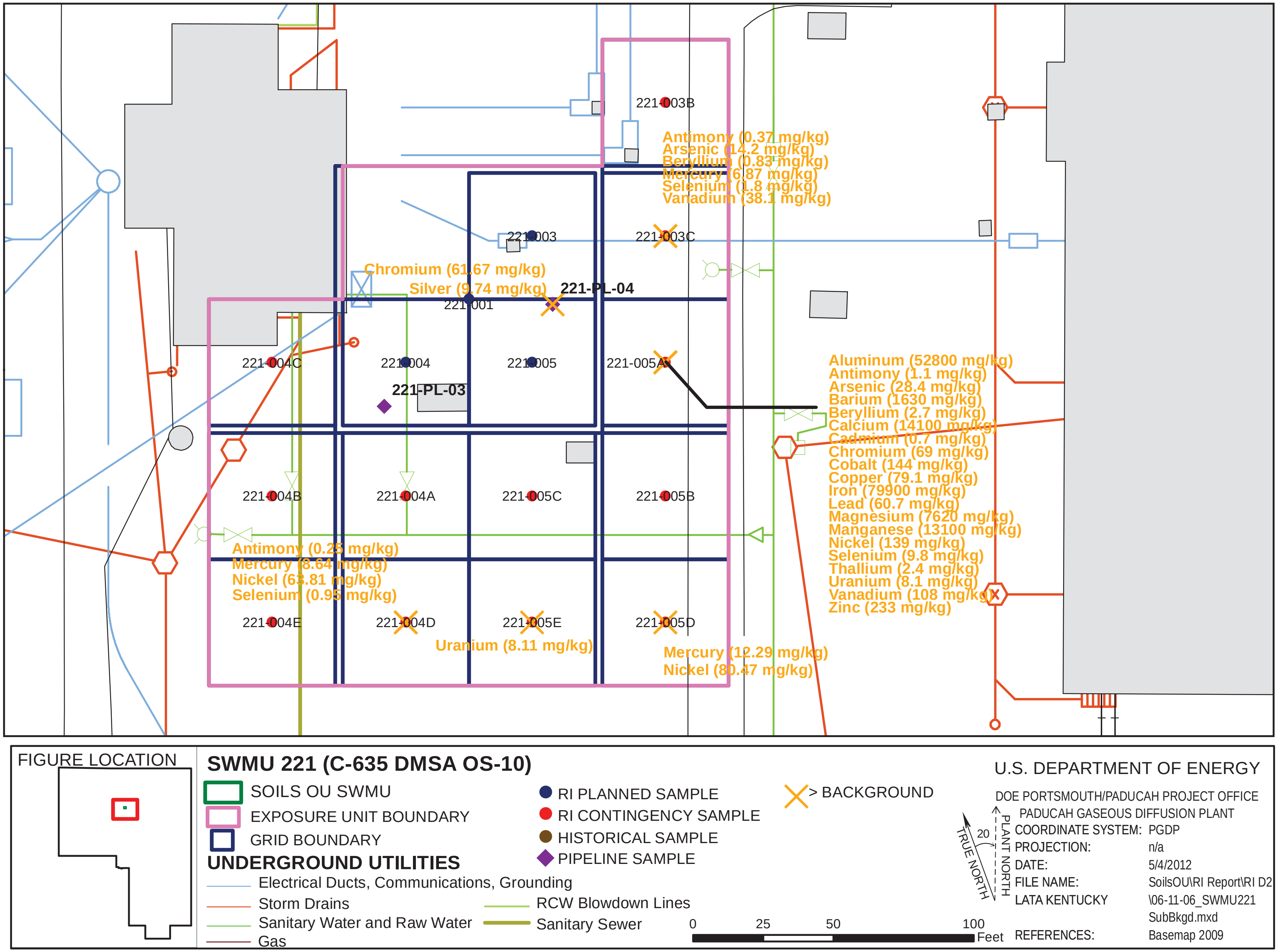


Figure 6.8.6. SWMU 221 Background Exceedances - Subsurface Soil

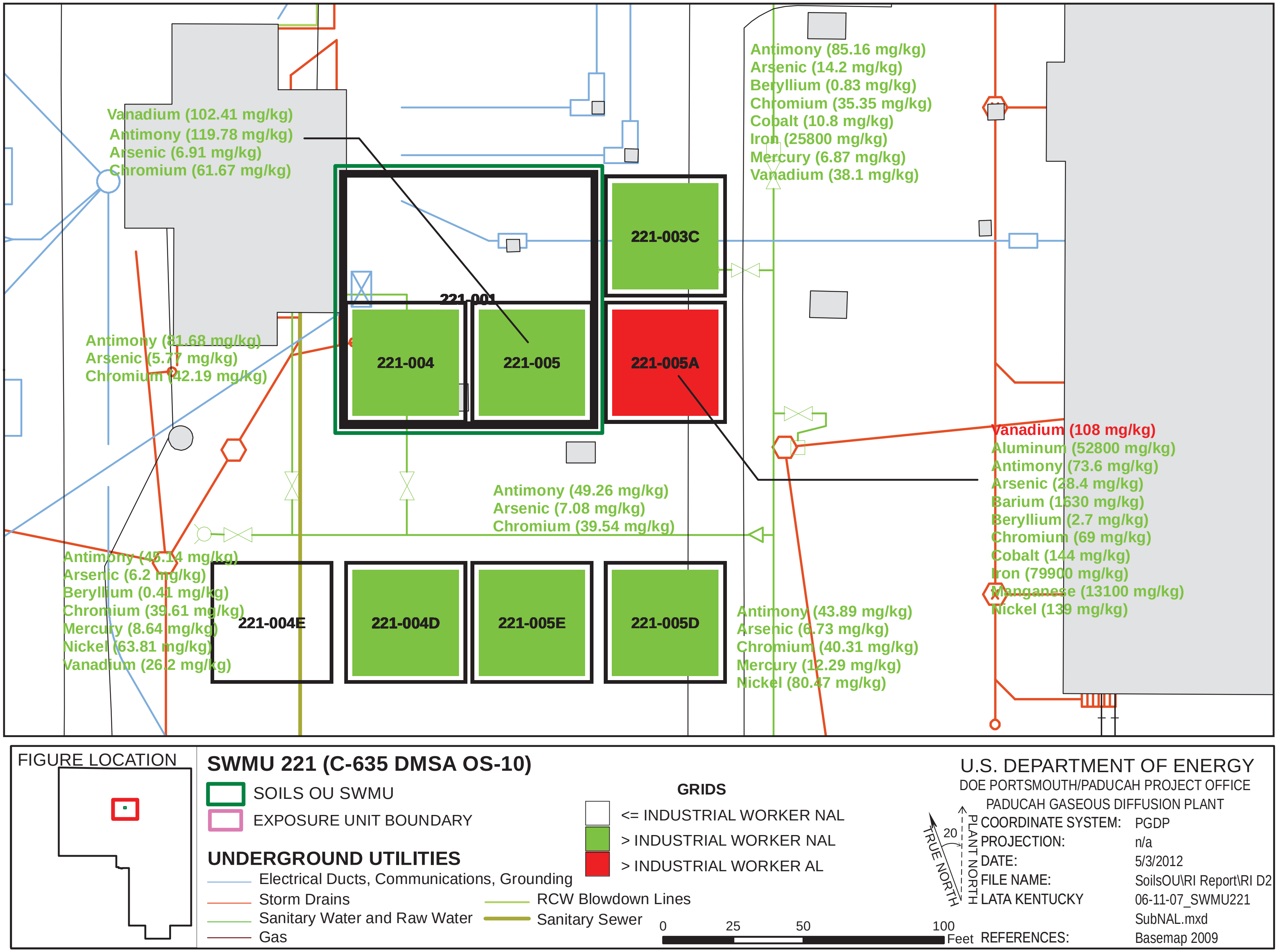


Figure 6.8.7. SWMU 221 NAL Exceedances - Subsurface Soil

Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 221 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 221 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 221 subsurface soil. The following are the metals detected at or above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Aluminum	5A
Arsenic	3C, 5A
Barium	5A
Beryllium	3C, 5A
Chromium	5, 5A
Cobalt	5A
Iron	5A
Manganese	5A
Mercury	3C, 4D, 5D
Nickel	4D, 5A, 5D
Vanadium	3C, 5A

* SWMU 221 consists of one EU.

Grids 3C, 4D, 5A, 5B, and 5D are not located within the administrative boundary of SWMU 221; instead, they are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 221, as described in the Work Plan (DOE 2010a).

The maximum depth at which metals were detected at or above the background screening levels and the industrial worker NALs as 10 ft bgs. The end depths of the boreholes taken from grids 3C, 4D, 5A, 5B, and 5D range from 1 to 10 ft bgs.

Vanadium was detected above the industrial worker AL. The AL used for screening is based on an uncertain toxicity value [i.e., reference dose (for vanadium metal), see Appendix D] that likely is not representative of the vanadium compounds native to the soils at PGDP; therefore this exceedance is uncertain. This exceedance is bounded to the north, south, and west by sampling and to the east by a road and building.

The following are the metals detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Aluminum	5A
Antimony	3C, 5A
Arsenic	3C, 5A
Barium	5A
Cadmium	5A
Cobalt	5A
Copper	5A
Iron	5A

Metal	Grid
Lead	5A
Manganese	5A
Mercury	3C, 4D, 5D
Molybdenum[1]	3C, 4D, 5A
Nickel	4D, 5A, 5D
Selenium	3C, 4D, 5A
Silver	5
Thallium	5A
Vanadium	3C, 5A
Zinc	5A

* SWMU 221 consists of one EU.
[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater, and the grids in which they were detected.

Metal	Grid
Arsenic	5A
Cobalt	5A
Iron	5A
Manganese	5A
Mercury	3C, 3D, 5D
Nickel	5A, 5D
Silver	5
Vanadium	3C, 5A

* SWMU 221 consists of one EU.

PCBs

PCBs were not detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 221 subsurface soil.

SVOCs

No subsurface soil samples from SWMU 221 were analyzed for SVOCs.

VOCs

No subsurface soil samples from SWMU 221 were analyzed for VOCs.

Radionuclides

No subsurface soil samples from SWMU 221 were analyzed for radionuclides.

6.8.5 Fate and Transport

No target chemicals were identified for further evaluation of impacts to the RGA (Chapter 4). There is no concern for significant potential runoff for SWMU 221. Contaminants present at this SWMU are unlikely to migrate due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow, and there is no direct connection to surface water from this SWMU. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

6.8.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 221 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for SWMU 221 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 6.8.5 for the future industrial worker and the hypothetical resident. The excavation worker scenario did not identify COCs. Table 6.8.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 221 include PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 6.8.6.

6.8.7 SWMU 221 Summary

The following text summarizes the results for SWMU 221 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Plant processes that could have contributed to contamination at SWMU 221 are releases and discharges from the equipment and materials that were stored there in the past.

COPCs for surface and subsurface soils from SWMU 221 are shown on Tables 6.8.1–6.8.4 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The investigation for SWMU 221 revealed that metals, PCBs, SVOCs, and radionuclides comprise the types of COPCs found there in the surface soils and metals in the subsurface soils. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 10 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

SWMU 221 is grass covered and the contaminants at SWMU 221 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water; therefore, dispersement of soil by rainfall runoff is minimized and not considered significant. A pipeline was sampled as part of the RI for SWMU 221 and no target chemicals were found to need modeling. The CSM can be found in Appendix D.

Table 6.8.5. RGOs for SWMU 221

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3] 1 x 10^{-6}	RGOs for ELCR[3] 1 x 10^{-5}	RGOs for ELCR[3] 1 x 10^{-4}	HI[4]	RGOs for HI[3] 0.1	RGOs for HI[3] 1	RGOs for HI[3] 3
Future Industrial Worker											
1	Chromium	7.01E+01	mg/kg	2.3E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
1	PCB, Total	5.00E-01	mg/kg	2.7E-06	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
1	Total PAH	1.02E+00	mg/kg	1.7E-05	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
1	Uranium-238	1.93E+00	pCi/g	1.1E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**2.3E-05**				**< 1**			
Hypothetical Resident[5]											
1	Chromium	7.01E+01	mg/kg	4.5E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
1	PCB, Total	5.00E-01	mg/kg	7.8E-06	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
1	Total PAH	1.02E+00	mg/kg	5.3E-05	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
1	Uranium-238	1.93E+00	pCi/g	5.6E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**7.1E-05**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.31, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.31, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 6.8.6 Ecological Screening for SWMU 221

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg) [b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Mostly gravel to grass/soil mix	No	168	PCB, Total	n/a	2.50E+00	2.00E-02	125
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 221.

- Future Industrial Worker
  - Chromium
  - Total PAHs
  - Total PCBs
  - Uranium-238
- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Chromium
  - Total PAHs
  - Total PCBs
  - Uranium-238

Of the above, there are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 221. There are no priority COCs for other scenarios.

For SWMU 221, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Total PCBs
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 221 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 221 is adjacent to SWMU 400, a USEC-operated generator staging area, which is an NFA SWMU in the 2012 SMP. There are no other SWMUs adjacent or very close to SWMU 221. There would be no known physical or cultural impediments to conducting a response action here. A response action at SWMU 221 would not have an impact on any other integrator OUs.

6.8.8 SWMU 221 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 221; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark (DOE 2010a) for scenarios including future industrial worker and hypothetical resident. The reasonably anticipated future land use for this SWMU is industrial land use as shown in the SMP (DOE 2012a).

6.9 SWMU 222, C-410, OS-11

6.9.1 Background

SWMU 222 includes SWMU 76, the C-632-B Sulfuric Acid Storage Tank, and DMSA OS-11 at the south and north ends, respectively. SWMU 222 is located northeast of the C-410 facility and southwest of the C-631 Pump House and Cooling Tower near the central portion of the plant site. SWMU 222 is approximately 1,738 ft^2. There is no direct connection to surface water from this SWMU.

DMSA OS-11 is believed to have been created around 1993 during the USEC/DOE transition. Miscellaneous materials were placed in this area, the majority of which were radiologically surveyed and sent to the scrap yards around 1998. In 2001, DOE began characterization and remediation of the materials in the DMSAs. Material found within this area included the following:

- A light bulb base
- Railroad ties/pieces
- Ladders
- Wooden pallets
- A collection container for antifreeze
- Hoses
- Waste water
- A gasoline engine
- A generator, a motor
- Gasoline and fluids drained from equipment

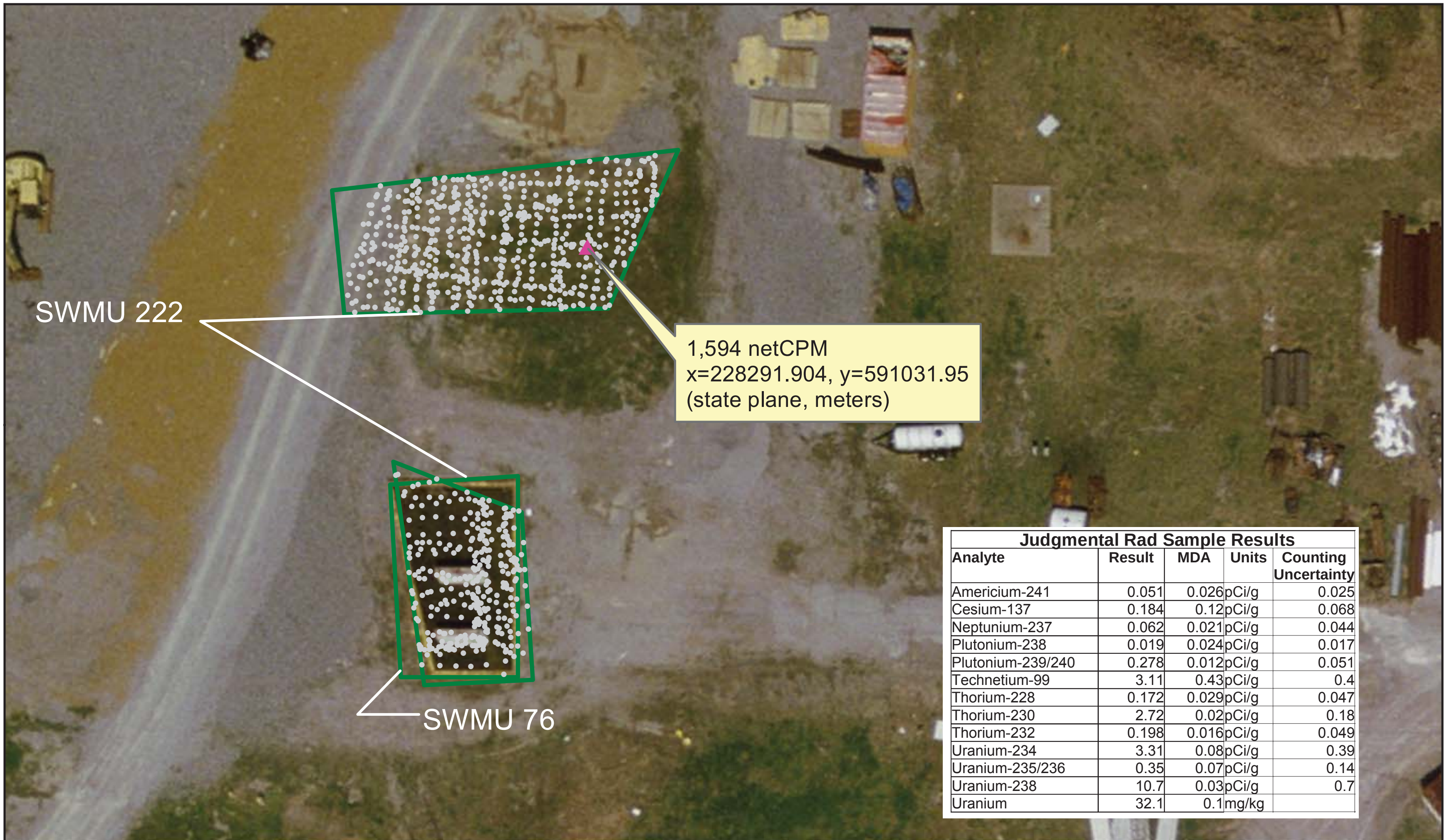
All materials previously located in DMSA OS-11 either were properly disposed of or moved to permitted storage prior to disposal (DOE 2002f).

A certified RCRA Closure Report was approved by Kentucky on February 13, 2007, for this DMSA. The KDWM "determined that the characterization, removal and disposal of hazardous waste meets the applicable requirements of the approved Agreed Order Closure Plan for DMSAs, dated December 23, 2005" (Webb 2007).

6.9.2 Fieldwork Summary

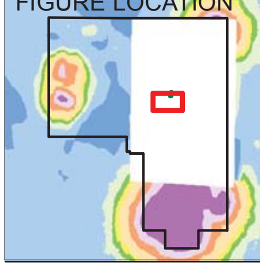
One grid sample for the surface only was planned and collected at the unit. Field laboratory results indicated that 35 contingency samples were needed for concentration of lead, zinc, and uranium of which 29 were collected. Collection was limited due to gravel and sample not being recoverable. Figure A.10 in Appendix A is the sample rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 6.9.1) using a FIDLER; the 674 measurements ranged from 5,531 to 12,594 gross cpm. The ground cover here is mostly soils and grass with gravel close to the rail spur. A judgmental grab sample was collected for radiological constituents.



Judgmental Rad Sample Results				
Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.051	0.026	pCi/g	0.025
Cesium-137	0.184	0.12	pCi/g	0.068
Neptunium-237	0.062	0.021	pCi/g	0.044
Plutonium-238	0.019	0.024	pCi/g	0.017
Plutonium-239/240	0.278	0.012	pCi/g	0.051
Technetium-99	3.11	0.43	pCi/g	0.4
Thorium-228	0.172	0.029	pCi/g	0.047
Thorium-230	2.72	0.02	pCi/g	0.18
Thorium-232	0.198	0.016	pCi/g	0.049
Uranium-234	3.31	0.08	pCi/g	0.39
Uranium-235/236	0.35	0.07	pCi/g	0.14
Uranium-238	10.7	0.03	pCi/g	0.7
Uranium	32.1	0.1	mg/kg	

FIGURE LOCATION



SWMU 222 (C-410 DMSA OS-11)

SOILS OU SWMU

GAMMA WALKOVER SURVEY RESULTS [1]

- < 10,300 net CPM
- ≥ 10,300 net CPM

10,300 net CPM was calculated as 171 pCi/g U-238

[1]Only results within SWMU boundary presented.

JUDGMENTAL RAD SAMPLE
NOTE: A sample was collected, but not required.

0 15 30 60 Feet

TRUE NORTH 20 PLANT NORTH

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

COORDINATE SYSTEM:	PGDP
PROJECTION:	n/a
DATE:	5/5/2012
FILE NAME:	SoilsOU\RI Report\RI D2\
LATA KENTUCKY	06-12-01_SWMU222 GWS.mxd
REFERENCES:	Basemap 2009

Figure 6.9.1. SWMU 222 Gamma Walkover Survey

6.9.3 Nature and Extent of Contamination—Surface Soils

For SWMU 222, the representative data set for surface soils is presented in Tables 6.9.1 and 6.9.2 and provides the nature of the contamination in SWMU 222 surface soils. Figures 6.9.2–6.9.4 illustrate the horizontal extent of the surface soil contamination. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 222 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 222 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 222 subsurface soil. The following are the metals detected at or above both the background screening levels and the industrial NALs and the grids in which they were detected.

Metal	Grid
Chromium	1, 1H
Nickel	1D, 1J, 1L

* SWMU 222 consists of one EU.

Grids 1D, 1H, 1J and 1L are not located within the administrative boundary of SWMU 222; instead, they are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 222, as described in the Work Plan (DOE 2010a).

No metals were detected above the industrial worker ALs in the SWMU 222 surface soil samples.

The following are the metals detected in the SWMU 222 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	1G
Cadmium	1G
Molybdenum[1]	1, 1G
Nickel	1D, 1J, 1L
Selenium	1
Thallium	1, 1G
Uranium	1
Zinc	1, 1C

* SWMU 222 consists of one EU.
[1]No background value is available.

Nickel in grids 1D and 1L was detected above both the background screening level and the SSLs for the protection of RGA groundwater.

Table 6.9.1. Surface Soil Historical Data Summary: SWMU 222 DMSA OS-11

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range

There is no historical surface data for this SWMU

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.9.2. Surface Soil RI Data Summary: SWMU 222, C-410 DMSA Outside-11

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	3.11E+03	8.64E+03	5.88E+03	0/2	2/2	0/2	1.30E+04	0/2	3.32E+04	0/2	3.97E+06	0/2	2/2	5.4 - 6.2
METAL	Antimony	mg/kg	3.90E-01	3.90E-01	3.90E-01	0/2	1/2	1/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	1/2	0.54 - 0.62
METAL	Arsenic	mg/kg	4.90E+00	9.60E+00	7.58E+00	0/13	4/13	0/13	1.20E+01	4/13	9.97E-01	0/13	9.97E+01	0/13	4/13	1.1 - 11
METAL	Barium	mg/kg	6.31E+01	7.90E+01	7.11E+01	0/2	2/2	0/2	2.00E+02	0/2	5.92E+02	0/2	3.78E+05	0/2	0/2	2.1 - 2.5
METAL	Beryllium	mg/kg	2.50E-01	5.10E-01	3.80E-01	0/2	2/2	0/2	6.70E-01	2/2	1.40E-02	0/2	9.22E+00	0/2	0/2	0.11 - 0.12
METAL	Cadmium	mg/kg	1.90E-01	5.50E-01	3.70E-01	0/2	2/2	1/2	2.10E-01	0/2	3.16E+00	0/2	3.16E+02	0/2	1/2	0.054 - 0.062
METAL	Calcium	mg/kg	7.57E+04	3.15E+05	1.95E+05	0/2	2/2	1/2	2.00E+05	0/2	n/a	0/2	n/a	n/a	n/a	310 - 537
METAL	Chromium	mg/kg	1.41E+01	4.73E+01	2.43E+01	0/13	4/13	3/13	1.60E+01	2/13	3.02E+01	0/13	3.02E+03	0/13	0/13	1.1 - 85
METAL	Cobalt	mg/kg	3.60E+00	7.10E+00	5.35E+00	0/2	2/2	0/2	1.40E+01	0/2	1.05E+01	0/2	1.52E+03	2/2	2/2	0.21 - 0.25
METAL	Copper	mg/kg	6.00E+00	2.45E+01	1.27E+01	0/13	3/13	1/13	1.90E+01	0/13	1.43E+03	0/13	2.24E+05	0/13	0/13	1.1 - 35
METAL	Iron	mg/kg	5.05E+03	1.89E+04	1.13E+04	0/13	13/13	0/13	2.80E+04	0/13	2.51E+04	0/13	3.92E+06	13/13	13/13	5.4 - 100
METAL	Lead	mg/kg	1.03E+01	3.25E+01	2.02E+01	0/13	11/13	0/13	3.60E+01	0/13	4.00E+02	0/13	4.00E+02	0/13	9/13	0.32 - 13
METAL	Magnesium	mg/kg	3.11E+03	7.04E+03	5.08E+03	0/2	2/2	0/2	7.70E+03	0/2	n/a	0/2	n/a	n/a	n/a	53.7 - 62
METAL	Manganese	mg/kg	1.25E+02	8.55E+02	3.28E+02	0/13	13/13	0/13	1.50E+03	0/13	2.58E+03	0/13	1.16E+05	13/13	13/13	0.21 - 85
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	2.00E-01	0/13	9.00E-01	0/13	7.85E+02	0/13	0/13	0.0358 - 10
METAL	Molybdenum	mg/kg	1.10E+00	1.20E+00	1.15E+00	0/13	2/13	0/13	n/a	0/13	1.79E+02	0/13	2.80E+04	0/13	2/13	0.54 - 15
METAL	Nickel	mg/kg	9.00E+00	9.19E+01	4.28E+01	0/13	5/13	3/13	2.10E+01	3/13	4.28E+01	0/13	3.18E+04	2/13	5/13	0.54 - 65
METAL	Selenium	mg/kg	6.20E-01	1.40E+00	1.01E+00	0/13	2/13	1/13	8.00E-01	0/13	1.79E+02	0/13	2.80E+04	0/13	2/13	0.54 - 20
METAL	Silver	mg/kg	3.50E-02	4.50E-02	4.00E-02	0/13	2/13	0/13	2.30E+00	0/13	1.08E+01	0/13	9.15E+03	0/13	1/13	0.21 - 10
METAL	Sodium	mg/kg	5.72E+01	1.46E+02	1.02E+02	0/2	2/2	0/2	3.20E+02	0/2	n/a	0/2	n/a	n/a	n/a	21.5 - 24.8
METAL	Thallium	mg/kg	2.70E-01	3.50E-01	3.10E-01	0/2	2/2	2/2	2.10E-01	0/2	2.87E+00	0/2	4.48E+02	0/2	2/2	0.21 - 0.25
METAL	Uranium	mg/kg	9.60E+00	5.86E+01	3.22E+01	0/15	6/15	6/15	4.90E+00	0/15	1.07E+02	0/15	1.65E+04	0/15	4/15	0.06 - 20
METAL	Vanadium	mg/kg	1.18E+01	3.00E+01	2.09E+01	0/2	2/2	0/2	3.80E+01	2/2	1.51E-01	0/2	9.30E+01	2/2	2/2	1.1 - 1.2
METAL	Zinc	mg/kg	4.58E+01	9.45E+01	6.09E+01	0/13	13/13	3/13	6.50E+01	0/13	1.08E+04	0/13	1.68E+06	0/13	13/13	2.1 - 25
PPCB	PCB, Total	mg/kg	1.40E+00	1.40E+00	1.40E+00	0/1	1/1	0/1	n/a	1/1	1.88E-01	0/1	1.88E+01	0/1	1/1	0.37 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	2 - 2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.41 - 0.41
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.41 - 0.41
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Benzo(ghi)perylene	mg/kg	2.20E-01	2.20E-01	2.20E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.9.2. Surface Soil RI Data Summary: SWMU 222, C-410 DMSA Outside-11 (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0082 - 0.0082
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	2.40E-01	2.40E-01	2.40E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Fluoranthene	mg/kg	2.70E-01	2.70E-01	2.70E-01	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.41 - 0.41
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.41 - 0.41
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.41 - 0.41
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.82 - 0.82
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.41 - 0.41
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0082 - 0.0082
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	2 - 2
SVOA	Phenanthrene	mg/kg	8.50E-02	8.50E-02	8.50E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Pyrene	mg/kg	2.10E-01	2.10E-01	2.10E-01	1/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.41 - 0.41
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.82 - 0.82
SVOA	Total PAH	mg/kg	1.77E-01	1.77E-01	1.77E-01	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	4.27E+01	8.50E+01	6.46E+01	0/3	3/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	4 - 5.4
RADS	Americium-241	pCi/g	1.58E-02	5.30E-02	3.99E-02	0/3	3/3	0/3	n/a	0/3	5.01E+00	0/3	5.01E+02	0/3	0/3	0.026 - 0.034
RADS	Beta activity	pCi/g	4.89E+01	1.06E+02	7.92E+01	0/3	3/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	3 - 3.9
RADS	Cesium-137	pCi/g	1.61E-01	3.93E-01	2.46E-01	0/3	3/3	0/3	4.90E-01	3/3	8.61E-02	0/3	8.61E+00	0/3	0/3	0.042 - 0.12
RADS	Neptunium-237	pCi/g	6.20E-02	6.30E-02	6.25E-02	0/2	2/2	0/2	1.00E-01	0/2	2.71E-01	0/2	2.71E+01	0/2	2/2	0.02 - 0.021
RADS	Plutonium-238	pCi/g	1.00E-02	1.90E-02	1.36E-02	0/3	3/3	0/3	7.30E-02	0/3	1.09E+01	0/3	1.09E+03	0/3	0/3	0.017 - 0.024
RADS	Plutonium-239/240	pCi/g	5.10E-02	2.78E-01	1.97E-01	0/3	3/3	3/3	2.50E-02	0/3	1.07E+01	0/3	1.07E+03	0/3	2/3	0.012 - 0.014
RADS	Technetium-99	pCi/g	2.92E+00	1.04E+01	5.48E+00	0/3	3/3	3/3	2.50E+00	0/3	3.61E+02	0/3	3.61E+04	0/3	3/3	0.43 - 0.5
RADS	Thorium-228	pCi/g	1.72E-01	7.90E-01	5.34E-01	0/3	3/3	0/3	1.60E+00	0/3	n/a	0/3	n/a	n/a	n/a	0.02 - 0.05
RADS	Thorium-230	pCi/g	1.46E+00	3.38E+00	2.52E+00	0/3	3/3	2/3	1.50E+00	0/3	1.38E+01	0/3	1.38E+03	0/3	3/3	0.007 - 0.04
RADS	Thorium-232	pCi/g	1.98E-01	8.20E-01	4.96E-01	0/3	3/3	0/3	1.50E+00	0/3	n/a	0/3	n/a	n/a	n/a	0.007 - 0.04
RADS	Uranium-234	pCi/g	3.31E+00	1.04E+01	6.21E+00	0/3	3/3	3/3	1.20E+00	0/3	1.89E+01	0/3	1.89E+03	0/3	0/3	0.03 - 0.08
RADS	Uranium-235/236	pCi/g	3.03E-01	7.10E-01	4.54E-01	0/3	3/3	3/3	6.00E-02	1/3	3.95E-01	0/3	3.95E+01	0/3	0/3	0.02 - 0.07
RADS	Uranium-238	pCi/g	8.78E+00	1.96E+01	1.30E+01	0/3	3/3	3/3	1.20E+00	3/3	1.70E+00	0/3	1.70E+02	0/3	3/3	0.02 - 0.03

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

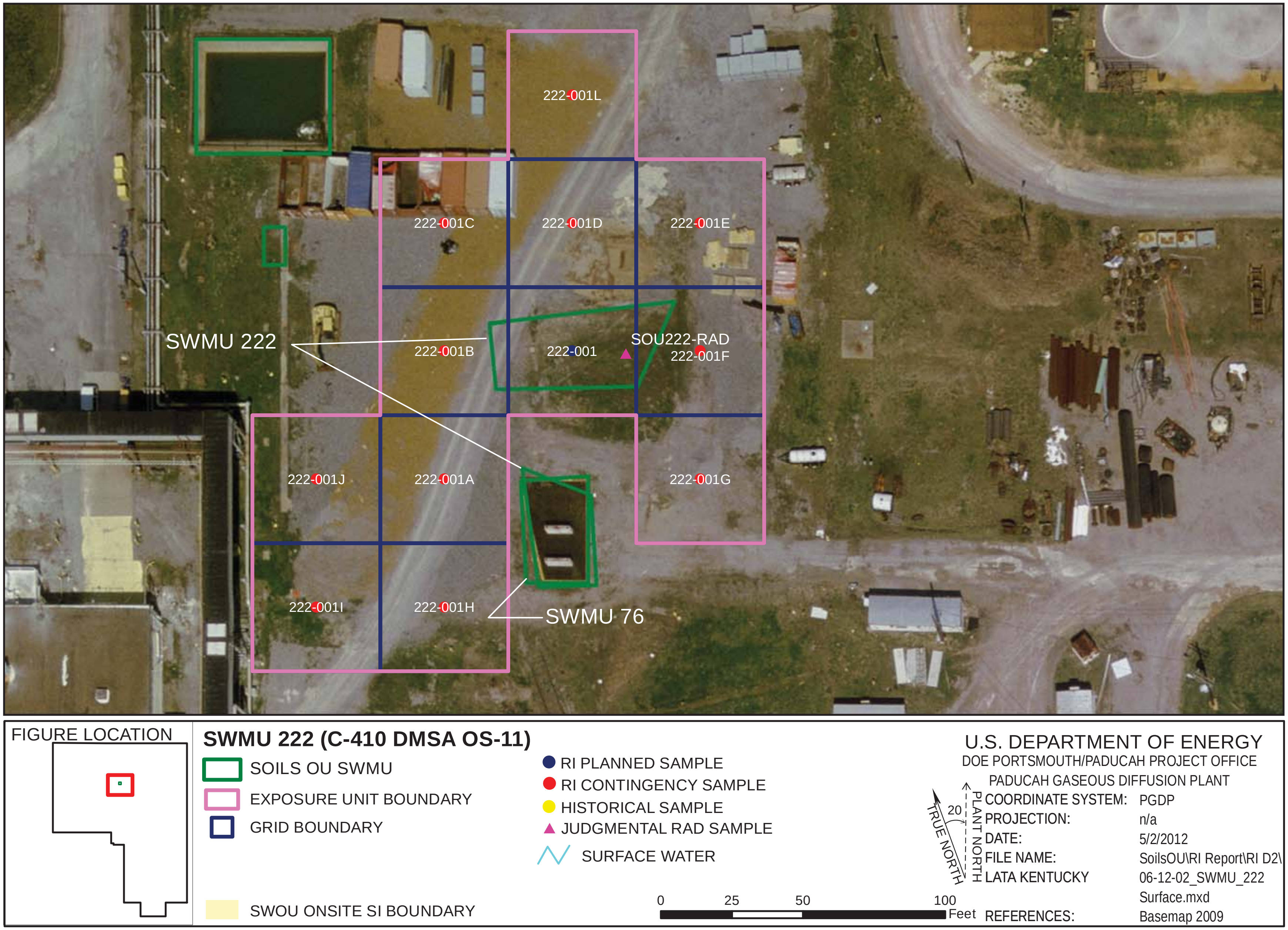


Figure 6.9.2. SWMU 222 Sample Locations - Surface Soil

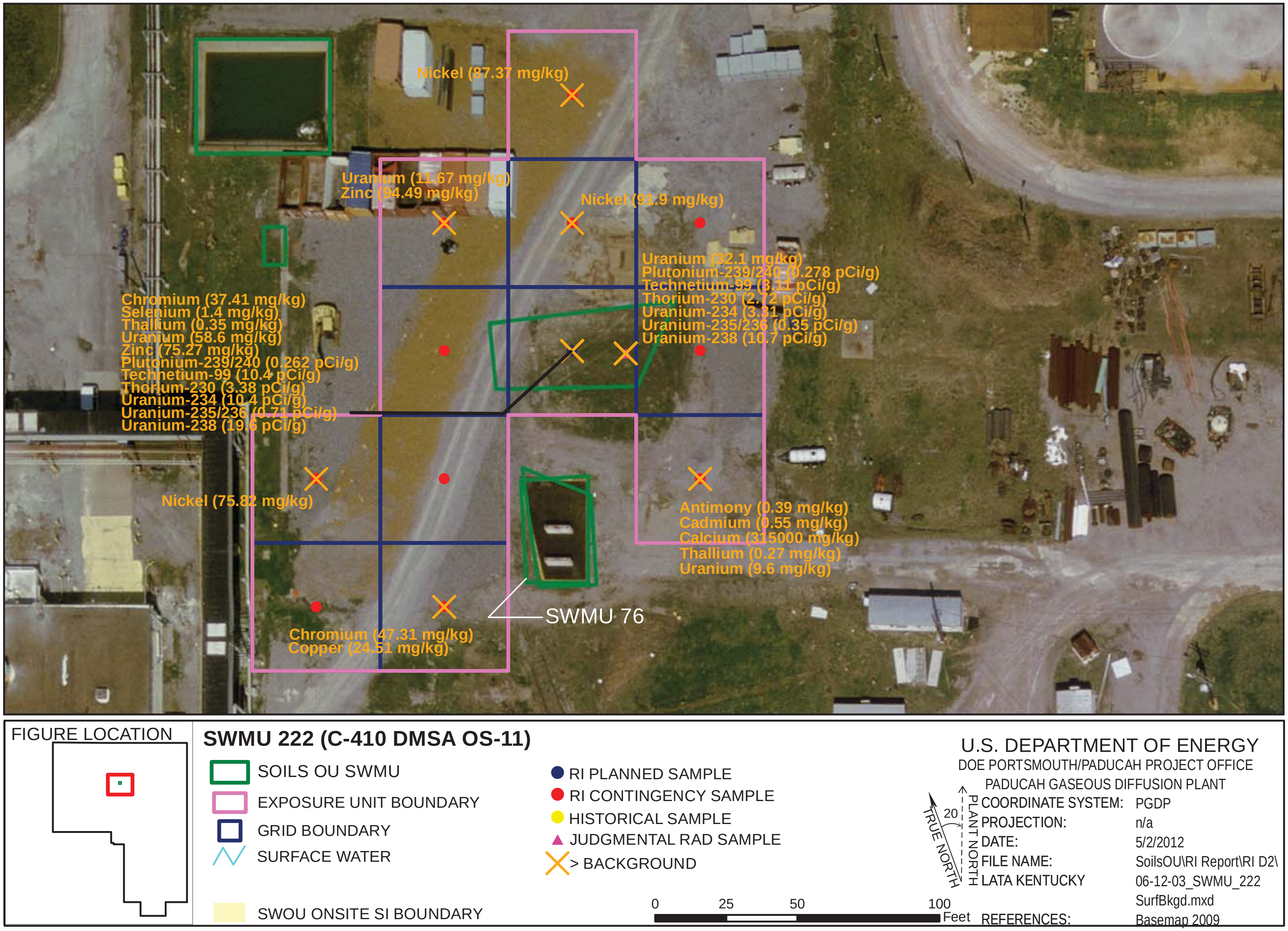


Figure 6.9.3. SWMU 222 Background Exceedances - Surface Soil

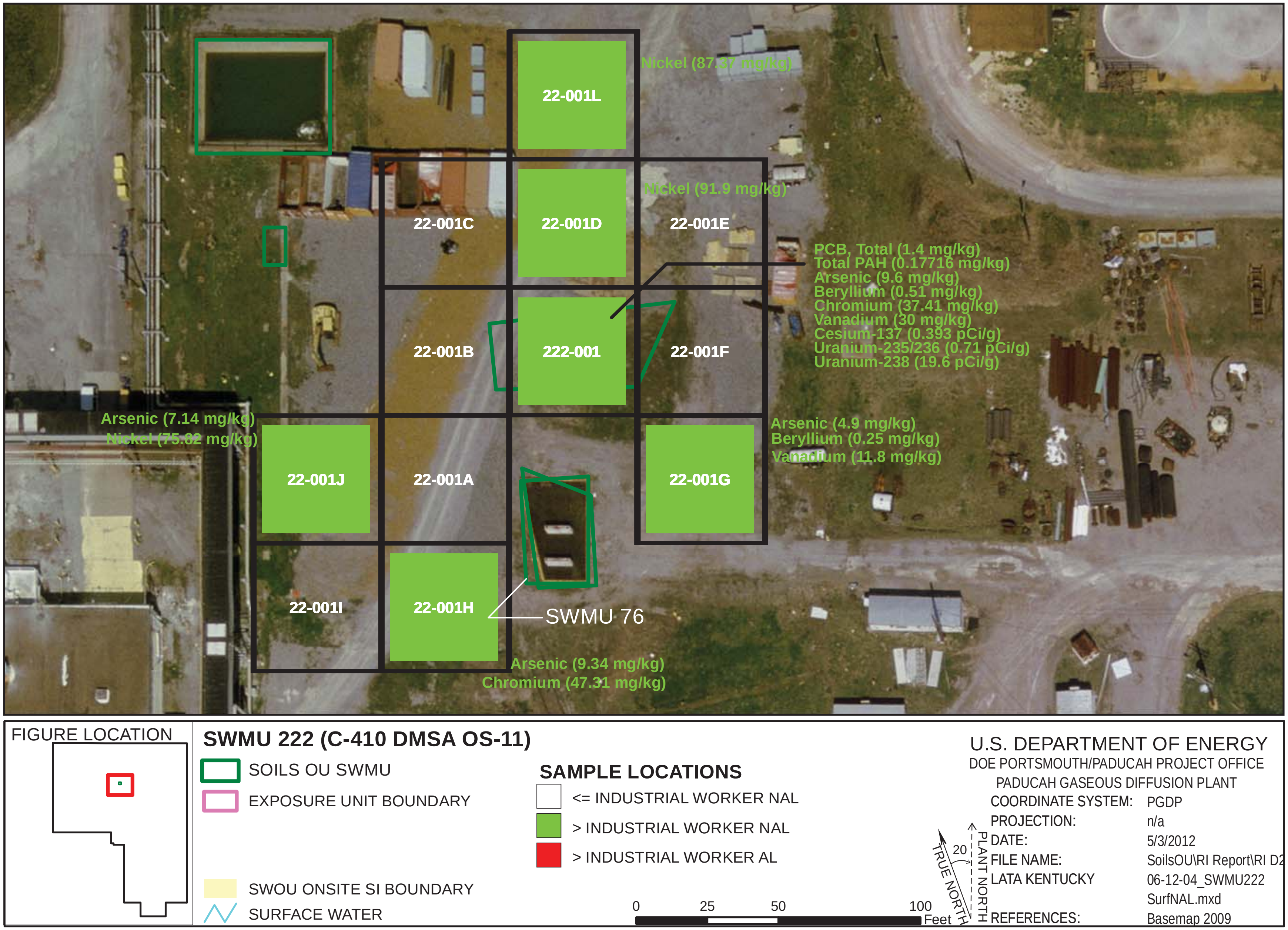


Figure 6.9.4. SWMU 222 NAL Exceedances - Surface Soil

PCBs

One surface soil sample was analyzed for PCBs. Total PCBs were detected above the industrial worker NALs in grid 1 of SWMU 222.

PCBs were not detected above the industrial worker ALs in the SWMU 222 surface soil.

Total PCBs were detected in grid 1 above the SSLs for the protection of UCRS groundwater, but PCBs were not detected above the SSLs for the protection of RGA groundwater.

SVOCs

One surface soil sample was collected from SWMU 222 (in grid 1) was analyzed for SVOCs. Total PAHs were detected above industrial worker NALs and above the SSLs for the protection of UCRS groundwater.

No SVOCs were detected above the industrial worker ALs or the SSLs for the protection of RGA groundwater in the SWMU 222 surface soil.

VOCs

No surface soil samples from SWMU 222 were analyzed for VOCs.

Radionuclides

Uranium-235/236, and uranium-238 were detected at or above both the background screening levels and industrial worker NALs in the SWMU 222 surface soil in grid 1.

No radionuclides were above the industrial worker ALs in the SWMU 222 surface soil.

Plutonium-239-240, technetium-99, thorium-230, and uranium-238 in grid 1 were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater; no radionuclides were detected above background screening levels and the SSLs for the protection of RGA groundwater.

In conjunction with the samples collected by the Soils OU RI, the Kentucky Radiation Health Branch collected five split samples and analyzed them for radiological parameters. The results of these samples were not included in the RI dataset. Results of that sampling are summarized below.

- Actinium-228 was reported above MDA in 4 samples, ranging from 0.585 to 0.937 pCi/g.
- Bismuth-214 was reported above MDA in all samples, ranging from 0.554 to 0.981 pCi/g.
- Cesium-137 was reported above MDA in all samples, ranging from 0.423 to 1.10 pCi/g.
- Lead-210 was reported above MDA in all samples, ranging from 6.81 to 10.6 pCi/g.
- Lead-214 was reported above MDA in all samples, ranging from 0.511 to 1.03 pCi/g.
- Protactinium-234m was reported above MDA in all samples, ranging from 18.8 to 36.4 pCi/g.
- Plutonium-239/240 was reported above MDA in 2 samples, ranging from 0.226 to 0.474 pCi/g.
- Technetium-99 was reported above MDA in all samples, ranging from 13.2 to 32.7 pCi/g.
- Thorium-234/Uranium-238 was reported above MDA in all samples, ranging from 14.2 to 27.8 pCi/g.
- Uranium-234 was reported above MDA in all samples, ranging from 6.62 to 14.9 pCi/g.
- Uranium-235 was reported above MDA in all samples, ranging from 0.563 to 1.19 pCi/g.
- Uranium-238 was reported above MDA in all samples, ranging from 16.7 to 32.3 pCi/g.

Americium-241 (no background value available), beryllium-7, cobalt-60, neptunium-237/protactinium-233, plutonium-238, and thorium-230 were analyzed, but were not reported above MDA in any of the samples.

Of the radionuclides reported above their MDA, listed previously, actinium-228, bismuth-214, lead-210, lead-214, protactinium-234m, and thorium-234 are not significant COPCs at PGDP (see Table 1.4). The radionuclides protactinium-234m and thorium-234 are decay products of uranium-238 and are included in the assessment of uranium-238.

The results of the split samples are consistent with background or other radionuclide data presented, with the exception of lead-210. The presence of lead-210 at the levels reported is inconsistent with values typically found in PGDP soils. This issue will be carried forward to the FS.

6.9.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 222, the representative data set for subsurface soils is presented in Tables 6.9.3 and 6.9.4 and provides the nature of the contamination in SWMU 222 subsurface soils. Figures 6.9.5–6.9.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 222 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 222 consists of one EU.

<u>Metals</u>

Metals were detected above the industrial worker NALs in the SWMU 222 subsurface soil. The following are the metals detected at or above the background screening levels and the industrial NALs and the grids in which they were detected.

Metal	Grid
Arsenic	1, 1A, 1C, 1E, 1G, 1J, 1I
Chromium	1G, 1H, 1J
Nickel	1, 1A, 1H, 1I, 1J

* SWMU 222 consists of one EU.

Grids 1A, 1C, 1E, 1G, 1H, 1I and 1J are not located within the administrative boundary of SWMU 222; instead, they are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 222, as described in the Work Plan (DOE 2010a).

The maximum depth at which metals were detected at or above the background screening levels and the industrial worker NALs was 10 ft bgs. The end depths of the boreholes taken from grids 1A, 1C, 1E, 1G, 1H, 1I, and 1J range from 1 to 10 ft bgs.

No metals were detected above the industrial worker ALs in the SWMU 222 subsurface soil samples.

Table 6.9.3. Subsurface Soil Historical Data Summary: SWMU 222 DMSA OS-11

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	1.08E+04	1.42E+04	1.22E+04	0/5	5/5	2/5	1.20E+04	0/5	3.32E+04	0/5	3.97E+06	0/5	5/5	-
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	2.10E-01	0/5	2.53E+00	0/5	1.51E+03	0/5	0/5	-
METAL	Arsenic	mg/kg	4.00E+00	8.80E+00	6.70E+00	0/5	5/5	1/5	7.90E+00	5/5	9.97E-01	0/5	9.97E+01	0/5	5/5	-
METAL	Barium	mg/kg	8.35E+01	1.07E+02	9.41E+01	0/5	5/5	0/5	1.70E+02	0/5	5.92E+02	0/5	3.78E+05	0/5	5/5	-
METAL	Beryllium	mg/kg	4.10E-01	5.90E-01	4.94E-01	0/5	5/5	0/5	6.90E-01	5/5	1.40E-02	0/5	9.22E+00	0/5	0/5	-
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	2.10E-01	0/5	3.16E+00	0/5	3.16E+02	0/5	0/5	-
METAL	Calcium	mg/kg	1.03E+03	1.75E+04	8.36E+03	0/5	5/5	3/5	6.10E+03	0/5	n/a	0/5	n/a	n/a	n/a	-
METAL	Chromium	mg/kg	1.28E+01	1.99E+01	1.54E+01	0/5	5/5	0/5	4.30E+01	0/5	3.02E+01	0/5	3.02E+03	0/5	0/5	-
METAL	Cobalt	mg/kg	5.80E+00	1.01E+01	7.58E+00	0/5	5/5	0/5	1.30E+01	0/5	1.05E+01	0/5	1.52E+03	5/5	5/5	-
METAL	Copper	mg/kg	9.70E+00	1.74E+01	1.43E+01	0/5	5/5	0/5	2.50E+01	0/5	1.43E+03	0/5	2.24E+05	0/5	0/5	-
METAL	Iron	mg/kg	1.62E+04	1.96E+04	1.78E+04	0/5	5/5	0/5	2.80E+04	0/5	2.51E+04	0/5	3.92E+06	5/5	5/5	-
METAL	Lead	mg/kg	7.40E+00	1.22E+01	9.88E+00	0/5	5/5	0/5	2.30E+01	0/5	4.00E+02	0/5	4.00E+02	0/5	0/5	-
METAL	Magnesium	mg/kg	1.63E+03	2.67E+03	2.16E+03	0/5	5/5	2/5	2.10E+03	0/5	n/a	0/5	n/a	n/a	n/a	-
METAL	Manganese	mg/kg	2.66E+02	6.05E+02	3.72E+02	0/5	5/5	0/5	8.20E+02	0/5	2.58E+03	0/5	1.16E+05	5/5	5/5	-
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	1.30E-01	0/5	9.00E-01	0/5	7.85E+02	0/5	0/5	-
METAL	Nickel	mg/kg	1.01E+01	1.62E+01	1.35E+01	0/5	5/5	0/5	2.20E+01	0/5	4.28E+01	0/5	3.18E+04	0/5	5/5	-
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	7.00E-01	0/5	1.79E+02	0/5	2.80E+04	0/5	0/5	-
METAL	Silver	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	2.70E+00	0/5	1.08E+01	0/5	9.15E+03	0/5	0/5	-
METAL	Sodium	mg/kg	1.65E+02	3.24E+02	2.13E+02	0/5	5/5	0/5	3.40E+02	0/5	n/a	0/5	n/a	n/a	n/a	-
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	3.40E-01	0/5	2.87E+00	0/5	4.48E+02	0/5	0/5	-
METAL	Vanadium	mg/kg	1.91E+01	2.25E+01	2.07E+01	0/5	5/5	0/5	3.70E+01	5/5	1.51E-01	0/5	9.30E+01	5/5	5/5	-
METAL	Zinc	mg/kg	3.55E+01	5.95E+01	5.15E+01	0/5	5/5	0/5	6.00E+01	0/5	1.08E+04	0/5	1.68E+06	0/5	5/5	-
PPCB	PCB, Total	mg/kg	8.00E-02	6.00E-01	2.24E-01	1/5	5/5	0/5	n/a	1/5	1.88E-01	0/5	1.88E+01	0/5	5/5	0.1 - 0.1
RADS	Americium-241	pCi/g	2.51E-02	2.51E-02	2.51E-02	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.14 - 0.14
RADS	Cesium-137	pCi/g	-1.43E-02	-1.43E-02	-1.43E-02	0/1	1/1	0/1	2.80E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.026 - 0.026
RADS	Cobalt-60	pCi/g	6.54E-03	6.54E-03	6.54E-03	0/1	1/1	0/1	n/a	0/1	1.77E-02	0/1	1.77E+00	0/1	0/1	0.0243 - 0.0243
RADS	Neptunium-237	pCi/g	-1.59E-02	-1.59E-02	-1.59E-02	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.0477 - 0.0477
RADS	Uranium-234	pCi/g	1.77E+00	1.77E+00	1.77E+00	0/1	1/1	1/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.325 - 0.325
RADS	Uranium-238	pCi/g	1.43E+00	1.43E+00	1.43E+00	0/1	1/1	1/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.262 - 0.262

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.9.4. Subsurface Soil RI Data Summary: SWMU 222, C-410 DMSA Outside-11

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.35E+03	9.21E+03	7.87E+03	0/3	3/3	0/3	1.20E+04	0/3	3.32E+04	0/3	3.97E+06	0/3	3/3	5.3 - 5.9
METAL	Antimony	mg/kg	2.70E-01	4.10E-01	3.30E-01	0/3	3/3	3/3	2.10E-01	0/3	2.53E+00	0/3	1.51E+03	0/3	2/3	0.53 - 0.59
METAL	Arsenic	mg/kg	4.70E+00	1.18E+01	8.51E+00	0/19	12/19	8/19	7.90E+00	12/19	9.97E-01	0/19	9.97E+01	0/19	12/19	1.1 - 11
METAL	Barium	mg/kg	4.41E+01	1.45E+02	1.08E+02	0/3	3/3	0/3	1.70E+02	0/3	5.92E+02	0/3	3.78E+05	0/3	2/3	2.1 - 2.3
METAL	Beryllium	mg/kg	3.40E-01	6.30E-01	5.10E-01	0/3	3/3	0/3	6.90E-01	3/3	1.40E-02	0/3	9.22E+00	0/3	0/3	0.11 - 0.12
METAL	Cadmium	mg/kg	8.80E-02	4.70E-01	2.33E-01	0/3	3/3	1/3	2.10E-01	0/3	3.16E+00	0/3	3.16E+02	0/3	1/3	0.053 - 0.059
METAL	Calcium	mg/kg	9.94E+03	2.02E+05	7.61E+04	0/3	3/3	3/3	6.10E+03	0/3	n/a	0/3	n/a	n/a	n/a	56.7 - 266
METAL	Chromium	mg/kg	1.48E+01	7.61E+01	4.21E+01	0/19	8/19	5/19	4.30E+01	7/19	3.02E+01	0/19	3.02E+03	0/19	0/19	1.1 - 85
METAL	Cobalt	mg/kg	3.30E+00	7.50E+00	6.07E+00	0/3	3/3	0/3	1.30E+01	0/3	1.05E+01	0/3	1.52E+03	3/3	3/3	0.21 - 0.23
METAL	Copper	mg/kg	1.00E+01	2.61E+01	1.66E+01	0/19	5/19	1/19	2.50E+01	0/19	1.43E+03	0/19	2.24E+05	0/19	0/19	1.1 - 35
METAL	Iron	mg/kg	9.90E+03	2.17E+04	1.54E+04	0/19	19/19	0/19	2.80E+04	0/19	2.51E+04	0/19	3.92E+06	19/19	19/19	5.3 - 100
METAL	Lead	mg/kg	6.53E+00	3.82E+01	1.46E+01	0/19	19/19	2/19	2.30E+01	0/19	4.00E+02	0/19	4.00E+02	0/19	6/19	0.32 - 13
METAL	Magnesium	mg/kg	1.98E+03	5.20E+03	3.15E+03	0/3	3/3	2/3	2.10E+03	0/3	n/a	0/3	n/a	n/a	n/a	53.3 - 58.5
METAL	Manganese	mg/kg	1.26E+02	8.89E+02	3.45E+02	0/19	19/19	1/19	8.20E+02	0/19	2.58E+03	0/19	1.16E+05	19/19	19/19	0.21 - 85
METAL	Mercury	mg/kg	2.77E-02	2.77E-02	2.77E-02	0/19	1/19	0/19	1.30E-01	0/19	9.00E-01	0/19	7.85E+02	0/19	0/19	0.0355 - 10
METAL	Molybdenum	mg/kg	6.50E-01	9.90E-01	8.53E-01	0/19	3/19	0/19	n/a	0/19	1.79E+02	0/19	2.80E+04	0/19	3/19	0.53 - 15
METAL	Nickel	mg/kg	1.16E+01	7.67E+01	4.10E+01	0/19	9/19	6/19	2.20E+01	6/19	4.28E+01	0/19	3.18E+04	0/19	9/19	0.53 - 65
METAL	Selenium	mg/kg	5.50E-01	1.10E+00	8.83E-01	0/19	3/19	2/19	7.00E-01	0/19	1.79E+02	0/19	2.80E+04	0/19	3/19	0.53 - 20
METAL	Silver	mg/kg	3.50E-02	5.00E-02	4.07E-02	0/19	3/19	0/19	2.70E+00	0/19	1.08E+01	0/19	9.15E+03	0/19	1/19	0.21 - 10
METAL	Sodium	mg/kg	8.55E+01	1.27E+02	1.11E+02	0/3	3/3	0/3	3.40E+02	0/3	n/a	0/3	n/a	n/a	n/a	21.3 - 23.4
METAL	Thallium	mg/kg	2.30E-01	2.80E-01	2.53E-01	0/3	3/3	0/3	3.40E-01	0/3	2.87E+00	0/3	4.48E+02	0/3	3/3	0.21 - 0.23
METAL	Uranium	mg/kg	1.10E+00	9.87E+00	5.58E+00	0/19	4/19	2/19	4.60E+00	0/19	1.07E+02	0/19	1.65E+04	0/19	0/19	0.11 - 20
METAL	Vanadium	mg/kg	1.38E+01	2.78E+01	2.30E+01	0/3	3/3	0/3	3.70E+01	3/3	1.51E-01	0/3	9.30E+01	3/3	3/3	1.1 - 1.2
METAL	Zinc	mg/kg	1.75E+01	1.01E+02	5.51E+01	0/19	19/19	7/19	6.00E+01	0/19	1.08E+04	0/19	1.68E+06	0/19	18/19	2.1 - 25

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

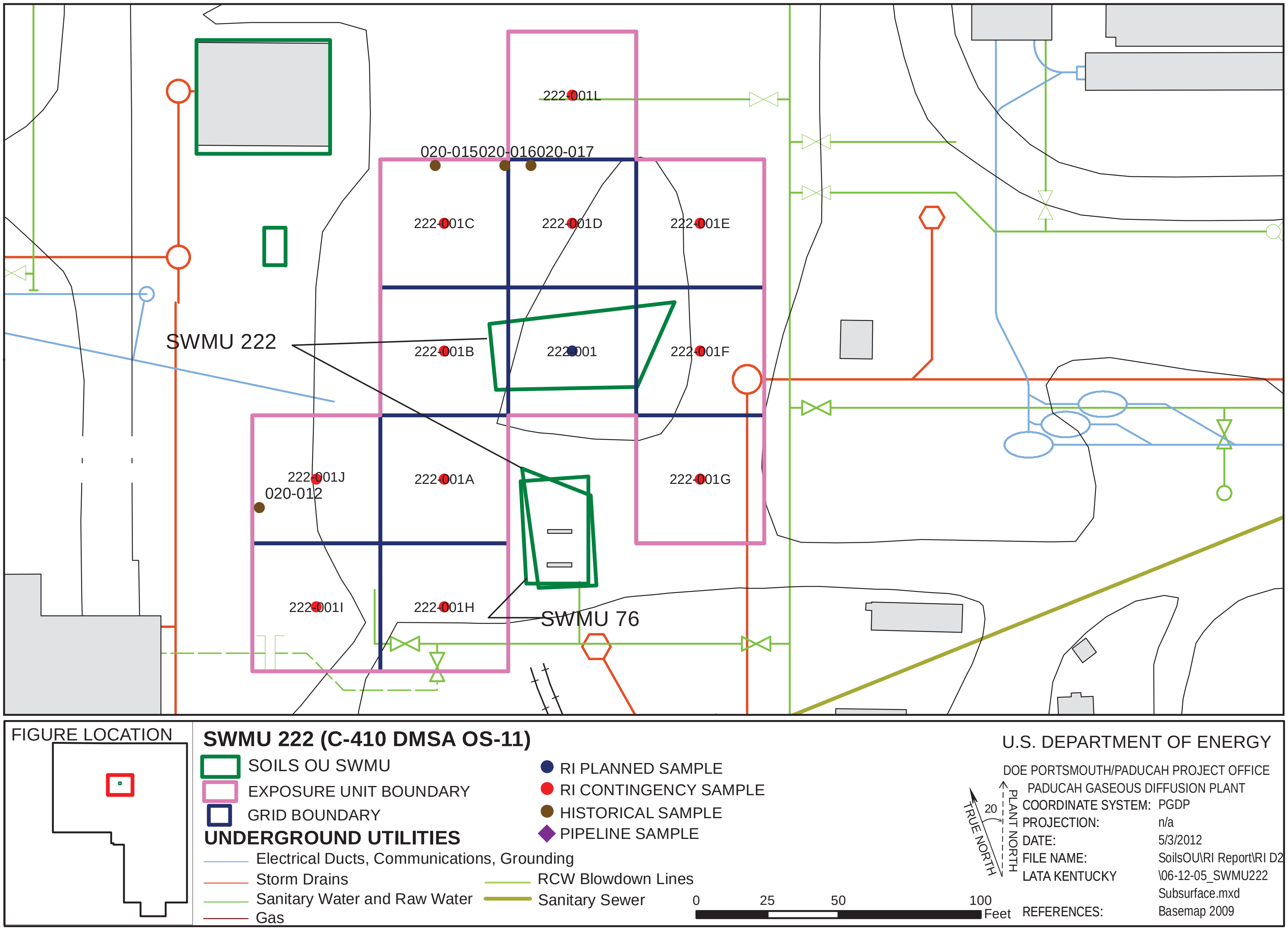


Figure 6.9.5. SWMU 222 Sample Locations - Subsurface Soil

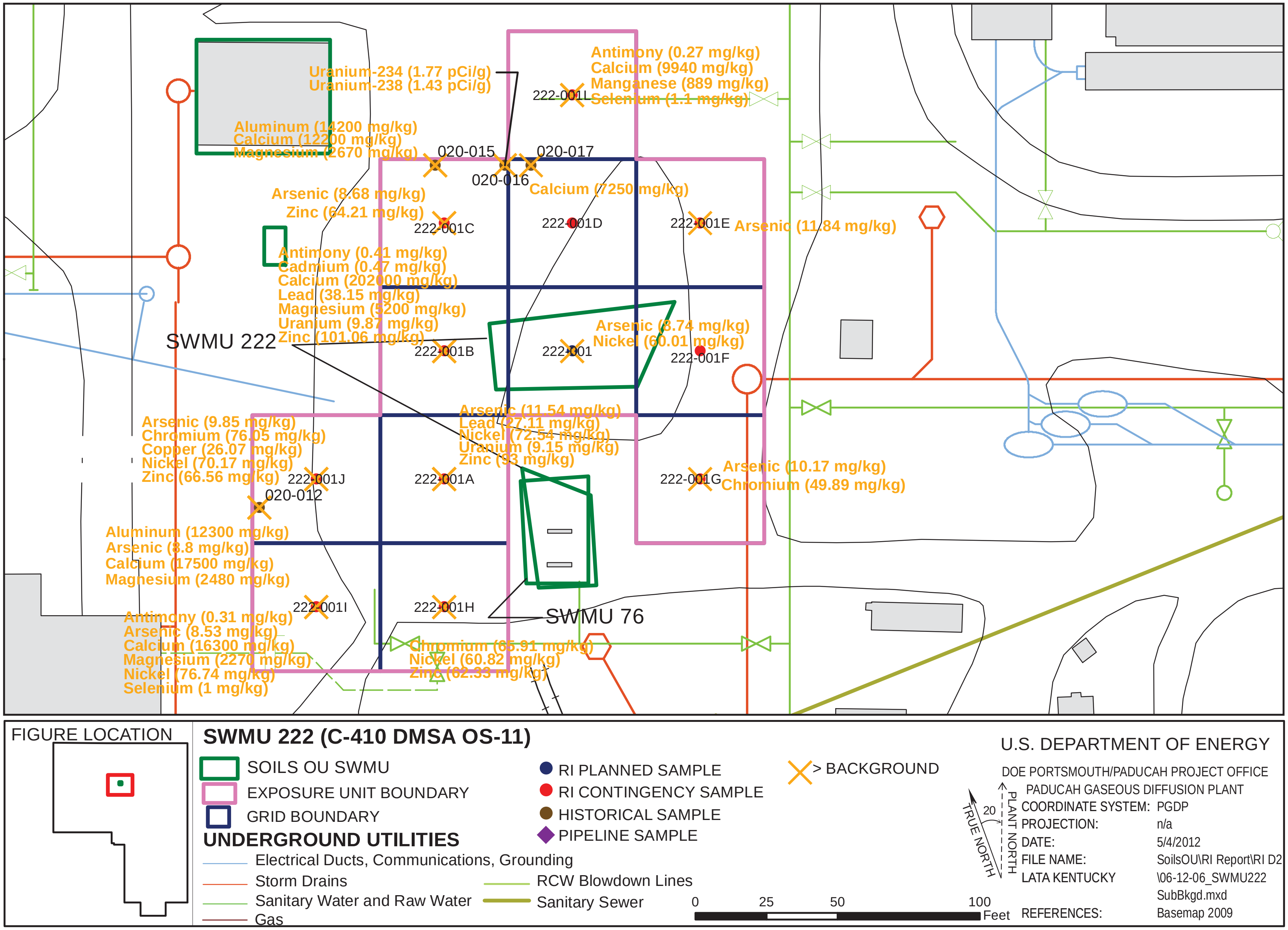


Figure 6.9.6. SWMU 222 Background Exceedances - Subsurface Soil

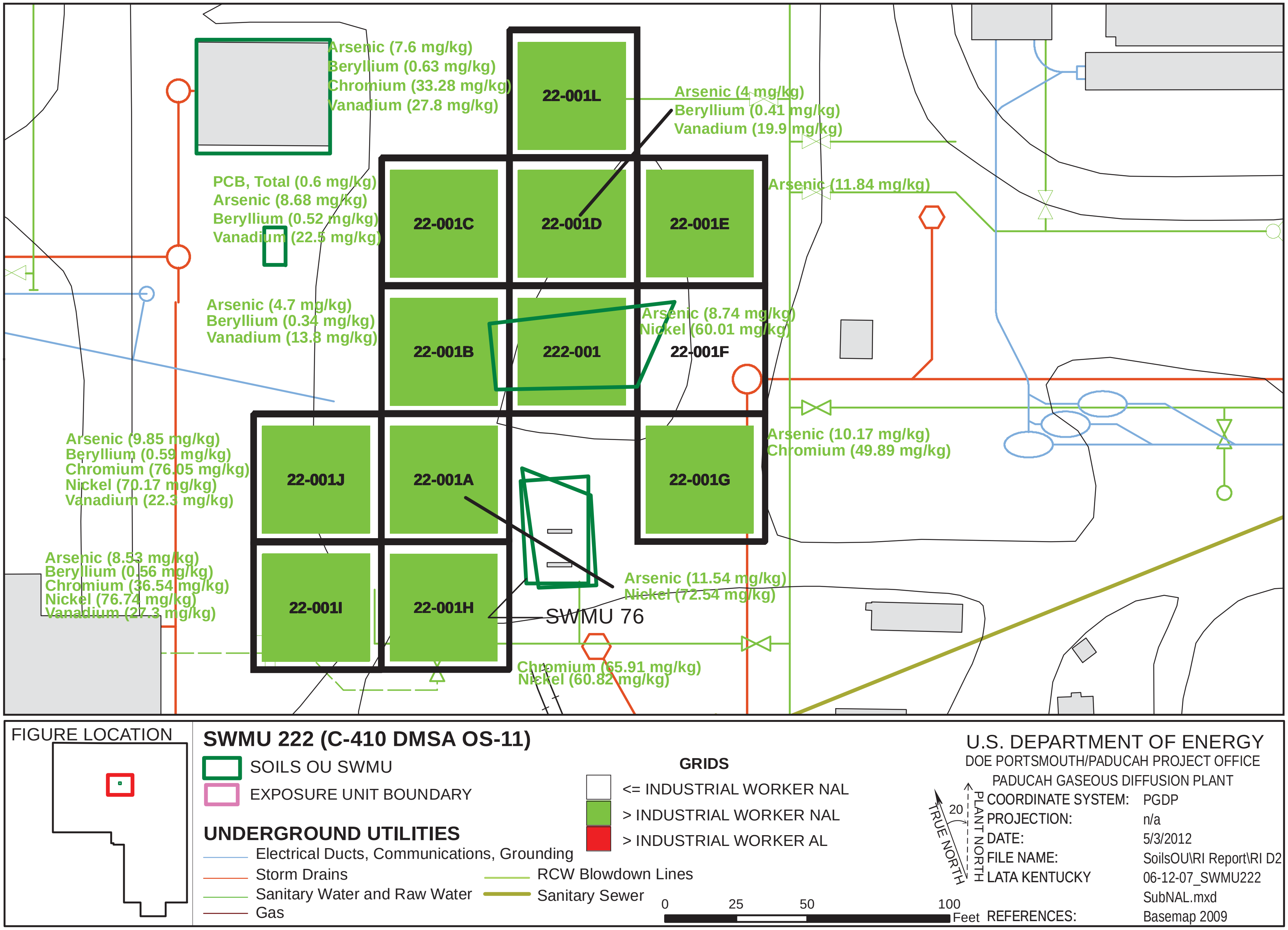


Figure 6.9.7. SWMU 222 NAL Exceedances - Subsurface Soil

The following are the metals detected above the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Aluminum	1C, 1J
Antimony	1B, 1I
Arsenic	1A, 1C, 1E, 1G, 1I, 1J
Cadmium	1B
Lead	1A, 1B
Manganese	1L
Molybdenum[1]	1B, 1I, 1L
Nickel	1, 1A, 1H, 1I, 1J
Selenium	1I, IL
Zinc	1A, 1B, 1C, 1H, 1J

* SWMU 222 consists of one EU.
[1] No background value is available.

Manganese was detected in grid 1L above the background screening level and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs in grid 1C were detected above the industrial worker NAL at a maximum depth of 4 ft bgs. Total PCBs were detected above the SSLs for the protection of UCRS groundwater in grids 1C, 1D, and 1J.

PCBs were not detected above the industrial worker ALs or the SSLs for the protection of RGA groundwater.

SVOCs

No subsurface soil samples from SWMU 222 were analyzed for SVOCs.

VOCs

No subsurface soil samples from SWMU 222 were analyzed for VOCs.

Radionuclides

One subsurface soil sample from SWMU 222 (in grid 1C) was analyzed for radionuclides. No radionuclides were detected above the background screening levels and the industrial worker NALs or the industrial worker ALs in the SWMU 222 subsurface soil.

No radionuclides were detected above the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

6.9.5 Fate and Transport

No target chemicals were identified for further evaluation of impacts to the RGA (Chapter 4). There is no concern for significant potential runoff from SWMU 222. Contaminants present at this SWMU are unlikely to migrate due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow, and there is no direct connection to surface water from this SWMU. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

6.9.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 222 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 222 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 6.9.5 for the future industrial worker and the hypothetical resident. The excavation worker scenario did not identify COCs. Table 6.9.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 222 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ≥ 10) are summarized in Table 6.9.6.

6.9.7 SWMU 222 Summary

The following text summarizes the results for SWMU 222 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Plant processes that could have contributed to contamination at SWMU 222 are inadvertent spills or releases from the containers and equipment that were stored there in the past.

COPCs for surface and subsurface soils from SWMU 222 are shown on Tables 6.9.1–6.9.4 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The investigation for SWMU 222 revealed that metals, PCBs, SVOCs, and radionuclides comprise the types of COPCs found in the surface soils and metals, and PCBs comprise the types of COPCs found in subsurface soils. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 10 ft bgs. A complete list of sampling results is provided in Appendix G.

Table 6.9.5. RGOs for SWMU 222

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Future Industrial Worker											
1	Chromium	4.73E+01	mg/kg	1.6E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	PCB, Total	1.40E+00	mg/kg	7.5E-06	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	1.77E-01	mg/kg	3.0E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-235	7.10E-01	pCi/g	1.8E-06	3.95E-01	3.95E+00	3.95E+01	n/a	n/a	n/a	n/a
	Uranium-238	1.96E+01	pCi/g	1.2E-05	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**2.5E-05**				**< 1**			
Hypothetical Resident[5]											
1	Chromium	4.73E+01	mg/kg	3.0E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	PCB, Total	1.40E+00	mg/kg	2.2E-05	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Total PAH	1.77E-01	mg/kg	9.1E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-234	1.04E+01	pCi/g	2.2E-06	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	7.10E-01	pCi/g	9.0E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	1.96E+01	pCi/g	5.7E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.0E-04**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.33, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.33, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 6.9.6. Ecological Screening for SWMU 222

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg) [b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Grassy	No	176	PCB, Total	n/a	2.50E+00	2.00E-02	125
			Selenium	8.00E-01	1.00E+01	5.20E-01	19
			Uranium	4.90E+00	5.86E+01	5.00E+00	12

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 222 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no known underground pipelines at SWMU 222. The CSM can be found in Appendix D.

Goal 3. Complete a for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 222.

- Future Industrial Worker
  - Chromium
  - Total PAHs
  - Total PCBs
  - Uranium-235
  - Uranium-238
- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Chromium
  - Total PAHs
  - Total PCBs
  - Uranium-234
  - Uranium-235
  - Uranium-238

Of the above, there are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 222. There are no priority COCs for other scenarios.

For SWMU 222, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Total PCBs
- Selenium
- Uranium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 222 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 222 and SWMU 76 are isolated. There are no physical or cultural impediments to a response action here. A response action at SWMU 222 would not have an impact on other integrator operable units.

6.9.8 SWMU 222 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 222; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial land use as shown in the SMP (DOE 2012a).

6.10 SWMU 227, C-746-B, OS-16

6.10.1 Background

SWMU 227, the location of the former DMSA OS-16, is located south of the C-746-B Warehouse, in the northwest portion of the plant site. SWMU 227 is approximately 37,000 ft^2. The south border of this SWMU abuts KPDES Outfall Ditch 001.

This area had been used as a storage area for miscellaneous excess process equipment and UF_6 cylinders since the 1970s. Materials stored within this area included the following:

- Wood/metal pallets
- Stainless steel tanks
- Air conditioners
- Scrap metal
- Miscellaneous equipment/parts
- Office furniture
- Floor buffers
- Empty poly tanks
- Spools of wire and cable
- Incandescent light bulbs
- Fluorescent light tubes
- A broken fluorescent light tube
- Light bulb bases

In 2001, DOE began characterization and remediation of the materials in the DMSAs. All RCRA-regulated items and other waste have been dispositioned properly (DOE 2004b).

A certified RCRA Closure Report was approved by Kentucky on February 13, 2007, for this DMSA. KDWM "determined that the characterization, removal and disposal of hazardous waste meets the applicable requirements of the approved Agreed Order Closure Plan for DMSAs, dated December 23, 2005" (Webb 2007).

6.10.2 Fieldwork Summary

Fifty-four grid samples were planned for the unit, of which 52 samples were collected. The field laboratory identified the need to collect 58 contingency samples due to concentrations of cadmium, copper, lead, nickel, uranium, and zinc, of which 2 were collected. The locations that were not sampled were in a gravel road and in a ditch. Figure A.11 in Appendix A is the sample rectification map.

The SWMU underwent two separate gamma radiological walkover surveys (Figure 6.10.1) using a FIDLER. This was due to the existing designations (one section designated as a Contaminated Area, and another section designated as a Radioactive Material Area) within SWMU 227. In the Contaminated Area, 6,734 measurements were taken that ranged from 10,301 to 165,313 gross cpm. In the Radioactive Material Area, a total of 5,872 measurements was taken that ranged from 4,077 to 10,300 gross cpm. The ground cover in this SWMU is mostly gravel with grass and brush on the southern perimeter. A judgmental grab sample was collected for radiological constituents.

6.10.3 Nature and Extent of Contamination—Surface Soils

For SWMU 227, the representative data set for surface soils is presented in Tables 6.10.1 and 6.10.2 and provides the nature of the contamination in SWMU 227 surface soils. Figures 6.10.2–6.10.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

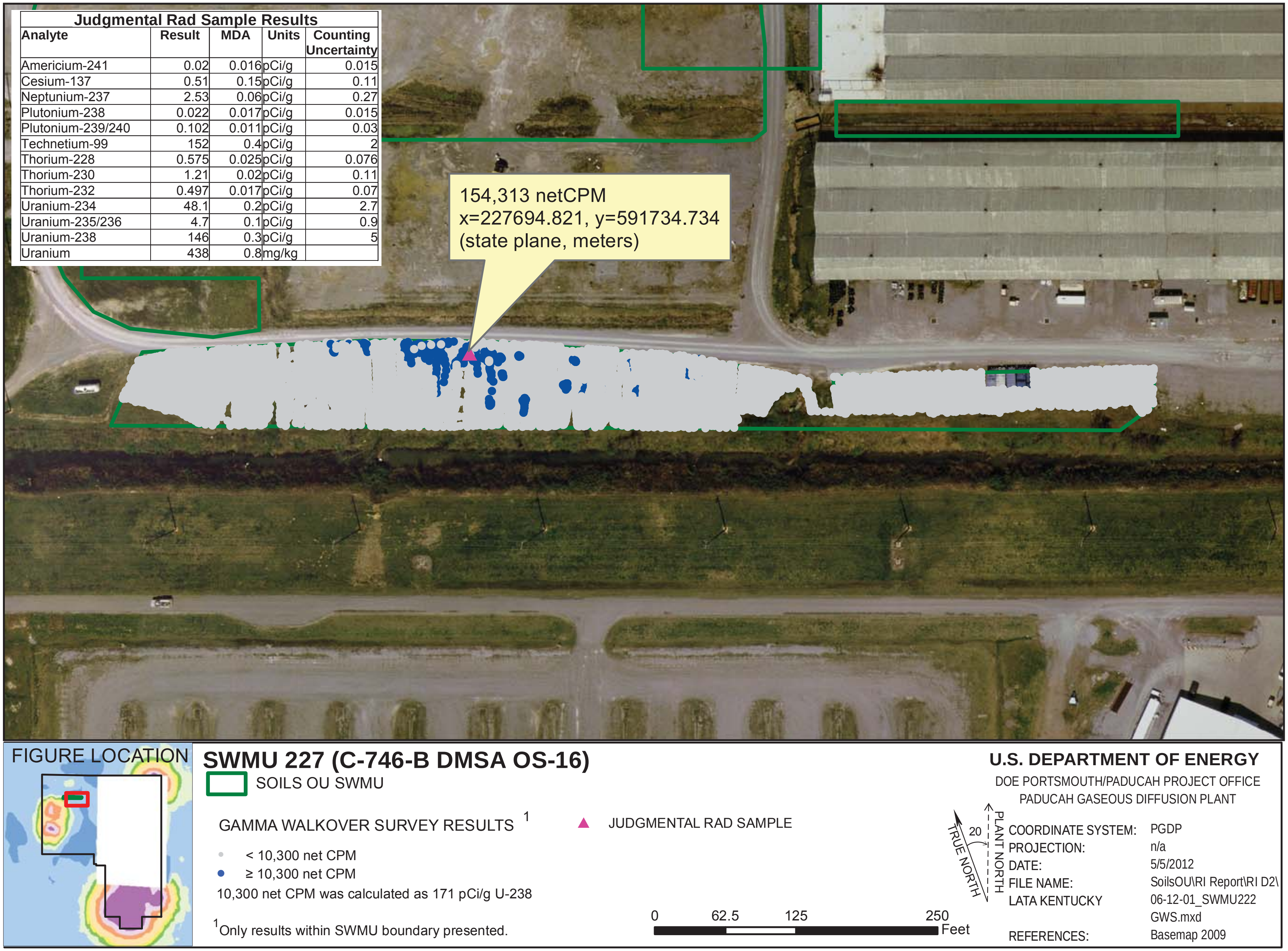
The horizontal extent of SWMU 227 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 227 consists of two EUs.

Metals

Metals were detected above the industrial worker NALs in the SWMU 227 surface soil. The following are the metals detected at or above both the background screening levels and the industrial worker NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Beryllium	53, 23	1, 2
Chromium	3, 5, 8, 9, 10, 14, 15, 16, 17, 18, 24	1, 2
Cobalt	65	2
Mercury	23	2
Nickel	2, 4, 5, 6, 11, 13, 14, 16, 17, 18, 19, 21, 22, 23, 25, 26, 27	1, 2
Uranium	5	1

Grids 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 14, and 15 within EU 1 and grids 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, and 27 within EU 2 are located within the administrative boundary of SWMU 227. Grids 53 and 65 are not located within the administrative boundary of SWMU 227; instead, they are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 227, as described in the Work Plan (DOE 2010a).



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.02	0.016	pCi/g	0.015
Cesium-137	0.51	0.15	pCi/g	0.11
Neptunium-237	2.53	0.06	pCi/g	0.27
Plutonium-238	0.022	0.017	pCi/g	0.015
Plutonium-239/240	0.102	0.011	pCi/g	0.03
Technetium-99	152	0.4	pCi/g	2
Thorium-228	0.575	0.025	pCi/g	0.076
Thorium-230	1.21	0.02	pCi/g	0.11
Thorium-232	0.497	0.017	pCi/g	0.07
Uranium-234	48.1	0.2	pCi/g	2.7
Uranium-235/236	4.7	0.1	pCi/g	0.9
Uranium-238	146	0.3	pCi/g	5
Uranium	438	0.8	mg/kg	

Figure 6.10.1. SWMU 227 Gamma Walkover Survey

Table 6.10.1. Surface Soil Historical Data Summary: SWMU 227 DMSA OS-16

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.01E+03	1.12E+04	7.34E+03	0/10	10/10	0/10	1.30E+04	0/10	3.32E+04	0/10	3.97E+06	0/10	10/10	18.1 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	2.10E-01	0/10	2.53E+00	0/10	1.51E+03	0/10	0/10	9.05 - 20
METAL	Arsenic	mg/kg	4.47E+00	5.70E+00	5.09E+00	0/10	2/10	0/10	1.20E+01	2/10	9.97E-01	0/10	9.97E+01	0/10	2/10	0.99 - 5
METAL	Barium	mg/kg	4.07E+01	9.51E+01	7.22E+01	0/10	10/10	0/10	2.00E+02	0/10	5.92E+02	0/10	3.78E+05	0/10	3/10	1 - 5
METAL	Beryllium	mg/kg	5.40E-01	7.90E-01	6.65E-01	0/10	2/10	1/10	6.70E-01	2/10	1.40E-02	0/10	9.22E+00	0/10	0/10	0.45 - 0.5
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	2.10E-01	0/10	3.16E+00	0/10	3.16E+02	0/10	0/10	1.81 - 2
METAL	Calcium	mg/kg	1.06E+03	7.35E+04	1.58E+04	1/10	10/10	0/10	2.00E+05	0/10	n/a	0/10	n/a	n/a	n/a	50 - 500
METAL	Chromium	mg/kg	7.38E+00	1.62E+01	1.06E+01	0/10	10/10	1/10	1.60E+01	0/10	3.02E+01	0/10	3.02E+03	0/10	0/10	2 - 2.5
METAL	Cobalt	mg/kg	2.61E+00	1.48E+01	5.49E+00	0/10	9/10	1/10	1.40E+01	1/10	1.05E+01	0/10	1.52E+03	9/10	9/10	1 - 2.5
METAL	Copper	mg/kg	5.72E+00	1.73E+01	8.44E+00	0/10	10/10	0/10	1.90E+01	0/10	1.43E+03	0/10	2.24E+05	0/10	0/10	2 - 2.5
METAL	Iron	mg/kg	6.08E+03	1.84E+04	1.12E+04	0/10	10/10	0/10	2.80E+04	0/10	2.51E+04	0/10	3.92E+06	10/10	10/10	5 - 188
METAL	Lead	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	3.60E+01	0/10	4.00E+02	0/10	4.00E+02	0/10	0/10	18.1 - 20
METAL	Magnesium	mg/kg	6.96E+02	2.72E+03	1.32E+03	0/10	10/10	0/10	7.70E+03	0/10	n/a	0/10	n/a	n/a	n/a	4.52 - 15
METAL	Manganese	mg/kg	1.11E+02	1.15E+03	3.56E+02	0/10	10/10	0/10	1.50E+03	0/10	2.58E+03	0/10	1.16E+05	10/10	10/10	1 - 10
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	2.00E-01	0/10	9.00E-01	0/10	7.85E+02	0/10	0/10	0.06 - 0.2
METAL	Molybdenum	mg/kg	5.21E+00	5.21E+00	5.21E+00	0/6	1/6	0/6	n/a	0/6	1.79E+02	0/6	2.80E+04	0/6	1/6	2.35 - 4.78
METAL	Nickel	mg/kg	8.64E+00	2.07E+01	1.19E+01	0/10	9/10	0/10	2.10E+01	0/10	4.28E+01	0/10	3.18E+04	0/10	9/10	4.52 - 5
METAL	Selenium	mg/kg	1.37E+00	1.37E+00	1.37E+00	0/10	1/10	1/10	8.00E-01	0/10	1.79E+02	0/10	2.80E+04	0/10	1/10	1 - 19.9
METAL	Silver	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	2.30E+00	0/10	1.08E+01	0/10	9.15E+03	0/10	0/10	2.26 - 4
METAL	Sodium	mg/kg	1.22E+02	2.11E+02	1.85E+02	0/8	4/8	0/8	3.20E+02	0/8	n/a	0/8	n/a	n/a	n/a	90.5 - 200
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	2.10E-01	0/10	2.87E+00	0/10	4.48E+02	0/10	0/10	15 - 20
METAL	Uranium	mg/kg	1.11E+00	1.77E+01	6.28E+00	0/8	6/8	3/8	4.90E+00	0/8	1.07E+02	0/8	1.65E+04	0/8	1/8	0.13 - 200
METAL	Vanadium	mg/kg	1.04E+01	3.11E+01	1.93E+01	0/10	10/10	0/10	3.80E+01	10/10	1.51E-01	0/10	9.30E+01	10/10	10/10	2 - 2.5
METAL	Zinc	mg/kg	2.16E+01	9.10E+01	4.66E+01	0/10	9/10	2/10	6.50E+01	0/10	1.08E+04	0/10	1.68E+06	0/10	9/10	15 - 20
PPCB	PCB, Total	mg/kg	1.20E-01	1.26E+01	1.60E+00	1/82	53/82	0/82	n/a	49/82	1.88E-01	0/82	1.88E+01	4/82	53/82	0.06 - 105
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.46 - 0.5
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.46 - 0.5
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.46 - 0.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.30E+00	0/4	3.91E+01	0/4	0/4	0.46 - 0.5
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	6.02E+02	0/10	1.81E+04	0/10	0/10	0.46 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	4.05E+03	0/10	1.22E+05	0/10	0/10	0.46 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	1.17E-01	1.17E-01	1.17E-01	1/10	1/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.10.1. Surface Soil Historical Data Summary: SWMU 227 DMSA OS-16 (Continued)

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.46 - 0.5
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	2.75E+01	0/4	2.75E+03	n/a	n/a	0.46 - 0.5
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Di-n-butyl phthalate	mg/kg	7.60E-01	7.60E-01	7.60E-01	0/2	1/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	Fluoranthene	mg/kg	2.49E-01	1.20E+00	5.85E-01	1/8	3/8	0/8	n/a	0/8	6.01E+02	0/8	1.80E+04	0/8	0/8	0.46 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	4.87E+02	0/10	1.46E+04	0/10	0/10	0.46 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.17E-01	0/2	1.17E+01	0/2	0/2	0.46 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	2.24E+00	0/10	2.24E+02	0/10	0/10	0.46 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	5.22E-02	0/4	5.22E+00	0/4	0/4	0.46 - 0.5
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.46 - 0.5
SVOA	Phenanthrene	mg/kg	6.40E-01	6.40E-01	6.40E-01	0/10	1/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pyrene	mg/kg	2.69E-01	8.30E-01	4.65E-01	1/10	3/10	0/10	n/a	0/10	4.49E+02	0/10	1.35E+04	0/10	1/10	0.46 - 0.5
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.46 - 0.48
SVOA	Total PAH	mg/kg	6.56E-02	3.38E-01	2.47E-01	0/10	2/10	0/10	n/a	2/10	5.92E-02	0/10	5.92E+00	1/10	2/10	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	n/a	0/8	n/a	0/8	0/8	0.005 - 0.01
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.89E-02	0/2	5.53E+00	0/2	0/2	0.01 - 0.01
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.38E+02	0/2	8.21E+03	0/2	0/2	0.01 - 0.01
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.98E-01	0/2	8.22E+01	0/2	0/2	0.01 - 0.01
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.97E-01	0/2	5.76E+01	0/2	0/2	0.01 - 0.01
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.29E+00	0/2	3.84E+02	0/2	0/2	0.01 - 0.01
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.50E+01	0/2	1.07E+03	0/2	0/2	0.02 - 0.02
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.82E-01	0/2	7.08E+01	0/2	0/2	0.01 - 0.01
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.10.1. Surface Soil Historical Data Summary: SWMU 227 DMSA OS-16 (Continued)

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.07E+01	0/2	3.42E+02	0/2	0/2	0.01 - 0.01
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	4.69E-02	0/8	4.98E+00	0/8	0/8	0.005 - 0.01
RADS	Americium-241	pCi/g	-1.92E-02	4.22E-02	-5.51E-04	0/8	8/8	0/8	n/a	0/8	5.01E+00	0/8	5.01E+02	0/8	0/8	0.02 - 0.0909
RADS	Cesium-137	pCi/g	-3.80E-02	8.21E-02	4.47E-03	0/8	8/8	0/8	4.90E-01	0/8	8.61E-02	0/8	8.61E+00	0/8	0/8	0.0168 - 0.11
RADS	Cobalt-60	pCi/g	-3.18E-02	3.47E-02	3.59E-03	0/8	8/8	0/8	n/a	1/8	1.77E-02	0/8	1.77E+00	0/8	0/8	0.0156 - 0.1
RADS	Neptunium-237	pCi/g	-4.40E-03	4.31E-02	1.32E-02	0/8	8/8	0/8	1.00E-01	0/8	2.71E-01	0/8	2.71E+01	0/8	5/8	0.02 - 0.04
RADS	Plutonium-238	pCi/g	-1.31E-02	1.36E-02	-8.31E-04	0/7	7/7	0/7	7.30E-02	0/7	1.09E+01	0/7	1.09E+03	0/7	0/7	0.02 - 0.211
RADS	Plutonium-239/240	pCi/g	-1.27E-02	2.56E-02	-1.48E-03	0/8	8/8	1/8	2.50E-02	0/8	1.07E+01	0/8	1.07E+03	0/8	0/8	0.01 - 0.0423
RADS	Technetium-99	pCi/g	-5.34E-01	1.39E+01	3.98E+00	0/10	10/10	6/10	2.50E+00	0/10	3.61E+02	0/10	3.61E+04	0/10	8/10	2.64 - 4.63
RADS	Thorium-228	pCi/g	1.85E-01	5.24E-01	3.34E-01	0/8	8/8	0/8	1.60E+00	0/8	n/a	0/8	n/a	n/a	n/a	0.06 - 0.15
RADS	Thorium-230	pCi/g	1.66E-01	6.43E-01	3.67E-01	0/8	8/8	0/8	1.50E+00	0/8	1.38E+01	0/8	1.38E+03	0/8	6/8	0.19 - 0.22
RADS	Thorium-232	pCi/g	2.01E-01	5.46E-01	3.61E-01	0/8	8/8	0/8	1.50E+00	0/8	n/a	0/8	n/a	n/a	n/a	0.03 - 0.05
RADS	Uranium-234	pCi/g	2.62E-01	1.93E+00	7.21E-01	0/8	8/8	1/8	1.20E+00	0/8	1.89E+01	0/8	1.89E+03	0/8	0/8	0.08 - 0.333
RADS	Uranium-235	pCi/g	4.78E-03	1.49E-01	4.63E-02	0/8	8/8	2/8	6.00E-02	0/8	3.95E-01	0/8	3.95E+01	0/8	0/8	0.02 - 0.03
RADS	Uranium-238	pCi/g	3.59E-01	5.91E+00	1.57E+00	0/8	8/8	3/8	1.20E+00	3/8	1.70E+00	0/8	1.70E+02	0/8	1/8	0.04 - 0.547

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.10.2. Surface Soil RI Data Summary: SWMU 227 C-746-B DMSA Outside-16

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	6.76E+03	7.34E+03	7.05E+03	0/2	2/2	0/2	1.30E+04	0/2	3.32E+04	0/2	3.97E+06	0/2	2/2	5.2 - 5.4
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	0/2	0.52 - 0.54
METAL	Arsenic	mg/kg	6.16E+00	9.84E+00	7.77E+00	0/28	9/28	0/28	1.20E+01	9/28	9.97E-01	0/28	9.97E+01	0/28	9/28	1 - 11
METAL	Barium	mg/kg	1.06E+02	1.60E+02	1.33E+02	0/2	2/2	0/2	2.00E+02	0/2	5.92E+02	0/2	3.78E+05	0/2	2/2	2.1 - 2.2
METAL	Beryllium	mg/kg	4.80E-01	7.00E-01	5.90E-01	0/2	2/2	1/2	6.70E-01	2/2	1.40E-02	0/2	9.22E+00	0/2	0/2	0.11 - 0.52
METAL	Cadmium	mg/kg	1.90E-01	6.30E-01	4.10E-01	0/2	2/2	1/2	2.10E-01	0/2	3.16E+00	0/2	3.16E+02	0/2	1/2	0.052 - 0.054
METAL	Calcium	mg/kg	1.04E+05	1.36E+05	1.20E+05	0/2	2/2	0/2	2.00E+05	0/2	n/a	0/2	n/a	n/a	n/a	260 - 269
METAL	Chromium	mg/kg	1.56E+01	5.63E+01	3.38E+01	0/28	13/28	12/28	1.60E+01	11/28	3.02E+01	0/28	3.02E+03	0/28	0/28	1 - 85
METAL	Cobalt	mg/kg	6.80E+00	1.23E+01	9.55E+00	0/2	2/2	0/2	1.40E+01	1/2	1.05E+01	0/2	1.52E+03	2/2	2/2	0.21 - 0.22
METAL	Copper	mg/kg	1.28E+01	1.58E+02	4.96E+01	0/28	11/28	9/28	1.90E+01	0/28	1.43E+03	0/28	2.24E+05	0/28	5/28	1 - 35
METAL	Iron	mg/kg	9.04E+03	1.75E+04	1.20E+04	0/28	28/28	0/28	2.80E+04	0/28	2.51E+04	0/28	3.92E+06	28/28	28/28	5.2 - 100
METAL	Lead	mg/kg	1.03E+01	9.87E+01	2.39E+01	0/28	28/28	3/28	3.60E+01	0/28	4.00E+02	0/28	4.00E+02	0/28	21/28	0.31 - 13
METAL	Magnesium	mg/kg	3.53E+03	4.92E+03	4.23E+03	0/2	2/2	0/2	7.70E+03	0/2	n/a	0/2	n/a	n/a	n/a	51.9 - 53.8
METAL	Manganese	mg/kg	1.23E+02	8.60E+02	3.64E+02	0/28	28/28	0/28	1.50E+03	0/28	2.58E+03	0/28	1.16E+05	28/28	28/28	0.21 - 85
METAL	Mercury	mg/kg	1.22E-02	8.41E+00	4.21E+00	0/28	2/28	1/28	2.00E-01	1/28	9.00E-01	0/28	7.85E+02	1/28	1/28	0.0346 - 10
METAL	Molybdenum	mg/kg	7.60E-01	8.90E-01	8.25E-01	0/28	2/28	0/28	n/a	0/28	1.79E+02	0/28	2.80E+04	0/28	2/28	0.52 - 15
METAL	Nickel	mg/kg	6.48E+01	6.53E+02	1.70E+02	0/28	17/28	17/28	2.10E+01	17/28	4.28E+01	0/28	3.18E+04	16/28	17/28	0.52 - 65
METAL	Selenium	mg/kg	1.10E+00	1.40E+00	1.25E+00	0/28	2/28	2/28	8.00E-01	0/28	1.79E+02	0/28	2.80E+04	0/28	2/28	0.52 - 20
METAL	Silver	mg/kg	4.40E-02	2.00E-01	1.22E-01	0/28	2/28	0/28	2.30E+00	0/28	1.08E+01	0/28	9.15E+03	0/28	2/28	0.21 - 10
METAL	Sodium	mg/kg	6.27E+01	9.97E+01	8.12E+01	0/2	2/2	0/2	3.20E+02	0/2	n/a	0/2	n/a	n/a	n/a	20.8 - 21.5
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	2.87E+00	0/2	4.48E+02	0/2	0/2	0.21 - 0.22
METAL	Uranium	mg/kg	3.33E+00	4.38E+02	2.95E+01	0/29	18/29	16/29	4.90E+00	1/29	1.07E+02	0/29	1.65E+04	0/29	6/29	0.02 - 20
METAL	Vanadium	mg/kg	2.41E+01	2.69E+01	2.55E+01	0/2	2/2	0/2	3.80E+01	2/2	1.51E-01	0/2	9.30E+01	2/2	2/2	1 - 1.1
METAL	Zinc	mg/kg	3.65E+01	1.99E+02	9.24E+01	0/28	28/28	17/28	6.50E+01	0/28	1.08E+04	0/28	1.68E+06	0/28	28/28	2.1 - 25
PPCB	PCB, Total	mg/kg	6.70E-01	6.70E-01	6.70E-01	0/28	1/28	0/28	n/a	1/28	1.88E-01	0/28	1.88E+01	0/28	1/28	0.31 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.34 - 0.36
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.34 - 0.36
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.34 - 0.36
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.7
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.7
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.30E+00	0/3	3.91E+01	0/3	0/3	1.7 - 1.7
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.7
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.7
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.7
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	6.02E+02	0/3	1.81E+04	0/3	0/3	0.34 - 0.36
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.05E+03	0/3	1.22E+05	0/3	0/3	0.34 - 0.36
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Benzo(ghi)perylene	mg/kg	6.60E-02	6.60E-02	6.60E-02	1/3	1/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.7

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.10.2. Surface Soil RI Data Summary: SWMU 227 C-746-B DMSA Outside-16 (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.0069 - 0.0071
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.34 - 0.36
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Fluoranthene	mg/kg	4.20E-02	1.20E-01	8.10E-02	2/3	2/3	0/3	n/a	0/3	6.01E+02	0/3	1.80E+04	0/3	0/3	0.34 - 0.36
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.87E+02	0/3	1.46E+04	0/3	0/3	0.34 - 0.36
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.17E-01	0/3	1.17E+01	0/3	0/3	0.34 - 0.36
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.7
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.69 - 0.71
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	2.24E+00	0/3	2.24E+02	0/3	0/3	0.34 - 0.36
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.7
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.22E-02	0/3	5.22E+00	0/3	0/3	0.0069 - 0.0071
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	1.7 - 1.7
SVOA	Phenanthrene	mg/kg	3.90E-02	3.90E-02	3.90E-02	1/3	1/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.34 - 0.36
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.7
SVOA	Pyrene	mg/kg	1.10E-01	1.10E-01	1.10E-01	1/3	1/3	0/3	n/a	0/3	4.49E+02	0/3	1.35E+04	0/3	0/3	0.34 - 0.36
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.69 - 0.71
SVOA	Total PAH	mg/kg	1.20E-02	1.16E-01	4.86E-02	0/3	3/3	0/3	n/a	1/3	5.92E-02	0/3	5.92E+00	0/3	3/3	-
RADS	Alpha activity	pCi/g	2.20E+01	8.30E+01	3.90E+01	0/4	4/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	4.9 - 6.3
RADS	Americium-241	pCi/g	1.90E-03	2.00E-02	1.12E-02	0/4	4/4	0/4	n/a	0/4	5.01E+00	0/4	5.01E+02	0/4	0/4	0.012 - 0.023
RADS	Beta activity	pCi/g	3.18E+01	3.45E+02	1.30E+02	0/4	4/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	3 - 4.4
RADS	Cesium-137	pCi/g	9.00E-03	5.10E-01	1.90E-01	0/4	4/4	1/4	4.90E-01	3/4	8.61E-02	0/4	8.61E+00	0/4	0/4	0.04 - 0.15
RADS	Neptunium-237	pCi/g	8.50E-02	2.53E+00	1.31E+00	0/2	2/2	1/2	1.00E-01	1/2	2.71E-01	0/2	2.71E+01	1/2	2/2	0.032 - 0.06
RADS	Plutonium-238	pCi/g	-4.00E-04	2.20E-02	1.07E-02	0/4	4/4	0/4	7.30E-02	0/4	1.09E+01	0/4	1.09E+03	0/4	0/4	0.017 - 0.032
RADS	Plutonium-239/240	pCi/g	4.00E-04	1.02E-01	3.74E-02	0/4	4/4	2/4	2.50E-02	0/4	1.07E+01	0/4	1.07E+03	0/4	1/4	0.011 - 0.028
RADS	Technetium-99	pCi/g	1.37E+00	1.52E+02	5.92E+01	0/4	4/4	3/4	2.50E+00	0/4	3.61E+02	0/4	3.61E+04	3/4	4/4	0.4 - 0.42
RADS	Thorium-228	pCi/g	5.75E-01	9.70E-01	7.63E-01	0/4	4/4	0/4	1.60E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.013 - 0.03
RADS	Thorium-230	pCi/g	9.00E-01	1.21E+00	1.00E+00	0/4	4/4	0/4	1.50E+00	0/4	1.38E+01	0/4	1.38E+03	0/4	4/4	0.01 - 0.02
RADS	Thorium-232	pCi/g	4.97E-01	9.20E-01	7.29E-01	0/4	4/4	0/4	1.50E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.02
RADS	Uranium-234	pCi/g	9.50E-01	4.81E+01	1.29E+01	0/4	4/4	2/4	1.20E+00	1/4	1.89E+01	0/4	1.89E+03	0/4	0/4	0.02 - 0.2
RADS	Uranium-235/236	pCi/g	5.90E-02	4.70E+00	1.23E+00	0/4	4/4	3/4	6.00E-02	1/4	3.95E-01	0/4	3.95E+01	0/4	0/4	0.009 - 0.1
RADS	Uranium-238	pCi/g	1.11E+00	1.46E+02	3.77E+01	0/4	4/4	3/4	1.20E+00	2/4	1.70E+00	0/4	1.70E+02	0/4	1/4	0.007 - 0.3

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

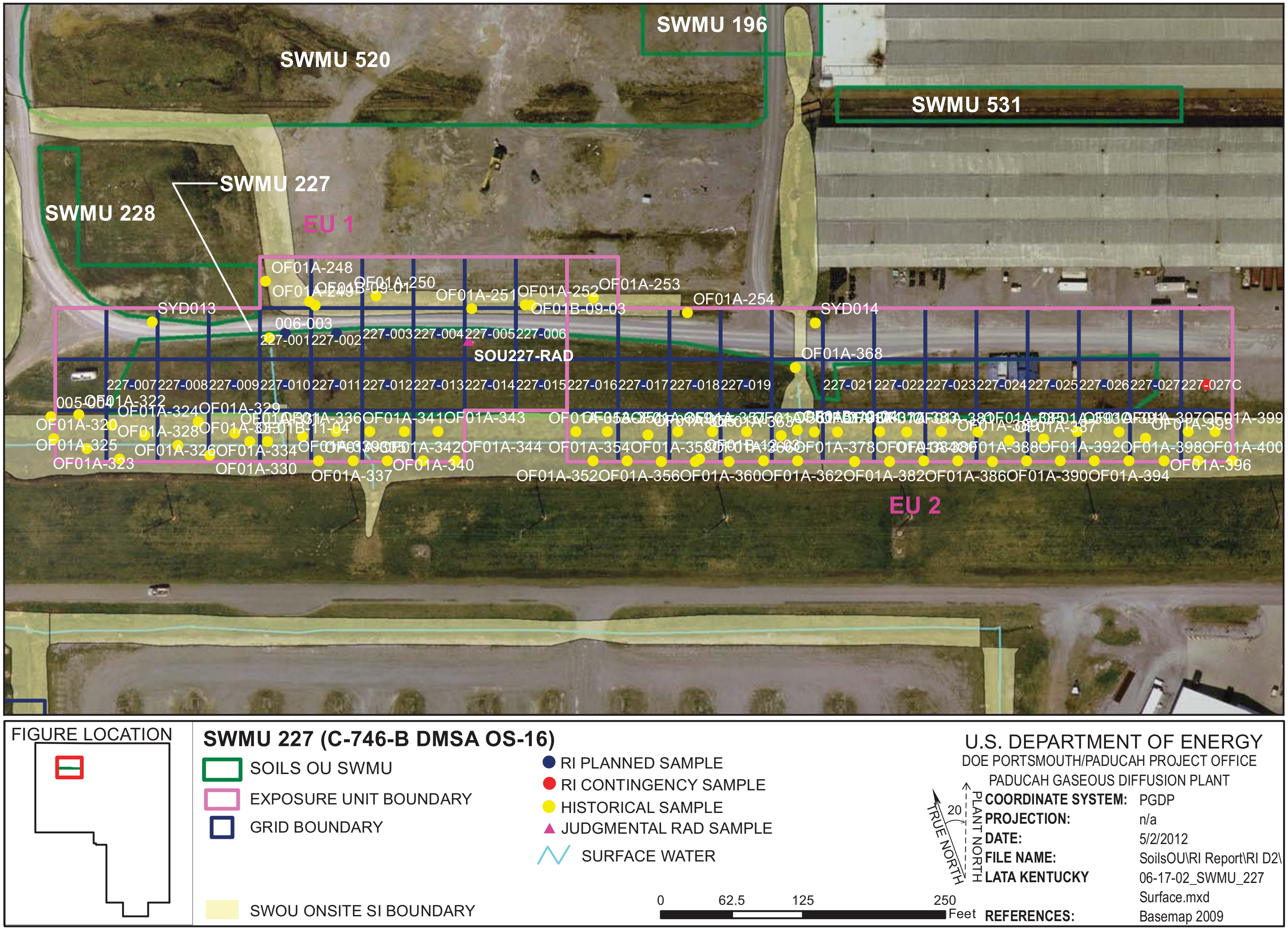


Figure 6.10.2. SWMU 227 Sample Locations - Surface Soil

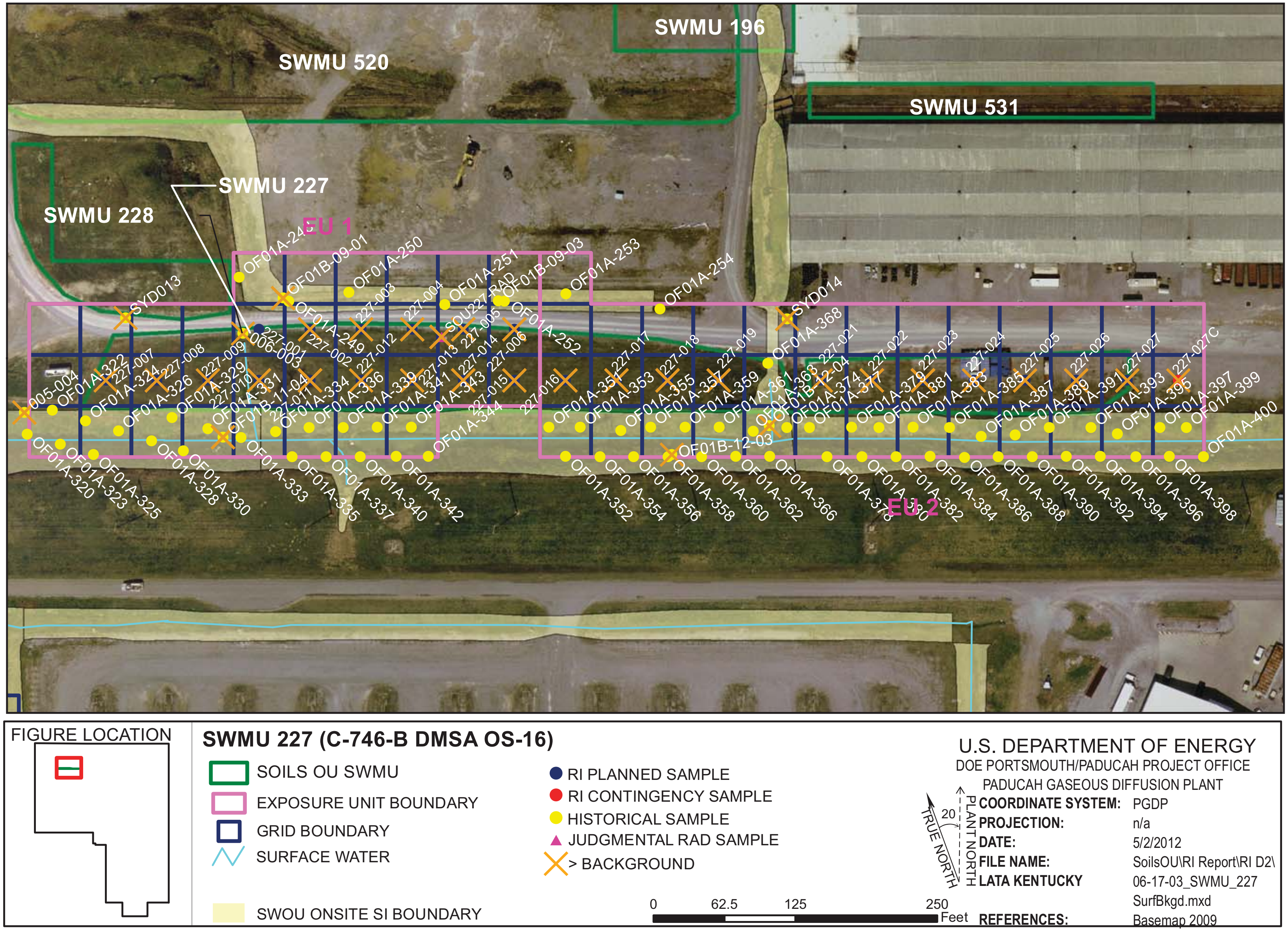


Figure 6.10.3. SWMU 227 Background Exceedances - Surface Soil

Station	Results Exceeding Background
005-004	Beryllium 0.79 (mg/kg)
	Chromium 16.2 (mg/kg)
	Zinc 68.9 (mg/kg)
006-003	Technetium-99 13.9 (pCi/g)
OF01B-09-01	Uranium 8.56 (mg/kg)
	Technetium-99 7.08 (pCi/g)
	Uranium-238 0.671 (pCi/g)
OF01B-11-04	Uranium 17.7 (mg/kg)
	Zinc 91 (mg/kg)
	Plutonium-239/240 0.0256 (pCi/g)
	Technetium-99 5.38 (pCi/g)
	Uranium-234 1.93 (pCi/g)
	Uranium-235 0.149 (pCi/g)
	Uranium-238 5.91 (pCi/g)
OF01B-12-03	Cobalt 14.8 (mg/kg)
OF01B-12-04	Uranium 5.67 (mg/kg)
	Technetium-99 3.9 (pCi/g)
	Uranium-238 1.9 (pCi/g)
SOU227-002	Copper 61.55 (mg/kg)
	Nickel 191.29 (mg/kg)
	Uranium 10.11 (mg/kg)
SOU227-003	Chromium 47.14 (mg/kg)
	Copper 23.56 (mg/kg)
	Uranium 8.75 (mg/kg)
SOU227-004	Copper 64.77 (mg/kg)
	Nickel 367.61 (mg/kg)
	Uranium 39.23 (mg/kg)
SOU227-005	Chromium 40.75 (mg/kg)
	Copper 157.89 (mg/kg)
	Nickel 653 (mg/kg)
	Uranium 19.55 (mg/kg)
SOU227-006	Copper 108.03 (mg/kg)
	Nickel 322.02 (mg/kg)
	Uranium 9.11 (mg/kg)
SOU227-007	Zinc 75.55 (mg/kg)
SOU227-008	Chromium 31.27 (mg/kg)
	Zinc 85.28 (mg/kg)
SOU227-009	Chromium 42.52 (mg/kg)
SOU227-010	Chromium 39.12 (mg/kg)
	Zinc 144.95 (mg/kg)
SOU227-011	Chromium 20.2 (mg/kg)
	Lead 60.3 (mg/kg)
	Nickel 64.82 (mg/kg)
	Selenium 1.4 (mg/kg)
	Zinc 164 (mg/kg)
	Technetium-99 47.5 (pCi/g)
	Uranium-235/236 0.08 (pCi/g)
	Uranium-238 1.32 (pCi/g)
SOU227-012	Uranium 11.47 (mg/kg)
SOU227-013	Nickel 88.87 (mg/kg)
	Uranium 16.23 (mg/kg)
SOU227-014	Chromium 40.85 (mg/kg)
	Copper 43.06 (mg/kg)
	Nickel 93.42 (mg/kg)
	Uranium 14.7 (mg/kg)
SOU227-015	Chromium 32.38 (mg/kg)
	Copper 28.39 (mg/kg)
	Uranium 12.53 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 6.10.3. SWMU 227 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU227-016	Chromium 33.74 (mg/kg)
	Nickel 104.61 (mg/kg)
	Uranium 8.75 (mg/kg)
	Zinc 82.28 (mg/kg)

Station	Results Exceeding Background
SOU227-017	Chromium 56.31 (mg/kg)
	Lead 37.03 (mg/kg)
	Nickel 94.13 (mg/kg)
	Zinc 121.66 (mg/kg)

Station	Results Exceeding Background
SOU227-018	Chromium 32.79 (mg/kg)
	Copper 43.94 (mg/kg)
	Nickel 188.02 (mg/kg)
	Uranium 10.65 (mg/kg)
	Zinc 81.72 (mg/kg)

Station	Results Exceeding Background
SOU227-019	Copper 62.27 (mg/kg)
	Nickel 192.4 (mg/kg)
	Uranium 15.05 (mg/kg)
	Zinc 117.47 (mg/kg)

Station	Results Exceeding Background
SOU227-021	Nickel 141.87 (mg/kg)
	Zinc 79.31 (mg/kg)

Station	Results Exceeding Background
SOU227-022	Nickel 97.02 (mg/kg)
	Uranium 8.78 (mg/kg)
	Zinc 123.45 (mg/kg)

Station	Results Exceeding Background
SOU227-023	Beryllium 0.7 (mg/kg)
	Cadmium 0.63 (mg/kg)
	Mercury 8.41 (mg/kg)
	Nickel 143.37 (mg/kg)
	Selenium 1.1 (mg/kg)
	Uranium 9 (mg/kg)
	Zinc 147.2 (mg/kg)
	Plutonium-239/240 0.027 (pCi/g)
	Uranium-234 1.4 (pCi/g)
	Uranium-238 2.45 (pCi/g)

Station	Results Exceeding Background
SOU227-024	Chromium 39.26 (mg/kg)
	Zinc 160.59 (mg/kg)

Station	Results Exceeding Background
SOU227-025	Nickel 84.94 (mg/kg)
	Zinc 77.89 (mg/kg)

Station	Results Exceeding Background
SOU227-026	Lead 98.7 (mg/kg)
	Nickel 117.38 (mg/kg)
	Uranium 8.92 (mg/kg)
	Zinc 198.95 (mg/kg)

Station	Results Exceeding Background
SOU227-027	Nickel 86.09 (mg/kg)
	Zinc 114.05 (mg/kg)

Station	Results Exceeding Background
SOU227-027C	Zinc 65.56 (mg/kg)

Station	Results Exceeding Background
SOU227-RAD	Uranium 438 (mg/kg)
	Cesium-137 0.51 (pCi/g)
	Neptunium-237 2.53 (pCi/g)
	Plutonium-239/240 0.102 (pCi/g)
	Technetium-99 152 (pCi/g)
	Uranium-234 48.1 (pCi/g)
	Uranium-235/236 4.7 (pCi/g)
	Uranium-238 146 (pCi/g)

Station	Results Exceeding Background
SYD013	Selenium 1.37 (mg/kg)

Station	Results Exceeding Background
SYD014	Technetium-99 3.8 (pCi/g)
	Uranium-235 0.0668 (pCi/g)
	Uranium-238 1.97 (pCi/g)

NOTE: maximum detections only shown for location.

Figure 6.10.3. SWMU 227 Background Exceedances – Surface (Continued)

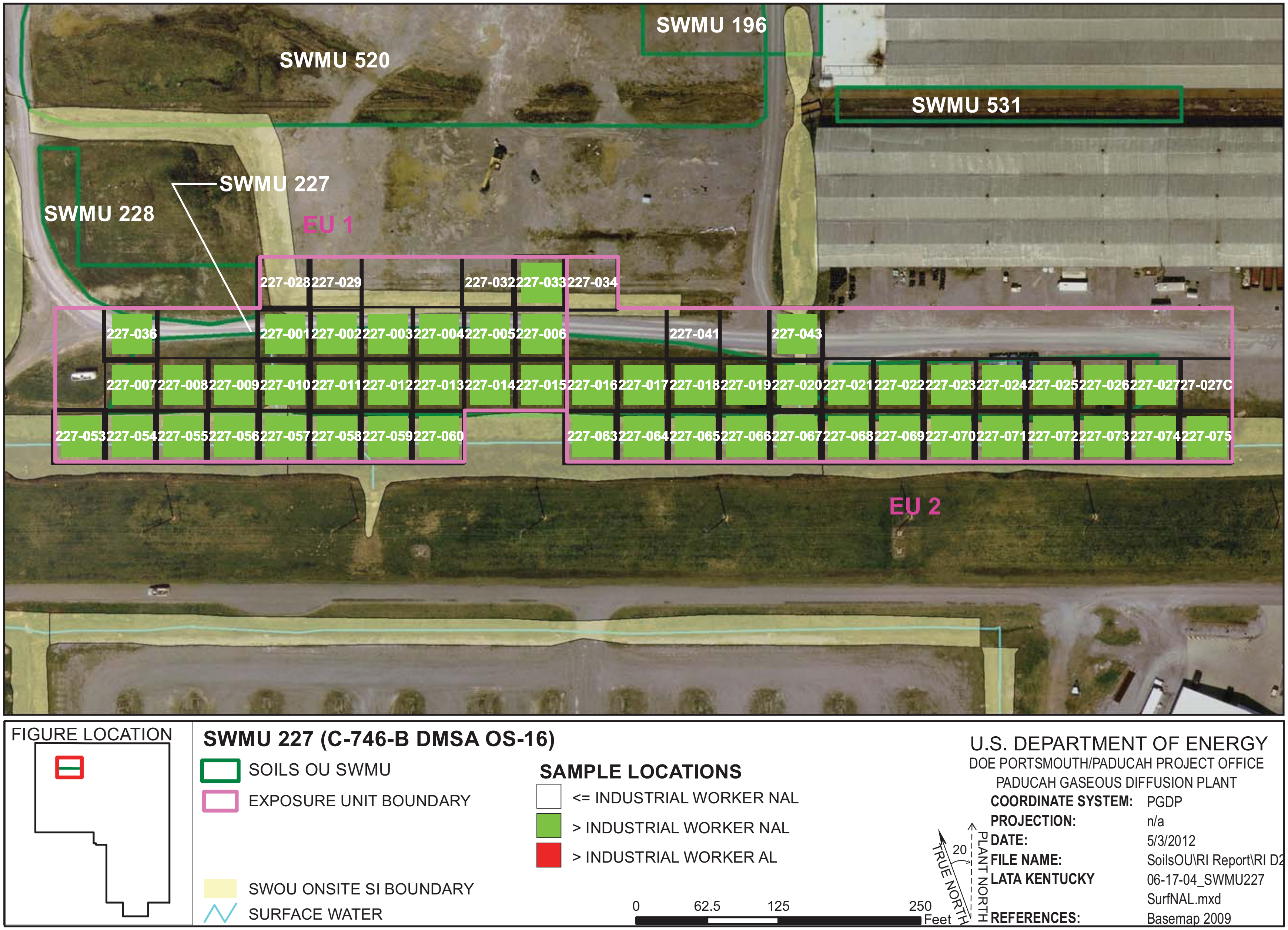


Figure 6.10.4. SWMU 227 NAL Exceedances - Surface Soil

Grid	Results Exceeding NAL
227-001	Beryllium 0.54 (mg/kg) Vanadium 17.6 (mg/kg) Total PAH 0.337817 (mg/kg)

Grid	Results Exceeding NAL
227-002	Nickel 191.29 (mg/kg)

Grid	Results Exceeding NAL
227-003	Chromium 47.14 (mg/kg)

Grid	Results Exceeding NAL
227-004	Nickel 367.61 (mg/kg)

Grid	Results Exceeding NAL
227-005	Chromium 40.75 (mg/kg) Nickel 653 (mg/kg) Uranium 438 (mg/kg) Cesium-137 0.51 (pCi/g) Neptunium-237 2.53 (pCi/g) Uranium-234 48.1 (pCi/g) Uranium-235/236 4.7 (pCi/g) Uranium-238 146 (pCi/g)

Grid	Results Exceeding NAL
227-006	Arsenic 6.36 (mg/kg) Nickel 322.02 (mg/kg)

Grid	Results Exceeding NAL
227-007	Arsenic 9.84 (mg/kg)

Grid	Results Exceeding NAL
227-008	Chromium 31.27 (mg/kg)

Grid	Results Exceeding NAL
227-009	Chromium 42.52 (mg/kg)

Grid	Results Exceeding NAL
227-010	Chromium 39.12 (mg/kg)

Grid	Results Exceeding NAL
227-011	Arsenic 7 (mg/kg) Beryllium 0.48 (mg/kg) Nickel 64.82 (mg/kg) Vanadium 26.9 (mg/kg) Cesium-137 0.117 (pCi/g)

Grid	Results Exceeding NAL
227-012	Arsenic 7.36 (mg/kg)

Grid	Results Exceeding NAL
227-013	Arsenic 7.33 (mg/kg) Nickel 88.87 (mg/kg)

Grid	Results Exceeding NAL
227-014	Chromium 40.85 (mg/kg) Nickel 93.42 (mg/kg)

Grid	Results Exceeding NAL
227-015	Arsenic 6.16 (mg/kg) Chromium 32.38 (mg/kg)

Grid	Results Exceeding NAL
227-016	Chromium 33.74 (mg/kg) Nickel 104.61 (mg/kg)

Grid	Results Exceeding NAL
227-017	Chromium 56.31 (mg/kg) Nickel 94.13 (mg/kg)

Grid	Results Exceeding NAL
227-018	Chromium 32.79 (mg/kg) Nickel 188.02 (mg/kg)

Grid	Results Exceeding NAL
227-019	Nickel 192.4 (mg/kg)

Grid	Results Exceeding NAL
227-020	PCB, Total 0.47 (mg/kg)

Grid	Results Exceeding NAL
227-021	Nickel 141.87 (mg/kg)

Grid	Results Exceeding NAL
227-022	Arsenic 8.34 (mg/kg) Nickel 97.02 (mg/kg)

Grid	Results Exceeding NAL
227-023	Arsenic 9.55 (mg/kg) Beryllium 0.7 (mg/kg) Cobalt 12.3 (mg/kg) Mercury 8.41 (mg/kg) Nickel 143.37 (mg/kg) Vanadium 24.1 (mg/kg) PCB, Total 0.67 (mg/kg) Cesium-137 0.123 (pCi/g) Uranium-238 2.45 (pCi/g) Total PAH 0.11568 (mg/kg)

Grid	Results Exceeding NAL
227-024	Chromium 39.26 (mg/kg)

Grid	Results Exceeding NAL
227-025	Arsenic 4.47 (mg/kg) Nickel 84.94 (mg/kg) Vanadium 27.8 (mg/kg)

Grid	Results Exceeding NAL
227-026	Nickel 117.38 (mg/kg)

Grid	Results Exceeding NAL
227-027	Nickel 86.09 (mg/kg)

Grid	Results Exceeding NAL
227-033	Vanadium 25.3 (mg/kg)

Grid	Results Exceeding NAL
227-036	Vanadium 10.4 (mg/kg)

Grid	Results Exceeding NAL
227-043	Vanadium 17.7 (mg/kg) Uranium-238 1.97 (pCi/g)

NOTE: maximum detections only shown for location.

Figure 6.10.4. SWMU 227 NAL Exceedances – Surface (Continued)

Grid	Results Exceeding NAL
227-053	Arsenic 5.7 (mg/kg) Beryllium 0.79 (mg/kg) Vanadium 31.1 (mg/kg) PCB, Total 0.67 (mg/kg)

Grid	Results Exceeding NAL
227-054	PCB, Total 0.23 (mg/kg)

Grid	Results Exceeding NAL
227-055	PCB, Total 0.79 (mg/kg)

Grid	Results Exceeding NAL
227-056	Vanadium 11.1 (mg/kg) PCB, Total 1.97 (mg/kg) Uranium-238 5.91 (pCi/g)

Grid	Results Exceeding NAL
227-057	PCB, Total 1.03 (mg/kg)

Grid	Results Exceeding NAL
227-058	PCB, Total 2.5 (mg/kg)

Grid	Results Exceeding NAL
227-059	PCB, Total 4.77 (mg/kg)

Grid	Results Exceeding NAL
227-060	PCB, Total 1.51 (mg/kg)

Grid	Results Exceeding NAL
227-063	PCB, Total 2.49 (mg/kg)

Grid	Results Exceeding NAL
227-064	PCB, Total 2.25 (mg/kg)

Grid	Results Exceeding NAL
227-065	Cobalt 14.8 (mg/kg) Vanadium 18.1 (mg/kg) PCB, Total 0.21 (mg/kg)

Grid	Results Exceeding NAL
227-066	PCB, Total 9.62 (mg/kg)

NOTE: maximum detections only shown for location.

Grid	Results Exceeding NAL
227-067	Vanadium 14.2 (mg/kg) PCB, Total 2.82 (mg/kg) Cobalt-60 0.0347 (pCi/g) Uranium-238 1.9 (pCi/g) Total PAH 0.06562 (mg/kg)

Grid	Results Exceeding NAL
227-068	PCB, Total 0.58 (mg/kg)

Grid	Results Exceeding NAL
227-069	PCB, Total 0.64 (mg/kg)

Grid	Results Exceeding NAL
227-070	PCB, Total 3.41 (mg/kg)

Grid	Results Exceeding NAL
227-071	PCB, Total 2.83 (mg/kg)

Grid	Results Exceeding NAL
227-072	PCB, Total 7.72 (mg/kg)

Grid	Results Exceeding NAL
227-073	PCB, Total 1.52 (mg/kg)

Grid	Results Exceeding NAL
227-074	PCB, Total 1.28 (mg/kg)

Grid	Results Exceeding NAL
227-075	PCB, Total 12.6 (mg/kg)

Figure 6.10.4. SWMU 227 NAL Exceedances – Surface (Continued)

The following are the metals detected in the SWMU 227 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Cadmium	23	2
Cobalt	65	2
Copper	2,4, 5, 6, 19	1, 2
Lead	11, 17, 26	1, 2
Mercury	23	2
Molybdenum[1]	11, 23, 67	1, 2
Nickel	2, 4, 5, 6, 11, 13, 14, 16, 17, 18, 19, 21, 22, 23, 25, 26, 27	1, 2
Selenium	11, 2, 36	1, 2
Uranium	4, 5, 13, 14, 19, 56	1, 2
Zinc	7, 8, 10, 11, 16, 17, 18 19, 21,22, 23, 24, 25, 26, 27, 27C, 53, 56	1, 2

[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Cobalt	65	2
Mercury	23	2
Nickel	2, 4, 5, 6, 13, 14, 16, 17, 18, 19, 21, 22, 23, 25, 26, 27	1, 2

PCBs

Total PCBs were detected above the industrial worker NALs in grids, 53, 54, 55, 56, 57, 58, 59, and 60 within EU 1 and grids 20, 23, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, and 75 within EU 2 in the SWMU 227 surface soil.

PCBs were not detected above the industrial worker ALs in the SWMU 227 surface soil.

Total PCBs were detected above the SSLs for the protection of UCRS groundwater in grids 20, 23, 43, 53, 54, 55, 56, 57, 58, 59, and 60 in EU 1 and grids 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, and 75 in EU 2.

Total PCBs were detected above the SSLs for the protection of RGA groundwater in grids 59 (EU 1), 66, 72, and 75 (EU 2).

The wide-spread distribution of PCBs above the industrial worker NALs throughout this SWMU means that should an action be needed, additional data to determine the lateral extent of PCB contamination may be required.

SVOCs

Total PAHs were detected above the industrial worker NALs in SWMU 227 in the surface soil in grids 1 (EU 1), 23 and 67 (EU 2).

No SVOCs were detected above the industrial worker ALs in the SWMU 227 surface soil.

Pyrene (grid 67, EU 2) and Total PAHs (grids 1 and 11, EU 1; grids 23 and 67, EU 2) were detected above the SSLs for the protection of UCRS groundwater. Total PAHs (grid 1, EU1) also were detected above the SSLs for the protection of RGA groundwater.

VOCs

No VOCs were detected in the SWMU 227 surface soil.

Radionuclides

The following are the radionuclides detected at or above both the background screening levels and the industrial worker NALs and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Cesium-137	5	1
Neptunium-237	5	1
Uranium-234	5	1
Uranium-235/236	5	1
Uranium-238	5, 23, 43, 56, 67	1, 2

Grids 5 (EU 1) and 23 (EU 2) are located within the administrative boundary of SWMU 227. Grids 56 (EU 1), 43 and 67 (EU 2), are not located within the administrative boundary of SWMU 227; instead, they are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 227, as described in the Work Plan (DOE 2010a).

The following are the radionuclides detected above both the background screening levels and the SSLs for the protection of UCRS and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Neptunium-237	5	1
Plutonium-239/240	5	1
Technetium-99	1,5,11, 25, 43, 56, 67	1, 2
Uranium-238	5, 56	1

Neptunium-237 (grid 5, EU1) and technetium-99 (grids 5 and 11, EU 1) were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

6.10.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 227, the representative data set for subsurface soils is presented in Tables 6.10.3 and 6.10.4 and provides the nature of the contamination in SWMU 227 subsurface soils. Figures 6.10.5–6.10.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 227 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 227 consists of two EUs.

Table 6.10.3. Subsurface Soil Historical Data Summary: SWMU 227 DMSA OS-16

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	9.33E+03	1.17E+04	1.05E+04	0/4	4/4	0/4	1.20E+04	0/4	3.32E+04	0/4	3.97E+06	0/4	4/4	20 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	0/2	20 - 20
METAL	Arsenic	mg/kg	3.30E+00	4.60E+00	3.95E+00	0/4	2/4	0/4	7.90E+00	2/4	9.97E-01	0/4	9.97E+01	0/4	2/4	0.6 - 5
METAL	Barium	mg/kg	6.30E+01	1.97E+02	9.96E+01	0/4	4/4	1/4	1.70E+02	0/4	5.92E+02	0/4	3.78E+05	0/4	1/4	1 - 1
METAL	Beryllium	mg/kg	5.00E-01	9.00E-01	6.33E-01	0/4	3/4	1/4	6.90E-01	3/4	1.40E-02	0/4	9.22E+00	0/4	0/4	0.4 - 0.5
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	2.10E-01	0/4	3.16E+00	0/4	3.16E+02	0/4	0/4	0.7 - 2
METAL	Calcium	mg/kg	1.46E+03	1.49E+04	5.94E+03	0/4	4/4	1/4	6.10E+03	0/4	n/a	0/4	n/a	n/a	n/a	100 - 100
METAL	Chromium	mg/kg	1.28E+01	1.82E+01	1.43E+01	0/4	4/4	0/4	4.30E+01	0/4	3.02E+01	0/4	3.02E+03	0/4	0/4	2 - 2
METAL	Cobalt	mg/kg	2.73E+00	8.70E+00	5.39E+00	0/4	4/4	0/4	1.30E+01	0/4	1.05E+01	0/4	1.52E+03	4/4	4/4	2 - 3
METAL	Copper	mg/kg	6.41E+00	1.13E+01	7.94E+00	0/4	4/4	0/4	2.50E+01	0/4	1.43E+03	0/4	2.24E+05	0/4	0/4	2 - 2
METAL	Iron	mg/kg	9.14E+03	1.59E+04	1.25E+04	0/4	4/4	0/4	2.80E+04	0/4	2.51E+04	0/4	3.92E+06	4/4	4/4	5 - 5
METAL	Lead	mg/kg	1.04E+01	1.28E+01	1.16E+01	0/4	2/4	0/4	2.30E+01	0/4	4.00E+02	0/4	4.00E+02	0/4	0/4	20 - 20
METAL	Magnesium	mg/kg	1.07E+03	2.37E+03	1.56E+03	0/4	4/4	1/4	2.10E+03	0/4	n/a	0/4	n/a	n/a	n/a	15 - 15
METAL	Manganese	mg/kg	1.64E+02	1.09E+03	4.44E+02	0/4	4/4	1/4	8.20E+02	0/4	2.58E+03	0/4	1.16E+05	4/4	4/4	10 - 10
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	1.30E-01	0/4	9.00E-01	0/4	7.85E+02	0/4	0/4	0.1 - 0.2
METAL	Nickel	mg/kg	7.20E+00	2.18E+01	1.20E+01	0/4	4/4	0/4	2.20E+01	0/4	4.28E+01	0/4	3.18E+04	0/4	4/4	5 - 6.8
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	7.00E-01	0/4	1.79E+02	0/4	2.80E+04	0/4	0/4	0.7 - 1
METAL	Silver	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	2.70E+00	0/4	1.08E+01	0/4	9.15E+03	0/4	0/4	2.2 - 4
METAL	Sodium	mg/kg	2.01E+02	2.75E+02	2.30E+02	2/4	4/4	0/4	3.40E+02	0/4	n/a	0/4	n/a	n/a	n/a	200 - 200
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	3.40E-01	0/4	2.87E+00	0/4	4.48E+02	0/4	0/4	0.7 - 15
METAL	Vanadium	mg/kg	1.81E+01	3.92E+01	2.73E+01	0/4	4/4	1/4	3.70E+01	4/4	1.51E-01	0/4	9.30E+01	4/4	4/4	2 - 2
METAL	Zinc	mg/kg	1.31E+01	4.83E+01	3.03E+01	0/4	4/4	0/4	6.00E+01	0/4	1.08E+04	0/4	1.68E+06	0/4	3/4	20 - 20
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.88E-01	0/4	1.88E+01	0/4	0/4	0.1 - 0.2
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.41 - 0.47
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.41 - 0.47
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.41 - 0.47
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 2.1
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 2.1
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 2.1
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.30E+00	0/4	3.91E+01	0/4	0/4	0.46 - 2.1
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.83
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 2.1
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 2.1
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	6.02E+02	0/4	1.81E+04	0/4	0/4	0.41 - 0.47
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.05E+03	0/4	1.22E+05	0/4	0/4	0.41 - 0.47
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.42
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2 - 2.1

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.10.3. Subsurface Soil Historical Data Summary: SWMU 227 DMSA OS-16 (Continued)

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.46 - 0.65
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.75E+01	0/2	2.75E+03	n/a	n/a	0.46 - 0.47
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Di-n-butyl phthalate	mg/kg	7.40E-01	8.60E-01	8.00E-01	0/4	2/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	6.01E+02	0/4	1.80E+04	0/4	0/4	0.41 - 0.47
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.87E+02	0/4	1.46E+04	0/4	0/4	0.41 - 0.47
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.17E-01	0/4	1.17E+01	0/4	0/4	0.41 - 0.47
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	2.24E+00	0/4	2.24E+02	0/4	0/4	0.41 - 0.47
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	5.22E-02	0/4	5.22E+00	0/4	0/4	0.41 - 0.47
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.46 - 2.1
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.41 - 0.47
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 2.1
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.49E+02	0/4	1.35E+04	0/4	0/4	0.41 - 0.47
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.47
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	5.92E-02	0/4	5.92E+00	0/4	0/4	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.006 - 0.01
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.006 - 0.01
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.006 - 0.01
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.006 - 0.01
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.89E-02	0/4	5.53E+00	0/4	0/4	0.006 - 0.01
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.006 - 0.01
VOA	1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.48E+00	0/2	1.76E+02	0/2	0/2	0.006 - 0.006
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.006 - 0.01
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.38E+02	0/2	8.21E+03	0/2	0/2	0.01 - 0.01
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.012
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.012
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.012
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.012
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	6.98E-01	0/4	8.22E+01	0/4	0/4	0.006 - 0.01
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.006 - 0.01
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.006 - 0.01
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.012
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.006 - 0.01
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.97E-01	0/4	5.76E+01	0/4	0/4	0.006 - 0.01
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.006 - 0.01
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.012
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	2.42E-01	0/4	2.49E+01	0/4	0/4	0.006 - 0.01
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.012
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.74E+00	0/2	1.93E+02	0/2	0/2	0.01 - 0.21
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.006 - 0.01

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.10.3. Subsurface Soil Historical Data Summary: SWMU 227 DMSA OS-16 (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.006 - 0.01
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	3.29E+00	0/4	3.84E+02	0/4	0/4	0.006 - 0.01
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.50E+01	0/2	1.07E+03	0/2	0/2	0.02 - 0.02
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.006 - 0.01
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.006 - 0.01
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	2.82E-01	0/4	7.08E+01	0/4	0/4	0.006 - 0.01
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.006 - 0.01
VOA	Total Xylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.50E+01	0/2	1.07E+03	0/2	0/2	0.006 - 0.006
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.07E+01	0/2	3.42E+02	0/2	0/2	0.01 - 0.21
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.006 - 0.01
VOA	Trichloroethene	mg/kg	1.10E-03	3.80E-03	2.45E-03	0/4	2/4	0/4	n/a	0/4	4.69E-02	0/4	4.98E+00	0/4	1/4	0.0011 - 0.01
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	2.04E-01	0/4	4.83E+01	0/4	0/4	0.01 - 21
RADS	Americium-241	pCi/g	-1.08E-01	-8.50E-04	-5.44E-02	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.123 - 0.124
RADS	Neptunium-237	pCi/g	1.38E-02	5.49E-02	3.44E-02	0/2	2/2	0/2	n/a	0/2	2.71E-01	0/2	2.71E+01	0/2	2/2	0.065 - 0.0767
RADS	Plutonium-239/240	pCi/g	-1.53E-02	-9.39E-03	-1.23E-02	0/2	2/2	0/2	n/a	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.373 - 0.373
RADS	Technetium-99	pCi/g	8.12E-01	8.12E-01	8.12E-01	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	1/1	4.06 - 4.06

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.10.4. Subsurface Soil RI Data Summary: SWMU 227 C-746-B DMSA Outside-16

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	6.39E+03	1.12E+04	8.82E+03	0/3	3/3	0/3	1.20E+04	0/3	3.32E+04	0/3	3.97E+06	0/3	3/3	5.6 - 6.3
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.10E-01	0/3	2.53E+00	0/3	1.51E+03	0/3	0/3	0.56 - 0.63
METAL	Arsenic	mg/kg	6.25E+00	1.06E+01	7.71E+00	0/28	8/28	3/28	7.90E+00	8/28	9.97E-01	0/28	9.97E+01	0/28	8/28	1.1 - 11
METAL	Barium	mg/kg	6.68E+01	2.75E+02	1.40E+02	0/3	3/3	1/3	1.70E+02	0/3	5.92E+02	0/3	3.78E+05	0/3	1/3	2.2 - 2.5
METAL	Beryllium	mg/kg	2.40E-01	5.90E-01	4.63E-01	0/3	3/3	0/3	6.90E-01	3/3	1.40E-02	0/3	9.22E+00	0/3	0/3	0.11 - 0.13
METAL	Cadmium	mg/kg	4.50E-02	1.50E-01	8.47E-02	0/3	3/3	0/3	2.10E-01	0/3	3.16E+00	0/3	3.16E+02	0/3	0/3	0.056 - 0.063
METAL	Calcium	mg/kg	1.35E+03	8.69E+04	3.03E+04	0/3	3/3	1/3	6.10E+03	0/3	n/a	0/3	n/a	n/a	n/a	59.6 - 281
METAL	Chromium	mg/kg	9.40E+00	5.51E+01	3.76E+01	0/28	16/28	5/28	4.30E+01	15/28	3.02E+01	0/28	3.02E+03	0/28	0/28	1.1 - 85
METAL	Cobalt	mg/kg	4.00E+00	2.44E+01	1.12E+01	0/3	3/3	1/3	1.30E+01	1/3	1.05E+01	0/3	1.52E+03	3/3	3/3	0.22 - 0.25
METAL	Copper	mg/kg	5.00E+00	2.34E+01	1.07E+01	0/28	4/28	0/28	2.50E+01	0/28	1.43E+03	0/28	2.24E+05	0/28	0/28	1.1 - 35
METAL	Iron	mg/kg	6.84E+03	1.98E+04	1.19E+04	0/28	28/28	0/28	2.80E+04	0/28	2.51E+04	0/28	3.92E+06	28/28	28/28	5.6 - 100
METAL	Lead	mg/kg	6.46E+00	2.44E+01	1.17E+01	0/28	27/28	1/28	2.30E+01	0/28	4.00E+02	0/28	4.00E+02	0/28	5/28	0.34 - 13
METAL	Magnesium	mg/kg	8.83E+02	9.05E+03	3.66E+03	0/3	3/3	1/3	2.10E+03	0/3	n/a	0/3	n/a	n/a	n/a	56.1 - 62.6
METAL	Manganese	mg/kg	1.08E+02	2.39E+03	4.72E+02	0/28	28/28	1/28	8.20E+02	0/28	2.58E+03	0/28	1.16E+05	28/28	28/28	0.22 - 85
METAL	Mercury	mg/kg	1.53E-02	7.09E+00	1.43E+00	0/28	3/28	1/28	1.30E-01	1/28	9.00E-01	0/28	7.85E+02	1/28	1/28	0.0374 - 10
METAL	Molybdenum	mg/kg	4.90E-01	4.90E-01	4.90E-01	0/28	1/28	0/28	n/a	0/28	1.79E+02	0/28	2.80E+04	0/28	1/28	0.56 - 15
METAL	Nickel	mg/kg	6.10E+00	8.34E+01	5.01E+01	0/28	8/28	6/28	2.20E+01	6/28	4.28E+01	0/28	3.18E+04	4/28	8/28	0.56 - 65
METAL	Selenium	mg/kg	7.60E-01	2.20E+00	1.42E+00	0/28	3/28	3/28	7.00E-01	0/28	1.79E+02	0/28	2.80E+04	0/28	3/28	0.56 - 20
METAL	Silver	mg/kg	3.00E-02	1.01E+01	1.47E+00	0/28	4/28	1/28	2.70E+00	0/28	1.08E+01	0/28	9.15E+03	1/28	2/28	0.22 - 10
METAL	Sodium	mg/kg	7.24E+01	1.08E+02	9.51E+01	0/3	3/3	0/3	3.40E+02	0/3	n/a	0/3	n/a	n/a	n/a	22.4 - 25
METAL	Thallium	mg/kg	5.10E-01	5.10E-01	5.10E-01	0/3	1/3	1/3	3.40E-01	0/3	2.87E+00	0/3	4.48E+02	0/3	1/3	0.22 - 0.25
METAL	Uranium	mg/kg	1.50E+00	3.07E+01	1.22E+01	0/28	7/28	5/28	4.60E+00	0/28	1.07E+02	0/28	1.65E+04	0/28	1/28	0.07 - 20
METAL	Vanadium	mg/kg	1.67E+01	2.96E+01	2.49E+01	0/3	3/3	0/3	3.70E+01	3/3	1.51E-01	0/3	9.30E+01	3/3	3/3	1.1 - 1.3
METAL	Zinc	mg/kg	1.76E+01	5.37E+01	3.28E+01	0/28	28/28	0/28	6.00E+01	0/28	1.08E+04	0/28	1.68E+06	0/28	27/28	2.2 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/28	0/28	0/28	n/a	0/28	1.88E-01	0/28	1.88E+01	0/28	0/28	0.36 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.39 - 0.41
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.39 - 0.41
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.39 - 0.41
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.30E+00	0/2	3.91E+01	0/2	0/2	1.9 - 2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.02E+02	0/2	1.81E+04	0/2	0/2	0.39 - 0.41
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.05E+03	0/2	1.22E+05	0/2	0/2	0.39 - 0.41
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.10.4. Subsurface Soil RI Data Summary: SWMU 227 C-746-B DMSA Outside-16 (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.0079 - 0.0083
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.39 - 0.41
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.01E+02	0/2	1.80E+04	0/2	0/2	0.39 - 0.41
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.87E+02	0/2	1.46E+04	0/2	0/2	0.39 - 0.41
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.17E-01	0/2	1.17E+01	0/2	0/2	0.39 - 0.41
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.79 - 0.83
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.24E+00	0/2	2.24E+02	0/2	0/2	0.39 - 0.41
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.22E-02	0/2	5.22E+00	0/2	0/2	0.0079 - 0.0083
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	1.9 - 2
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.41
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.49E+02	0/2	1.35E+04	0/2	0/2	0.39 - 0.41
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.79 - 0.83
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.92E-02	0/2	5.92E+00	0/2	0/2	-
RADS	Alpha activity	pCi/g	2.41E+01	2.61E+01	2.51E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	5.2 - 5.5
RADS	Americium-241	pCi/g	8.00E-04	4.40E-03	2.60E-03	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.018 - 0.02
RADS	Beta activity	pCi/g	2.42E+01	3.48E+01	2.95E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	3.1 - 3.5
RADS	Cesium-137	pCi/g	-1.30E-02	-8.00E-03	-1.05E-02	0/2	2/2	0/2	2.80E-01	0/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.12 - 0.13
RADS	Neptunium-237	pCi/g	4.00E-03	4.00E-03	4.00E-03	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.021 - 0.021
RADS	Plutonium-238	pCi/g	1.90E-02	2.10E-02	2.00E-02	0/2	2/2	0/2	n/a	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.026 - 0.033
RADS	Plutonium-239/240	pCi/g	9.00E-04	1.40E-02	7.45E-03	0/2	2/2	0/2	n/a	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.02 - 0.028
RADS	Technetium-99	pCi/g	2.20E-01	3.46E+00	1.84E+00	0/2	2/2	1/2	2.80E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	1/2	0.39 - 0.43
RADS	Thorium-228	pCi/g	1.04E+00	1.09E+00	1.07E+00	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.02 - 0.03
RADS	Thorium-230	pCi/g	9.70E-01	1.20E+00	1.09E+00	0/2	2/2	0/2	1.40E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.02 - 0.02
RADS	Thorium-232	pCi/g	9.30E-01	1.09E+00	1.01E+00	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.02
RADS	Uranium-234	pCi/g	1.01E+00	1.11E+00	1.06E+00	0/2	2/2	0/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.02 - 0.04
RADS	Uranium-235/236	pCi/g	5.70E-02	7.80E-02	6.75E-02	0/2	2/2	1/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.01 - 0.028
RADS	Uranium-238	pCi/g	1.17E+00	2.18E+00	1.68E+00	0/2	2/2	1/2	1.20E+00	1/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.02 - 0.04

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

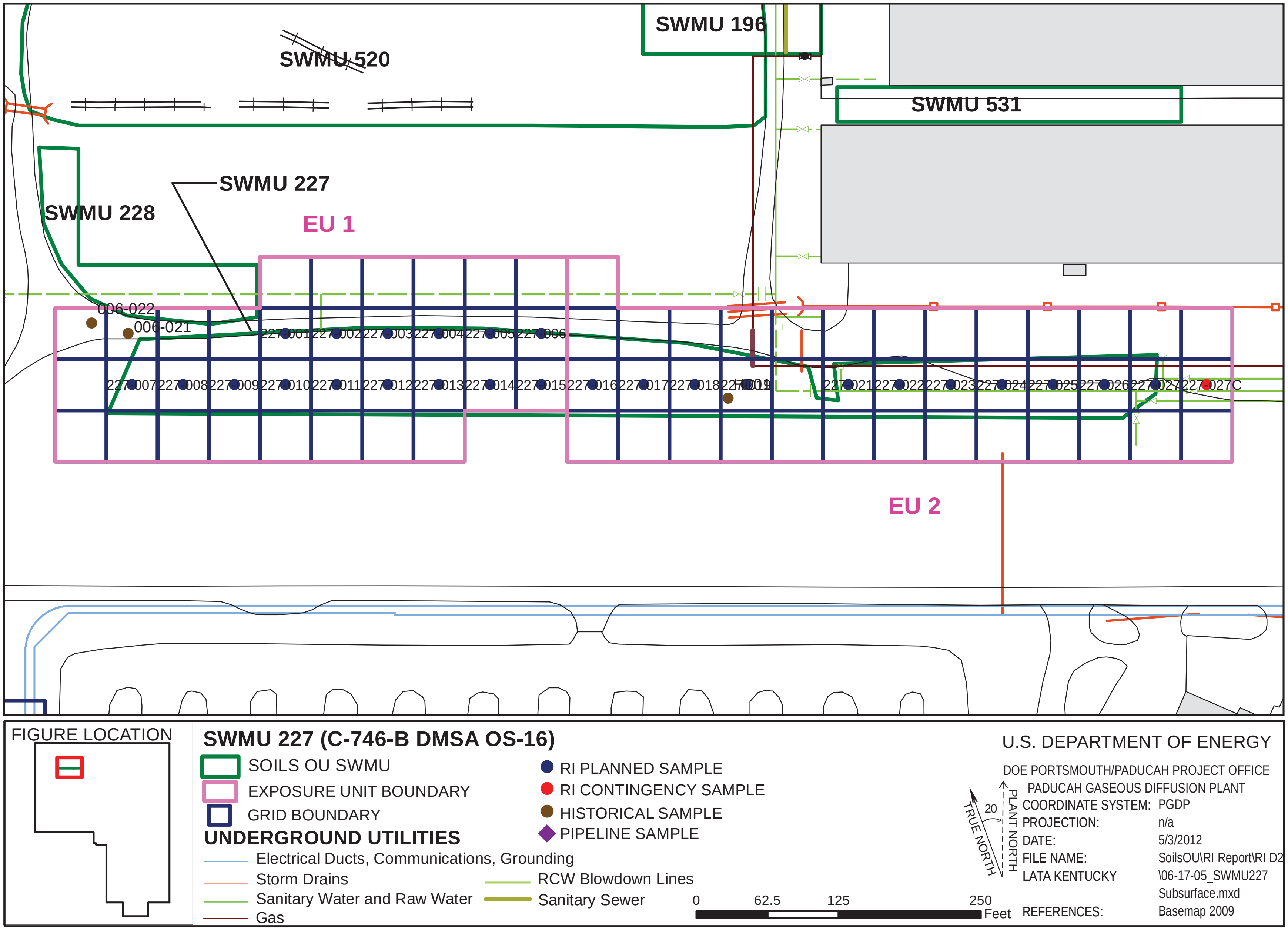


Figure 6.10.5. SWMU 227 Sample Locations - Subsurface Soil

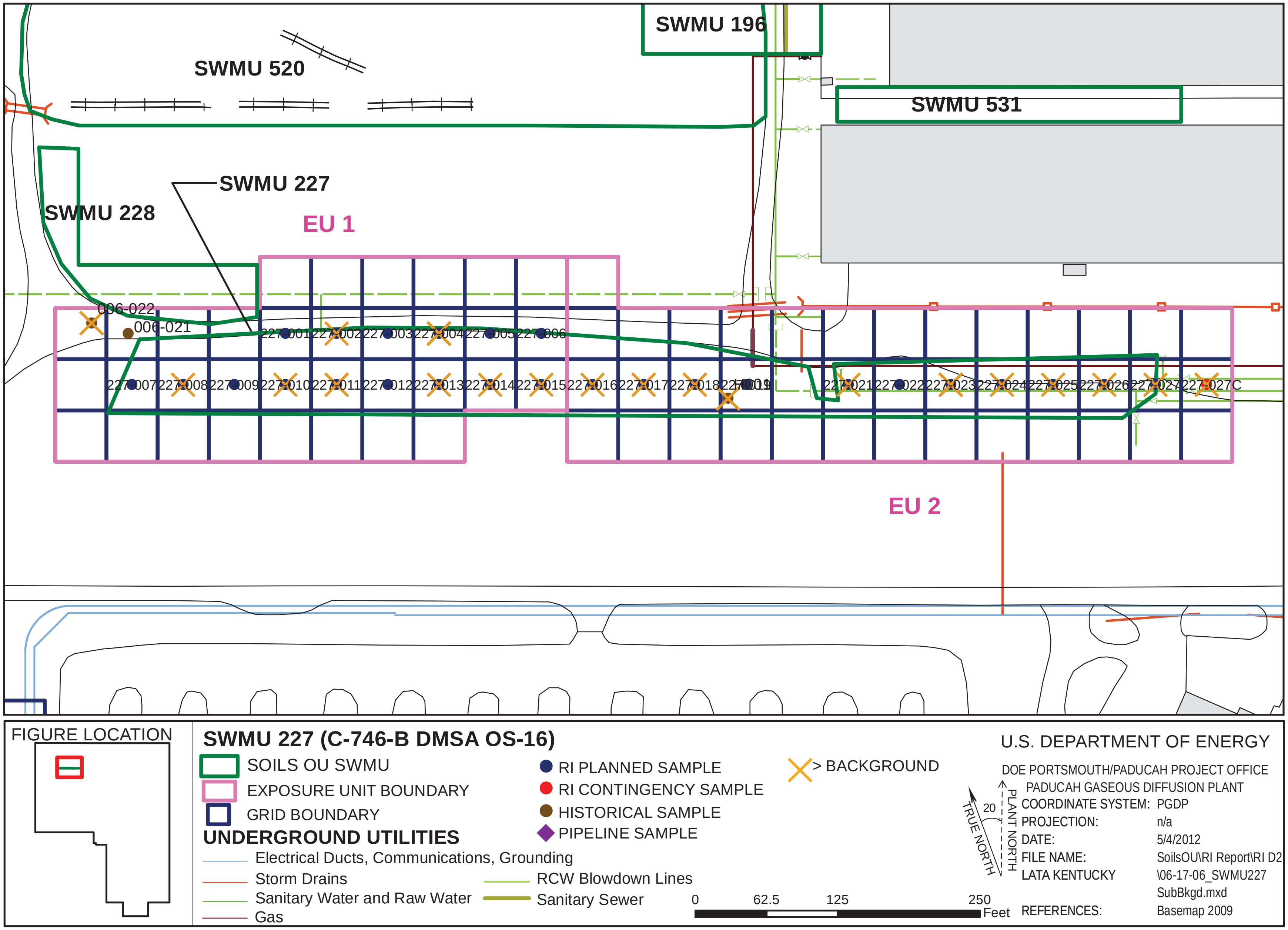


Figure 6.10.6. SWMU 227 Background Exceedances - Subsurface Soil

Station	Results Exceeding Background
006-022	Calcium 14900 (mg/kg)
	Magnesium 2370 (mg/kg)

Station	Results Exceeding Background
H001	Barium 197 (mg/kg)
	Beryllium 0.9 (mg/kg)
	Manganese 1090 (mg/kg)
	Vanadium 39.2 (mg/kg)

Station	Results Exceeding Background
SOU227-002	Uranium 9.73 (mg/kg)

Station	Results Exceeding Background
SOU227-004	Nickel 62.32 (mg/kg)
	Selenium 2.2 (mg/kg)
	Thallium 0.51 (mg/kg)
	Uranium 30.7 (mg/kg)
	Technetium-99 3.46 (pCi/g)
	Uranium-235/236 0.078 (pCi/g)
	Uranium-238 2.18 (pCi/g)

Station	Results Exceeding Background
SOU227-008	Chromium 47.62 (mg/kg)

Station	Results Exceeding Background
SOU227-010	Arsenic 10.61 (mg/kg)

Station	Results Exceeding Background
SOU227-011	Chromium 55.08 (mg/kg)
	Nickel 79.41 (mg/kg)

Station	Results Exceeding Background
SOU227-013	Uranium 8.96 (mg/kg)

Station	Results Exceeding Background
SOU227-014	Nickel 83.35 (mg/kg)

Station	Results Exceeding Background
SOU227-015	Chromium 46.51 (mg/kg)

Station	Results Exceeding Background
SOU227-016	Nickel 80.72 (mg/kg)

Station	Results Exceeding Background
SOU227-017	Arsenic 9.58 (mg/kg)
	Uranium 10.35 (mg/kg)

Station	Results Exceeding Background
SOU227-018	Nickel 82.38 (mg/kg)
	Uranium 11.6 (mg/kg)

Station	Results Exceeding Background
SOU227-021	Arsenic 7.97 (mg/kg)

Station	Results Exceeding Background
SOU227-023	Barium 275 (mg/kg)
	Chromium 44 (mg/kg)
	Cobalt 24.4 (mg/kg)
	Lead 24.4 (mg/kg)
	Manganese 2390 (mg/kg)
	Selenium 1.3 (mg/kg)

Station	Results Exceeding Background
SOU227-024	Mercury 7.09 (mg/kg)

Station	Results Exceeding Background
SOU227-025	Nickel 64.35 (mg/kg)

Station	Results Exceeding Background
SOU227-026	Chromium 49.5 (mg/kg)

Station	Results Exceeding Background
SOU227-027	Silver 10.07 (mg/kg)

Station	Results Exceeding Background
SOU227-027C	Calcium 86900 (mg/kg)
	Magnesium 9050 (mg/kg)
	Selenium 0.76 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 6.10.6. SWMU 227 Background Exceedances – Subsurface (Continued)

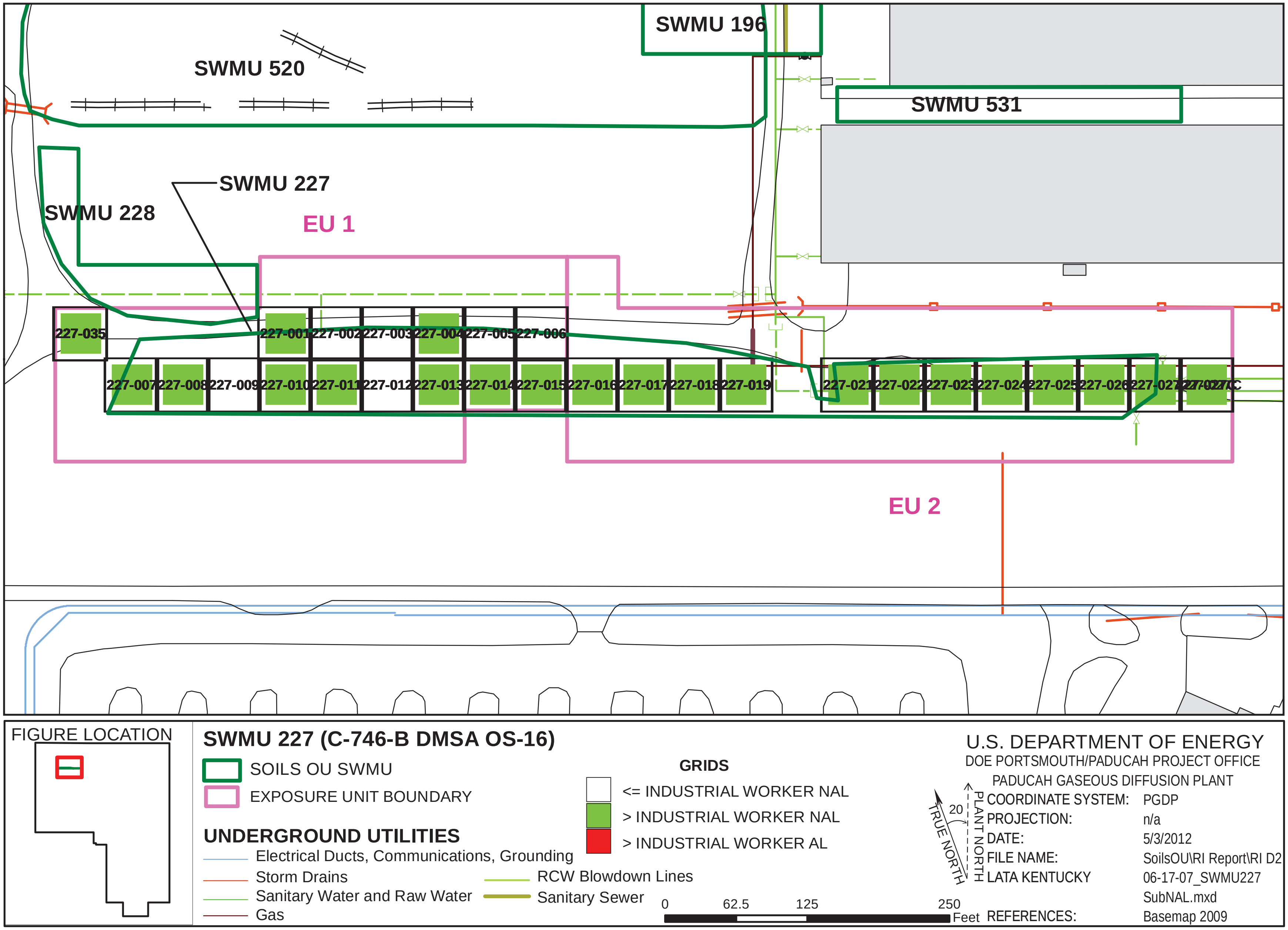


Figure 6.10.7. SWMU 227 NAL Exceedances - Subsurface Soil

Grid	Results Exceeding NAL
227-001	Arsenic 6.25 (mg/kg) Chromium 39.4 (mg/kg)

Grid	Results Exceeding NAL
227-004	Arsenic 7.1 (mg/kg) Beryllium 0.56 (mg/kg) Chromium 38.3 (mg/kg) Nickel 62.32 (mg/kg) Vanadium 28.4 (mg/kg) Uranium-238 2.18 (pCi/g)

Grid	Results Exceeding NAL
227-007	Chromium 35.91 (mg/kg)

Grid	Results Exceeding NAL
227-008	Chromium 47.62 (mg/kg)

Grid	Results Exceeding NAL
227-010	Arsenic 10.61 (mg/kg) Chromium 40.8 (mg/kg)

Grid	Results Exceeding NAL
227-011	Chromium 55.08 (mg/kg) Nickel 79.41 (mg/kg)

Grid	Results Exceeding NAL
227-013	Chromium 33.3 (mg/kg)

Grid	Results Exceeding NAL
227-014	Chromium 35.84 (mg/kg) Nickel 83.35 (mg/kg)

Grid	Results Exceeding NAL
227-015	Chromium 46.51 (mg/kg)

Grid	Results Exceeding NAL
227-016	Nickel 80.72 (mg/kg)

Grid	Results Exceeding NAL
227-017	Arsenic 9.58 (mg/kg)

Grid	Results Exceeding NAL
227-018	Nickel 82.38 (mg/kg)

Grid	Results Exceeding NAL
227-019	Arsenic 4.6 (mg/kg) Beryllium 0.9 (mg/kg) Vanadium 39.2 (mg/kg)

Grid	Results Exceeding NAL
227-021	Arsenic 7.97 (mg/kg)

Grid	Results Exceeding NAL
227-022	Chromium 42.79 (mg/kg)

Grid	Results Exceeding NAL
227-023	Arsenic 7.4 (mg/kg) Beryllium 0.59 (mg/kg) Chromium 44 (mg/kg) Cobalt 24.4 (mg/kg) Vanadium 29.6 (mg/kg)

Grid	Results Exceeding NAL
227-024	Arsenic 6.73 (mg/kg) Chromium 31.17 (mg/kg) Mercury 7.09 (mg/kg)

Grid	Results Exceeding NAL
227-025	Chromium 36.92 (mg/kg) Nickel 64.35 (mg/kg)

Grid	Results Exceeding NAL
227-026	Chromium 49.5 (mg/kg)

Grid	Results Exceeding NAL
227-027	Chromium 35.89 (mg/kg)

Grid	Results Exceeding NAL
227-027C	Arsenic 7.36 (mg/kg) Beryllium 0.24 (mg/kg) Vanadium 16.7 (mg/kg)

Grid	Results Exceeding NAL
227-035	Beryllium 0.5 (mg/kg) Vanadium 18.9 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 6.10.7. SWMU 227 NAL Exceedances – Subsurface (Continued)

Metals

Metals were detected above the industrial worker NALs in the SWMU 227 subsurface soil. The following are the metals detected at or above both the background screening levels and the industrial worker NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	10, 17, 21	1, 2
Beryllium	19	2
Chromium	8, 11, 15, 23, 26	1, 2
Cobalt	23	2
Mercury	24	2
Nickel	4, 11, 14, 16, 18, 25	1, 2
Vanadium	19	2

Grids 4, 8, 10, 11, 14, and 15 within EU 1 and grids 16, 17, 18, 19, 21, 23, 24, 25, and 26 within EU 2 are located within the administrative boundary of SWMU 227.

The maximum depth at which metals were detected at or above both the background screening levels and the industrial worker NALs was 10 ft bgs. The end depths of the boreholes taken from grids 4, 8, 10, 11, 14, 15, 16, 17, 18, 19, 21, 23, 24, 25, and 26 range from 1 to 16 ft bgs.

No metals were detected above the industrial worker ALs in the SWMU 227 subsurface soil.

The following are the metals detected in the SWMU 227 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	10, 17, 21	1, 2
Barium	19, 23	2
Cobalt	23	2
Lead	23	2
Manganese	19, 23	2
Mercury	24	2
Molybdenum[1]	23	2
Nickel	4, 11, 14, 16, 18, 25	1, 2
Selenium	4, 23, 27C	1, 2
Silver	27	2
Thallium	4	1
Uranium	4	1
Vanadium	19	2

[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Cobalt	23	2
Manganese	19, 23	2

Metal	Grid	EU
Mercury	24	2
Nickel	11, 14, 16, 18	1, 2
Silver	27	2
Vanadium	19	2

PCBs

PCBs were not detected in any of the SWMU 227 subsurface soil samples.

SVOCs

No SVOCs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 227 subsurface soil.

VOCs

No VOCs were detected above the industrial worker NALs, industrial worker ALs, or above the SSLs for the protection of RGA groundwater in the SWMU 227 subsurface soil. TCE was detected above the SSL for the protection of UCRS groundwater in the SWMU 227 subsurface soil at 16 ft bgs in grid 35 (EU 1).

Radionuclides

Of the radionuclides, uranium-238 was detected at or above both the background screening level and the industrial worker NAL in the subsurface soil sample from grid 4 (EU 1) at a maximum depth of 4 ft bgs.

Neptunium-237 (no background value available) (grid 35, EU 1) and technetium-99 (grid 4, EU 1) were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both background screening levels and the SSLs for the protection of RGA groundwater.

6.10.5 Fate and Transport

No target chemicals were identified for further evaluation of impacts to the RGA (Chapter 4). SWMU 227 has the potential of runoff to the south which flows to Outfall 001, but is not considered significant due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow (DOE 2008a). Ditches to the south were sampled during the SWOU SI, and a final response action for internal ditches will be addressed by the SWOU, as described in the SMP (DOE 2012a). There are no known underground pipelines at SWMU 227. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

6.10.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 227 were evaluated for each EU for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI. The cumulative ELCR for one or more EUs at SWMU 227 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 6.10.5 for the future industrial worker and the hypothetical resident. The excavation worker scenario did not identify COCs. Table 6.10.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 227 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 6.10.6.

Table 6.10.5. RGOs for SWMU 227

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Future Industrial Worker											
1	Cesium-137	1.90E-01	pCi/g	2.2E-06	8.61E-02	8.61E-01	8.61E+00	n/a	n/a	n/a	n/a
	Chromium	4.71E+01	mg/kg	1.6E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Neptunium-237	9.05E-01	pCi/g	3.3E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	PCB, Total	4.14E+00	mg/kg	2.2E-05	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	3.38E-01	mg/kg	5.7E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-235	1.49E+00	pCi/g	3.8E-06	3.95E-01	3.95E+00	3.95E+01	n/a	n/a	n/a	n/a
	Uranium-238	4.63E+01	pCi/g	2.7E-05	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.6E-05**				**< 1**			
2	Chromium	5.63E+01	mg/kg	1.9E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	PCB, Total	5.82E+00	mg/kg	3.1E-05	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	1.16E-01	mg/kg	2.0E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Cumulative			**3.5E-05**				**< 1**			
Hypothetical Resident[5]											
1	Cesium-137	1.90E-01	pCi/g	1.1E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Chromium	4.71E+01	mg/kg	3.0E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Neptunium-237	9.05E-01	pCi/g	1.7E-05	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	PCB, Total	4.14E+00	mg/kg	6.5E-05	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Total PAH	3.38E-01	mg/kg	1.7E-05	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-234	1.54E+01	pCi/g	3.2E-06	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	1.49E+00	pCi/g	1.9E-05	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	4.63E+01	pCi/g	1.3E-04	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**2.7E-04**				**< 1**			
2	Chromium	5.63E+01	mg/kg	3.6E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	PCB, Total	5.82E+00	mg/kg	9.1E-05	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Total PAH	1.16E-01	mg/kg	6.0E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-238	1.57E+00	pCi/g	4.5E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.1E-04**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.35, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.35, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 6.10.6. Ecological Screening for SWMU 227

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg) [b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Mostly gravel	Yes	2887	Mercury	2.00E-01	8.41E+00	1.00E-01	84
			Nickel	2.10E+01	6.53E+02	3.80E+01	17
			PCB, Total	n/a	5.28E+01	2.00E-02	2641
			Selenium	8.00E-01	1.00E+01	5.20E-01	19
			Uranium	4.90E+00	4.38E+02	5.00E+00	88

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

6.10.7 SWMU 227 Summary

The following text summarizes the results for SWMU 227 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

The plant processes that could have contributed to contamination at SWMU 227 are spill and/or discharges from the waste and equipment stored there.

COPCs for surface and subsurface soils from SWMU 227 are shown on Tables 6.10.1–6.10.4 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 10 ft bgs. A complete list of sampling results is provided in Appendix G. The COPCs identified for each EU in SWMU 227 are as follows:

- EU 1
  - Surface—metals, PCBs, SVOCs, radionuclides
  - Subsurface—metals, VOCs, radionuclides
- EU 2
  - Surface—metals, PCBs, SVOCs, radionuclides
  - Subsurface—metals

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 227 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. SWMU 227 has the potential of runoff to the south, which flows to Outfall 001, but is not considered significant (DOE 2008a). There are no known underground pipelines at SWMU 227. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 227.

- Future Industrial Worker
  - Cesium-137
  - Chromium
  - Neptunium-237
  - Total PAHs
  - Total PCBs
  - Uranium-235
  - Uranium-238
- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Cesium-137
  - Chromium
  - Neptunium-237
  - Total PAHs
  - Total PCBs
  - Uranium-234
  - Uranium-235
  - Uranium-238

Of the above, uranium-238 for the hypothetical resident is a priority COC (i.e., HQ > 1 or chemical-specific ELCR > 1E-04). There are no other priority COCs for other scenarios.

For SWMU 227, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Mercury
- Nickel
- Total PCBs
- Selenium
- Uranium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 227 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 227 is adjacent to SWMUs 228 and 520, both of which are immediately north of it and both are part of the Soils OU RI. A response action at this site would not impact other integrator OUs.

6.10.8 SWMU 227 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 227; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial land use as shown in the SMP (DOE 2012a).

6.11 SWMU 228, C-747-B, OS-17

6.11.1 Background

SWMU 228, the location of the former DMSA OS-17, is located west of C-747-B in the northwest portion of the plant site. SWMU 228 is approximately 10,800 ft^2. DMSA OS-17 was used for the storage of excess mobile industrial equipment, which originally was slated for auction. Equipment at this location included forklifts, tow motors, pump trucks, and concrete culverts. The equipment had remained in storage at this location since the termination of off-site property sales around 1985. The exact operational dates for this site are unknown, although it is probable that the last equipment was placed in this area in 1996. There is no direct connection from this SWMU to surface water. There is no material stored at this area now; the DMSA has been dismantled. An FI/CR Report was submitted and approved in 2004 (DOE 2004c).

6.11.2 Fieldwork Summary

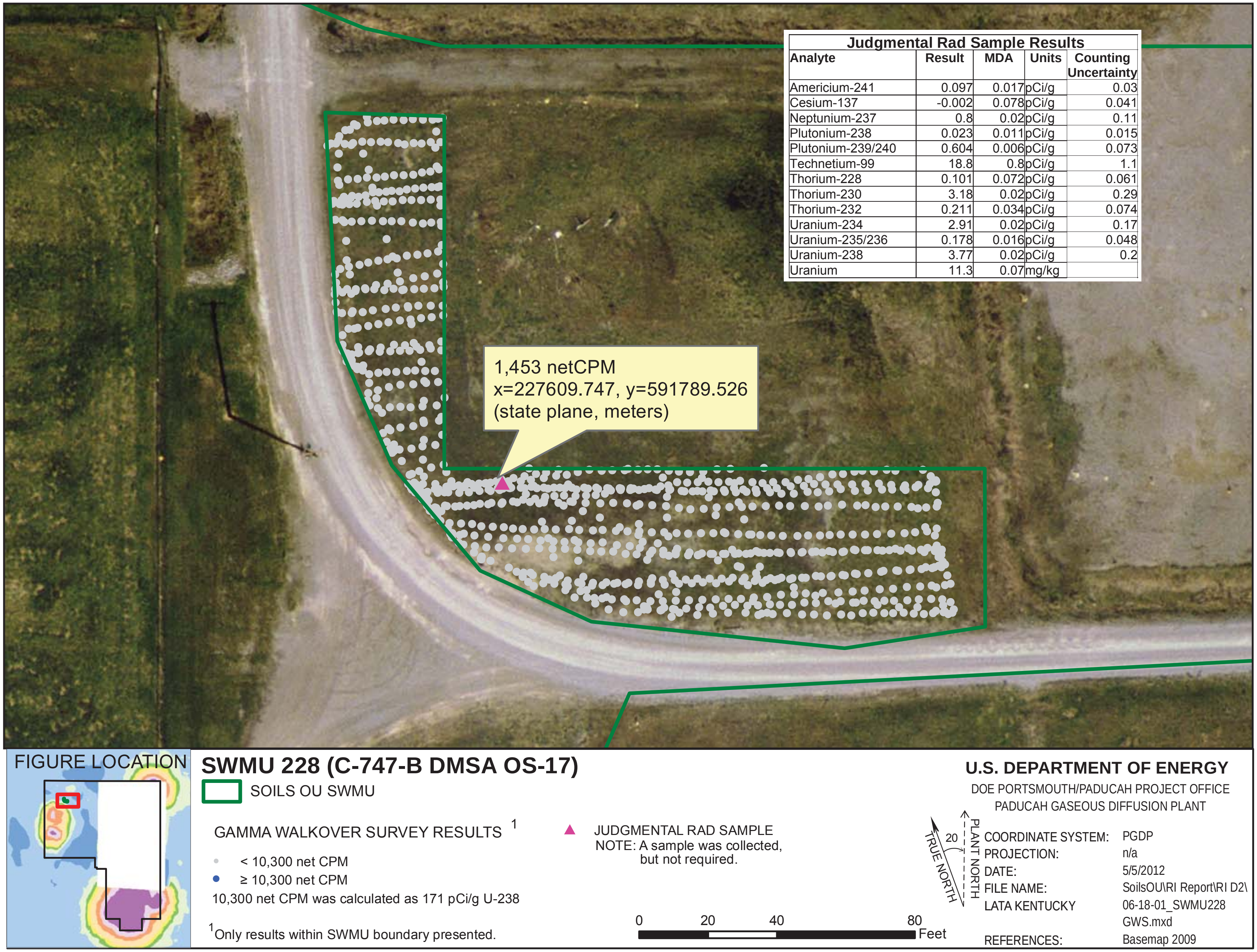
Ten grid samples were planned and collected for the unit. Field laboratory results indicated contingency samples were needed for concentrations of chromium, copper, lead, and zinc. Ten of 10 contingency samples were collected (for depth samples only).

The SWMU underwent a gamma radiological walkover survey (Figure 6.11.1) using a FIDLER; the 978 measurements ranged from 6,042 to 12,451 gross cpm. Survey coverage was impacted by terrain and vegetation in this area. This area is posted as a contamination area. It is just north of the C-745-B Depleted Uranium Cylinder Storage Yard. The ground cover in this SWMU is mostly gravel with some soil and grass. A judgmental grab sample was collected for radiological constituents, although results did not exceed the project action limit.

6.11.3 Nature and Extent of Contamination—Surface Soils

For SWMU 228, the representative data set for surface soils is presented in Tables 6.11.1 and 6.11.2 and provides the nature of the contamination in SWMU 228 surface soils. Figures 6.11.2–6.11.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 228 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 228 consists of one EU.



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.097	0.017	pCi/g	0.03
Cesium-137	-0.002	0.078	pCi/g	0.041
Neptunium-237	0.8	0.02	pCi/g	0.11
Plutonium-238	0.023	0.011	pCi/g	0.015
Plutonium-239/240	0.604	0.006	pCi/g	0.073
Technetium-99	18.8	0.8	pCi/g	1.1
Thorium-228	0.101	0.072	pCi/g	0.061
Thorium-230	3.18	0.02	pCi/g	0.29
Thorium-232	0.211	0.034	pCi/g	0.074
Uranium-234	2.91	0.02	pCi/g	0.17
Uranium-235/236	0.178	0.016	pCi/g	0.048
Uranium-238	3.77	0.02	pCi/g	0.2
Uranium	11.3	0.07	mg/kg	

Figure 6.11.1. SWMU 228 Gamma Walkover Survey

Table 6.11.1. Surface Soil Historical Data Summary: SWMU 228 DMSA OS-17

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range

There is no historical surface data for this SWMU.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.11.2. Surface Soil RI Data Summary: SWMU 228 C-747-B DMSA Outside 17

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	3.12E+03	3.12E+03	3.12E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.1 - 5.1
METAL	Antimony	mg/kg	6.30E-01	6.30E-01	6.30E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.51 - 0.51
METAL	Arsenic	mg/kg	2.90E+00	1.16E+01	7.34E+00	0/11	3/11	0/11	1.20E+01	3/11	9.97E-01	0/11	9.97E+01	0/11	3/11	1 - 11
METAL	Barium	mg/kg	1.09E+02	1.09E+02	1.09E+02	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.1 - 2.1
METAL	Beryllium	mg/kg	1.90E-01	1.90E-01	1.90E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.1 - 0.1
METAL	Cadmium	mg/kg	3.90E+00	3.90E+00	3.90E+00	0/1	1/1	1/1	2.10E-01	1/1	3.16E+00	0/1	3.16E+02	0/1	1/1	0.051 - 0.051
METAL	Calcium	mg/kg	2.68E+05	2.68E+05	2.68E+05	0/1	1/1	1/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	514 - 514
METAL	Chromium	mg/kg	1.40E+01	1.89E+02	8.76E+01	0/11	3/11	2/11	1.60E+01	2/11	3.02E+01	0/11	3.02E+03	0/11	0/11	1 - 85
METAL	Cobalt	mg/kg	2.50E+00	2.50E+00	2.50E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.21 - 0.21
METAL	Copper	mg/kg	1.65E+01	9.80E+01	5.72E+01	0/11	2/11	1/11	1.90E+01	0/11	1.43E+03	0/11	2.24E+05	0/11	1/11	1 - 35
METAL	Iron	mg/kg	7.19E+03	1.37E+04	1.08E+04	0/11	11/11	0/11	2.80E+04	0/11	2.51E+04	0/11	3.92E+06	11/11	11/11	5.1 - 100
METAL	Lead	mg/kg	1.09E+01	6.09E+01	3.59E+01	0/11	11/11	5/11	3.60E+01	0/11	4.00E+02	0/11	4.00E+02	0/11	10/11	0.31 - 13
METAL	Magnesium	mg/kg	1.10E+04	1.10E+04	1.10E+04	0/1	1/1	1/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	51.4 - 51.4
METAL	Manganese	mg/kg	8.50E+01	4.49E+02	2.19E+02	0/11	11/11	0/11	1.50E+03	0/11	2.58E+03	0/11	1.16E+05	10/11	11/11	0.21 - 85
METAL	Mercury	mg/kg	9.66E-02	9.37E+00	3.19E+00	0/11	2/11	1/11	2.00E-01	1/11	9.00E-01	0/11	7.85E+02	1/11	1/11	0.0343 - 10
METAL	Molybdenum	mg/kg	1.20E+00	1.20E+00	1.20E+00	0/11	1/11	0/11	n/a	0/11	1.79E+02	0/11	2.80E+04	0/11	1/11	0.51 - 15
METAL	Nickel	mg/kg	1.55E+01	7.92E+01	4.99E+01	0/11	4/11	3/11	2.10E+01	3/11	4.28E+01	0/11	3.18E+04	1/11	4/11	0.51 - 65
METAL	Selenium	mg/kg	4.50E-01	3.97E+00	1.62E+00	0/11	2/11	1/11	8.00E-01	0/11	1.79E+02	0/11	2.80E+04	0/11	2/11	0.51 - 20
METAL	Silver	mg/kg	4.70E-02	1.16E+01	3.91E+00	0/11	2/11	1/11	2.30E+00	1/11	1.08E+01	0/11	9.15E+03	1/11	2/11	0.21 - 10
METAL	Sodium	mg/kg	1.40E+02	1.40E+02	1.40E+02	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	20.6 - 20.6
METAL	Thallium	mg/kg	8.50E-02	8.50E-02	8.50E-02	0/1	1/1	0/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	0/1	0.21 - 0.21
METAL	Uranium	mg/kg	4.62E+00	1.51E+01	8.06E+00	0/12	3/12	2/12	4.90E+00	0/12	1.07E+02	0/12	1.65E+04	0/12	1/12	0.02 - 20
METAL	Vanadium	mg/kg	7.20E+00	7.20E+00	7.20E+00	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1 - 1
METAL	Zinc	mg/kg	5.75E+01	1.91E+02	1.06E+02	0/11	11/11	9/11	6.50E+01	0/11	1.08E+04	0/11	1.68E+06	0/11	11/11	2.1 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	1.88E-01	0/10	1.88E+01	0/10	0/10	5 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.34 - 0.34
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.34 - 0.34
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.34 - 0.34
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.6 - 1.6
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.6 - 1.6
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.6 - 1.6
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.6 - 1.6
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.6 - 1.6
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.6 - 1.6
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.34 - 0.34
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.34 - 0.34
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Benzo(ghi)perylene	mg/kg	4.50E-02	4.50E-02	4.50E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.6 - 1.6

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.11.2. Surface Soil RI Data Summary: SWMU 228 C-747-B DMSA Outside 17 (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0068 - 0.0068
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.34 - 0.34
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Fluoranthene	mg/kg	7.00E-02	7.00E-02	7.00E-02	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.34 - 0.34
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.34 - 0.34
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.34 - 0.34
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.6 - 1.6
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.68 - 0.68
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.34 - 0.34
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.6 - 1.6
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0068 - 0.0068
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.6 - 1.6
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.34 - 0.34
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.6 - 1.6
SVOA	Pyrene	mg/kg	6.50E-02	6.50E-02	6.50E-02	1/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.34 - 0.34
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.68 - 0.68
SVOA	Total PAH	mg/kg	6.69E-02	6.69E-02	6.69E-02	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	1.78E+01	4.35E+01	3.07E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	5.6 - 5.9
RADS	Americium-241	pCi/g	4.40E-03	9.70E-02	5.07E-02	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.017 - 0.018
RADS	Beta activity	pCi/g	2.36E+01	1.02E+02	6.28E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.4 - 2.8
RADS	Cesium-137	pCi/g	-2.00E-03	4.00E-03	1.00E-03	0/2	2/2	0/2	4.90E-01	0/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.048 - 0.078
RADS	Neptunium-237	pCi/g	8.10E-02	8.00E-01	4.41E-01	0/2	2/2	1/2	1.00E-01	1/2	2.71E-01	0/2	2.71E+01	1/2	2/2	0.02 - 0.023
RADS	Plutonium-238	pCi/g	1.30E-02	2.30E-02	1.80E-02	0/2	2/2	0/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.007 - 0.011
RADS	Plutonium-239/240	pCi/g	2.10E-02	6.04E-01	3.13E-01	0/2	2/2	1/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	1/2	0.006 - 0.007
RADS	Technetium-99	pCi/g	8.50E-01	1.88E+01	9.83E+00	0/2	2/2	1/2	2.50E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	2/2	0.63 - 0.8
RADS	Thorium-228	pCi/g	1.01E-01	2.28E-01	1.65E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.067 - 0.072
RADS	Thorium-230	pCi/g	4.50E-01	3.18E+00	1.82E+00	0/2	2/2	1/2	1.50E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.02 - 0.03
RADS	Thorium-232	pCi/g	2.11E-01	2.20E-01	2.16E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.03 - 0.034
RADS	Uranium-234	pCi/g	9.80E-01	2.91E+00	1.95E+00	0/2	2/2	1/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.01 - 0.02
RADS	Uranium-235/236	pCi/g	4.30E-02	1.78E-01	1.11E-01	0/2	2/2	1/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.009 - 0.016
RADS	Uranium-238	pCi/g	1.55E+00	3.77E+00	2.66E+00	0/2	2/2	2/2	1.20E+00	1/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.007 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

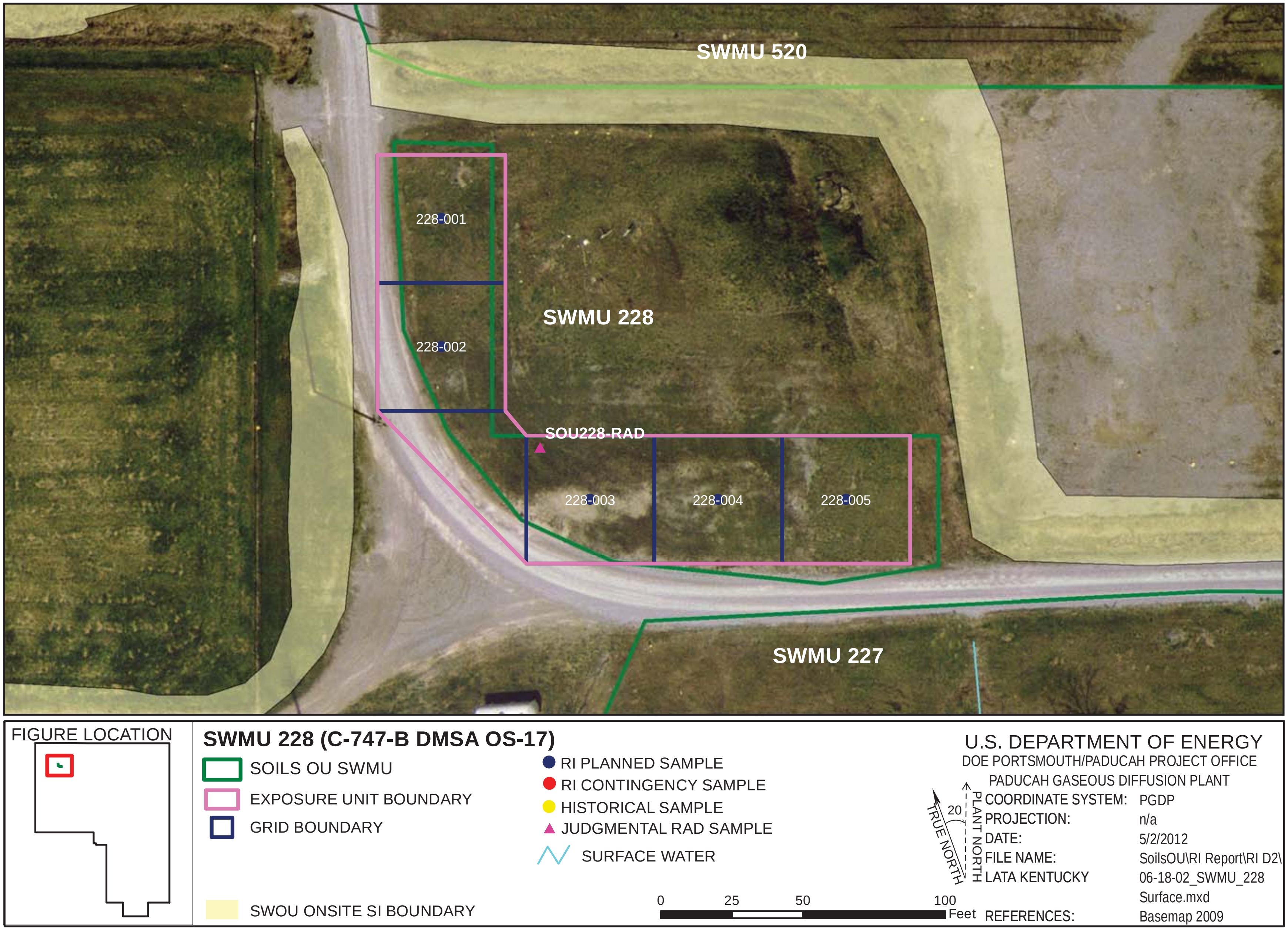


Figure 6.11.2. SWMU 228 Sample Locations - Surface Soil

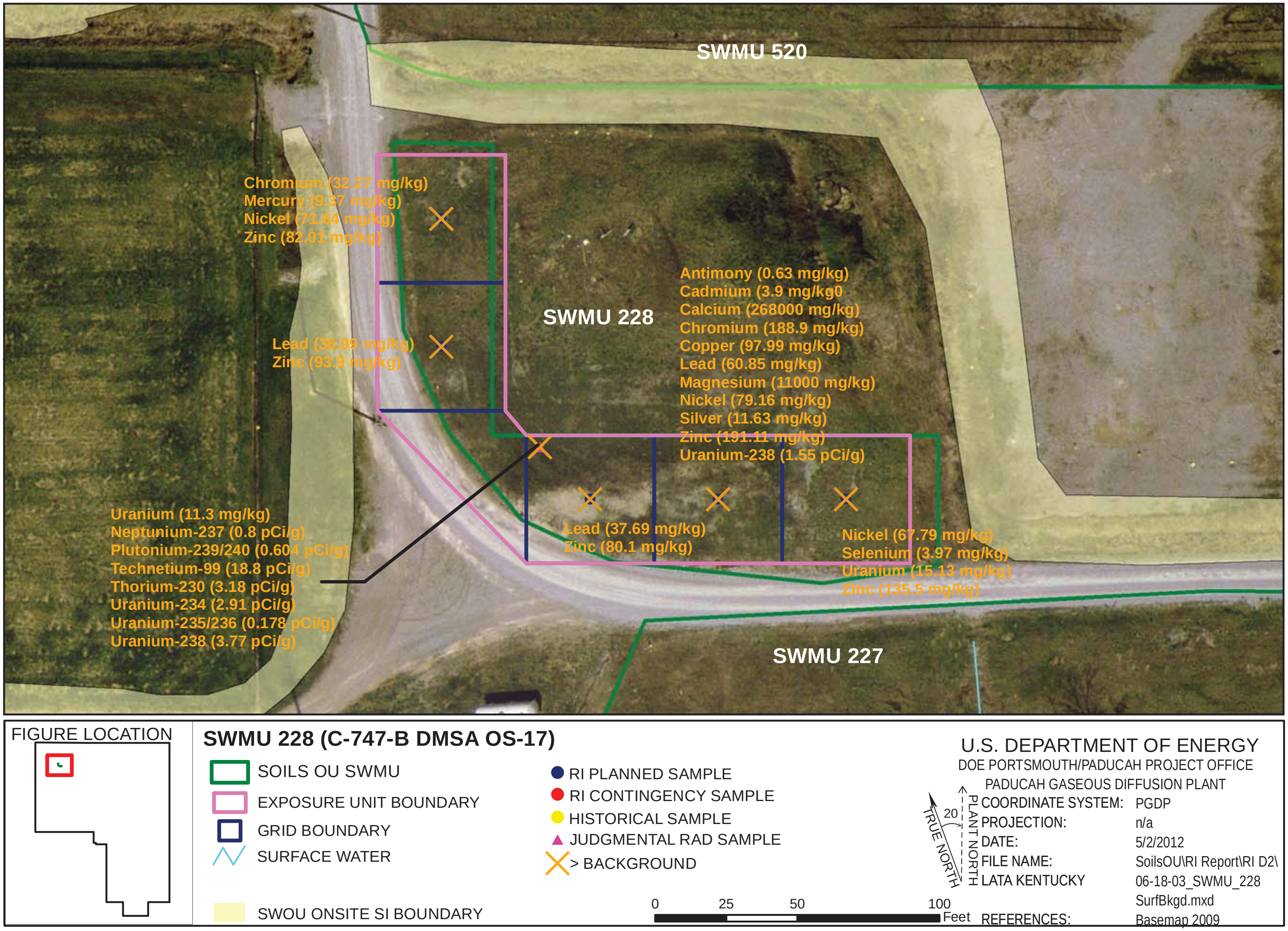


Figure 6.11.3. SWMU 228 Background Exceedances - Surface Soil

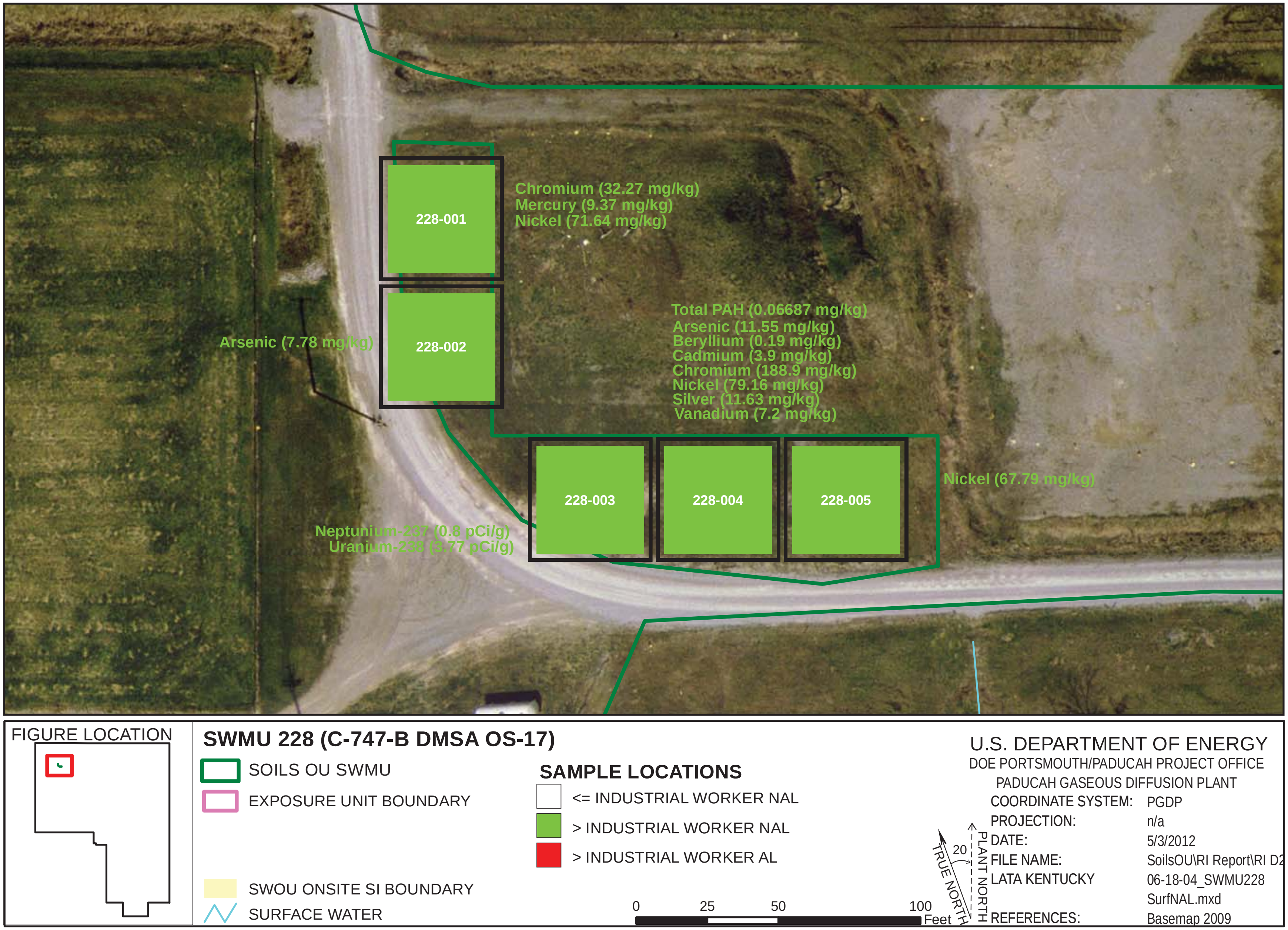


Figure 6.11.4. SWMU 228 NAL Exceedances - Surface Soil

Metals

Metals were detected above the industrial worker NALs in the SWMU 228 surface soil. The following are the metals detected at or above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Cadmium	4
Chromium	1, 4
Mercury	1
Nickel	1, 4, 5
Silver	4

* SWMU 228 consists of one EU.

Grids 1, 4 and 5 are located within the administrative boundary of SWMU 228.

No metals were detected above the industrial worker ALs in the SWMU 228 surface soil.

The following are the metals detected in the SWMU 228 surface soil above the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	4
Cadmium	4
Copper	4
Lead	2, 3, 4
Mercury	1
Molybdenum[1]	4
Nickel	1, 4, 5
Selenium	5
Silver	4
Uranium	5
Zinc	1, 2, 3, 4, 5

* SWMU 228 consists of one EU.
[1] No background value is available.

Mercury (grid 1), nickel (grid 4), and silver (grid 4) were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected above the industrial worker NALs, the industrial worker ALs or the SSLs for the protection of UCRS and RGA groundwater in surface soils at the SWMU 228.

SVOCs

One surface soil sample was collected from grid 4 in SWMU 228. Total PAHs were detected above the industrial worker NALs and the SSLs for the protection of UCRS groundwater in the SWMU 228 surface soil.

SVOCs were not detected above the industrial worker ALs or the SSLs for protection of RGA groundwater in the SWMU 228 surface soil.

VOCs

There are no VOC analyses from SWMU 228.

Radionuclides

Radionuclides were detected above the industrial worker NALs in the SWMU 228 surface soil. The following are the radionuclides detected at or above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Radionuclide	Grid
Neptunium-237	3
Uranium-238	3

* SWMU 228 consists of one EU.

No radionuclides were detected above the industrial worker ALs in the SWMU 228 surface soil.

Neptunium-237, plutonium-239/240, technetium-99, and thorium-230 were detected in grid 3 above both the background screening levels and the SSLs for the protection of UCRS groundwater. Neptunium-237 was detected in grid 3 above both the background screening level and the SSL for the protection of RGA groundwater.

6.11.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 228, the representative data set for subsurface soils is presented in Tables 6.11.3 and 6.11.4 and provides the nature of the contamination in SWMU 228 subsurface soils, Figures 6.11.5–6.11.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 228 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 228 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 228 subsurface soil. The following are the metals detected at or above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Arsenic	1, 2, 5
Beryllium	2
Chromium	2, 3, 5
Iron	1
Nickel	3, 4, 5
Silver	3

* SWMU 228 consists of one EU.

Grids 1, 2, 3, 4, and 5 are located within the administrative boundary of SWMU 228.

No metals were detected above the industrial worker ALs in the SWMU 228 subsurface soil.

Table 6.11.3. Subsurface Soil Historical Data Summary: SWMU 228 DMSA OS-17

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	8.10E+03	9.55E+03	8.73E+03	0/3	3/3	0/3	1.20E+04	0/3	3.32E+04	0/3	3.97E+06	0/3	3/3	18.7 - 19.8
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.10E-01	0/3	2.53E+00	0/3	1.51E+03	0/3	0/3	8.85 - 9.72
METAL	Arsenic	mg/kg	1.53E+00	5.94E+00	3.01E+00	0/3	3/3	0/3	7.90E+00	3/3	9.97E-01	0/3	9.97E+01	0/3	3/3	0.934 - 0.989
METAL	Barium	mg/kg	6.44E+01	8.42E+01	7.16E+01	0/3	3/3	0/3	1.70E+02	0/3	5.92E+02	0/3	3.78E+05	0/3	1/3	2.33 - 2.47
METAL	Beryllium	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	6.90E-01	0/3	1.40E-02	0/3	9.22E+00	0/3	0/3	0.467 - 0.494
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.10E-01	0/3	3.16E+00	0/3	3.16E+02	0/3	0/3	1.87 - 1.98
METAL	Calcium	mg/kg	9.42E+02	1.37E+03	1.13E+03	0/3	3/3	0/3	6.10E+03	0/3	n/a	0/3	n/a	n/a	n/a	93.4 - 98.9
METAL	Chromium	mg/kg	1.15E+01	1.90E+01	1.45E+01	0/3	3/3	0/3	4.30E+01	0/3	3.02E+01	0/3	3.02E+03	0/3	0/3	2.33 - 2.47
METAL	Cobalt	mg/kg	4.23E+00	5.00E+00	4.64E+00	0/3	3/3	0/3	1.30E+01	0/3	1.05E+01	0/3	1.52E+03	3/3	3/3	2.33 - 2.47
METAL	Copper	mg/kg	4.81E+00	1.30E+01	7.55E+00	0/3	3/3	0/3	2.50E+01	0/3	1.43E+03	0/3	2.24E+05	0/3	0/3	2.33 - 2.47
METAL	Iron	mg/kg	7.83E+03	1.45E+04	1.01E+04	0/3	3/3	0/3	2.80E+04	0/3	2.51E+04	0/3	3.92E+06	3/3	3/3	18.7 - 19.8
METAL	Lead	mg/kg	7.12E+00	8.80E+00	7.68E+00	0/3	3/3	0/3	2.30E+01	0/3	4.00E+02	0/3	4.00E+02	0/3	0/3	0.934 - 0.989
METAL	Magnesium	mg/kg	9.18E+02	1.40E+03	1.12E+03	0/3	3/3	0/3	2.10E+03	0/3	n/a	0/3	n/a	n/a	n/a	4.67 - 4.94
METAL	Manganese	mg/kg	2.16E+02	2.88E+02	2.60E+02	0/3	3/3	0/3	8.20E+02	0/3	2.58E+03	0/3	1.16E+05	3/3	3/3	2.33 - 2.47
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	1.30E-01	0/3	9.00E-01	0/3	7.85E+02	0/3	0/3	0.018 - 0.019
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.79E+02	0/3	2.80E+04	0/3	0/3	2.33 - 2.47
METAL	Nickel	mg/kg	7.56E+00	1.29E+01	9.38E+00	0/3	3/3	0/3	2.20E+01	0/3	4.28E+01	0/3	3.18E+04	0/3	3/3	4.67 - 4.94
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	7.00E-01	0/3	1.79E+02	0/3	2.80E+04	0/3	0/3	0.934 - 0.989
METAL	Silver	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.70E+00	0/3	1.08E+01	0/3	9.15E+03	0/3	0/3	2.33 - 2.47
METAL	Sodium	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	3.40E+02	0/3	n/a	0/3	n/a	n/a	n/a	93.4 - 98.9
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	3.40E-01	0/3	2.87E+00	0/3	4.48E+02	0/3	0/3	1.87 - 1.98
METAL	Uranium	mg/kg	1.02E+00	1.02E+00	1.02E+00	0/3	1/3	0/3	4.60E+00	0/3	1.07E+02	0/3	1.65E+04	0/3	0/3	0.934 - 0.989
METAL	Vanadium	mg/kg	5.94E+00	1.60E+01	9.97E+00	0/3	3/3	0/3	3.70E+01	3/3	1.51E-01	0/3	9.30E+01	3/3	3/3	2.33 - 2.47
METAL	Zinc	mg/kg	3.21E+01	3.21E+01	3.21E+01	0/3	1/3	0/3	6.00E+01	0/3	1.08E+04	0/3	1.68E+06	0/3	1/3	18.7 - 19.8
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.88E-01	0/3	1.88E+01	0/3	0/3	0.09 - 0.1
RADS	Americium-241	pCi/g	-2.85E-03	-1.06E-04	-1.70E-03	0/3	3/3	0/3	n/a	0/3	5.01E+00	0/3	5.01E+02	0/3	0/3	0.0295 - 0.0303
RADS	Cesium-137	pCi/g	-2.40E-02	1.09E-03	-1.37E-02	0/3	3/3	0/3	2.80E-01	0/3	8.61E-02	0/3	8.61E+00	0/3	0/3	0.0415 - 0.0541
RADS	Cobalt-60	pCi/g	-8.68E-05	1.29E-02	6.14E-03	0/3	3/3	0/3	n/a	0/3	1.77E-02	0/3	1.77E+00	0/3	0/3	0.0451 - 0.0512
RADS	Neptunium-237	pCi/g	-2.50E-03	-4.98E-04	-1.32E-03	0/3	3/3	0/3	n/a	0/3	2.71E-01	0/3	2.71E+01	0/3	0/3	0.0393 - 0.0409
RADS	Plutonium-238	pCi/g	-4.27E-03	1.10E-03	-2.08E-03	0/3	3/3	0/3	n/a	0/3	1.09E+01	0/3	1.09E+03	0/3	0/3	0.0184 - 0.0187
RADS	Plutonium-239/240	pCi/g	-2.56E-03	8.53E-05	-1.67E-03	0/3	3/3	0/3	n/a	0/3	1.07E+01	0/3	1.07E+03	0/3	0/3	0.0184 - 0.0184
RADS	Technetium-99	pCi/g	-2.85E-01	-1.49E-01	-2.28E-01	0/3	3/3	0/3	2.80E+00	0/3	3.61E+02	0/3	3.61E+04	0/3	0/3	1.83 - 1.83
RADS	Thorium-228	pCi/g	3.05E-01	3.68E-01	3.31E-01	0/3	3/3	0/3	1.60E+00	0/3	n/a	0/3	n/a	n/a	n/a	0.0918 - 0.0933
RADS	Thorium-230	pCi/g	2.00E-01	2.57E-01	2.32E-01	0/3	3/3	0/3	1.40E+00	0/3	1.38E+01	0/3	1.38E+03	0/3	0/3	0.106 - 0.109
RADS	Thorium-232	pCi/g	2.75E-01	3.73E-01	3.22E-01	0/3	3/3	0/3	1.50E+00	0/3	n/a	0/3	n/a	n/a	n/a	0.0552 - 0.0568
RADS	Uranium-234	pCi/g	9.54E-04	8.22E-02	3.36E-02	0/3	3/3	0/3	1.20E+00	0/3	1.89E+01	0/3	1.89E+03	0/3	0/3	0.128 - 0.129
RADS	Uranium-235	pCi/g	-1.27E-02	-4.11E-03	-7.62E-03	0/3	3/3	0/3	6.00E-02	0/3	3.95E-01	0/3	3.95E+01	0/3	0/3	0.0357 - 0.0359
RADS	Uranium-238	pCi/g	-2.65E-03	9.57E-02	3.65E-02	0/3	3/3	0/3	1.20E+00	0/3	1.70E+00	0/3	1.70E+02	0/3	0/3	0.124 - 0.125

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.11.4. Subsurface Soil RI Data Summary: SWMU 228 C-747-B DMSA Outside 17

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	8.55E+03	1.04E+04	9.48E+03	0/2	2/2	0/2	1.20E+04	0/2	3.32E+04	0/2	3.97E+06	0/2	2/2	5.9 - 6.1
METAL	Antimony	mg/kg	1.70E-01	1.80E-01	1.75E-01	0/2	2/2	0/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	0/2	0.59 - 0.61
METAL	Arsenic	mg/kg	3.50E+00	2.79E+01	9.55E+00	0/15	6/15	3/15	7.90E+00	6/15	9.97E-01	0/15	9.97E+01	1/15	6/15	1.2 - 11
METAL	Barium	mg/kg	1.12E+02	1.35E+02	1.24E+02	0/2	2/2	0/2	1.70E+02	0/2	5.92E+02	0/2	3.78E+05	0/2	2/2	2.4 - 2.4
METAL	Beryllium	mg/kg	3.70E-01	7.50E-01	5.60E-01	0/2	2/2	1/2	6.90E-01	2/2	1.40E-02	0/2	9.22E+00	0/2	0/2	0.12 - 0.12
METAL	Cadmium	mg/kg	2.80E-02	5.10E-02	3.95E-02	0/2	2/2	0/2	2.10E-01	0/2	3.16E+00	0/2	3.16E+02	0/2	0/2	0.059 - 0.061
METAL	Calcium	mg/kg	3.52E+03	7.27E+03	5.40E+03	0/2	2/2	1/2	6.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	59.2 - 60.9
METAL	Chromium	mg/kg	1.00E+01	5.91E+01	4.14E+01	0/15	9/15	5/15	4.30E+01	8/15	3.02E+01	0/15	3.02E+03	0/15	0/15	1.2 - 85
METAL	Cobalt	mg/kg	4.90E+00	6.30E+00	5.60E+00	0/2	2/2	0/2	1.30E+01	0/2	1.05E+01	0/2	1.52E+03	2/2	2/2	0.24 - 0.24
METAL	Copper	mg/kg	9.90E+00	2.36E+01	1.34E+01	0/15	3/15	0/15	2.50E+01	0/15	1.43E+03	0/15	2.24E+05	0/15	0/15	1.2 - 35
METAL	Iron	mg/kg	6.86E+03	3.77E+04	1.37E+04	0/15	15/15	1/15	2.80E+04	1/15	2.51E+04	0/15	3.92E+06	15/15	15/15	5.9 - 100
METAL	Lead	mg/kg	6.45E+00	1.87E+01	1.14E+01	0/15	15/15	0/15	2.30E+01	0/15	4.00E+02	0/15	4.00E+02	0/15	3/15	0.36 - 13
METAL	Magnesium	mg/kg	1.01E+03	1.44E+03	1.23E+03	0/2	2/2	0/2	2.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	59.2 - 60.9
METAL	Manganese	mg/kg	1.44E+02	9.97E+02	3.46E+02	0/15	15/15	1/15	8.20E+02	0/15	2.58E+03	0/15	1.16E+05	15/15	15/15	0.24 - 85
METAL	Mercury	mg/kg	1.72E-02	1.95E-02	1.84E-02	0/15	2/15	0/15	1.30E-01	0/15	9.00E-01	0/15	7.85E+02	0/15	0/15	0.0395 - 10
METAL	Molybdenum	mg/kg	1.60E-01	5.70E-01	3.65E-01	0/15	2/15	0/15	n/a	0/15	1.79E+02	0/15	2.80E+04	0/15	2/15	0.59 - 15
METAL	Nickel	mg/kg	1.01E+01	6.57E+01	3.56E+01	0/15	6/15	4/15	2.20E+01	4/15	4.28E+01	0/15	3.18E+04	0/15	6/15	0.59 - 65
METAL	Selenium	mg/kg	8.80E-01	1.10E+00	9.90E-01	0/15	2/15	2/15	7.00E-01	0/15	1.79E+02	0/15	2.80E+04	0/15	2/15	0.59 - 20
METAL	Silver	mg/kg	2.80E-02	1.15E+01	2.32E+00	0/15	3/15	1/15	2.70E+00	1/15	1.08E+01	0/15	9.15E+03	1/15	1/15	0.24 - 10
METAL	Sodium	mg/kg	1.01E+02	1.51E+02	1.26E+02	0/2	2/2	0/2	3.40E+02	0/2	n/a	0/2	n/a	n/a	n/a	23.7 - 24.3
METAL	Thallium	mg/kg	1.70E-01	1.80E-01	1.75E-01	0/2	2/2	0/2	3.40E-01	0/2	2.87E+00	0/2	4.48E+02	0/2	2/2	0.24 - 0.24
METAL	Uranium	mg/kg	1.10E+00	7.35E+00	5.27E+00	0/15	3/15	2/15	4.60E+00	0/15	1.07E+02	0/15	1.65E+04	0/15	0/15	0.02 - 20
METAL	Vanadium	mg/kg	1.46E+01	2.51E+01	1.99E+01	0/2	2/2	0/2	3.70E+01	2/2	1.51E-01	0/2	9.30E+01	2/2	2/2	1.2 - 1.2
METAL	Zinc	mg/kg	1.32E+01	5.53E+01	3.46E+01	0/15	15/15	0/15	6.00E+01	0/15	1.08E+04	0/15	1.68E+06	0/15	14/15	2.4 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	1.88E-01	0/5	1.88E+01	0/5	0/5	0.36 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.9 - 1.9
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.39 - 0.39
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.39 - 0.39
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 6.11.4. Subsurface Soil RI Data Summary: SWMU 228 C-747-B DMSA Outside 17 (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0078 - 0.0078
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.39 - 0.39
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.39 - 0.39
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.39 - 0.39
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.78 - 0.78
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.39 - 0.39
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0078 - 0.0078
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.9 - 1.9
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.39 - 0.39
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.78 - 0.78
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	0/1	-
RADS	Alpha activity	pCi/g	3.98E+01	3.98E+01	3.98E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.1 - 5.1
RADS	Americium-241	pCi/g	3.20E-03	3.20E-03	3.20E-03	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.019 - 0.019
RADS	Beta activity	pCi/g	3.40E+01	3.40E+01	3.40E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.7 - 3.7
RADS	Cesium-137	pCi/g	-5.00E-03	-5.00E-03	-5.00E-03	0/1	1/1	0/1	2.80E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.06 - 0.06
RADS	Neptunium-237	pCi/g	2.90E-03	2.90E-03	2.90E-03	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.018 - 0.018
RADS	Plutonium-238	pCi/g	2.10E-02	2.10E-02	2.10E-02	0/1	1/1	0/1	n/a	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.022 - 0.022
RADS	Plutonium-239/240	pCi/g	5.37E-03	5.37E-03	5.37E-03	0/1	1/1	0/1	n/a	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.018 - 0.018
RADS	Technetium-99	pCi/g	2.20E-01	2.20E-01	2.20E-01	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	0/1	0.43 - 0.43
RADS	Thorium-228	pCi/g	9.90E-01	9.90E-01	9.90E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	1.05E+00	1.05E+00	1.05E+00	0/1	1/1	0/1	1.40E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	1.00E+00	1.00E+00	1.00E+00	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Uranium-234	pCi/g	7.10E-01	7.10E-01	7.10E-01	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	3.40E-02	3.40E-02	3.40E-02	0/1	1/1	0/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.008 - 0.008
RADS	Uranium-238	pCi/g	8.30E-01	8.30E-01	8.30E-01	0/1	1/1	0/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.007 - 0.007

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

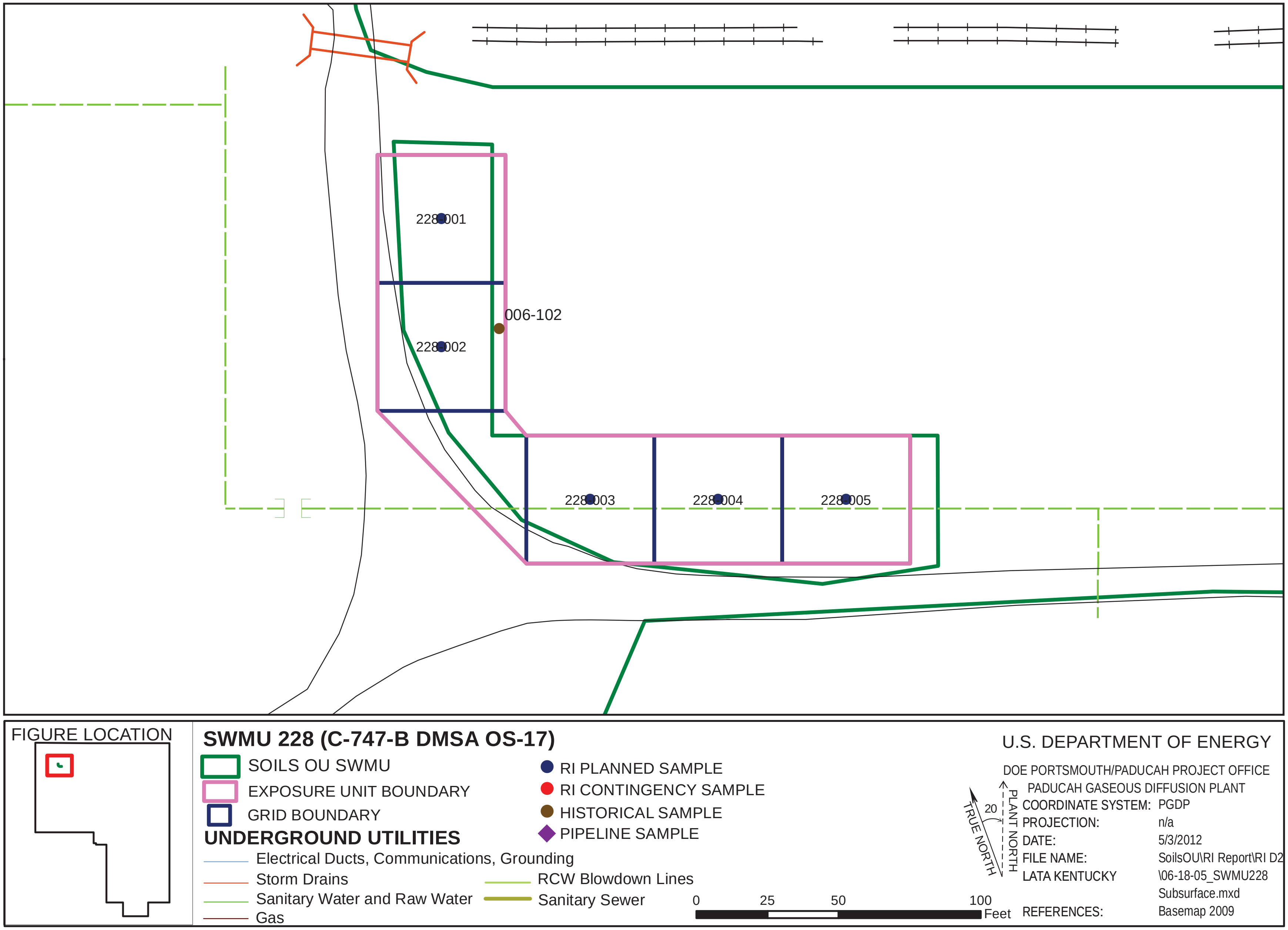


Figure 6.11.5. SWMU 228 Sample Locations - Subsurface Soil

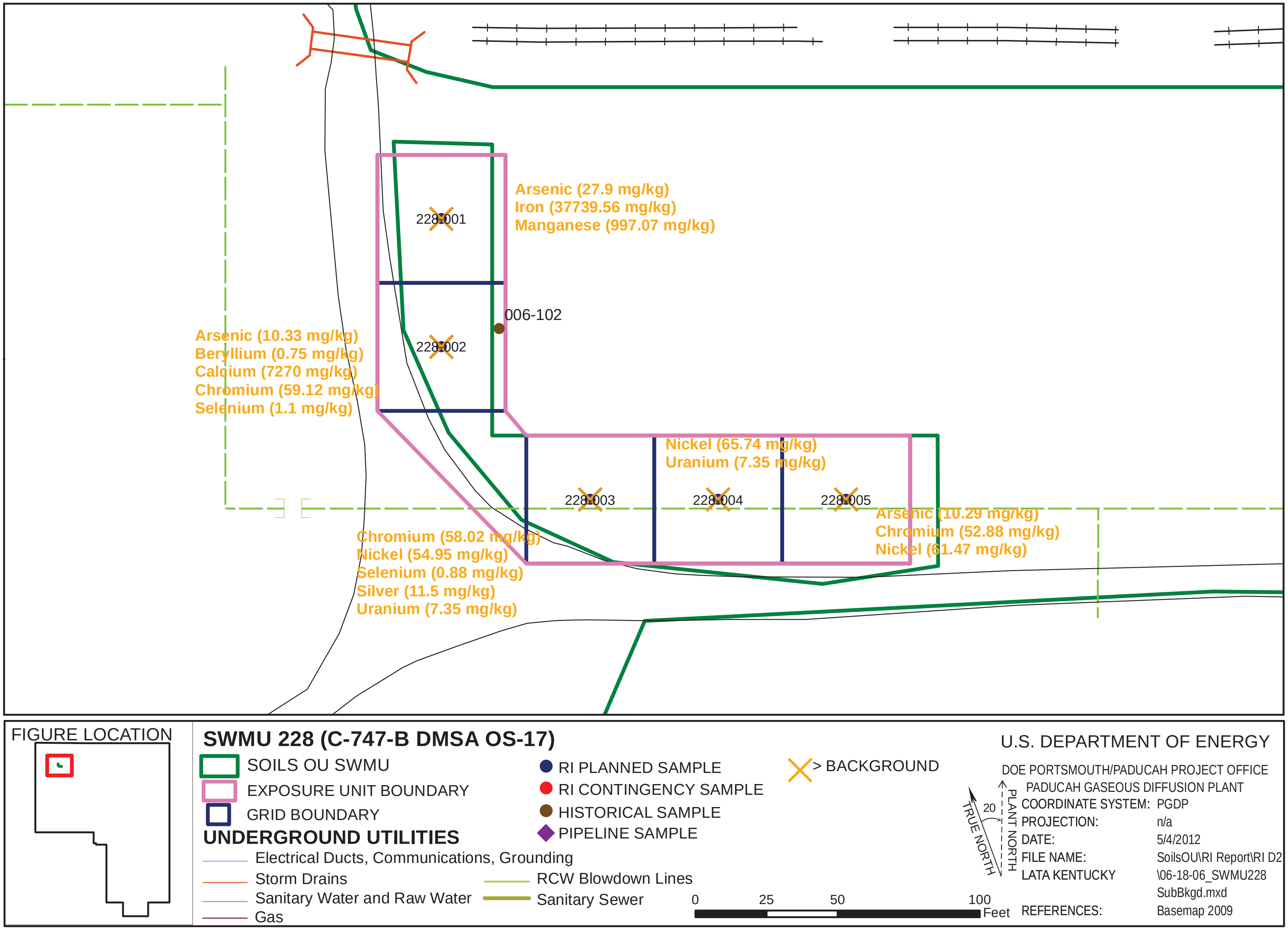


Figure 6.11.6. SWMU 228 Background Exceedances - Subsurface Soil

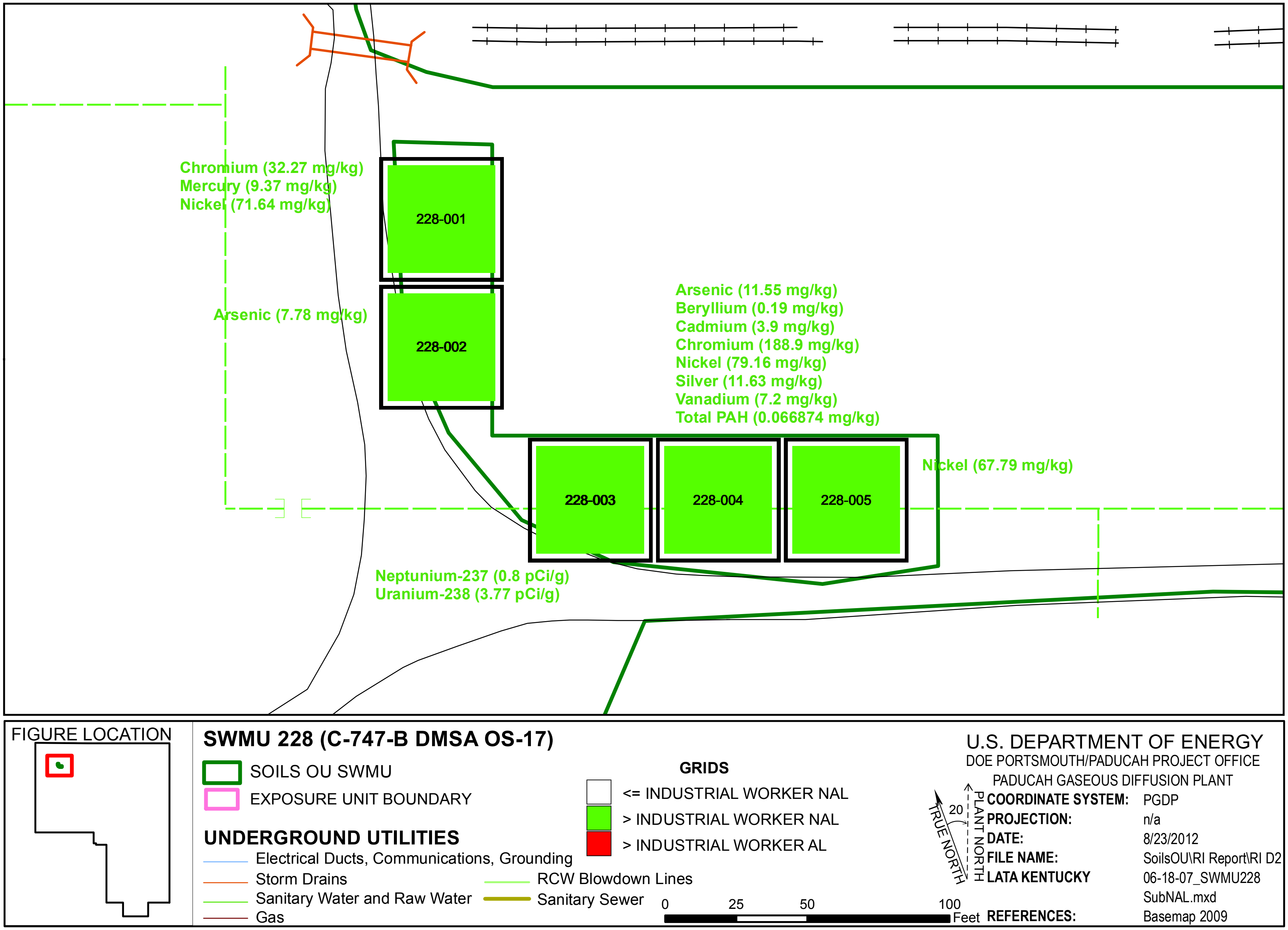


Figure 6.11.7. SWMU 228 NAL Exceedances - Subsurface Soil

The maximum depth at which metals were detected at or above background screening levels and the industrial worker NALs was 10 ft bgs. The end depths of the boreholes taken from grids 1, 2, 3, 4, and 5 range from 1 to 15 ft bgs.

The following are the metals in the SWMU 228 subsurface soil that were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Arsenic	1, 2, 5
Iron	1
Manganese	1
Molybdenum[1]	2, 3
Nickel	3, 4, 5
Selenium	2
Silver	3

* SWMU 228 consists of one EU.
[1] No background value is available.

Arsenic, iron, and manganese in grid 1, and silver in grid 3 were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected above the industrial worker NALs, the industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 228 subsurface soil.

SVOCs

One subsurface soil sample was collected from grid 3 in SWMU 228. No SVOCs were detected above the industrial worker NALs, the industrial worker ALs, or the SSLs for protection of UCRS and RGA groundwater in the SWMU 228 subsurface soil.

VOCs

No subsurface soil samples from SWMU 228 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 228 subsurface soil samples.

6.11.5 Fate and Transport

No target chemicals were identified for further evaluation of impacts to the RGA (Chapter 4). SWMU 228 has the potential of runoff to the west, which flows to Outfall 001, but is not considered significant due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow (DOE 2008a). Ditches to the west were sampled during the SWOU SI, and a final response action for internal ditches will be addressed by the SWOU, as described in the SMP (DOE 2012a). In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

6.11.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 228 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 228 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 6.11.5 for the future industrial worker and the hypothetical resident. The excavation worker scenario did not identify COCs. Table 6.11.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Table 6.11.5. RGOs for SWMU 228

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Future Industrial Worker											
1	Chromium	1.89E+02	mg/kg	6.3E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Neptunium-237	8.00E-01	pCi/g	3.0E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	Total PAH	6.69E-02	mg/kg	1.1E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-238	3.77E+00	pCi/g	2.2E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.3E-05**				**< 1**			
Hypothetical Resident[5]											
1	Chromium	1.89E+02	mg/kg	1.2E-05	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Neptunium-237	8.00E-01	pCi/g	1.5E-05	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Total PAH	6.69E-02	mg/kg	3.4E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-235	1.78E-01	pCi/g	2.3E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	3.77E+00	pCi/g	1.1E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**4.4E-05**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.37, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.37, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Ecological Screening. COPECs for SWMU 228 include metals. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 6.11.6.

Table 6.11.6. Ecological Screening for SWMU 228

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Mostly gravel with some soil/grass	No	156	Cadmium	2.10E-01	3.90E+00	3.60E-01	11
			Mercury	2.00E-01	9.37E+00	1.00E-01	94
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

6.11.7 SWMU 228 Summary

The following text below summarizes the results for SWMU 228 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

The plant processes that could have contributed to contamination at SWMU 228 are spill and/or discharges from the waste and equipment stored there.

COPCs for surface and subsurface soils from SWMU 228 are shown on Tables 6.11.1–6.11.4 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The investigation for SWMU 228 revealed that metals, SVOCs, and radionuclides comprise the types of COPCs found there in the surface soils and only metals in the subsurface soils. Contaminants were detected greater than background and Industrial Worker NALs to a maximum depth of 10 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

SWMU 228 is gravel/grass covered and the contaminants at SWMU 228 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water; therefore, dispersement of soil by rainfall runoff is minimized and not considered significant. There are no known underground pipelines at SWMU 228. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 228.

- Future Industrial Worker
    - — Chromium
    - — Neptunium-237

- Total PAHs
- Uranium-238

- Excavation worker

  - None

- Hypothetical Resident (hazards evaluated against the child resident)

  - Chromium
  - Neptunium-237
  - Total PAHs
  - Uranium-235
  - Uranium-238

Of the above, there are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 228. There are no priority COCs for other scenarios.

For SWMU 228, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Cadmium
- Mercury
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 228 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. The NALs for the industrial worker are exceeded over the entire area of this SWMU. SWMUs 227 and 228 are adjacent to each other. SWMU 228 also is adjacent to SWMU 6, the C-747-B Burial Area, which is in the BGOU; and SWMU 473, the C-746-B Pad, West, which is an NFA site in the 2012 SMP. A response action at SWMU 228 could have a logistical impact on fieldwork at SWMU 6 in the BGOU CERCLA project.

6.11.8 SWMU 228 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 228; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial land use as shown in the SMP (DOE 2012a).

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7. GROUP 2, UNDERGROUND TANKS

This chapter includes a discussion of the underground tanks SWMUs, which includes the following 4 SWMUs:

- SWMU 27, C-722 Acid Neutralization Tank, not sampled during RI (DOE 2010a)
- SWMU 76, C-632-B Sulfuric Acid Storage Tank, sampled during RI
- SWMU 165, C-616-L Pipeline and Vault Soil Contamination, not sampled during RI (DOE 2010a)
- SWMU 170, C-729 Acetylene Building Drain Pits, not sampled during RI (DOE 2010a)

The SWMU-specific discussions highlight the current understanding of each SWMU's impacts. Chapter 4 describes the overall evaluation approach that was used for each SWMU. Figures display the 45 ft grids that were used for the composite sampling and historical sample assignments. There are approximately 10 grids for each EU for SWMUs that are larger than 0.5 acres. If a SWMU is smaller than 0.5 acres, it is considered one EU. If contingency "step-out" grids were deemed necessary by field laboratory results to define extent, the step-out grids are displayed on the figures.

All of these sites are located within the current industrial area of the facility, as shown in Figure 7.1, and fieldwork was conducted in accordance with the Work Plan (DOE 2010a).

The nature and extent is divided into surface and subsurface sections that summarize the representative data set and describe the future industrial worker scenario for SWMUs located inside the limited area and teen recreator scenario for SWMUs located outside the limited area. The evaluation of the XRF data with fixed-base laboratory data indicates the use of XRF results for copper, iron, lead, nickel, uranium and zinc has good correlation and therefore is reliable for use in determining nature and extent and hot spots. Molybdenum, mercury, selenium, and silver XRF results generally are below the reporting limits and will not lead to incorrect decisions in the risk assessment; however, these results may not provide much useful information for nature and extent determination. Use of XRF results for arsenic, chromium, and manganese has uncertainties; however, higher values in the complete data set indicate overall patterns of these constituents present in the soils at the SWMUs/AOCs. Uncertainties associated with arsenic will be managed in the FS because detections at high concentrations from the fixed-base laboratory were detected at lower concentrations by the XRF and may lead to underestimating risk. For vanadium, comparison with the fixed-base laboratory data indicates XRF data are much higher; therefore, risks may be overestimated when using the XRF data. See Appendix B for additional information.

For the fate and transport section, the process for evaluating surface water runoff and groundwater modeling is described in Chapter 4 and Appendix C, and only the conclusions are provided in the SWMU/AOC specific sections. As discussed in the fate and transport discussion, SWMU 165 was identified for groundwater modeling. The following SWMU-specific discussions highlight current understanding of the site impacts.

The human health risk assessment narrative discusses the future industrial worker, the excavation worker, and the hypothetical future resident. Each SWMU/AOC was evaluated for the following receptors. Additional discussion of scenarios is presented in Appendix D.

- Current on-site industrial worker (This assumes exposure to surface soils only.)

- Future on-site industrial worker (This assumes exposure to surface soils only.)

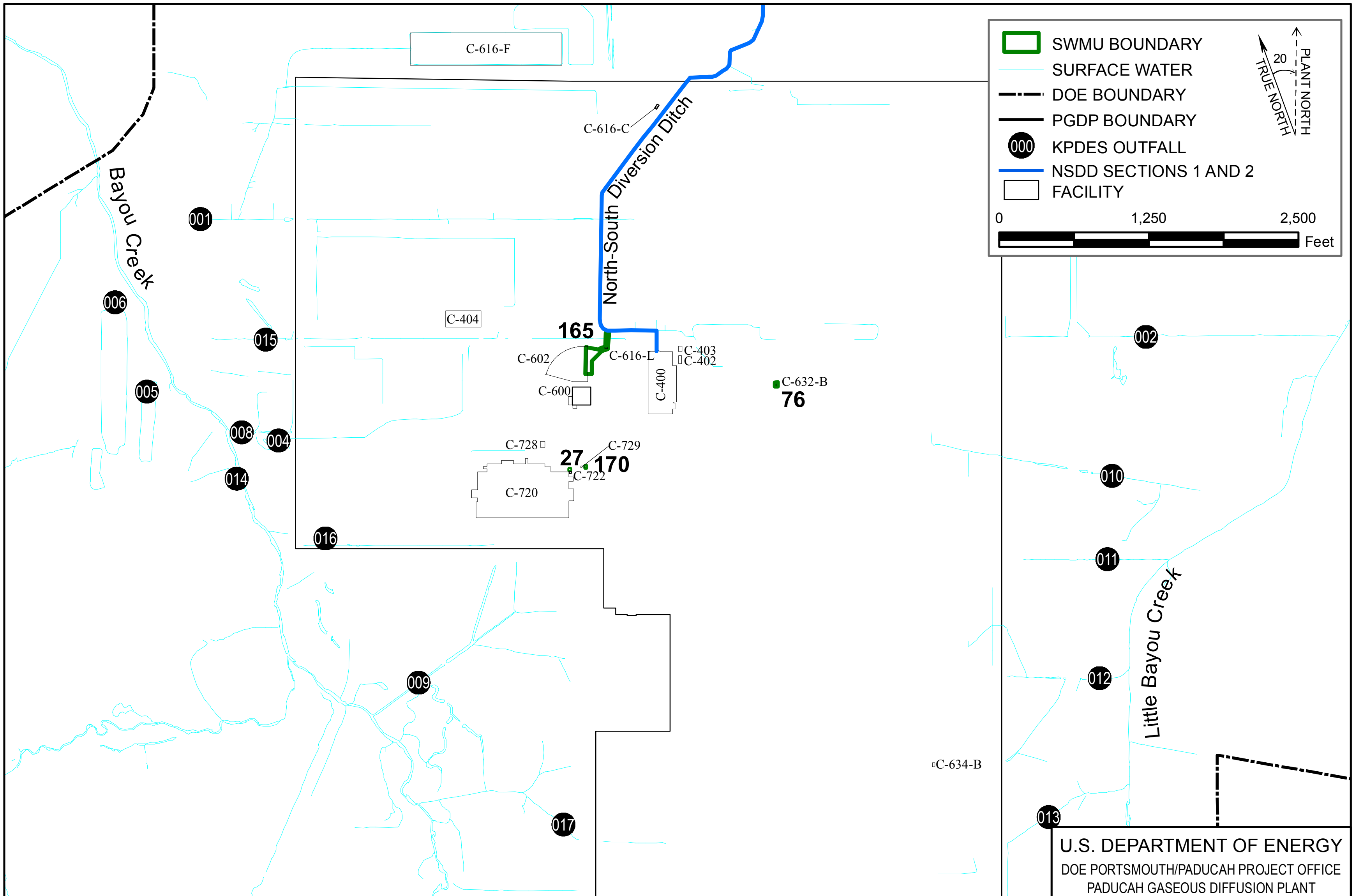


Figure 7.1. SWMU Locations and Features for Underground/Tanks

9/26/2012 SoilsOU\RI Report\RI D2\07-00SWMUsandFeatures R1.mxd

- Outdoor worker (surface and subsurface soils: 0-16 ft bgs) [This assumes exposure to surface (0-1 ft bgs) and a mixture of the surface (0-1 ft bgs) and subsurface soils (1-16 ft bgs), as appropriate, following a future construction activity. As a subset of the outdoor worker exposed to surface and subsurface soils, the potential risks and hazards for shorter-term exposure for workers during excavation also are provided.]

- Hypothetical future adult and child residents (This assumes exposure to surface soils only.)

- Future teen recreational users (This assumes exposure to surface soils only.)

The following are the uncertainties in the human health risk assessment that may affect SWMUs/AOCs in Chapter 7.

- The range of background was not considered beyond the initial screening against site-specific background.

- Overly conservative dermal toxicity factors potentially lead to an overestimation of risk.

- Concentration of total cancerous PAHs were used to estimate risk and the minimum detection limit of the PAHs with toxicity equivalency factors were used when PAHs were not detected.

- Some detection limits for XRF data are above background concentrations and NALs; the COPCs identified using these data are expected to overstate the presence of these metals.

- For those constituents that never were detected within an EU, even if the detection limit is greater than the NAL, the constituent was not considered a COPC.

- UCL concentrations were used as EPCs if there were a sufficient number of samples and distinct results to calculate a UCL. This likely will lead to an overestimation of actual exposure because receptors are assumed to be exposed to the UCL concentration for the entire exposure duration.

- Conservative (i.e., health protective) exposure factors are used when information available is limited in the form of using RME assumptions, as per the Risk Methods Document (DOE 2011a). This may result in an overestimation of potential risk.

- Many of the SWMUs/AOCs (especially SWMU 76) evaluated in this assessment are very small, and the assumptions used for the levels of exposures (duration, frequency) overstate potential chronic exposures in these units.

- The risk assessment does not consider that concentrations of some COCs may be lower or higher in the future because of processes such as degradation and attenuation.

- Additivity of multiple chemicals is assumed. Whether assuming additivity can lead to an underestimation or overestimation of risk is unknown.

- Most of the assumptions about exposure and toxicity used in this BHHRA are representative of statistical upper-bounds or even maximums for each parameter. The result of combining several such upper-bound assumptions is that the final estimate of potential exposure or potential risk is conservative.

Additional information can be found in Appendix D.

For the ecological screening, the priority chemicals that exceeded their respective screening values are shown in tables within each subsection (maximum HQ $\geq$ 10) as well as the overall HI for the constituents detected. This allows for comparison of the HIs, SWMU sizes, and other factors, such as proximity to a surface water body. Additional information is contained in Appendix E.

7.1 SWMU 27, C-722 ACID NEUTRALIZATION TANK

7.1.1 Background

The C-722 Acid Neutralization Tank (SWMU 27) is an underground concrete tank lined with an acid-resistant membrane and acid brick. SWMU 27 is located at the northeast corner of the C-720 Building in the central portion of the plant site. The tank pad is approximately 180 ft^2. There is no direct connection between this SWMU and surface water.

The C-722 Acid Neutralization Tank was designed as a holdup tank for instrument shop effluent from the 1950s. All lines were capped from the instrument shop. All sludge and water were removed after the lines were capped. Discharge to the tank was stopped in 1992.

A sludge sample from 1989 indicated a high level of mercury. The area soils were sampled further as part of the site evaluation for WAGs 9 and 11 (DOE 1999c), and it was determined that contamination present at SWMU 27 does not present potential risks and hazards that exceed *de minimis* levels to industrial workers, potential residential groundwater users, or nonhuman receptors. Direct contact potential risks and hazards are *de minimis* because contaminated media are not available for direct contact at SWMU 27. Potential risks and hazards from use of groundwater contaminated by the migration from soil are *de minimis* because the concentrations of all contaminants in soil were below the groundwater protection screening criteria. An NFA was proposed.

7.1.2 Fieldwork Summary

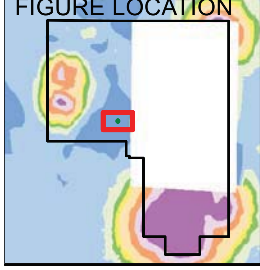
Additional sampling was not needed to determine the nature and extent of contamination. This SWMU was investigated and results proposing an NFA were presented in the site evaluation for WAGs 9 and 11.

The SWMU underwent a gamma radiological walkover survey (Figure 7.1.1) using a FIDLER; the 70 measurements ranged from 4,627 to 8,640 gross cpm. This area consists of a mix of gravel, soil, and concrete, and, as such, all measurements were found to be lower than the project action limit. A judgmental sample was not required as no project action limits were exceeded.

7.1.3 Nature and Extent of Contamination—Surface Soils

Not applicable. (Table 7.1.1 denotes no surface soil data.) Figure 7.1.2 shows the assigned grid locations for SWMU 27.

FIGURE LOCATION



SWMU 27 (C-722 Acid Neutralization Tank)

SOILS OU SWMU

GAMMA WALKOVER SURVEY RESULTS [1]

- < 10,300 net CPM
- ≥ 10,300 net CPM

10,300 net CPM was calculated as 171 pCi/g U-238

[1]Only results within SWMU boundary presented.

0 25 50 100 Feet

TRUE NORTH
20
PLANT NORTH

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

COORDINATE SYSTEM:	PGDP
PROJECTION:	n/a
DATE:	7/11/2012
FILE NAME:	SoilsOU\RI Report\RI D2\
LATA KENTUCKY	07-03-01_SWMU027 GWS.mxd
REFERENCES:	Basemap 2009

Figure 7.1.1. SWMU 27 Gamma Walkover Survey

Table 7.1.1. Surface Soil Historical Data Summary: SWMU 27 C-722 Acid Neutralization Tank

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range

There is no surface data.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

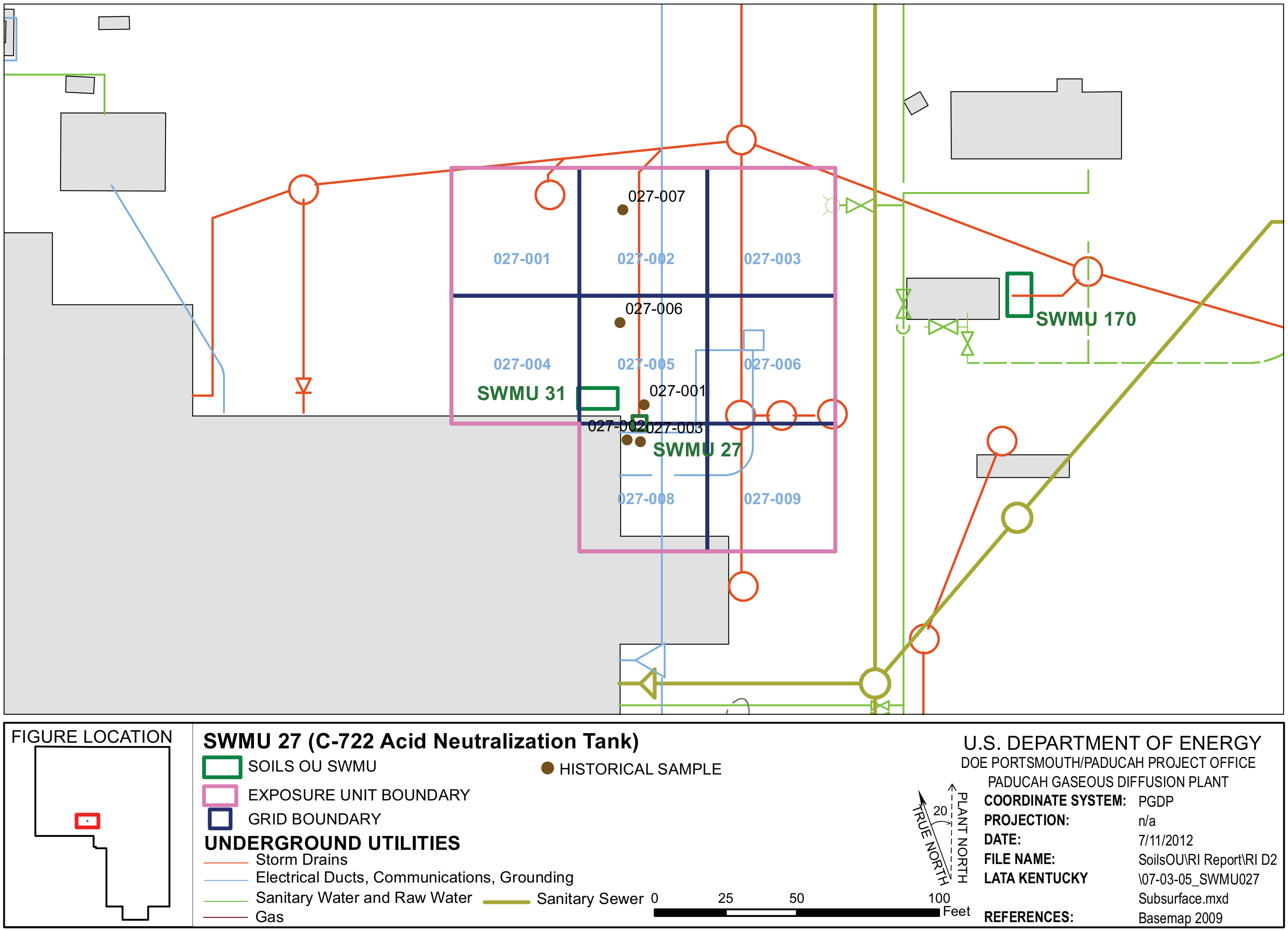


Figure 7.1.2. SWMU 27 Sample Locations - Subsurface Soil

7.1.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 27, the representative data set for subsurface soils is presented in Table 7.1.2 and provides the nature of the contamination in SWMU 27 subsurface soils. Figures 7.1.3–7.1.4 illustrate the horizontal extent. A complete list of detailed sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 27 subsurface soil contamination is considered adequately defined to support the BRA and FS. SWMU 27 consists of one EU.

<u>Metals</u>

No metals were detected above both the background screening levels and the industrial worker NALs or ALs in the SWMU 27 subsurface soil.

Nickel in grid 2 was detected in the SWMU 27 subsurface soil above both the background screening level and the SSLs for the protection of UCRS groundwater. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

<u>PCBs</u>

No PCBs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 27 subsurface soil.

<u>SVOCs</u>

There are no analytical results for SVOCs for SWMU 27.

<u>VOCs</u>

No VOCs were detected above the industrial worker NALs or ALs in the SWMU 27 subsurface soil.

No VOCs were detected above the SSLs for the protection of UCRS and RGA groundwater.

<u>Radionuclides</u>

No radionuclides were detected above both the background screening levels and the industrial worker NALs or ALs in the SWMU 27 subsurface soil.

Neptunium-237 (no background value available) in grid 8 was detected above the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

7.1.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). SWMU 27 is an underground tank; there is no potential for significant runoff.

Table 7.1.2. Subsurface Soil Historical Data Summary: SWMU 27 C-722 Acid Neutralization Tank

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	4.37E+03	8.23E+03	6.43E+03	0/9	9/9	0/9	1.20E+04	0/9	3.32E+04	0/9	3.97E+06	0/9	9/9	-
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	2.10E-01	0/9	2.53E+00	0/9	1.51E+03	0/9	0/9	-
METAL	Arsenic	mg/kg	2.30E+00	4.80E+00	3.23E+00	0/9	9/9	0/9	7.90E+00	9/9	9.97E-01	0/9	9.97E+01	0/9	9/9	-
METAL	Barium	mg/kg	2.69E+01	1.10E+02	6.18E+01	0/9	9/9	0/9	1.70E+02	0/9	5.92E+02	0/9	3.78E+05	0/9	2/9	-
METAL	Beryllium	mg/kg	2.50E-01	6.60E-01	3.99E-01	0/9	9/9	0/9	6.90E-01	9/9	1.40E-02	0/9	9.22E+00	0/9	0/9	-
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	2.10E-01	0/9	3.16E+00	0/9	3.16E+02	0/9	0/9	-
METAL	Calcium	mg/kg	5.93E+02	2.62E+04	9.53E+03	0/9	9/9	5/9	6.10E+03	0/9	n/a	0/9	n/a	n/a	n/a	-
METAL	Chromium	mg/kg	6.10E+00	1.32E+01	1.07E+01	0/9	9/9	0/9	4.30E+01	0/9	3.02E+01	0/9	3.02E+03	0/9	0/9	-
METAL	Cobalt	mg/kg	2.80E+00	1.05E+01	5.70E+00	0/9	9/9	0/9	1.30E+01	0/9	1.05E+01	0/9	1.52E+03	9/9	9/9	-
METAL	Copper	mg/kg	2.20E+00	2.30E+01	8.81E+00	0/9	9/9	0/9	2.50E+01	0/9	1.43E+03	0/9	2.24E+05	0/9	0/9	-
METAL	Iron	mg/kg	7.45E+03	1.68E+04	1.01E+04	0/9	9/9	0/9	2.80E+04	0/9	2.51E+04	0/9	3.92E+06	9/9	9/9	-
METAL	Lead	mg/kg	4.70E+00	1.71E+01	7.62E+00	0/9	9/9	0/9	2.30E+01	0/9	4.00E+02	0/9	4.00E+02	0/9	1/9	-
METAL	Magnesium	mg/kg	3.38E+02	2.66E+03	1.12E+03	0/9	9/9	1/9	2.10E+03	0/9	n/a	0/9	n/a	n/a	n/a	-
METAL	Manganese	mg/kg	5.45E+01	5.19E+02	2.11E+02	0/9	9/9	0/9	8.20E+02	0/9	2.58E+03	0/9	1.16E+05	7/9	9/9	-
METAL	Mercury	mg/kg	3.20E-02	4.90E-02	4.05E-02	0/9	2/9	0/9	1.30E-01	0/9	9.00E-01	0/9	7.85E+02	0/9	0/9	-
METAL	Nickel	mg/kg	3.60E+00	3.97E+01	1.12E+01	0/9	9/9	1/9	2.20E+01	0/9	4.28E+01	0/9	3.18E+04	0/9	9/9	-
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	7.00E-01	0/9	1.79E+02	0/9	2.80E+04	0/9	0/9	-
METAL	Silver	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	2.70E+00	0/9	1.08E+01	0/9	9.15E+03	0/9	0/9	-
METAL	Sodium	mg/kg	4.58E+01	1.73E+02	8.79E+01	0/9	9/9	0/9	3.40E+02	0/9	n/a	0/9	n/a	n/a	n/a	-
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	3.40E-01	0/9	2.87E+00	0/9	4.48E+02	0/9	0/9	-
METAL	Vanadium	mg/kg	1.35E+01	2.44E+01	1.66E+01	0/9	9/9	0/9	3.70E+01	9/9	1.51E-01	0/9	9.30E+01	9/9	9/9	-
METAL	Zinc	mg/kg	1.13E+01	4.10E+01	2.45E+01	0/9	9/9	0/9	6.00E+01	0/9	1.08E+04	0/9	1.68E+06	0/9	7/9	-
PPCB	Total PCB	mg/kg	3.20E-02	7.20E-02	5.20E-02	2/9	2/9	0/9	n/a	0/9	1.88E-01	0/9	1.88E+01	0/9	0/9	0.1 - 0.1
VOA	1,1,1-Trichloroethane	mg/kg	1.50E-02	1.50E-02	1.50E-02	0/9	1/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	-
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	-
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	4.89E-02	0/9	5.53E+00	0/9	0/9	-
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	-
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	2.38E+02	0/9	8.21E+03	0/9	0/9	-
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	6.98E-01	0/9	8.22E+01	0/9	0/9	-
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	4.97E-01	0/9	5.76E+01	0/9	0/9	-
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	-
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	2.42E-01	0/9	2.49E+01	0/9	0/9	-
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	*cis*-1,2-Dichloroethene	mg/kg	4.00E-03	4.00E-03	4.00E-03	0/9	1/9	0/9	n/a	0/9	4.74E+00	0/9	1.93E+02	0/9	0/9	-
VOA	*cis*-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	-
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	3.29E+00	0/9	3.84E+02	0/9	0/9	-
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	3.50E+01	0/9	1.07E+03	0/9	0/9	-
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	-
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	-
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	2.82E-01	0/9	7.08E+01	0/9	0/9	-
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	-

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.1.2. Subsurface Soil Historical Data Summary: SWMU 27 C-722 Acid Neutralization Tank (Continued)

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Industrial Worker FOE	Industrial Worker NAL	Industrial Worker FOE	Industrial Worker AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
VOA	*trans*-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	1.07E+01	0/9	3.42E+02	0/9	0/9	-
VOA	*trans*-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	-
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	4.69E-02	0/9	4.98E+00	0/9	0/9	-
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	2.04E-01	0/9	4.83E+01	0/9	0/9	-
RADS	Americium-241	pCi/g	3.92E-02	5.16E-02	4.54E-02	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.083 - 0.0848
RADS	Cesium-137	pCi/g	-9.19E-03	-8.92E-03	-9.06E-03	0/2	2/2	0/2	2.80E-01	0/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.0151 - 0.0157
RADS	Cobalt-60	pCi/g	5.11E-03	1.01E-02	7.61E-03	0/2	2/2	0/2	n/a	0/2	1.77E-02	0/2	1.77E+00	0/2	0/2	0.0146 - 0.0162
RADS	Neptunium-237	pCi/g	-3.91E-03	3.53E-02	1.57E-02	0/2	2/2	0/2	n/a	0/2	2.71E-01	0/2	2.71E+01	0/2	1/2	0.0307 - 0.0318
RADS	Uranium-234	pCi/g	3.34E-01	9.00E-01	6.17E-01	0/2	2/2	0/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.0736 - 0.215
RADS	Uranium-238	pCi/g	7.46E-01	7.83E-01	7.65E-01	0/2	2/2	0/2	1.20E+00	0/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.162 - 0.187

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

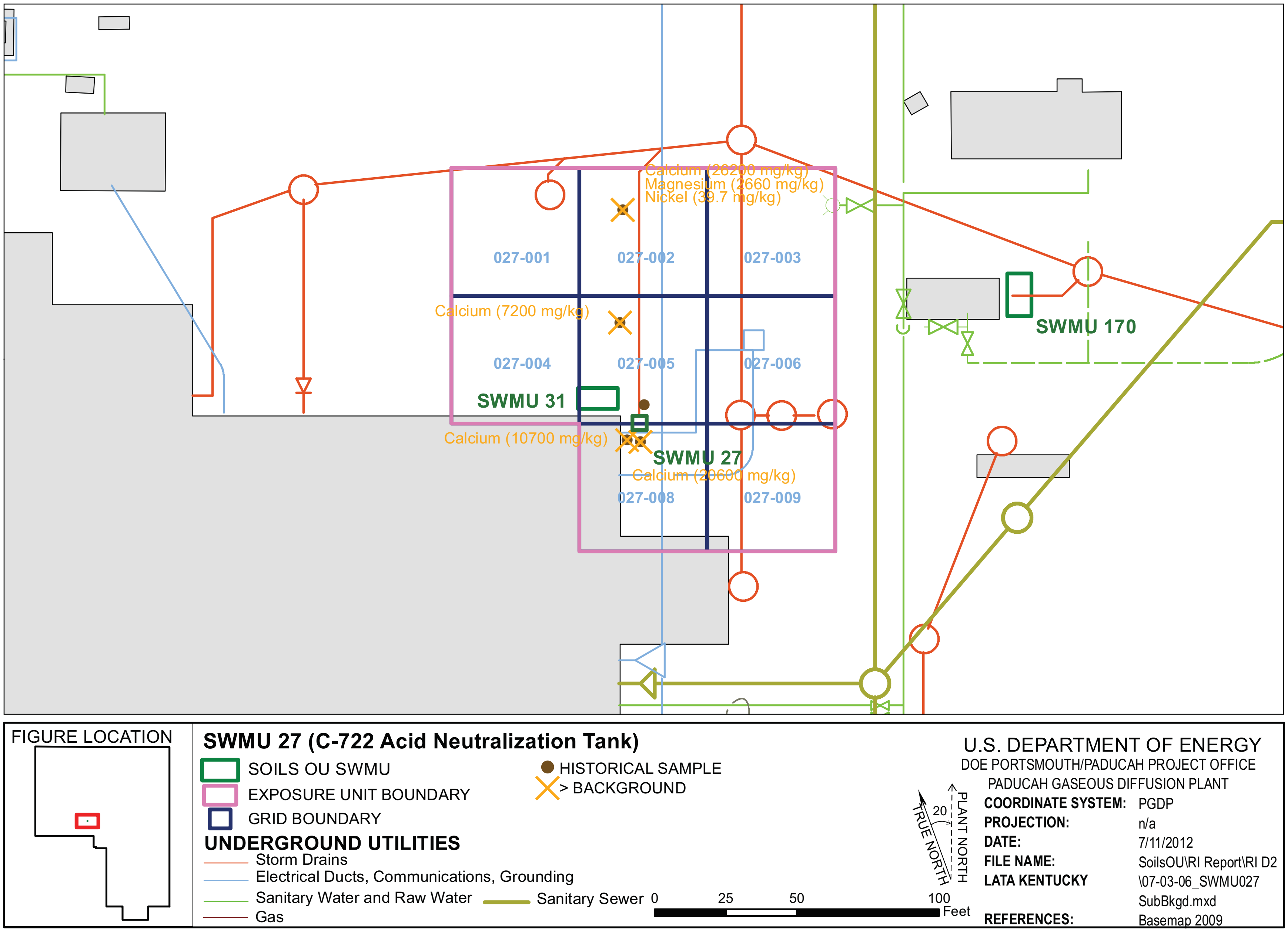


Figure 7.1.3. SWMU 27 Background Exceedances - Subsurface Soil

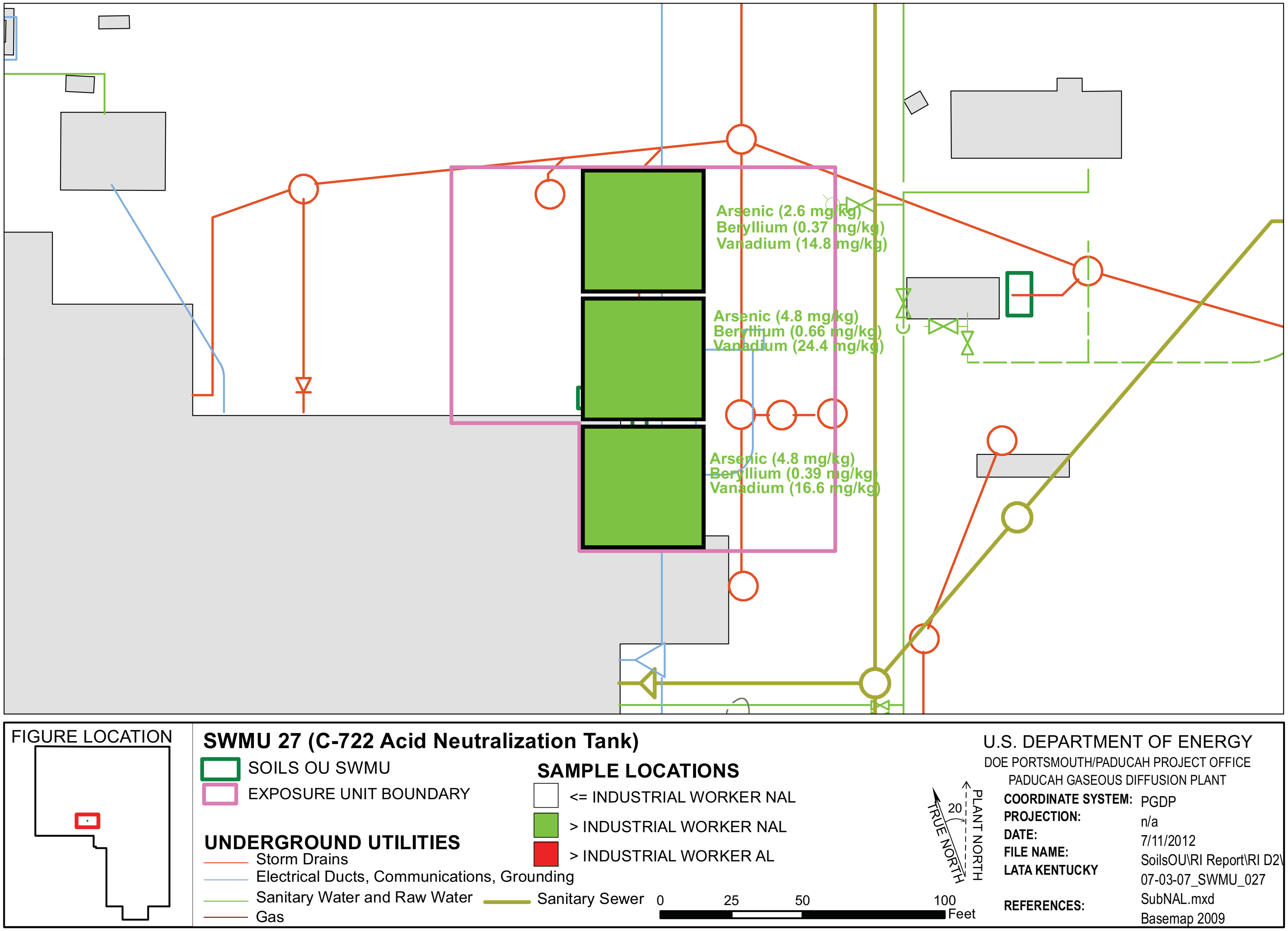


Figure 7.1.4. SWMU 27 NAL Exceedances - Subsurface Soil

7.1.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 27 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow.

The cumulative ELCR and the cumulative HI for SWMU 27 do not exceed the cumulative ELCR benchmark of 1E-6 or the cumulative HI greater than 1 for any scenario evaluated. Consistent with the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU is not required to be evaluated in the FS. As described in the BHHRA (Appendix D), no COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

Ecological Screening. There were no identified COPECs for SWMU 27.

7.1.7 SWMU 27 Summary

The following text summarizes the results for SWMU 27 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

Plant processes that could have contributed to contamination at this site are releases from the tank during neutralization activities.

COPCs for subsurface soils from SWMU 27 are shown on Table 7.1.2 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The COPCs for this SWMU are metals and radionuclides in the subsurface soil. Contaminants were detected greater than background to a maximum depth of 14 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 27 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. SWMU 27 is an underground tank and there are no known underground pipelines remaining at SWMU 27. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Neither cumulative ELCRs nor HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the evaluated scenarios.

For SWMU 27, there are no COPECs exceeding ESVs.

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 27 is sufficient to support decision making and indicates that this SWMU should be considered for a "No Further Action" decision. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 27 is adjacent to the north of the C-720 Maintenance and Stores Building, and SWMU 31, the C-720 Compressor Pit Water Storage Tank, which is part of the

Soils OU. A response action at SWMU 27 could have a logistical impact on the C-720 operations, but would not affect other integrator OUs.

7.1.8 SWMU 27 Conclusion

Previous sampling evaluated by this RI adequately defined the nature and extent of contamination in soils at SWMU 27. Data are available to develop ELCR for only exposure scenarios that encompass subsurface soil, the future outdoor worker (surface and subsurface soil), and the excavation worker, which were less than 1E-06 and the HI < 1. The reasonably anticipated land use for SWMU 27, now and in the future, is industrial, as shown in the SMP (DOE 2012a). Because the only completed exposure pathway for this SWMU has an ELCR/HI less than EPA's accepted values, this SWMU should be considered for a "No Further Action" decision.

7.2 SWMU 76, C-632-B SULFURIC ACID STORAGE TANK

7.2.1 Background

The C-632-B Sulfuric Acid Storage Tank (SWMU 76) is located in the central portion of the plant site. The tank itself is empty, but the unit includes a diked area surrounding the tank. This SWMU is located on the south end of DMSA OS-11, SWMU 222. There is no direct connection between this SWMU and a surface water body.

The tank was used for the storage of sulfuric acid. Spills of sulfuric acid inside the diked area are known to have occurred.

7.2.2 Fieldwork Summary

Two samples were planned and collected for the unit. No contingency samples were required.

The SWMU underwent a gamma radiological walkover survey (Figure 7.2.1) using a FIDLER; the 375 measurements ranged from 4,359 to 7,543 gross cpm. The area consists mostly of gravel with some soil/grass. Due to the area being primarily gravel, the survey measurements were lower than the project action limit. A judgmental sample was not collected because no project action limits were exceeded.

7.2.3 Nature and Extent of Contamination—Surface Soils

For SWMU 76, the representative data set for surface soils is presented in Table 7.2.1 and provides the nature of the contamination in SWMU 76 surface soils. Figures 7.2.2–7.2.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 76 surface soil contamination is considered adequately defined to support the BRA and FS. SWMU 76 consists of one grid and one EU.

Metals

No metals were detected above both the background screening levels and the industrial worker NALs or ALs in the SWMU 76 surface soil.

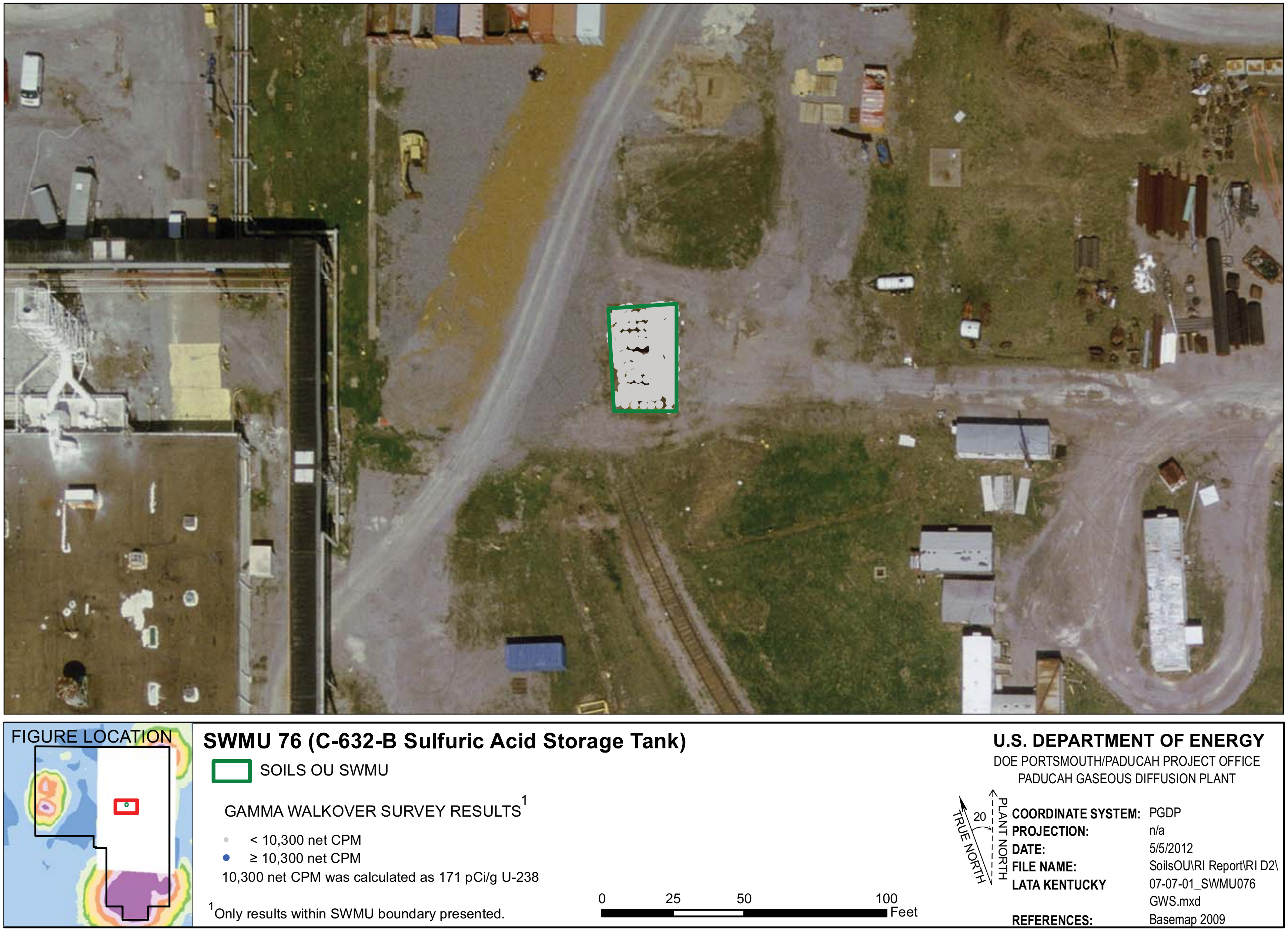


Figure 7.2.1. SWMU 76 Gamma Walkover Survey

Table 7.2.1. Surface Soil RI Data Summary: SWMU 76, C-632-B Sulfuric Acid Storage Tank

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.99E+03	5.99E+03	5.99E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.5 - 5.5
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	0/1	0.55 - 0.55
METAL	Arsenic	mg/kg	7.80E+00	7.80E+00	7.80E+00	0/1	1/1	0/1	1.20E+01	1/1	9.97E-01	0/1	9.97E+01	0/1	1/1	1.1 - 11
METAL	Barium	mg/kg	2.69E+02	2.69E+02	2.69E+02	0/1	1/1	1/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.2 - 2.2
METAL	Beryllium	mg/kg	3.00E-01	3.00E-01	3.00E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.11 - 0.11
METAL	Cadmium	mg/kg	2.60E-01	2.60E-01	2.60E-01	0/1	1/1	1/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.055 - 0.055
METAL	Calcium	mg/kg	1.38E+05	1.38E+05	1.38E+05	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	275 - 275
METAL	Chromium	mg/kg	1.56E+01	1.56E+01	1.56E+01	0/1	1/1	0/1	1.60E+01	0/1	3.02E+01	0/1	3.02E+03	0/1	0/1	1.1 - 85
METAL	Cobalt	mg/kg	4.80E+00	4.80E+00	4.80E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.22 - 0.22
METAL	Copper	mg/kg	7.90E+00	7.90E+00	7.90E+00	0/1	1/1	0/1	1.90E+01	0/1	1.43E+03	0/1	2.24E+05	0/1	0/1	1.1 - 35
METAL	Iron	mg/kg	1.20E+04	1.20E+04	1.20E+04	0/1	1/1	0/1	2.80E+04	0/1	2.51E+04	0/1	3.92E+06	1/1	1/1	5.5 - 100
METAL	Lead	mg/kg	2.21E+01	2.21E+01	2.21E+01	0/1	1/1	0/1	3.60E+01	0/1	4.00E+02	0/1	4.00E+02	0/1	1/1	0.33 - 13
METAL	Magnesium	mg/kg	4.01E+03	4.01E+03	4.01E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	55 - 55
METAL	Manganese	mg/kg	4.37E+02	4.37E+02	4.37E+02	0/1	1/1	0/1	1.50E+03	0/1	2.58E+03	0/1	1.16E+05	1/1	1/1	0.22 - 85
METAL	Mercury	mg/kg	2.22E-02	2.22E-02	2.22E-02	0/1	1/1	0/1	2.00E-01	0/1	9.00E-01	0/1	7.85E+02	0/1	0/1	0.0367 - 10
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.79E+02	0/1	2.80E+04	0/1	0/1	0.55 - 15
METAL	Nickel	mg/kg	9.40E+00	9.40E+00	9.40E+00	0/1	1/1	0/1	2.10E+01	0/1	4.28E+01	0/1	3.18E+04	0/1	1/1	0.55 - 65
METAL	Selenium	mg/kg	9.70E-01	9.70E-01	9.70E-01	0/1	1/1	1/1	8.00E-01	0/1	1.79E+02	0/1	2.80E+04	0/1	1/1	0.55 - 20
METAL	Silver	mg/kg	6.30E-02	6.30E-02	6.30E-02	0/1	1/1	0/1	2.30E+00	0/1	1.08E+01	0/1	9.15E+03	0/1	1/1	0.22 - 10
METAL	Sodium	mg/kg	9.23E+01	9.23E+01	9.23E+01	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	22 - 22
METAL	Thallium	mg/kg	1.80E-01	1.80E-01	1.80E-01	0/1	1/1	0/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.22 - 0.22
METAL	Uranium	mg/kg	4.36E+00	4.36E+00	4.36E+00	0/1	1/1	0/1	4.90E+00	0/1	1.07E+02	0/1	1.65E+04	0/1	0/1	0.05 - 20
METAL	Vanadium	mg/kg	2.44E+01	2.44E+01	2.44E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	6.83E+01	6.83E+01	6.83E+01	0/1	1/1	1/1	6.50E+01	0/1	1.08E+04	0/1	1.68E+06	0/1	1/1	2.2 - 25
PPCB	Total PCB	mg/kg	2.60E-01	2.60E-01	2.60E-01	1/1	1/1	0/1	n/a	1/1	1.88E-01	0/1	1.88E+01	0/1	1/1	0.33 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.36 - 0.36
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.36 - 0.36
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.36 - 0.36
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.8 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Acenaphthene	mg/kg	1.10E-01	1.10E-01	1.10E-01	1/1	1/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.36 - 0.36
SVOA	Acenaphthylene	mg/kg	2.90E-01	2.90E-01	2.90E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Anthracene	mg/kg	6.20E-01	6.20E-01	6.20E-01	0/1	1/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.36 - 0.36

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.2.1. Surface Soil RI Data Summary: SWMU 76, C-632-B Sulfuric Acid Storage Tank (Continued)

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Industrial Worker FOE	Industrial Worker NAL	Industrial Worker FOE	Industrial Worker AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Benzo(ghi)perylene	mg/kg	5.40E-01	5.40E-01	5.40E-01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0073 - 0.0073
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.36 - 0.36
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Dibenzofuran	mg/kg	7.70E-02	7.70E-02	7.70E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Fluoranthene	mg/kg	2.30E+00	2.30E+00	2.30E+00	0/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	1/1	0.36 - 0.36
SVOA	Fluorene	mg/kg	1.20E-01	1.20E-01	1.20E-01	1/1	1/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.36 - 0.36
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.36 - 0.36
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.73 - 0.73
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.36 - 0.36
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0073 - 0.0073
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.8 - 1.8
SVOA	Phenanthrene	mg/kg	8.10E-01	8.10E-01	8.10E-01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Pyrene	mg/kg	1.80E+00	1.80E+00	1.80E+00	0/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	1/1	0.36 - 0.36
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.73 - 0.73
SVOA	Total PAH	mg/kg	1.76E+00	1.76E+00	1.76E+00	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	1/1	1/1	-
RADS	Alpha activity	pCi/g	2.63E+01	2.63E+01	2.63E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.9 - 3.9
RADS	Americium-241	pCi/g	1.10E-02	1.10E-02	1.10E-02	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.016 - 0.016
RADS	Beta activity	pCi/g	2.51E+01	2.51E+01	2.51E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.9 - 3.9
RADS	Cesium-137	pCi/g	1.80E-02	1.80E-02	1.80E-02	0/1	1/1	0/1	4.90E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.1 - 0.1
RADS	Neptunium-237	pCi/g	2.90E-03	2.90E-03	2.90E-03	0/1	1/1	0/1	1.00E-01	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.018 - 0.018
RADS	Plutonium-238	pCi/g	8.00E-03	8.00E-03	8.00E-03	0/1	1/1	0/1	7.30E-02	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.016 - 0.016
RADS	Plutonium-239/240	pCi/g	1.50E-02	1.50E-02	1.50E-02	0/1	1/1	0/1	2.50E-02	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.016 - 0.016
RADS	Technetium-99	pCi/g	4.20E-01	4.20E-01	4.20E-01	0/1	1/1	0/1	2.50E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	1/1	0.52 - 0.52
RADS	Thorium-228	pCi/g	7.30E-01	7.30E-01	7.30E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.04 - 0.04
RADS	Thorium-230	pCi/g	9.30E-01	9.30E-01	9.30E-01	0/1	1/1	0/1	1.50E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.03 - 0.03
RADS	Thorium-232	pCi/g	6.90E-01	6.90E-01	6.90E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Uranium-234	pCi/g	1.01E+00	1.01E+00	1.01E+00	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	9.10E-02	9.10E-02	9.10E-02	0/1	1/1	1/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.009 - 0.009
RADS	Uranium-238	pCi/g	1.45E+00	1.45E+00	1.45E+00	0/1	1/1	1/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.02 - 0.02

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.2.1. Surface Soil RI Data Summary: SWMU 76, C-632-B Sulfuric Acid Storage Tank (Continued)

(red)	One or more samples exceed AL value[1]
(green)	One or more samples exceed NAL value[2]
(orange)	One or more samples exceed background value
(blue)	One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

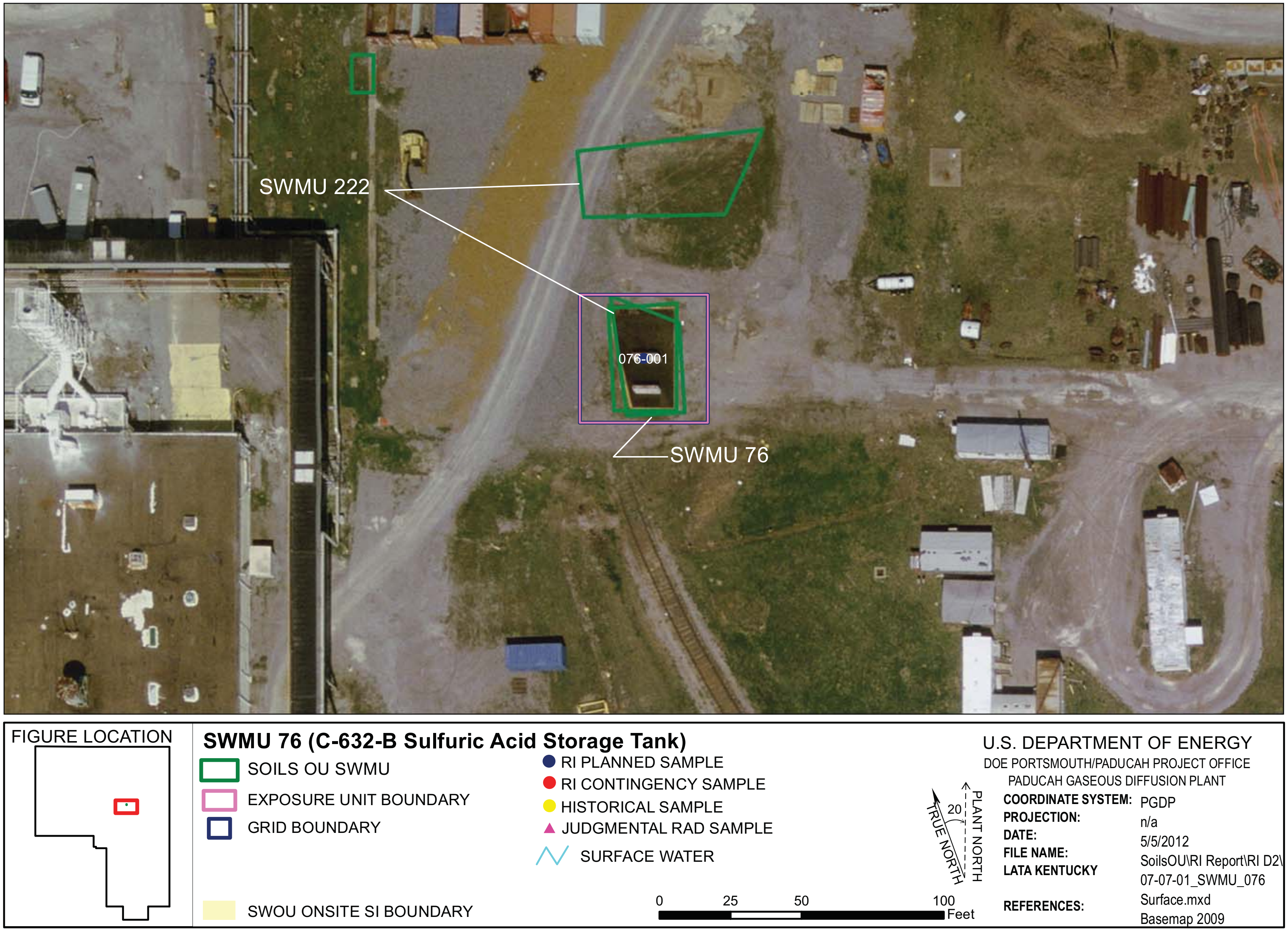


Figure 7.2.2. SWMU 76 Sample Locations - Surface Soil

Figure 7.2.3. SWMU 76 Background Exceedances - Surface Soil

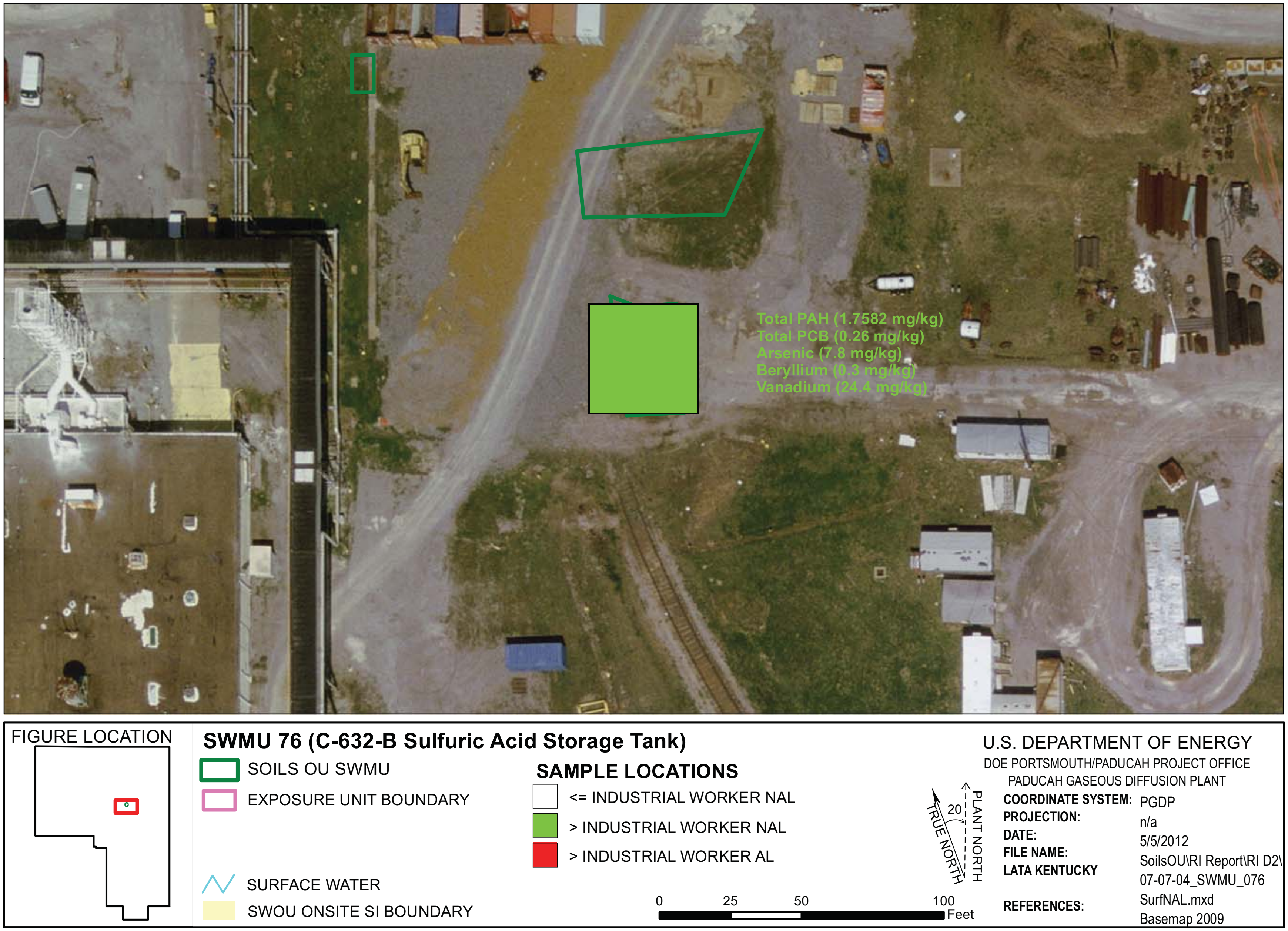


Figure 7.2.4. SWMU 76 NAL Exceedances - Surface Soil

The following metals were detected in the SWMU 76 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater: barium, selenium, and zinc. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the industrial worker NAL and the SSL for the protection of UCRS groundwater in the SWMU 76 surface soil.

PCBs were not detected above the industrial worker AL or the SSL for the protection of RGA groundwater.

SVOCs

Total PAHs were detected above the industrial worker NAL in the SWMU 76 surface soil. No SVOCs were detected above the industrial worker ALs.

Fluoranthene, pyrene, and Total PAHs were detected above the SSLs for the protection of UCRS groundwater, and Total PAHs were detected above the SSL for the protection of RGA groundwater in the SWMU 76 surface soil.

VOCs

There are no VOC data for surface soil at SWMU 76.

Radionuclides

No radionuclides were detected above both the background screening levels and the industrial worker NALs or ALs in the SWMU 76 surface soil.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

7.2.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 76, the representative data set for subsurface soils is presented in Table 7.2.2 and provides the nature of the contamination in SWMU 76 subsurface soils. Figures 7.2.5–7.2.7 illustrate the horizontal extent. A complete list of detailed sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 76 subsurface soil contamination is considered adequately defined to support the BRA and FS. SWMU 76 consists of one grid and one EU.

Metals

Arsenic and mercury were detected above both the background screening levels and the industrial worker NALs in the SWMU 76 subsurface soil. The detections were at 4 ft bgs, which also was the end depth of the borehole.

Table 7.2.2. Subsurface Soil RI Data Summary: SWMU 76, C-632-B Sulfuric Acid Storage Tank

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	1.04E+04	1.04E+04	1.04E+04	0/1	1/1	0/1	1.20E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	6.1 - 6.1
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	0/1	0.61 - 0.61
METAL	Arsenic	mg/kg	8.62E+00	1.31E+01	1.16E+01	0/2	2/2	2/2	7.90E+00	2/2	9.97E-01	0/2	9.97E+01	0/2	2/2	1.2 - 11
METAL	Barium	mg/kg	8.59E+01	8.59E+01	8.59E+01	0/1	1/1	0/1	1.70E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.4 - 2.4
METAL	Beryllium	mg/kg	4.70E-01	4.70E-01	4.70E-01	0/1	1/1	0/1	6.90E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.12 - 0.12
METAL	Cadmium	mg/kg	7.90E-02	7.90E-02	7.90E-02	0/1	1/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.061 - 0.061
METAL	Calcium	mg/kg	1.08E+04	1.08E+04	1.08E+04	0/1	1/1	1/1	6.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	61.1 - 61.1
METAL	Chromium	mg/kg	2.08E+01	2.08E+01	2.08E+01	0/2	1/2	0/2	4.30E+01	0/2	3.02E+01	0/2	3.02E+03	0/2	0/2	1.2 - 85
METAL	Cobalt	mg/kg	6.10E+00	6.10E+00	6.10E+00	0/1	1/1	0/1	1.30E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.24 - 0.24
METAL	Copper	mg/kg	1.39E+01	1.39E+01	1.39E+01	0/2	1/2	0/2	2.50E+01	0/2	1.43E+03	0/2	2.24E+05	0/2	0/2	1.2 - 35
METAL	Iron	mg/kg	1.51E+04	2.28E+04	2.02E+04	0/2	2/2	0/2	2.80E+04	0/2	2.51E+04	0/2	3.92E+06	2/2	2/2	6.1 - 100
METAL	Lead	mg/kg	1.23E+01	3.02E+01	2.42E+01	0/2	2/2	1/2	2.30E+01	0/2	4.00E+02	0/2	4.00E+02	0/2	1/2	0.37 - 13
METAL	Magnesium	mg/kg	1.82E+03	1.82E+03	1.82E+03	0/1	1/1	0/1	2.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	61.1 - 61.1
METAL	Manganese	mg/kg	2.05E+02	4.57E+02	3.73E+02	0/2	2/2	0/2	8.20E+02	0/2	2.58E+03	0/2	1.16E+05	2/2	2/2	0.24 - 85
METAL	Mercury	mg/kg	3.08E-02	7.45E+00	2.50E+00	0/2	2/2	1/2	1.30E-01	1/2	9.00E-01	0/2	7.85E+02	1/2	1/2	0.0407 - 10
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.79E+02	0/2	2.80E+04	0/2	0/2	0.61 - 15
METAL	Nickel	mg/kg	1.20E+01	1.20E+01	1.20E+01	0/2	1/2	0/2	2.20E+01	0/2	4.28E+01	0/2	3.18E+04	0/2	1/2	0.61 - 65
METAL	Selenium	mg/kg	1.50E+00	1.50E+00	1.50E+00	0/2	1/2	1/2	7.00E-01	0/2	1.79E+02	0/2	2.80E+04	0/2	1/2	0.61 - 20
METAL	Silver	mg/kg	4.20E-02	4.20E-02	4.20E-02	0/2	1/2	0/2	2.70E+00	0/2	1.08E+01	0/2	9.15E+03	0/2	0/2	0.24 - 10
METAL	Sodium	mg/kg	5.74E+01	5.74E+01	5.74E+01	0/1	1/1	0/1	3.40E+02	0/1	n/a	0/1	n/a	n/a	n/a	24.4 - 24.4
METAL	Thallium	mg/kg	2.70E-01	2.70E-01	2.70E-01	0/1	1/1	0/1	3.40E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.24 - 0.24
METAL	Uranium	mg/kg	4.90E+00	4.90E+00	4.90E+00	0/2	1/2	1/2	4.60E+00	0/2	1.07E+02	0/2	1.65E+04	0/2	0/2	0.02 - 20
METAL	Vanadium	mg/kg	3.69E+01	3.69E+01	3.69E+01	0/1	1/1	0/1	3.70E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.2 - 1.2
METAL	Zinc	mg/kg	4.13E+01	5.44E+01	5.01E+01	0/2	2/2	0/2	6.00E+01	0/2	1.08E+04	0/2	1.68E+06	0/2	2/2	2.4 - 25
PPCB	Total PCB	mg/kg	7.30E-02	7.30E-02	7.30E-02	1/2	1/2	0/2	n/a	0/2	1.88E-01	0/2	1.88E+01	0/2	0/2	0.37 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.4 - 0.4
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.4 - 0.4
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.4 - 0.4
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	2 - 2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.4 - 0.4
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.4 - 0.4

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.2.2. Subsurface Soil RI Data Summary: SWMU 76, C-632-B Sulfuric Acid Storage Tank (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Benzo(ghi)perylene	mg/kg	1.30E-01	1.30E-01	1.30E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0081 - 0.0081
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.4 - 0.4
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Fluoranthene	mg/kg	1.50E-01	1.50E-01	1.50E-01	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.4 - 0.4
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.4 - 0.4
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.4 - 0.4
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.81 - 0.81
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.4 - 0.4
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0081 - 0.0081
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	2 - 2
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Pyrene	mg/kg	1.90E-01	1.90E-01	1.90E-01	1/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.4 - 0.4
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.81 - 0.81
SVOA	Total PAH	mg/kg	2.70E-01	2.70E-01	2.70E-01	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	1/1	1/1	-
RADS	Alpha activity	pCi/g	2.85E+01	2.85E+01	2.85E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	4.8 - 4.8
RADS	Americium-241	pCi/g	0.00E+00	0.00E+00	0.00E+00	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.0059 - 0.0059
RADS	Beta activity	pCi/g	3.90E+01	3.90E+01	3.90E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.1 - 5.1
RADS	Cesium-137	pCi/g	1.50E-02	1.50E-02	1.50E-02	0/1	1/1	0/1	2.80E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.096 - 0.096
RADS	Neptunium-237	pCi/g	-3.50E-03	-3.50E-03	-3.50E-03	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.023 - 0.023
RADS	Plutonium-238	pCi/g	8.00E-03	8.00E-03	8.00E-03	0/1	1/1	0/1	n/a	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.025 - 0.025
RADS	Plutonium-239/240	pCi/g	5.30E-03	5.30E-03	5.30E-03	0/1	1/1	0/1	n/a	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.016 - 0.016
RADS	Technetium-99	pCi/g	2.30E-01	2.30E-01	2.30E-01	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	0/1	0.43 - 0.43
RADS	Thorium-228	pCi/g	1.18E+00	1.18E+00	1.18E+00	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	1.27E+00	1.27E+00	1.27E+00	0/1	1/1	0/1	1.40E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.008 - 0.008
RADS	Thorium-232	pCi/g	1.19E+00	1.19E+00	1.19E+00	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.008 - 0.008
RADS	Uranium-234	pCi/g	1.22E+00	1.22E+00	1.22E+00	0/1	1/1	1/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	6.80E-02	6.80E-02	6.80E-02	0/1	1/1	1/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.021 - 0.021
RADS	Uranium-238	pCi/g	1.42E+00	1.42E+00	1.42E+00	0/1	1/1	1/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.007 - 0.007

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.2.2. Subsurface Soil RI Data Summary: SWMU 76, C-632-B Sulfuric Acid Storage Tank (Continued)

(red)	One or more samples exceed AL value[1]
(green)	One or more samples exceed NAL value[2]
(orange)	One or more samples exceed background value
(light blue)	One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

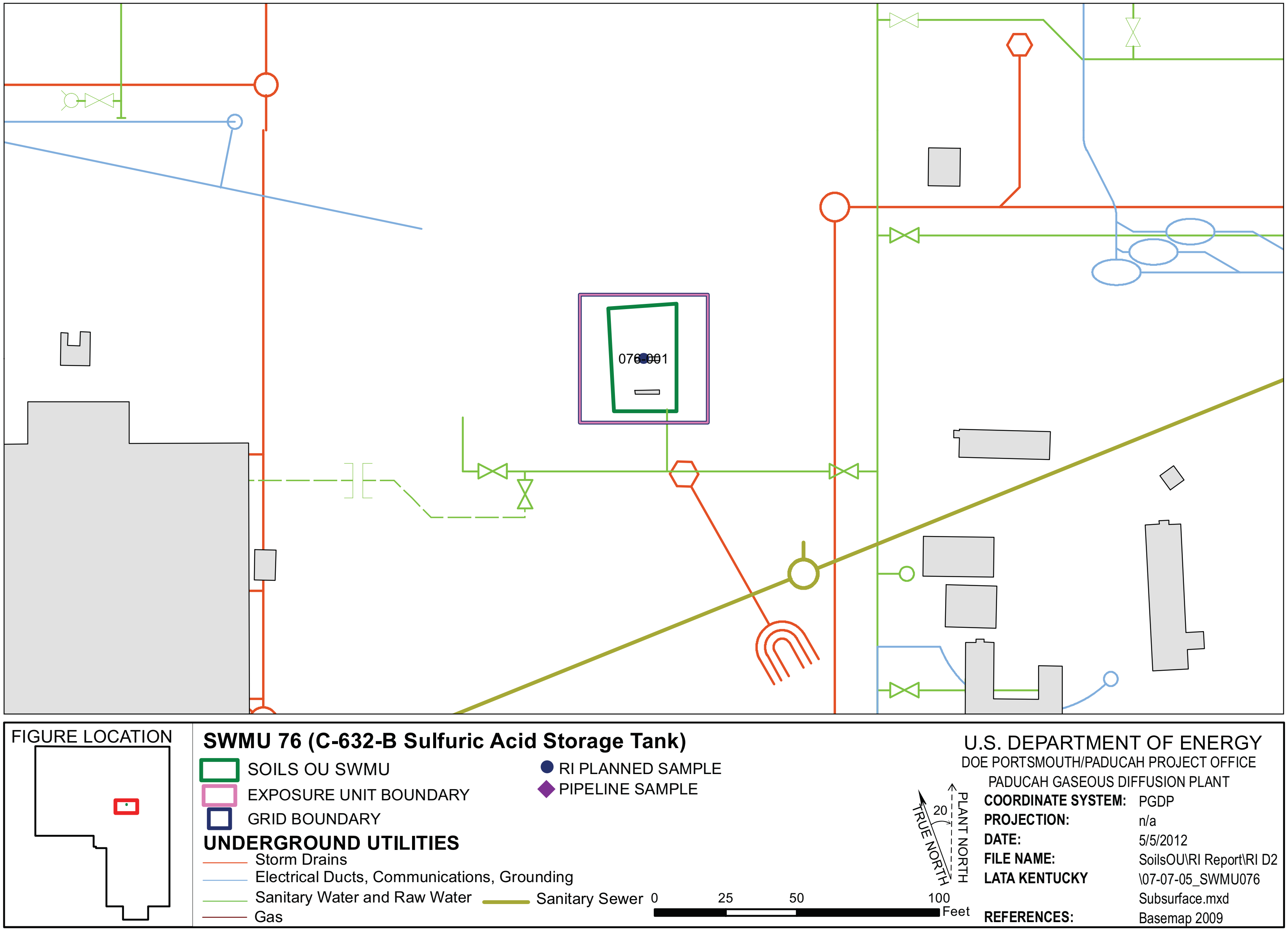


Figure 7.2.5. SWMU 76 Sample Locations - Subsurface Soil

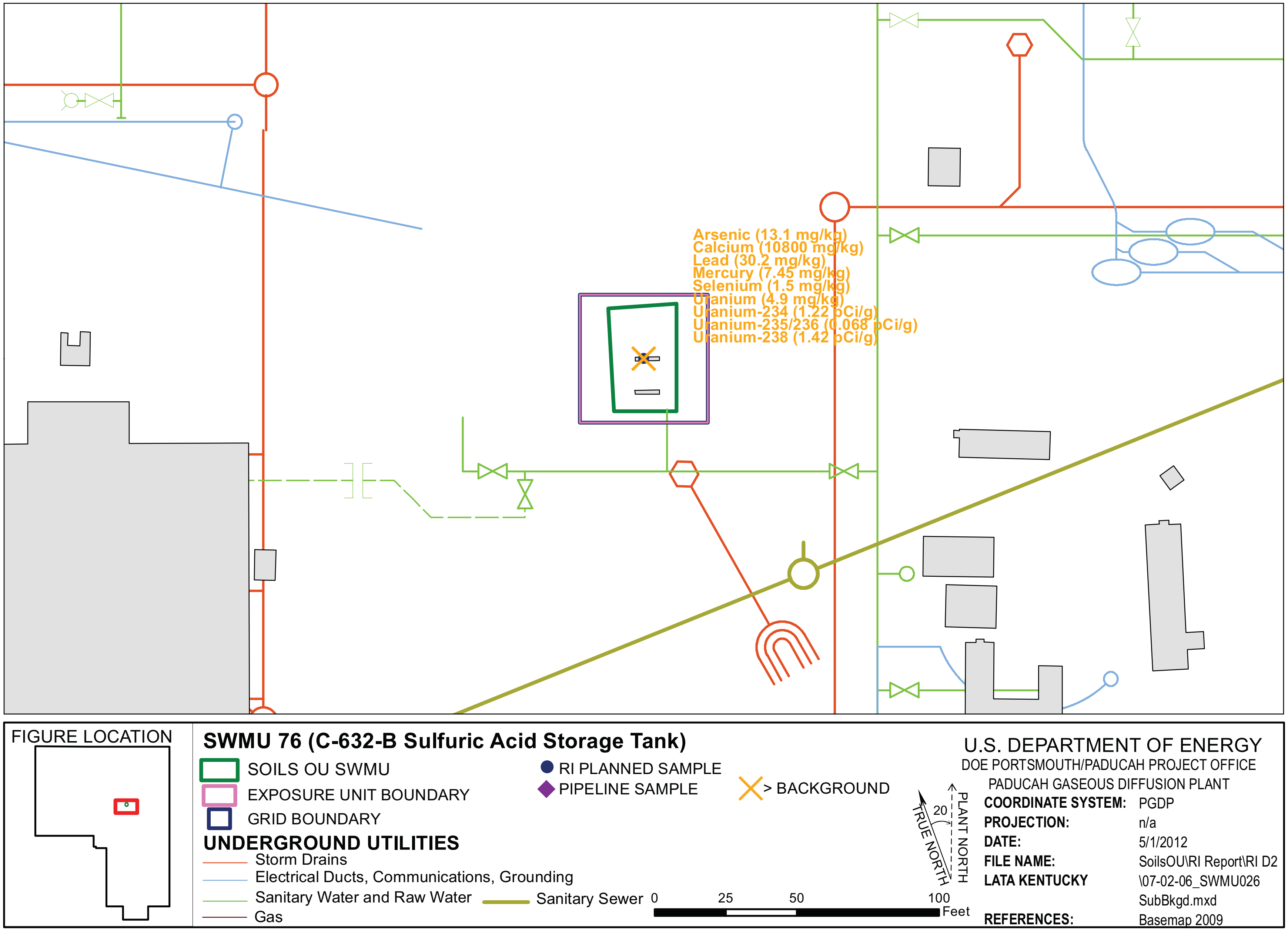


Figure 7.2.6. SWMU 76 Background Exceedances - Subsurface Soil

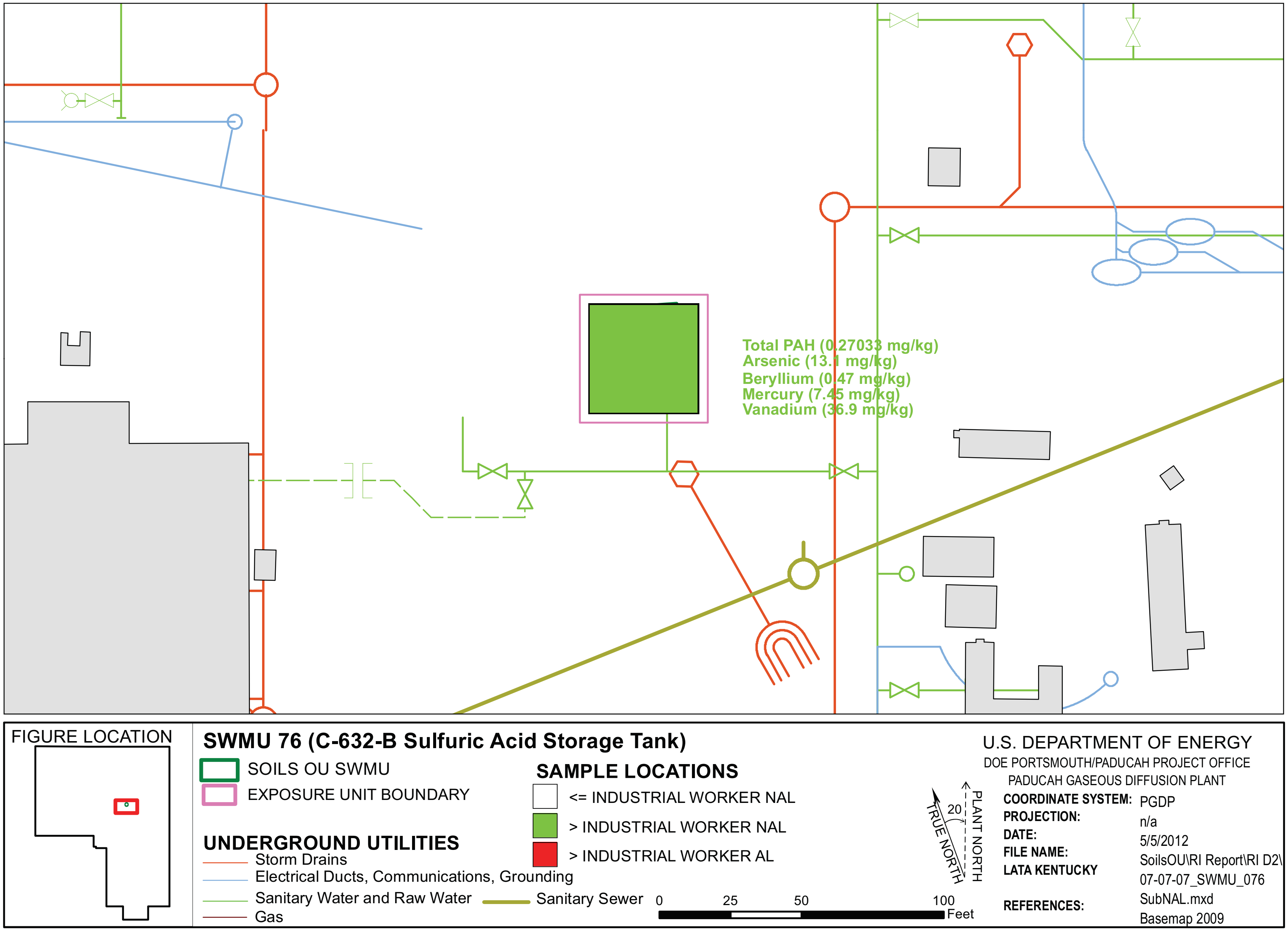


Figure 7.2.7. SWMU 76 NAL Exceedances - Subsurface Soil

No metals were detected above both the background screening levels and the industrial worker ALs.

The following metals were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater: arsenic, lead, mercury, and selenium. Mercury was detected above both the background screening level and the SSLs for the protection of RGA groundwater.

PCBs

No PCBs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 76 subsurface soil.

SVOCs

Of the SVOCs, Total PAHs were detected above the industrial worker NAL in the SWMU 76 subsurface soil (at 4 ft bgs). No SVOCs were detected above the industrial worker ALs.

Total PAHs were detected above the SSLs for the protection of UCRS and RGA groundwater in the SWMU 76 subsurface soil.

VOCs

There is no VOC data for surface soil at SWMU 76.

Radionuclides

No radionuclides were detected above the background screening levels and the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 76 subsurface soil.

7.2.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no direct connection between this SWMU and a surface water body; SWMU 76 is a diked area. There is no potential for runoff.

7.2.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 76 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 76 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 7.2.3 for the future industrial worker and the hypothetical resident. The excavation worker did not have any identified COCs. Table 7.2.3 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Table 7.2.3. RGOs for SWMU 76

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3] 1 x 10^{-6}	RGOs for ELCR[3] 1 x 10^{-5}	RGOs for ELCR[3] 1 x 10^{-4}	HI[4]	RGOs for HI[3] 0.1	RGOs for HI[3] 1	RGOs for HI[3] 3
Future Industrial Worker											
1	Total PCB	2.60E-01	mg/kg	1.4E-06	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	1.76E+00	mg/kg	3.0E-05	5.92E-02	5.92E-01	5.92E+00	n/a	n/a	n/a	n/a
	Cumulative			**3.1E-05**				**< 1**			
Hypothetical Resident[5]											
1	Total PCB	2.60E-01	mg/kg	4.1E-06	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Total PAH	1.76E+00	mg/kg	9.0E-05	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-238	1.45E+00	pCi/g	4.2E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**9.9E-05**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.40, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.40, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Ecological Screening. Primary COPECs for SWMU 76 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 7.2.4.

Table 7.2.4 Ecological Screening for SWMU 76

Ground Cover	Near a Surface Water Body?	Total HI (max) [a]	Priority COPECs	Background (mg/kg) [b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Mostly gravel	No	155	PCB, Total	n/a	2.50E+00	2.00E-02	125
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b).
n/a = not applicable

7.2.7 SWMU 76 Summary

The following text summarizes the results for SWMU 76 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

Plant processes that could have contributed to contamination at SWMU 76 are spills and releases from the sulfuric acid tank.

COPCs for surface subsurface soils from SWMU 76 are shown on Tables 7.2.1 and 7.2.2 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The COPCs identified for this SWMU are metals, PCBs, and SVOCs in the surface soils and metals and SVOCs in the subsurface soils. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 76 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water; SWMU 76 is a diked area. There are no known underground pipelines at SWMU 76. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 76.

- Future Industrial Worker
  - — Total PAHs
  - — Total PCBs

- Excavation worker

  — None

- Hypothetical Resident (hazards evaluated against the child resident)

  — Total PAHs
  — Total PCBs
  — Uranium-238

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 76. There are no priority COCs for other scenarios.

For SWMU 76, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Total PCBs
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 76 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 76 is not adjacent to any other SWMUs. SWMU 76 is near the C-410 Building, SWMU 478, which is scheduled for demolition in the near future. Deactivation of the C-410 Complex is underway as of June 2011, as part of American Recovery and Reinvestment Act funding for the PGDP. A response action at SWMU 76 would not have an effect on other integrator OUs at PGDP.

7.2.8 SWMU 76 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 76; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated land use for SWMU 76, now and in the future is industrial as shown in the SMP (DOE 2012a).

7.3 SWMU 165, C-616-L PIPELINE AND VAULT SOIL CONTAMINATION

7.3.1 Background

The C-616-L Pipeline and Vault Soil Contamination Site (SWMU 165) is located in the central portion of the plant site. The C-616-L Vault and Lift Station are located on the south side of Virginia Avenue and north of the C-600 Steam Plant. The SWMU dimensions consist of two areas: Area 1 is 105-ft wide by 210-ft long; and Area 2 is 30-ft wide by 130-ft long. This area discharges directly into KPDES Outfall 015.

The C-616-L Vault historically served as an effluent collection system. The area collects runoff from the C-602 Coal Storage Yard. This runoff was transferred to the NSDD causing the ditch to overflow onto an adjacent stretch of 10th Street at PGDP during heavy rains. In order to address risks to workers that were exposed to contaminated sediments from the NSDD, a removal action was implemented as described in the ROD (DOE 1994c). The removal action, which was completed in 1995, consisted of several components. The component pertinent to SWMU 165 included removing fly ash from the C-600 Steam Plant ash pile runoff by constructing settling lagoons then pumping the supernatant in the lagoons into the piping that replaced the southern part of the NSDD channel. The pump in the lift station collects runoff and sediment from C-600 coal pile and pumps it around the southern reaches of the NSDD to a point just north of the C-616-C Lift Station inlet. Water from the fly ash settling basins enters the station through underground piping from the basins. Coal pile runoff is routed into the west side of the lift station by a trench. This lift station is under the control and operation of USEC.

Past sampling events occurred in 1989, 1990, 1991, 1994, and 1995. Analysis of soil samples detected low-levels of PCBs and radionuclides. Subsurface soil samples also were obtained and analyzed as part of the Site Evaluation for WAGs 9 and 11 (DOE 1999c). Characterization of the area has identified PCBs, uranium, and technetium-99.

7.3.2 Fieldwork Summary

The historical data are representative of the nature and adequately delineate the extent of the contamination; therefore, no grid samples were collected from SWMU 165 during the Soils OU RI sampling effort (DOE 2010a).

The SWMU underwent a gamma radiological walkover survey (Figure 7.3.1) using a FIDLER; the 7,284 measurements ranged from 3,730 to 50,822 gross cpm. The area consists mostly of soil and grass with gravel and concrete pavement. Areas not surveyed were due to an existing concrete vault, a building, and a ditch associated with the USEC coal stockpile. The highest measurements are where the boundary for SWMU 165 and SWMU 26 is coincident. A judgmental grab sample was collected for radiological constituents.

7.3.3 Nature and Extent of Contamination—Surface Soils

For SWMU 165, the representative data set for surface soils is presented in Tables 7.3.1 and 7.3.2 and provides the nature of the contamination in SWMU 165 surface soils. Figures 7.3.2–7.3.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

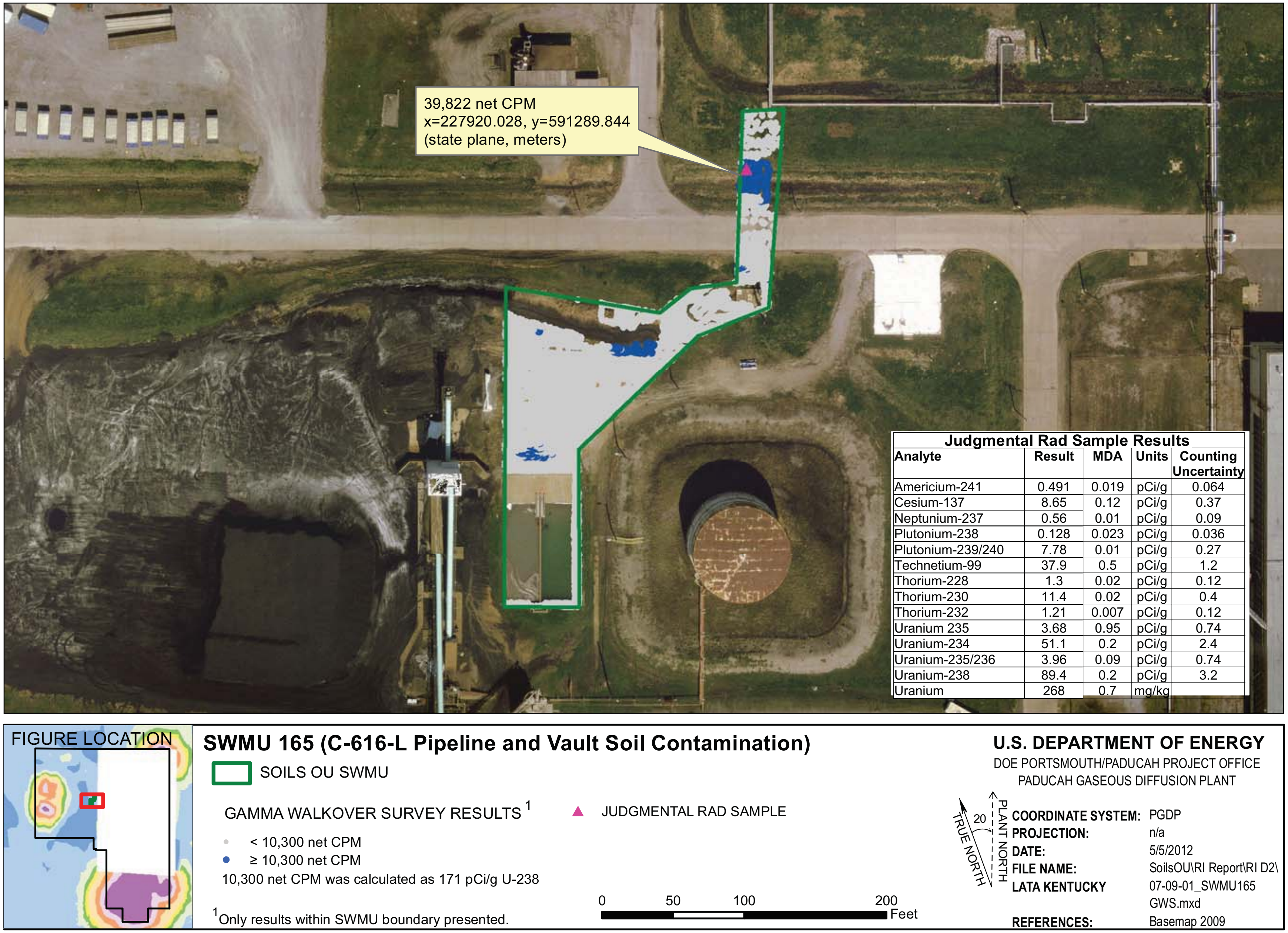
The horizontal extent of SWMU 165 surface soil contamination is considered adequately defined to support the BRA and FS. SWMU 165 consists of one EU.

<u>Metals</u>

Metals were detected above the industrial worker NALs in the SWMU 165 surface soil. The following are the metals detected above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Arsenic	2, 5, 8
Barium	2, 8
Beryllium	4
Chromium	2
Silver	5
Uranium	2, 5

* SWMU 165 consists of one EU.



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.491	0.019	pCi/g	0.064
Cesium-137	8.65	0.12	pCi/g	0.37
Neptunium-237	0.56	0.01	pCi/g	0.09
Plutonium-238	0.128	0.023	pCi/g	0.036
Plutonium-239/240	7.78	0.01	pCi/g	0.27
Technetium-99	37.9	0.5	pCi/g	1.2
Thorium-228	1.3	0.02	pCi/g	0.12
Thorium-230	11.4	0.02	pCi/g	0.4
Thorium-232	1.21	0.007	pCi/g	0.12
Uranium 235	3.68	0.95	pCi/g	0.74
Uranium-234	51.1	0.2	pCi/g	2.4
Uranium-235/236	3.96	0.09	pCi/g	0.74
Uranium-238	89.4	0.2	pCi/g	3.2
Uranium	268	0.7	mg/kg	

Figure 7.3.1. SWMU 165 Gamma Walkover Survey

Table 7.3.1. Surface Soil Historical Data Summary: SWMU 165 C-616-L Pipeline and Vault Soil Contamination

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	1.40E+00	7.46E+03	3.43E+03	0/4	4/4	0/4	1.30E+04	0/4	3.32E+04	0/4	3.97E+06	0/4	2/4	19.6 - 12700
METAL	Antimony	mg/kg	2.20E+00	2.20E+00	2.20E+00	0/4	1/4	1/4	2.10E-01	0/4	2.53E+00	0/4	1.51E+03	0/4	1/4	2.2 - 10
METAL	Arsenic	mg/kg	5.50E-01	1.30E+02	4.78E+01	0/16	15/16	12/16	1.20E+01	14/16	9.97E-01	2/16	9.97E+01	12/16	15/16	4.9 - 39.5
METAL	Barium	mg/kg	1.10E-01	1.14E+03	5.01E+02	0/15	15/15	9/15	2.00E+02	5/15	5.92E+02	0/15	3.78E+05	0/15	11/15	2.45 - 510
METAL	Beryllium	mg/kg	1.10E-01	1.08E+00	4.52E-01	0/4	4/4	1/4	6.70E-01	4/4	1.40E-02	0/4	9.22E+00	0/4	0/4	0.22 - 5.7
METAL	Cadmium	mg/kg	2.20E-01	2.20E-01	2.20E-01	0/16	2/16	2/16	2.10E-01	0/16	3.16E+00	0/16	3.16E+02	0/16	0/16	0.22 - 2
METAL	Calcium	mg/kg	3.30E-01	8.30E+04	2.77E+04	0/3	3/3	0/3	2.00E+05	0/3	n/a	0/3	n/a	n/a	n/a	980 - 168000
METAL	Chromium	mg/kg	2.20E-01	6.66E+01	2.69E+01	0/16	16/16	9/16	1.60E+01	4/16	3.02E+01	0/16	3.02E+03	0/16	0/16	2.45 - 23.6
METAL	Cobalt	mg/kg	3.30E-01	5.60E+00	2.09E+00	0/3	3/3	0/3	1.40E+01	0/3	1.05E+01	0/3	1.52E+03	1/3	3/3	0.97 - 16
METAL	Copper	mg/kg	2.20E-01	6.60E+01	2.66E+01	1/4	4/4	2/4	1.90E+01	0/4	1.43E+03	0/4	2.24E+05	0/4	1/4	1.6 - 82.9
METAL	Iron	mg/kg	2.20E-01	1.34E+04	6.53E+03	0/4	4/4	0/4	2.80E+04	0/4	2.51E+04	0/4	3.92E+06	2/4	2/4	19.6 - 9580
METAL	Lead	mg/kg	2.20E-01	5.15E+01	2.31E+01	0/16	11/16	3/16	3.60E+01	0/16	4.00E+02	0/16	4.00E+02	0/16	5/16	5.6 - 20
METAL	Magnesium	mg/kg	1.90E+00	4.41E+03	1.47E+03	0/3	3/3	0/3	7.70E+03	0/3	n/a	0/3	n/a	n/a	n/a	4.9 - 3500
METAL	Manganese	mg/kg	1.10E-01	4.34E+02	1.80E+02	0/4	4/4	0/4	1.50E+03	0/4	2.58E+03	0/4	1.16E+05	2/4	2/4	2.45 - 183
METAL	Mercury	mg/kg	1.50E-01	9.00E-01	5.77E-01	0/15	5/15	4/15	2.00E-01	0/15	9.00E-01	0/15	7.85E+02	0/15	5/15	0.07 - 0.2
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.79E+02	0/1	2.80E+04	0/1	0/1	4.9 - 4.9
METAL	Nickel	mg/kg	4.40E-01	3.92E+01	2.64E+01	0/16	16/16	10/16	2.10E+01	0/16	4.28E+01	0/16	3.18E+04	0/16	14/16	1.3 - 25.9
METAL	Selenium	mg/kg	1.10E-01	1.25E+01	4.17E+00	0/16	14/16	12/16	8.00E-01	0/16	1.79E+02	0/16	2.80E+04	0/16	12/16	1.7 - 20
METAL	Silver	mg/kg	2.20E-01	8.33E+01	4.08E+01	0/16	7/16	6/16	2.30E+00	4/16	1.08E+01	0/16	9.15E+03	6/16	7/16	0.22 - 2.5
METAL	Sodium	mg/kg	1.50E+00	3.33E+02	1.12E+02	0/3	3/3	1/3	3.20E+02	0/3	n/a	0/3	n/a	n/a	n/a	69 - 352
METAL	Thallium	mg/kg	1.10E-01	1.10E-01	1.10E-01	0/12	2/12	0/12	2.10E-01	0/12	2.87E+00	0/12	4.48E+02	0/12	0/12	0.28 - 19.6
METAL	Uranium	mg/kg	4.00E+00	1.87E+02	3.16E+01	0/9	9/9	6/9	4.90E+00	1/9	1.07E+02	0/9	1.65E+04	0/9	3/9	0.12 - 100
METAL	Vanadium	mg/kg	1.10E-01	2.47E+01	9.88E+00	0/4	4/4	0/4	3.80E+01	2/4	1.51E-01	0/4	9.30E+01	2/4	4/4	2.45 - 74.5
METAL	Zinc	mg/kg	1.10E-01	1.22E+02	4.07E+01	0/3	3/3	1/3	6.50E+01	0/3	1.08E+04	0/3	1.68E+06	0/3	1/3	10.4 - 33.2
PPCB	Total PCB	mg/kg	2.00E-01	5.10E+01	3.62E+00	0/196	34/196	0/196	n/a	34/196	1.88E-01	1/196	1.88E+01	8/196	34/196	0.1 - 2
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	-
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	-
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	-
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	2-Methylnaphthalene	mg/kg	3.70E-01	3.70E-01	3.70E-01	0/2	1/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.62 - 0.62
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.30E+00	0/2	3.91E+01	0/2	0/2	-
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Acenaphthene	mg/kg	3.70E-01	3.70E-01	3.70E-01	1/6	1/6	0/6	n/a	0/6	6.02E+02	0/6	1.81E+04	0/6	1/6	0.11 - 0.5
SVOA	Acenaphthylene	mg/kg	3.60E-01	3.60E-01	3.60E-01	1/6	1/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.043 - 0.5
SVOA	Anthracene	mg/kg	3.60E-01	6.30E-01	4.53E-01	1/6	3/6	0/6	n/a	0/6	4.05E+03	0/6	1.22E+05	0/6	0/6	0.096 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.3.1. Surface Soil Historical Data Summary: SWMU 165 C-616-L Pipeline and Vault Soil Contamination (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzo(ghi)perylene	mg/kg	3.70E-01	9.30E-01	6.27E-01	2/6	3/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.27 - 0.93
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	-
SVOA	Butyl benzyl phthalate	mg/kg	3.60E-01	3.60E-01	3.60E-01	1/2	1/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.071 - 0.071
SVOA	Carbazole	mg/kg	3.70E-01	3.70E-01	3.70E-01	1/2	1/2	0/2	n/a	0/2	2.75E+01	0/2	2.75E+03	n/a	n/a	0.12 - 0.12
SVOA	Dibenzofuran	mg/kg	3.70E-01	3.70E-01	3.70E-01	1/2	1/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.28 - 0.28
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Di-n-butyl phthalate	mg/kg	3.60E-01	3.70E-01	3.65E-01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.45 - 0.91
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Fluoranthene	mg/kg	3.60E-01	4.00E+00	1.40E+00	0/6	4/6	0/6	n/a	0/6	6.01E+02	0/6	1.80E+04	0/6	1/6	0.47 - 0.91
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.87E+02	0/6	1.46E+04	0/6	0/6	0.47 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.17E-01	0/2	1.17E+01	0/2	0/2	-
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Naphthalene	mg/kg	3.70E-01	4.70E+00	2.26E+00	0/6	3/6	0/6	n/a	1/6	2.24E+00	0/6	2.24E+02	3/6	3/6	0.47 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.22E-02	0/2	5.22E+00	0/2	0/2	-
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	-
SVOA	Phenanthrene	mg/kg	3.60E-01	3.80E+00	2.03E+00	2/6	4/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.097 - 1.3
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Pyrene	mg/kg	3.60E-01	2.90E+00	1.12E+00	1/6	4/6	0/6	n/a	0/6	4.49E+02	0/6	1.35E+04	0/6	2/6	0.34 - 0.82
SVOA	Total PAH	mg/kg	4.36E-01	1.87E+00	1.10E+00	0/20	4/20	0/20	n/a	4/20	5.92E-02	0/20	5.92E+00	4/20	4/20	2 - 20
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.005 - 0.011
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.008 - 0.011
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.008 - 0.011
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.008 - 0.011
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.89E-02	0/6	5.53E+00	0/6	0/6	0.008 - 0.011
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.008 - 0.011
VOA	1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	5.48E+00	0/4	1.76E+02	0/4	0/4	0.008 - 0.011
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.008 - 0.011
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	-
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.015 - 0.021
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.015 - 0.021
VOA	Acetone	mg/kg	1.10E-01	1.10E-01	1.10E-01	1/6	1/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.015 - 0.091
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	6.98E-01	0/6	8.22E+01	0/6	0/6	0.008 - 0.011
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.008 - 0.011

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.3.1. Surface Soil Historical Data Summary: SWMU 165 C-616-L Pipeline and Vault Soil Contamination (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.008 - 0.011
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.015 - 0.021
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.008 - 0.011
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.97E-01	0/6	5.76E+01	0/6	0/6	0.008 - 0.011
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.008 - 0.011
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.015 - 0.021
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	2.42E-01	0/6	2.49E+01	0/6	0/6	0.008 - 0.011
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.015 - 0.021
VOA	*cis* -1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.008 - 0.011
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.008 - 0.011
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	3.29E+00	0/6	3.84E+02	0/6	0/6	0.008 - 0.011
VOA	Methylene chloride	mg/kg	5.00E-03	6.00E-03	5.50E-03	0/6	2/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	2/6	0.008 - 0.035
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.008 - 0.011
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	2.82E-01	0/6	7.08E+01	0/6	0/6	0.008 - 0.011
VOA	Toluene	mg/kg	7.00E-02	2.10E-01	1.40E-01	0/6	2/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.008 - 0.008
VOA	Total Xylene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	3.50E+01	0/6	1.07E+03	0/6	0/6	0.008 - 0.011
VOA	*trans* -1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.008 - 0.011
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	4.69E-02	0/7	4.98E+00	0/7	0/7	0.005 - 0.011
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.015 - 0.021
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	2.04E-01	0/4	4.83E+01	0/4	0/4	0.015 - 0.021
RADS	Americium-241	pCi/g	-1.29E-02	1.38E-01	6.26E-02	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	1/2	0.02 - 0.0452
RADS	Cesium-137	pCi/g	-1.45E-02	2.13E+00	1.06E+00	0/2	2/2	1/2	4.90E-01	1/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.03 - 0.0336
RADS	Cobalt-60	pCi/g	-1.42E-02	-1.42E-02	-1.42E-02	0/1	1/1	0/1	n/a	0/1	1.77E-02	0/1	1.77E+00	0/1	0/1	0.01 - 0.01
RADS	Neptunium-237	pCi/g	6.00E-02	5.27E-01	3.28E-01	0/5	5/5	4/5	1.00E-01	3/5	2.71E-01	0/5	2.71E+01	3/5	5/5	0.00031 - 0.5
RADS	Plutonium-238	pCi/g	1.00E-02	1.22E-02	1.11E-02	1/2	2/2	0/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.00026 - 0.05
RADS	Plutonium-239	pCi/g	1.00E-03	3.90E-01	1.96E-01	0/2	2/2	1/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	1/2	0.001 - 0.1
RADS	Plutonium-239/240	pCi/g	9.63E-03	1.01E+00	5.10E-01	0/2	2/2	1/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	1/2	0.02 - 0.023
RADS	Technetium-99	pCi/g	5.30E-01	6.00E+01	2.72E+01	0/5	5/5	4/5	2.50E+00	0/5	3.61E+02	0/5	3.61E+04	4/5	5/5	0.00083 - 3
RADS	Thorium-228	pCi/g	2.70E-01	3.91E-01	3.31E-01	1/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.00297 - 0.15
RADS	Thorium-230	pCi/g	2.20E-01	8.73E+00	2.80E+00	1/5	5/5	2/5	1.50E+00	0/5	1.38E+01	0/5	1.38E+03	0/5	4/5	0.00332 - 0.302
RADS	Thorium-232	pCi/g	2.20E-01	4.07E-01	3.14E-01	1/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.00348 - 0.03
RADS	Uranium-234	pCi/g	1.00E-02	1.40E+02	2.84E+01	0/6	6/6	3/6	1.20E+00	1/6	1.89E+01	0/6	1.89E+03	0/6	0/6	0.00145 - 10
RADS	Uranium-235	pCi/g	0.00E+00	4.70E+00	1.16E+00	0/6	6/6	4/6	6.00E-02	3/6	3.95E-01	0/6	3.95E+01	0/6	0/6	0.00012 - 0.7

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.3.1. Surface Soil Historical Data Summary: SWMU 165 C-616-L Pipeline and Vault Soil Contamination (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
RADS	Uranium-238	pCi/g	1.00E-02	1.50E+02	3.20E+01	0/6	6/6	4/6	1.20E+00	4/6	1.70E+00	0/6	1.70E+02	0/6	3/6	0.00237 - 10

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.3.2. Surface Soil RI Data Summary: SWMU 165 C-616-L Pipeline and Vault Soil Contamination

Type	Analysis	Unit	Detected Results*			J-qualified	FOD	Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD		FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Uranium	mg/kg	2.68E+02	2.68E+02	2.68E+02	0/1	1/1	1/1	4.90E+00	1/1	1.07E+02	0/1	1.65E+04	0/1	1/1	0.7 - 0.7
RADS	Alpha activity	pCi/g	1.06E+02	1.06E+02	1.06E+02	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	6 - 6
RADS	Americium-241	pCi/g	4.91E-01	4.91E-01	4.91E-01	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	1/1	0.019 - 0.019
RADS	Beta activity	pCi/g	1.75E+02	1.75E+02	1.75E+02	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3 - 3
RADS	Cesium-137	pCi/g	8.65E+00	8.65E+00	8.65E+00	0/1	1/1	1/1	4.90E-01	1/1	8.61E-02	1/1	8.61E+00	0/1	1/1	0.12 - 0.12
RADS	Neptunium-237	pCi/g	5.60E-01	5.60E-01	5.60E-01	0/1	1/1	1/1	1.00E-01	1/1	2.71E-01	0/1	2.71E+01	1/1	1/1	0.01 - 0.01
RADS	Plutonium-238	pCi/g	1.28E-01	1.28E-01	1.28E-01	0/1	1/1	1/1	7.30E-02	0/1	1.09E+01	0/1	1.09E+03	0/1	1/1	0.023 - 0.023
RADS	Plutonium-239/240	pCi/g	7.78E+00	7.78E+00	7.78E+00	0/1	1/1	1/1	2.50E-02	0/1	1.07E+01	0/1	1.07E+03	1/1	1/1	0.01 - 0.01
RADS	Technetium-99	pCi/g	3.79E+01	3.79E+01	3.79E+01	0/1	1/1	1/1	2.50E+00	0/1	3.61E+02	0/1	3.61E+04	1/1	1/1	0.5 - 0.5
RADS	Thorium-228	pCi/g	1.30E+00	1.30E+00	1.30E+00	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	1.14E+01	1.14E+01	1.14E+01	0/1	1/1	1/1	1.50E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	1.21E+00	1.21E+00	1.21E+00	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.007 - 0.007
RADS	Uranium-234	pCi/g	5.11E+01	5.11E+01	5.11E+01	0/1	1/1	1/1	1.20E+00	1/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.2 - 0.2
RADS	Uranium-235/236	pCi/g	3.96E+00	3.96E+00	3.96E+00	0/1	1/1	1/1	6.00E-02	1/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.09 - 0.09
RADS	Uranium-238	pCi/g	8.94E+01	8.94E+01	8.94E+01	0/1	1/1	1/1	1.20E+00	1/1	1.70E+00	0/1	1.70E+02	0/1	1/1	0.2 - 0.2

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

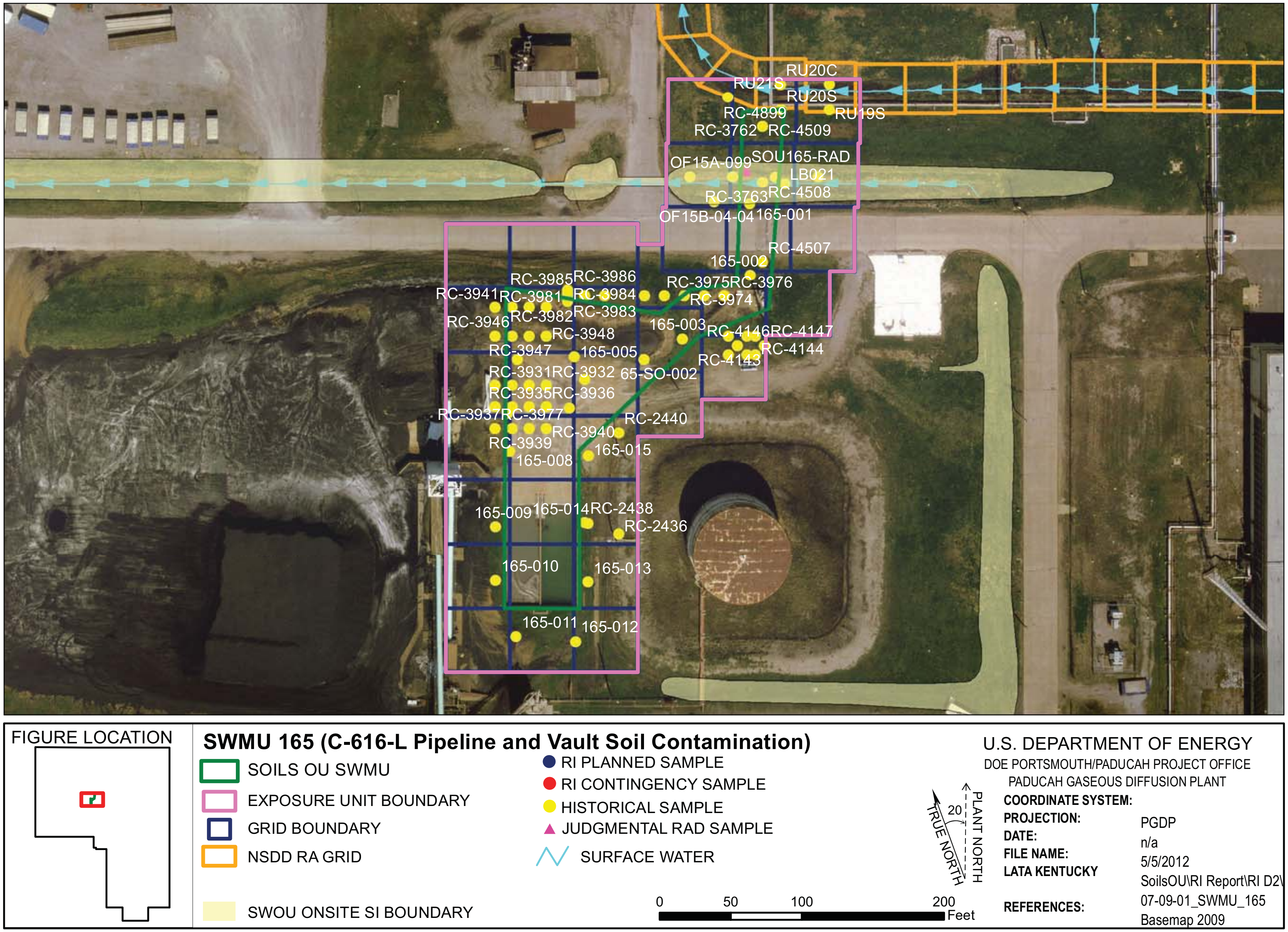


Figure 7.3.2. SWMU 165 Sample Locations - Surface Soil

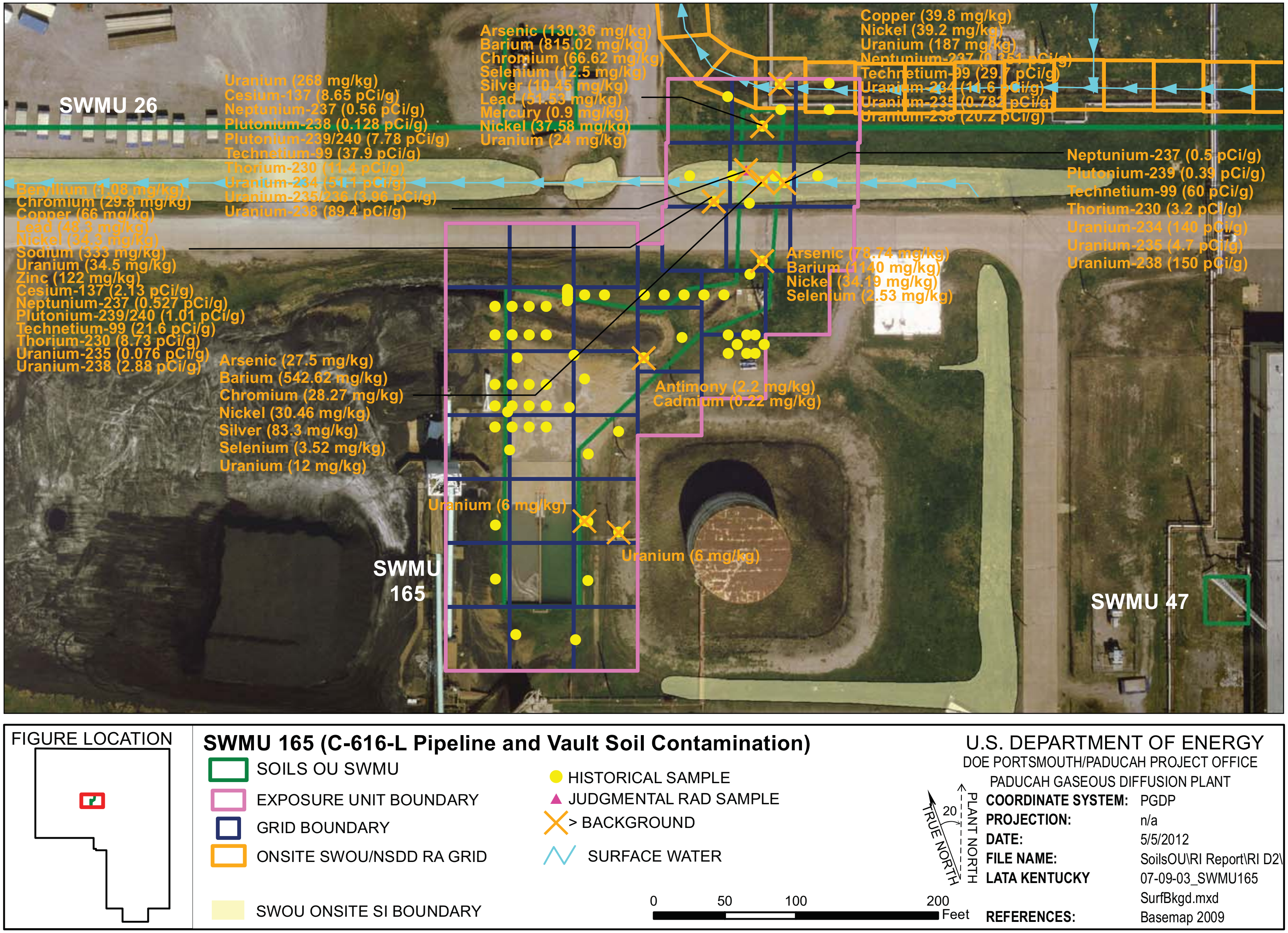


Figure 7.3.3. SWMU 165 Background Exceedances - Surface Soil

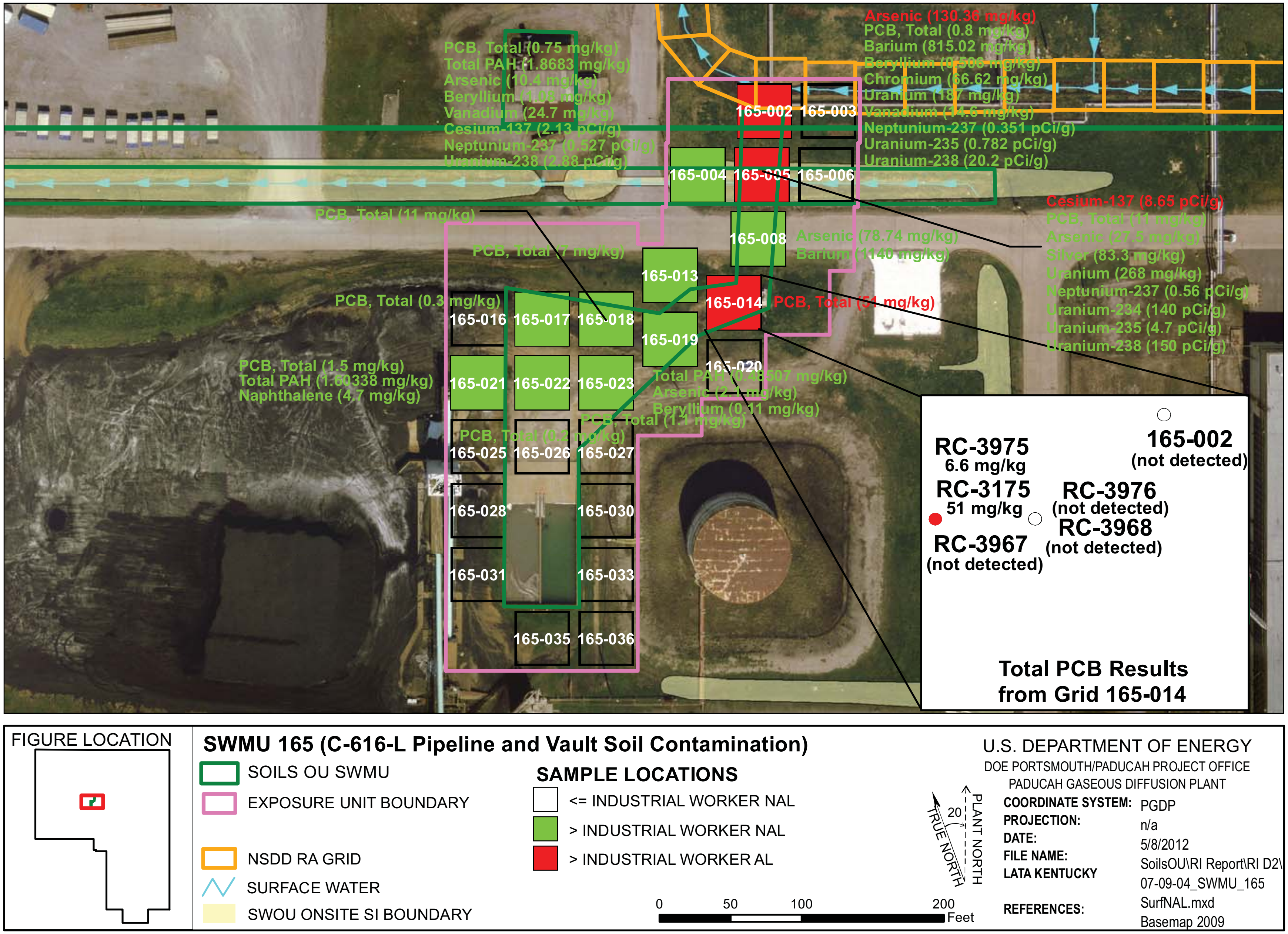


Figure 7.3.4. SWMU 165 NAL Exceedances - Surface Soil

Arsenic was detected above both the background screening level and the industrial worker AL in the surface soil of grid 2. Grid 2 is located on the northern border of SWMU 165. It is bound to the north by the NSDD remedial action as noted in the *Remedial Action Completion Report for the North-South Diversion Ditch Sections 1 & 2 At the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 2005).

The following are the metals detected in the SWMU 165 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	19
Arsenic	2, 5, 8
Barium	2, 5, 8
Copper	4
Lead	2, 4
Mercury	2
Nickel	2, 4, 5, 8
Selenium	2, 5, 8
Silver	2, 5
Uranium	2, 4, 5
Zinc	4

* SWMU 165 consists of one EU.

Arsenic (grids 2, 5, and 8) and silver (grids 2 and 5) were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the industrial worker NAL in the surface soil of the following grids: 2, 4, 5, 13, 14, 17, 18, 19, 21, 22, and 23.

Grids 2, 4, 13, 14, 17, 18, 21, and 23 are located on the border of the area sampled for SWMU 165.

Total PCBs were detected above the industrial worker AL in the surface soil of grid 14. Grid 14 is located on the eastern border of the SWMU 165 sampling area; however, more than one sample from grid 14 was analyzed for PCBs. The sample that exceeded the industrial worker AL was collected from the western border of grid 14. Additional samples collected within grid 14 to the east of the PCB industrial worker AL exceedance were nondetect for PCBs.

Total PCBs were detected in grids 2, 4, 5, 13, 14, 17, 18, 21, 22, and 23 surface soils above the SSLs for the protection of UCRS groundwater. Total PCBs were detected in grids 5, 13, 14, and 18 surface soils above the SSLs for the protection of RGA groundwater.

SVOCs

Naphthalene was detected above the industrial worker NAL in the surface soil of grid 21, and Total PAHs were detected above the industrial worker NAL in the surface soil of grids 4, 19, and 21.

Grids 4, 19, and 21 are located on the border of the area sampled for SWMU 165.

The following SVOCs were detected above the SSLs for the protection of UCRS groundwater.

SVOC	Grid
Acenaphthene	19
Fluoranthene	4
Naphthalene	4, 19, 21
Pyrene	4, 21
Total PAHs	4, 19, 21

* SWMU 165 consists of one EU.

Naphthalene and Total PAHs in grids 4, 19, and 21 were detected above the SSL for the protection of RGA groundwater.

VOCs

No VOCs were detected above the industrial worker NALs or ALs in the SWMU 165 surface soil. Methylene chloride in grid 19 was detected above the SSLs for the protection of UCRS groundwater. No VOCs were detected above the SSLs for the protection of RGA groundwater.

Radionuclides

Radionuclides were detected above the industrial worker NALs in the SWMU 165 surface soil. The following are the radionuclides detected above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Radionuclide	Grid
Cesium-137	4, 5
Neptunium-237	2, 4, 5
Uranium-234	5
Uranium-235/236	2, 5
Uranium-238	2, 4, 5

* SWMU 165 consists of one EU.

Cesium-137 was detected above both the background screening level and the industrial worker AL in the surface soil of grid 5.

The following are the radionuclides detected above both the background screening levels and the SSLs for the protection of the UCRS groundwater and the grids in which they were detected.

Radionuclide	Grid
Americium-241[1]	4, 5
Cesium-137	5
Neptunium-237	2, 4, 5
Plutonium-238	5
Plutonium-239/240	4, 5
Technetium-99	2, 4, 5
Thorium-230	4, 5
Uranium-238	2, 5

* SWMU 165 consists of one EU.
[1] No background value is available.

Plutonium-239/240 in grid 5 and neptunium-237 and technetium-99 in grids 2, 4, and 5 were detected above both the background screening levels and the SSLs for the protection of the RGA groundwater.

7.3.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 165, the representative data set for subsurface soils is presented in Table 7.3.3–7.3.4 and provides the nature of the contamination in SWMU 165 subsurface soils. Figures 7.3.5–7.3.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 165 subsurface soil contamination is considered adequately defined to support the BRA and FS. SWMU 165 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 165 subsurface soil. The following are the metals detected above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Beryllium	19
Cobalt	19

* SWMU 165 consists of one EU.

The maximum depth at which a metal was detected (in samples associated with this RI Report) above both the background screening levels and the industrial worker NALs was 14 ft bgs. The end depth of the borehole was 14 ft bgs.

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 165 subsurface soil.

The following metals were detected in the SWMU 165 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater: aluminum, antimony, and cobalt in grid 19. Cobalt in grid 19 was detected above both the background screening level and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the industrial worker NAL in the subsurface soil of grid 21. The detection was at 1.5 ft bgs, and the end depth of the borehole was 1.5 ft bgs. Grid 21 is located on the border of the area sampled for SWMU 165.

PCBs were not detected above the industrial work AL in the SWMU 165 subsurface soil.

Total PCBs in grid 19 were detected above the SSLs for the protection of UCRS groundwater. PCBs were not detected above the SSL for the protection of RGA groundwater in the SWMU 165 subsurface soil.

SVOCs

No SVOCs were detected above the industrial worker NALs or ALs in the SWMU 165 subsurface soil.

Table 7.3.3. Subsurface Soil Historical Data Summary: SWMU 165 C-616-L Pipeline and Vault Soil Contamination

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	1.10E+00	1.30E+04	5.28E+03	0/8	8/8	2/8	1.20E+04	0/8	3.32E+04	0/8	3.97E+06	0/8	4/8	6910 - 7970
METAL	Antimony	mg/kg	2.20E+00	2.20E+00	2.20E+00	0/9	1/9	1/9	2.10E-01	0/9	2.53E+00	0/9	1.51E+03	0/9	1/9	2.2 - 2.8
METAL	Arsenic	mg/kg	1.10E-01	5.00E+00	1.93E+00	0/9	9/9	0/9	7.90E+00	4/9	9.97E-01	0/9	9.97E+01	0/9	5/9	1.7 - 7.1
METAL	Barium	mg/kg	1.10E-01	1.40E+02	4.78E+01	0/9	9/9	0/9	1.70E+02	0/9	5.92E+02	0/9	3.78E+05	0/9	3/9	38.7 - 87.8
METAL	Beryllium	mg/kg	1.10E-01	8.00E-01	3.37E-01	0/9	9/9	1/9	6.90E-01	9/9	1.40E-02	0/9	9.22E+00	0/9	0/9	0.45 - 0.64
METAL	Cadmium	mg/kg	2.20E-01	3.20E-01	2.70E-01	0/9	2/9	2/9	2.10E-01	0/9	3.16E+00	0/9	3.16E+02	0/9	0/9	0.22 - 0.38
METAL	Calcium	mg/kg	2.20E-01	1.59E+04	2.14E+03	0/9	9/9	1/9	6.10E+03	0/9	n/a	0/9	n/a	n/a	n/a	825 - 40000
METAL	Chromium	mg/kg	2.20E-01	2.39E+01	8.17E+00	0/9	9/9	0/9	4.30E+01	0/9	3.02E+01	0/9	3.02E+03	0/9	0/9	10 - 12.5
METAL	Cobalt	mg/kg	2.20E-01	1.31E+01	4.63E+00	0/9	9/9	1/9	1.30E+01	2/9	1.05E+01	0/9	1.52E+03	4/9	9/9	4.3 - 7.6
METAL	Copper	mg/kg	2.20E-01	1.18E+01	4.81E+00	0/9	9/9	0/9	2.50E+01	0/9	1.43E+03	0/9	2.24E+05	0/9	0/9	2 - 8.5
METAL	Iron	mg/kg	2.20E-01	2.14E+04	8.20E+03	0/9	9/9	0/9	2.80E+04	0/9	2.51E+04	0/9	3.92E+06	4/9	4/9	11300 - 21000
METAL	Lead	mg/kg	5.30E-01	1.17E+01	4.10E+00	0/9	9/9	0/9	2.30E+01	0/9	4.00E+02	0/9	4.00E+02	0/9	0/9	2.7 - 10.2
METAL	Magnesium	mg/kg	1.90E+00	2.04E+03	6.68E+02	0/9	9/9	0/9	2.10E+03	0/9	n/a	0/9	n/a	n/a	n/a	685 - 7150
METAL	Manganese	mg/kg	1.10E-01	6.96E+02	2.58E+02	0/9	9/9	0/9	8.20E+02	0/9	2.58E+03	0/9	1.16E+05	4/9	4/9	131 - 408
METAL	Mercury	mg/kg	9.70E-02	9.70E-02	9.70E-02	0/9	1/9	0/9	1.30E-01	0/9	9.00E-01	0/9	7.85E+02	0/9	0/9	0.09 - 0.12
METAL	Nickel	mg/kg	4.50E-01	1.61E+01	5.76E+00	0/9	9/9	0/9	2.20E+01	0/9	4.28E+01	0/9	3.18E+04	0/9	4/9	5 - 10.1
METAL	Selenium	mg/kg	1.10E-01	4.50E-01	2.80E-01	0/9	2/9	0/9	7.00E-01	0/9	1.79E+02	0/9	2.80E+04	0/9	1/9	0.11 - 0.45
METAL	Silver	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	2.70E+00	0/9	1.08E+01	0/9	9.15E+03	0/9	0/9	0.22 - 0.22
METAL	Sodium	mg/kg	1.60E+00	5.73E+02	1.30E+02	0/9	9/9	1/9	3.40E+02	0/9	n/a	0/9	n/a	n/a	n/a	99.6 - 194
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	3.40E-01	0/9	2.87E+00	0/9	4.48E+02	0/9	0/9	0.11 - 0.11
METAL	Vanadium	mg/kg	1.10E-01	3.48E+01	1.33E+01	0/9	9/9	0/9	3.70E+01	4/9	1.51E-01	0/9	9.30E+01	4/9	9/9	17 - 23.1
METAL	Zinc	mg/kg	1.10E-01	3.48E+01	1.14E+01	0/9	8/9	0/9	6.00E+01	0/9	1.08E+04	0/9	1.68E+06	0/9	3/9	11.5 - 31.5
PPCB	Total PCB	mg/kg	3.00E-01	3.00E-01	3.00E-01	0/28	1/28	0/28	n/a	1/28	1.88E-01	0/28	1.88E+01	0/28	1/28	0.002 - 0.21
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	0/11	0.41 - 0.66
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	0/11	0.005 - 0.66
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.005 - 0.66
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	0/11	0.005 - 0.66
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.66 - 2.2
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	2.1 - 3.3
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	2.1 - 3.3
SVOA	2-Methylnaphthalene	mg/kg	3.70E-01	3.80E-01	3.75E-01	2/11	2/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.059 - 1.3
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	1.30E+00	0/11	3.91E+01	0/11	0/11	2.1 - 3.3
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.82 - 1.3
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	2.1 - 3.3
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 1.3
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	2.1 - 3.3
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	6.02E+02	0/11	1.81E+04	0/11	0/11	0.41 - 0.66
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	n/a	0/8	n/a	n/a	n/a	0.41 - 0.66
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	4.05E+03	0/11	1.22E+05	0/11	0/11	0.41 - 0.66
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.44
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.1 - 2.2

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.3.3. Subsurface Soil Historical Data Summary: SWMU 165 C-616-L Pipeline and Vault Soil Contamination (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	n/a	0/8	n/a	n/a	n/a	0.41 - 0.66
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	3.80E-01	1.10E+00	6.98E-01	2/11	4/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	0/11	0.085 - 0.66
SVOA	Butyl benzyl phthalate	mg/kg	3.80E-01	3.80E-01	3.80E-01	1/11	1/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.28 - 0.66
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	2.75E+01	0/9	2.75E+03	n/a	n/a	0.66 - 0.66
SVOA	Dibenzofuran	mg/kg	3.80E-01	3.80E-01	3.80E-01	1/11	1/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.077 - 0.66
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	Di-n-butyl phthalate	mg/kg	8.40E-02	4.10E-01	2.87E-01	7/11	8/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.1 - 0.66
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	Fluoranthene	mg/kg	3.70E-01	3.80E-01	3.75E-01	2/11	2/11	0/11	n/a	0/11	6.01E+02	0/11	1.80E+04	0/11	0/11	0.048 - 0.66
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	4.87E+02	0/11	1.46E+04	0/11	0/11	0.41 - 0.66
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	1.17E-01	0/11	1.17E+01	0/11	0/11	0.41 - 0.66
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	n/a	0/8	n/a	n/a	n/a	0.41 - 0.66
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	Naphthalene	mg/kg	3.80E-01	3.80E-01	3.80E-01	1/11	1/11	0/11	n/a	0/11	2.24E+00	0/11	2.24E+02	1/11	1/11	0.17 - 0.66
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	5.22E-02	0/11	5.22E+00	0/11	0/11	0.41 - 0.66
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	Pentachlorophenol	mg/kg	2.10E+00	2.10E+00	2.10E+00	0/11	1/11	0/11	n/a	0/11	n/a	0/11	n/a	1/11	1/11	0.41 - 3.3
SVOA	Phenanthrene	mg/kg	3.70E-01	3.80E-01	3.75E-01	2/11	2/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.065 - 0.66
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.41 - 0.66
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.66 - 2.2
SVOA	Pyrene	mg/kg	3.80E-01	3.80E-01	3.80E-01	1/11	1/11	0/11	n/a	0/11	4.49E+02	0/11	1.35E+04	0/11	0/11	0.081 - 0.66
SVOA	Total PAH	mg/kg	3.84E-02	3.84E-02	3.84E-02	0/11	1/11	0/11	n/a	0/11	5.92E-02	0/11	5.92E+00	0/11	1/11	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	0/11	0.005 - 0.007
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.006 - 0.007
VOA	1,1,2-Trichloroethane	mg/kg	6.00E-03	6.00E-03	6.00E-03	1/11	1/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	1/11	0.002 - 0.007
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.005 - 0.007
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	4.89E-02	0/11	5.53E+00	0/11	0/11	0.005 - 0.007
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	0/11	0.005 - 0.007
VOA	1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	5.48E+00	0/10	1.76E+02	0/10	0/10	0.006 - 0.007
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.005 - 0.007
VOA	2-Butanone	mg/kg	5.00E-03	1.20E-01	6.25E-02	2/11	2/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.007 - 1.3
VOA	2-Chloroethyl vinyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
VOA	2-Hexanone	mg/kg	6.00E-02	6.00E-02	6.00E-02	1/11	1/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.01 - 0.02
VOA	4-Methyl-2-pentanone	mg/kg	6.00E-02	6.00E-02	6.00E-02	1/11	1/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.01 - 0.014
VOA	Acetone	mg/kg	2.10E-02	1.20E-01	9.42E-02	8/11	9/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.01 - 0.026
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	6.98E-01	0/11	8.22E+01	0/11	0/11	0.005 - 0.007
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.005 - 0.007
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.006 - 0.007
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.005 - 0.013
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.005 - 0.007
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	4.97E-01	0/11	5.76E+01	0/11	0/11	0.005 - 0.007
VOA	Chlorobenzene	mg/kg	6.00E-03	6.00E-03	6.00E-03	1/11	1/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	0/11	0.001 - 0.007
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	n/a	0/8	n/a	n/a	n/a	0.005 - 0.013
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	2.42E-01	0/11	2.49E+01	0/11	0/11	0.005 - 0.007
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.012 - 0.013
VOA	*cis*- 1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.74E+00	0/1	1.93E+02	0/1	0/1	0.005 - 0.005
VOA	*cis* -1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.005 - 0.007
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	0/11	0.005 - 0.007

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.3.3. Subsurface Soil Historical Data Summary: SWMU 165 C-616-L Pipeline and Vault Soil Contamination (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	Ethylbenzene	mg/kg	6.00E-03	6.00E-03	6.00E-03	1/11	1/11	0/11	n/a	0/11	3.29E+00	0/11	3.84E+02	0/11	0/11	0.001 - 0.007
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.50E+01	0/1	1.07E+03	0/1	0/1	0.005 - 0.005
VOA	Methylene chloride	mg/kg	6.00E-03	6.80E-02	2.25E-02	0/11	8/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	8/11	0.005 - 0.054
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	0/11	0.005 - 0.007
VOA	Tetrachloroethene	mg/kg	6.00E-03	6.00E-03	6.00E-03	1/11	1/11	0/11	n/a	0/11	2.82E-01	0/11	7.08E+01	0/11	1/11	0.001 - 0.007
VOA	Toluene	mg/kg	6.00E-03	6.00E-03	6.00E-03	0/11	2/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	0/11	0.005 - 0.043
VOA	Total Xylene	mg/kg	6.00E-03	6.00E-03	6.00E-03	2/11	2/11	0/11	n/a	0/11	3.50E+01	0/11	1.07E+03	0/11	0/11	0.005 - 0.007
VOA	*trans* -1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.07E+01	0/1	3.42E+02	0/1	0/1	0.005 - 0.005
VOA	*trans* -1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.005 - 0.007
VOA	Trichloroethene	mg/kg	6.00E-03	6.00E-03	6.00E-03	1/11	2/11	0/11	n/a	0/11	4.69E-02	0/11	4.98E+00	0/11	2/11	0.002 - 0.026
VOA	Trichlorofluoromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.005 - 0.005
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.01 - 0.013
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	2.04E-01	0/11	4.83E+01	0/11	0/11	0.005 - 0.013
RADS	Technetium-99	pCi/g	-9.00E-02	5.50E+00	2.10E+00	0/5	5/5	2/5	2.80E+00	0/5	3.61E+02	0/5	3.61E+04	0/5	4/5	0.0005 - 0.4
RADS	Uranium-233/234	pCi/g	1.10E+00	1.10E+00	1.10E+00	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.000056 - 0.000056
RADS	Uranium-234	pCi/g	1.00E-02	6.73E-01	2.57E-01	0/8	8/8	0/8	1.20E+00	0/8	1.89E+01	0/8	1.89E+03	0/8	0/8	0.00003 - 0.00129
RADS	Uranium-235	pCi/g	1.00E-02	1.60E-01	3.81E-02	0/8	8/8	1/8	6.00E-02	0/8	3.95E-01	0/8	3.95E+01	0/8	0/8	0.000022 - 0.000836
RADS	Uranium-238	pCi/g	1.00E-02	8.70E-01	2.80E-01	0/9	9/9	0/9	1.20E+00	0/9	1.70E+00	0/9	1.70E+02	0/9	0/9	0.00002 - 0.00155

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.3.4. Subsurface Soil RI Data Summary: SWMU 165 C-616-L Pipeline and Vault Soil Contamination

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range

There is no subsurface data.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

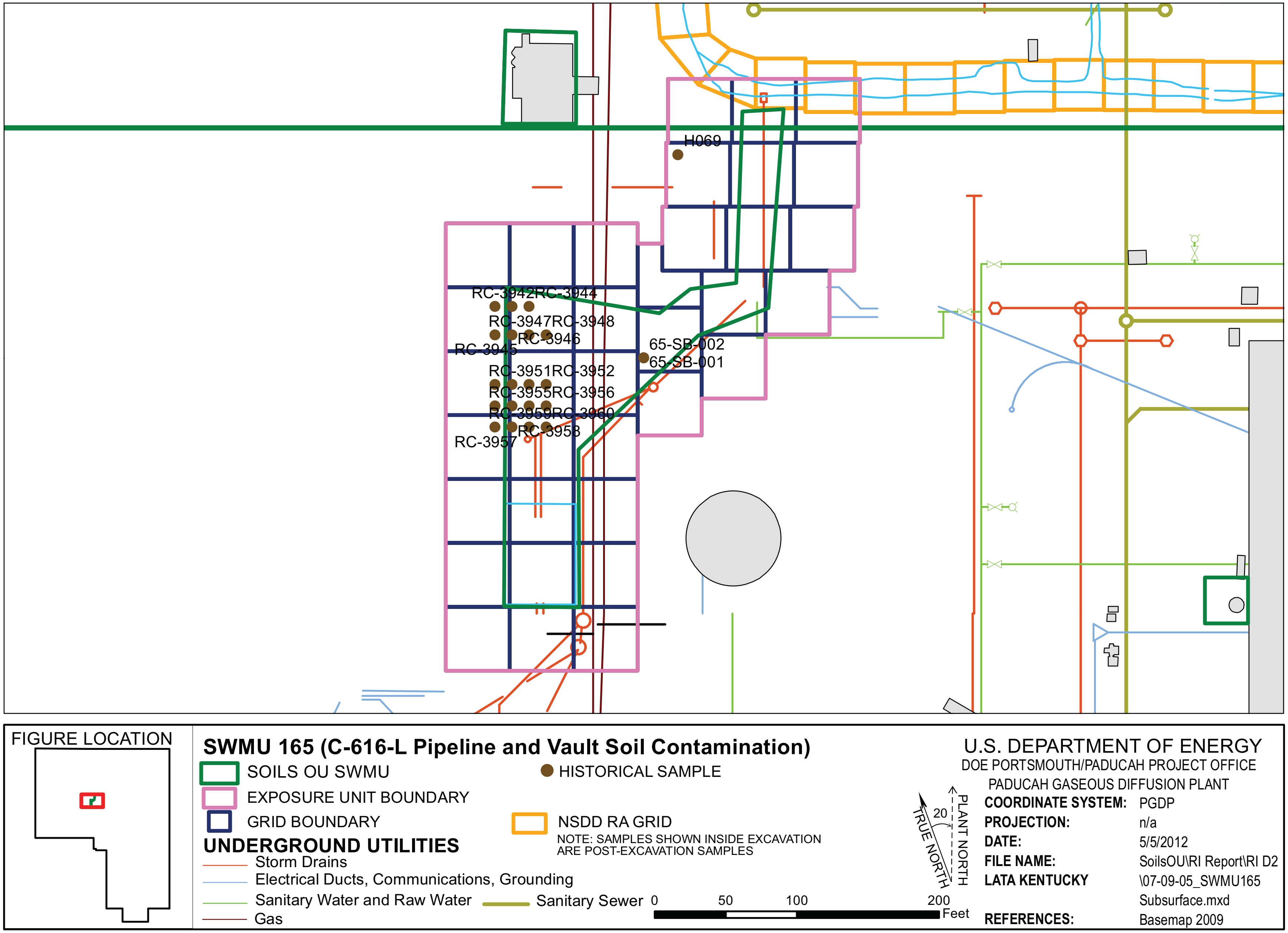


Figure 7.3.5. SWMU 165 Sample Locations - Subsurface Soil

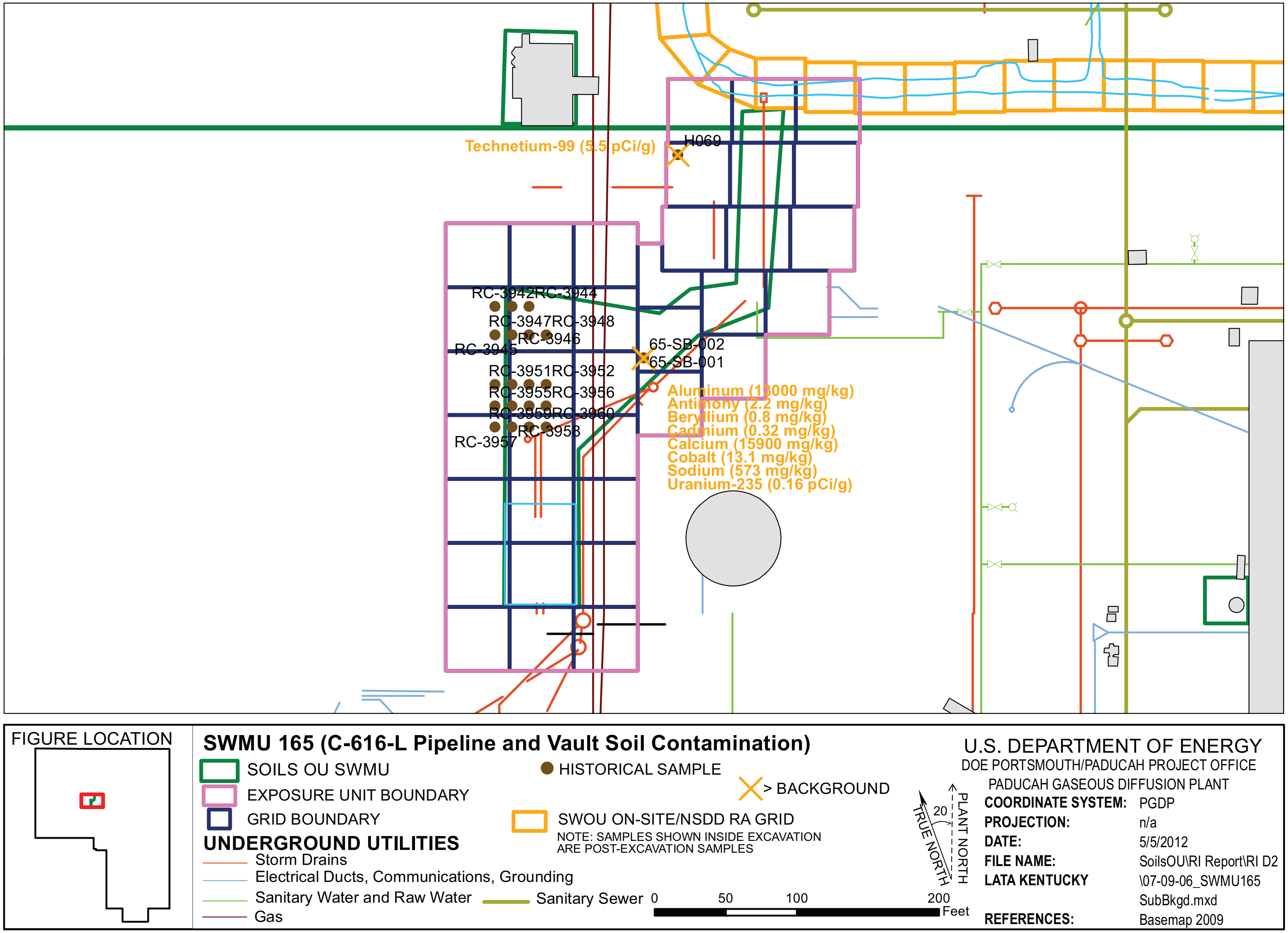


Figure 7.3.6. SWMU 165 Background Exceedances - Subsurface Soil

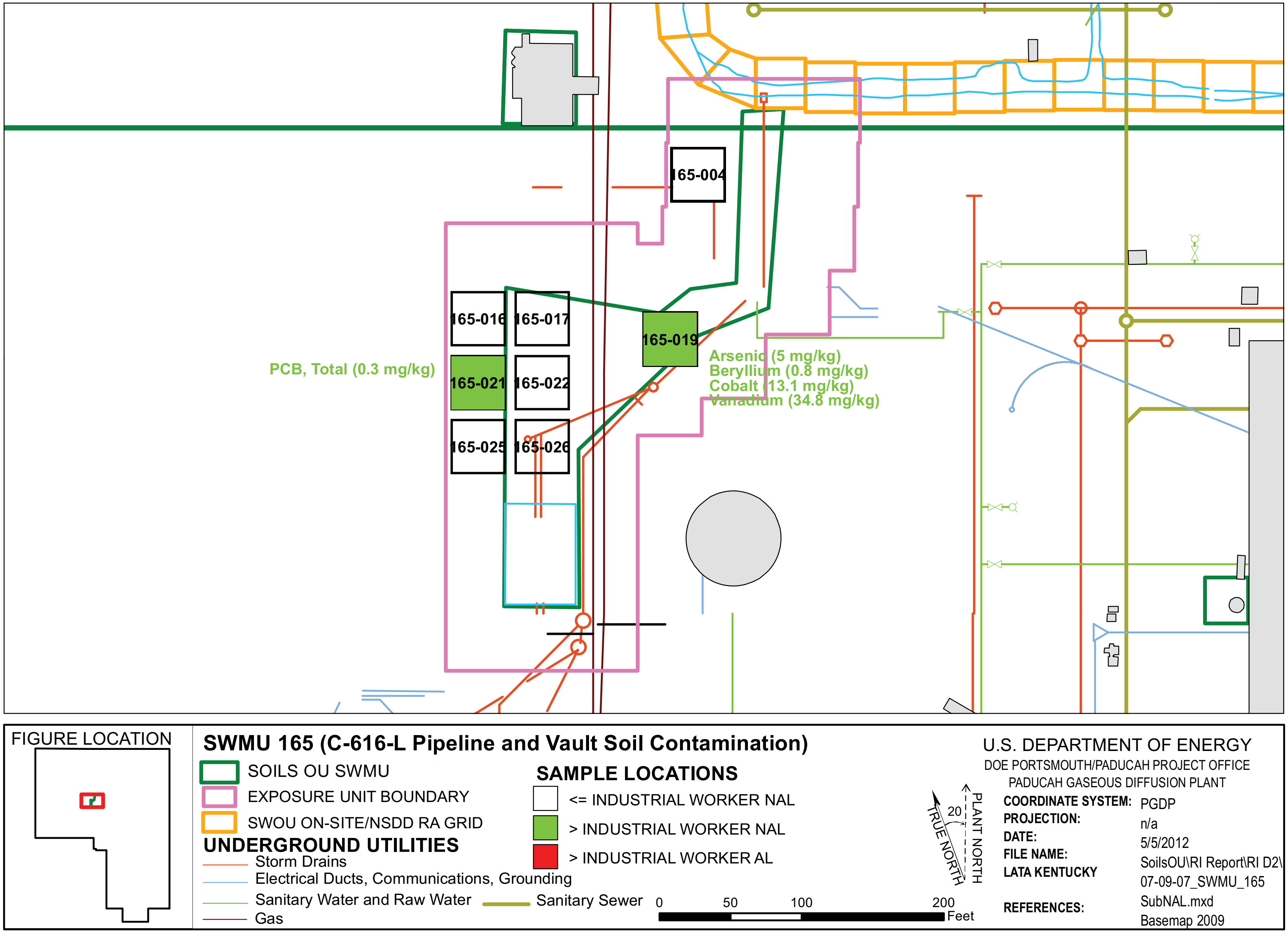


Figure 7.3.7. SWMU 165 NAL Exceedances - Subsurface Soil

Naphthalene in grid 19, pentachlorophenol in grid 4, and Total PAHs in grid 19 were detected above the SSL for the protection of UCRS groundwater. Naphthalene in grid 19 and pentachlorophenol in grid 4 were detected above the SSLs for the protection of RGA groundwater.

VOCs

No VOCs were detected above the industrial worker NALs or ALs in the SWMU 165 subsurface soil.

TCE, 1,1,2-Trichloroethane, methylene chloride, and tetrachloroethene in grid 19 were detected above the SSLs for the protection of UCRS groundwater. No VOCs were detected above the SSLs for the protection of RGA groundwater.

Radionuclides

No radionuclides were detected above both the background screening levels and the industrial worker NALs or ALs in the SWMU 165 subsurface soil.

Technetium-99 in grid 4 was detected above both the background screening level and the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

7.3.5 Fate and Transport

SESOIL and AT123D groundwater and transport modeling was conducted to determine maximum potential RGA groundwater concentrations at the SWMU 165 boundary, the DOE property boundary, and the surface water discharge location that result from residual arsenic soil constituents. Screening of the soil contaminant data (Appendix C) determined that the average soil concentrations of arsenic exceeded screening criteria. The results presented in Appendix C show that migration of arsenic at SWMU 165 is retarded in the UCRS, and this constituent does not reach the RGA in the 1,000-year simulation period.

There is potential for runoff that flows to Outfall 015, but is not considered significant due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow (DOE 2008a). Outfall 15 was sampled as part of the SWOU SI and was part of a removal action as documented in the *Removal Action Report for Contaminated Sediment Associated with the Surface Water Operable Unit (On-Site) at the Paducah Gaseous Diffusion Plant* (DOE 2011b). A remedial action for internal ditches will be addressed by the SWOU, as described in the SMP (DOE 2012a). In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

7.3.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 165 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for SWMU 165 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 7.3.5 for the future industrial worker, excavation worker, and the hypothetical resident. Table 7.3.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 165 include metals, PCBs, and VOCs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 7.3.6.

Table 7.3.5. RGOs for SWMU 165

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	**COC**	**EPC[1]**	**Units**	**ELCR[2]**	**1 x 10^{-6}**	**1 x 10^{-5}**	**1 x 10^{-4}**	**HI[4]**	**0.1**	**1**	**3**
Future Industrial Worker											
1	Arsenic	6.35E+01	mg/kg	6.4E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Cesium-137	3.47E+00	pCi/g	4.0E-05	8.61E-02	8.61E-01	8.61E+00	n/a	n/a	n/a	n/a
	Chromium	3.74E+01	mg/kg	1.2E-06	3.02E+01	3.02E+02	3.02E+03	< 0.1	n/a	n/a	n/a
	Neptunium-237	4.26E-01	pCi/g	1.6E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	Total PCB	8.27E+00	mg/kg	4.4E-05	1.88E-01	1.88E+00	1.88E+01	< 0.1	n/a	n/a	n/a
	Total PAH	1.87E+00	mg/kg	3.2E-05	5.92E-02	5.92E-01	5.92E+00	< 0.1	n/a	n/a	n/a
	Uranium-234	5.76E+01	pCi/g	3.0E-06	1.89E+01	1.89E+02	1.89E+03	n/a	n/a	n/a	n/a
	Uranium-235	2.05E+00	pCi/g	5.2E-06	3.95E-01	3.95E+00	3.95E+01	n/a	n/a	n/a	n/a
	Uranium-238	6.41E+01	pCi/g	3.8E-05	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**2.3E-04**				**< 1**			
Excavation Worker											
1	Arsenic	6.37E+01	mg/kg	1.9E-06	3.32E+01	3.32E+02	3.32E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.9E-06**				**< 1**			
Hypothetical Resident[5]											
1	Arsenic	6.35E+01	mg/kg	2.7E-04	2.35E-01	2.35E+00	2.35E+01	3.9	1.64E+00	1.64E+01	4.93E+01
	Cesium-137	3.47E+00	pCi/g	2.0E-04	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Chromium	3.74E+01	mg/kg	2.4E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Naphthalene	1.61E+00	mg/kg	1.4E-06	1.14E+00	1.14E+01	1.14E+02	< 0.1	n/a	n/a	n/a
	Neptunium-237	4.26E-01	pCi/g	7.9E-06	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Total PCB	8.27E+00	mg/kg	1.3E-04	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Plutonium-239/240	2.81E+00	pCi/g	1.0E-06	2.78E+00	2.78E+01	2.78E+02	n/a	n/a	n/a	n/a
	Thorium-230	6.02E+00	pCi/g	1.7E-06	3.57E+00	3.57E+01	3.57E+02	n/a	n/a	n/a	n/a
	Total PAH	1.87E+00	mg/kg	9.6E-05	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	1.08E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.5	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	5.76E+01	pCi/g	1.2E-05	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	2.05E+00	pCi/g	2.6E-05	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	6.41E+01	pCi/g	1.9E-04	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**9.4E-04**				**4.3**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.42, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.42, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 7.3.6 Ecological Screening for SWMU 165

Ground Cover	Near a Surface Water Body?	Total HI (max) [a]	Priority COPECs	Background (mg/kg) [b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Mostly soil/grass with gravel and concrete pavement	Yes	2737	Antimony	2.10E-01	5.00E+00	2.70E-01	19
			PCB, Total	n/a	5.10E+01	2.00E-02	2550
			Selenium	8.00E-01	1.25E+01	5.20E-01	24
			Silver	2.30E+00	8.33E+01	4.20E+00	20
			Toluene	n/a	3.05E-01	1.00E-02	31
			Uranium	4.90E+00	2.68E+02	5.00E+00	54

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b).
n/a = not applicable

7.3.7 SWMU 165 Summary

The following text summarizes the results for SWMU 165 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

Plant processes that could have resulted in contamination at SWMU 165 are releases from the coal pile runoff lagoons. SWMU 165 is located over the groundwater contaminant plume that originates at the south end of the C-400 Building; therefore, some of the groundwater contamination, especially VOCs, may not be from SWMU 165, but from the C-400 Building, which is upgradient of SWMU 165.

COPCs for surface and subsurface soils from SWMU 165 are shown on Tables 7.3.1–7.3.4 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The COPCs identified for SWMU 165 are metals, PCBs, SVOCs, VOCs, and radionuclides in the surface and subsurface soils. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 14 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The metal and radiological contaminants at SWMU 165 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. The underground piping associated with discharge of coal pile runoff was replaced in a CERCLA action in 1994. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker, excavation worker, and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 165.

- Future Industrial Worker

    - Arsenic
    - Cesium-137
    - Chromium
    - Neptunium-237
    - Total PAHs
    - Total PCBs
    - Uranium-234
    - Uranium-235
    - Uranium-238

- Excavation worker

    - Arsenic

- Hypothetical Resident (hazards evaluated against the child resident)

    - Arsenic
    - Cesium-137
    - Chromium
    - Naphthalene
    - Neptunium-237
    - Plutonium-239/240
    - Thorium-230
    - Total PCBs
    - Total PAHs
    - Uranium
    - Uranium-234
    - Uranium-235
    - Uranium-238

Of these COCs, arsenic, cesium-137, Total PCBs, and uranium-238 are priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for the hypothetical resident. Priority COCs for other scenarios are described in Appendix D. Figure 7.3.8 also shows the COCs exceeding RGOs for the future industrial worker.

For SWMU 165, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Antimony
- Total PCBs
- Selenium
- Silver
- Toluene
- Uranium

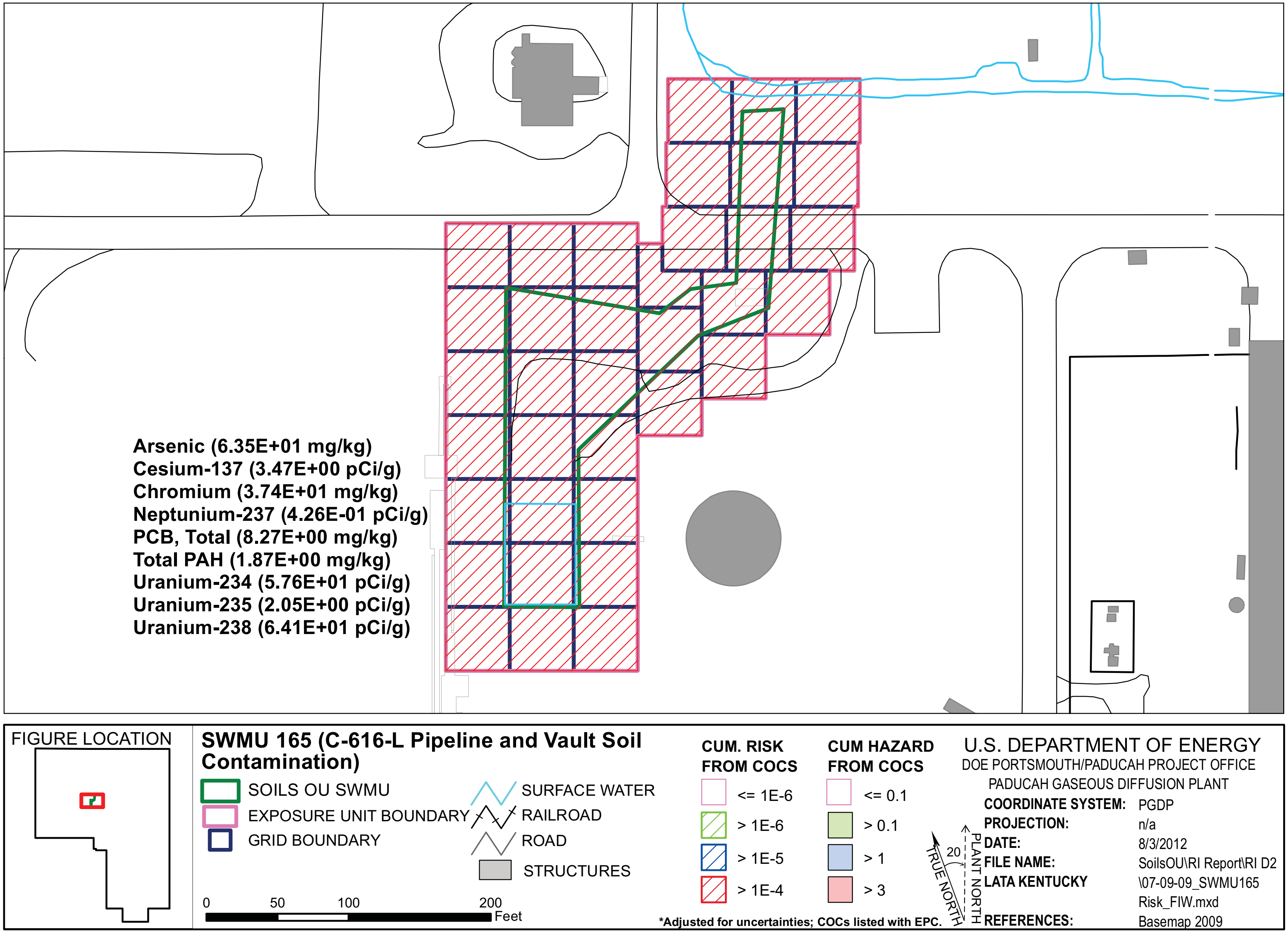


Figure 7.3.8. Summary of COCs Contributing to Risk to the Future Industrial Worker at SWMU 165

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 165 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. The soil contamination at SWMU 165 is associated with the PGDP coal pile runoff. SWMU 165 crosses SWMU 26, which is part of the Soils OU RI. The vault and lift station are operating facilities, and a response action could affect requirements resulting from a CERCLA action in 1994 that was part of the SWOU.

7.3.8 SWMU 165 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 165; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker, excavation worker, and hypothetical resident (DOE 2010a). The facility at this unit was constructed as part of a CERCLA action to reduce higher potential risks and hazards that had been present when the runoff from the coal pile flowed into the roadway, exposing workers to unacceptable levels of contamination. The reasonably anticipated future land use for SWMU 165 is industrial as shown in the SMP (DOE 2012a).

7.4 SWMU 170, C-729 ACETYLENE BUILDING DRAIN PITS

7.4.1 Background

The C-729 Acetylene Building Drain Pits (SWMU 170) are located in the central portion of the plant site. The two pits are approximately 16-ft long by 8-ft wide by 3-ft deep.

The two pits were operational from 1954 to the mid-1970s. Acetylene was generated for maintenance activities by combining calcium carbide and water. The residual from the operation drained to two outside concrete pits. Standpipes in the pits allowed sediments to settle out with the effluent draining to the storm sewer system. Other than the standpipe system, there is no direct connection to surface water from this SWMU.

A sludge sample was obtained and analyzed from each of the pits in 1993. Results indicated a high pH, volatiles, and uranium contamination. Surface and subsurface sampling results from the WAGs 9 and 11 Site Evaluation showed no VOCs, but uranium was present (DOE 1999c).

7.4.2 Fieldwork Summary

The historical data are representative of the nature and adequately delineate the extent of the contamination; therefore, no grid samples were collected from SWMU 170 during the Soils OU RI sampling effort (DOE 2010a).

The SWMU underwent a gamma radiological walkover survey (Figure 7.4.1) using a FIDLER; the 37 measurements ranged from 8,025 to 10,729 gross cpm. The area consists mostly of concrete, soil and grass with some gravel. A judgmental grab sample was collected for radiological constituents.

7.4.3 Nature and Extent of Contamination—Surface Soils

For SWMU 170, the representative data set for surface soils is presented in Tables 7.4.1 and 7.4.2 and provides the nature of the contamination in SWMU 170 surface soils. Figures 7.4.2–7.4.4 illustrate the

Figure 7.4.1. SWMU 170 Gamma Walkover Survey

Table 7.4.1. Surface Soil Historical Data Summary: SWMU 170 C-729 Acetylene Building Drain Pits

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
PPCB	Total PCB	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	1.88E-01	0/6	1.88E+01	0/6	0/6	-

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.4.2. Surface Soil RI Data Summary: SWMU 170 C-729 Acetylene Building Drain Pits

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Uranium	mg/kg	4.57E+00	4.57E+00	4.57E+00	0/1	1/1	0/1	4.90E+00	0/1	1.07E+02	0/1	1.65E+04	0/1	0/1	0.04 - 0.04
RADS	Alpha activity	pCi/g	2.79E+01	2.79E+01	2.79E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.9 - 5.9
RADS	Americium-241	pCi/g	1.50E-02	1.50E-02	1.50E-02	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.022 - 0.022
RADS	Beta activity	pCi/g	3.15E+01	3.15E+01	3.15E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.5 - 3.5
RADS	Cesium-137	pCi/g	3.35E-01	3.35E-01	3.35E-01	0/1	1/1	0/1	4.90E-01	1/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.074 - 0.074
RADS	Neptunium-237	pCi/g	1.15E-01	1.15E-01	1.15E-01	0/1	1/1	1/1	1.00E-01	0/1	2.71E-01	0/1	2.71E+01	0/1	1/1	0.04 - 0.04
RADS	Plutonium-238	pCi/g	1.00E-02	1.00E-02	1.00E-02	0/1	1/1	0/1	7.30E-02	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.015 - 0.015
RADS	Plutonium-239/240	pCi/g	2.70E-02	2.70E-02	2.70E-02	0/1	1/1	1/1	2.50E-02	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.015 - 0.015
RADS	Technetium-99	pCi/g	9.10E-01	9.10E-01	9.10E-01	0/1	1/1	0/1	2.50E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	1/1	0.4 - 0.4
RADS	Thorium-228	pCi/g	8.10E-01	8.10E-01	8.10E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
RADS	Thorium-230	pCi/g	9.30E-01	9.30E-01	9.30E-01	0/1	1/1	0/1	1.50E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.007 - 0.007
RADS	Thorium-232	pCi/g	7.70E-01	7.70E-01	7.70E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.007 - 0.007
RADS	Uranium-234	pCi/g	1.05E+00	1.05E+00	1.05E+00	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	6.70E-02	6.70E-02	6.70E-02	0/1	1/1	1/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.021 - 0.021
RADS	Uranium-238	pCi/g	1.53E+00	1.53E+00	1.53E+00	0/1	1/1	1/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.01 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

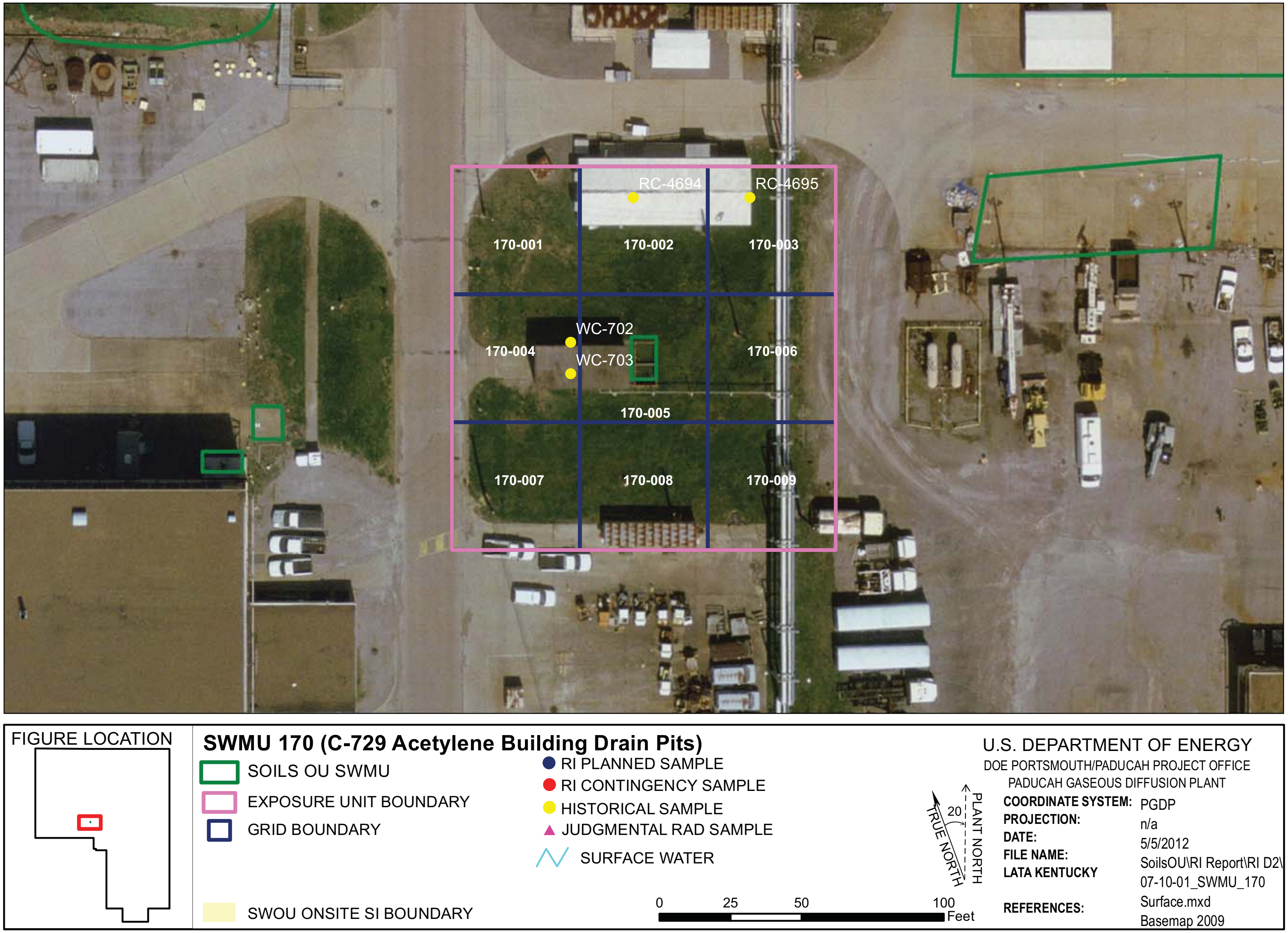


Figure 7.4.2. SWMU 170 Sample Locations - Surface Soil

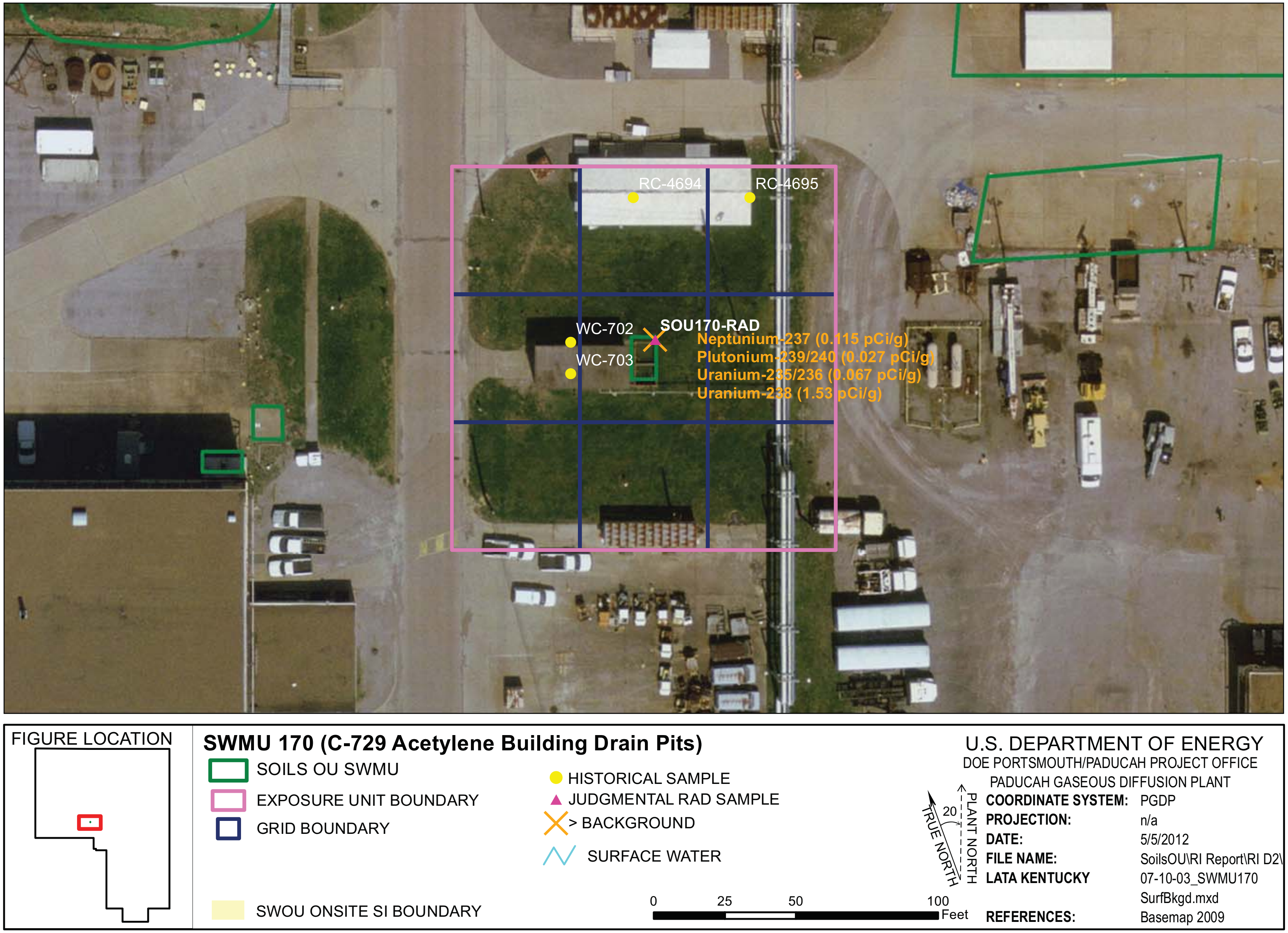


Figure 7.4.3. SWMU 170 Background Exceedances - Surface Soil

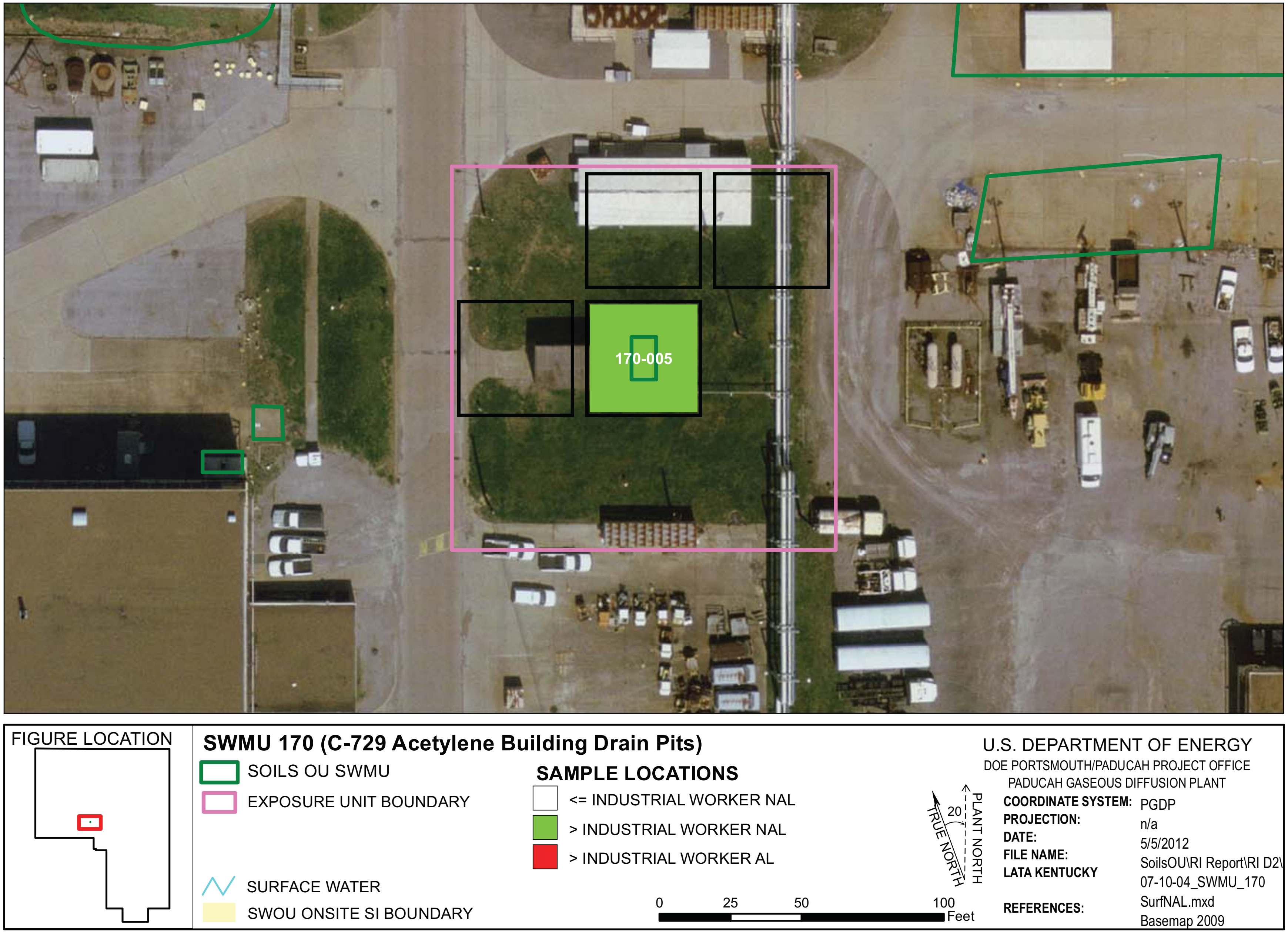


Figure 7.4.4. SWMU 170 NAL Exceedances - Surface Soil

horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 170 surface soil contamination is considered adequately defined to support the BRA and FS. SWMU 170 consists of one EU.

Metals

No metals were detected above both the background screening level and the industrial worker NAL, industrial worker AL, or the SSL for the protection of UCRS and RGA groundwater in the SWMU 170 surface soil.

PCBs

No PCBs were detected in the SWMU 170 surface soil.

SVOCs

No surface soil samples from SWMU 170 were analyzed for SVOCs.

VOCs

No surface soil samples from SWMU 170 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the industrial worker NALs or ALs in the SWMU 170 surface soil.

Neptunium-237 in grid 5 was detected above both the background screening level and the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

7.4.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 170, the representative data set for subsurface soils is presented in Table 7.4.3–7.4.4 and provides the nature of the contamination in SWMU 170 subsurface soils. Figures 7.4.5–7.4.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 170 subsurface soil contamination is considered adequately defined to support the BRA and FS. SWMU 170 consists of one EU.

Metals

No subsurface soil samples from SWMU 170 were analyzed for metals.

Table 7.4.3. Subsurface Soil Historical Data Summary: SWMU 170 C-729 Acetylene Building Drain Pits

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	-
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	-
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	-
RADS	Americium-241	pCi/g	8.95E-04	5.23E-02	2.66E-02	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.124 - 0.129
RADS	Cesium-137	pCi/g	5.16E-03	1.54E-01	7.96E-02	0/2	2/2	0/2	2.80E-01	1/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.0232 - 0.0291
RADS	Cobalt-60	pCi/g	-3.31E-03	9.50E-03	3.10E-03	0/2	2/2	0/2	n/a	0/2	1.77E-02	0/2	1.77E+00	0/2	0/2	0.0237 - 0.0249
RADS	Neptunium-237	pCi/g	3.43E-03	4.36E-02	2.35E-02	0/2	2/2	0/2	n/a	0/2	2.71E-01	0/2	2.71E+01	0/2	1/2	0.0424 - 0.0499
RADS	Uranium-234	pCi/g	9.38E-01	1.04E+00	9.89E-01	0/2	2/2	0/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.0912 - 0.183
RADS	Uranium-238	pCi/g	1.40E+00	2.55E+00	1.98E+00	0/2	2/2	2/2	1.20E+00	1/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.224 - 0.271

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 7.4.4. Subsurface Soil RI Data Summary: SWMU 170 C-729 Acetylene Building Drain Pits

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range

There is no subsurface data.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

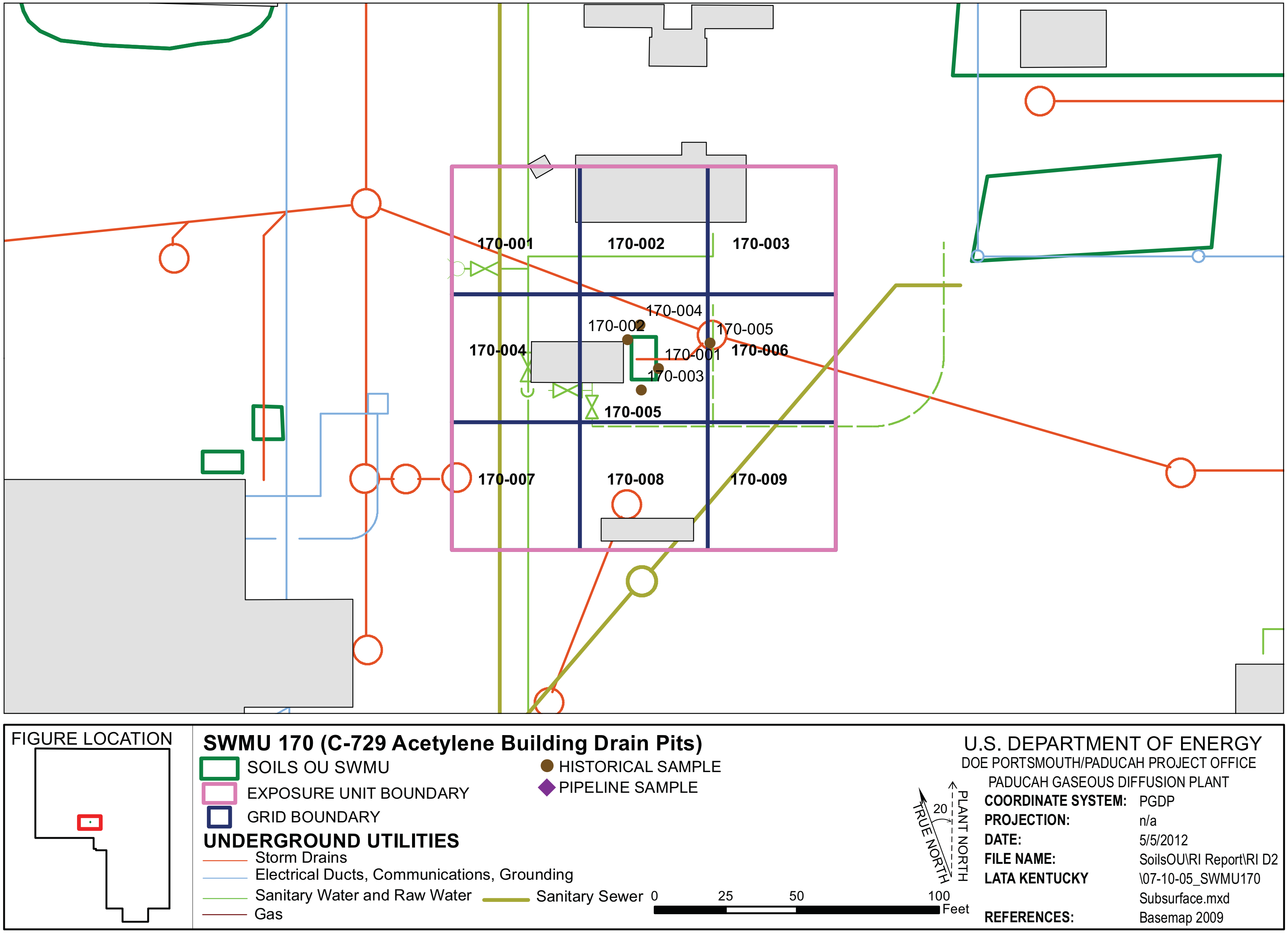


Figure 7.4.5. SWMU 170 Sample Locations - Subsurface Soil

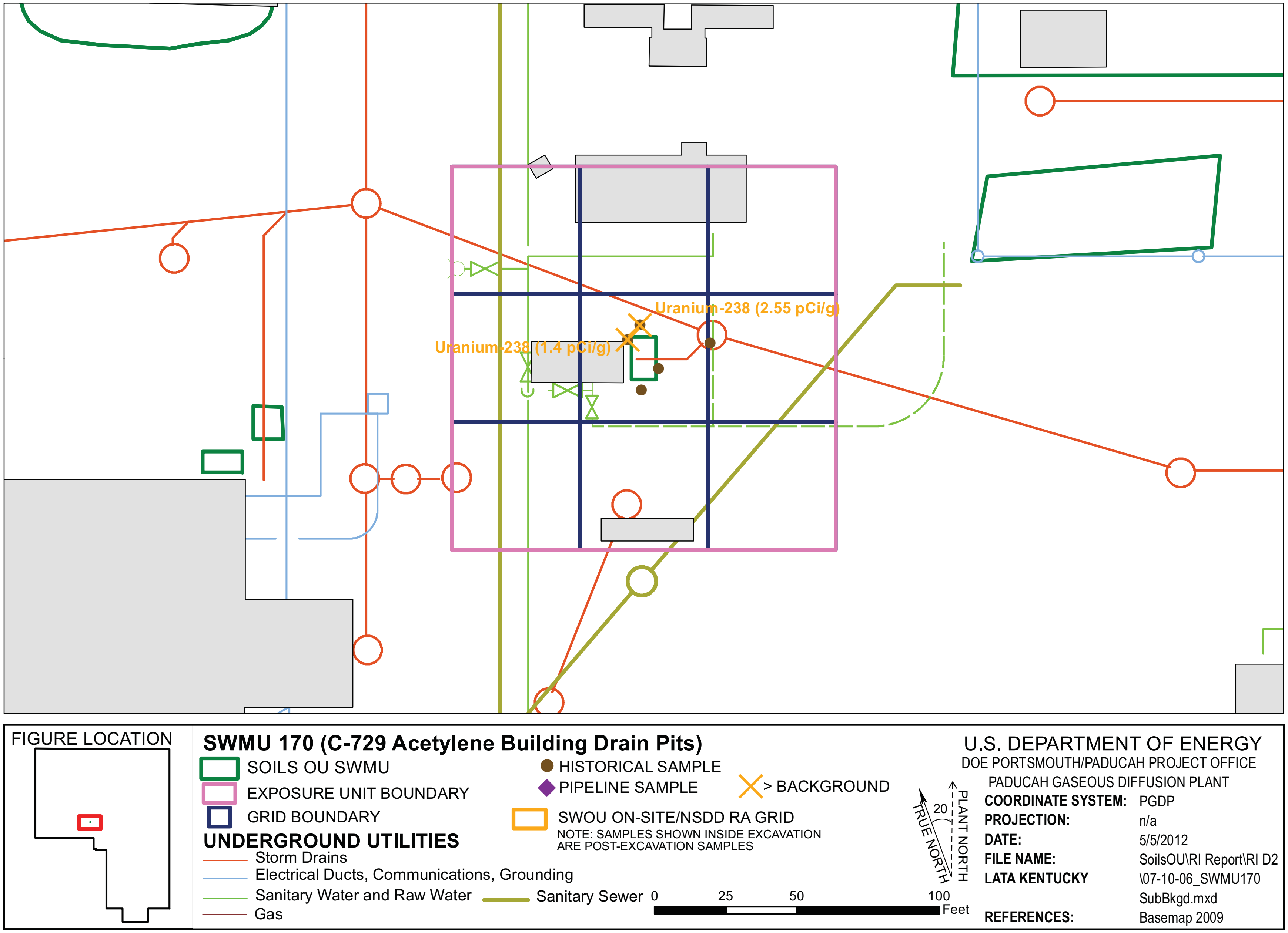


Figure 7.4.6. SWMU 170 Background Exceedances - Subsurface Soil

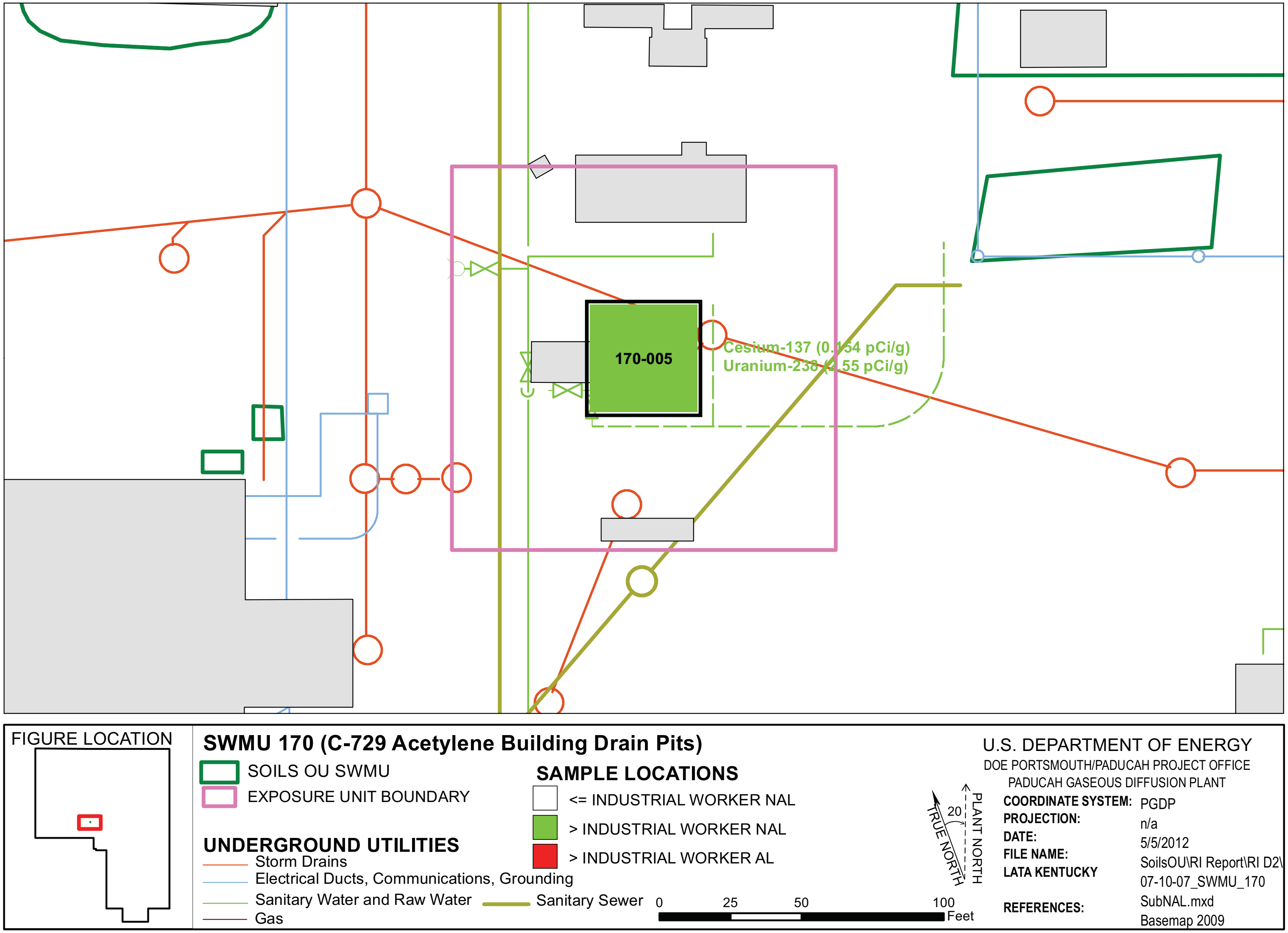


Figure 7.4.7. SWMU 170 NAL Exceedances - Subsurface Soil

PCBs

No subsurface soil samples from SWMU 170 were analyzed for PCBs.

SVOCs

No subsurface soil samples from SWMU 170 were analyzed for SVOCs.

VOCs

No VOCs were detected in the SWMU 170 subsurface soil.

Radionuclides

Of the radionuclides, uranium-238 was detected above both the background screening level and the industrial worker NAL in the SWMU 170 subsurface soil. The detection was at 2 ft bgs. The end depth of the borehole was 12 ft bgs.

No radionuclides were detected above both the background screening level and the industrial worker AL in the SWMU 170 subsurface soil.

Neptunium-237 (no background value available) in grid 5 was detected above the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

7.4.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no potential for runoff; SWMU 170 consists of two concrete pits.

7.4.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 170 were evaluated for direct contact. These results are summarized in Appendix D and in the following subsections, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 170 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 7.4.5 for the hypothetical resident. The future industrial worker and the excavation worker scenarios did not identify COCs. Table 7.4.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Table 7.4.5. RGOs for SWMU 170

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Hypothetical Resident[5]											
1	Neptunium-237	1.15E-01	pCi/g	2.1E-06	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Uranium-238	1.53E+00	pCi/g	4.4E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**6.5E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.44, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.44, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Ecological Screening. There were no identified COPECs for SWMU 170.

7.4.7 SWMU 170 Summary

The following text summarizes the results for SWMU 170 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

Plant processes that could have contributed to contamination at this site are releases from effluent discharge from the drain pits.

COPCs for surface and subsurface soils from SWMU 170 are shown on Tables 7.4.1–7.4.4 as those analytes with green boxes under the “Industrial Worker/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. The COPCs for SWMU 170 were radionuclides in surface and subsurface soils. Contaminants were detected greater than background to a maximum depth of 6 ft bgs and greater than industrial worker NALs to a maximum depth of 2 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 170 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. The standpipes are the only known underground pipelines at SWMU 170. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the hypothetical residential scenario. The following are the COCs for this scenario for SWMU 170.

- Future Industrial Worker
  - None
- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Neptunium-237
  - Uranium-238

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 170. There are no priority COCs for other scenarios.

For SWMU 170, there are no COPECs exceeding ESVs.

Goal 4. Support Evaluation of Remedial Alternatives

Possible remedial technologies applicable for this unit are posting, fencing (or other means of limiting access), and excavation. SWMU 170 is not adjacent to any other SWMUs, and is far enough away from the nearest operating facility, C-720 that a response action at SWMU 170 would have little or no impact on it. A response action here would not impact other integrator OUs.

7.4.8 SWMU 170 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 170; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial as shown in the SMP (DOE 2012a).

8. GROUP 2, CHROMIUM AREAS

This chapter includes a discussion of the chromium areas SWMUs, which include the following two SWMUs:

- SWMU 158, C-720 Chilled Water System Leak Site, sampled during RI
- SWMU 169, C-410-E HF Vent Surge Protection Tank, sampled during RI

The SWMU-specific discussions highlight the current understanding of each SWMU's impacts. Chapter 4 describes the overall evaluation approach that was used for each SWMU. Figures display the 45 ft grids that were used for the grab sampling and historical sample assignments. There are approximately 10 grids for each EU for SWMUs that are larger than 0.5 acres. If a SWMU is smaller than 0.5 acres, it is considered one EU. If contingency "step-out" grids were deemed necessary by field laboratory results to define extent, the step-out grids are displayed on the figures.

All of these sites are located within the current industrial area of the facility, as shown in Figure 8.1, and fieldwork was conducted in accordance with the Work Plan (DOE 2010a).

The nature and extent is divided into surface and subsurface sections that summarize the representative data set and describe the future industrial worker scenario for SWMUs located inside the limited area and teen recreator scenario for SWMUs located outside the limited area. The evaluation of the XRF data with fixed-base laboratory data indicates the use of XRF results for copper, iron, lead, nickel, uranium and zinc has good correlation and therefore is reliable for use in determining nature and extent and hot spots. Molybdenum, mercury, selenium, and silver XRF results are generally below the reporting limits and will not lead to incorrect decisions in the risk assessment; however, these results may not provide much useful information for nature and extent determination. Use of XRF results for arsenic, chromium, and manganese has uncertainties; however, higher values in the complete data set indicate overall patterns of these constituents present in the soils at the SWMUs/AOCs. Uncertainties associated with arsenic will be managed in the FS because detections at high concentrations from the fixed-base laboratory were detected at lower concentrations by the XRF and may lead to underestimating risk. For vanadium, comparison with the fixed-base laboratory data indicates XRF data are much higher; therefore, risks may be overestimated when using the XRF data. See Appendix B for additional information.

For the fate and transport section, the process for evaluating surface water run-off and groundwater modeling is described in Chapter 4 and Appendix C, and only the conclusions are provided in the SWMU/AOC specific sections.

The human health risk assessment narrative discussed the future industrial worker, the excavation worker, and the hypothetical future resident. Each SWMU/AOC was evaluated for the following receptors. Additional discussion of scenarios is presented in Appendix D.

- Current on-site industrial worker (This assumes exposure to surface soils only.)

- Future on-site industrial worker (This assumes exposure to surface soils only.)

- Outdoor worker (surface and subsurface soils: 0-16 ft bgs) [This assumes exposure to surface (0-1 ft bgs) and a mixture of the surface (0-1 ft bgs) and subsurface soils (1-16 ft bgs), as appropriate, following a future construction activity. As a subset of the outdoor worker exposed to surface and subsurface soils, the potential risks and hazards for shorter-term exposure for workers during excavation also are provided.]

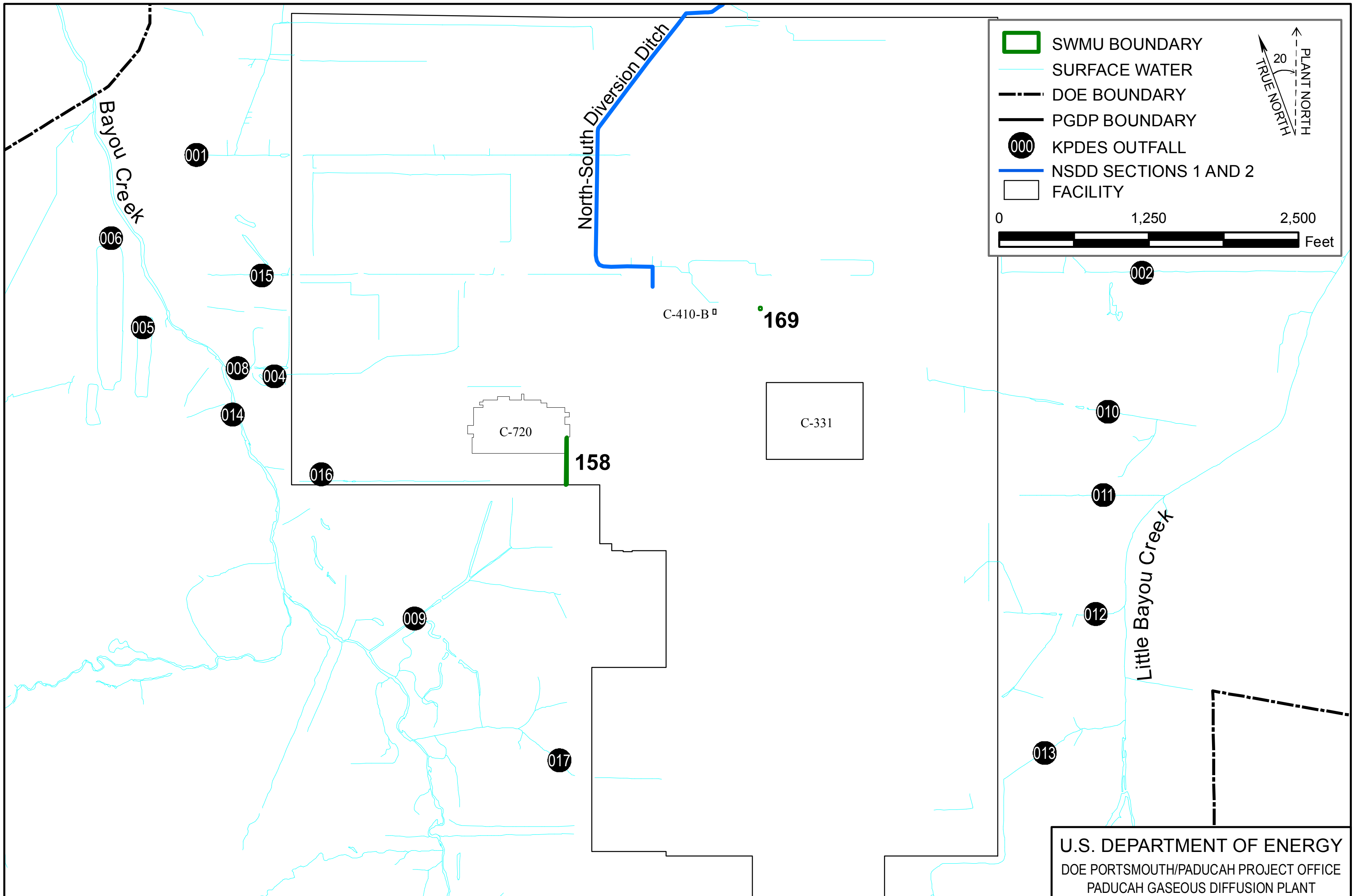


Figure 8.1. SWMU Locations and Features for Chromium Areas

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- Hypothetical future adult and child residents (This assumes exposure to surface soils only.)
- Future teen recreational users (This assumes exposure to surface soils only.)

The following are the uncertainties in the human health risk assessment that may affect SWMUs/AOCs in Chapter 8.

- The range of background was not considered beyond the initial screening against site-specific background.
- Overly conservative dermal toxicity factors potentially lead to an overestimation of risk.
- Concentration of total cancerous PAHs were used to estimate risk and the minimum detection limit of the PAHs with toxicity equivalency factors were used when PAHs were not detected.
- Some detection limits for XRF data are above background concentrations and NALs; the COPCs identified using these data are expected to overstate the presence of these metals.
- For those constituents that never were detected within an EU, even if the detection limit is greater than the NAL, the constituent was not considered a COPC.
- UCL concentrations were used as EPCs if there were a sufficient number of samples and distinct results to calculate a UCL. This likely will lead to an overestimation of actual exposure because receptors are assumed to be exposed to the UCL concentration for the entire exposure duration.
- Conservative (i.e., health protective) exposure factors are used when information available is limited in the form of using RME assumptions, per the Risk Methods Document (DOE 2011a). This may result in an overestimation of potential risk.
- Many of the SWMUs/AOCs evaluated in this assessment are very small, and the assumptions used for the levels of exposures (duration, frequency) overstate potential chronic exposures in these units.
- The risk assessment does not consider that concentrations of some COCs may be lower or higher in the future because of processes such as degradation and attenuation.
- Additivity of multiple chemicals is assumed. Whether assuming additivity can lead to an underestimation or overestimation of risk is unknown.
- Most of the assumptions about exposure and toxicity used in this BHHRA are representative of statistical upper-bounds or even maximums for each parameter. The result of combining several such upper-bound assumptions is that the final estimate of potential exposure or potential risk is conservative.

Additional information can be found in Appendix D.

For the ecological screening, the priority chemicals that exceeded their respective screening values are shown in tables within each subsection (maximum HQ $\geq$ 10) as well as the overall HI for the constituents detected. This allows for comparison of the HIs, SWMU sizes, and other factors, such as proximity to a surface water body. Additional information is contained in Appendix E.

8.1 SWMU 158, C-720 CHILLED WATER SYSTEM LEAK SITE

8.1.1 Background

The Chilled Water System Leak Site (SWMU 158) is located in the central portion of the plant site, southeast of the C-720 Building. The SWMU consists of chilled waterlines located under the concrete pad near the C-720 Truck Alley. The SWMU 158 area is approximately 10-ft wide by 30-ft long.

The primary function of the system was to provide cooling water for computer systems and HVAC systems in various plant buildings. The site is an area where approximately 3,500 gal of chromated water from the chilled water system leaked into an adjacent electrical vault and spilled over to another connected vault. Suspected contamination is hexavalent chromium due to process knowledge.

8.1.2 Fieldwork Summary

Twenty-six out of 50 planned grab samples were collected from the unit. Field laboratory results indicated that an additional 34 contingency sample locations were needed to determine the extent of contamination at this unit, and 30 were collected. These field laboratory results indicated high levels of lead, manganese, uranium, and zinc. The samples not collected were due to the presence of roadways, building grounding mat, and utilities. Figure A.12 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 8.1.1) using a FIDLER; the 694 measurements ranged from 4,482 to 16,201 gross cpm. The area is comprised of soil, grass, a soil and gravel mix, and concrete pavement. The lowest measurements appear over the concrete pavement, and there appears to be some contribution due to shine from C-720 Maintenance and Stores Building and some fixed contamination in the concrete/gravel/soil immediately east of C-720 Maintenance and Stores Building at the extreme north end of the SWMU. Gamma walkover survey results were consistent with background; therefore, no judgmental grab sample was collected.

8.1.3 Nature and Extent of Contamination—Surface Soils

The representative data set for surface soils is presented in Tables 8.1.1 and 8.1.2 and provides the nature of the contamination in SWMU 158 surface soils. Figures 8.1.2-8.1.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 158 surface soil contamination is considered adequately defined to support the BRA and FS. SWMU 158 consists of one EU.

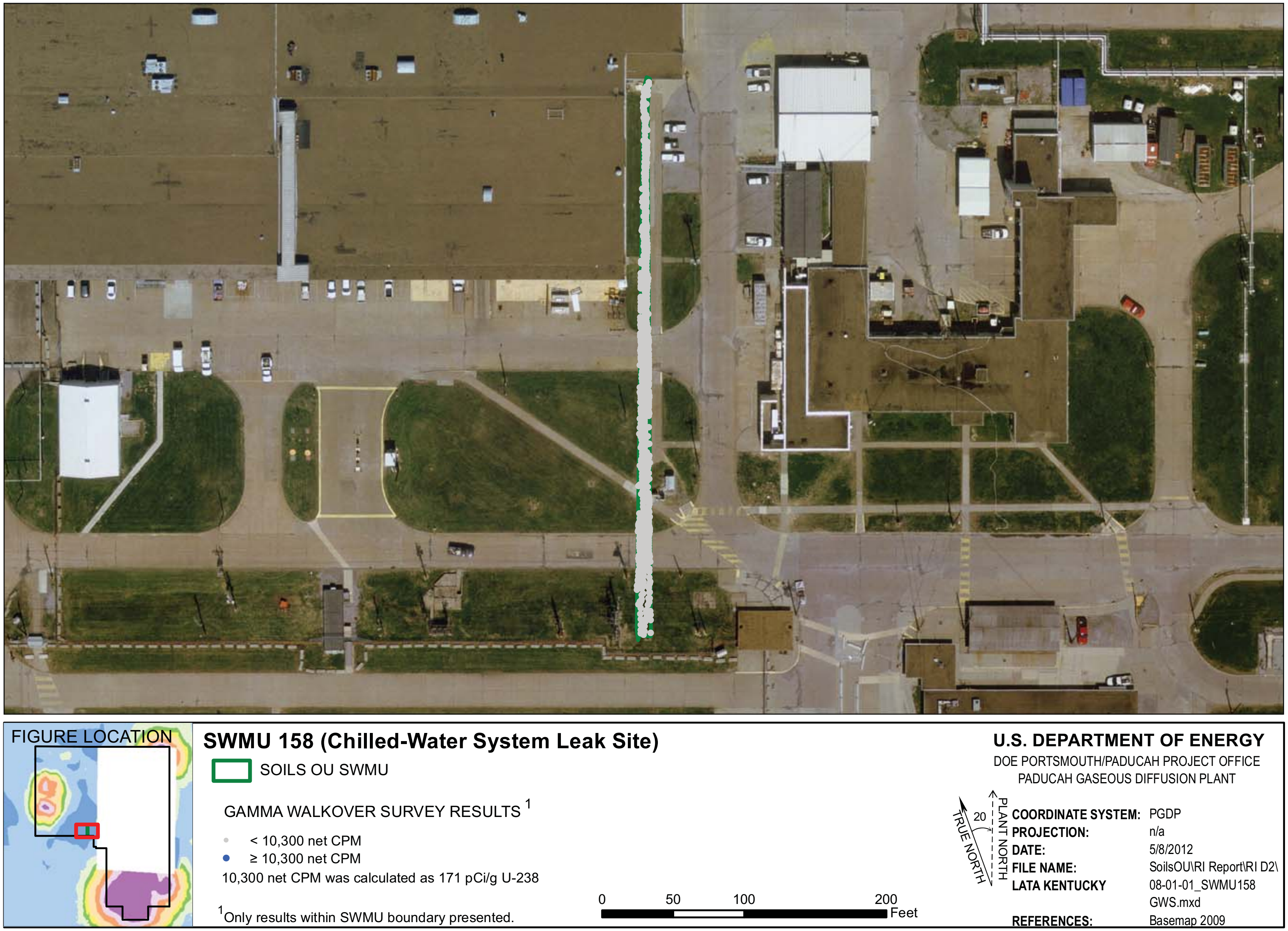


Figure 8.1.1. SWMU 158 Gamma Walkover Survey

Table 8.1.1. Surface Soil Historical Data Summary: SWMU 158 C-720 Chilled Water System Leak Site

Type	Analysis	Unit	Detected Results*			J-qualified	FOD	Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD		FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	

There are no surface samples.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 8.1.2. Surface Soil RI Data Summary: SWMU 158, Chilled Water System Leak Site

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	6.98E+03	8.97E+03	8.34E+03	0/4	4/4	0/4	1.30E+04	0/4	3.32E+04	0/4	3.97E+06	0/4	4/4	5.4 - 5.9
METAL	Antimony	mg/kg	1.50E-01	7.00E-01	4.60E-01	0/4	3/4	2/4	2.10E-01	0/4	2.53E+00	0/4	1.51E+03	0/4	2/4	0.54 - 0.59
METAL	Arsenic	mg/kg	6.80E+00	1.28E+01	9.32E+00	0/27	15/27	2/27	1.20E+01	15/27	9.97E-01	0/27	9.97E+01	0/27	15/27	1.1 - 11
METAL	Barium	mg/kg	1.29E+02	2.92E+02	2.09E+02	0/4	4/4	2/4	2.00E+02	0/4	5.92E+02	0/4	3.78E+05	0/4	4/4	2.2 - 2.4
METAL	Beryllium	mg/kg	4.90E-01	6.30E-01	5.63E-01	0/4	4/4	0/4	6.70E-01	4/4	1.40E-02	0/4	9.22E+00	0/4	0/4	0.11 - 0.12
METAL	Cadmium	mg/kg	7.00E-02	3.90E-01	1.83E-01	0/4	4/4	1/4	2.10E-01	0/4	3.16E+00	0/4	3.16E+02	0/4	1/4	0.054 - 0.059
METAL	Calcium	mg/kg	1.90E+03	7.32E+03	3.73E+03	0/4	4/4	0/4	2.00E+05	0/4	n/a	0/4	n/a	n/a	n/a	54.4 - 59.2
METAL	Chromium	mg/kg	1.19E+01	6.16E+01	3.28E+01	0/27	13/27	11/27	1.60E+01	10/27	3.02E+01	0/27	3.02E+03	0/27	0/27	1.1 - 85
METAL	Cobalt	mg/kg	5.90E+00	3.65E+01	1.44E+01	0/4	4/4	1/4	1.40E+01	1/4	1.05E+01	0/4	1.52E+03	4/4	4/4	0.22 - 0.24
METAL	Copper	mg/kg	1.22E+01	4.34E+01	2.44E+01	0/27	10/27	8/27	1.90E+01	0/27	1.43E+03	0/27	2.24E+05	0/27	0/27	1.1 - 35
METAL	Iron	mg/kg	7.69E+03	2.09E+04	1.45E+04	0/27	27/27	0/27	2.80E+04	0/27	2.51E+04	0/27	3.92E+06	27/27	27/27	5.4 - 100
METAL	Lead	mg/kg	1.06E+01	9.43E+01	3.21E+01	0/27	26/27	8/27	3.60E+01	0/27	4.00E+02	0/27	4.00E+02	0/27	25/27	0.33 - 13
METAL	Magnesium	mg/kg	6.08E+02	1.53E+03	1.08E+03	0/4	4/4	0/4	7.70E+03	0/4	n/a	0/4	n/a	n/a	n/a	54.4 - 59.2
METAL	Manganese	mg/kg	7.55E+01	1.86E+03	6.12E+02	0/27	27/27	1/27	1.50E+03	0/27	2.58E+03	0/27	1.16E+05	26/27	27/27	0.22 - 85
METAL	Mercury	mg/kg	2.22E-02	1.05E+01	1.20E+00	0/27	5/27	1/27	2.00E-01	1/27	9.00E-01	0/27	7.85E+02	1/27	1/27	0.0362 - 10
METAL	Molybdenum	mg/kg	7.10E-01	1.20E+00	9.65E-01	0/27	4/27	0/27	n/a	0/27	1.79E+02	0/27	2.80E+04	0/27	4/27	0.54 - 15
METAL	Nickel	mg/kg	9.10E+00	1.32E+02	4.26E+01	0/27	9/27	5/27	2.10E+01	5/27	4.28E+01	0/27	3.18E+04	3/27	9/27	0.54 - 65
METAL	Selenium	mg/kg	1.10E+00	2.20E+00	1.65E+00	0/27	4/27	4/27	8.00E-01	0/27	1.79E+02	0/27	2.80E+04	0/27	4/27	0.54 - 20
METAL	Silver	mg/kg	2.60E-02	3.10E-01	1.39E-01	0/27	4/27	0/27	2.30E+00	0/27	1.08E+01	0/27	9.15E+03	0/27	2/27	0.22 - 10
METAL	Sodium	mg/kg	1.15E+02	1.42E+03	5.47E+02	0/4	4/4	2/4	3.20E+02	0/4	n/a	0/4	n/a	n/a	n/a	21.7 - 23.7
METAL	Thallium	mg/kg	1.80E-01	4.20E-01	2.98E-01	0/4	4/4	3/4	2.10E-01	0/4	2.87E+00	0/4	4.48E+02	0/4	4/4	0.22 - 0.24
METAL	Uranium	mg/kg	2.10E+00	3.02E+01	1.32E+01	0/27	14/27	12/27	4.90E+00	0/27	1.07E+02	0/27	1.65E+04	0/27	6/27	0.04 - 20
METAL	Vanadium	mg/kg	2.68E+01	3.06E+01	2.83E+01	0/4	4/4	0/4	3.80E+01	4/4	1.51E-01	0/4	9.30E+01	4/4	4/4	1.1 - 1.2
METAL	Zinc	mg/kg	2.02E+01	9.89E+01	5.38E+01	0/27	27/27	6/27	6.50E+01	0/27	1.08E+04	0/27	1.68E+06	0/27	27/27	2.2 - 25
PPCB	Total PCB	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	1.88E-01	0/14	1.88E+01	0/14	0/14	0.33 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.36 - 0.37
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.36 - 0.37
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.36 - 0.37
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.30E+00	0/3	3.91E+01	0/3	0/3	1.7 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.8
SVOA	Acenaphthene	mg/kg	8.30E-02	8.30E-02	8.30E-02	1/3	1/3	0/3	n/a	0/3	6.02E+02	0/3	1.81E+04	0/3	0/3	0.36 - 0.37
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Anthracene	mg/kg	7.50E-02	1.30E-01	1.03E-01	2/3	2/3	0/3	n/a	0/3	4.05E+03	0/3	1.22E+05	0/3	0/3	0.36 - 0.37
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 8.1.2. Surface Soil RI Data Summary: SWMU 158, Chilled Water System Leak Site (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Benzo(ghi)perylene	mg/kg	2.50E-01	2.60E-01	2.55E-01	2/3	2/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.8
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.0072 - 0.0073
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.36 - 0.37
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Fluoranthene	mg/kg	7.70E-01	1.00E+00	8.85E-01	0/3	2/3	0/3	n/a	0/3	6.01E+02	0/3	1.80E+04	0/3	0/3	0.36 - 0.37
SVOA	Fluorene	mg/kg	5.70E-02	5.70E-02	5.70E-02	1/3	1/3	0/3	n/a	0/3	4.87E+02	0/3	1.46E+04	0/3	0/3	0.36 - 0.37
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.17E-01	0/3	1.17E+01	0/3	0/3	0.36 - 0.37
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.72 - 0.73
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	2.24E+00	0/3	2.24E+02	0/3	0/3	0.36 - 0.37
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.22E-02	0/3	5.22E+00	0/3	0/3	0.0072 - 0.0073
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	1.7 - 1.8
SVOA	Phenanthrene	mg/kg	4.40E-01	7.80E-01	6.10E-01	0/3	2/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.36 - 0.37
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.7 - 1.8
SVOA	Pyrene	mg/kg	7.70E-01	9.50E-01	8.60E-01	0/3	2/3	0/3	n/a	0/3	4.49E+02	0/3	1.35E+04	0/3	2/3	0.36 - 0.37
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.72 - 0.73
SVOA	Total PAH	mg/kg	4.18E-01	4.78E-01	4.48E-01	0/3	2/3	0/3	n/a	2/3	5.92E-02	0/3	5.92E+00	2/3	2/3	-
RADS	Alpha activity	pCi/g	2.66E+01	4.47E+01	3.58E+01	0/3	3/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	4.6 - 6.1
RADS	Americium-241	pCi/g	4.00E-04	1.00E-02	5.80E-03	0/3	3/3	0/3	n/a	0/3	5.01E+00	0/3	5.01E+02	0/3	0/3	0.016 - 0.019
RADS	Beta activity	pCi/g	2.74E+01	4.66E+01	3.59E+01	0/3	3/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	3.2 - 3.6
RADS	Cesium-137	pCi/g	2.50E-02	7.80E-02	4.93E-02	0/3	3/3	0/3	4.90E-01	0/3	8.61E-02	0/3	8.61E+00	0/3	0/3	0.097 - 0.2
RADS	Neptunium-237	pCi/g	0.00E+00	8.90E-02	5.70E-02	0/3	3/3	0/3	1.00E-01	0/3	2.71E-01	0/3	2.71E+01	0/3	2/3	0.0088 - 0.016
RADS	Plutonium-238	pCi/g	5.20E-03	1.70E-02	1.24E-02	0/3	3/3	0/3	7.30E-02	0/3	1.09E+01	0/3	1.09E+03	0/3	0/3	0.017 - 0.02
RADS	Plutonium-239/240	pCi/g	7.00E-03	2.90E-02	1.53E-02	0/3	3/3	1/3	2.50E-02	0/3	1.07E+01	0/3	1.07E+03	0/3	0/3	0.012 - 0.016
RADS	Technetium-99	pCi/g	1.50E-01	2.44E+00	1.12E+00	0/3	3/3	0/3	2.50E+00	0/3	3.61E+02	0/3	3.61E+04	0/3	2/3	0.47 - 0.53
RADS	Thorium-228	pCi/g	8.50E-01	1.00E+00	9.23E-01	0/3	3/3	0/3	1.60E+00	0/3	n/a	0/3	n/a	n/a	n/a	0.007 - 0.03
RADS	Thorium-230	pCi/g	9.20E-01	1.10E+00	9.83E-01	0/3	3/3	0/3	1.50E+00	0/3	1.38E+01	0/3	1.38E+03	0/3	3/3	0.02 - 0.03
RADS	Thorium-232	pCi/g	8.40E-01	9.80E-01	9.30E-01	0/3	3/3	0/3	1.50E+00	0/3	n/a	0/3	n/a	n/a	n/a	0.007 - 0.01
RADS	Uranium-234	pCi/g	1.00E+00	4.00E+00	2.37E+00	0/3	3/3	2/3	1.20E+00	0/3	1.89E+01	0/3	1.89E+03	0/3	0/3	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	5.80E-02	2.59E-01	1.53E-01	0/3	3/3	2/3	6.00E-02	0/3	3.95E-01	0/3	3.95E+01	0/3	0/3	0.01 - 0.02
RADS	Uranium-238	pCi/g	1.09E+00	6.50E+00	3.51E+00	0/3	3/3	2/3	1.20E+00	2/3	1.70E+00	0/3	1.70E+02	0/3	1/3	0.01 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

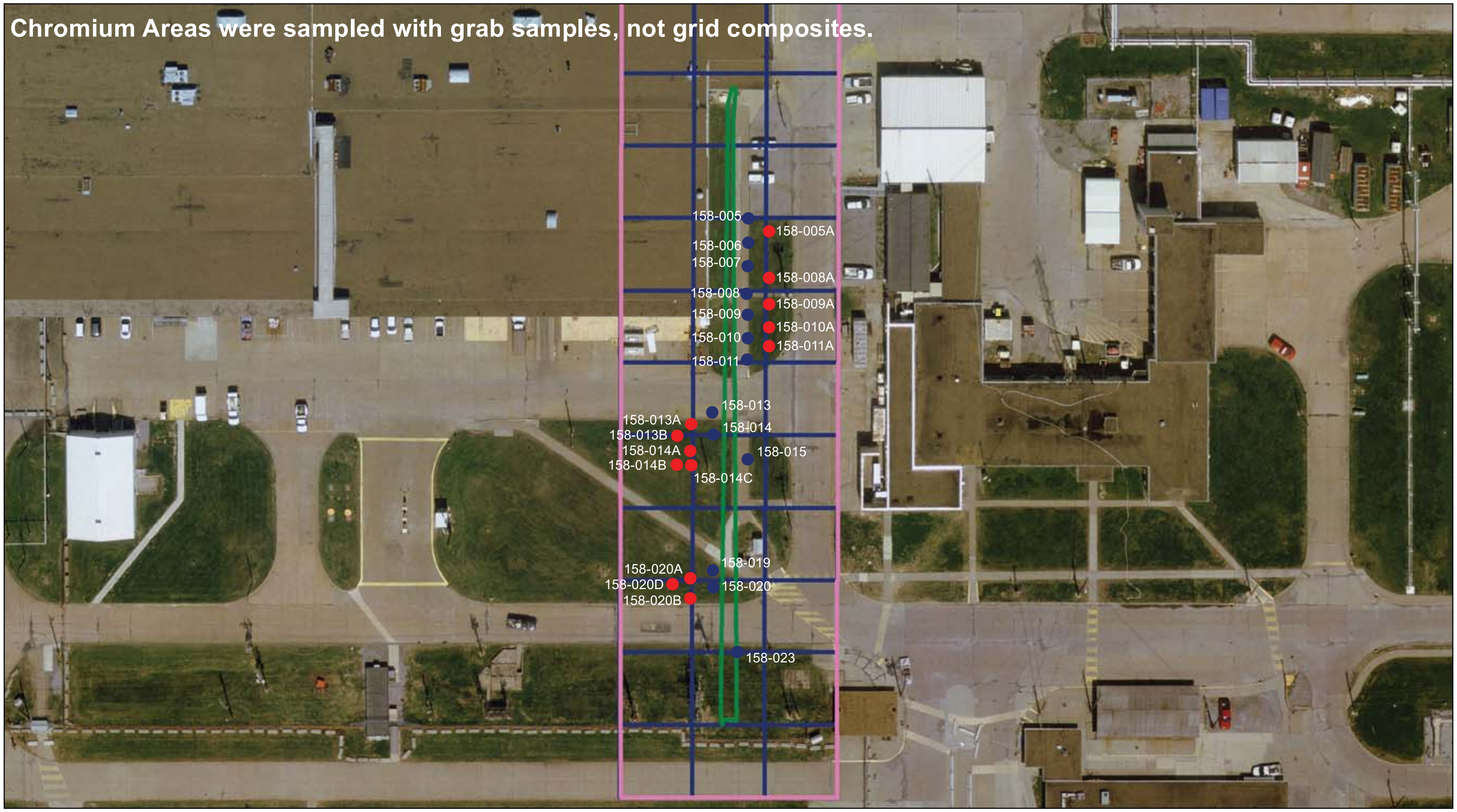
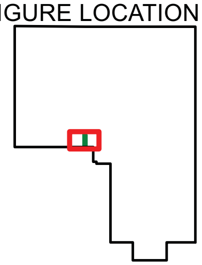


FIGURE LOCATION



SWMU 158 (Chilled-Water System Leak Site)

SOILS OU SWMU
EXPOSURE UNIT BOUNDARY
GRID BOUNDARY
SWOU ONSITE SI BOUNDARY

RI PLANNED SAMPLE
RI CONTINGENCY SAMPLE
HISTORICAL SAMPLE
JUDGMENTAL RAD SAMPLE
SURFACE WATER

0 50 100 200 Feet

TRUE NORTH 20 PLANT NORTH

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

COORDINATE SYSTEM:	PGDP
PROJECTION:	n/a
DATE:	5/6/2012
FILE NAME:	SoilsOU\RI Report\RI D2\
LATA KENTUCKY	08-01-02_SWMU158 Surface.mxd
REFERENCES:	Basemap 2009

Figure 8.1.2. SWMU 158 Sample Locations - Surface Soil

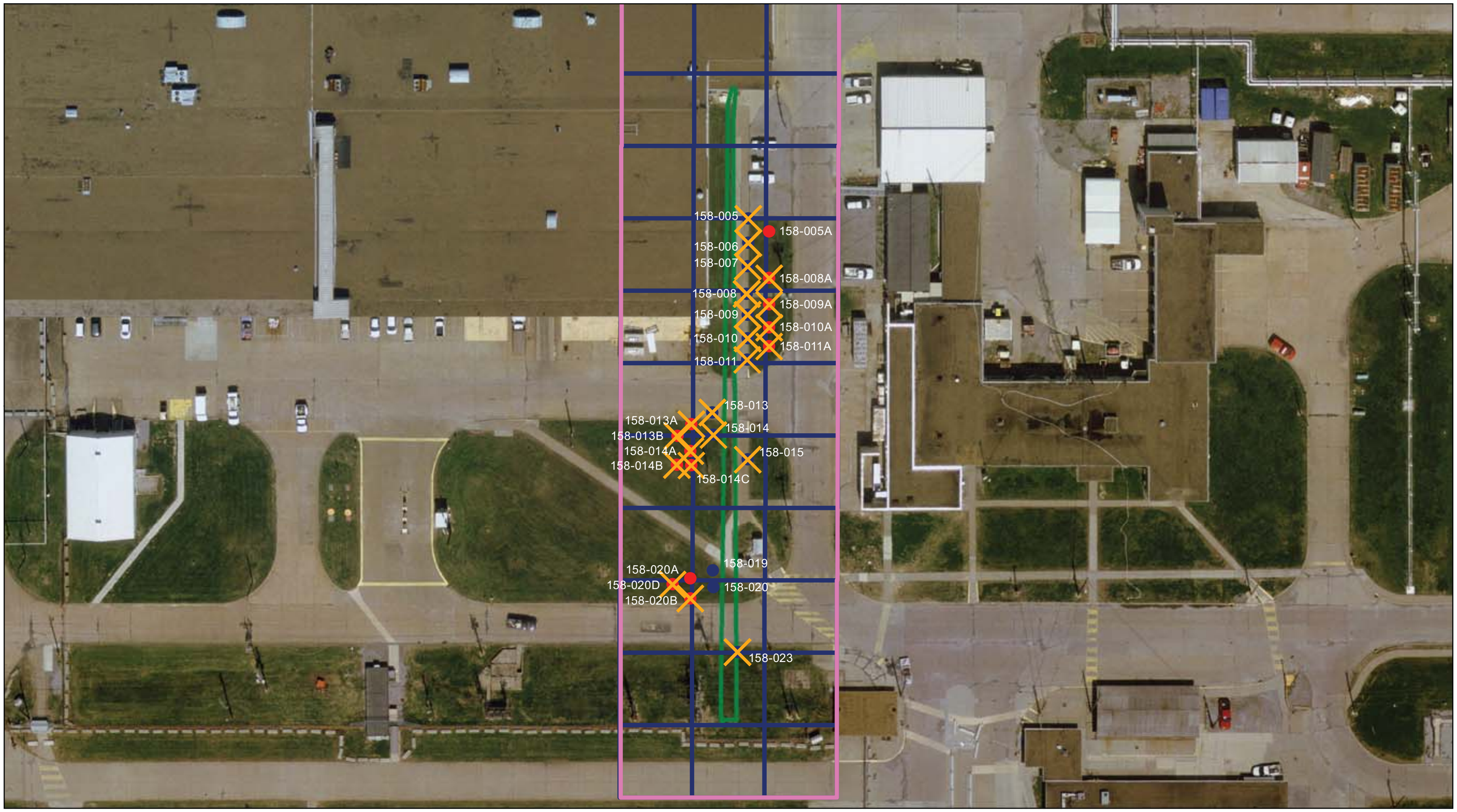
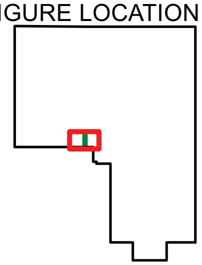


FIGURE LOCATION



SWMU 158 (Chilled-Water System Leak Site)

SOILS OU SWMU

EXPOSURE UNIT BOUNDARY

GRID BOUNDARY

SURFACE WATER

SWOU ONSITE SI BOUNDARY

RI PLANNED SAMPLE

RI CONTINGENCY SAMPLE

HISTORICAL SAMPLE

JUDGMENTAL RAD SAMPLE

> BACKGROUND

0 50 100 200 Feet

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

TRUE NORTH 20 PLANT NORTH

COORDINATE SYSTEM: PGDP
PROJECTION: n/a
DATE: 5/6/2012
FILE NAME: SoilsOU\RI Report\RI D2\08-01-03_SWMU158 SurfBkgd.mxd
LATA KENTUCKY
REFERENCES: Basemap 2009

Figure 8.1.3. SWMU 158 Background Exceedances - Surface Soil

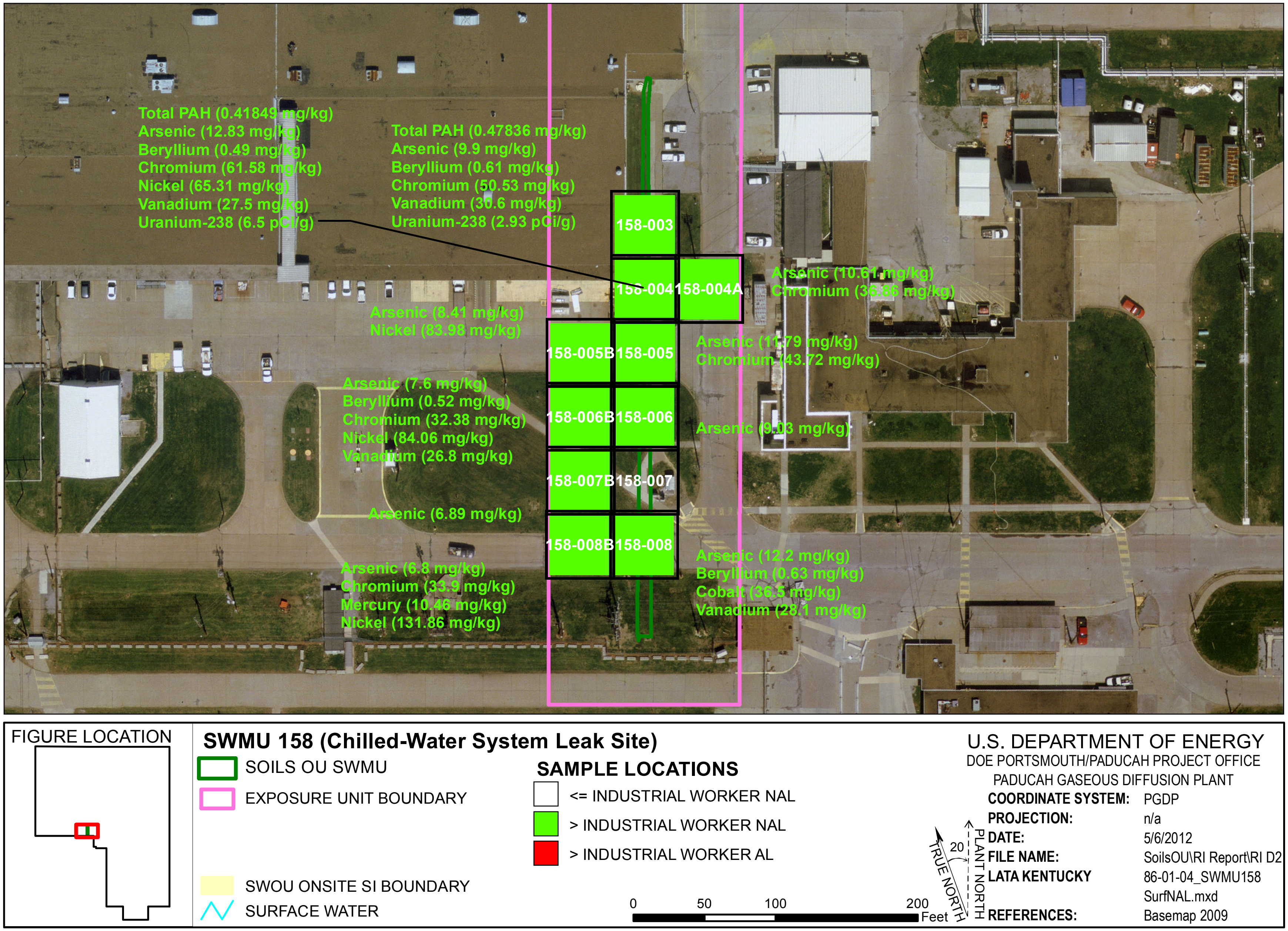


Figure 8.1.4. SWMU 158 NAL Exceedances - Surface Soil

Metals

Metals were detected above the industrial worker NALs in the SWMU 158 surface soil. The following are the metals detected above both background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Arsenic	4, 8
Chromium	3, 4, 4A, 5, 6B, 8B
Cobalt	8
Mercury	8B
Nickel	4, 5B, 6B, 8B

* SWMU 158 consists of one EU.

The administrative boundary of SWMU 158 is located inside grids 1 through 9. Grids 3A, 4A, 5B, 6B, and 8B are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 158, as described in the Work Plan (DOE 2010a).

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 158 surface soil.

The following are the metals detected in the SWMU 158 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	3. 4
Arsenic	4, 8
Barium	3, 8
Cadmium	4
Cobalt	8
Lead	4, 4A, 5, 5B, 6B, 8B
Manganese	8
Mercury	8B
Molybdenum[1]	4, 6B, 8
Nickel	4, 5B, 6B, 8B
Selenium	3, 4, 6B, 8
Thallium	4, 6B, 8
Uranium	3, 4, 5
Zinc	4, 5, 5B, 6B

* SWMU 158 consists of one EU.
[1] No background value is available.

Cobalt and manganese in grid 8, mercury in grid 8B, and nickel in grids 5B, 6B, and 8B were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

No PCBs were detected in the SWMU 158 surface soil.

SVOCs

Total PAHs were detected above the industrial worker NAL in the surface soil of grids 3 and 4. Grids 3 and 4 are located on the border of the area sampled for SWMU 158.

No SVOCs were detected above the industrial worker ALs in the SWMU 158 surface soil.

Pyrene and Total PAHs in grids 3 and 4 were detected above the SSL for the protection of UCRS groundwater and Total PAHs in grids 3 and 4 were detected above the SSL for the protection of RGA groundwater in the SWMU 158 surface soil.

VOCs

No surface soil samples from SWMU 158 were analyzed for VOCs.

Radionuclides

Uranium-238 was detected above both the background screening level and the industrial worker NAL in the surface soil of grids 3 and 4. Grids 3 and 4 are located on the border of the area sampled for SWMU 158.

No radionuclides were detected above both the background screening levels and the industrial worker ALs in the SWMU 158 surface soil.

Uranium-238 in grid 4 was detected above both the background screening level and the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

8.1.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 158, the representative data set for subsurface soils is presented in Tables 8.1.3 and 8.1.4 and provides the nature of contamination in SWMU 158 subsurface soils. Figures 8.1.5-8.1.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 158 subsurface soil contamination is considered adequately defined to support the BRA and FS. SWMU 158 consists of one EU.

Table 8.1.3. Subsurface Soil Historical Data Summary: SWMU 158 C-720 Chilled Water System Leak Site

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	3.70E+03	6.72E+03	5.21E+03	0/2	2/2	0/2	1.20E+04	0/2	3.32E+04	0/2	3.97E+06	0/2	2/2	1.6328 - 1.6328
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	0/2	0.5215 - 0.5215
METAL	Arsenic	mg/kg	3.33E+00	5.38E+00	4.36E+00	0/2	2/2	0/2	7.90E+00	2/2	9.97E-01	0/2	9.97E+01	0/2	2/2	0.0827 - 0.0827
METAL	Barium	mg/kg	3.06E+01	8.01E+01	5.54E+01	0/2	2/2	0/2	1.70E+02	0/2	5.92E+02	0/2	3.78E+05	0/2	0/2	0.0242 - 0.1709
METAL	Beryllium	mg/kg	4.62E-01	5.64E-01	5.13E-01	0/2	2/2	0/2	6.90E-01	2/2	1.40E-02	0/2	9.22E+00	0/2	0/2	0.1811 - 0.1811
METAL	Cadmium	mg/kg	2.49E-01	2.49E-01	2.49E-01	0/2	1/2	1/2	2.10E-01	0/2	3.16E+00	0/2	3.16E+02	0/2	0/2	0.2453 - 0.2453
METAL	Calcium	mg/kg	6.14E+02	9.09E+02	7.62E+02	0/2	2/2	0/2	6.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	6.6323 - 6.6323
METAL	Chromium	mg/kg	2.21E+01	7.18E+01	4.70E+01	0/2	2/2	1/2	4.30E+01	1/2	3.02E+01	0/2	3.02E+03	0/2	0/2	0.3826 - 0.3826
METAL	Cobalt	mg/kg	6.28E+00	1.02E+01	8.24E+00	0/2	2/2	0/2	1.30E+01	0/2	1.05E+01	0/2	1.52E+03	2/2	2/2	0.3725 - 0.3725
METAL	Copper	mg/kg	3.58E+00	6.89E+00	5.24E+00	0/2	2/2	0/2	2.50E+01	0/2	1.43E+03	0/2	2.24E+05	0/2	0/2	0.2113 - 0.2113
METAL	Iron	mg/kg	1.57E+04	1.70E+04	1.64E+04	0/2	2/2	0/2	2.80E+04	0/2	2.51E+04	0/2	3.92E+06	2/2	2/2	0.6677 - 23.597
METAL	Lead	mg/kg	8.23E+00	1.13E+01	9.77E+00	0/2	2/2	0/2	2.30E+01	0/2	4.00E+02	0/2	4.00E+02	0/2	0/2	2.4842 - 2.4842
METAL	Magnesium	mg/kg	3.29E+02	5.14E+02	4.22E+02	0/2	2/2	0/2	2.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	3.7451 - 6.7902
METAL	Manganese	mg/kg	3.64E+01	1.55E+02	9.57E+01	0/2	2/2	0/2	8.20E+02	0/2	2.58E+03	0/2	1.16E+05	1/2	2/2	0.2014 - 0.2014
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	1.30E-01	0/2	9.00E-01	0/2	7.85E+02	0/2	0/2	0.0078 - 0.0078
METAL	Nickel	mg/kg	4.20E+00	4.54E+00	4.37E+00	0/2	2/2	0/2	2.20E+01	0/2	4.28E+01	0/2	3.18E+04	0/2	2/2	1.2834 - 1.2834
METAL	Selenium	mg/kg	1.02E-01	1.02E-01	1.02E-01	0/2	1/2	0/2	7.00E-01	0/2	1.79E+02	0/2	2.80E+04	0/2	0/2	0.0891 - 0.0891
METAL	Silver	mg/kg	3.45E-01	3.45E-01	3.45E-01	0/2	1/2	0/2	2.70E+00	0/2	1.08E+01	0/2	9.15E+03	0/2	1/2	0.2914 - 0.2914
METAL	Sodium	mg/kg	2.12E+02	3.23E+02	2.68E+02	0/2	2/2	0/2	3.40E+02	0/2	n/a	0/2	n/a	n/a	n/a	11.074 - 11.074
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	3.40E-01	0/2	2.87E+00	0/2	4.48E+02	0/2	0/2	0.534 - 0.534
METAL	Vanadium	mg/kg	2.96E+01	3.53E+01	3.25E+01	0/2	2/2	0/2	3.70E+01	2/2	1.51E-01	0/2	9.30E+01	2/2	2/2	0.6021 - 0.6021
METAL	Zinc	mg/kg	6.91E+00	8.81E+00	7.86E+00	0/2	2/2	0/2	6.00E+01	0/2	1.08E+04	0/2	1.68E+06	0/2	0/2	0.0806 - 0.0806
PPCB	Total PCB	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.88E-01	0/2	1.88E+01	0/2	0/2	1 - 1
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.33 - 2.3
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.33 - 2.3
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.33 - 2.3
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.65 - 4.6
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.65 - 2.3
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.30E+00	0/2	3.91E+01	0/2	0/2	1.65 - 2.3
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.65 - 2.3
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.65 - 2.3
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.02E+02	0/2	1.81E+04	0/2	0/2	0.33 - 2.3
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.05E+03	0/2	1.22E+05	0/2	0/2	0.33 - 2.3
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.65 - 2.3

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 8.1.3. Subsurface Soil Historical Data Summary: SWMU 158 C-720 Chilled Water System Leak Site (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.33 - 2.3
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.01E+02	0/2	1.80E+04	0/2	0/2	0.33 - 2.3
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.87E+02	0/2	1.46E+04	0/2	0/2	0.33 - 2.3
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.17E-01	0/2	1.17E+01	0/2	0/2	0.33 - 2.3
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.3 - 2.3
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.24E+00	0/2	2.24E+02	0/2	0/2	0.33 - 2.3
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.22E-02	0/2	5.22E+00	0/2	0/2	0.33 - 2.3
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	1.65 - 2.3
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.33 - 2.3
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.65 - 2.3
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.49E+02	0/2	1.35E+04	0/2	0/2	0.33 - 2.3
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.92E-02	0/2	5.92E+00	0/2	0/2	-
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.89E-02	0/2	5.53E+00	0/2	0/2	0.7 - 0.9
VOA	*cis* -1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.74E+00	0/2	1.93E+02	0/2	0/2	0.7 - 0.9
VOA	*trans* -1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.07E+01	0/2	3.42E+02	0/2	0/2	0.7 - 0.9
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.69E-02	0/2	4.98E+00	0/2	0/2	0.7 - 0.9
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.04E-01	0/2	4.83E+01	0/2	0/2	0.7 - 0.9

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 8.1.4. Subsurface Soil RI Data Summary: SWMU 158, Chilled Water System Leak Site

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	5.92E+03	9.44E+03	8.09E+03	0/4	4/4	0/4	1.20E+04	0/4	3.32E+04	0/4	3.97E+06	0/4	4/4	5.3 - 5.7
METAL	Antimony	mg/kg	2.50E-01	5.40E-01	3.53E-01	0/4	4/4	4/4	2.10E-01	0/4	2.53E+00	0/4	1.51E+03	0/4	3/4	0.53 - 0.57
METAL	Arsenic	mg/kg	3.10E+00	1.17E+01	7.18E+00	0/34	15/34	5/34	7.90E+00	15/34	9.97E-01	0/34	9.97E+01	0/34	15/34	1.1 - 11
METAL	Barium	mg/kg	7.30E+01	1.55E+02	1.01E+02	0/4	4/4	0/4	1.70E+02	0/4	5.92E+02	0/4	3.78E+05	0/4	2/4	2.1 - 2.3
METAL	Beryllium	mg/kg	3.30E-01	7.50E-01	5.25E-01	0/4	4/4	1/4	6.90E-01	4/4	1.40E-02	0/4	9.22E+00	0/4	0/4	0.11 - 0.11
METAL	Cadmium	mg/kg	1.90E-02	8.70E-02	5.08E-02	0/4	4/4	0/4	2.10E-01	0/4	3.16E+00	0/4	3.16E+02	0/4	0/4	0.053 - 0.057
METAL	Calcium	mg/kg	1.50E+03	2.11E+04	8.40E+03	0/4	4/4	1/4	6.10E+03	0/4	n/a	0/4	n/a	n/a	n/a	53.3 - 56.6
METAL	Chromium	mg/kg	7.80E+00	5.04E+01	3.15E+01	0/34	13/34	3/34	4.30E+01	10/34	3.02E+01	0/34	3.02E+03	0/34	0/34	1.1 - 85
METAL	Cobalt	mg/kg	3.10E+00	6.90E+00	5.55E+00	0/4	4/4	0/4	1.30E+01	0/4	1.05E+01	0/4	1.52E+03	4/4	4/4	0.21 - 0.23
METAL	Copper	mg/kg	6.00E+00	2.66E+01	1.64E+01	0/34	5/34	1/34	2.50E+01	0/34	1.43E+03	0/34	2.24E+05	0/34	0/34	1.1 - 35
METAL	Iron	mg/kg	6.26E+03	2.73E+04	1.16E+04	0/34	34/34	0/34	2.80E+04	1/34	2.51E+04	0/34	3.92E+06	34/34	34/34	5.3 - 100
METAL	Lead	mg/kg	7.06E+00	2.94E+01	1.27E+01	0/34	33/34	3/34	2.30E+01	0/34	4.00E+02	0/34	4.00E+02	0/34	7/34	0.32 - 13
METAL	Magnesium	mg/kg	5.78E+02	2.26E+03	1.34E+03	0/4	4/4	1/4	2.10E+03	0/4	n/a	0/4	n/a	n/a	n/a	53.3 - 56.6
METAL	Manganese	mg/kg	5.89E+01	1.12E+03	3.41E+02	0/34	32/34	3/34	8.20E+02	0/34	2.58E+03	0/34	1.16E+05	23/34	32/34	0.21 - 85
METAL	Mercury	mg/kg	2.09E-02	8.90E+00	2.07E+00	0/34	5/34	2/34	1.30E-01	2/34	9.00E-01	0/34	7.85E+02	2/34	2/34	0.0356 - 10
METAL	Molybdenum	mg/kg	2.80E-01	1.10E+00	7.28E-01	0/34	4/34	0/34	n/a	0/34	1.79E+02	0/34	2.80E+04	0/34	4/34	0.53 - 15
METAL	Nickel	mg/kg	5.50E+00	9.35E+01	3.09E+01	0/34	8/34	4/34	2.20E+01	4/34	4.28E+01	0/34	3.18E+04	1/34	8/34	0.53 - 65
METAL	Selenium	mg/kg	1.00E+00	4.15E+00	1.55E+00	0/34	5/34	5/34	7.00E-01	0/34	1.79E+02	0/34	2.80E+04	0/34	5/34	0.53 - 20
METAL	Silver	mg/kg	2.90E-02	1.47E+01	1.66E+00	0/34	5/34	1/34	2.70E+00	1/34	1.08E+01	0/34	9.15E+03	1/34	2/34	0.21 - 10
METAL	Sodium	mg/kg	5.06E+01	3.57E+02	2.56E+02	0/4	4/4	2/4	3.40E+02	0/4	n/a	0/4	n/a	n/a	n/a	21.3 - 22.7
METAL	Thallium	mg/kg	1.40E-01	3.50E-01	2.40E-01	0/4	4/4	1/4	3.40E-01	0/4	2.87E+00	0/4	4.48E+02	0/4	3/4	0.21 - 0.23
METAL	Uranium	mg/kg	9.10E-01	8.54E+00	3.13E+00	0/34	6/34	2/34	4.60E+00	0/34	1.07E+02	0/34	1.65E+04	0/34	0/34	0.02 - 20
METAL	Vanadium	mg/kg	1.47E+01	3.21E+01	2.58E+01	0/4	4/4	0/4	3.70E+01	4/4	1.51E-01	0/4	9.30E+01	4/4	4/4	1.1 - 1.1
METAL	Zinc	mg/kg	1.23E+01	6.77E+01	3.07E+01	0/34	34/34	1/34	6.00E+01	0/34	1.08E+04	0/34	1.68E+06	0/34	31/34	2.1 - 25
PPCB	Total PCB	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	1.88E-01	0/14	1.88E+01	0/14	0/14	0.33 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.36 - 0.37
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.36 - 0.37
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.36 - 0.37
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.30E+00	0/2	3.91E+01	0/2	0/2	1.8 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 1.8
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.02E+02	0/2	1.81E+04	0/2	0/2	0.36 - 0.37
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Anthracene	mg/kg	4.20E-02	4.20E-02	4.20E-02	1/2	1/2	0/2	n/a	0/2	4.05E+03	0/2	1.22E+05	0/2	0/2	0.36 - 0.37
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 8.1.4. Subsurface Soil RI Data Summary: SWMU 158, Chilled Water System Leak Site (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Benzo(ghi)perylene	mg/kg	5.50E-02	5.50E-02	5.50E-02	1/2	1/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 1.8
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.0072 - 0.0075
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.36 - 0.37
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Fluoranthene	mg/kg	2.10E-01	2.10E-01	2.10E-01	1/2	1/2	0/2	n/a	0/2	6.01E+02	0/2	1.80E+04	0/2	0/2	0.36 - 0.37
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.87E+02	0/2	1.46E+04	0/2	0/2	0.36 - 0.37
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.17E-01	0/2	1.17E+01	0/2	0/2	0.36 - 0.37
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.72 - 0.75
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.24E+00	0/2	2.24E+02	0/2	0/2	0.36 - 0.37
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.22E-02	0/2	5.22E+00	0/2	0/2	0.0072 - 0.0075
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	1.8 - 1.8
SVOA	Phenanthrene	mg/kg	2.10E-01	2.10E-01	2.10E-01	1/2	1/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.36 - 0.37
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 1.8
SVOA	Pyrene	mg/kg	2.00E-01	2.00E-01	2.00E-01	1/2	1/2	0/2	n/a	0/2	4.49E+02	0/2	1.35E+04	0/2	0/2	0.36 - 0.37
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.72 - 0.75
SVOA	Total PAH	mg/kg	9.74E-02	9.74E-02	9.74E-02	0/2	1/2	0/2	n/a	1/2	5.92E-02	0/2	5.92E+00	0/2	1/2	-
RADS	Alpha activity	pCi/g	2.47E+01	3.58E+01	3.03E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.4 - 5.2
RADS	Americium-241	pCi/g	2.00E-03	5.00E-03	3.50E-03	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.022 - 0.024
RADS	Beta activity	pCi/g	2.72E+01	2.95E+01	2.84E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.8 - 3.2
RADS	Cesium-137	pCi/g	-1.00E-02	1.80E-02	4.00E-03	0/2	2/2	0/2	2.80E-01	0/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.083 - 0.1
RADS	Neptunium-237	pCi/g	-1.70E-03	6.20E-03	2.25E-03	0/2	2/2	0/2	n/a	0/2	2.71E-01	0/2	2.71E+01	0/2	1/2	0.0083 - 0.018
RADS	Plutonium-238	pCi/g	1.20E-02	1.30E-02	1.25E-02	0/2	2/2	0/2	n/a	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.014 - 0.015
RADS	Plutonium-239/240	pCi/g	4.00E-04	2.30E-03	1.35E-03	0/2	2/2	0/2	n/a	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.0061 - 0.015
RADS	Technetium-99	pCi/g	7.00E-03	1.60E-01	8.35E-02	0/2	2/2	0/2	2.80E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	0/2	0.48 - 0.54
RADS	Thorium-228	pCi/g	7.30E-01	7.90E-01	7.60E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	8.20E-01	8.40E-01	8.30E-01	0/2	2/2	0/2	1.40E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.01 - 0.02
RADS	Thorium-232	pCi/g	7.60E-01	7.80E-01	7.70E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.007 - 0.01
RADS	Uranium-234	pCi/g	6.19E-01	7.60E-01	6.90E-01	0/2	2/2	0/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.013 - 0.02
RADS	Uranium-235/236	pCi/g	3.60E-02	5.30E-02	4.45E-02	0/2	2/2	0/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.009 - 0.016
RADS	Uranium-238	pCi/g	7.20E-01	7.90E-01	7.55E-01	0/2	2/2	0/2	1.20E+00	0/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.007 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

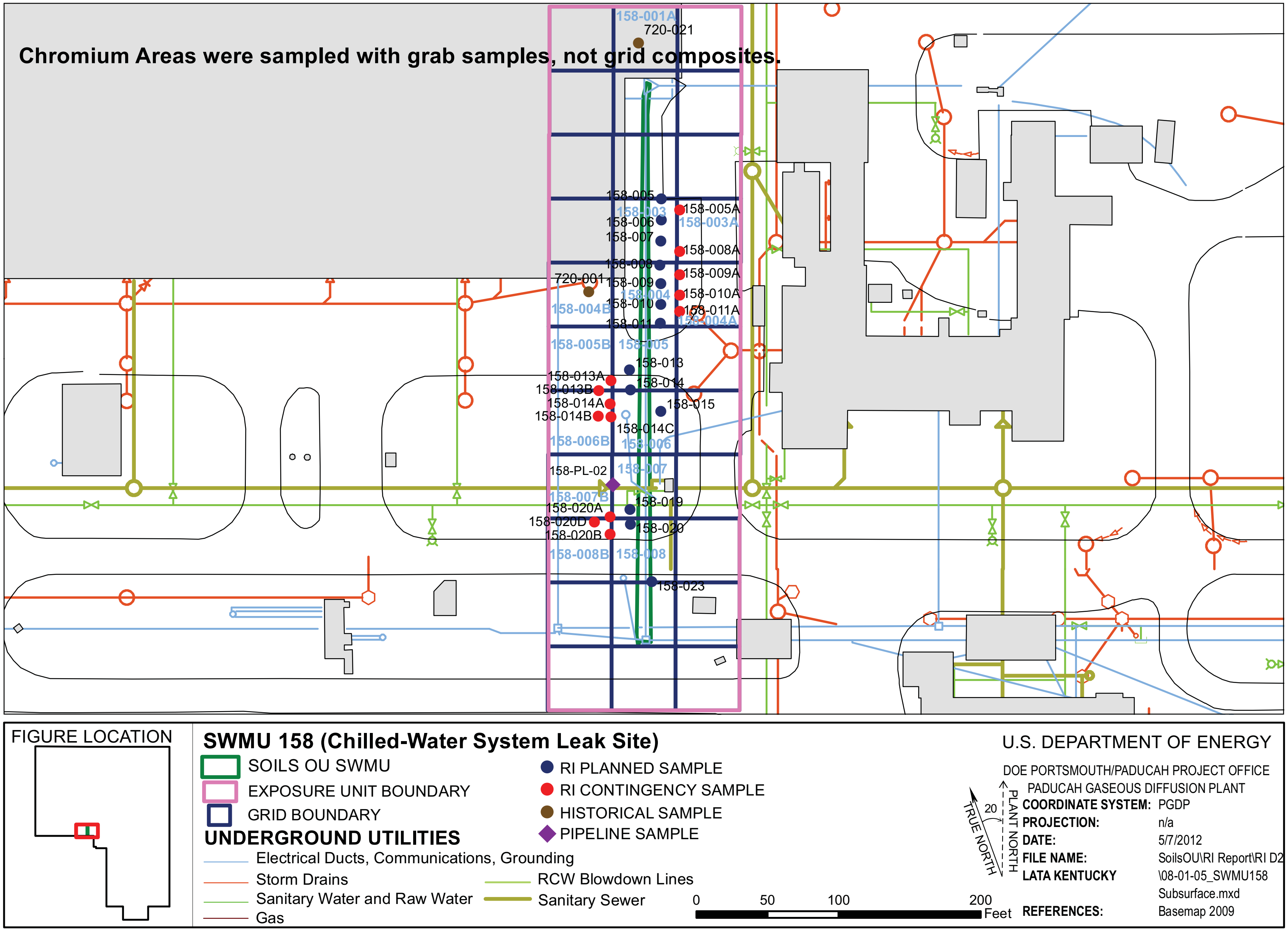


Figure 8.1.5. SWMU 158 Sample Locations - Subsurface Soil

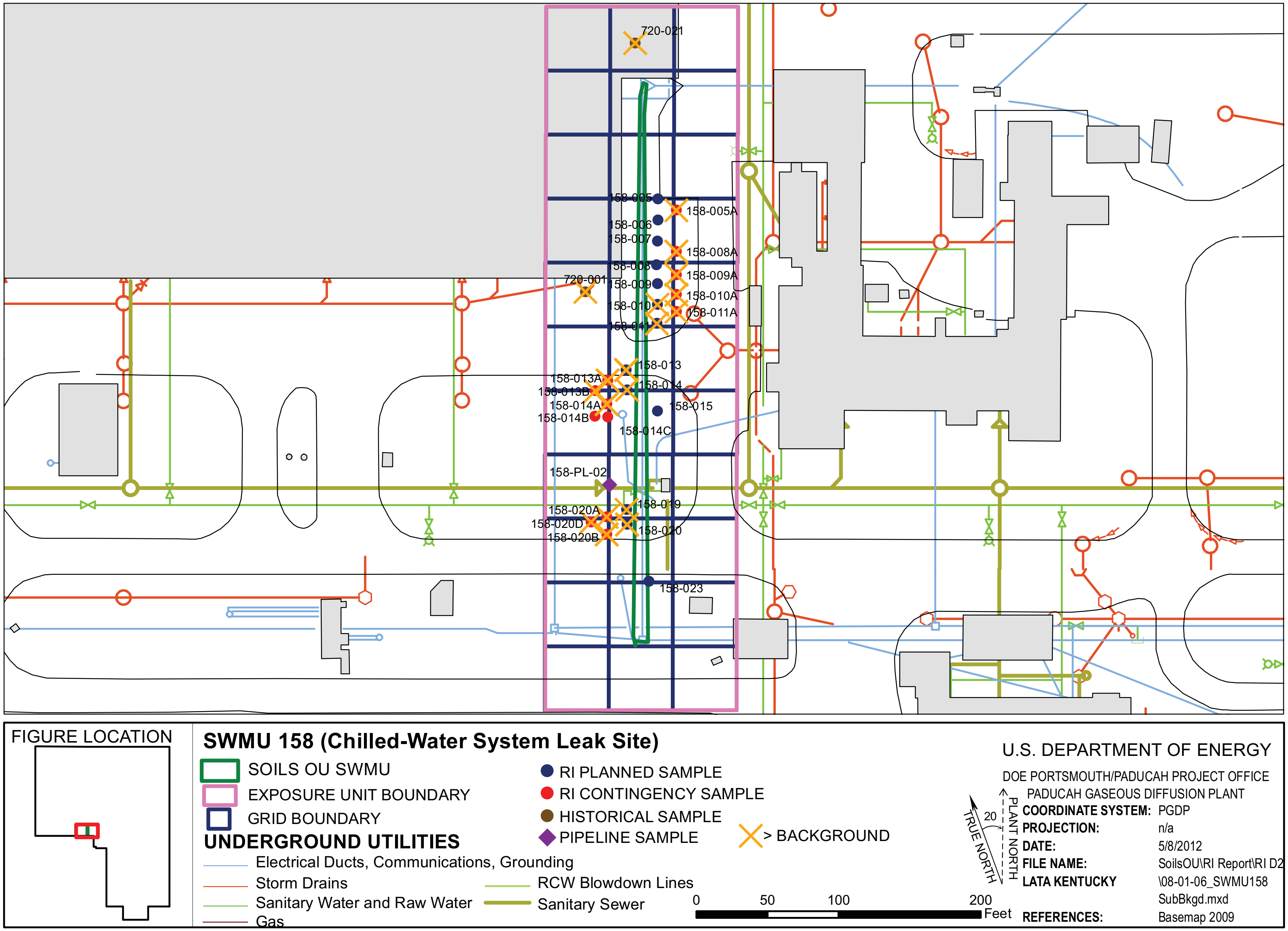


Figure 8.1.6. SWMU 158 Background Exceedances - Subsurface Soil

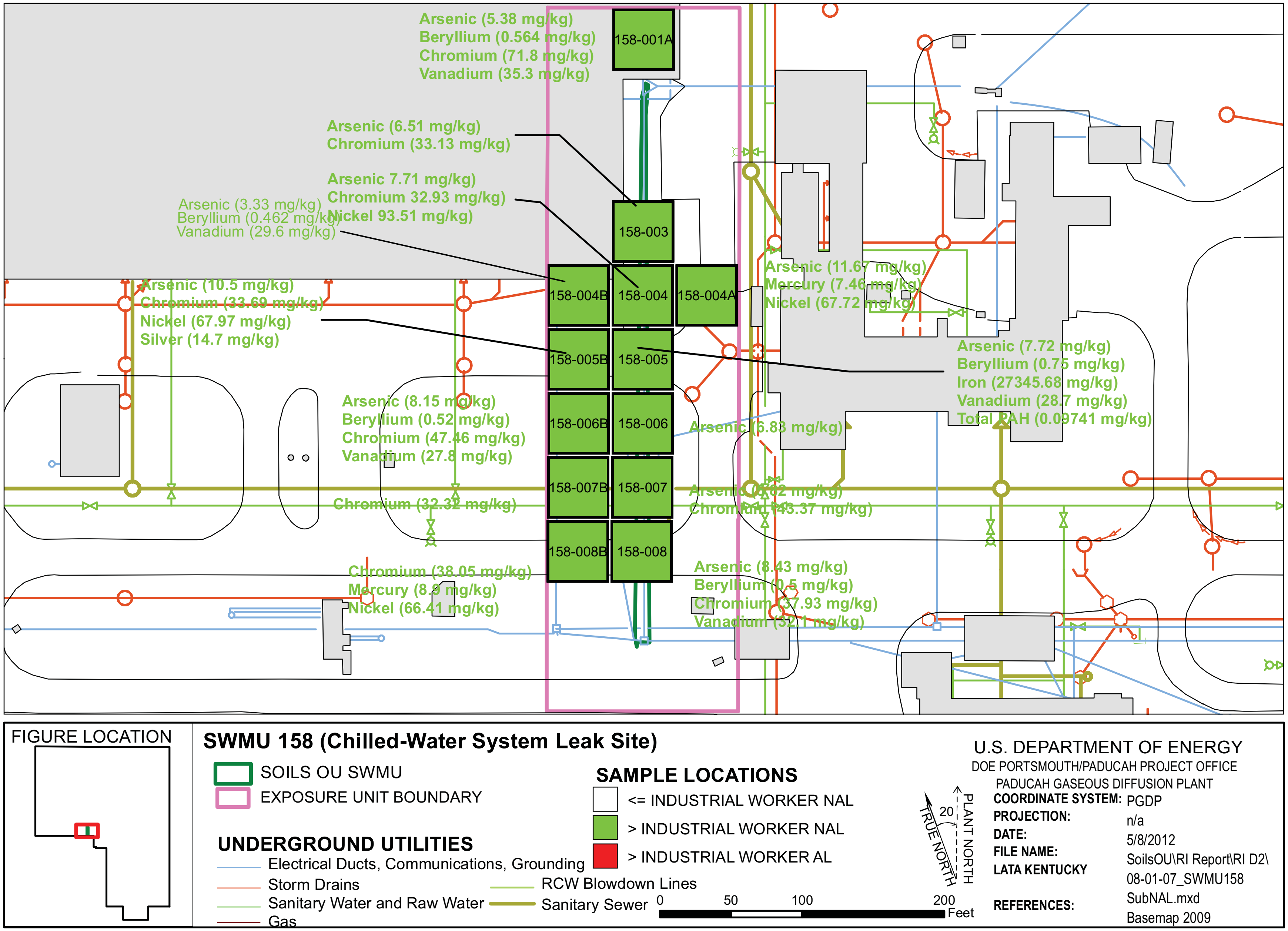


Figure 8.1.7. SWMU 158 NAL Exceedances - Subsurface Soil

Metals

Metals were detected above the industrial worker NALs in the SWMU 158 subsurface soil. The following are the metals detected above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Arsenic	4A, 5B, 6B, 8
Beryllium	5
Chromium	1A, 6B, 7
Mercury	4A, 8B
Nickel	4, 4A, 5B, 8B
Silver	5B

* SWMU 158 consists of one EU.

The administrative boundary of SWMU 158 is located inside grids 1 through 9. Grids 1A, 3A, 4A, 4B, 5B, 6B, 7B, and 8B are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 158, as described in the Work Plan (DOE 2010a).

The maximum depth at which metals were detected (in samples associated with this RI Report) above both background screening levels and the industrial worker NALs was 15 ft bgs. The end depths of the boreholes taken from the grids listed above ranged from 1 to 20 ft bgs; however, only results for samples taken at or above 16 ft bgs were included in this RI, per the Work Plan (DOE 2010a).

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 158 subsurface soil.

The following are the metals detected in the SWMU 158 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS and the grids in which they were detected.

Metal	Grid
Antimony	5, 6B, 8
Arsenic	4A, 5B, 6B, 8
Lead	8B
Manganese	5B, 6B, 8B
Mercury	4A, 8B
Molybdenum[1]	5, 6B, 8
Nickel	4, 4A, 5B, 8B
Selenium	5, 6B, 7B, 8
Silver	5B
Thallium	6B
Zinc	6B

* SWMU 158 consists of one EU.
[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids in which they were detected.

Metal	Grid
Manganese	5B, 6B, 8B
Mercury	4A, 8B
Nickel	4
Silver	5B

* SWMU 158 consists of one EU.

PCBs

No PCBs were detected in the SWMU 158 subsurface soil.

SVOCs

Of the SVOCs, Total PAHs were detected above the industrial worker NAL in the subsurface soil of grid 5. The detection was at 4 ft bgs, which also was the end depth of the borehole. Grid 5 is located on the border of the area sampled for SWMU 158.

No SVOCs were detected above the industrial worker ALs in the SWMU 158 subsurface soil.

Total PAHs in grid 5 were detected above the SSLs for the protection of UCRS groundwater, but no SVOCs were detected above the SSLs for the protection of RGA groundwater.

VOCs

No VOCs were detected in the SWMU 158 subsurface soil.

Radionuclides

No radionuclides were detected above both the background screening levels and the industrial worker NALs or ALs in the SWMU 158 subsurface soil.

Neptunium-237 (no background value available) in grid 5 was detected above the SSL for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

8.1.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no potential for significant runoff because SWMU 158 is an underground pipeline. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

8.1.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health from SWMU 158 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for SWMU 158 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 8.1.5 for the future industrial worker and the hypothetical resident. The excavation worker did not have any identified COCs. Table 8.1.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs from SWMU 158 include metals. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 8.1.6.

Table 8.1.5. RGOs for SWMU 158

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	**COC**	**EPC[1]**	**Units**	**ELCR[2]**	**1 x 10^{-6}**	**1 x 10^{-5}**	**1 x 10^{-4}**	**HI[4]**	**0.1**	**1**	**3**
				Future Industrial Worker							
1	Arsenic	1.01E+01	mg/kg	1.0E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Chromium	6.07E+01	mg/kg	2.0E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Total PAH	3.69E-01	mg/kg	6.2E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-238	3.79E+00	pCi/g	2.2E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**2.1E-05**				**< 1**			
				Hypothetical Resident[5]							
1	Arsenic	1.01E+01	mg/kg	4.3E-05	2.35E-01	2.35E+00	2.35E+01	0.6	1.64E+00	1.64E+01	4.93E+01
	Chromium	6.07E+01	mg/kg	3.9E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Cobalt	1.62E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.7	2.30E+00	2.30E+01	6.91E+01
	Manganese	9.91E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	5.34E+02	5.34E+03	1.60E+04
	Mercury	1.05E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.4	2.35E+00	2.35E+01	7.04E+01
	Total PAH	3.69E-01	mg/kg	1.9E-05	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium-235	1.63E-01	pCi/g	2.1E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	3.79E+00	pCi/g	1.1E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**7.9E-05**				**2.0**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.46, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.46, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 8.1.6 Ecological Screening for SWMU 158

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg) [b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Soil/grass, soil/gravel mix, and concrete pavement	Yes	167	Mercury	2.00E-01	1.05E+01	1.00E-01	105
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

8.1.7 SWMU 158 Summary

The following text summarizes the results for SWMU 158 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Plant processes that could have contributed to contamination at this area are releases of chromated water from the chilled water system.

COPCs for surface and subsurface soils from SWMU 158 are shown on Tables 8.1.1–8.1.4 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The COPCs for SWMU 158 in the surface and subsurface soil are metals, SVOCs, and radionuclides. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 15 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 158 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no other known underground pipelines at SWMU 158. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 158.

- Future Industrial Worker

  — Arsenic
  — Chromium
  — Total PAHs
  — Uranium-238

- Excavation worker
  - None

- Hypothetical Resident (hazards evaluated against the child resident)
  - Arsenic
  - Chromium
  - Cobalt
  - Manganese
  - Mercury
  - Total PAHs
  - Uranium-235
  - Uranium-238

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 158. There are no priority COCs for other scenarios.

For SWMU 158, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Mercury
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 158 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 158 is not adjacent to other SWMUs, but is close to the eastern boundary of SWMU 211B, the C-720 TCE Spill Site Southeast, which is part of the GWOU and is considered one of the sources of the Southwest Plume. Although they are close together, a response action at either is not expected to affect the other. The metal contaminants at SWMU 158 do not migrate, and the contaminants at SWMU 211B migrate toward the north-northwest, away from SWMU 158 (DOE 2011b). In the event that the response actions occur simultaneously, the only impacts would be logistical, as would be the impacts of working close to the C-720 Maintenance and Stores Building, an active support facility for uranium enrichment operations.

8.1.8 SWMU 158 Summary

The RI adequately defined the nature and extent of contamination in soils at SWMU 158; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial as shown in the SMP (DOE 2012a).

8.2 SWMU 169, C-410-E HF VENT SURGE PROTECTION TANK

8.2.1 Background

The C-410-E HF Vent Surge Protection Tank (SWMU 169) is located in the east central portion of the plant site. The tank had an approximate volume of 150 gal and was operated from 1952 to 1977. There is no direct connection from this SWMU to a surface water body and is less than 0.5 acres.

The tank was an aboveground tank that was used for surge protection. It is part of a system that produced HF for the feed facility. Visual observation of staining on the ground indicated probable release of materials from the tank.

The 1992 SAR indicates that sampling of the aboveground tank found chromium present.

8.2.2 Fieldwork Summary

The 10 grab samples planned were collected successfully. Field laboratory results indicated that contingency samples were needed to determine the lateral and vertical extent of contamination. Twenty-four of the 26 contingency samples were collected. Sampling was limited due to utilities. Field laboratory results had elevated concentrations of cadmium, chromium, copper, lead, manganese, nickel, PCBs, uranium, and zinc. Figure A.13 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 8.2.1) using a FIDLER; the 34 measurements ranged from 6,873 to 11,755 gross cpm. The area is mostly soil and grass with a “hint” of gravel. A judgmental grab sample was collected for radiological constituents, although gamma walkover survey results were consistent with background.

8.2.3 Nature and Extent of Contamination—Surface Soils

For SWMU 169, the representative data set for surface soils is presented in Tables 8.2.1 and 8.2.2 and provides the nature of the contamination in SWMU 169 surface soils. Figures 8.2.2-8.2.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

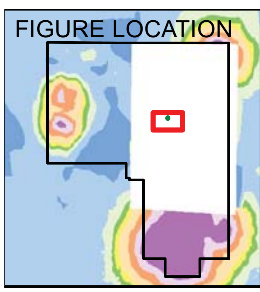
The horizontal extent of SWMU 169 surface soil contamination is considered adequately defined to support the BRA and FS. SWMU 169 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 169 surface soil. The following are the metals detected above both background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Arsenic	5, 8
Beryllium	2, 3
Chromium	2, 3, 4, 5, 8
Iron	5
Mercury	2
Nickel	1, 2, 3, 5, 8

* SWMU 169 consists of one EU.



SWMU 169 (HF Vent Surge Protection Tank)

SOILS OU SWMU

GAMMA WALKOVER SURVEY RESULTS [1]

- < 10,300 net CPM
- ≥ 10,300 net CPM

10,300 net CPM was calculated as 171 pCi/g U-238

[1]Only results within SWMU boundary presented.

0 12.5 25 50 Feet

TRUE NORTH 20 PLANT NORTH

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

COORDINATE SYSTEM:	PGDP
PROJECTION:	n/a
DATE:	5/7/2012
FILE NAME:	SoilsOU\RI Report\RI D2\
LATA KENTUCKY	08-02-01_SWMU169 GWS.mxd
REFERENCES:	Basemap 2009

Figure 8.2.1. SWMU 169 Gamma Walkover Survey

Table 8.2.1. Surface Soil Historical Data Summary: SWMU 169 C-410-E HF Vent Surge Protection Tank

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	8.34E+03	1.27E+04	1.09E+04	0/3	3/3	0/3	1.30E+04	0/3	3.32E+04	0/3	3.97E+06	0/3	3/3	-
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.10E-01	0/3	2.53E+00	0/3	1.51E+03	0/3	0/3	-
METAL	Arsenic	mg/kg	4.80E+00	6.10E+00	5.58E+00	0/3	3/3	0/3	1.20E+01	3/3	9.97E-01	0/3	9.97E+01	0/3	3/3	-
METAL	Barium	mg/kg	7.07E+01	8.82E+01	7.69E+01	0/3	3/3	0/3	2.00E+02	0/3	5.92E+02	0/3	3.78E+05	0/3	1/3	-
METAL	Beryllium	mg/kg	5.50E-01	8.00E-01	7.03E-01	0/3	3/3	2/3	6.70E-01	3/3	1.40E-02	0/3	9.22E+00	0/3	0/3	-
METAL	Cadmium	mg/kg	6.10E-01	6.10E-01	6.10E-01	0/3	1/3	1/3	2.10E-01	0/3	3.16E+00	0/3	3.16E+02	0/3	1/3	-
METAL	Calcium	mg/kg	3.86E+04	1.79E+05	1.31E+05	0/3	3/3	0/3	2.00E+05	0/3	n/a	0/3	n/a	n/a	n/a	-
METAL	Chromium	mg/kg	1.80E+01	2.88E+01	2.26E+01	0/3	3/3	3/3	1.60E+01	0/3	3.02E+01	0/3	3.02E+03	0/3	0/3	-
METAL	Cobalt	mg/kg	6.30E+00	6.30E+00	6.30E+00	0/3	1/3	0/3	1.40E+01	0/3	1.05E+01	0/3	1.52E+03	1/3	1/3	-
METAL	Copper	mg/kg	9.60E+00	1.01E+02	4.08E+01	0/3	3/3	1/3	1.90E+01	0/3	1.43E+03	0/3	2.24E+05	0/3	1/3	-
METAL	Iron	mg/kg	1.14E+04	1.97E+04	1.48E+04	0/3	3/3	0/3	2.80E+04	0/3	2.51E+04	0/3	3.92E+06	3/3	3/3	-
METAL	Lead	mg/kg	1.38E+01	2.40E+01	2.04E+01	3/3	3/3	0/3	3.60E+01	0/3	4.00E+02	0/3	4.00E+02	0/3	3/3	-
METAL	Magnesium	mg/kg	2.48E+03	6.20E+03	3.88E+03	0/3	3/3	0/3	7.70E+03	0/3	n/a	0/3	n/a	n/a	n/a	-
METAL	Manganese	mg/kg	3.30E+02	3.63E+02	3.42E+02	0/3	3/3	0/3	1.50E+03	0/3	2.58E+03	0/3	1.16E+05	3/3	3/3	-
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.00E-01	0/3	9.00E-01	0/3	7.85E+02	0/3	0/3	-
METAL	Nickel	mg/kg	9.90E+00	6.99E+01	3.14E+01	0/3	3/3	1/3	2.10E+01	1/3	4.28E+01	0/3	3.18E+04	0/3	3/3	-
METAL	Selenium	mg/kg	3.60E-01	6.40E-01	4.67E-01	0/3	3/3	0/3	8.00E-01	0/3	1.79E+02	0/3	2.80E+04	0/3	3/3	-
METAL	Silver	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.30E+00	0/3	1.08E+01	0/3	9.15E+03	0/3	0/3	-
METAL	Sodium	mg/kg	1.21E+02	2.17E+02	1.74E+02	0/3	3/3	0/3	3.20E+02	0/3	n/a	0/3	n/a	n/a	n/a	-
METAL	Thallium	mg/kg	4.60E-01	4.60E-01	4.60E-01	0/3	1/3	1/3	2.10E-01	0/3	2.87E+00	0/3	4.48E+02	0/3	1/3	-
METAL	Vanadium	mg/kg	2.28E+01	2.94E+01	2.62E+01	0/3	3/3	0/3	3.80E+01	3/3	1.51E-01	0/3	9.30E+01	3/3	3/3	-
METAL	Zinc	mg/kg	8.89E+01	1.31E+02	1.14E+02	0/3	3/3	3/3	6.50E+01	0/3	1.08E+04	0/3	1.68E+06	0/3	3/3	-
PPCB	Total PCB	mg/kg	8.00E-01	3.20E+00	2.17E+00	0/3	3/3	0/3	n/a	3/3	1.88E-01	0/3	1.88E+01	0/3	3/3	0.1 - 0.1

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 8.2.2. Surface Soil RI Data Summary: SWMU 169, C-410-E HF Vent Surge Protection Tank

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	1.32E+04	1.42E+04	1.37E+04	0/2	2/2	2/2	1.30E+04	0/2	3.32E+04	0/2	3.97E+06	0/2	2/2	5.8 - 6.2
METAL	Antimony	mg/kg	3.00E-01	1.30E+00	8.00E-01	0/2	2/2	2/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	2/2	0.58 - 0.62
METAL	Arsenic	mg/kg	6.27E+00	2.03E+01	1.07E+01	0/14	9/14	2/14	1.20E+01	9/14	9.97E-01	0/14	9.97E+01	1/14	9/14	1.2 - 11
METAL	Barium	mg/kg	9.59E+01	1.48E+02	1.22E+02	0/2	2/2	0/2	2.00E+02	0/2	5.92E+02	0/2	3.78E+05	0/2	2/2	2.3 - 2.5
METAL	Beryllium	mg/kg	3.80E-01	5.80E-01	4.80E-01	0/2	2/2	0/2	6.70E-01	2/2	1.40E-02	0/2	9.22E+00	0/2	0/2	0.12 - 0.12
METAL	Cadmium	mg/kg	1.40E-01	3.40E-01	2.40E-01	0/2	2/2	1/2	2.10E-01	0/2	3.16E+00	0/2	3.16E+02	0/2	0/2	0.058 - 0.062
METAL	Calcium	mg/kg	3.11E+03	3.57E+04	1.94E+04	0/2	2/2	0/2	2.00E+05	0/2	n/a	0/2	n/a	n/a	n/a	57.8 - 62.1
METAL	Chromium	mg/kg	2.97E+01	2.15E+02	6.05E+01	0/14	10/14	10/14	1.60E+01	9/14	3.02E+01	0/14	3.02E+03	0/14	0/14	1.2 - 85
METAL	Cobalt	mg/kg	5.40E+00	6.30E+00	5.85E+00	0/2	2/2	0/2	1.40E+01	0/2	1.05E+01	0/2	1.52E+03	2/2	2/2	0.23 - 0.25
METAL	Copper	mg/kg	2.28E+01	3.74E+02	6.12E+01	0/14	12/14	12/14	1.90E+01	0/14	1.43E+03	0/14	2.24E+05	0/14	3/14	1.2 - 35
METAL	Iron	mg/kg	6.54E+03	4.16E+04	1.82E+04	0/14	14/14	1/14	2.80E+04	2/14	2.51E+04	0/14	3.92E+06	14/14	14/14	5.8 - 100
METAL	Lead	mg/kg	1.08E+01	1.54E+02	4.78E+01	0/14	14/14	7/14	3.60E+01	0/14	4.00E+02	0/14	4.00E+02	0/14	11/14	0.35 - 13
METAL	Magnesium	mg/kg	2.41E+03	2.66E+03	2.54E+03	0/2	2/2	0/2	7.70E+03	0/2	n/a	0/2	n/a	n/a	n/a	57.8 - 62.1
METAL	Manganese	mg/kg	1.45E+02	6.08E+02	2.81E+02	0/14	13/14	0/14	1.50E+03	0/14	2.58E+03	0/14	1.16E+05	13/14	13/14	0.23 - 85
METAL	Mercury	mg/kg	2.42E-02	7.87E+00	1.60E+00	0/14	3/14	1/14	2.00E-01	1/14	9.00E-01	0/14	7.85E+02	1/14	1/14	0.0386 - 10
METAL	Molybdenum	mg/kg	8.50E-01	6.27E+00	2.15E+00	0/14	3/14	0/14	n/a	0/14	1.79E+02	0/14	2.80E+04	1/14	3/14	0.58 - 15
METAL	Nickel	mg/kg	1.88E+01	5.49E+02	1.38E+02	0/14	8/14	7/14	2.10E+01	7/14	4.28E+01	0/14	3.18E+04	7/14	8/14	0.58 - 65
METAL	Selenium	mg/kg	1.30E+00	1.50E+00	1.40E+00	0/14	2/14	2/14	8.00E-01	0/14	1.79E+02	0/14	2.80E+04	0/14	2/14	0.58 - 20
METAL	Silver	mg/kg	2.80E-02	7.90E-02	5.35E-02	0/14	2/14	0/14	2.30E+00	0/14	1.08E+01	0/14	9.15E+03	0/14	1/14	0.23 - 10
METAL	Sodium	mg/kg	2.31E+02	4.18E+02	3.25E+02	0/2	2/2	1/2	3.20E+02	0/2	n/a	0/2	n/a	n/a	n/a	23.1 - 24.8
METAL	Thallium	mg/kg	2.70E-01	3.10E-01	2.90E-01	0/2	2/2	2/2	2.10E-01	0/2	2.87E+00	0/2	4.48E+02	0/2	2/2	0.23 - 0.25
METAL	Uranium	mg/kg	3.00E+00	5.03E+01	2.12E+01	0/15	12/15	11/15	4.90E+00	0/15	1.07E+02	0/15	1.65E+04	0/15	7/15	0.07 - 20
METAL	Vanadium	mg/kg	3.30E+01	3.74E+01	3.52E+01	0/2	2/2	0/2	3.80E+01	2/2	1.51E-01	0/2	9.30E+01	2/2	2/2	1.2 - 1.2
METAL	Zinc	mg/kg	1.48E+01	4.73E+02	1.07E+02	0/14	14/14	11/14	6.50E+01	0/14	1.08E+04	0/14	1.68E+06	0/14	13/14	2.3 - 25
PPCB	Total PCB	mg/kg	6.80E+00	1.00E+01	7.60E+00	0/5	2/5	0/5	n/a	2/5	1.88E-01	0/5	1.88E+01	2/5	2/5	0.35 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.9 - 1.9
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.38 - 0.38
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Anthracene	mg/kg	6.60E-02	6.60E-02	6.60E-02	1/1	1/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.38 - 0.38
SVOA	Benzenemethanol	mg/kg	5.90E-02	5.90E-02	5.90E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 8.2.2. Surface Soil RI Data Summary: SWMU 169, C-410-E HF Vent Surge Protection Tank (Continued)

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Industrial Worker FOE	Industrial Worker NAL	Industrial Worker FOE	Industrial Worker AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
SVOA	Benzo(ghi)perylene	mg/kg	2.80E+00	2.80E+00	2.80E+00	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0076 - 0.0076
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	2.70E-01	2.70E-01	2.70E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Fluoranthene	mg/kg	2.00E+00	2.00E+00	2.00E+00	0/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	1/1	0.38 - 0.38
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.76 - 0.76
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.38 - 0.38
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0076 - 0.0076
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.9 - 1.9
SVOA	Phenanthrene	mg/kg	3.60E-01	3.60E-01	3.60E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Pyrene	mg/kg	1.80E+00	1.80E+00	1.80E+00	0/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	1/1	0.38 - 0.38
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.76 - 0.76
SVOA	Total PAH	mg/kg	4.59E+00	4.59E+00	4.59E+00	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	1/1	1/1	-
RADS	Alpha activity	pCi/g	2.37E+01	2.66E+01	2.52E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.4 - 5.2
RADS	Americium-241	pCi/g	1.60E-03	1.30E-02	7.30E-03	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.015 - 0.016
RADS	Beta activity	pCi/g	3.38E+01	3.70E+01	3.54E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.2 - 3.4
RADS	Cesium-137	pCi/g	4.80E-02	2.15E-01	1.32E-01	0/2	2/2	0/2	4.90E-01	1/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.068 - 0.15
RADS	Neptunium-237	pCi/g	1.00E-02	3.20E-02	2.10E-02	0/2	2/2	0/2	1.00E-01	0/2	2.71E-01	0/2	2.71E+01	0/2	2/2	0.02 - 0.023
RADS	Plutonium-238	pCi/g	2.10E-02	2.70E-02	2.40E-02	1/2	2/2	0/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.014 - 0.015
RADS	Plutonium-239/240	pCi/g	1.20E-02	5.30E-02	3.25E-02	1/2	2/2	1/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.006 - 0.007
RADS	Technetium-99	pCi/g	2.01E+00	4.69E+00	3.35E+00	0/2	2/2	1/2	2.50E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	2/2	0.5 - 0.51
RADS	Thorium-228	pCi/g	5.36E-01	1.05E+00	7.93E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.024 - 0.04
RADS	Thorium-230	pCi/g	1.20E+00	1.27E+00	1.24E+00	0/2	2/2	0/2	1.50E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.02 - 0.03
RADS	Thorium-232	pCi/g	4.75E-01	9.50E-01	7.13E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.016 - 0.03
RADS	Uranium-234	pCi/g	2.63E+00	6.55E+00	4.59E+00	0/2	2/2	2/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.02 - 0.03
RADS	Uranium-235/236	pCi/g	1.16E-01	4.60E-01	2.88E-01	0/2	2/2	2/2	6.00E-02	1/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.019 - 0.023
RADS	Uranium-238	pCi/g	3.03E+00	8.12E+00	5.58E+00	0/2	2/2	2/2	1.20E+00	2/2	1.70E+00	0/2	1.70E+02	0/2	1/2	0.02 - 0.03

One or more samples exceed AL value[1]

One or more samples exceed NAL value[2]

One or more samples exceed background value

One or more samples exceed groundwater protection screening

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.

[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.

Thallium metal results are compared to thallium chloride action levels/no action levels.

Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).

Field replicates, or separate samples are counted independently.

The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

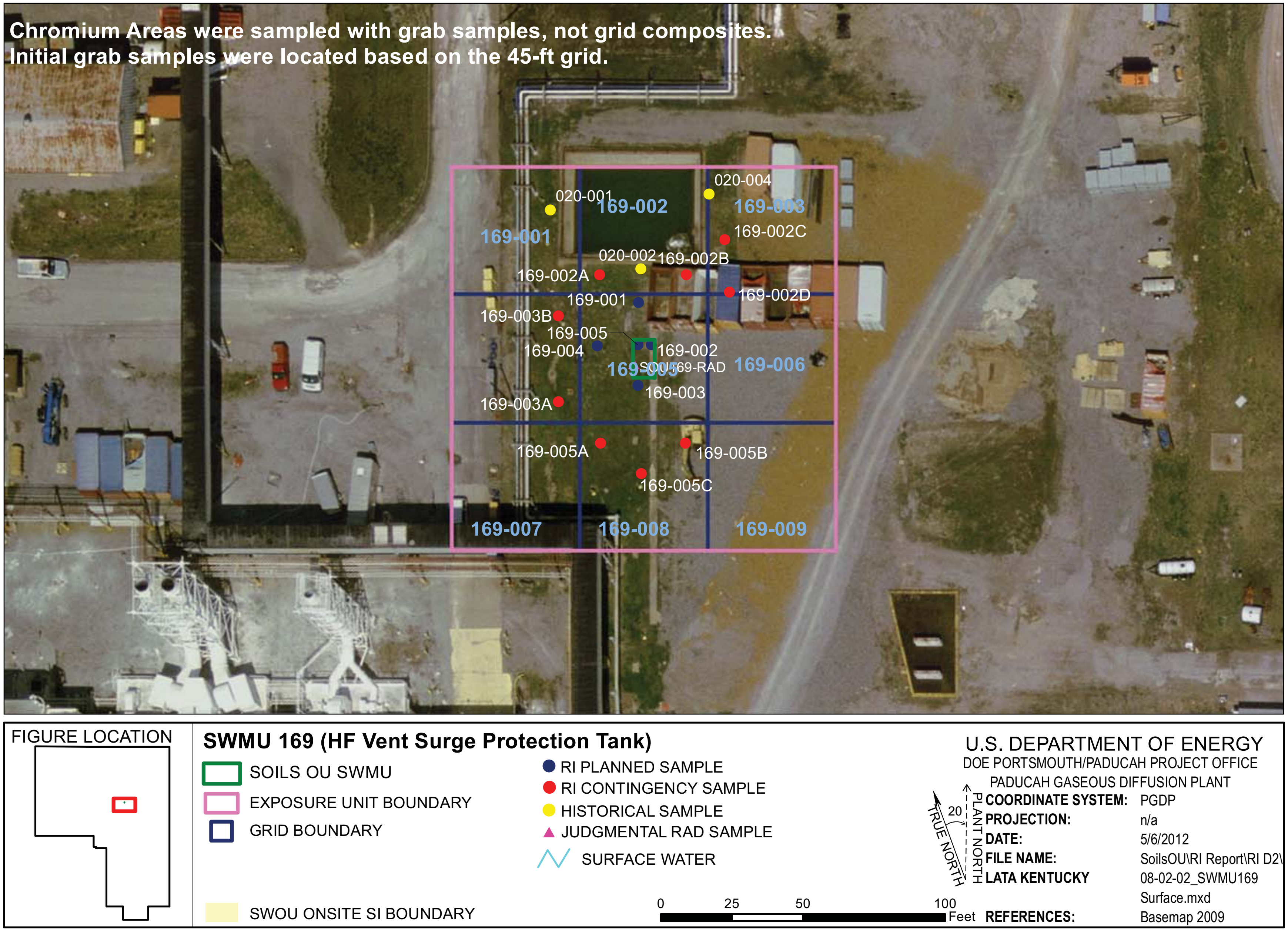


Figure 8.2.2. SWMU 169 Sample Locations - Surface Soil

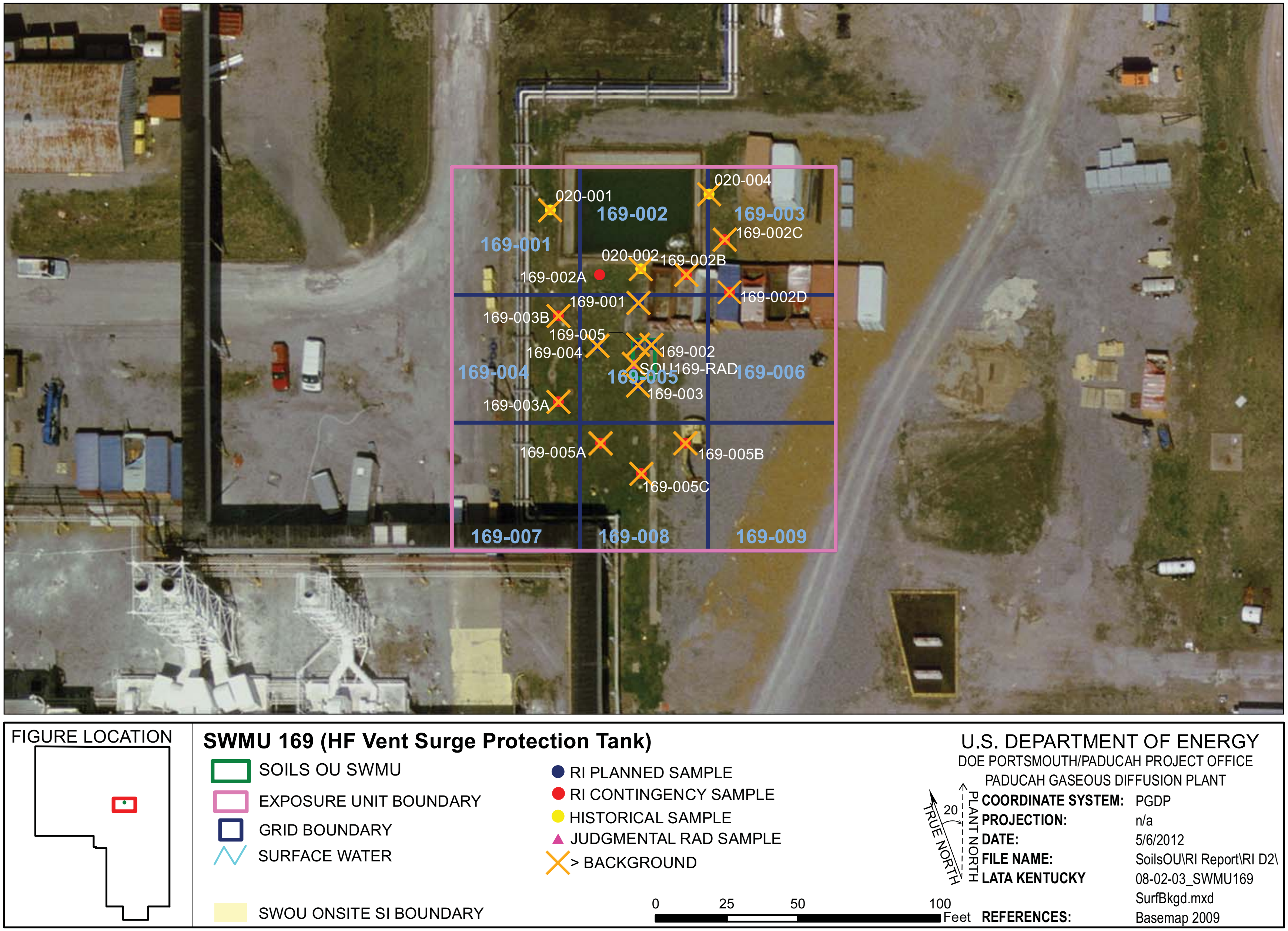


Figure 8.2.3. SWMU 169 Background Exceedances - Surface Soil

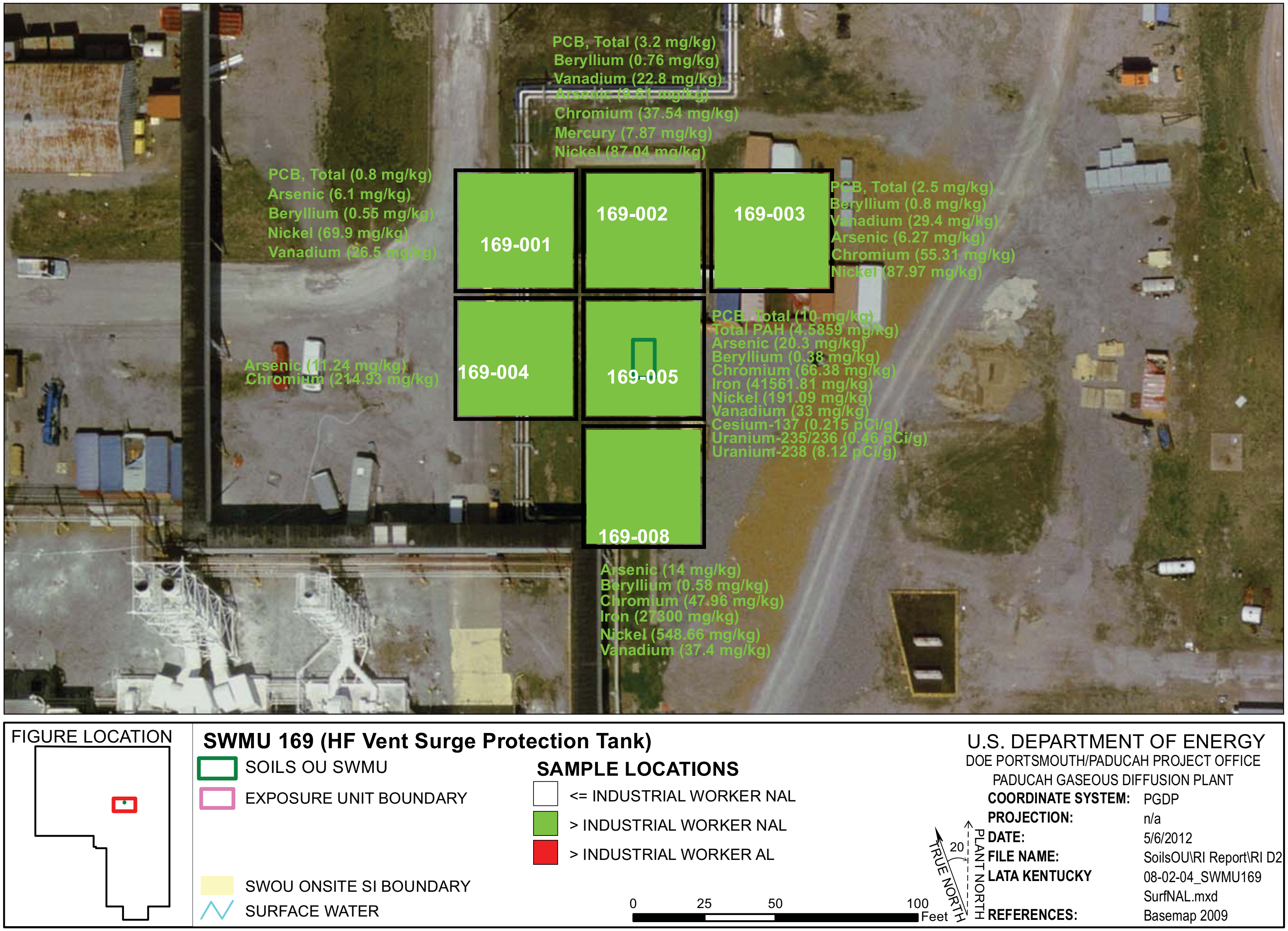


Figure 8.2.4. SWMU 169 NAL Exceedances - Surface Soil

The administrative boundary of SWMU 169 is located inside grid 5. Grids 1, 2, 3, 4, and 8 are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 169, as described in the Work Plan (DOE 2010a).

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 169 surface soil.

The following are the metals detected in the SWMU 169 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Aluminum	5, 8
Antimony	5, 8
Arsenic	5, 8
Cadmium	1
Copper	1, 5, 8
Iron	5
Lead	4, 5, 8
Mercury	2
Molybdenum[1]	5, 8
Nickel	1, 2, 3, 5, 8
Selenium	5, 8
Thallium	3, 5, 8
Uranium	2, 5, 8
Zinc	1, 2, 3, 4, 5, 8

* SWMU 169 consists of one EU.
[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids in which they were detected.

Metal	Grid
Arsenic	5
Iron	5
Mercury	2
Molybdenum[1]	5
Nickel	2, 3, 5, 8

* SWMU 169 consists of one EU.
[1]No background value is available.

PCBs

Total PCBs were detected above the industrial worker NAL in the surface soil of grids 1, 2, 3, and 5. All of these grids are located on the border of the area sampled for SWMU 169.

No PCBs were detected above the industrial worker ALs in the SWMU 169 surface soil.

Total PCBs were detected above the SSLs for the protection of UCRS (grids 1, 2, 3 and 5) and RGA (grid 5) groundwater.

SVOCs

One SWMU 169 surface soil sample was analyzed for SVOCs, and it was collected from grid 5. Total PAHs were detected above the industrial worker NAL in the surface soil sample.

No SVOCs were detected above the industrial worker ALs.

Fluoranthene, pyrene, and Total PAHs in grid 5 were detected above the SSLs for the protection of UCRS groundwater. Total PAHs in grid 5 were detected above the SSLs for the protection of RGA groundwater.

VOCs

No surface soil samples from SWMU 169 were analyzed for VOCs.

Radionuclides

Uranium-235/236 in grid 5 and uranium-238 in grids 4 and 5 were detected above both the background screening levels and the industrial worker NALs in the SWMU 169 surface soil.

No radionuclides were detected above both the background screening levels and the industrial worker ALs.

Technetium-99 and uranium-238 in grid 5 were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

8.2.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 169, the representative data set for subsurface soils is presented in Tables 8.2.3 and 8.2.4 and provides the nature of contamination in SWMU 169 subsurface soils. Figures 8.2.5–8.2.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 169 subsurface soil contamination is considered adequately defined to support the BRA and FS. SWMU 169 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 169 subsurface soil. The following are the metals detected above both the background screening levels and the industrial worker NALs, as well as the grids in which they were detected.

Metal	Grid
Arsenic	2, 3, 4, 5
Beryllium	2, 5
Chromium	3, 5, 8
Cobalt	5
Nickel	1, 3, 4, 5, 8
Vanadium	5

* SWMU 169 consists of one EU.

Table 8.2.3. Subsurface Soil Historical Data Summary: SWMU 169 C-410-E HF Vent Surge Protection Tank

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.47E+03	2.06E+04	1.02E+04	0/17	17/17	3/17	1.20E+04	0/17	3.32E+04	0/17	3.97E+06	0/17	17/17	-
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	2.10E-01	0/17	2.53E+00	0/17	1.51E+03	0/17	0/17	-
METAL	Arsenic	mg/kg	2.10E+00	8.70E+00	5.44E+00	0/17	17/17	1/17	7.90E+00	17/17	9.97E-01	0/17	9.97E+01	0/17	17/17	-
METAL	Barium	mg/kg	7.86E+01	1.62E+02	9.86E+01	0/17	17/17	0/17	1.70E+02	0/17	5.92E+02	0/17	3.78E+05	0/17	13/17	-
METAL	Beryllium	mg/kg	3.00E-01	2.30E+00	5.69E-01	0/17	17/17	2/17	6.90E-01	17/17	1.40E-02	0/17	9.22E+00	0/17	0/17	-
METAL	Cadmium	mg/kg	1.40E-01	1.80E-01	1.60E-01	0/17	2/17	0/17	2.10E-01	0/17	3.16E+00	0/17	3.16E+02	0/17	0/17	-
METAL	Calcium	mg/kg	8.72E+02	1.43E+05	1.58E+04	0/17	17/17	6/17	6.10E+03	0/17	n/a	0/17	n/a	n/a	n/a	-
METAL	Chromium	mg/kg	1.05E+01	3.31E+01	1.48E+01	0/17	17/17	0/17	4.30E+01	1/17	3.02E+01	0/17	3.02E+03	0/17	0/17	-
METAL	Cobalt	mg/kg	3.30E+00	1.29E+01	6.09E+00	0/17	15/17	0/17	1.30E+01	1/17	1.05E+01	0/17	1.52E+03	15/17	15/17	-
METAL	Copper	mg/kg	5.90E+00	4.28E+02	3.64E+01	0/17	17/17	1/17	2.50E+01	0/17	1.43E+03	0/17	2.24E+05	0/17	1/17	-
METAL	Iron	mg/kg	8.66E+03	1.88E+04	1.43E+04	0/17	17/17	0/17	2.80E+04	0/17	2.51E+04	0/17	3.92E+06	17/17	17/17	-
METAL	Lead	mg/kg	6.80E+00	2.79E+01	1.14E+01	9/17	17/17	1/17	2.30E+01	0/17	4.00E+02	0/17	4.00E+02	0/17	1/17	-
METAL	Magnesium	mg/kg	1.19E+03	4.01E+03	2.17E+03	0/17	17/17	6/17	2.10E+03	0/17	n/a	0/17	n/a	n/a	n/a	-
METAL	Manganese	mg/kg	1.71E+02	4.27E+02	2.79E+02	0/17	17/17	0/17	8.20E+02	0/17	2.58E+03	0/17	1.16E+05	17/17	17/17	-
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	1.30E-01	0/17	9.00E-01	0/17	7.85E+02	0/17	0/17	-
METAL	Nickel	mg/kg	1.01E+01	8.04E+02	6.01E+01	0/17	17/17	1/17	2.20E+01	1/17	4.28E+01	0/17	3.18E+04	1/17	17/17	-
METAL	Selenium	mg/kg	2.70E-01	3.70E-01	3.15E-01	0/17	6/17	0/17	7.00E-01	0/17	1.79E+02	0/17	2.80E+04	0/17	6/17	-
METAL	Silver	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	2.70E+00	0/17	1.08E+01	0/17	9.15E+03	0/17	0/17	-
METAL	Sodium	mg/kg	6.45E+01	1.23E+03	2.43E+02	2/17	17/17	2/17	3.40E+02	0/17	n/a	0/17	n/a	n/a	n/a	-
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/17	0/17	0/17	3.40E-01	0/17	2.87E+00	0/17	4.48E+02	0/17	0/17	-
METAL	Vanadium	mg/kg	1.60E+01	3.51E+01	2.01E+01	0/17	17/17	0/17	3.70E+01	17/17	1.51E-01	0/17	9.30E+01	17/17	17/17	-
METAL	Zinc	mg/kg	1.67E+01	1.36E+02	4.79E+01	0/17	17/17	2/17	6.00E+01	0/17	1.08E+04	0/17	1.68E+06	0/17	16/17	-
PPCB	Total PCB	mg/kg	3.00E-02	7.00E-01	2.01E-01	7/17	14/17	0/17	n/a	5/17	1.88E-01	0/17	1.88E+01	0/17	8/17	0.1 - 0.1
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	-
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	-
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.89E-02	0/1	5.53E+00	0/1	0/1	-
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	-
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.38E+02	0/1	8.21E+03	0/1	0/1	-
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.98E-01	0/1	8.22E+01	0/1	0/1	-
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.97E-01	0/1	5.76E+01	0/1	0/1	-
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	-
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.42E-01	0/1	2.49E+01	0/1	0/1	-
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	*cis*-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.74E+00	0/1	1.93E+02	0/1	0/1	-
VOA	*cis*-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	-
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.29E+00	0/1	3.84E+02	0/1	0/1	-
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.50E+01	0/1	1.07E+03	0/1	0/1	-
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	-
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	-
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.82E-01	0/1	7.08E+01	0/1	0/1	-
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	-

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 8.2.3. Subsurface Soil Historical Data Summary: SWMU 169 C-410-E HF Vent Surge Protection Tank (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	*trans* -1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.07E+01	0/1	3.42E+02	0/1	0/1	-
VOA	*trans* -1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	-
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.69E-02	0/1	4.98E+00	0/1	0/1	-
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.04E-01	0/1	4.83E+01	0/1	0/1	-
RADS	Americium-241	pCi/g	-7.29E-03	4.85E-02	2.61E-02	0/3	3/3	0/3	n/a	0/3	5.01E+00	0/3	5.01E+02	0/3	0/3	0.105 - 0.14
RADS	Cesium-137	pCi/g	5.17E-03	1.02E-02	8.43E-03	0/3	3/3	0/3	2.80E-01	0/3	8.61E-02	0/3	8.61E+00	0/3	0/3	0.0216 - 0.0281
RADS	Cobalt-60	pCi/g	-5.80E-03	7.40E-03	2.71E-03	0/3	3/3	0/3	n/a	0/3	1.77E-02	0/3	1.77E+00	0/3	0/3	0.0172 - 0.0259
RADS	Neptunium-237	pCi/g	-2.39E-02	1.49E-02	-3.85E-03	0/3	3/3	0/3	n/a	0/3	2.71E-01	0/3	2.71E+01	0/3	1/3	0.0374 - 0.0487
RADS	Plutonium-239/240	pCi/g	1.99E-03	2.60E-03	2.30E-03	0/2	2/2	0/2	n/a	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.0777 - 0.0781
RADS	Thorium-230	pCi/g	2.95E-01	3.23E-01	3.09E-01	0/2	2/2	0/2	1.40E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	1/2	0.23 - 0.231
RADS	Uranium-234	pCi/g	3.23E-01	1.85E+00	1.15E+00	0/3	3/3	2/3	1.20E+00	0/3	1.89E+01	0/3	1.89E+03	0/3	0/3	0.0752 - 0.231
RADS	Uranium-238	pCi/g	8.05E-01	2.25E+00	1.50E+00	0/3	3/3	2/3	1.20E+00	1/3	1.70E+00	0/3	1.70E+02	0/3	0/3	0.184 - 0.257

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 8.2.4. Subsurface Soil RI Data Summary: SWMU 169, C-410-E HF Vent Surge Protection Tank

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	7.73E+03	1.73E+04	1.33E+04	0/4	4/4	2/4	1.20E+04	0/4	3.32E+04	0/4	3.97E+06	0/4	4/4	5.8 - 6.1
METAL	Antimony	mg/kg	2.80E-01	7.00E-01	4.50E-01	0/4	3/4	3/4	2.10E-01	0/4	2.53E+00	0/4	1.51E+03	0/4	3/4	0.58 - 0.61
METAL	Arsenic	mg/kg	3.60E+00	1.67E+01	7.96E+00	0/24	17/24	7/24	7.90E+00	17/24	9.97E-01	0/24	9.97E+01	0/24	17/24	1.2 - 11
METAL	Barium	mg/kg	7.47E+01	2.81E+02	1.47E+02	0/4	4/4	1/4	1.70E+02	0/4	5.92E+02	0/4	3.78E+05	0/4	3/4	2.3 - 2.5
METAL	Beryllium	mg/kg	3.70E-01	7.20E-01	5.38E-01	0/4	4/4	1/4	6.90E-01	4/4	1.40E-02	0/4	9.22E+00	0/4	0/4	0.12 - 0.12
METAL	Cadmium	mg/kg	3.30E-02	3.20E-01	1.81E-01	0/4	4/4	2/4	2.10E-01	0/4	3.16E+00	0/4	3.16E+02	0/4	0/4	0.058 - 0.061
METAL	Calcium	mg/kg	1.63E+03	1.59E+05	4.74E+04	0/4	4/4	3/4	6.10E+03	0/4	n/a	0/4	n/a	n/a	n/a	60.5 - 290
METAL	Chromium	mg/kg	1.59E+01	7.16E+01	3.96E+01	0/24	12/24	5/24	4.30E+01	10/24	3.02E+01	0/24	3.02E+03	0/24	0/24	1.2 - 85
METAL	Cobalt	mg/kg	4.40E+00	7.80E+01	2.36E+01	0/4	4/4	1/4	1.30E+01	1/4	1.05E+01	0/4	1.52E+03	4/4	4/4	0.23 - 0.25
METAL	Copper	mg/kg	7.70E+00	1.55E+02	3.32E+01	0/24	12/24	8/24	2.50E+01	0/24	1.43E+03	0/24	2.24E+05	0/24	1/24	1.2 - 35
METAL	Iron	mg/kg	8.06E+03	2.20E+04	1.54E+04	0/24	24/24	0/24	2.80E+04	0/24	2.51E+04	0/24	3.92E+06	24/24	24/24	5.8 - 100
METAL	Lead	mg/kg	7.45E+00	3.22E+01	1.38E+01	0/24	22/24	2/24	2.30E+01	0/24	4.00E+02	0/24	4.00E+02	0/24	7/24	0.35 - 13
METAL	Magnesium	mg/kg	2.00E+03	3.68E+03	2.91E+03	0/4	4/4	3/4	2.10E+03	0/4	n/a	0/4	n/a	n/a	n/a	57.9 - 61.4
METAL	Manganese	mg/kg	6.24E+01	1.58E+03	4.05E+02	0/24	23/24	2/24	8.20E+02	0/24	2.58E+03	0/24	1.16E+05	20/24	23/24	0.23 - 85
METAL	Mercury	mg/kg	1.21E-02	3.78E-02	2.76E-02	0/24	4/24	0/24	1.30E-01	0/24	9.00E-01	0/24	7.85E+02	0/24	0/24	0.0386 - 10
METAL	Molybdenum	mg/kg	4.90E-01	1.50E+00	9.78E-01	0/24	4/24	0/24	n/a	0/24	1.79E+02	0/24	2.80E+04	0/24	4/24	0.58 - 15
METAL	Nickel	mg/kg	1.22E+01	1.83E+02	6.99E+01	0/24	15/24	13/24	2.20E+01	12/24	4.28E+01	0/24	3.18E+04	6/24	15/24	0.58 - 65
METAL	Selenium	mg/kg	7.60E-01	1.70E+00	1.32E+00	0/24	4/24	4/24	7.00E-01	0/24	1.79E+02	0/24	2.80E+04	0/24	4/24	0.58 - 20
METAL	Silver	mg/kg	3.70E-02	6.40E-02	4.88E-02	0/24	4/24	0/24	2.70E+00	0/24	1.08E+01	0/24	9.15E+03	0/24	2/24	0.23 - 10
METAL	Sodium	mg/kg	1.50E+02	4.34E+02	2.64E+02	0/4	4/4	1/4	3.40E+02	0/4	n/a	0/4	n/a	n/a	n/a	23.2 - 24.6
METAL	Thallium	mg/kg	2.40E-01	3.40E-01	2.88E-01	0/4	4/4	0/4	3.40E-01	0/4	2.87E+00	0/4	4.48E+02	0/4	4/4	0.23 - 0.25
METAL	Uranium	mg/kg	1.50E+00	3.47E+01	1.33E+01	0/24	6/24	4/24	4.60E+00	0/24	1.07E+02	0/24	1.65E+04	0/24	3/24	0.07 - 20
METAL	Vanadium	mg/kg	2.69E+01	4.49E+01	3.55E+01	0/4	4/4	2/4	3.70E+01	4/4	1.51E-01	0/4	9.30E+01	4/4	4/4	1.2 - 1.2
METAL	Zinc	mg/kg	2.04E+01	1.24E+02	5.36E+01	0/24	24/24	5/24	6.00E+01	0/24	1.08E+04	0/24	1.68E+06	0/24	24/24	2.3 - 25
PPCB	Total PCB	mg/kg	2.90E-01	2.90E-01	2.90E-01	1/6	1/6	0/6	n/a	1/6	1.88E-01	0/6	1.88E+01	0/6	1/6	0.37 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.4 - 0.4
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.4 - 0.4
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.4 - 0.4
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	2 - 2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.4 - 0.4
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.4 - 0.4

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 8.2.4. Subsurface Soil RI Data Summary: SWMU 169, C-410-E HF Vent Surge Protection Tank (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0081 - 0.0081
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.4 - 0.4
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.4 - 0.4
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.4 - 0.4
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.4 - 0.4
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.81 - 0.81
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.4 - 0.4
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0081 - 0.0081
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	2 - 2
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.4 - 0.4
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.4 - 0.4
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.81 - 0.81
SVOA	Total PAH	mg/kg	8.80E-03	8.80E-03	8.80E-03	0/1	1/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	3.45E+01	3.45E+01	3.45E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.6 - 5.6
RADS	Americium-241	pCi/g	5.10E-03	5.10E-03	5.10E-03	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.0068 - 0.0068
RADS	Beta activity	pCi/g	3.17E+01	3.17E+01	3.17E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.6 - 3.6
RADS	Cesium-137	pCi/g	8.90E-02	8.90E-02	8.90E-02	1/1	1/1	0/1	2.80E-01	1/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.076 - 0.076
RADS	Neptunium-237	pCi/g	-1.00E-03	-1.00E-03	-1.00E-03	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.019 - 0.019
RADS	Plutonium-238	pCi/g	1.08E-02	1.08E-02	1.08E-02	1/1	1/1	0/1	n/a	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.0058 - 0.0058
RADS	Plutonium-239/240	pCi/g	9.90E-03	9.90E-03	9.90E-03	0/1	1/1	0/1	n/a	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.011 - 0.011
RADS	Technetium-99	pCi/g	1.24E+00	1.24E+00	1.24E+00	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	1/1	0.5 - 0.5
RADS	Thorium-228	pCi/g	7.60E-01	7.60E-01	7.60E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.05 - 0.05
RADS	Thorium-230	pCi/g	1.09E+00	1.09E+00	1.09E+00	0/1	1/1	0/1	1.40E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.03 - 0.03
RADS	Thorium-232	pCi/g	9.10E-01	9.10E-01	9.10E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.04 - 0.04
RADS	Uranium-234	pCi/g	2.58E+00	2.58E+00	2.58E+00	0/1	1/1	1/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	1.22E-01	1.22E-01	1.22E-01	0/1	1/1	1/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.027 - 0.027
RADS	Uranium-238	pCi/g	2.74E+00	2.74E+00	2.74E+00	0/1	1/1	1/1	1.20E+00	1/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.02 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

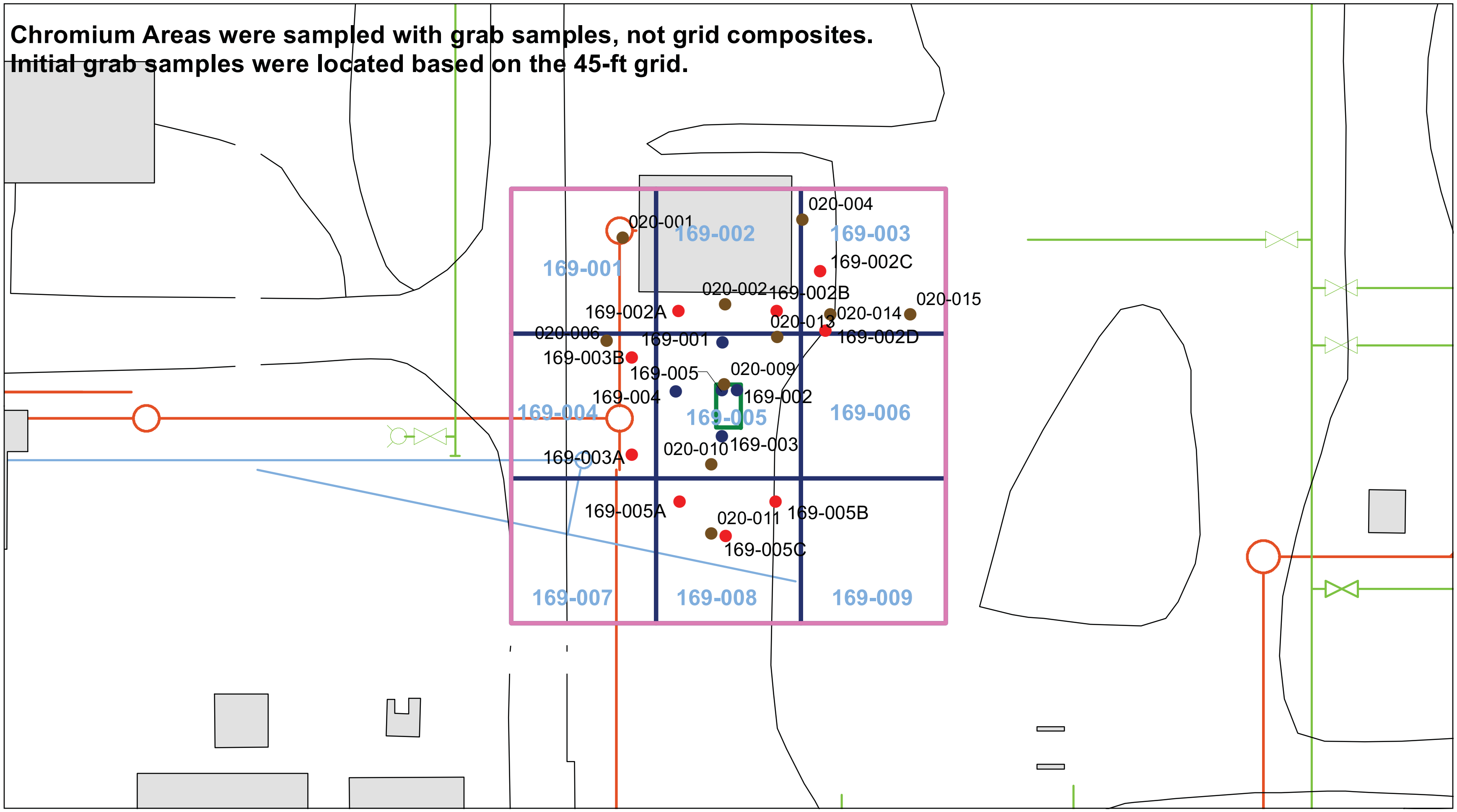


FIGURE LOCATION

SWMU 169 (HF Vent Surge Protection Tank)

SOILS OU SWMU
EXPOSURE UNIT BOUNDARY
GRID BOUNDARY

RI PLANNED SAMPLE
RI CONTINGENCY SAMPLE
HISTORICAL SAMPLE
PIPELINE SAMPLE

UNDERGROUND UTILITIES

Electrical Ducts, Communications, Grounding
Storm Drains
Sanitary Water and Raw Water
Gas
RCW Blowdown Lines
Sanitary Sewer

0 25 50 100 Feet

TRUE NORTH 20 PLANT NORTH

U.S. DEPARTMENT OF ENERGY

DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

COORDINATE SYSTEM: PGDP
PROJECTION: n/a
DATE: 5/7/2012
FILE NAME: SoilsOU\RI Report\RI D2 \08-02-05_SWMU169 Subsurface.mxd
LATA KENTUCKY
REFERENCES: Basemap 2009

Figure 8.2.5. SWMU 169 Sample Locations - Subsurface Soil

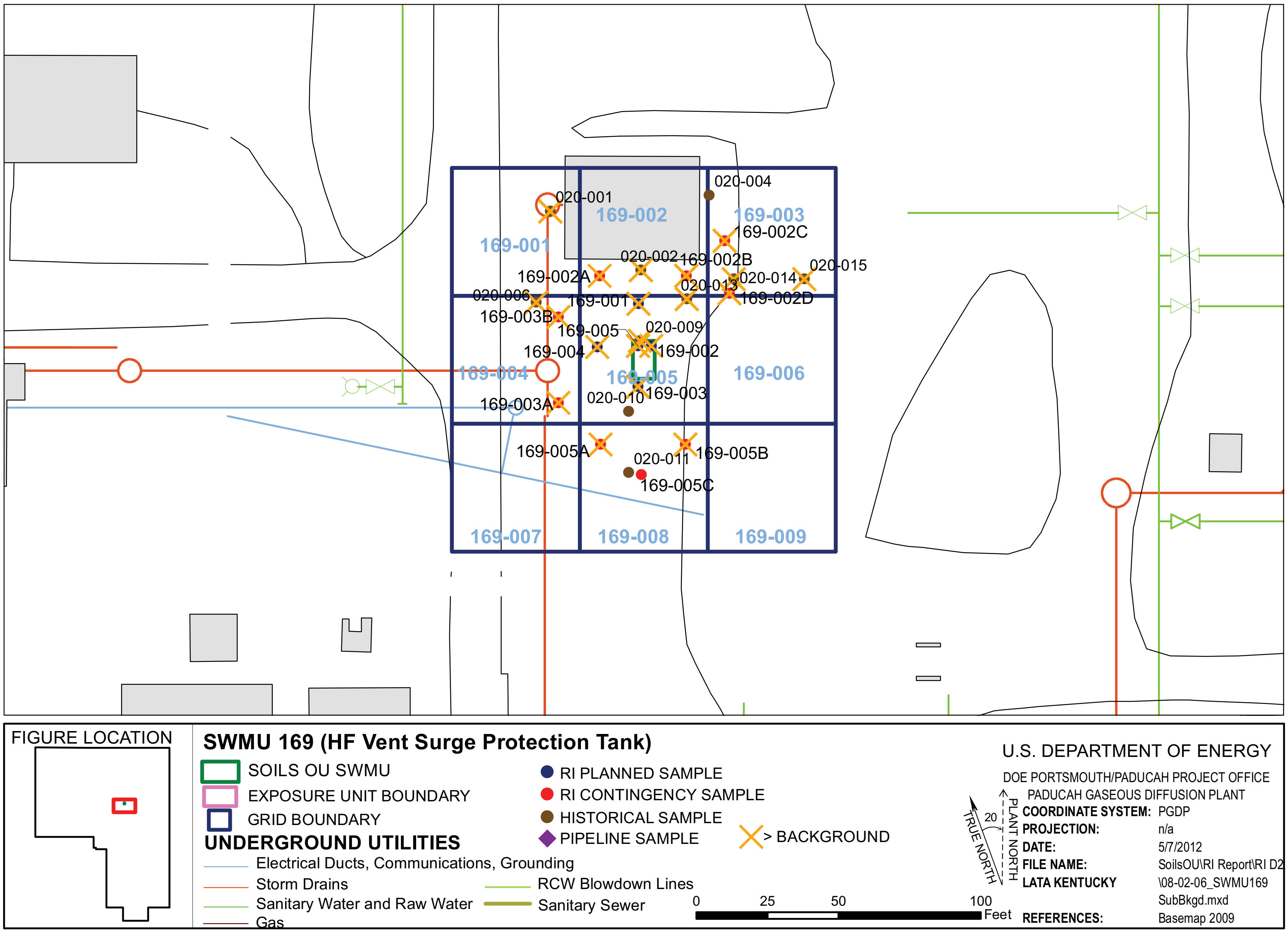


Figure 8.2.6. SWMU 169 Background Exceedances - Subsurface Soil

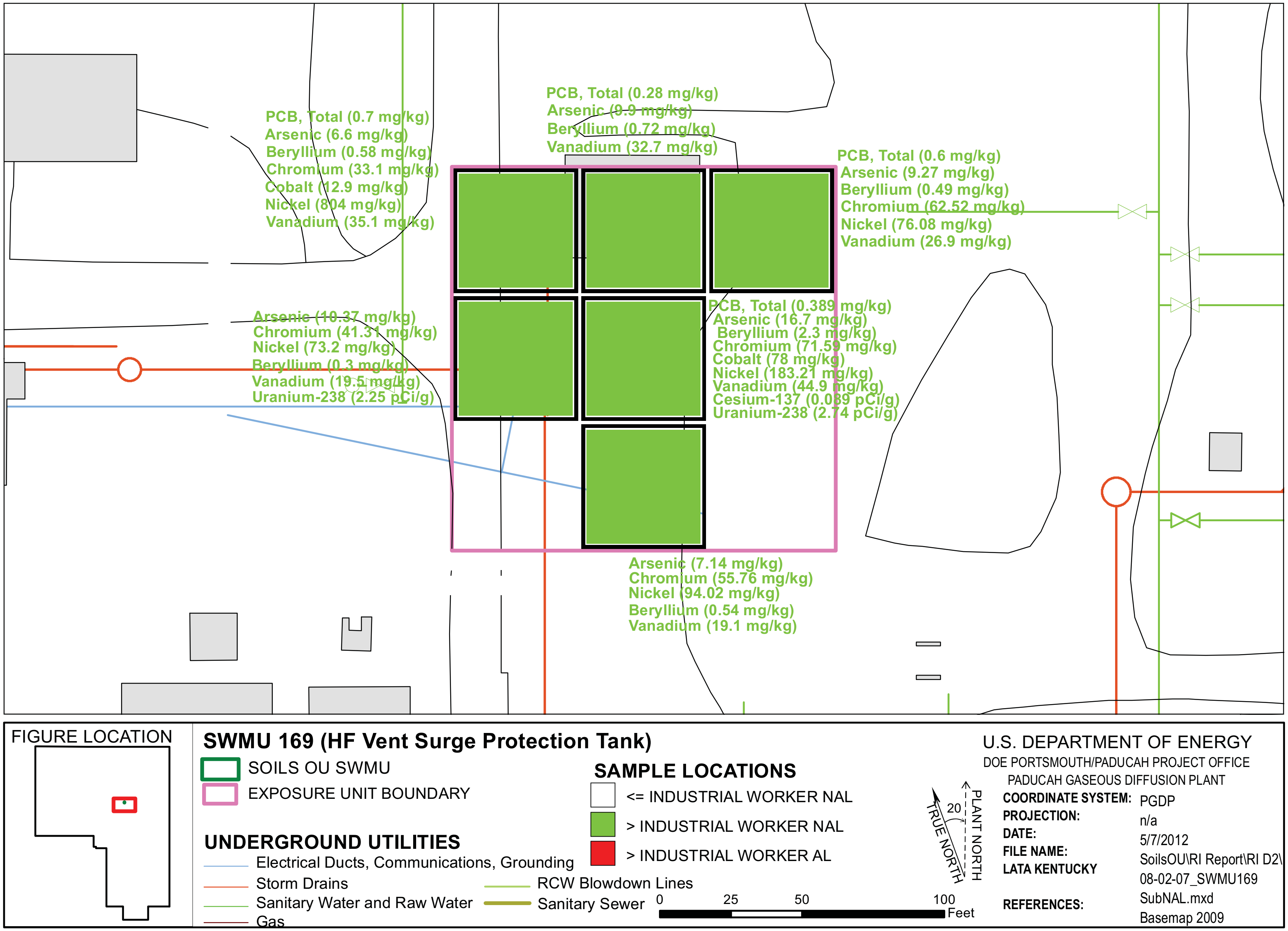


Figure 8.2.7. SWMU 169 NAL Exceedances - Subsurface Soil

The administrative boundary of SWMU 169 is located inside grid 5. Grids 1, 2, 3, 4, and 8 are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 169, as described in the Work Plan (DOE 2010a).

The maximum depth at which metals were detected (in samples associated with this RI Report) above both background screening levels and the industrial worker NALs was 10 ft bgs. The end depths of the boreholes taken from the grids 1, 2, 3, 4, 5, and 8 ranged from 1 to 13 ft bgs.

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 169 subsurface soil.

The following are the metals detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Aluminum	1, 3, 5
Antimony	2, 5
Arsenic	2, 3, 4, 5
Barium	5
Cobalt	5
Copper	1, 5
Lead	1, 3, 5
Manganese	5
Molybdenum[1]	2, 3, 5
Nickel	1, 2, 3, 4, 5, 8
Selenium	2, 3, 5
Uranium	5
Vanadium	5
Zinc	1, 2, 3, 5

* SWMU 169 consists of one EU.
[1] No background value is available.

Cobalt, manganese, and vanadium in grid 5 and nickel in grids 1, 5 and 8 were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the industrial worker NAL in the subsurface soil of grids 1, 2, 3, and 5. All of these grids are located on the border of the area sampled for SWMU 169.

The maximum depth at which PCBs were detected (in samples associated with this RI Report) above the industrial worker NALs was 13 ft bgs. The end depths of the boreholes taken from grids 1, 2, 3, and 5 ranged from 1 to 15 ft bgs.

No PCBs were detected above the industrial worker ALs in the SWMU 169 subsurface soil.

Total PCBs in grids 1, 3, 5, and 8 were detected above the SSLs for the protection of UCRS groundwater; however, no PCBs were detected above the SSL for the protection of RGA groundwater.

SVOCs

No SVOCs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of RGA groundwater in the SWMU 169 subsurface soil.

Total PAHs in grid 5 were detected above the SSL for the protection of UCRS groundwater.

VOCs

No VOCs were detected in the SWMU 169 subsurface soil.

Radionuclides

Of the radionuclides, uranium-238 was detected above both the background screening level and the industrial worker NAL in the subsurface soil of grids 4 and 5, which are located on the border of the area sampled for SWMU 169.

The maximum depth at which uranium-238 was detected (in samples associated with this RI Report) above both the background screening level and the industrial worker NAL was 7 ft bgs (in grid 4). The end depths of the boreholes taken from grids 4 and 5 ranged from 4 to 7 ft bgs.

No radionuclides were detected above both the background screening levels and the industrial worker ALs in the SWMU 169 subsurface soil.

Neptunium-237 (no background value available) in grid 3 was detected above the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

8.2.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no potential for significant runoff at SWMU 169 due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

8.2.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 169 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for SWMU 169 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 8.2.5 for the future industrial worker, excavation worker, and the hypothetical resident. Table 8.2.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Table 8.2.5. RGOs for SWMU 169

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Future Industrial Worker											
1	Arsenic	2.03E+01	mg/kg	2.0E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Chromium	2.15E+02	mg/kg	7.1E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	PCB, Total	1.00E+01	mg/kg	5.3E-05	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	4.59E+00	mg/kg	7.7E-05	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-235	4.60E-01	pCi/g	1.2E-06	3.95E-01	3.95E+00	3.95E+01	n/a	n/a	n/a	n/a
	Uranium-238	8.12E+00	pCi/g	4.8E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.6E-04**				**< 1**			
Excavation Worker											
1	Total PAH	4.59E+00	mg/kg	1.2E-06	3.88E+00	3.88E+01	3.88E+02	< 1	n/a	n/a	n/a
	Cumulative			**1.2E-06**				**< 1**			
Hypothetical Resident[5]											
1	Aluminum	1.42E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	7.27E+03	7.27E+04	2.18E+05
	Arsenic	2.03E+01	mg/kg	8.6E-05	2.35E-01	2.35E+00	2.35E+01	1.2	1.64E+00	1.64E+01	4.93E+01
	Chromium	2.15E+02	mg/kg	1.4E-05	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Copper	3.74E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	3.13E+02	3.13E+03	9.39E+03
	Iron	4.16E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.8	5.48E+03	5.48E+04	1.64E+05
	Mercury	7.87E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	2.35E+00	2.35E+01	7.04E+01
	Nickel	5.49E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.4	1.44E+02	1.44E+03	4.33E+03
	PCB, Total	1.00E+01	mg/kg	1.6E-04	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Total PAH	4.59E+00	mg/kg	2.4E-04	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	5.03E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	6.55E+00	pCi/g	1.4E-06	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	4.60E-01	pCi/g	5.8E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	8.12E+00	pCi/g	2.3E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**5.2E-04**				**3.2**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.48, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.48, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Ecological Screening. COPECs for SWMU 169 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 8.2.6.

Table 8.2.6 Ecological Screening for SWMU 169

Ground Cover	Near a Surface Water Body?	Total HI (max) [a]	Priority COPECs	Background (mg/kg) [b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Mostly soil/grass with a hint of gravel	No	724	Antimony	2.10E-01	1.02E+01	2.70E-01	38
			Copper	1.90E+01	3.74E+02	2.80E+01	13
			Lead	3.60E+01	1.54E+02	1.10E+01	14
			Mercury	2.00E-01	7.87E+00	1.00E-01	79
			Nickel	2.10E+01	5.49E+02	3.80E+01	14
			PCB, Total	n/a	1.00E+01	2.00E-02	500
			Selenium	8.00E-01	1.00E+01	5.20E-01	19
			Uranium	4.90E+00	5.03E+01	5.00E+00	10
			Zinc	6.50E+01	4.73E+02	4.60E+01	10

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

8.2.7 SWMU 169 Summary

The following text summarizes the results for SWMU 169 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

Plant processes that could have contributed to contamination at this site are releases from the surge tank.

COPCs for surface and subsurface soils from SWMU 169 are shown on Tables 8.2.1–8.2.4 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The COPCs identified for SWMU 169 are metals, PCBs, SVOCs, and radionuclides in surface and subsurface soil. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 13 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Define Extent of Source Zone and Contamination in Soil

The contaminants at SWMU 169 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no known underground pipelines at SWMU 169. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker, excavation worker, and hypothetical residential scenarios. The following are the COCs for these scenarios for SWMU 169.

- Future Industrial Worker

    - Arsenic
    - Chromium
    - Total PAHs
    - Total PCBs
    - Uranium-235
    - Uranium-238

- Excavation worker

    - Total PAHs

- Hypothetical Resident (hazards evaluated against the child resident)

    - Aluminum
    - Arsenic
    - Chromium
    - Copper
    - Iron
    - Mercury
    - Nickel
    - Total PCBs
    - Total PAHs
    - Uranium
    - Uranium-234
    - Uranium-235
    - Uranium-238

Of the above, arsenic, Total PAHs, Total PCBs, and uranium-238 are priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for the hypothetical resident. There are no priority COCs for other scenarios. Figure 8.2.8 also shows the COCs exceeding RGOs for the future industrial worker.

For SWMU 169, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Antimony
- Copper
- Lead
- Mercury
- Nickel
- Total PCBs
- Selenium
- Uranium
- Zinc

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 169 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation.

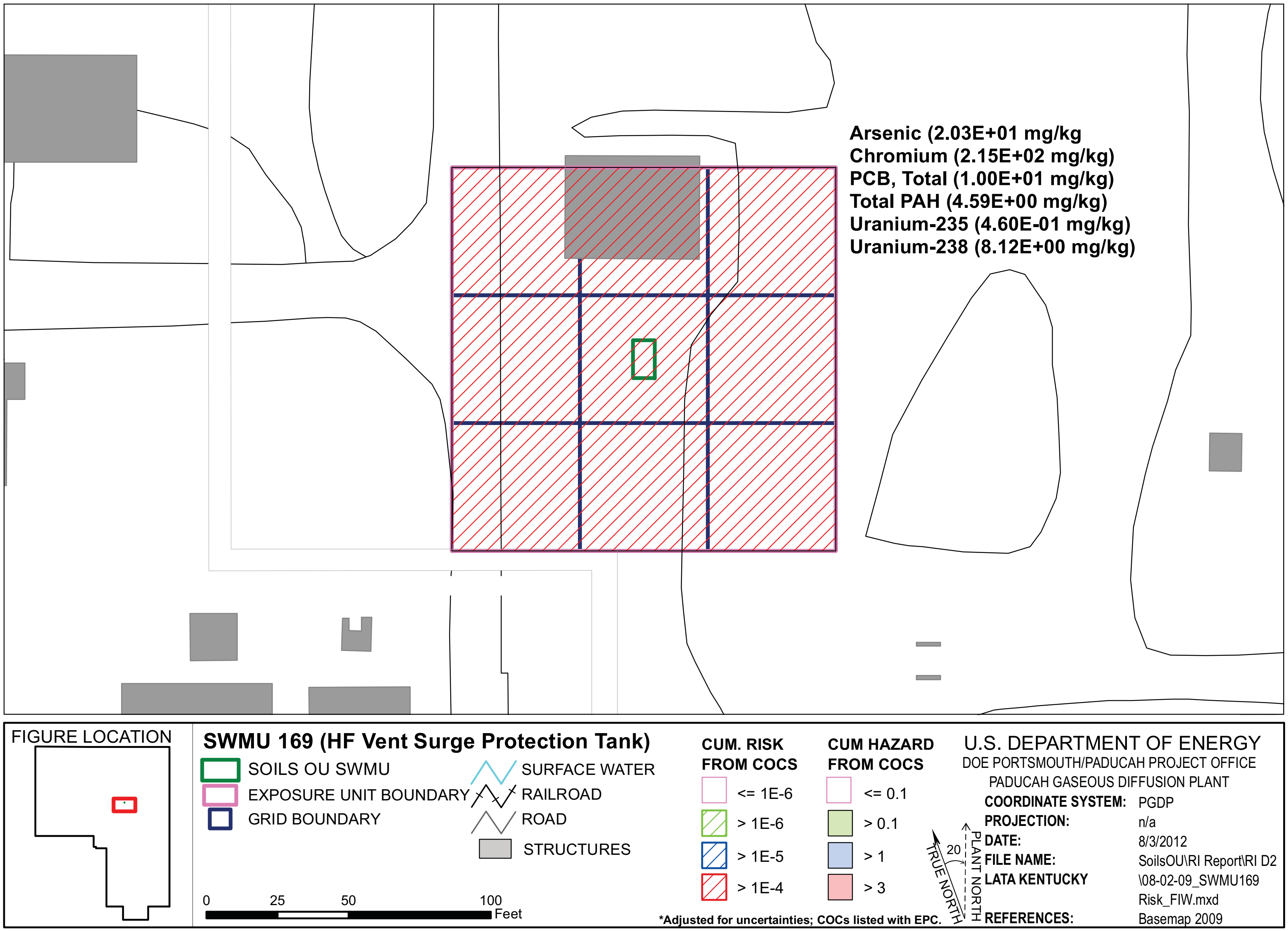


Figure 8.2.8. Summary of COCs Contributing to Risk to the Future Industrial Worker at SWMU 169

SWMU 169 is not adjacent to any other SWMUs; however, SWMU 20, the C-410-E Emergency Holding pond, is just to the north of SWMU 169.

8.2.8 SWMU 169 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 169; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker, excavation worker, and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial as shown in the SMP (DOE 2012a).

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9. GROUP 2, SOIL/RUBBLE AREAS

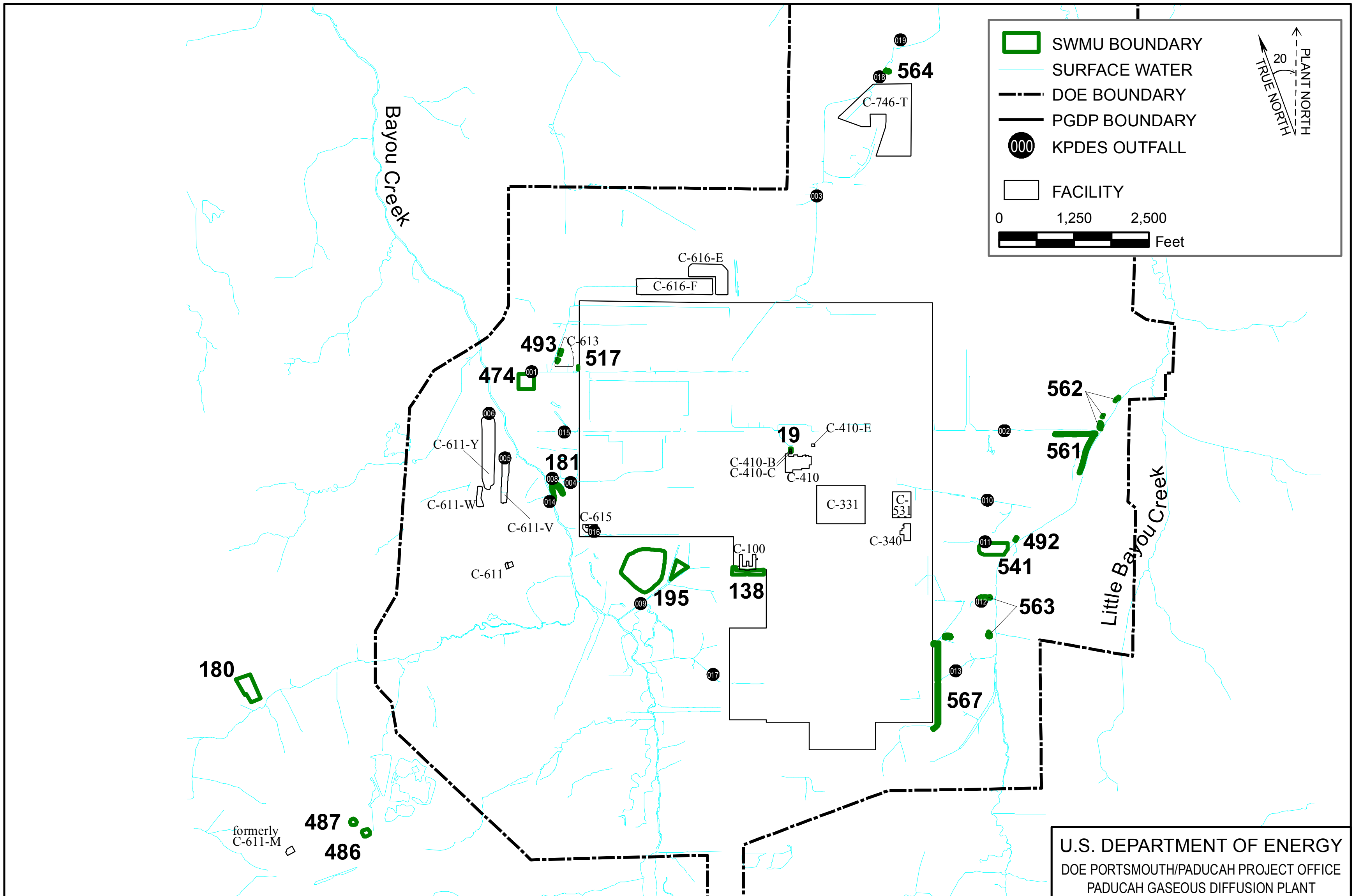
This chapter includes a discussion of the soil and rubble areas SWMUs/AOCs, which includes the following 16 SWMUs/AOCs:

- SWMU 19, C-410-B HF Neutralization Lagoon, not sampled during RI (DOE 2010a)
- SWMU 138, C-100 Southside Berm, sampled during RI
- SWMU 180, WKWMA Outdoor Firing Range (WKWMA), sampled during RI
- SWMU 181, West Side Outdoor Firing Range (PGDP), not sampled during RI (DOE 2010a)
- SWMU 195, SW PGDP Curlee Road Contaminated Soil Mounds, sampled during RI
- SWMU 486, West of PGDP Rubble Pile WKWMA, not sampled during RI (DOE 2010a)
- SWMU 487, West of PGDP Rubble Pile WKWMA, not sampled during RI (DOE 2010a)
- AOC 492, Contaminated Soil Area, North of Outfall 010, not sampled during RI (DOE 2010a)
- SWMU 493, Concrete Rubble Piles near Outfall 001, sampled during RI
- SWMU 517, Rubble and Debris Erosion Control Fill Area, sampled during RI
- AOC 541, Contaminated Area by Outfall 011, not sampled during RI (DOE 2010a)
- SWMU 561, Soil Pile I, not sampled during RI (DOE 2010a)
- AOC 562, Soil Piles C, D, E, F, G, H, J, K, and P in Subunit 1 north of Soil Pile I on west bank of Little Bayou Creek, not sampled during RI (DOE 2010a)
- AOC 563, Soil Piles 20, CC, and BW in Subunit 4 north of Outfall 012, west of Little Bayou Creek, not sampled during RI (DOE 2010a)
- AOC 564, Soil Pile AT in Subunit 5 that consists of three soil areas on the east side of the North-South Diversion Ditch north of the P-, S-, and T-Landfills, not sampled during RI (DOE 2010a)
- AOC 567, Soil Pile K013 near Outfall 013, not sampled during RI (DOE 2010a)

The SWMU/AOC-specific discussions highlight the current understanding of each SWMU's/AOC's impacts. Chapter 4 describes the overall evaluation approach that was used for each SWMU/AOC. Figures display the 45 ft grids that were used for the composite sampling and historical sample assignments. There are approximately 10 grids for each EU for SWMUs/AOCs that are larger than 0.5 acres. If a SWMU/AOC is smaller than 0.5 acres, it is considered one EU. If contingency "step-out" grids were deemed necessary by field laboratory results to define extent, the step-out grids are displayed on the figures.

One of these sites is located within the current industrial area of the facility, SWMU 19; the remaining 15 SWMUs/AOCs are located outside the limited area as shown in Figure 9.1. Fieldwork was conducted in accordance with the Work Plan (DOE 2010a).

The nature and extent is divided into surface and subsurface sections that summarize the representative data set and describes the future industrial worker scenario for SWMUs located inside the limited area and teen recreator scenario for SWMUs located outside the limited area. The evaluation of the XRF data with fixed-base laboratory data indicates the use of XRF results for copper, iron, lead, nickel, uranium and zinc has good correlation and, therefore, is reliable for use in determining nature and extent and hot spots. Molybdenum, mercury, selenium, and silver XRF results are generally below the reporting limits and will not lead to incorrect decisions in the risk assessment; however, these results may not provide much useful information for nature and extent determination. Use of XRF results for arsenic, chromium, and manganese has uncertainties; however, higher values in the complete data set indicate overall patterns of these constituents present in the soils at the SWMUs/AOCs. Uncertainties associated with arsenic will be managed in the FS because detections at high concentrations from the fixed-base laboratory were detected at lower concentrations by the XRF and may lead to underestimating risk. For vanadium,



U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

Figure 9.1. SWMU Locations and Features for Soil/Rubble Areas

LATA Environmental Services of Kentucky, LLC

9/26/2012 SoilsOU\RI Report\RI D2\09-00SWMUsandFeatures R1.mxd

comparison with the fixed-base laboratory data indicates XRF data are much higher; therefore, risks may be overestimated when using the XRF data. See Appendix B for additional information.

For the fate and transport section, the process for evaluating surface water run-off and groundwater modeling are described in Chapter 4 and Appendix C, and only the conclusions are provided in the SWMU/AOC specific sections. As discussed in the fate and transport discussion, only two of the 16 sites (AOC 541 and AOC 564) were identified for groundwater modeling. The following SWMU/AOC-specific discussions highlight current understanding of the site impacts.

The human health risk assessment narrative discusses the outdoor worker exposed to surface soil (for SWMU 19, which is inside the limited area, the future industrial worker is discussed instead of the outdoor worker), the excavation worker, and the hypothetical future resident. For SWMUs/AOCs outside the limited area, the teen recreational user is also discussed. Each SWMU/AOC was evaluated for receptors listed below. Additional discussion of scenarios is presented in Appendix D.

- Current on-site industrial worker (This assumes exposure to surface soils only.)

- Future on-site industrial worker (This assumes exposure to surface soils only.)

- Outdoor worker (surface and subsurface soils: 0–16 ft bgs) [This assumes exposure to surface (0–1 ft bgs) and a mixture of the surface (0–1 ft bgs) and subsurface soils (1–16 ft bgs), as appropriate, following a future construction activity. As a subset of the outdoor worker exposed to surface and subsurface soils, the potential risks and hazards for shorter-term exposure for workers during excavation also are provided.]

- Hypothetical future adult and child residents (This assumes exposure to surface soils only.)

- Future teen recreational users (This assumes exposure to surface soils only.)

The following are the uncertainties in the human health risk assessment that may affect SWMUs in Chapter 9.

- The range of background was not considered beyond the initial screening against site-specific background.

- Overly conservative dermal toxicity factors potentially lead to an overestimation of risk.

- Arithmetic average lead concentration is compared to the NAL to determine if additional risk analysis is needed (specifically SWMU 180).

- Concentration of total cancerous PAHs were used to estimate risk and the minimum detection limit of the PAHs with toxicity equivalency factors were used when PAHs were not detected.

- Some detection limits for XRF data are above background concentrations and NALs, the COPCs identified using these data are expected to overstate the presence of these metals.

- For those constituents that never were detected within an EU, even if the detection limit is greater than the NAL, the constituent was not considered a COPC.

- For determining COPCs, maximum detected values were screened against background values presented in the Risk Methods Document regardless of analytical method used (DOE 2011a). For uranium-238, this presents an uncertainty with respect to those samples analyzed using nitric extraction. The adjusted background value for uranium-238 is lower that the value used to screen.

- UCL concentrations were used as EPCs if there were a sufficient number of samples and distinct results to calculate a UCL. This likely will lead to an overestimation of actual exposure because receptors are assumed to be exposed to the UCL concentration for the entire exposure duration.

- Conservative (i.e., health protective) exposure factors are used when information available is limited in the form of using reasonable maximum exposure assumptions, per the Risk Methods Document (DOE 2011a). This may result in an overestimation of potential risk.

- Many of the SWMUs/AOCs (especially SWMUs/AOCs 19, 486, 487, 492, 493, 517, and 564) evaluated in this assessment are very small, and the assumptions used for the levels of exposures (duration, frequency) overstate potential chronic exposures in these units.

- The risk assessment does not consider that concentrations of some COCs may be lower or higher in the future because of processes such as degradation and attenuation.

- Additivity of multiple chemicals is assumed. Whether assuming additivity can lead to an underestimation or overestimation of risk is unknown.

- Most of the assumptions about exposure and toxicity used in this BHHRA are representative of statistical upper-bounds or even maximums for each parameter. The result of combining several such upper-bound assumptions is that the final estimate of potential exposure or potential risk is conservative.

Additional information can be found in Appendix D.

For the ecological screening, the priority chemicals that exceeded their respective screening values are shown in tables within each subsection (maximum HQ ≥ 10) as well as the overall HI for the constituents detected. This allows for comparison of the HIs, SWMU sizes, and other factors, such as proximity to a surface water body. Additional information is contained in Appendix E.

9.1 SWMU 19, C-410-B HF NEUTRALIZATION LAGOON

9.1.1 Background

The C-410-B HF Neutralization Lagoon (SWMU 19) was a below-grade impoundment with an earth/clay floor and wire-reinforced concrete walls and was located north of the C-410 Building in the central portion of the plant site. SWMU 19 was approximately 1,900 ft^2 (38 ft x 51 ft) and 7-ft deep. This SWMU was excavated as described in the *Removal Action Report for Soils Operable Unit Inactive Facilities Solid Waste Management Units 19 and 181 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0356&D2 (DOE 2010b).

SWMU 19 received effluent from the C-410-C Neutralization Building, where lime was used for the neutralization of HF cell electrolyte from fluorine cells. In addition, trucks transporting fly ash to the C-746-T Inert Landfill were rinsed in this impoundment. All processes in the C-410 Building ceased in the late 1970s.

In 1991, the C-410-B HF Neutralization Lagoon was investigated as part of the Phase II SI, and sediment and soil samples were collected from the lagoon (CH2M HILL 1992). Analytical results indicated low-level concentrations of PAHs in soil samples from a single soil boring. TCE was detected in soil samples from the upper 15 ft of the boring. Surface water samples collected from the lagoon indicated traces of PAHs. In addition, the surface water samples contained detectable concentrations of technetium-99, uranium-235, uranium-234, uranium-238, barium, and nickel. Surface soil samples contained PAHs, as well as detectable concentrations of arsenic, chromium, mercury, selenium, barium, lead, nickel, silver, technetium-99, uranium-234, uranium-235, and uranium-238. Sludge samples taken from the C-410-B Lagoon in July 1991 for waste characterization also indicated detectable concentrations of total uranium and technetium-99.

In 1999, the C-410-B HF Neutralization Lagoon was investigated using soil borings to 15 ft bgs during the WAGs 9 and 11 Site Evaluation (DOE 1999c). The Site Evaluation found concentrations of technetium-99, uranium-234, uranium-235, and uranium-238 that were about 10 times their background concentration. The Site Evaluation concluded that additional analyses (i.e., risk assessment) were necessary to determine the potential risks and hazards to industrial workers and nonhuman receptors. Several organic compounds and inorganic chemicals were detected at concentrations that exceed their direct contact screening criteria.

Eight samples were collected at SWMU 19 after the removal action. Based on the sampling results, the RAOs for this removal action were achieved by reducing the risk to current and future workers and excavation workers from direct contact by removing known sources of contamination (DOE 2010d).

The only data used for this RI Report are representative of current conditions (i.e., postexcavation).

9.1.2 Fieldwork Summary

SWMU 19 was excavated as part of the Soils OU Inactive Facilities Removal Action; therefore, no additional samples were required during this investigation.

A gamma radiological walkover survey (Figure 9.1.1) was conducted using a FIDLER; the 822 measurements ranged from 9,007 to 14,562 gross cpm. There appeared to be some contribution to the readings from C-410 Feed Plant because of its close proximity to this SWMU. The area consists entirely of gravel backfill; therefore, no judgmental radiological sample was collected.

9.1.3 Nature and Extent of Contamination—Surface Soils

For SWMU 19, the representative data set for surface soils is presented in Table 9.1.1 and provides the nature of the contamination in SWMU 19 surface soils. Figures 9.1.2–9.1.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 19 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 19 consists of one grid and one EU.

<u>Metals</u>

Metals were detected above the industrial worker NALs in the SWMU 19 surface soil. Of those metals, only beryllium in grid 1 was detected above both the background screening level and the industrial worker NAL in the SWMU 19 surface soil.

Figure 9.1.1. SWMU 19 Gamma Walkover Survey

Table 9.1.1. Surface Soil Historical Data Summary: SWMU 19 C410-B HF Emergency Lagoon

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	4.37E+03	8.49E+03	6.85E+03	0/4	4/4	0/4	1.30E+04	0/4	3.32E+04	0/4	3.97E+06	0/4	4/4	-
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	2.10E-01	0/4	2.53E+00	0/4	1.51E+03	0/4	0/4	-
METAL	Arsenic	mg/kg	3.20E+00	6.40E+00	4.80E+00	0/4	4/4	0/4	1.20E+01	4/4	9.97E-01	0/4	9.97E+01	0/4	4/4	-
METAL	Barium	mg/kg	4.26E+01	8.76E+01	6.14E+01	0/4	4/4	0/4	2.00E+02	0/4	5.92E+02	0/4	3.78E+05	0/4	1/4	-
METAL	Beryllium	mg/kg	2.30E-01	1.10E+00	5.60E-01	0/4	4/4	1/4	6.70E-01	4/4	1.40E-02	0/4	9.22E+00	0/4	0/4	-
METAL	Cadmium	mg/kg	1.20E+00	1.20E+00	1.20E+00	0/4	1/4	1/4	2.10E-01	0/4	3.16E+00	0/4	3.16E+02	0/4	1/4	-
METAL	Calcium	mg/kg	2.09E+03	2.67E+05	1.75E+05	0/4	4/4	2/4	2.00E+05	0/4	n/a	0/4	n/a	n/a	n/a	-
METAL	Chromium	mg/kg	1.20E+01	1.56E+01	1.39E+01	0/4	3/4	0/4	1.60E+01	0/4	3.02E+01	0/4	3.02E+03	0/4	0/4	-
METAL	Cobalt	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	1.40E+01	0/4	1.05E+01	0/4	1.52E+03	0/4	0/4	-
METAL	Copper	mg/kg	5.80E+00	5.09E+01	2.23E+01	0/4	4/4	1/4	1.90E+01	0/4	1.43E+03	0/4	2.24E+05	0/4	1/4	-
METAL	Iron	mg/kg	3.84E+03	1.20E+04	8.01E+03	0/4	4/4	0/4	2.80E+04	0/4	2.51E+04	0/4	3.92E+06	4/4	4/4	-
METAL	Lead	mg/kg	9.60E+00	5.08E+01	2.12E+01	0/4	4/4	1/4	3.60E+01	0/4	4.00E+02	0/4	4.00E+02	0/4	2/4	-
METAL	Magnesium	mg/kg	1.18E+03	1.59E+04	7.51E+03	0/4	4/4	1/4	7.70E+03	0/4	n/a	0/4	n/a	n/a	n/a	-
METAL	Manganese	mg/kg	8.58E+01	7.23E+02	3.03E+02	0/4	4/4	0/4	1.50E+03	0/4	2.58E+03	0/4	1.16E+05	3/4	4/4	-
METAL	Mercury	mg/kg	2.30E-02	1.01E-01	5.57E-02	0/4	3/4	0/4	2.00E-01	0/4	9.00E-01	0/4	7.85E+02	0/4	0/4	-
METAL	Nickel	mg/kg	5.00E+00	1.49E+01	9.95E+00	0/4	2/4	0/4	2.10E+01	0/4	4.28E+01	0/4	3.18E+04	0/4	2/4	-
METAL	Selenium	mg/kg	4.20E-01	4.20E-01	4.20E-01	0/4	1/4	0/4	8.00E-01	0/4	1.79E+02	0/4	2.80E+04	0/4	1/4	-
METAL	Silver	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	2.30E+00	0/4	1.08E+01	0/4	9.15E+03	0/4	0/4	-
METAL	Sodium	mg/kg	7.69E+01	4.32E+02	2.61E+02	3/4	4/4	2/4	3.20E+02	0/4	n/a	0/4	n/a	n/a	n/a	-
METAL	Thallium	mg/kg	6.20E-01	9.80E-01	8.07E-01	0/4	3/4	3/4	2.10E-01	0/4	2.87E+00	0/4	4.48E+02	0/4	3/4	-
METAL	Vanadium	mg/kg	6.20E+00	2.25E+01	1.67E+01	0/4	4/4	0/4	3.80E+01	4/4	1.51E-01	0/4	9.30E+01	4/4	4/4	-
METAL	Zinc	mg/kg	4.70E+00	2.03E+02	6.79E+01	0/4	4/4	1/4	6.50E+01	0/4	1.08E+04	0/4	1.68E+06	0/4	3/4	-
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	6.02E+02	0/4	1.81E+04	0/4	0/4	-
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	-
SVOA	Anthracene	mg/kg	1.40E+00	1.40E+00	1.40E+00	0/4	1/4	0/4	n/a	0/4	4.05E+03	0/4	1.22E+05	0/4	0/4	-
SVOA	Benzo(ghi)perylene	mg/kg	6.10E-01	2.10E+00	1.28E+00	0/4	4/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	-
SVOA	Fluoranthene	mg/kg	9.10E-01	9.10E+00	3.93E+00	0/4	4/4	0/4	n/a	0/4	6.01E+02	0/4	1.80E+04	0/4	3/4	-
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.87E+02	0/4	1.46E+04	0/4	0/4	-
SVOA	Naphthalene	mg/kg	1.10E+00	1.10E+00	1.10E+00	0/4	1/4	0/4	n/a	0/4	2.24E+00	0/4	2.24E+02	1/4	1/4	-
SVOA	Phenanthrene	mg/kg	5.80E-01	8.10E+00	2.97E+00	0/4	4/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	-
SVOA	Pyrene	mg/kg	1.50E+00	8.60E+00	4.48E+00	0/4	4/4	0/4	n/a	0/4	4.49E+02	0/4	1.35E+04	0/4	4/4	-
SVOA	Total PAH	mg/kg	8.27E-01	5.23E+00	2.66E+00	0/4	4/4	0/4	n/a	4/4	5.92E-02	0/4	5.92E+00	4/4	4/4	-
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.69E-02	0/4	4.98E+00	0/4	0/4	0.005 - 0.005

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) data may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Figure 9.1.2. SWMU 19 Sample Locations - Surface Soil

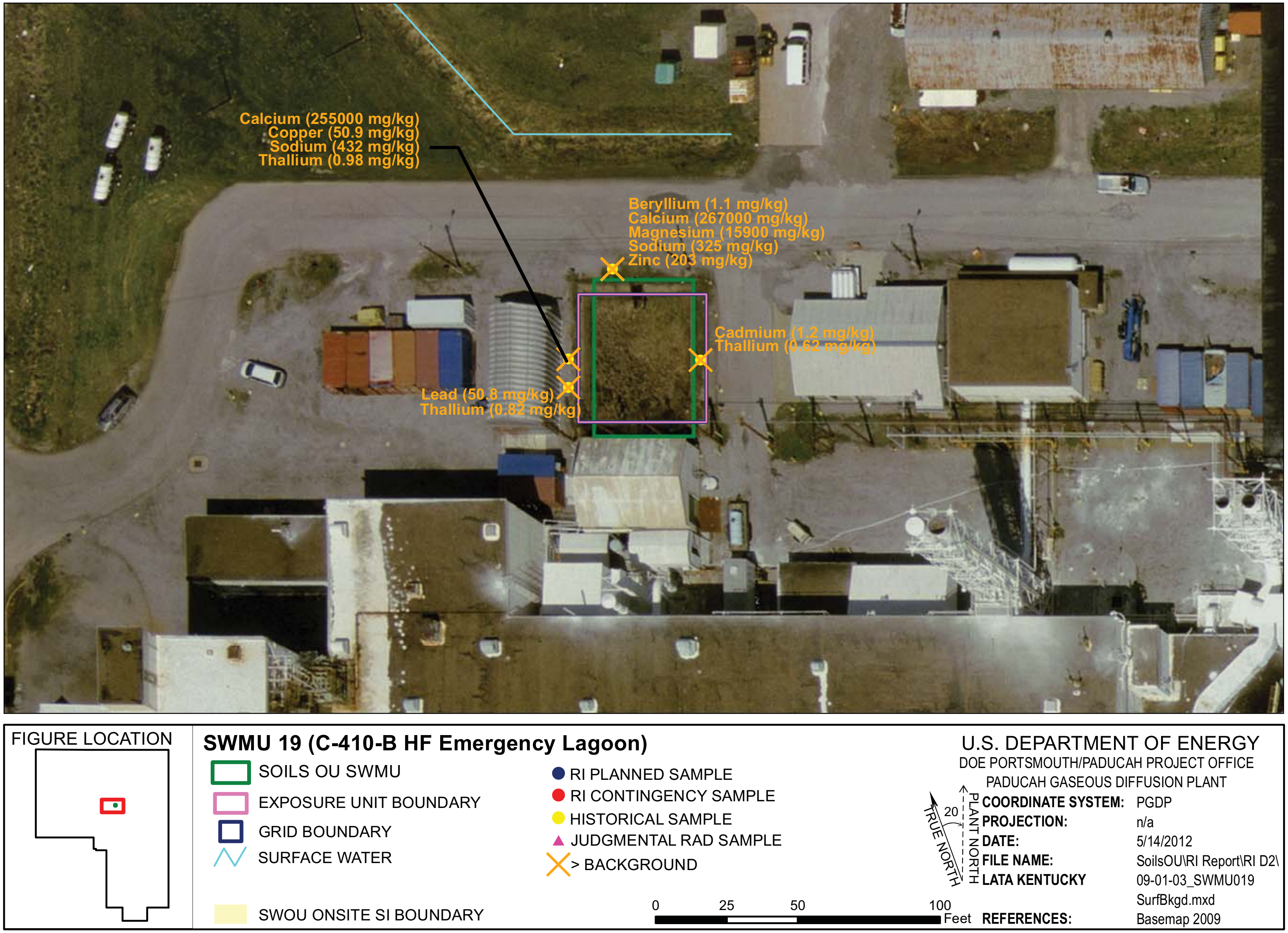


Figure 9.1.3. SWMU 19 Background Exceedances - Surface Soil

Figure 9.1.4. SWMU 19 NAL Exceedances - Surface Soil

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 19 surface soil.

Cadmium, copper, lead, thallium, and zinc in grid 1 were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

No surface soil samples from SWMU 19 were analyzed for PCBs.

SVOCs

Total PAHs in grid 1 were detected above the industrial worker NAL in the SWMU 19 surface soil.

No SVOCs were detected above the industrial worker ALs in the SWMU 19 surface soil.

Fluoranthene, naphthalene, pyrene, and Total PAHs in grid 1 were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater. Naphthalene and Total PAHs were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

VOCs

No VOCs were detected above industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 19 surface soil.

Radionuclides

No surface soil samples from SWMU 19 were analyzed for radionuclides.

9.1.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 19, the representative data set for subsurface soils is presented in Table 9.1.2 and provides the nature of contamination in SWMU 19 subsurface soils. Figures 9.1.5–9.1.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 19 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 19 consists of one grid and one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 19 subsurface soil. Arsenic, beryllium, cadmium, cobalt, copper, nickel, uranium, and vanadium in grid 1 were detected at or above both the background screening levels and the industrial worker NALs in the SWMU 19 subsurface soil.

The maximum depth at which metals were detected (in samples associated with this RI Report) at or above both the background screening levels and the industrial worker NALs was 13 ft bgs. The end depths of the boreholes taken from grid 1 ranged from 1 to 15 ft bgs.

Table 9.1.2. Subsurface Soil Historical Data Summary: SWMU 19 C410-B HF Emergency Lagoon

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	3.50E+03	1.10E+04	7.38E+03	0/23	23/23	0/23	1.20E+04	0/23	3.32E+04	0/23	3.97E+06	0/23	23/23	17.9 - 19.6
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/23	0/23	0/23	2.10E-01	0/23	2.53E+00	0/23	1.51E+03	0/23	0/23	6.17 - 9.18
METAL	Arsenic	mg/kg	1.55E+00	1.01E+01	5.17E+00	0/23	23/23	2/23	7.90E+00	23/23	9.97E-01	0/23	9.97E+01	0/23	23/23	0.896 - 0.978
METAL	Barium	mg/kg	1.38E+01	1.30E+02	6.73E+01	0/23	23/23	0/23	1.70E+02	0/23	5.92E+02	0/23	3.78E+05	0/23	5/23	2.24 - 2.45
METAL	Beryllium	mg/kg	2.90E-01	1.40E+00	5.36E-01	0/23	14/23	2/23	6.90E-01	14/23	1.40E-02	0/23	9.22E+00	0/23	0/23	0.448 - 0.489
METAL	Cadmium	mg/kg	3.10E-01	5.70E+00	1.31E+00	0/23	7/23	7/23	2.10E-01	1/23	3.16E+00	0/23	3.16E+02	0/23	6/23	0.448 - 0.489
METAL	Calcium	mg/kg	1.12E+03	5.28E+04	1.15E+04	0/23	23/23	9/23	6.10E+03	0/23	n/a	0/23	n/a	n/a	n/a	89.6 - 97.8
METAL	Chromium	mg/kg	5.63E+00	2.89E+01	1.32E+01	0/23	22/23	0/23	4.30E+01	0/23	3.02E+01	0/23	3.02E+03	0/23	0/23	2.24 - 2.45
METAL	Cobalt	mg/kg	2.40E+00	1.35E+01	5.99E+00	0/23	22/23	1/23	1.30E+01	2/23	1.05E+01	0/23	1.52E+03	22/23	22/23	0.896 - 0.978
METAL	Copper	mg/kg	5.70E+00	1.80E+03	1.95E+02	0/23	20/23	4/23	2.50E+01	2/23	1.43E+03	0/23	2.24E+05	0/23	4/23	2.24 - 2.45
METAL	Iron	mg/kg	6.48E+03	1.80E+04	1.16E+04	0/23	23/23	0/23	2.80E+04	0/23	2.51E+04	0/23	3.92E+06	23/23	23/23	17.9 - 19.6
METAL	Lead	mg/kg	4.24E+00	3.31E+01	1.00E+01	0/23	23/23	1/23	2.30E+01	0/23	4.00E+02	0/23	4.00E+02	0/23	3/23	0.896 - 0.978
METAL	Magnesium	mg/kg	5.66E+02	3.16E+03	1.50E+03	0/23	23/23	4/23	2.10E+03	0/23	n/a	0/23	n/a	n/a	n/a	4.48 - 4.89
METAL	Manganese	mg/kg	6.75E+01	5.10E+02	2.75E+02	0/23	23/23	0/23	8.20E+02	0/23	2.58E+03	0/23	1.16E+05	22/23	23/23	2.24 - 2.45
METAL	Mercury	mg/kg	1.60E-02	6.80E-02	4.24E-02	0/23	7/23	0/23	1.30E-01	0/23	9.00E-01	0/23	7.85E+02	0/23	0/23	0.011 - 0.016
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	1.79E+02	0/9	2.80E+04	0/9	0/9	4.48 - 4.89
METAL	Nickel	mg/kg	5.54E+00	4.38E+02	5.08E+01	0/23	22/23	4/23	2.20E+01	3/23	4.28E+01	0/23	3.18E+04	2/23	22/23	4.48 - 4.89
METAL	Selenium	mg/kg	2.40E-01	2.40E-01	2.40E-01	0/23	1/23	0/23	7.00E-01	0/23	1.79E+02	0/23	2.80E+04	0/23	0/23	0.896 - 0.978
METAL	Silver	mg/kg	n/a	n/a	n/a	0/23	0/23	0/23	2.70E+00	0/23	1.08E+01	0/23	9.15E+03	0/23	0/23	1.54 - 2.29
METAL	Sodium	mg/kg	3.73E+01	5.76E+02	1.20E+02	5/23	16/23	1/23	3.40E+02	0/23	n/a	0/23	n/a	n/a	n/a	179 - 196
METAL	Thallium	mg/kg	4.20E-01	8.20E-01	6.05E-01	0/23	6/23	6/23	3.40E-01	0/23	2.87E+00	0/23	4.48E+02	0/23	6/23	1.79 - 1.96
METAL	Uranium	mg/kg	2.13E+00	1.64E+02	3.18E+01	0/9	8/9	7/9	4.60E+00	1/9	1.07E+02	0/9	1.65E+04	0/9	4/9	0.896 - 9.71
METAL	Vanadium	mg/kg	6.88E+00	3.83E+01	1.81E+01	0/23	23/23	1/23	3.70E+01	23/23	1.51E-01	0/23	9.30E+01	23/23	23/23	2.24 - 2.45
METAL	Zinc	mg/kg	1.45E+01	2.41E+02	4.22E+01	0/23	18/23	3/23	6.00E+01	0/23	1.08E+04	0/23	1.68E+06	0/23	14/23	17.9 - 19.6
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	1.88E-01	0/9	1.88E+01	0/9	0/9	0.09 - 0.1
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	0.47 - 0.5
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	0.47 - 0.5
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	0.47 - 0.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	1.30E+00	0/9	3.91E+01	0/9	0/9	0.47 - 0.5
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.1.2. Subsurface Soil Historical Data Summary: SWMU 19 C410-B HF Emergency Lagoon (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/23	0/23	0/23	n/a	0/23	6.02E+02	0/23	1.81E+04	0/23	0/23	0.47 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/23	0/23	0/23	n/a	0/23	n/a	0/23	n/a	n/a	n/a	0.47 - 0.5
SVOA	Anthracene	mg/kg	1.80E-01	1.80E-01	1.80E-01	0/23	1/23	0/23	n/a	0/23	4.05E+03	0/23	1.22E+05	0/23	0/23	0.47 - 0.5
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	3.90E-01	6.70E-01	5.30E-01	1/23	2/23	0/23	n/a	0/23	n/a	0/23	n/a	n/a	n/a	0.47 - 0.5
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	0.47 - 0.5
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Diethyl phthalate	mg/kg	5.20E-01	5.20E-01	5.20E-01	0/9	1/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Fluoranthene	mg/kg	1.40E-01	2.10E+00	8.13E-01	0/23	10/23	0/23	n/a	0/23	6.01E+02	0/23	1.80E+04	0/23	1/23	0.47 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/23	0/23	0/23	n/a	0/23	4.87E+02	0/23	1.46E+04	0/23	0/23	0.47 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	1.17E-01	0/9	1.17E+01	0/9	0/9	0.47 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/23	0/23	0/23	n/a	0/23	2.24E+00	0/23	2.24E+02	0/23	0/23	0.47 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	5.22E-02	0/9	5.22E+00	0/9	0/9	0.47 - 0.5
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	0/9	0/9	0.47 - 0.5
SVOA	Phenanthrene	mg/kg	2.10E-01	1.30E+00	7.10E-01	0/23	6/23	0/23	n/a	0/23	n/a	0/23	n/a	n/a	n/a	0.47 - 0.5
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Pyrene	mg/kg	1.40E-01	2.40E+00	7.48E-01	0/23	10/23	0/23	n/a	0/23	4.49E+02	0/23	1.35E+04	0/23	3/23	0.47 - 0.5
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.47 - 0.5
SVOA	Total PAH	mg/kg	5.95E-02	1.46E+00	8.53E-01	0/23	3/23	0/23	n/a	3/23	5.92E-02	0/23	5.92E+00	2/23	3/23	-
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/14	0/14	0/14	n/a	0/14	4.69E-02	0/14	4.98E+00	0/14	0/14	0.005 - 0.005
RADS	Americium-241	pCi/g	-4.77E-03	1.79E-02	9.11E-04	0/9	9/9	0/9	n/a	0/9	5.01E+00	0/9	5.01E+02	0/9	0/9	0.0188 - 0.0206
RADS	Cesium-137	pCi/g	-8.32E-03	3.61E-02	4.81E-03	0/9	9/9	0/9	2.80E-01	0/9	8.61E-02	0/9	8.61E+00	0/9	0/9	0.0266 - 0.0329
RADS	Neptunium-237	pCi/g	-2.70E-03	4.30E-02	9.42E-03	0/8	8/8	0/8	n/a	0/8	2.71E-01	0/8	2.71E+01	0/8	5/8	0.0192 - 0.056
RADS	Plutonium-238	pCi/g	-1.52E-03	2.66E-03	2.42E-04	0/8	8/8	0/8	n/a	0/8	1.09E+01	0/8	1.09E+03	0/8	0/8	0.0127 - 0.0151
RADS	Plutonium-239/240	pCi/g	-1.23E-03	1.28E-01	2.65E-02	0/9	9/9	0/9	n/a	0/9	1.07E+01	0/9	1.07E+03	0/9	1/9	0.0114 - 0.0139
RADS	Technetium-99	pCi/g	1.44E+00	3.70E+01	1.01E+01	0/9	9/9	7/9	2.80E+00	0/9	3.61E+02	0/9	3.61E+04	1/9	9/9	2.35 - 2.35
RADS	Thorium-228	pCi/g	8.94E-01	1.41E+00	1.09E+00	0/9	9/9	0/9	1.60E+00	0/9	n/a	0/9	n/a	n/a	n/a	0.158 - 0.166
RADS	Thorium-230	pCi/g	8.61E-01	3.21E+00	1.46E+00	0/9	9/9	3/9	1.40E+00	0/9	1.38E+01	0/9	1.38E+03	0/9	9/9	0.13 - 0.146
RADS	Thorium-232	pCi/g	9.11E-01	1.39E+00	1.11E+00	0/9	9/9	0/9	1.50E+00	0/9	n/a	0/9	n/a	n/a	n/a	0.0712 - 0.105
RADS	Uranium-234	pCi/g	5.51E-01	2.77E+01	7.32E+00	0/9	9/9	7/9	1.20E+00	1/9	1.89E+01	0/9	1.89E+03	0/9	0/9	0.1 - 0.116
RADS	Uranium-235	pCi/g	3.10E-02	1.30E+00	3.66E-01	0/9	9/9	7/9	6.00E-02	2/9	3.95E-01	0/9	3.95E+01	0/9	0/9	0.0136 - 0.0218
RADS	Uranium-238	pCi/g	5.36E-01	3.06E+01	8.03E+00	0/9	9/9	7/9	1.20E+00	7/9	1.70E+00	0/9	1.70E+02	0/9	5/9	0.115 - 0.119

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.1.2. Subsurface Soil Historical Data Summary: SWMU 19 C410-B HF Emergency Lagoon (Continued)

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

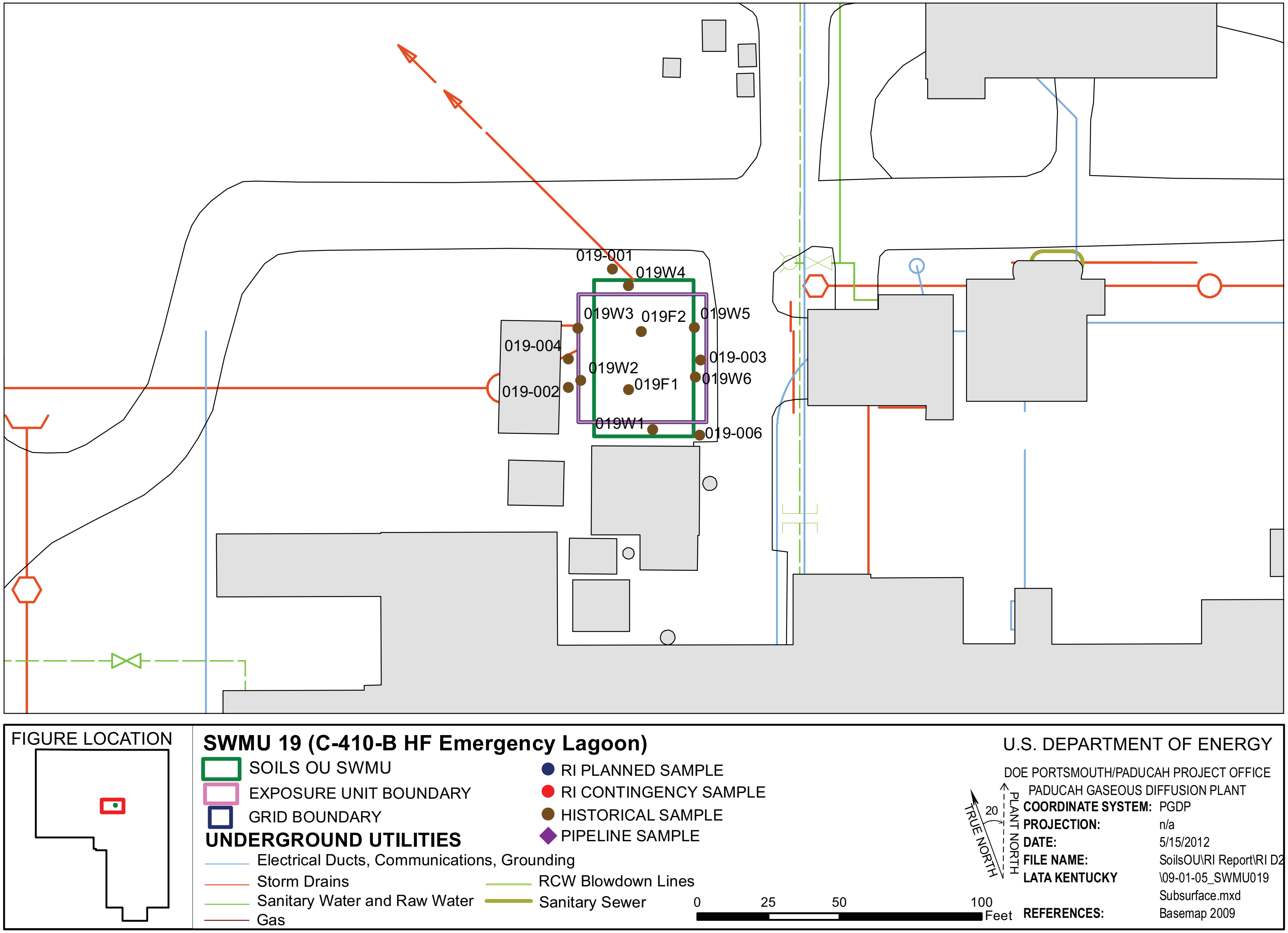


Figure 9.1.5. SWMU 19 Sample Locations - Subsurface Soil

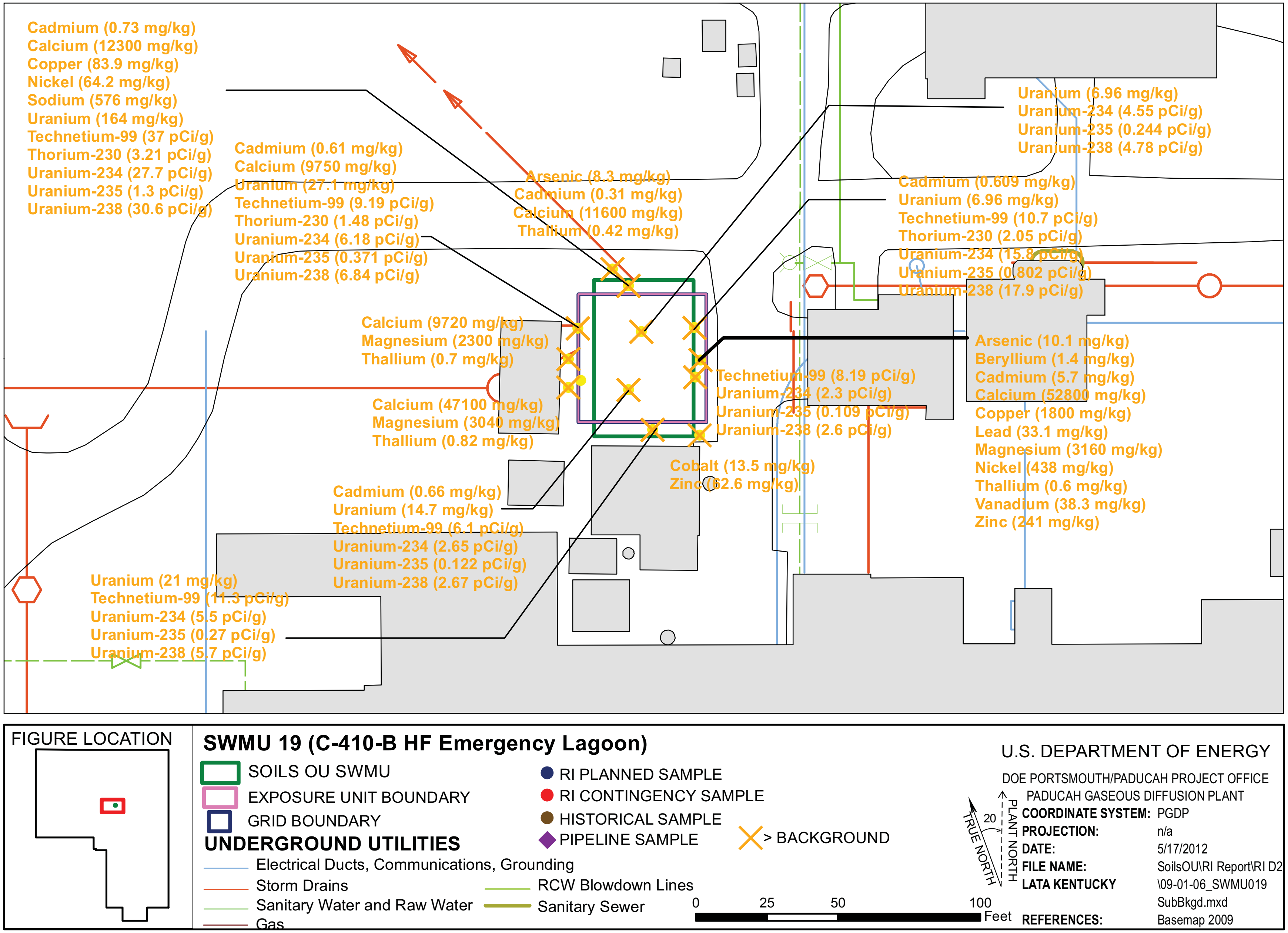


Figure 9.1.6. SWMU 19 Background Exceedances - Subsurface Soil

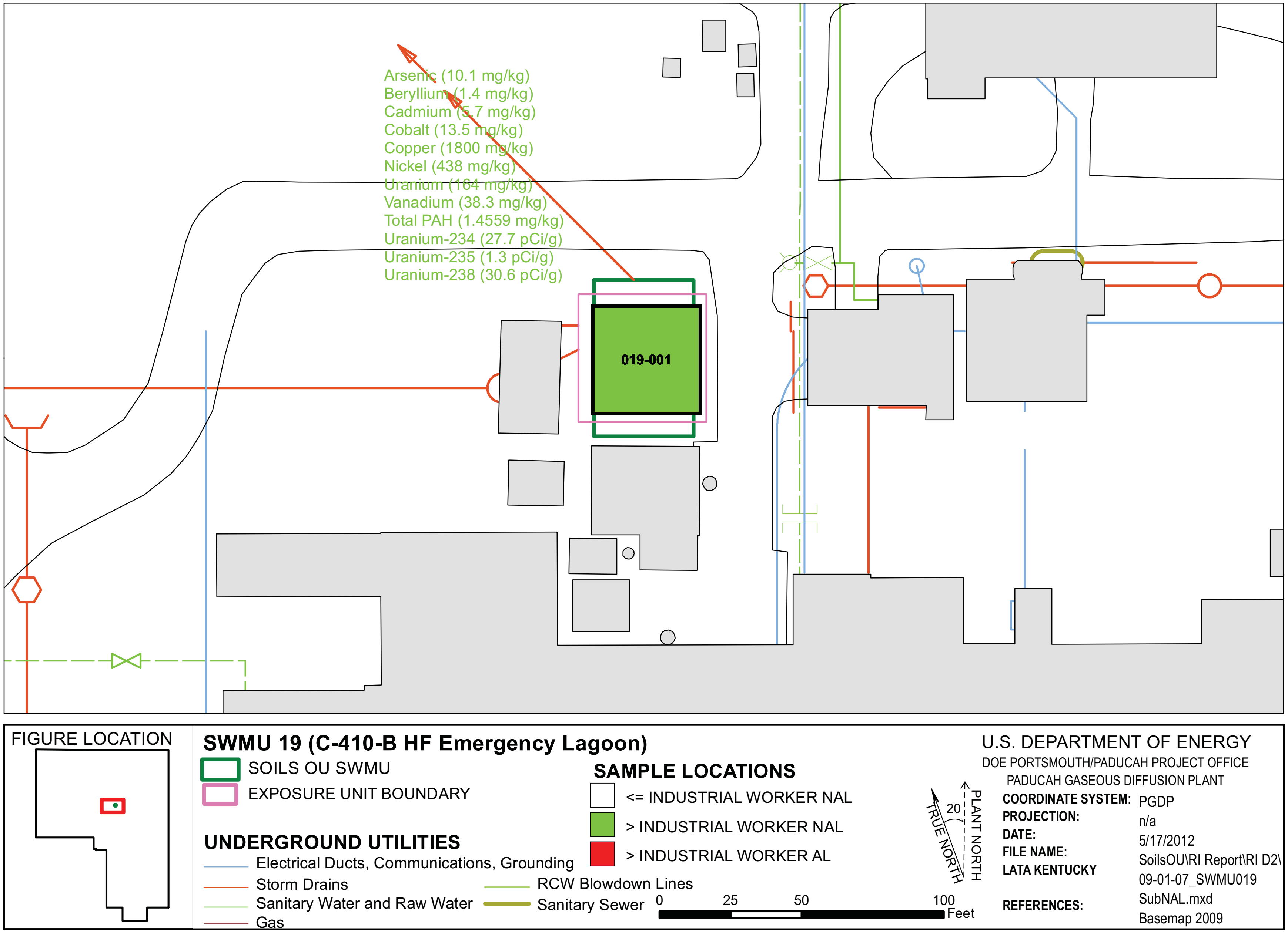


Figure 9.1.7. SWMU 19 NAL Exceedances - Subsurface Soil

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 19 subsurface soil.

The following metals were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater: arsenic, cadmium, cobalt, copper, lead, nickel, thallium, uranium, vanadium, and zinc. Cobalt, nickel, and vanadium were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 19 subsurface soil.

SVOCs

Total PAHs were detected above the industrial worker NALs to a maximum depth of 15 ft bgs. No SVOCs were detected above the industrial worker ALs in the SWMU 19 subsurface soil.

Fluoranthene, pyrene, and Total PAHs were detected above the SSLs for the protection of UCRS groundwater in the SWMU 19 subsurface soil. Total PAHs were detected above the SSLs for the protection of RGA groundwater.

VOCs

No VOCs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 19 subsurface soil.

Radionuclides

Uranium-234, uranium-235, and uranium-238 were detected at 5 ft bgs above both the background screening levels and the industrial worker NALs in the SWMU 19 subsurface soil.

No radionuclides were detected above both the background screening levels and the industrial worker ALs in the SWMU 19 subsurface soil.

Neptunium-237 (no background value available), plutonium-239/240 (no background value available), technetium-99, thorium-230, and uranium-238 were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater. Technetium-99 was detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

9.1.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no potential for significant runoff at SWMU 19 because it is a below grade impoundment. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

9.1.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 19 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 19 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.1.3 for the future industrial worker, the excavation worker, and the hypothetical resident. Table 9.1.3 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COC for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 19 include metals and SVOCs; however, none had a maximum HQ $\geq$ 10. Potential hazards for ecological receptors are listed in Appendix E.

9.1.7 SWMU 19 Summary

The following text summarizes the results for SWMU 19 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

Plant processes that could have contributed to contamination at SWMU 19 are releases from the lagoon during neutralization activities.

COPCs for surface and subsurface soils from SWMU 19 are shown on Tables 9.1.1 and 9.1.2 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The COPCs identified for this SWMU are metals and SVOCs in surface soil. Subsurface soil COPCs were metals, SVOCs, and radionuclides. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 13 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

SWMU 19 was a below grade impoundment with an earth/clay floor and wire-reinforced concrete walls and was excavated/removed as part of the Soils OU Inactive Facilities Removal Action and backfilled with clean gravel; therefore, there is no potential for migration to surface water. All underground pipelines and utilities were capped during the removal action. The CSM can be found in Appendix D.

Table 9.1.3. RGOs for SWMU 19

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Future Industrial Worker											
1	Total PAH	5.23E+00	mg/kg	8.8E-05	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Cumulative			**8.8E-05**				**< 1**			
Excavation Worker											
1	Total PAH	5.23E+00	mg/kg	1.3E-06	3.88E+00	3.88E+01	3.88E+02	< 1	n/a	n/a	n/a
	Cumulative			**1.3E-06**				**< 1**			
Hypothetical Resident[5]											
1	Total PAH	5.23E+00	mg/kg	2.7E-04	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Cumulative			**2.7E-04**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (e.g., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI)
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.50, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.50, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the future industrial worker, the excavation worker, and hypothetical residential scenarios. COCs for these scenarios for SWMU 19 are as follows:

- Future Industrial Worker
  - Total PAHs
- Excavation worker
  - Total PAHs
- Hypothetical Resident (hazards evaluated against the child resident)
  - Total PAHs

Total PAHs is a priority COC (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for the hypothetical resident. Priority COCs for other scenarios are described in Appendix D.

For SWMU 19, COPECs exceed ESVs, but there were no priority COPECs (i.e., maximum HQ ≥ 10).

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 19 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or and other means of limiting access), *in situ* treatment, and excavation. SWMU 19 is adjacent to SWMU 41, the C-410-C Neutralization Tank Slab and underlying soils, which is part of the Soils and Slabs OU that is scheduled for post-GDP shutdown. SWMU 19 is between SWMU 198, C-410-D Area Soil Contamination, and SWMU 481, C-611-M Storage Tank. SWMU 198 is part of the GDP D&D OU, and SWMU 481 is an NFA site in the 2011 SMP (DOE 2012). SWMU 19 is just north of the C-410 Building, which is undergoing deactivation as of June 2011, and is scheduled for demolition in the near future. An additional response action at SWMU 19 could have a logistical impact on the C-410 deactivation operations, but not on other integrator OUs.

9.1.8 SWMU 19 Conclusion

Previous sampling evaluated by this RI adequately defined the nature and extent of contamination in soils at SWMU 19; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker, excavation worker, and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial, as shown in the SMP (DOE 2012a). This SWMU was excavated as a Removal Action under CERCLA to reduce potential risks and hazards that had been present before the excavation.

9.2 SWMU 138, C-100 SOUTHSIDE BERM

9.2.1 Background

The C-100 Southside Berm (SWMU 138) is located south of the C-100 Building, on the south side of the plant site. SWMU 138 consists of two soil berms, each approximately 10,000 ft^2 (200 ft x 50 ft), which were constructed in 1979. The berms consist of sludge dredged from the C-611 Lagoon, the potable drinking water treatment plant, and the C-615 Sewage Treatment Plant. The sewage treatment plant and the water treatment plant were constructed for the Kentucky Ordnance Works. During that time period, trickling filter arms of the sewage treatment plants were designed with a mercury seal for the mechanical bearing. The mercury is suspected to have spilled during operation. There is no direct connection between this SWMU and a surface water body.

Characterization of the berms was performed using preliminary soil samples collected in September and October 1991 for WAG 13, and a draft screening assessment was prepared showing that the primary COCs for this SWMU are PCBs, radionuclides, and metals. (Jacobs EM Team 1994). Location information for historical samples is uncertain within the SWMU.

9.2.2 Fieldwork Summary

Of the planned 48 grid samples, all were collected. Field laboratory results indicated that contingency samples were required to determine the lateral and vertical extent of contamination. Eighty-four out of 90 of the contingency samples were collected. Those that were not collected were due to underground utilities. Field laboratory analyses indicated high concentrations of lead, zinc, nickel, cadmium, iron, and manganese. Figure A.14 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 9.2.1) using a FIDLER; the 8,715 measurements ranged from 6,305 to 17,077 gross cpm. The area is comprised entirely of soils and grass.
The count rates trend higher from west to east due to contribution from cylinder yards southeast of this SWMU. The influence of background radiation from nearby cylinders does not allow a reliable determination for areas of contamination at project action limits. A judgmental grab sample for radiological constituents was collected for radiological constituents.

9.2.3 Nature and Extent of Contamination—Surface Soils

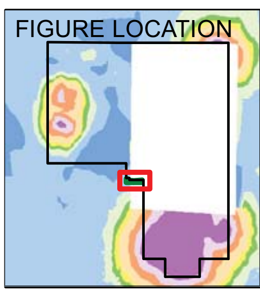
For SWMU 138, the representative data set for surface soils is presented in Tables 9.2.1 and 9.2.2 and provides the nature of the contamination in SWMU 138 surface soils. Figures 9.2.2–9.2.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits. Due to the uncertain location of historical data, SWMU 138 has been evaluated as one EU.

The horizontal extent of SWMU 138 surface soil contamination is considered adequately defined for supporting the BRA and FS.

Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	-0.007	0.03	pCi/g	0.012
Cesium-137	0.026	0.1	pCi/g	0.058
Neptunium-237	0.0016	0.014	pCi/g	0.0058
Plutonium-238	0.005	0.024	pCi/g	0.013
Plutonium-239/240	0.0041	0.017	pCi/g	0.0089
Technetium-99	0.29	0.43	pCi/g	0.26
Thorium-228	0.86	0.01	pCi/g	0.09
Thorium-230	0.87	0.007	pCi/g	0.09
Thorium-232	0.87	0.007	pCi/g	0.09
Uranium-234	0.87	0.03	pCi/g	0.1
Uranium-235/236	0.051	0.02	pCi/g	0.028
Uranium-238	1.04	0.02	pCi/g	0.11
Uranium	3.12	0.06	mg/kg	

FIGURE LOCATION



SWMU 138 (C-100 Southside Berm)

SOILS OU SWMU

GAMMA WALKOVER SURVEY RESULTS[1]

< 1,800 net CPM
≥ 1,800 net CPM
1,800 net CPM was calculated as 30 pCi/g U-238

[1]Only results within SWMU boundary presented.

JUDGMENTAL RAD SAMPLE collected at location of highest survey reading

0 50 100 200 Feet

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

TRUE NORTH 20 PLANT NORTH

COORDINATE SYSTEM: PGDP
PROJECTION: n/a
DATE: 5/14/2012
FILE NAME: SoilsOU\RI Report\RI D2\09-03-01_SWMU138 GWS.mxd
LATA KENTUCKY
REFERENCES: Basemap 2009

Figure 9.2.1. SWMU 138 Gamma Walkover Survey

Table 9.2.1. Surface Soil Historical Data Summary: SWMU 138 C-100 Southside Berm

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Teen Recreator FOE	NAL	Teen Recreator FOE	AL	GW Protection Screen RGA	UCRS	DL Range
METAL	Antimony	mg/kg	7.34E+00	7.34E+00	7.34E+00	0/13	1/13	1/13	2.10E-01	1/13	1.78E+00	0/13	1.90E+03	0/13	1/13	-
METAL	Arsenic	mg/kg	3.68E+00	8.08E+00	6.14E+00	0/10	10/10	0/10	1.20E+01	10/10	1.02E+00	0/10	1.02E+02	0/10	10/10	-
METAL	Barium	mg/kg	6.59E+01	1.69E+02	1.14E+02	0/12	12/12	0/12	2.00E+02	0/12	4.15E+02	0/12	4.58E+05	0/12	11/12	-
METAL	Cadmium	mg/kg	5.00E+00	7.30E+00	5.86E+00	0/13	3/13	3/13	2.10E-01	3/13	3.14E+00	0/13	3.14E+02	0/13	3/13	-
METAL	Chromium	mg/kg	6.46E+00	4.46E+01	2.49E+01	0/13	11/13	7/13	1.60E+01	0/13	7.15E+01	0/13	7.15E+03	0/13	0/13	-
METAL	Lead	mg/kg	7.20E+00	2.81E+02	1.21E+02	0/13	13/13	11/13	3.60E+01	0/13	4.00E+02	0/13	4.00E+02	0/13	12/13	-
METAL	Mercury	mg/kg	2.16E+00	2.13E+01	8.18E+00	0/13	13/13	13/13	2.00E-01	13/13	6.25E-01	0/13	7.88E+02	7/13	13/13	-
METAL	Nickel	mg/kg	6.05E+00	1.86E+01	1.22E+01	0/13	9/13	0/13	2.10E+01	0/13	2.98E+01	0/13	3.07E+04	0/13	9/13	-
METAL	Selenium	mg/kg	5.48E-01	1.66E+00	9.95E-01	0/13	11/13	7/13	8.00E-01	0/13	1.42E+02	0/13	5.93E+04	0/13	11/13	-
METAL	Silver	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	2.30E+00	0/13	7.45E+00	0/13	8.07E+03	0/13	0/13	-
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	2.10E-01	0/13	2.27E+00	0/13	9.50E+02	0/13	0/13	-
PPCB	PCB, Total	mg/kg	9.20E-02	5.00E-01	3.65E-01	0/16	6/16	0/16	n/a	5/16	1.83E-01	0/16	1.83E+01	0/16	6/16	-
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.87E+02	0/2	1.76E+04	0/2	0/2	-
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.25E+03	0/2	9.74E+04	0/2	0/2	-
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.47E+02	0/2	1.34E+04	0/2	0/2	-
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.19E+02	0/2	1.26E+04	0/2	0/2	-
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.27E+00	0/2	5.27E+02	0/2	0/2	-
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.35E+02	0/2	1.00E+04	0/2	0/2	-
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.57E-02	0/2	5.57E+00	0/2	0/2	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	0/13	0/13	-
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	9.45E-02	0/2	1.29E+01	0/2	0/2	-
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	-
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	-
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.28E+00	0/2	1.91E+02	0/2	0/2	-
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	9.30E-01	0/2	1.34E+02	0/2	0/2	-
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	-
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.38E-01	0/2	5.85E+01	0/2	0/2	-
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.26E-01	0/2	1.48E+02	0/2	0/2	-
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/15	0/15	0/15	n/a	0/15	9.91E-02	0/15	1.17E+01	0/15	0/15	-
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.39E-01	0/2	1.02E+02	0/2	0/2	-

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.2.2. Surface Soil RI Data Summary: SWMU 138, C-100 Southside Berm

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.67E+03	9.03E+03	7.14E+03	0/3	3/3	0/3	1.30E+04	0/3	2.77E+04	0/3	8.91E+06	0/3	3/3	5.7 - 6.5
METAL	Antimony	mg/kg	3.40E-01	3.60E-01	3.47E-01	0/3	3/3	3/3	2.10E-01	0/3	1.78E+00	0/3	1.90E+03	0/3	3/3	0.57 - 0.65
METAL	Arsenic	mg/kg	5.40E+00	1.55E+01	9.34E+00	0/48	15/48	2/48	1.20E+01	15/48	1.02E+00	0/48	1.02E+02	0/48	15/48	1.1 - 11
METAL	Barium	mg/kg	9.65E+01	1.74E+02	1.39E+02	0/3	3/3	0/3	2.00E+02	0/3	4.15E+02	0/3	4.58E+05	0/3	3/3	2.3 - 2.6
METAL	Beryllium	mg/kg	3.70E-01	5.40E-01	4.50E-01	0/3	3/3	0/3	6.70E-01	3/3	1.29E-02	0/3	8.65E+00	0/3	0/3	0.11 - 0.13
METAL	Cadmium	mg/kg	8.20E-02	5.30E-01	3.44E-01	0/3	3/3	2/3	2.10E-01	0/3	3.14E+00	0/3	3.14E+02	0/3	2/3	0.057 - 0.065
METAL	Calcium	mg/kg	1.24E+03	2.07E+05	1.23E+05	0/3	3/3	1/3	2.00E+05	0/3	n/a	0/3	n/a	n/a	n/a	57.1 - 326
METAL	Chromium	mg/kg	1.25E+01	5.39E+01	2.67E+01	0/48	8/48	5/48	1.60E+01	0/48	7.15E+01	0/48	7.15E+03	0/48	0/48	1.1 - 85
METAL	Cobalt	mg/kg	6.80E+00	9.40E+00	8.07E+00	0/3	3/3	0/3	1.40E+01	1/3	8.45E+00	0/3	3.29E+03	3/3	3/3	0.23 - 0.26
METAL	Copper	mg/kg	1.05E+01	4.13E+01	2.79E+01	0/48	17/48	16/48	1.90E+01	0/48	1.13E+03	0/48	4.75E+05	0/48	0/48	1.1 - 35
METAL	Iron	mg/kg	1.03E+04	2.35E+04	1.43E+04	0/48	48/48	0/48	2.80E+04	2/48	1.98E+04	0/48	8.31E+06	48/48	48/48	5.7 - 100
METAL	Lead	mg/kg	9.84E+00	6.81E+01	3.30E+01	0/48	48/48	19/48	3.60E+01	0/48	4.00E+02	0/48	4.00E+02	0/48	45/48	0.34 - 13
METAL	Magnesium	mg/kg	1.05E+03	3.79E+03	2.59E+03	0/3	3/3	0/3	7.70E+03	0/3	n/a	0/3	n/a	n/a	n/a	57.1 - 65.3
METAL	Manganese	mg/kg	9.62E+01	7.38E+02	4.14E+02	0/48	48/48	0/48	1.50E+03	0/48	3.47E+03	0/48	2.94E+05	48/48	48/48	0.23 - 85
METAL	Mercury	mg/kg	2.99E-02	1.14E-01	8.40E-02	0/48	3/48	0/48	2.00E-01	0/48	6.25E-01	0/48	7.88E+02	0/48	2/48	0.0381 - 10
METAL	Molybdenum	mg/kg	6.10E-01	6.40E-01	6.27E-01	0/48	3/48	0/48	n/a	0/48	1.42E+02	0/48	5.94E+04	0/48	3/48	0.57 - 15
METAL	Nickel	mg/kg	8.90E+00	1.13E+02	5.65E+01	0/48	9/48	6/48	2.10E+01	6/48	2.98E+01	0/48	3.07E+04	5/48	9/48	0.57 - 65
METAL	Selenium	mg/kg	1.20E+00	1.50E+00	1.33E+00	0/48	3/48	3/48	8.00E-01	0/48	1.42E+02	0/48	5.93E+04	0/48	3/48	0.57 - 20
METAL	Silver	mg/kg	4.90E-02	1.27E+01	4.57E+00	0/48	6/48	3/48	2.30E+00	3/48	7.45E+00	0/48	8.07E+03	3/48	6/48	0.23 - 10
METAL	Sodium	mg/kg	2.76E+01	9.39E+01	6.72E+01	0/3	3/3	0/3	3.20E+02	0/3	n/a	0/3	n/a	n/a	n/a	22.8 - 26.1
METAL	Thallium	mg/kg	2.00E-01	2.30E-01	2.20E-01	0/3	3/3	2/3	2.10E-01	0/3	2.27E+00	0/3	9.50E+02	0/3	3/3	0.23 - 0.26
METAL	Uranium	mg/kg	1.47E+00	9.09E+00	2.70E+00	0/49	5/49	1/49	4.90E+00	0/49	8.49E+01	0/49	3.50E+04	0/49	0/49	0.01 - 20
METAL	Vanadium	mg/kg	1.71E+01	2.93E+01	2.20E+01	0/3	3/3	0/3	3.80E+01	3/3	1.04E-01	0/3	7.61E+01	3/3	3/3	1.1 - 1.3
METAL	Zinc	mg/kg	2.58E+01	9.18E+01	6.40E+01	0/48	48/48	24/48	6.50E+01	0/48	8.50E+03	0/48	3.56E+06	0/48	48/48	2.3 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/25	0/25	0/25	n/a	0/25	1.83E-01	0/25	1.83E+01	0/25	0/25	5 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.38 - 0.43
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.38 - 0.43
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.38 - 0.43
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.35E+00	0/2	1.00E+02	0/2	0/2	1.8 - 2.1
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.87E+02	0/2	1.76E+04	0/2	0/2	0.38 - 0.43
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.25E+03	0/2	9.74E+04	0/2	0/2	0.38 - 0.43
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.2.2. Surface Soil RI Data Summary: SWMU 138, C-100 Southside Berm (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.0076 - 0.0086
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	9.30E-02	9.30E-02	9.30E-02	1/2	1/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.38 - 0.43
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Fluoranthene	mg/kg	1.00E-01	1.00E-01	1.00E-01	1/2	1/2	0/2	n/a	0/2	4.47E+02	0/2	1.34E+04	0/2	0/2	0.38 - 0.43
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.19E+02	0/2	1.26E+04	0/2	0/2	0.38 - 0.43
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.78E-01	0/2	1.78E+01	0/2	0/2	0.38 - 0.43
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.76 - 0.86
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.27E+00	0/2	5.27E+02	0/2	0/2	0.38 - 0.43
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.10E-02	0/2	6.10E+00	0/2	0/2	0.0076 - 0.0086
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	1.8 - 2.1
SVOA	Phenanthrene	mg/kg	5.90E-02	5.90E-02	5.90E-02	1/2	1/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.43
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	Pyrene	mg/kg	9.60E-02	9.60E-02	9.60E-02	1/2	1/2	0/2	n/a	0/2	3.35E+02	0/2	1.00E+04	0/2	0/2	0.38 - 0.43
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.76 - 0.86
SVOA	Total PAH	mg/kg	3.84E-02	9.74E-02	6.79E-02	0/2	2/2	0/2	n/a	1/2	5.57E-02	0/2	5.57E+00	0/2	2/2	-
RADS	Alpha activity	pCi/g	1.50E+01	2.56E+01	1.96E+01	0/3	3/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	4.6 - 6.9
RADS	Americium-241	pCi/g	-7.00E-03	1.50E-02	3.37E-03	0/3	3/3	0/3	n/a	0/3	1.28E+01	0/3	1.28E+03	0/3	0/3	0.013 - 0.03
RADS	Beta activity	pCi/g	1.93E+01	2.02E+01	1.96E+01	0/3	3/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	2.8 - 6.2
RADS	Cesium-137	pCi/g	2.60E-02	1.96E-01	1.09E-01	0/3	3/3	0/3	4.90E-01	0/3	1.98E-01	0/3	1.98E+01	0/3	0/3	0.059 - 0.1
RADS	Neptunium-237	pCi/g	-5.00E-03	1.60E-03	-1.80E-03	0/3	3/3	0/3	1.00E-01	0/3	6.26E-01	0/3	6.26E+01	0/3	0/3	0.014 - 0.037
RADS	Plutonium-238	pCi/g	1.60E-03	8.50E-03	5.03E-03	0/3	3/3	0/3	7.30E-02	0/3	3.64E+01	0/3	3.64E+03	0/3	0/3	0.01 - 0.024
RADS	Plutonium-239/240	pCi/g	4.10E-03	8.50E-03	6.03E-03	0/3	3/3	0/3	2.50E-02	0/3	3.56E+01	0/3	3.56E+03	0/3	0/3	0.0084 - 0.017
RADS	Technetium-99	pCi/g	7.00E-02	2.90E-01	1.80E-01	0/3	3/3	0/3	2.50E+00	0/3	1.11E+03	0/3	1.11E+05	0/3	0/3	0.39 - 0.43
RADS	Thorium-228	pCi/g	4.09E-01	8.60E-01	5.88E-01	0/3	3/3	0/3	1.60E+00	0/3	n/a	0/3	n/a	n/a	n/a	0.01 - 0.057
RADS	Thorium-230	pCi/g	6.70E-01	8.70E-01	7.70E-01	0/3	3/3	0/3	1.50E+00	0/3	4.49E+01	0/3	4.49E+03	0/3	3/3	0.007 - 0.03
RADS	Thorium-232	pCi/g	3.74E-01	8.70E-01	5.52E-01	0/3	3/3	0/3	1.50E+00	0/3	n/a	0/3	n/a	n/a	n/a	0.007 - 0.026
RADS	Uranium-234	pCi/g	5.14E-01	8.70E-01	6.58E-01	0/3	3/3	0/3	1.20E+00	0/3	6.25E+01	0/3	6.25E+03	0/3	0/3	0.004 - 0.03
RADS	Uranium-235/236	pCi/g	1.30E-02	5.10E-02	3.43E-02	2/3	3/3	0/3	6.00E-02	0/3	9.12E-01	0/3	9.12E+01	0/3	0/3	0.006 - 0.02
RADS	Uranium-238	pCi/g	4.91E-01	1.04E+00	7.25E-01	0/3	3/3	0/3	1.20E+00	0/3	4.02E+00	0/3	4.02E+02	0/3	0/3	0.004 - 0.02

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.2.2. Surface Soil RI Data Summary: SWMU 138, C-100 Southside Berm (Continued)

(red)	One or more samples exceed AL value[1]
(green)	One or more samples exceed NAL value[2]
(orange)	One or more samples exceed background value
(light blue)	One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

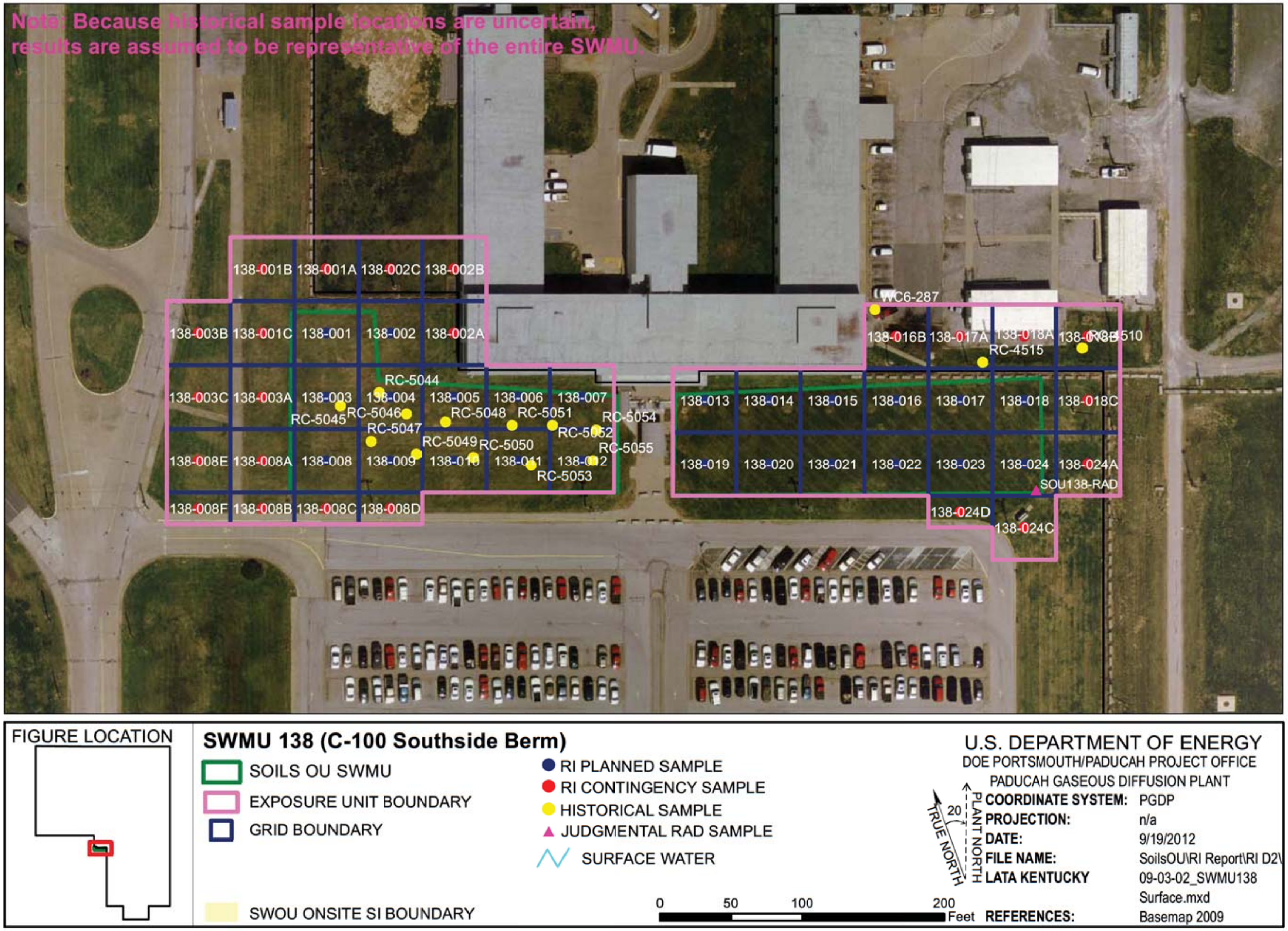


Figure 9.2.2. SWMU 138 Sample Locations - Surface Soil

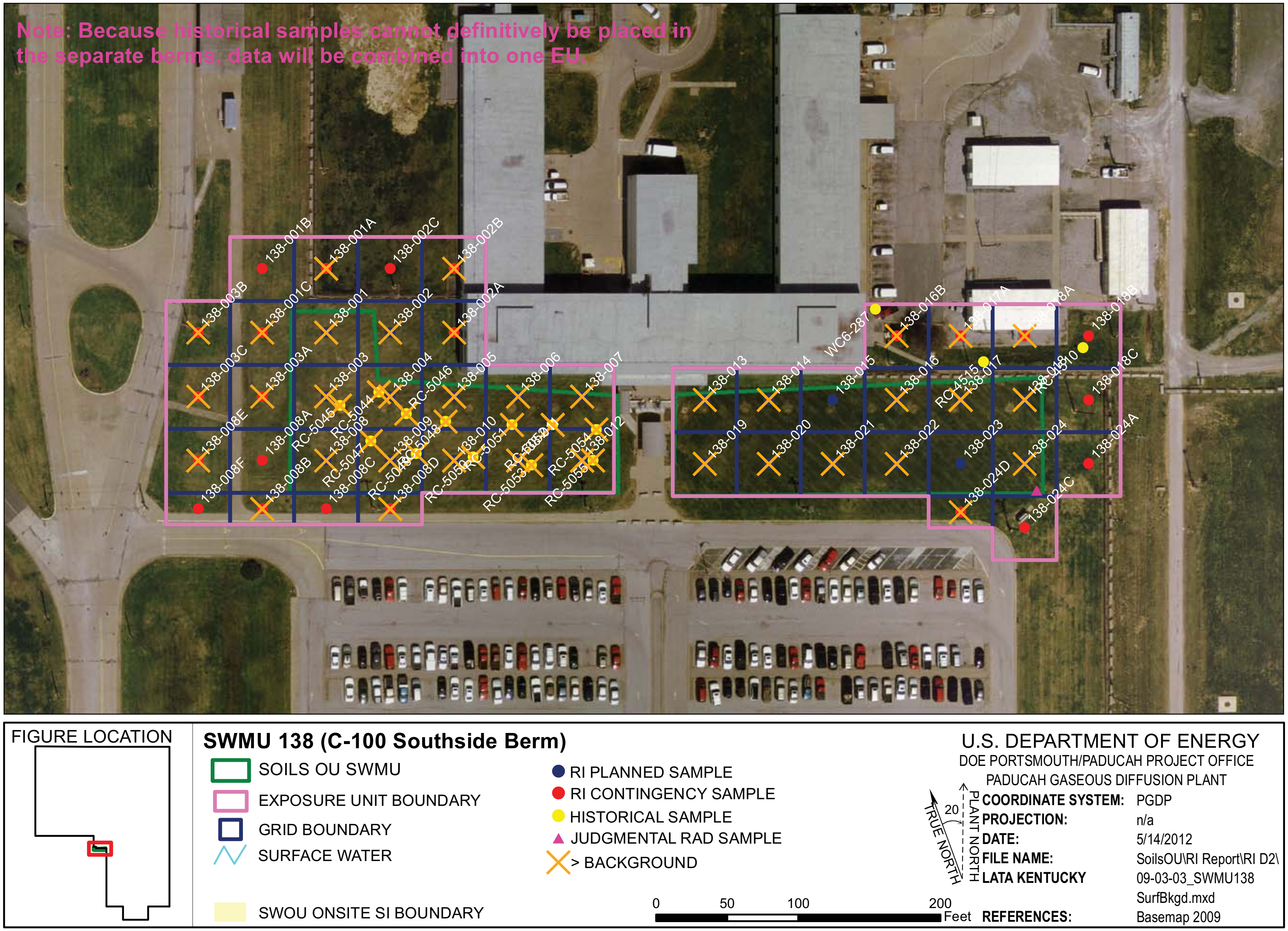


Figure 9.2.3. SWMU 138 Background Exceedances - Surface Soil

Station	Results Exceeding Background
RC-5044	Antimony (7.34 mg/kg) Chromium (16.2 mg/kg) Lead (127.4 mg/kg) Mercury (11.5 mg/kg) Selenium (1.08 mg/kg)
RC-5045	Cadmium (5 mg/kg) Lead (156.9 mg/kg) Mercury (8.99 mg/kg) Selenium (1.66 mg/kg)
RC-5046	Lead (154.4 mg/kg) Mercury (8.76 mg/kg) Selenium (1 mg/kg)
RC-5047	Lead (121.8 mg/kg) Mercury (21.3 mg/kg)
RC-5048	Lead (96.9 mg/kg) Mercury (8.07 mg/kg)
RC-5049	Lead (167.8 mg/kg) Mercury (3.32 mg/kg)
RC-5050	Cadmium (7.3 mg/kg) Chromium (25.9 mg/kg) Lead (231.4 mg/kg) Mercury (4.38 mg/kg) Selenium (1.22 mg/kg)
RC-5051	Cadmium (5.27 mg/kg) Chromium (35.3 mg/kg) Lead (280.5 mg/kg) Mercury (2.69 mg/kg)
RC-5052	Chromium (42.5 mg/kg) Lead (42.2 mg/kg) Mercury (5.69 mg/kg) Selenium (1.23 mg/kg)
RC-5053	Chromium (32.8 mg/kg) Mercury (2.16 mg/kg)
RC-5054	Chromium (44.6 mg/kg) Mercury (19.2 mg/kg) Selenium (1.38 mg/kg)
RC-5055	Chromium (33.8 mg/kg) Lead (39.2 mg/kg) Mercury (2.74 mg/kg)
SOU138-001	Copper (41.31 mg/kg) Lead (37.69 mg/kg)
SOU138-001A	Antimony (0.34 mg/kg) Selenium (1.3 mg/kg) Zinc (79 mg/kg)
SOU138-001C	Chromium (53.85 mg/kg)
SOU138-002	Zinc (71.43 mg/kg)
SOU138-002A	Zinc (73.45 mg/kg)
SOU138-002B	Zinc (68.32 mg/kg)
SOU138-003	Copper (25.41 mg/kg) Zinc (68.67 mg/kg)
SOU138-003A	Chromium (38.08 mg/kg)
SOU138-003B	Chromium (40.47 mg/kg)
SOU138-003C	Arsenic (12.55 mg/kg)
SOU138-004	Copper (24.88 mg/kg) Lead (49.01 mg/kg) Zinc (74.16 mg/kg)
SOU138-005	Copper (28.33 mg/kg) Lead (37.62 mg/kg) Silver (10.09 mg/kg) Zinc (67.27 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.2.3. SWMU 138 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU138-006	Lead (45.15 mg/kg)
	Zinc (76.76 mg/kg)

Station	Results Exceeding Background
SOU138-007	Lead (42.72 mg/kg)
	Zinc (76.34 mg/kg)

Station	Results Exceeding Background
SOU138-008	Copper (27.47 mg/kg)

Station	Results Exceeding Background
SOU138-008B	Chromium (39.75 mg/kg)
	Lead (38.5 mg/kg)
	Nickel (101.69 mg/kg)

Station	Results Exceeding Background
SOU138-008D	Lead (39.96 mg/kg)
	Zinc (91.83 mg/kg)

Station	Results Exceeding Background
SOU138-008E	Chromium (41.05 mg/kg)
	Uranium (9.09 mg/kg)

Station	Results Exceeding Background
SOU138-009	Lead (40.26 mg/kg)
	Zinc (67.84 mg/kg)

Station	Results Exceeding Background
SOU138-010	Arsenic (15.45 mg/kg)
	Copper (27.66 mg/kg)
	Zinc (72.51 mg/kg)

Station	Results Exceeding Background
SOU138-011	Copper (31.08 mg/kg)
	Lead (64.74 mg/kg)
	Zinc (91.18 mg/kg)

Station	Results Exceeding Background
SOU138-012	Antimony (0.34 mg/kg)
	Cadmium (0.53 mg/kg)
	Calcium (207000 mg/kg)
	Copper (38.9 mg/kg)
	Lead (68.1 mg/kg)
	Selenium (1.5 mg/kg)
	Thallium (0.23 mg/kg)
	Zinc (86.2 mg/kg)

Station	Results Exceeding Background
SOU138-013	Lead (53 mg/kg)
	Zinc (77.98 mg/kg)

Station	Results Exceeding Background
SOU138-014	Lead (42.82 mg/kg)
	Zinc (76.72 mg/kg)

Station	Results Exceeding Background
SOU138-016	Copper (24.14 mg/kg)
	Nickel (113.2 mg/kg)

Station	Results Exceeding Background
SOU138-016B	Zinc (74.95 mg/kg)

Station	Results Exceeding Background
SOU138-017	Antimony (0.36 mg/kg)
	Cadmium (0.42 mg/kg)
	Copper (32.9 mg/kg)
	Lead (56.8 mg/kg)
	Nickel (78.08 mg/kg)
	Selenium (1.2 mg/kg)
	Silver (11.05 mg/kg)
	Thallium (0.23 mg/kg)
	Zinc (74.4 mg/kg)

Station	Results Exceeding Background
SOU138-017A	Copper (22.28 mg/kg)
	Zinc (67.42 mg/kg)

Station	Results Exceeding Background
SOU138-018	Copper (39.32 mg/kg)
	Lead (41.02 mg/kg)
	Zinc (67.23 mg/kg)

Station	Results Exceeding Background
SOU138-018A	Zinc (90.15 mg/kg)

Station	Results Exceeding Background
SOU138-019	Lead (42.15 mg/kg)
	Nickel (88.53 mg/kg)
	Zinc (65.44 mg/kg)

Station	Results Exceeding Background
SOU138-020	Copper (24.56 mg/kg)
	Lead (51.06 mg/kg)
	Zinc (85.56 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.2.3. SWMU 138 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU138-021	Copper (23.1 mg/kg)
	Lead (42.6 mg/kg)
	Nickel (103.1 mg/kg)
	Zinc (72.45 mg/kg)

Station	Results Exceeding Background
SOU138-022	Copper (29.15 mg/kg)
	Lead (44.39 mg/kg)

Station	Results Exceeding Background
SOU138-024	Silver (12.67 mg/kg)

Station	Results Exceeding Background
SOU138-024D	Nickel (107.06 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.2.3. SWMU 138 Background Exceedances – Surface (Continued)

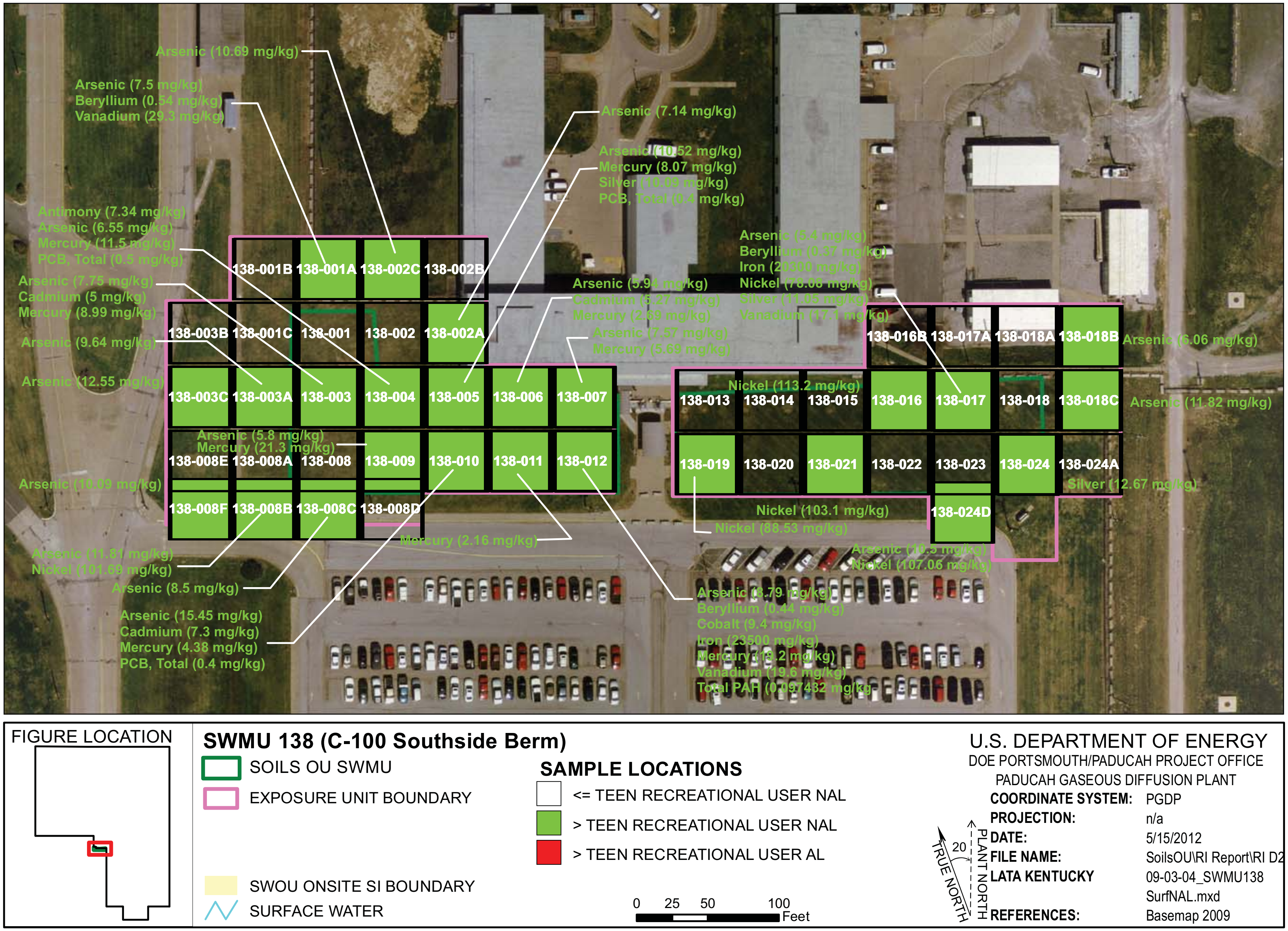


Figure 9.2.4. SWMU 138 NAL Exceedances - Surface Soil

Metals

Metals were detected above the teen recreator NALs in the SWMU 138 surface soil. The following are the metals detected at or above both the background screening levels and the teen recreator NALs and the grids in which they were detected.

Metal	Grid
Antimony	4
Arsenic	10, 3C
Cadmium	3, 6, 10
Mercury	2, 3, 4, 5, 6, 7, 9, 10, 11, 12
Nickel	8B, 16, 17, 19, 21, 24D
Silver	5, 17, 24

* SWMU 138 consists of one EU.

Grids 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 16, 17, 19, 21, and 24 are located within the administrative boundary of SWMU 138. Grids 3C, 8B, and 24D are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 138, as described in the Soils OU Work Plan (DOE 2010a).

No metals were detected above both the background screening levels and the teen recreator ALs in the SWMU 138 surface soil.

The following are the metals detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	1A, 4, 12, 17
Arsenic	3C, 10
Cadmium	3, 6,10, 12, 17
Lead	1, 3, 4, 5, 6, 7, 8B, 8D, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22
Mercury	3, 4, 5, 6, 7, 9, 10, 11, 12
Molybdenum[1]	1A, 12, 17
Nickel	8B, 16, 17, 19, 21, 21D
Selenium	1a, 3, 4,7, 10, 12, 17
Silver	5, 17, 24
Thallium	12, 17
Zinc	2A, 2B, 3, 4, 5, 6, 7, 8D, 9, 10, 11, 12, 13, 14, 16B, 17, 17A, 18. 18A, 19, 20, 21

* SWMU 138 consists of one EU.
[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids in which they were detected.

Metal	Grid
Mercury	3, 4, 5, 9, 12
Nickel	8B, 16, 19, 21, 24D
Silver	5, 17, 24

* SWMU 138 consists of one EU.

PCBs

Total PCBs were detected above the teen recreator NALs in the surface soil of grids 4, 5, and 10.

PCBs were not detected above the teen recreator ALs in the SWMU 138 surface soil.

Total PCBs were detected above the SSL for the protection of UCRS groundwater (grids 4, 5, 10, and 17A), but PCBs were not detected above the SSL for the protection of RGA groundwater.

SVOCs

Total PAHs were detected above the teen recreator NAL in the surface soil of grid 12.

No SVOCs were detected above the teen recreator ALs or the SSLs for the RGA in the SWMU 138 surface soil. Total PAHs were above the SSLs for the protection of UCRS groundwater in grids 12 and 17.

VOCs

No VOCs were detected above the teen recreator NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 138 surface soil.

Radionuclides

No radionuclides were detected in the SWMU 138 surface soil.

9.2.4 Nature and Extent of Contamination—Subsurface Soils

The representative data set for subsurface soils is presented in Tables 9.2.3 and 9.2.4 and provides the nature of the contamination in SWMU 138 subsurface soils. Figures 9.2.5–9.2.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits. Due to the uncertain location of historical data, SWMU 138 has been evaluated as one EU.

The horizontal and vertical extent of SWMU 138 subsurface soil contamination is considered adequately defined for supporting the BRA and FS.

Metals

Metals were detected above the teen recreator NALs in the SWMU 138 subsurface soil. The following are the metals detected at or above both the background screening levels and the teen recreator NALs and the grids in which they were detected.

Metal	Grid
Arsenic	1, 3, 5, 16, 17, 1C, 2A, 8F, 3A, 3C, 24A
Barium	1C
Beryllium	1C, 8F
Cobalt	8F
Iron	2A, 3A
Mercury	10, 12, 20
Nickel	1, 2, 6, 7, 8, 15, 16, 19, 20, 24, 1C, 3A, 3C, 8D, 8F, 24A, 24D
Silver	2, 7, 19, 20
Vanadium	1C

* SWMU 138 consists of one EU.

Table 9.2.3. Subsurface Soil Historical Data Summary: SWMU 138 C-100 Southside Berm

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range

There are no subsurface samples.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.2.4. Subsurface Soil RI Data Summary: SWMU 138, C-100 Southside Berm

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Teen Recreator FOE	NAL	Teen Recreator FOE	AL	GW Protection Screen RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.98E+03	1.30E+04	9.30E+03	0/10	10/10	1/10	1.20E+04	0/10	2.77E+04	0/10	8.91E+06	0/10	10/10	5.5 - 6.2
METAL	Antimony	mg/kg	1.50E-01	6.80E-01	2.87E-01	0/10	10/10	5/10	2.10E-01	0/10	1.78E+00	0/10	1.90E+03	0/10	4/10	0.55 - 0.62
METAL	Arsenic	mg/kg	2.30E+00	1.53E+01	7.75E+00	0/87	30/87	12/87	7.90E+00	30/87	1.02E+00	0/87	1.02E+02	0/87	30/87	1.1 - 11
METAL	Barium	mg/kg	7.10E+01	5.29E+02	1.81E+02	0/10	10/10	3/10	1.70E+02	1/10	4.15E+02	0/10	4.58E+05	0/10	8/10	2.2 - 2.5
METAL	Beryllium	mg/kg	2.90E-01	8.60E-01	5.18E-01	0/10	10/10	2/10	6.90E-01	10/10	1.29E-02	0/10	8.65E+00	0/10	0/10	0.11 - 0.12
METAL	Cadmium	mg/kg	1.90E-02	9.30E-01	2.63E-01	0/10	9/10	5/10	2.10E-01	0/10	3.14E+00	0/10	3.14E+02	0/10	3/10	0.055 - 0.062
METAL	Calcium	mg/kg	1.12E+03	1.74E+05	5.29E+04	0/10	10/10	4/10	6.10E+03	0/10	n/a	0/10	n/a	n/a	n/a	54.8 - 569
METAL	Chromium	mg/kg	1.13E+01	6.48E+01	3.59E+01	0/87	38/87	18/87	4.30E+01	0/87	7.15E+01	0/87	7.15E+03	0/87	0/87	1.1 - 85
METAL	Cobalt	mg/kg	2.70E+00	1.76E+01	7.45E+00	0/10	10/10	1/10	1.30E+01	3/10	8.45E+00	0/10	3.29E+03	10/10	10/10	0.22 - 0.25
METAL	Copper	mg/kg	5.60E+00	3.58E+01	1.81E+01	0/87	19/87	5/87	2.50E+01	0/87	1.13E+03	0/87	4.75E+05	0/87	0/87	1.1 - 35
METAL	Iron	mg/kg	6.08E+03	4.08E+04	1.39E+04	0/87	87/87	2/87	2.80E+04	11/87	1.98E+04	0/87	8.31E+06	87/87	87/87	5.5 - 100
METAL	Lead	mg/kg	6.00E+00	5.43E+01	2.02E+01	0/87	86/87	30/87	2.30E+01	0/87	4.00E+02	0/87	4.00E+02	0/87	52/87	0.33 - 13
METAL	Magnesium	mg/kg	8.77E+02	3.98E+03	2.13E+03	0/10	10/10	3/10	2.10E+03	0/10	n/a	0/10	n/a	n/a	n/a	54.7 - 62.5
METAL	Manganese	mg/kg	5.30E+01	1.23E+03	3.66E+02	0/87	86/87	4/87	8.20E+02	0/87	3.47E+03	0/87	2.94E+05	81/87	86/87	0.22 - 85
METAL	Mercury	mg/kg	9.40E-03	8.30E+00	7.41E-01	0/87	12/87	2/87	1.30E-01	2/87	6.25E-01	0/87	7.88E+02	2/87	3/87	0.0365 - 10
METAL	Molybdenum	mg/kg	2.00E-01	1.10E+00	5.96E-01	0/87	10/87	0/87	n/a	0/87	1.42E+02	0/87	5.94E+04	0/87	10/87	0.55 - 15
METAL	Nickel	mg/kg	6.60E+00	1.02E+02	4.70E+01	0/87	23/87	16/87	2.20E+01	16/87	2.98E+01	0/87	3.07E+04	3/87	23/87	0.55 - 65
METAL	Selenium	mg/kg	9.30E-01	4.72E+00	1.53E+00	0/87	11/87	11/87	7.00E-01	0/87	1.42E+02	0/87	5.93E+04	0/87	11/87	0.55 - 20
METAL	Silver	mg/kg	2.10E-02	1.65E+01	2.89E+00	0/87	16/87	6/87	2.70E+00	6/87	7.45E+00	0/87	8.07E+03	6/87	10/87	0.22 - 10
METAL	Sodium	mg/kg	7.77E+01	3.72E+02	1.91E+02	0/10	10/10	2/10	3.40E+02	0/10	n/a	0/10	n/a	n/a	n/a	21.9 - 25
METAL	Thallium	mg/kg	1.20E-01	6.20E-01	3.09E-01	0/10	10/10	4/10	3.40E-01	0/10	2.27E+00	0/10	9.50E+02	0/10	9/10	0.22 - 0.25
METAL	Uranium	mg/kg	6.50E-01	7.99E+00	1.96E+00	0/87	11/87	1/87	4.60E+00	0/87	8.49E+01	0/87	3.50E+04	0/87	0/87	0.03 - 20
METAL	Vanadium	mg/kg	1.53E+01	4.28E+01	2.56E+01	0/10	10/10	1/10	3.70E+01	10/10	1.04E-01	0/10	7.61E+01	10/10	10/10	1.1 - 1.2
METAL	Zinc	mg/kg	1.46E+01	1.31E+02	4.51E+01	0/87	87/87	12/87	6.00E+01	0/87	8.50E+03	0/87	3.56E+06	0/87	82/87	2.2 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/26	0/26	0/26	n/a	0/26	1.83E-01	0/26	1.83E+01	0/26	0/26	0.37 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.4 - 0.41
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.4 - 0.41
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.4 - 0.41
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.35E+00	0/2	1.00E+02	0/2	0/2	1.9 - 2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.87E+02	0/2	1.76E+04	0/2	0/2	0.4 - 0.41
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.25E+03	0/2	9.74E+04	0/2	0/2	0.4 - 0.41
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.2.4. Subsurface Soil RI Data Summary: SWMU 138, C-100 Southside Berm (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.0079 - 0.0082
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.4 - 0.41
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.47E+02	0/2	1.34E+04	0/2	0/2	0.4 - 0.41
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.19E+02	0/2	1.26E+04	0/2	0/2	0.4 - 0.41
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.78E-01	0/2	1.78E+01	0/2	0/2	0.4 - 0.41
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.79 - 0.82
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.27E+00	0/2	5.27E+02	0/2	0/2	0.4 - 0.41
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.10E-02	0/2	6.10E+00	0/2	0/2	0.0079 - 0.0082
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	1.9 - 2
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.4 - 0.41
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.35E+02	0/2	1.00E+04	0/2	0/2	0.4 - 0.41
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.79 - 0.82
SVOA	Total PAH	mg/kg	1.67E-02	2.03E-02	1.85E-02	0/2	2/2	0/2	n/a	0/2	5.57E-02	0/2	5.57E+00	0/2	2/2	-
RADS	Alpha activity	pCi/g	1.95E+01	2.01E+01	1.98E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.5 - 4.6
RADS	Americium-241	pCi/g	6.00E-04	4.20E-03	2.40E-03	0/2	2/2	0/2	n/a	0/2	1.28E+01	0/2	1.28E+03	0/2	0/2	0.0091 - 0.011
RADS	Beta activity	pCi/g	2.01E+01	2.24E+01	2.13E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.8 - 4.9
RADS	Cesium-137	pCi/g	4.00E-02	8.10E-02	6.05E-02	0/2	2/2	0/2	2.80E-01	0/2	1.98E-01	0/2	1.98E+01	0/2	0/2	0.092 - 0.12
RADS	Neptunium-237	pCi/g	7.00E-03	1.00E-02	8.50E-03	0/2	2/2	0/2	n/a	0/2	6.26E-01	0/2	6.26E+01	0/2	2/2	0.03 - 0.032
RADS	Plutonium-238	pCi/g	1.00E-02	1.03E-02	1.02E-02	0/2	2/2	0/2	n/a	0/2	3.64E+01	0/2	3.64E+03	0/2	0/2	0.011 - 0.016
RADS	Plutonium-239/240	pCi/g	2.40E-03	7.70E-03	5.05E-03	0/2	2/2	0/2	n/a	0/2	3.56E+01	0/2	3.56E+03	0/2	0/2	0.0095 - 0.013
RADS	Technetium-99	pCi/g	2.50E-01	2.80E-01	2.65E-01	0/2	2/2	0/2	2.80E+00	0/2	1.11E+03	0/2	1.11E+05	0/2	0/2	0.4 - 0.43
RADS	Thorium-228	pCi/g	5.89E-01	6.41E-01	6.15E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.022 - 0.031
RADS	Thorium-230	pCi/g	7.80E-01	8.60E-01	8.20E-01	0/2	2/2	0/2	1.40E+00	0/2	4.49E+01	0/2	4.49E+03	0/2	2/2	0.02 - 0.02
RADS	Thorium-232	pCi/g	5.06E-01	6.13E-01	5.60E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.017 - 0.017
RADS	Uranium-234	pCi/g	8.00E-01	8.30E-01	8.15E-01	0/2	2/2	0/2	1.20E+00	0/2	6.25E+01	0/2	6.25E+03	0/2	0/2	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	4.00E-02	5.60E-02	4.80E-02	1/2	2/2	0/2	6.00E-02	0/2	9.12E-01	0/2	9.12E+01	0/2	0/2	0.005 - 0.015
RADS	Uranium-238	pCi/g	8.40E-01	8.60E-01	8.50E-01	0/2	2/2	0/2	1.20E+00	0/2	4.02E+00	0/2	4.02E+02	0/2	0/2	0.01 - 0.01

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.2.4. Subsurface Soil RI Data Summary: SWMU 138, C-100 Southside Berm (Continued)

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

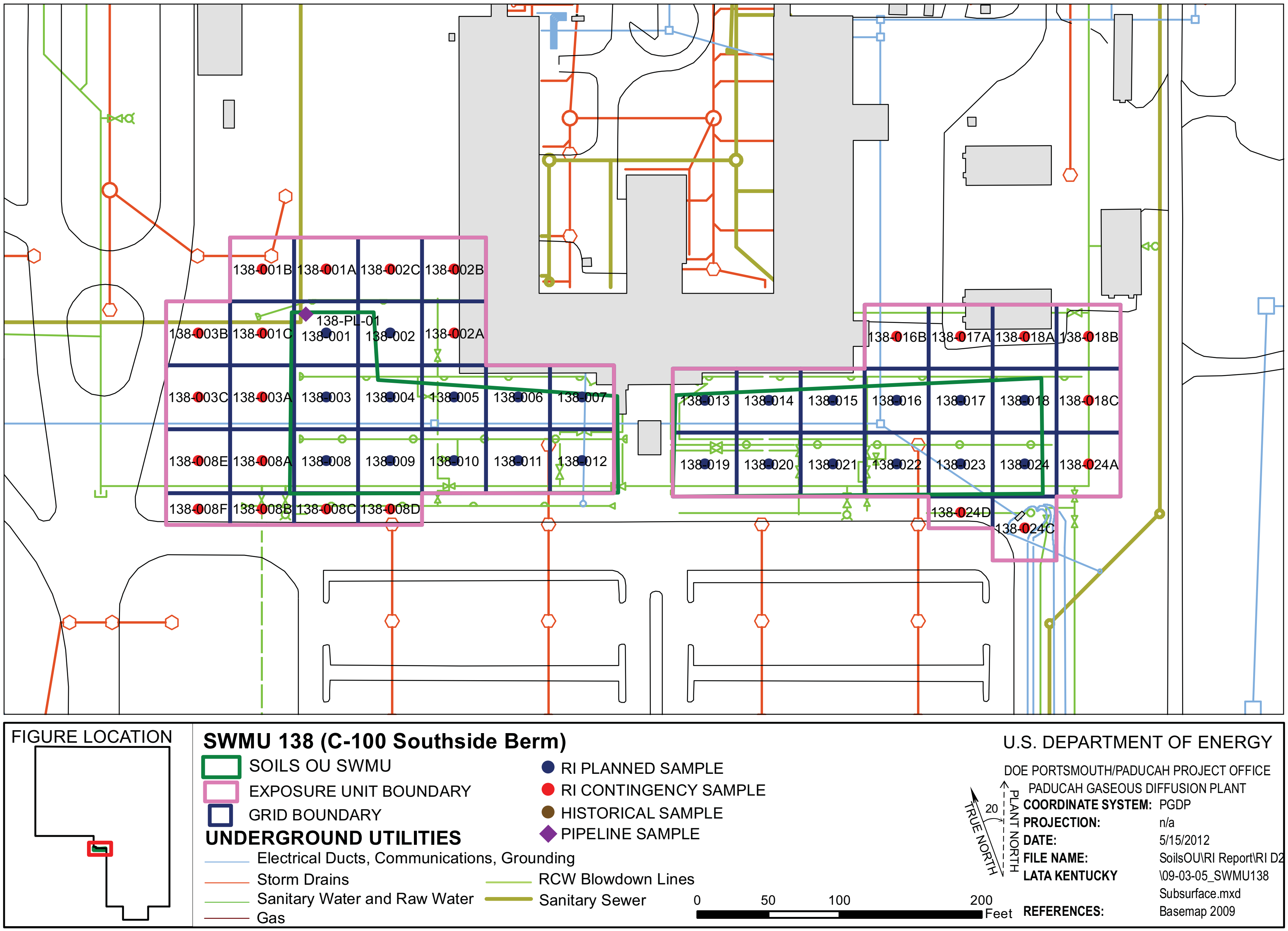


Figure 9.2.5. SWMU 138 Sample Locations - Subsurface Soil

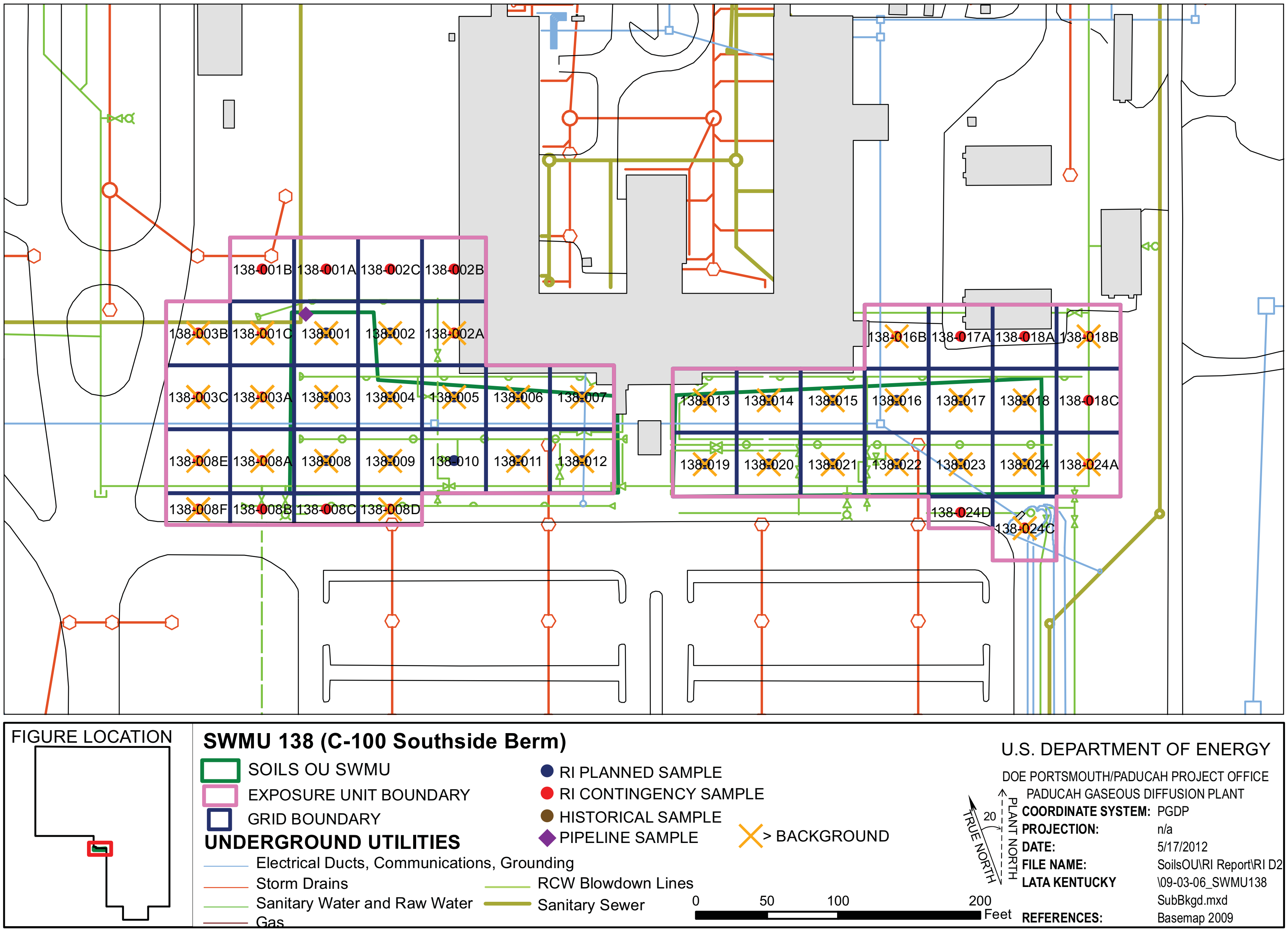


Figure 9.2.6. SWMU 138 Background Exceedances - Subsurface Soil

Station	Results Exceeding Background
SOU138-001	Arsenic (8.21 mg/kg)
	Lead (24.58 mg/kg)
	Nickel (64.15 mg/kg)
	Zinc (69.49 mg/kg)

Station	Results Exceeding Background
SOU138-001C	Aluminum (13000 mg/kg)
	Arsenic (15.3 mg/kg)
	Barium (529 mg/kg)
	Beryllium (0.86 mg/kg)
	Chromium (56.54 mg/kg)
	Nickel (72.3 mg/kg)
	Selenium (1.6 mg/kg)
	Vanadium (42.8 mg/kg)

Station	Results Exceeding Background
SOU138-002	Silver (9.54 mg/kg)

Station	Results Exceeding Background
SOU138-002A	Arsenic (15.26 mg/kg)
	Iron (40820.47 mg/kg)

Station	Results Exceeding Background
SOU138-003	Arsenic (12.15 mg/kg)
	Copper (35.76 mg/kg)
	Lead (54.33 mg/kg)
	Zinc (76.74 mg/kg)

Station	Results Exceeding Background
SOU138-003A	Arsenic (9.93 mg/kg)
	Chromium (50.62 mg/kg)
	Iron (30928.91 mg/kg)
	Lead (28.71 mg/kg)
	Manganese (961.6 mg/kg)
	Nickel (67.25 mg/kg)
	Zinc (130.81 mg/kg)

Station	Results Exceeding Background
SOU138-003B	Chromium (44.5 mg/kg)
	Lead (24.61 mg/kg)

Station	Results Exceeding Background
SOU138-003C	Antimony (0.68 mg/kg)
	Arsenic (10.2 mg/kg)
	Chromium (45.76 mg/kg)
	Lead (24.26 mg/kg)
	Nickel (70.68 mg/kg)
	Selenium (1.2 mg/kg)
	Sodium (350 mg/kg)

Station	Results Exceeding Background
SOU138-004	Lead (37.47 mg/kg)
	Zinc (65.99 mg/kg)

Station	Results Exceeding Background
SOU138-005	Arsenic (8.41 mg/kg)
	Lead (27.61 mg/kg)

Station	Results Exceeding Background
SOU138-006	Barium (298 mg/kg)
	Chromium (50.39 mg/kg)
	Lead (35.27 mg/kg)
	Nickel (85.05 mg/kg)
	Selenium (1.4 mg/kg)
	Thallium (0.62 mg/kg)

Station	Results Exceeding Background
SOU138-007	Silver (9.57 mg/kg)
	Zinc (61.23 mg/kg)

Station	Results Exceeding Background
SOU138-008	Copper (25.88 mg/kg)
	Lead (27.5 mg/kg)
	Nickel (101.38 mg/kg)

Station	Results Exceeding Background
SOU138-008A	Chromium (53.09 mg/kg)
	Manganese (1038.15 mg/kg)

Station	Results Exceeding Background
SOU138-008D	Nickel (68.74 mg/kg)

Station	Results Exceeding Background
SOU138-008E	Chromium (51.97 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.2.6. SWMU 138 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU138-008F	Antimony (0.38 mg/kg)
	Arsenic (14.92 mg/kg)
	Barium (219 mg/kg)
	Beryllium (0.85 mg/kg)
	Cadmium (0.24 mg/kg)
	Cobalt (17.6 mg/kg)
	Manganese (1230 mg/kg)
	Nickel (69.59 mg/kg)
	Selenium (1.6 mg/kg)
	Uranium (7.99 mg/kg)

Station	Results Exceeding Background
SOU138-009	Chromium (46.07 mg/kg)
	Lead (35.03 mg/kg)

Station	Results Exceeding Background
SOU138-011	Manganese (891.62 mg/kg)

Station	Results Exceeding Background
SOU138-012	Antimony (0.33 mg/kg)
	Cadmium (0.42 mg/kg)
	Calcium (174000 mg/kg)
	Copper (28.3 mg/kg)
	Lead (53.4 mg/kg)
	Magnesium (3800 mg/kg)
	Mercury (7.17 mg/kg)
	Selenium (1.4 mg/kg)
	Thallium (0.47 mg/kg)
	Zinc (65.9 mg/kg)

Station	Results Exceeding Background
SOU138-013	Chromium (64.83 mg/kg)
	Lead (31.1 mg/kg)
	Selenium (1.9 mg/kg)
	Sodium (372 mg/kg)
	Thallium (0.4 mg/kg)

Station	Results Exceeding Background
SOU138-014	Chromium (47.16 mg/kg)
	Lead (44.16 mg/kg)
	Zinc (62.5 mg/kg)

Station	Results Exceeding Background
SOU138-015	Lead (36.26 mg/kg)
	Nickel (57.11 mg/kg)

Station	Results Exceeding Background
SOU138-016	Arsenic (8.41 mg/kg)
	Nickel (65.74 mg/kg)

Station	Results Exceeding Background
SOU138-016B	Chromium (48.34 mg/kg)

Station	Results Exceeding Background
SOU138-017	Antimony (0.34 mg/kg)
	Arsenic (10.98 mg/kg)
	Cadmium (0.39 mg/kg)
	Calcium (173000 mg/kg)
	Copper (29.71 mg/kg)
	Lead (48.6 mg/kg)
	Magnesium (3330 mg/kg)
	Selenium (1.2 mg/kg)
	Thallium (0.41 mg/kg)

Station	Results Exceeding Background
SOU138-018	Chromium (53.47 mg/kg)

Station	Results Exceeding Background
SOU138-018B	Chromium (52.39 mg/kg)
	Selenium (1.4 mg/kg)

Station	Results Exceeding Background
SOU138-019	Lead (31.95 mg/kg)
	Nickel (64.21 mg/kg)
	Silver (13.53 mg/kg)

Station	Results Exceeding Background
SOU138-020	Lead (38.6 mg/kg)
	Mercury (8.3 mg/kg)
	Silver (16.51 mg/kg)
	Zinc (70.82 mg/kg)

Station	Results Exceeding Background
SOU138-021	Antimony (0.24 mg/kg)
	Cadmium (0.25 mg/kg)
	Calcium (84300 mg/kg)
	Lead (43.66 mg/kg)
	Selenium (1.1 mg/kg)
	Zinc (70.03 mg/kg)

Station	Results Exceeding Background
SOU138-022	Lead (25.16 mg/kg)

Station	Results Exceeding Background
SOU138-023	Copper (25.01 mg/kg)
	Lead (28.51 mg/kg)
	Selenium (4.72 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.2.6. SWMU 138 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU138-024	Lead (26.41 mg/kg)
	Nickel (72.22 mg/kg)

Station	Results Exceeding Background
SOU138-024A	Arsenic (8.46 mg/kg)
	Chromium (46.92 mg/kg)
	Nickel (101.84 mg/kg)

Station	Results Exceeding Background
SOU138-024D	Cadmium (0.93 mg/kg)
	Calcium (88600 mg/kg)
	Magnesium (3980 mg/kg)
	Nickel (74.63 mg/kg)
	Selenium (0.93 mg/kg)
	Zinc (123 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.2.6. SWMU 138 Background Exceedances – Subsurface (Continued)

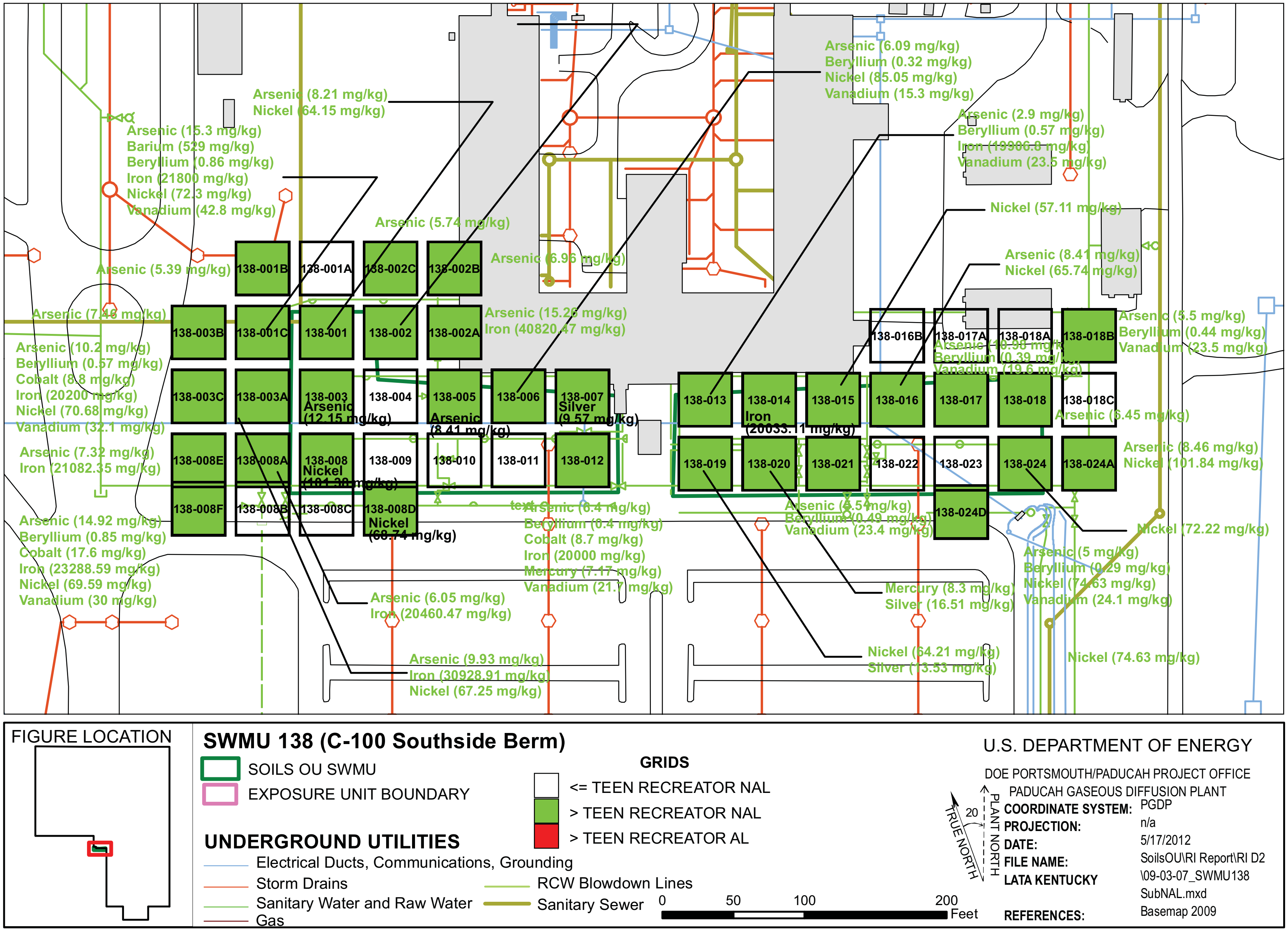


Figure 9.2.7. SWMU 138 NAL Exceedances - Subsurface Soil

Grids 1, 2, 5, 6, 7, 8, 10, 12, 15, 16, 17, 19, 20, and 24 are located within the administrative boundary of SWMU 138. Grids 1C, 2A, 3A, 3C, 8D, 8F, 24A, and 24D are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 138, as described in the Soils OU Work Plan (DOE 2010a).

The maximum depth at which metals were detected (in samples associated with this RI Report) at or above both the background screening levels and the teen recreator NALs was 10 ft bgs. The end depths of the boreholes taken from grids 1, 2, 5, 6, 7, 8, 10, 12, 15, 16, 17, 19, 20, 24, 1C, 2A, 3A, 3C, 8D, 8F, 24A, and 24D ranged from 4 to 10 ft bgs.

No metals were detected above both the background screening levels and the teen recreator ALs in the SWMU 138 subsurface soil.

The following are the metals detected in the SWMU 138 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Aluminum	1C
Antimony	3C, 8F, 12, 17
Arsenic	1, 1C, 2A, 3, 3A, 3C, 5, 8F, 16, 17, 24A
Barium	1C, 6, 8F
Cadmium	12, 17, 24D
Cobalt	8F
Iron	2A, 3A
Lead	1, 3, 3A, 3C, 4, 5, 6, 8, 9, 12, 13, 14, 15, 17, 19, 20, 12, 22, 23, 24
Manganese	3A, 8A, 8F, 11
Mercury	12, 20
Molybdenum[1]	1C, 3C, 6, 8F, 12, 13, 17, 18B, 21, 24D
Nickel	1, 1C, 3A, 3C, 6, 8, 8D, 8F, 15, 16, 19, 24, 24A, 24D
Selenium	1C, 3C, 6, 8F, 12, 13, 17, 18B, 21, 23, 24D
Silver	2, 7, 19, 20
Thallium	6, 12, 13, 17
Vanadium	1C
Zinc	1, 3, 3A, 4, 7, 12, 14, 20, 21, 24D

* SWMU 138 consists of one EU.
[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids in which they were detected.

Metal	Grid
Cobalt	8F
Iron	2A, 3A
Manganese	3A, 8A, 8F, 11
Mercury	12, 20
Nickel	6, 8, 24A
Silver	2, 7, 19, 20
Vanadium	1C

* SWMU 138 consists of one EU.

PCBs

PCBs were not detected in the SWMU 138 subsurface soil.

SVOCs

No SVOCs were detected above the teen recreator NALs, industrial worker ALs, or the SSLs for the protection of RGA groundwater. Total PAHs in grids 12 and 17 were detected above the SSLs for the protection of UCRS groundwater in the SWMU 138 subsurface soil.

VOCs

No subsurface soil samples from SWMU 138 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the teen recreator NALs or ALs in the SWMU 138 subsurface soil.

Neptunium-237 (no background value available) in grids 12 and 17 was detected above the SSL for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

9.2.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no potential for significant runoff at SWMU 138. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

9.2.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 138 are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI. Because of the uncertainty with respect to the location of historical samples, the risk results are assumed to be representative of the entire SWMU.

The cumulative ELCR and cumulative HI for one or more EUs at SWMU 138 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.2.5 for the outdoor worker (exposed to surface soils), the hypothetical resident, and the teen recreational user. The excavation worker did not have any identified COCs. Table 9.2.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Table 9.2.5. RGOs for SWMU 138

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3] 1 x 10^{-6}	RGOs for ELCR[3] 1 x 10^{-5}	RGOs for ELCR[3] 1 x 10^{-4}	HI[4]	RGOs for HI[3] 0.1	RGOs for HI[3] 1	RGOs for HI[3] 3
Outdoor Worker (exposed to surface soil)											
1,2	Arsenic	1.06E+01	mg/kg	2.6E-05	4.15E-01	4.15E+00	4.15E+01	< 1	n/a	n/a	n/a
	Chromium	5.39E+01	mg/kg	1.3E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	PCB, Total	5.00E-01	mg/kg	3.1E-06	1.62E-01	1.62E+00	1.62E+01	< 1	n/a	n/a	n/a
	Total PAH	9.74E-02	mg/kg	2.0E-06	4.85E-02	4.85E-01	4.85E+00	< 1	n/a	n/a	n/a
	Cumulative			**3.2E-05**				**< 1**			
Hypothetical Resident[5]											
1,2	Antimony	5.39E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	3.13E+00	3.13E+01	9.39E+01
	Arsenic	1.06E+01	mg/kg	4.5E-05	2.35E-01	2.35E+00	2.35E+01	0.6	1.64E+00	1.64E+01	4.93E+01
	Cadmium	5.42E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	4.90E+00	4.90E+01	1.47E+02
	Chromium	5.39E+01	mg/kg	3.5E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Mercury	1.30E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.6	2.35E+00	2.35E+01	7.04E+01
	PCB, Total	5.00E-01	mg/kg	7.8E-06	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Total PAH	9.74E-02	mg/kg	5.0E-06	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Cumulative			**6.1E-05**				**1.5**			
Teen Recreational User											
1,2	Arsenic	1.06E+01	mg/kg	6.0E-06	1.77E+00	1.77E+01	1.77E+02	< 0.1	n/a	n/a	n/a
	PCB, Total	5.00E-01	mg/kg	1.7E-06	2.99E-01	2.99E+00	2.99E+01	< 0.1	n/a	n/a	n/a
	Total PAH	9.74E-02	mg/kg	1.1E-06	8.99E-02	8.99E-01	8.99E+00	< 0.1	n/a	n/a	n/a
	Cumulative			**8.7E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.52, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.52, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Ecological Screening. COPECs for SWMU 138 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 9.2.6.

Table 9.2.6 Ecological Screening for SWMU 138

Ground Cover	Near a Surface Water Body?	Total HI (max) [a]	Priority COPECs	Background (mg/kg) [b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Grassy	No	451	Antimony	2.10E-01	7.34E+00	2.70E-01	27
			Cadmium	2.10E-01	7.30E+00	3.60E-01	20
			Lead	3.60E+01	2.81E+02	1.10E+01	26
			Mercury	2.00E-01	2.13E+01	1.00E-01	213
			PCB, Total	n/a	2.50E+00	2.00E-02	125
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

9.2.7 SWMU 138 Summary

The following text summarizes the results for SWMU 138 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Plant processes that could have contributed to contamination here are distribution of contaminants from the water treatment plant from sludges that were used to construct these berms.

COPCs for surface and subsurface soils from SWMU 138 are shown on Tables 9.2.1–9.2.4 as those analytes with green boxes under the “Teen Recreator/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. Metals, PCBs, and SVOCs were identified as COPC in surface soils. Metals, SVOCs, and radionuclides were identified as COPCs for subsurface soils. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 10 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 138 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMU 138. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soil), hypothetical residential, and teen recreational user scenarios. COCs for these scenarios for SWMU 138 are as follows:

- Outdoor worker (exposed to surface soil)

    - Arsenic
    - Chromium
    - Total PAHs
    - Total PCBs

- Excavation worker

    - None

- Hypothetical Resident (hazards evaluated against the child resident)

    - Antimony
    - Arsenic
    - Cadmium
    - Chromium
    - Mercury
    - Total PAHs
    - Total PCBs

- Teen Recreational User

    - Arsenic
    - Total PAHs
    - Total PCBs

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 138.

For SWMU 138, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Antimony
- Cadmium
- Lead
- Mercury
- Total PCBs
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 138 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. These berms were constructed to protect the C-100 Building from unsafe drivers in the parking lot immediately south of it. In the event that excavation is chosen as a response alternative for this SWMU, either the berms would have to be replaced or another barrier constructed that provided the same measure of security. SWMU 166 is adjacent to the north east of SWMU 138. SWMU 166, the C-100 Trailer Complex Soils Contamination is expected to be addressed during GDP D&D. A response at SWMU 138 would not have an impact on other integrator OUs.

9.2.8 SWMU 138 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 138; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including outdoor worker (exposed to surface soil), hypothetical resident, and teen recreational user (DOE 2010a). The reasonably anticipated future land use of this SWMU is recreational, as shown in the SMP (DOE 2012a). This SWMU is outside the PGDP limited area; therefore, it was evaluated for the teen recreator, per the Soils OU RI. This SWMU actually is a berm built to prevent vehicular access to the C-100 building and is located between the building and a parking lot in an industrial setting; therefore, use of this SWMU by a teen recreator is not a reasonably anticipated land use.

9.3 SWMU 180, WKWMA OUTDOOR FIRING RANGE (WKWMA)

9.3.1 Background

The Outdoor Firing Range (WKWMA) (SWMU 180) is located in the WKWMA, southwest of the plant site. The Outdoor Firing Range is controlled by the WKWMA. It was used by the Kentucky State Police as a firing range. Lead bullets are present in the berm. The unit is not used by PGDP.

9.3.2 Fieldwork Summary

Ninety-two sample locations were planned and collected for the unit. Field laboratory results indicated that contingency samples were needed to determine the lateral and vertical extent of contamination from this unit. Thirty-two of the 74 contingency samples were not collected. Those not collected were due to wooded wildlife areas and standing water. The field laboratory indicated elevated concentrations of lead, arsenic, and manganese. Figure A.15 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 9.3.1) using a FIDLER; the 20,639 measurements ranged from 4,002 to 40,940 gross cpm. A judgmental grab sample was collected for radiological constituents. Some areas were inaccessible due to existing structures, large trees, standing water, and steep slopes, and all but standing water contributed to global positioning system (GPS) errors.

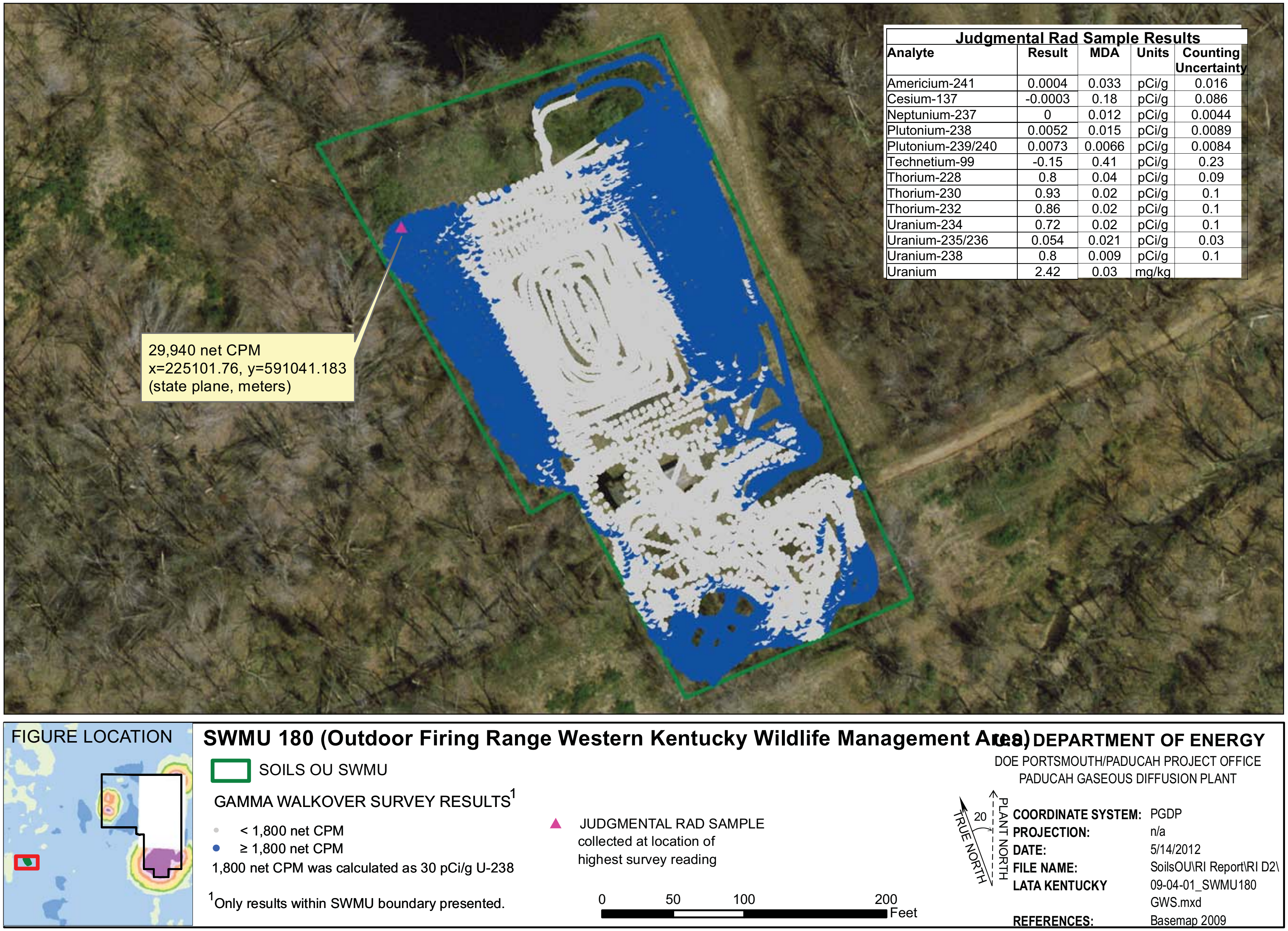
9.3.3 Nature and Extent of Contamination—Surface Soils

For SWMU 180, the representative data set for surface soils is presented in Table 9.3.1 and provides the nature of the contamination in SWMU 180 surface soils. Figures 9.3.2–9.3.4 illustrate the horizontal extent. A complete list of the sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 180 surface soil contamination is considered adequately defined for supporting the BRA and FS. Any uncertainty in the nature and extent of contamination of surface soil associated with standing water will be managed in the FS. SWMU 180 consists of four EUs.

Metals

Metals were detected above the teen recreator NALs in the SWMU 180 surface soil. The following are the metals detected at or above both the background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.0004	0.033	pCi/g	0.016
Cesium-137	-0.0003	0.18	pCi/g	0.086
Neptunium-237	0	0.012	pCi/g	0.0044
Plutonium-238	0.0052	0.015	pCi/g	0.0089
Plutonium-239/240	0.0073	0.0066	pCi/g	0.0084
Technetium-99	-0.15	0.41	pCi/g	0.23
Thorium-228	0.8	0.04	pCi/g	0.09
Thorium-230	0.93	0.02	pCi/g	0.1
Thorium-232	0.86	0.02	pCi/g	0.1
Uranium-234	0.72	0.02	pCi/g	0.1
Uranium-235/236	0.054	0.021	pCi/g	0.03
Uranium-238	0.8	0.009	pCi/g	0.1
Uranium	2.42	0.03	mg/kg	

Figure 9.3.1. SWMU 180 Gamma Walkover Survey

Table 9.3.1. Surface Soil RI Data Summary: SWMU 180, WKWMA Outdoor Firing Range

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	6.28E+03	1.03E+04	8.31E+03	0/5	5/5	0/5	1.30E+04	0/5	2.77E+04	0/5	8.91E+06	0/5	5/5	5.9 - 6.7
METAL	Antimony	mg/kg	2.50E-01	5.90E-01	4.08E-01	0/5	5/5	5/5	2.10E-01	0/5	1.78E+00	0/5	1.90E+03	0/5	4/5	0.59 - 0.67
METAL	Arsenic	mg/kg	4.40E+00	1.38E+02	1.48E+01	0/56	28/56	8/56	1.20E+01	28/56	1.02E+00	1/56	1.02E+02	5/56	28/56	1.2 - 11
METAL	Barium	mg/kg	8.30E+01	2.13E+02	1.29E+02	0/5	5/5	1/5	2.00E+02	0/5	4.15E+02	0/5	4.58E+05	0/5	5/5	2.4 - 2.7
METAL	Beryllium	mg/kg	4.80E-01	1.60E+00	7.32E-01	0/5	5/5	1/5	6.70E-01	5/5	1.29E-02	0/5	8.65E+00	0/5	0/5	0.12 - 0.13
METAL	Cadmium	mg/kg	4.20E-02	1.80E-01	8.08E-02	0/5	5/5	0/5	2.10E-01	0/5	3.14E+00	0/5	3.14E+02	0/5	0/5	0.059 - 0.067
METAL	Calcium	mg/kg	8.53E+02	3.11E+03	1.99E+03	0/5	5/5	0/5	2.00E+05	0/5	n/a	0/5	n/a	n/a	n/a	59.1 - 67.1
METAL	Chromium	mg/kg	1.32E+01	6.00E+01	3.82E+01	0/56	23/56	21/56	1.60E+01	0/56	7.15E+01	0/56	7.15E+03	0/56	0/56	1.2 - 85
METAL	Cobalt	mg/kg	5.90E+00	1.32E+01	8.34E+00	0/5	5/5	0/5	1.40E+01	2/5	8.45E+00	0/5	3.29E+03	5/5	5/5	0.24 - 0.27
METAL	Copper	mg/kg	8.70E+00	9.42E+01	2.07E+01	0/56	12/56	4/56	1.90E+01	0/56	1.13E+03	0/56	4.75E+05	0/56	2/56	1.2 - 35
METAL	Iron	mg/kg	2.66E+03	3.53E+04	1.18E+04	0/56	56/56	1/56	2.80E+04	1/56	1.98E+04	0/56	8.31E+06	56/56	56/56	5.9 - 100
METAL	Lead	mg/kg	7.99E+00	1.99E+03	8.37E+01	0/56	56/56	18/56	3.60E+01	2/56	4.00E+02	2/56	4.00E+02	1/56	42/56	0.35 - 13
METAL	Magnesium	mg/kg	6.70E+02	1.81E+03	1.29E+03	0/5	5/5	0/5	7.70E+03	0/5	n/a	0/5	n/a	n/a	n/a	59.1 - 67.1
METAL	Manganese	mg/kg	7.69E+01	1.99E+03	4.10E+02	0/56	55/56	1/56	1.50E+03	0/56	3.47E+03	0/56	2.94E+05	51/56	55/56	0.25 - 85
METAL	Mercury	mg/kg	1.39E-02	8.28E+00	7.76E-01	0/56	6/56	1/56	2.00E-01	1/56	6.25E-01	0/56	7.88E+02	1/56	1/56	0.0394 - 10
METAL	Molybdenum	mg/kg	4.60E-01	1.40E+00	6.98E-01	0/56	5/56	0/56	n/a	0/56	1.42E+02	0/56	5.94E+04	0/56	5/56	0.59 - 15
METAL	Nickel	mg/kg	1.02E+01	9.03E+01	4.16E+01	0/56	15/56	10/56	2.10E+01	10/56	2.98E+01	0/56	3.07E+04	3/56	15/56	0.59 - 65
METAL	Selenium	mg/kg	1.20E+00	1.80E+00	1.38E+00	0/56	5/56	5/56	8.00E-01	0/56	1.42E+02	0/56	5.93E+04	0/56	5/56	0.59 - 20
METAL	Silver	mg/kg	3.00E-02	1.14E+01	2.45E+00	0/56	8/56	3/56	2.30E+00	3/56	7.45E+00	0/56	8.07E+03	3/56	3/56	0.24 - 10
METAL	Sodium	mg/kg	2.90E+01	2.28E+02	1.26E+02	0/5	5/5	0/5	3.20E+02	0/5	n/a	0/5	n/a	n/a	n/a	23.6 - 26.9
METAL	Thallium	mg/kg	1.10E-01	2.10E-01	1.52E-01	0/5	5/5	0/5	2.10E-01	0/5	2.27E+00	0/5	9.50E+02	0/5	3/5	0.24 - 0.27
METAL	Uranium	mg/kg	1.10E+00	2.60E+00	1.87E+00	0/57	6/57	0/57	4.90E+00	0/57	8.49E+01	0/57	3.50E+04	0/57	0/57	0.01 - 20
METAL	Vanadium	mg/kg	2.48E+01	4.85E+01	3.10E+01	0/5	5/5	1/5	3.80E+01	5/5	1.04E-01	0/5	7.61E+01	5/5	5/5	1.2 - 1.3
METAL	Zinc	mg/kg	1.84E+01	6.86E+01	3.76E+01	0/56	56/56	2/56	6.50E+01	0/56	8.50E+03	0/56	3.56E+06	0/56	55/56	2.4 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/51	0/51	0/51	n/a	0/51	1.83E-01	0/51	1.83E+01	0/51	0/51	0.35 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.39 - 0.44
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.39 - 0.44
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.39 - 0.44
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2.1
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2.1
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	3.35E+00	0/4	1.00E+02	0/4	0/4	1.9 - 2.1
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2.1
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2.1
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2.1
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	5.87E+02	0/4	1.76E+04	0/4	0/4	0.39 - 0.44
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	3.25E+03	0/4	9.74E+04	0/4	0/4	0.39 - 0.44
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.3.1. Surface Soil RI Data Summary: SWMU 180, WKWMA Outdoor Firing Range (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2.1
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.0078 - 0.0089
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.39 - 0.44
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Fluoranthene	mg/kg	5.40E-02	5.40E-02	5.40E-02	1/4	1/4	0/4	n/a	0/4	4.47E+02	0/4	1.34E+04	0/4	0/4	0.39 - 0.44
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.19E+02	0/4	1.26E+04	0/4	0/4	0.39 - 0.44
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.78E-01	0/4	1.78E+01	0/4	0/4	0.39 - 0.44
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2.1
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.78 - 0.89
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	5.27E+00	0/4	5.27E+02	0/4	0/4	0.39 - 0.44
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2.1
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	6.10E-02	0/4	6.10E+00	0/4	0/4	0.0078 - 0.0089
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	1.9 - 2.1
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.44
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2.1
SVOA	Pyrene	mg/kg	5.60E-02	5.60E-02	5.60E-02	1/4	1/4	0/4	n/a	0/4	3.35E+02	0/4	1.00E+04	0/4	0/4	0.39 - 0.44
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.78 - 0.89
SVOA	Total PAH	mg/kg	5.60E-03	9.19E-02	3.24E-02	0/4	4/4	0/4	n/a	1/4	5.57E-02	0/4	5.57E+00	0/4	4/4	-
RADS	Alpha activity	pCi/g	1.47E+01	2.77E+01	2.15E+01	0/5	5/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	4.3 - 5.6
RADS	Americium-241	pCi/g	2.00E-04	1.00E-02	3.12E-03	0/5	5/5	0/5	n/a	0/5	1.28E+01	0/5	1.28E+03	0/5	0/5	0.0093 - 0.033
RADS	Beta activity	pCi/g	1.98E+01	3.11E+01	2.40E+01	0/5	5/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	3.8 - 5.6
RADS	Cesium-137	pCi/g	-3.00E-04	1.63E-01	7.41E-02	0/5	5/5	0/5	4.90E-01	0/5	1.98E-01	0/5	1.98E+01	0/5	0/5	0.051 - 0.18
RADS	Neptunium-237	pCi/g	-5.00E-03	8.00E-03	-2.40E-04	0/5	5/5	0/5	1.00E-01	0/5	6.26E-01	0/5	6.26E+01	0/5	1/5	0.012 - 0.042
RADS	Plutonium-238	pCi/g	1.40E-03	1.70E-02	8.00E-03	1/5	5/5	0/5	7.30E-02	0/5	3.64E+01	0/5	3.64E+03	0/5	0/5	0.012 - 0.019
RADS	Plutonium-239/240	pCi/g	7.00E-04	7.30E-03	5.04E-03	0/5	5/5	0/5	2.50E-02	0/5	3.56E+01	0/5	3.56E+03	0/5	0/5	0.0066 - 0.014
RADS	Technetium-99	pCi/g	-1.50E-01	2.80E-01	1.16E-01	0/5	5/5	0/5	2.50E+00	0/5	1.11E+03	0/5	1.11E+05	0/5	0/5	0.39 - 0.47
RADS	Thorium-228	pCi/g	5.04E-01	9.20E-01	7.80E-01	0/5	5/5	0/5	1.60E+00	0/5	n/a	0/5	n/a	n/a	n/a	0.01 - 0.04
RADS	Thorium-230	pCi/g	6.90E-01	9.80E-01	8.49E-01	0/5	5/5	0/5	1.50E+00	0/5	4.49E+01	0/5	4.49E+03	0/5	5/5	0.01 - 0.02
RADS	Thorium-232	pCi/g	4.22E-01	9.10E-01	7.44E-01	0/5	5/5	0/5	1.50E+00	0/5	n/a	0/5	n/a	n/a	n/a	0.0046 - 0.02
RADS	Uranium-234	pCi/g	4.44E-01	8.50E-01	6.37E-01	0/5	5/5	0/5	1.20E+00	0/5	6.25E+01	0/5	6.25E+03	0/5	0/5	0.01 - 0.02
RADS	Uranium-235/236	pCi/g	3.00E-02	5.40E-02	4.14E-02	3/5	5/5	0/5	6.00E-02	0/5	9.12E-01	0/5	9.12E+01	0/5	0/5	0.005 - 0.021
RADS	Uranium-238	pCi/g	5.12E-01	8.70E-01	6.82E-01	0/5	5/5	0/5	1.20E+00	0/5	4.02E+00	0/5	4.02E+02	0/5	0/5	0.005 - 0.017

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.3.1. Surface Soil RI Data Summary: SWMU 180, WKWMA Outdoor Firing Range (Continued)

(red)	One or more samples exceed AL value[1]
(green)	One or more samples exceed NAL value[2]
(orange)	One or more samples exceed background value
(blue)	One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

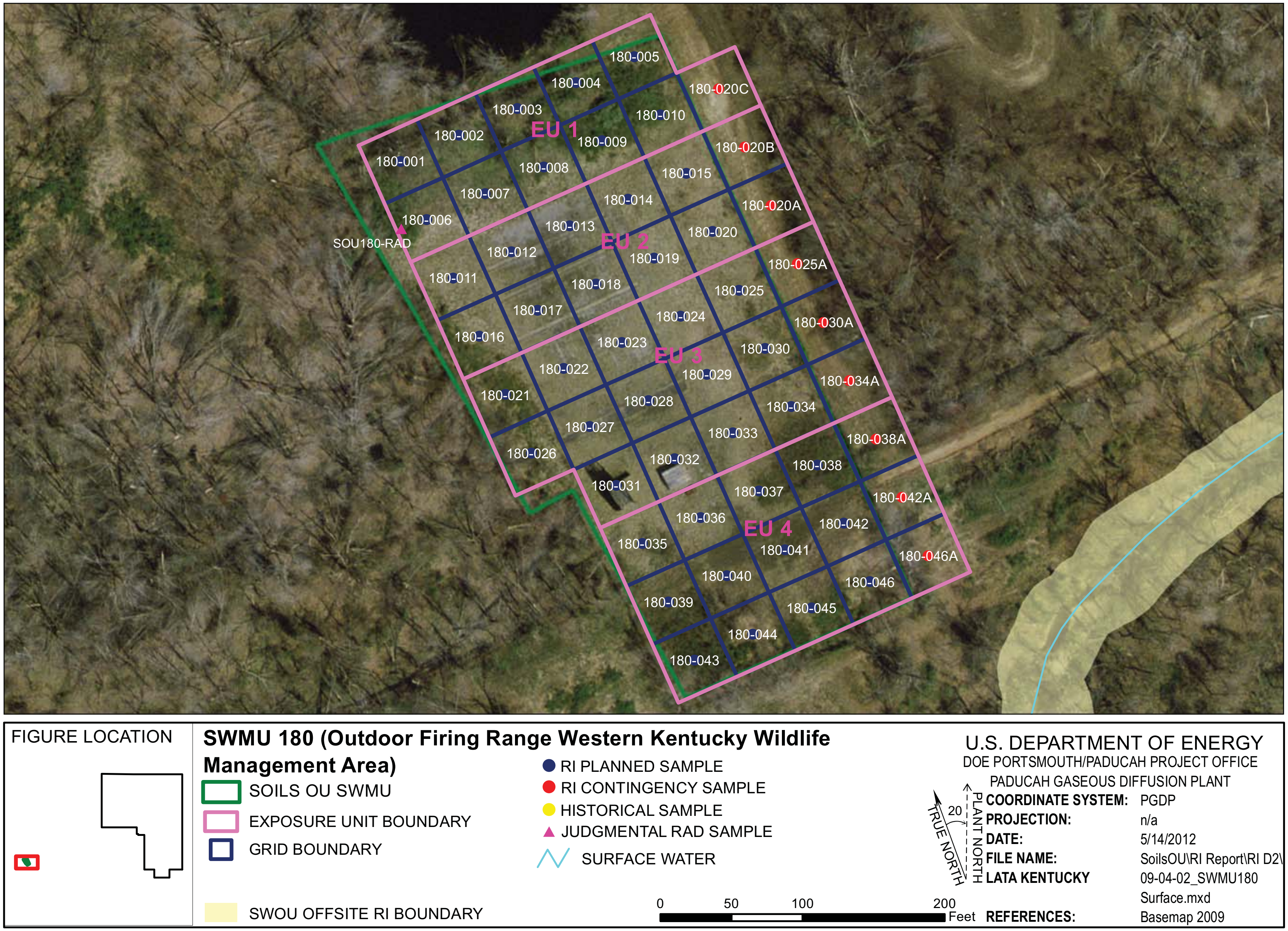
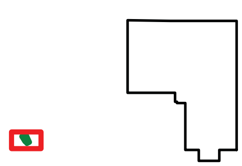


Figure 9.3.2. SWMU 180 Sample Locations - Surface Soil

FIGURE LOCATION



SWMU 180 (Outdoor Firing Range Western Kentucky Wildlife Management Area)

SOILS OU SWMU
EXPOSURE UNIT BOUNDARY
GRID BOUNDARY
SURFACE WATER
SWOU OFFSITE RI BOUNDARY

RI PLANNED SAMPLE
RI CONTINGENCY SAMPLE
HISTORICAL SAMPLE
JUDGMENTAL RAD SAMPLE
> BACKGROUND

0 50 100 200 Feet

TRUE NORTH 20 PLANT NORTH

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

COORDINATE SYSTEM:	PGDP
PROJECTION:	n/a
DATE:	5/14/2012
FILE NAME:	SoilsOU\RI Report\RI D2\
LATA KENTUCKY	09-04-03_SWMU180 SurfBkgd.mxd
REFERENCES:	Basemap 2009

Figure 9.3.3. SWMU 180 Background Exceedances - Surface Soil

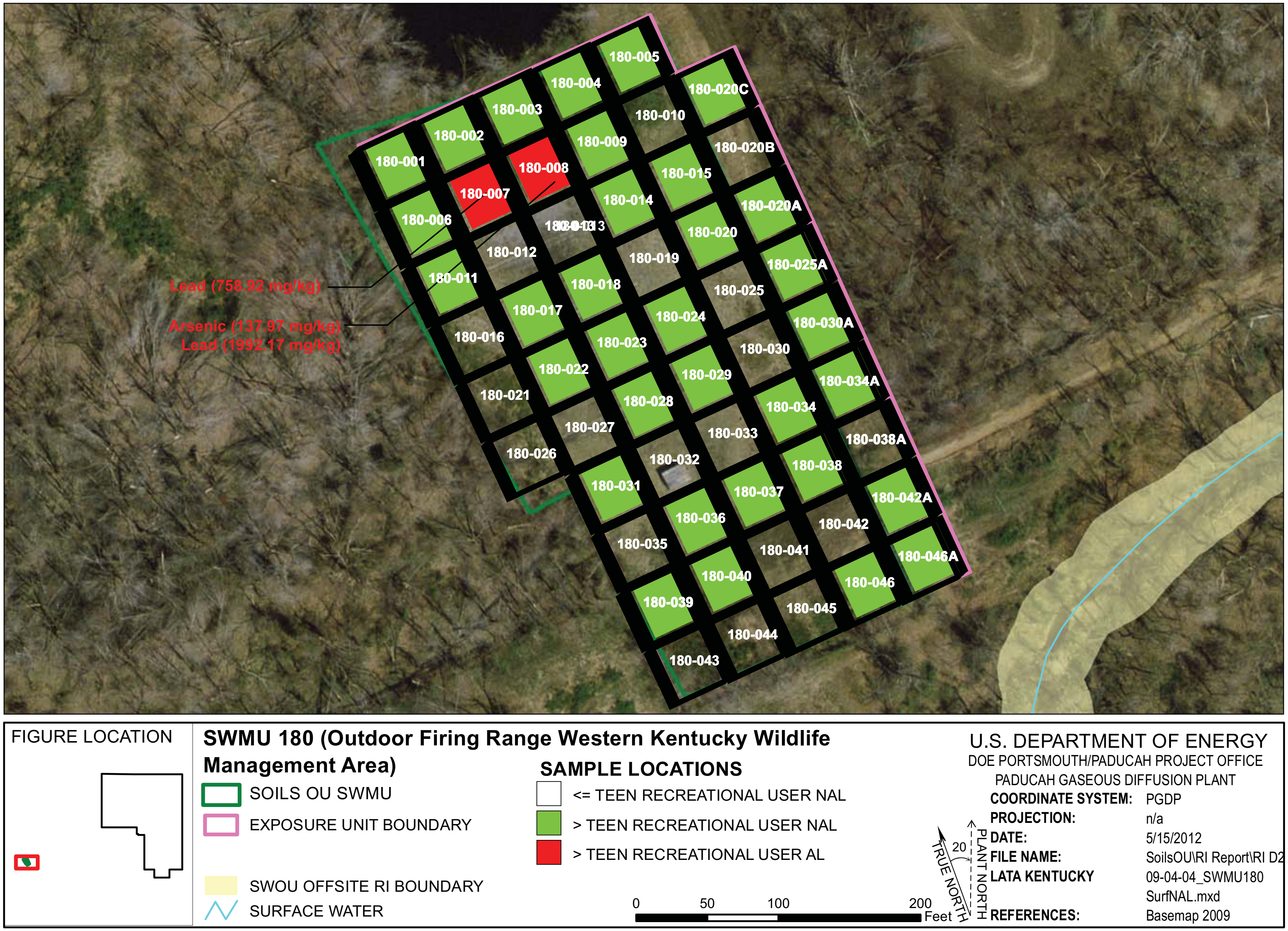


Figure 9.3.4. SWMU 180 NAL Exceedances - Surface Soil

SOU180-001	Arsenic (6.7 mg/kg) Beryllium (0.54 mg/kg) Vanadium (31.2 mg/kg)
SOU180-002	Arsenic (11.2 mg/kg)
SOU180-003	Mercury (8.28 mg/kg) Nickel (90.33 mg/kg)
SOU180-004	Arsenic (6.68 mg/kg)
SOU180-005	Arsenic (10.24 mg/kg)
SOU180-006	Arsenic (12.27 mg/kg)
SOU180-007	Lead (758.92 mg/kg)
SOU180-008	Arsenic (137.97 mg/kg) Lead (1992.17 mg/kg) Nickel (74.91 mg/kg)
SOU180-009	Arsenic (36.01 mg/kg)
SOU180-011	Arsenic (8.62 mg/kg) Beryllium (0.53 mg/kg) Vanadium (25.6 mg/kg) Total PAH (0.091854 mg/kg
SOU180-014	Arsenic (13.18 mg/kg)
SOU180-015	Nickel (82.87 mg/kg)
SOU180-017	Nickel (84.16 mg/kg)
SOU180-018	Arsenic (18.65 mg/kg)
SOU180-020	Arsenic (8.09 mg/kg)
SOU180-020A	Arsenic (9.71 mg/kg) Beryllium (0.51 mg/kg) Cobalt (8.6 mg/kg) Vanadium (24.8 mg/kg)
SOU180-020C	Arsenic (10.38 mg/kg)
SOU180-022	Arsenic (12.84 mg/kg) Nickel (68.91 mg/kg)
SOU180-023	Arsenic (30.3 mg/kg) Silver (11.4 mg/kg)

NOTE: maximum detections only shown for location.

SOU180-024	Arsenic (11.9 mg/kg)
SOU180-025A	Arsenic (8.1 mg/kg) Silver (10.41 mg/kg)
SOU180-028	Arsenic (4.4 mg/kg) Beryllium (0.48 mg/kg) Vanadium (24.8 mg/kg)
SOU180-029	Nickel (67.92 mg/kg)
SOU180-030A	Arsenic (7.86 mg/kg)
SOU180-031	Arsenic (7.92 mg/kg)
SOU180-034	Arsenic (7.67 mg/kg)
SOU180-034A	Arsenic (9.26 mg/kg) Nickel (64.25 mg/kg)
SOU180-036	Arsenic (6.88 mg/kg) Nickel (64.61 mg/kg)
SOU180-037	Arsenic (5.78 mg/kg)
SOU180-038	Silver (9.68 mg/kg)
SOU180-039	Arsenic (19.2 mg/kg) Beryllium (1.6 mg/kg) Cobalt (13.2 mg/kg) Iron (35300 mg/kg) Vanadium (48.5 mg/kg)
SOU180-040	Arsenic (6.44 mg/kg)
SOU180-042A	Arsenic (6.18 mg/kg)
SOU180-046	Arsenic (6.24 mg/kg) Nickel (61.28 mg/kg)
SOU180-046A	Nickel (55.03 mg/kg)

Figure 9.3.4. SWMU 180 NAL Exceedances – Surface (Continued)

Metal	Grid	EU
Arsenic	6, 8, 9, 14, 18, 22, 23, 39	1, 2, 3, 4
Beryllium	39	4
Iron	39	4
Lead	7, 8	1
Mercury	3	1
Nickel	3, 8, 15, 17, 22, 29, 36, 46, 34A, 46A	1, 2, 3, 4
Silver	23, 38, 25A	3, 4
Vanadium	39	4

Grids 3, 6, 7, 8, 9 (within EU 1), 14, 15, 17, 18 (within EU 2), 22, 23, 29 (within EU 3), 36, 38, 39, and 46 (within EU 4) are located within the administrative boundary of SWMU 180. Grids 25A, 34A (EU 3), and 46A (EU 4) are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination in SWMU 180, as described in the Soils OU Work Plan (DOE 2010a).

Arsenic in grid 8 (within EU 1) and lead in grids 7 and 8 (within EU 1) were detected above both the background screening levels and the teen recreator ALs in the SWMU 180 surface soil.

The following are the metals detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Antimony	1, 11, 28, 39	1, 2, 3, 4
Arsenic	6, 8, 9, 14, 18, 22, 23, 39	1, 2, 3, 4
Barium	39	4
Copper	7, 8	1
Iron	39	4
Lead	3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 21, 22, 23, 25, 29, 30	1, 2, 3
Manganese	39	4
Mercury	3	1
Molybdenum[1]	1, 11, 20A, 28, 39	1, 2, 3, 4
Nickel	8, 15, 17, 22, 29, 34A, 36, 46, 46A	1, 2, 3,4
Selenium	1, 11, 20a, 28, 39	1, 2,3,4
Silver	23, 25A, 38	4, 3
Vanadium	39	4
Zinc	17, 18	2

[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	8, 9, 18, 23, 39	1, 2, 3, 4
Iron	39	4
Lead	8	1
Manganese	39	4
Mercury	3	1
Nickel	3, 15, 17	1, 2
Silver	23, 25A, 38	3, 4
Vanadium	39	4

PCBs

PCBs were not detected in the SWMU 180 surface soil.

SVOCs

Total PAHs were detected above the teen recreator NALs in the SWMU 180 surface soil.

Total PAHs were detected above the SSLs for the protection of UCRS groundwater in grids 1 (EU 1), 11 (EU 2), 28 (EU 3), and 39 (EU 4).

No SVOCs were detected above the teen recreator ALs or the SSLs for the protection of RGA groundwater.

VOCs

No surface soil samples from SWMU 180 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 180 surface soil.

9.3.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 180, the representative data set for subsurface soils is presented in Table 9.3.2 and provides the nature of the contamination in SWMU 180 subsurface soils. Figures 9.3.5–9.3.7 illustrate the horizontal extent. A complete list of sampling results, including the sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 180 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. Any uncertainty in the nature and extent of contamination of subsurface soil associated with standing water will be managed in the FS. SWMU 180 consists of four EUs.

Metals

Metals were detected above the teen recreator NALs in the SWMU 180 subsurface soil. The following are the metals detected at or above both the background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	1, 2, 4, 5, 6, 7, 8, 12, 28, 33, 39, 43, 20A, 30A	1, 2, 3, 4
Beryllium	25A	3
Cobalt	4	1
Mercury	7, 42, 20A	1, 2, 4
Nickel	4, 6, 7, 8, 9, 10, 13, 18, 19, 20, 22, 25, 26, 30, 35, 36, 38, 42, 43, 25A	1, 2, 3, 4
Silver	4, 7, 28, 40	1, 3, 4
Vanadium	25A	3

Table 9.3.2. Subsurface Soil RI Data Summary: SWMU 180, WKWMA Outdoor Firing Range

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	6.54E+03	1.14E+04	9.44E+03	0/6	6/6	0/6	1.20E+04	0/6	2.77E+04	0/6	8.91E+06	0/6	6/6	5.9 - 6.4
METAL	Antimony	mg/kg	8.40E-02	7.00E-01	3.54E-01	0/6	6/6	5/6	2.10E-01	0/6	1.78E+00	0/6	1.90E+03	0/6	5/6	0.59 - 0.64
METAL	Arsenic	mg/kg	3.30E+00	2.36E+01	8.51E+00	0/73	32/73	16/73	7.90E+00	32/73	1.02E+00	0/73	1.02E+02	1/73	32/73	1.2 - 11
METAL	Barium	mg/kg	5.38E+01	1.43E+02	9.34E+01	0/6	6/6	0/6	1.70E+02	0/6	4.15E+02	0/6	4.58E+05	0/6	5/6	2.4 - 2.5
METAL	Beryllium	mg/kg	2.20E-01	7.00E-01	5.40E-01	0/6	6/6	1/6	6.90E-01	6/6	1.29E-02	0/6	8.65E+00	0/6	0/6	0.12 - 0.13
METAL	Cadmium	mg/kg	1.60E-02	5.80E-02	3.47E-02	0/6	6/6	0/6	2.10E-01	0/6	3.14E+00	0/6	3.14E+02	0/6	0/6	0.059 - 0.064
METAL	Calcium	mg/kg	3.86E+02	1.41E+03	9.49E+02	0/6	6/6	0/6	6.10E+03	0/6	n/a	0/6	n/a	n/a	n/a	59.3 - 63.7
METAL	Chromium	mg/kg	7.70E+00	6.34E+01	4.13E+01	0/73	40/73	21/73	4.30E+01	0/73	7.15E+01	0/73	7.15E+03	0/73	0/73	1.2 - 85
METAL	Cobalt	mg/kg	4.30E+00	1.96E+01	8.33E+00	0/6	6/6	1/6	1.30E+01	2/6	8.45E+00	0/6	3.29E+03	6/6	6/6	0.24 - 0.25
METAL	Copper	mg/kg	5.80E+00	2.43E+01	1.20E+01	0/73	11/73	0/73	2.50E+01	0/73	1.13E+03	0/73	4.75E+05	0/73	0/73	1.2 - 35
METAL	Iron	mg/kg	4.52E+03	2.59E+04	1.19E+04	0/73	73/73	0/73	2.80E+04	6/73	1.98E+04	0/73	8.31E+06	73/73	73/73	5.9 - 100
METAL	Lead	mg/kg	6.17E+00	2.96E+02	2.12E+01	0/73	65/73	4/73	2.30E+01	0/73	4.00E+02	0/73	4.00E+02	0/73	20/73	0.36 - 13
METAL	Magnesium	mg/kg	7.92E+02	1.87E+03	1.29E+03	0/6	6/6	0/6	2.10E+03	0/6	n/a	0/6	n/a	n/a	n/a	59.3 - 63.7
METAL	Manganese	mg/kg	6.73E+01	1.65E+03	3.67E+02	0/73	69/73	4/73	8.20E+02	0/73	3.47E+03	0/73	2.94E+05	58/73	69/73	0.24 - 85
METAL	Mercury	mg/kg	2.29E-02	8.25E+00	1.48E+00	0/73	9/73	3/73	1.30E-01	3/73	6.25E-01	0/73	7.88E+02	3/73	3/73	0.0395 - 10
METAL	Molybdenum	mg/kg	3.00E-01	1.40E+00	6.40E-01	0/73	6/73	0/73	n/a	0/73	1.42E+02	0/73	5.94E+04	0/73	6/73	0.59 - 15
METAL	Nickel	mg/kg	5.90E+00	1.08E+02	5.41E+01	0/73	27/73	23/73	2.20E+01	23/73	2.98E+01	0/73	3.07E+04	4/73	27/73	0.59 - 65
METAL	Selenium	mg/kg	7.20E-01	3.82E+00	1.35E+00	0/73	7/73	7/73	7.00E-01	0/73	1.42E+02	0/73	5.93E+04	0/73	7/73	0.59 - 20
METAL	Silver	mg/kg	2.80E-02	1.17E+01	2.78E+00	0/73	10/73	4/73	2.70E+00	4/73	7.45E+00	0/73	8.07E+03	4/73	6/73	0.24 - 10
METAL	Sodium	mg/kg	8.57E+01	4.95E+02	2.19E+02	0/6	6/6	1/6	3.40E+02	0/6	n/a	0/6	n/a	n/a	n/a	23.7 - 25.5
METAL	Thallium	mg/kg	1.50E-01	7.50E-01	3.43E-01	0/6	6/6	1/6	3.40E-01	0/6	2.27E+00	0/6	9.50E+02	0/6	6/6	0.24 - 0.25
METAL	Uranium	mg/kg	1.30E+00	9.29E+00	2.51E+00	0/73	7/73	1/73	4.60E+00	0/73	8.49E+01	0/73	3.50E+04	0/73	0/73	0.01 - 20
METAL	Vanadium	mg/kg	1.49E+01	4.05E+01	2.79E+01	0/6	6/6	1/6	3.70E+01	6/6	1.04E-01	0/6	7.61E+01	6/6	6/6	1.2 - 1.3
METAL	Zinc	mg/kg	1.25E+01	5.98E+01	3.01E+01	0/73	73/73	0/73	6.00E+01	0/73	8.50E+03	0/73	3.56E+06	0/73	62/73	2.4 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/48	0/48	0/48	n/a	0/48	1.83E-01	0/48	1.83E+01	0/48	0/48	0.36 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.39 - 0.42
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.39 - 0.42
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.39 - 0.42
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	3.35E+00	0/4	1.00E+02	0/4	0/4	1.9 - 2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	5.87E+02	0/4	1.76E+04	0/4	0/4	0.39 - 0.42
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	3.25E+03	0/4	9.74E+04	0/4	0/4	0.39 - 0.42
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.3.2. Subsurface Soil RI Data Summary: SWMU 180, WKWMA Outdoor Firing Range (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.0078 - 0.0084
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.39 - 0.42
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.47E+02	0/4	1.34E+04	0/4	0/4	0.39 - 0.42
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.19E+02	0/4	1.26E+04	0/4	0/4	0.39 - 0.42
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.78E-01	0/4	1.78E+01	0/4	0/4	0.39 - 0.42
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.78 - 0.84
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	5.27E+00	0/4	5.27E+02	0/4	0/4	0.39 - 0.42
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	6.10E-02	0/4	6.10E+00	0/4	0/4	0.0078 - 0.0084
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	1.9 - 2
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.39 - 0.42
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.9 - 2
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	3.35E+02	0/4	1.00E+04	0/4	0/4	0.39 - 0.42
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.78 - 0.84
SVOA	Total PAH	mg/kg	4.60E-03	1.47E-02	8.30E-03	0/4	3/4	0/4	n/a	0/4	5.57E-02	0/4	5.57E+00	0/4	3/4	-
RADS	Alpha activity	pCi/g	1.52E+01	2.75E+01	2.10E+01	0/4	4/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	4.3 - 4.6
RADS	Americium-241	pCi/g	2.00E-03	1.20E-02	5.78E-03	0/4	4/4	0/4	n/a	0/4	1.28E+01	0/4	1.28E+03	0/4	0/4	0.011 - 0.024
RADS	Beta activity	pCi/g	2.43E+01	2.87E+01	2.69E+01	0/4	4/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	4 - 4.9
RADS	Cesium-137	pCi/g	-9.00E-03	4.90E-02	2.38E-02	0/4	4/4	0/4	2.80E-01	0/4	1.98E-01	0/4	1.98E+01	0/4	0/4	0.091 - 0.12
RADS	Neptunium-237	pCi/g	-5.30E-03	1.00E-03	-1.53E-03	0/4	4/4	0/4	n/a	0/4	6.26E-01	0/4	6.26E+01	0/4	0/4	0.014 - 0.033
RADS	Plutonium-238	pCi/g	6.00E-03	1.90E-02	9.93E-03	0/4	4/4	0/4	n/a	0/4	3.64E+01	0/4	3.64E+03	0/4	0/4	0.0083 - 0.018
RADS	Plutonium-239/240	pCi/g	3.40E-03	4.30E-03	3.88E-03	2/4	4/4	0/4	n/a	0/4	3.56E+01	0/4	3.56E+03	0/4	0/4	0.0035 - 0.018
RADS	Technetium-99	pCi/g	-8.00E-02	5.00E-02	-2.00E-02	0/4	4/4	0/4	2.80E+00	0/4	1.11E+03	0/4	1.11E+05	0/4	0/4	0.41 - 0.46
RADS	Thorium-228	pCi/g	9.50E-01	1.14E+00	1.02E+00	0/4	4/4	0/4	1.60E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.03 - 0.04
RADS	Thorium-230	pCi/g	8.50E-01	1.33E+00	1.01E+00	0/4	4/4	0/4	1.40E+00	0/4	4.49E+01	0/4	4.49E+03	0/4	4/4	0.02 - 0.02
RADS	Thorium-232	pCi/g	8.80E-01	1.32E+00	1.04E+00	0/4	4/4	0/4	1.50E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.005 - 0.03
RADS	Uranium-234	pCi/g	6.35E-01	8.40E-01	7.64E-01	0/4	4/4	0/4	1.20E+00	0/4	6.25E+01	0/4	6.25E+03	0/4	0/4	0.01 - 0.02
RADS	Uranium-235/236	pCi/g	2.40E-02	6.30E-02	4.20E-02	2/4	4/4	1/4	6.00E-02	0/4	9.12E-01	0/4	9.12E+01	0/4	0/4	0.005 - 0.013
RADS	Uranium-238	pCi/g	7.10E-01	8.70E-01	7.82E-01	0/4	4/4	0/4	1.20E+00	0/4	4.02E+00	0/4	4.02E+02	0/4	0/4	0.004 - 0.02

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.3.2. Subsurface Soil RI Data Summary: SWMU 180, WKWMA Outdoor Firing Range (Continued)

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

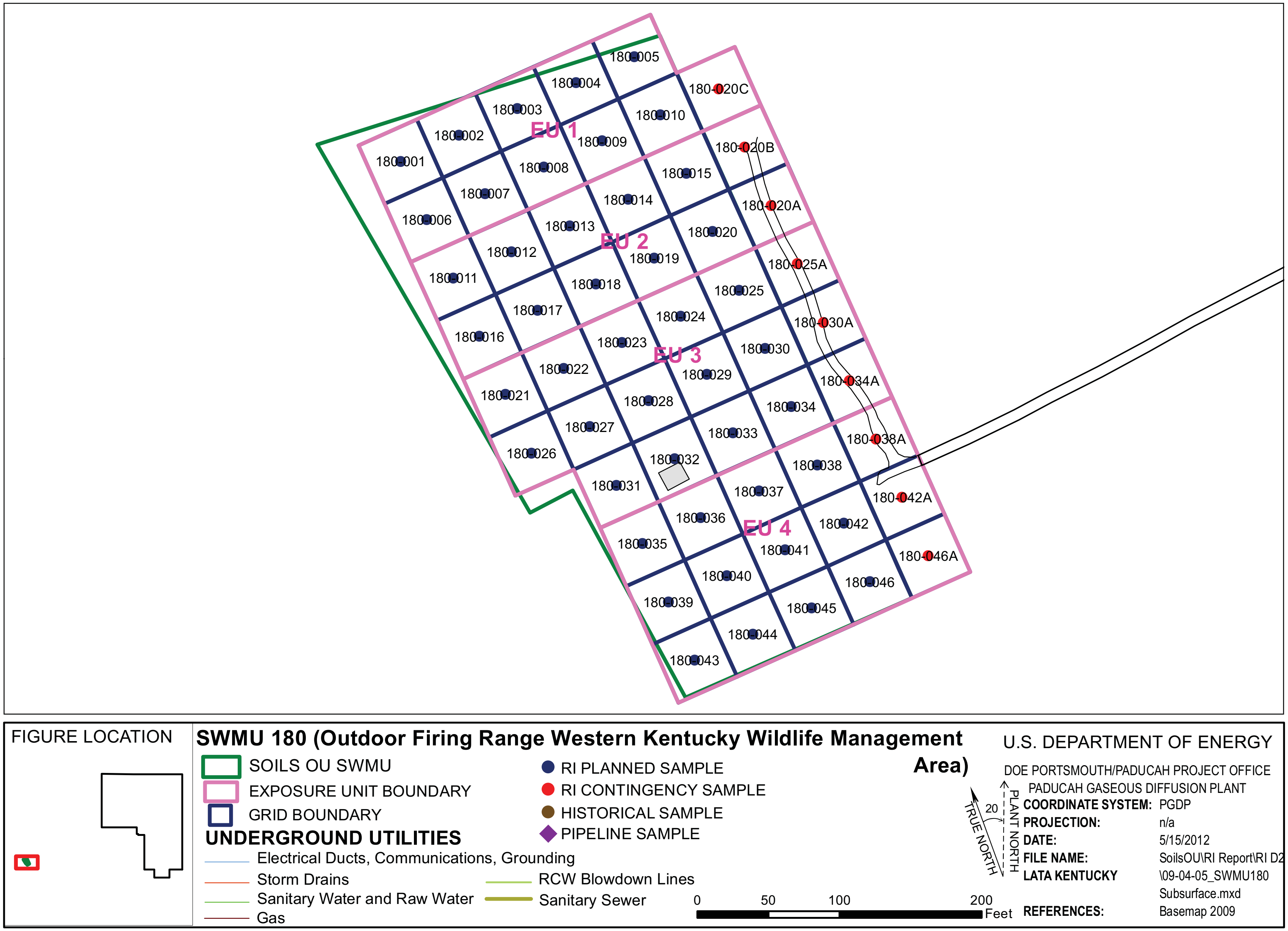


Figure 9.3.5. SWMU 180 Sample Locations - Subsurface Soil

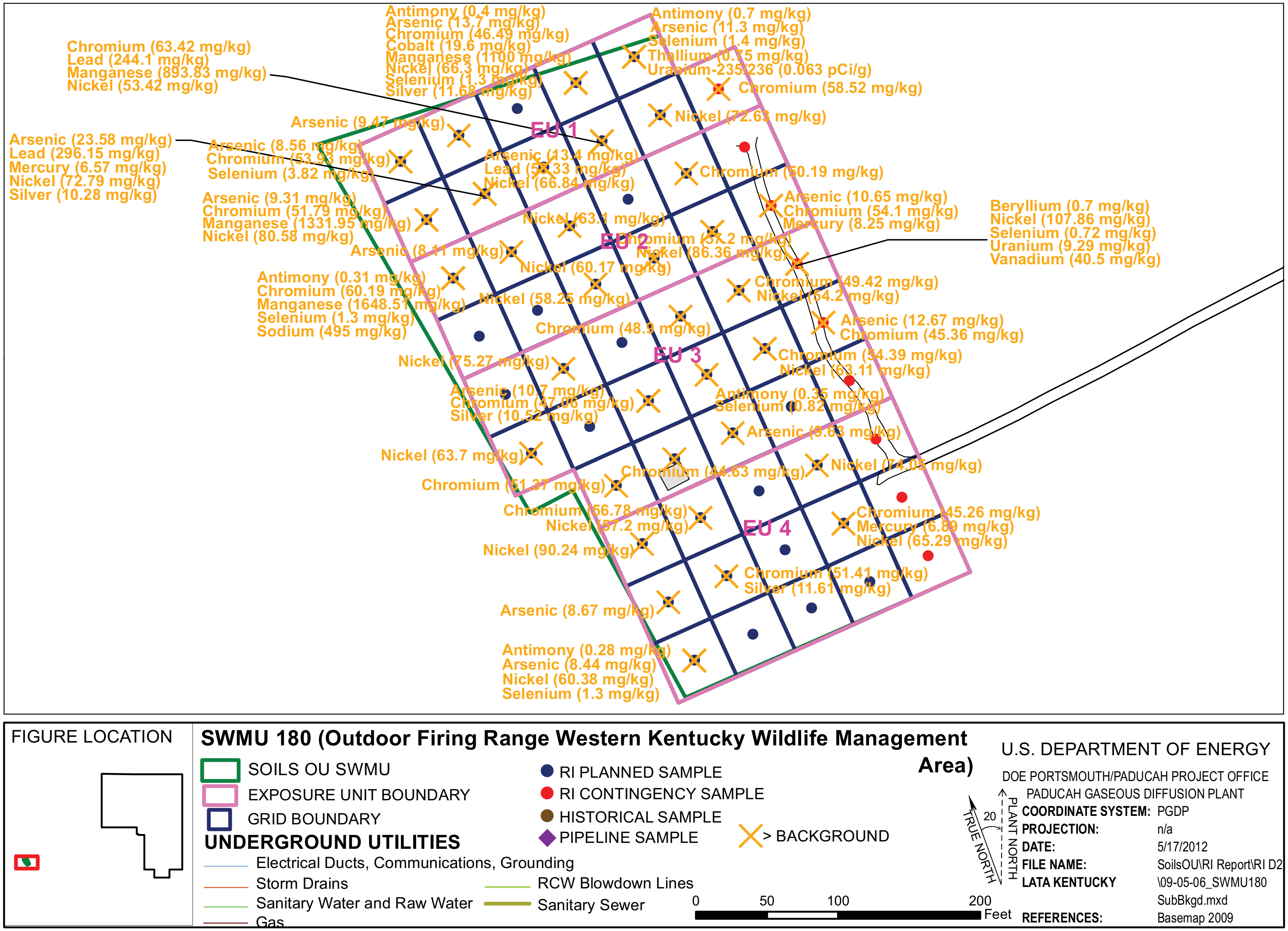


Figure 9.3.6. SWMU 180 Background Exceedances - Subsurface Soil

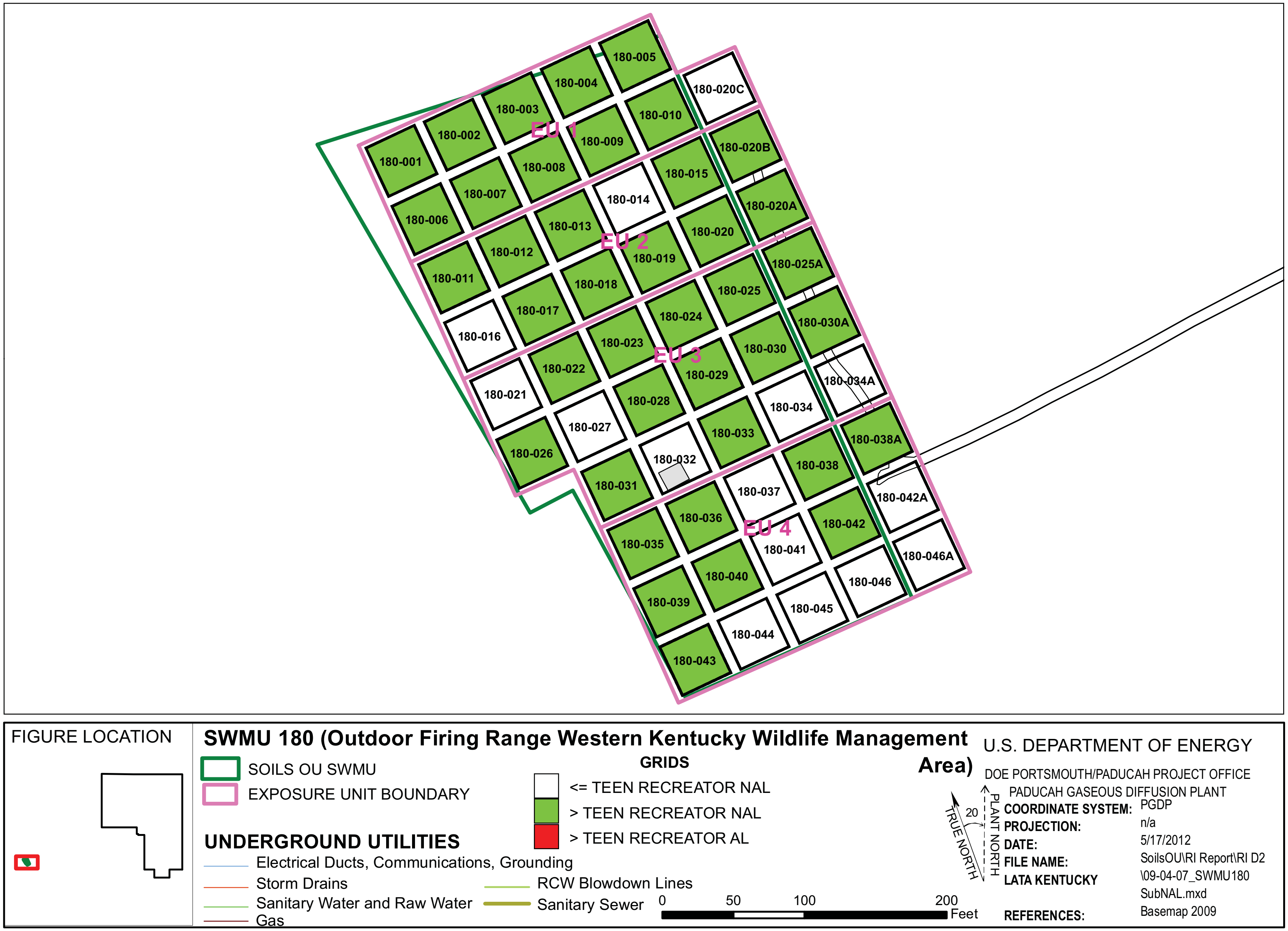


Figure 9.3.7. SWMU 180 NAL Exceedances - Subsurface Soil

Grids 4, 6, 7, 8, 9, 10 (EU 1), 13, 18, 19, 20 (EU 2), 22, 25, 26, 30 (EU 3), 35, 36, 38, 42, and 43 (EU 4) are located within the administrative boundary of SWMU 138. Grid 25A (EU 3) is a grid in which step-out contingency sampling was performed in order to define the horizontal extent of contamination in SWMU 180, as described in the Soils OU Work Plan (DOE 2010a).

The maximum depth at which metals were detected at or above both the background screening levels and the teen recreator NALs was 10 ft bgs. The end depths of the boreholes taken from grids 4, 6, 7, 8, 9, 10, 13, 18, 19, 20, 22, 25, 26, 30, 35, 36, 38, 42, 43, and 25A range from 4 to 10 ft bgs.

No metals were detected above both the background screening levels and the teen recreator ALs in the SWMU 180 subsurface soil.

The following are the metals detected in the SWMU 180 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Antimony	4, 5, 11, 29, 43	1, 2, 3, 4
Arsenic	1, 2, 4, 5, 6, 7, 8, 12, 20A, 28, 30A, 33, 39, 43	1, 2, 3, 4
Cobalt	4	1
Lead	7, 8, 9	1
Manganese	4, 6, 9, 11	1
Mercury	7, 20A, 42	1, 2, 4
Molybdenum[1]	4, 5, 11, 25A, 29, 43	1, 2, 3, 4
Nickel	4, 6, 7, 8, 9,10, 13, 18, 19, 20, 22, 25, 25a, 26, 30, 35, 36, 38, 42, 43	1, 2, 3, 4
Selenium	1, 4, 5, 11, 25A, 29, 43	1, 2, 3, 4
Silver	4, 7, 28, 40	1, 3, 4
Thallium	5	1
Vanadium	25A	3

[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	7	1
Cobalt	4	1
Manganese	4, 6, 9, 11	1, 2
Mercury	7, 20A, 42	1, 2, 4
Nickel	6, 20, 25A, 35	1, 2, 3, 4
Silver	4, 7, 28, 40	1, 3, 4
Vanadium	25A	3

PCBs

PCBs were not detected in the SWMU 180 subsurface soil.

SVOCs

No SVOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of RGA groundwater in the SWMU 180 subsurface soil. Total PAHs were detected above the SSL for the protection of UCRS groundwater in grids 5 (EU 1), 11 (EU 2), and 29 (EU3).

VOCs

No subsurface soil samples from SWMU 180 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 180 subsurface soil.

9.3.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is potential for runoff to the southeast into an unnamed tributary to Bayou Creek, upstream of PGDP; however, SWMU 180 is grass-covered or otherwise stabilized and the contaminants are not likely to be transported attached to suspended soil particles. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches. Uncertainty regarding fate and transport associated with the standing water within this SWMU will be managed in the FS. Bayou Creek and its tributary will be investigated as part of the SWOU.

9.3.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 180 are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for one or more EUs at SWMU 180 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D. The average lead concentration was below the NAL (400 mg/kg); therefore, lead was not identified in the human health risk assessment as a COC. The maximum lead result (1992.17 mg/kg) in surface soil at SWMU 180, together with the information that lead bullets are present in the berm, leads to the identification of lead as a COC for the SWMU.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.3.3 for the outdoor worker (exposed to surface soils), the excavation worker, the hypothetical resident, and the teen recreational user. Table 9.3.3 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC. RGOs for the COC lead were not calculated. Table 9.3.3 lists this COC in a footnote.

Ecological Screening. COPECs for SWMU 180 include metals. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 9.3.4.

9.3.7 SWMU 180 Summary

The text below summarizes the results for SWMU 180 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

A plant process that could have contributed to contamination is small arms firing practice resulting in lead bullets in the soil berm.

COPCs for surface and subsurface soils from SWMU 180 are shown on Tables 9.3.1 and 9.3.2 as those analytes with green boxes under the "Teen Recreator/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 10 ft bgs. A complete list of sampling results is provided in Appendix G. The COPCs identified for this SWMU for each EU are as follows:

- EU 1
  - Surface—metals, SVOCs
  - Subsurface—metals, SVOCs
- EU 2
  - Surface—metals
  - Subsurface—metals, SVOCs
- EU 3
  - Surface—metals
  - Subsurface—metals, SVOCs
- EU 4
  - Surface—metals
  - Subsurface—metals

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 180 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. Uncertainty regarding fate and transport associated with the standing water within this SWMU will be managed in the FS. Bayou Creek and its tributary will be investigated as part of the SWOU. There are no underground pipelines at SWMU 180. The CSM can be found in Appendix D.

Table 9.3.3. RGOs for SWMU 180

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	**COC**	**EPC[1]**	**Units**	**ELCR[2]**	**1 x 10^{-6}**	**1 x 10^{-5}**	**1 x 10^{-4}**	**HI[4]**	**0.1**	**1**	**3**
Outdoor Worker (exposed to surface soil)											
1	Arsenic	7.48E+01	mg/kg	1.8E-04	4.15E-01	4.15E+00	4.15E+01	1.1	6.65E+00	6.65E+01	1.99E+02
	Chromium	5.54E+01	mg/kg	1.4E-06	4.08E+01	4.08E+02	4.08E+03	< 0.1	n/a	n/a	n/a
	Cumulative			**1.8E-04**				**1.1**			
2	Arsenic	1.27E+01	mg/kg	3.0E-05	4.15E-01	4.15E+00	4.15E+01	< 1	n/a	n/a	n/a
	Chromium	4.46E+01	mg/kg	1.1E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Total PAH	9.19E-02	mg/kg	1.9E-06	4.85E-02	4.85E-01	4.85E+00	< 1	n/a	n/a	n/a
	Cumulative			**3.3E-05**				**< 1**			
3	Arsenic	1.34E+01	mg/kg	3.2E-05	4.15E-01	4.15E+00	4.15E+01	< 1	n/a	n/a	n/a
	Chromium	4.69E+01	mg/kg	1.2E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**3.3E-05**				**< 1**			
4	Arsenic	1.15E+01	mg/kg	2.8E-05	4.15E-01	4.15E+00	4.15E+01	< 1	n/a	n/a	n/a
	Chromium	6.00E+01	mg/kg	1.5E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**2.9E-05**				**< 1**			
Excavation Worker											
1	Arsenic	7.57E+01	mg/kg	2.3E-06	3.32E+01	3.32E+02	3.32E+03	< 1	n/a	n/a	n/a
	Cumulative			**2.3E-06**				**< 1**			
Hypothetical Resident[5]											
1	Arsenic	7.48E+01	mg/kg	3.2E-04	2.35E-01	2.35E+00	2.35E+01	4.6	1.64E+00	1.64E+01	4.93E+01
	Chromium	5.54E+01	mg/kg	3.6E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Mercury	8.28E+00	mg/kg	<1E-06	n/a	n/a	n/a	0.4	2.35E+00	2.35E+01	7.04E+01
	Cumulative			**3.2E-04**				**4.9**			
2	Arsenic	1.27E+01	mg/kg	5.4E-05	2.35E-01	2.35E+00	2.35E+01	< 1	n/a	n/a	n/a
	Chromium	4.46E+01	mg/kg	2.9E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Total PAH	9.19E-02	mg/kg	4.7E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Cumulative			**6.1E-05**				**< 1**			
3	Arsenic	1.34E+01	mg/kg	5.7E-05	2.35E-01	2.35E+00	2.35E+01	< 1	n/a	n/a	n/a
	Chromium	4.69E+01	mg/kg	3.0E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**6.0E-05**				**< 1**			

Table 9.3.3. RGOs for SWMU 180 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
4	Arsenic	1.15E+01	mg/kg	4.9E-05	2.35E-01	2.35E+00	2.35E+01	0.7	1.64E+00	1.64E+01	4.93E+01
	Chromium	6.00E+01	mg/kg	3.9E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Iron	1.54E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	5.47E+03	5.48E+04	1.64E+05
	Manganese	7.09E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	5.34E+02	5.34E+03	1.60E+04
	Total PAH	2.15E-02	mg/kg	1.1E-06	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Vanadium	4.85E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	3.91E+01	3.91E+02	1.17E+03
	Cumulative			**5.4E-05**				**1.2**			
Teen Recreational User											
1	Arsenic	7.48E+01	mg/kg	4.2E-05	1.77E+00	1.77E+01	1.77E+02	< 1	n/a	n/a	n/a
	Cumulative			**4.2E-05**				**< 1**			
2	Arsenic	1.27E+01	mg/kg	7.1E-06	1.77E+00	1.77E+01	1.77E+02	< 1	n/a	n/a	n/a
	Total PAH	9.19E-02	mg/kg	1.0E-06	8.99E-02	8.99E-01	8.99E+00	< 1	n/a	n/a	n/a
	Cumulative			**8.2E-06**				**< 1**			
3	Arsenic	1.34E+01	mg/kg	7.5E-06	1.77E+00	1.77E+01	1.77E+02	< 1	n/a	n/a	n/a
	Cumulative			**7.5E-06**				**< 1**			
4	Arsenic	1.15E+01	mg/kg	6.5E-06	1.77E+00	1.77E+01	1.77E+02	< 1	n/a	n/a	n/a
	Cumulative			**6.5E-06**				**< 1**			

NOTE: Lead also is considered a COC due to the nature of the SWMU. RGOs have not been calculated for lead since the average value was less than residential NAL (400 mg/kg).
Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.54, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.54, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 9.3.4. Ecological Screening for SWMU 180

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Soil/grass mix with gravel/soil	No	322	Lead	3.60E+01	1.99E+03	1.10E+01	181
			Mercury	2.00E-01	8.28E+00	1.00E-01	83
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soil), the excavation worker, hypothetical residential, and teen recreational user scenarios. COCs for these scenarios for SWMU 180 are as follows:

- Outdoor worker (exposed to surface soil)
  - Arsenic
  - Chromium
  - Total PAHs
- Excavation worker
  - Arsenic
- Hypothetical Resident (hazards evaluated against the child resident)
  - Arsenic
  - Chromium
  - Iron
  - Manganese
  - Mercury
  - Total PAHs
  - Vanadium
- Teen Recreational User
  - Arsenic
  - Total PAHs

Of the above, arsenic for the outdoor worker (exposed to surface soil) and the hypothetical resident is a priority COC (i.e., HQ > 1 or chemical-specific ELCR > 1E-04). Priority COCs for other scenarios are described in Appendix D. Additionally, though the average concentration for lead was below the residential NAL (400 mg/kg), it was not initially considered a COC. Due to the nature of the SWMU; however, and the maximum detected value in surface soil (1992.17 mg/kg), lead also should be considered a COC.

For SWMU 180, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Lead
- Mercury
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 180 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 180 is outside the PGDP industrial area in the WKWMA; no other SWMU are nearby. A response action at SWMU 180 would not affect other SWMUs and would not affect any integrator OUs.

9.3.8 SWMU 180 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 180; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark (DOE 2010a) for scenarios including outdoor worker (exposed to surface soil), excavation worker, hypothetical resident, and teen recreational user. The reasonably anticipated future land use for this SWMU is recreational as shown in the SMP (DOE 2012a).

9.4 SWMU 181, WEST SIDE OUTDOOR FIRING RANGE (PGDP)

9.4.1 Background

The Firing Range (SWMU 181) is located west of the plant site. This SWMU is included in the *Action Memorandum for the Soils Operable Unit Inactive Facilities* (DOE 2009b). Contaminated soil on the berm face has been excavated in accordance with the *Removal Action Work Plan for Soils Operable Unit Inactive Facilities SWMU 19 and SWMU 181* (DOE 2009d). The results of verification sampling are included in *Removal Action Report for Soils Operable Unit Inactive Facilities Solid Waste Management Units 19 and 181* (DOE 2010b).

SWMU 181 was used from the early 1980s until 1992 when it was shutdown and designated as a SWMU. The PGDP security force used the facility as a training ground for small arms target practice. Suspected contaminants include lead and other metals. This SWMU is on the banks of Bayou Creek.

In April of 1993, the surface soil from the Firing Range was sampled for TSCA, RCRA bulk metals, and radiological components. Bulk lead concentrations in the samples ranged from 1,774.2 mg/kg to 14,880.0 mg/kg.

Characterization of the West Side Firing Range (also referred to as the C-218 Firing Range) occurred during soil pile sampling in 2008. Soil was tested for radiological constituents, metals, and PCBs. Ten locations were sampled based upon 50 ft centers, with one surface sample and multiple subsurface samples to be collected at three 1-ft intervals (e.g., 1 ft to 4 ft) to the bottom of the berm. Preliminary results for surface samples showed that all analytes detected above background are less than their no action values. Preliminary results for subsurface samples showed that the analytes that were detected and above nonzero background were calcium and magnesium and Total PCBs.

Excavation of lead-contaminated soils began on November 30, 2009, and was completed on December 23, 2009, including demobilization. A total of 1,478 yd^3 of soil was removed and dispositioned. Confirmation sampling was performed as described in the Removal Action Work Plan (DOE 2009d).

The action limit and cleanup level of 800 mg/kg total lead, based on the industrial scenario, was achieved in all excavated areas. Based on the sampling results, the RAOs for this removal action were achieved. The removal action also successfully achieved cleanup to below 400 mg/kg total lead, the no action value for a residential scenario.

The only data used for this RI Report are representative of current conditions (i.e., postexcavation).

9.4.2 Fieldwork Summary

The historical/postexcavation data are representative of the nature and adequately delineate the extent of the contamination; therefore, no samples were collected from SWMU 181 during the Soils OU RI sampling effort (DOE 2010a).

A gamma radiological walkover survey (Figure 9.4.1) was conducted using a FIDLER; the 1,052 measurements ranged from 10,543 to 14,774 gross cpm. A judgmental radiological sample was collected. The survey encompassed the accessible areas that consist entirely of soil with grass. Areas not surveyed were due to the steep slope of the firing range. The higher cpm measurements located on the eastern side of SWMU 181 may be attributable to the cylinder yard to the northeast of the SWMU.

9.4.3 Nature and Extent of Contamination—Surface Soils

For SWMU 181, the representative data set for surface soils is presented in Tables 9.4.1 and 9.4.2 and provides the nature of the contamination in SWMU 181 surface soils. Figures 9.4.2–9.4.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 181 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 181 consists of one EU.

Metals

Metals were detected above the teen recreator NALs in the SWMU 181 surface soil. Thallium was detected above both the background screening level and the teen recreator NAL on the eastern portion of the SWMU (in grid "EAST").

No metals were detected above both the background screening levels and the teen recreator ALs in the SWMU 181 surface soil.

The following are the metals detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

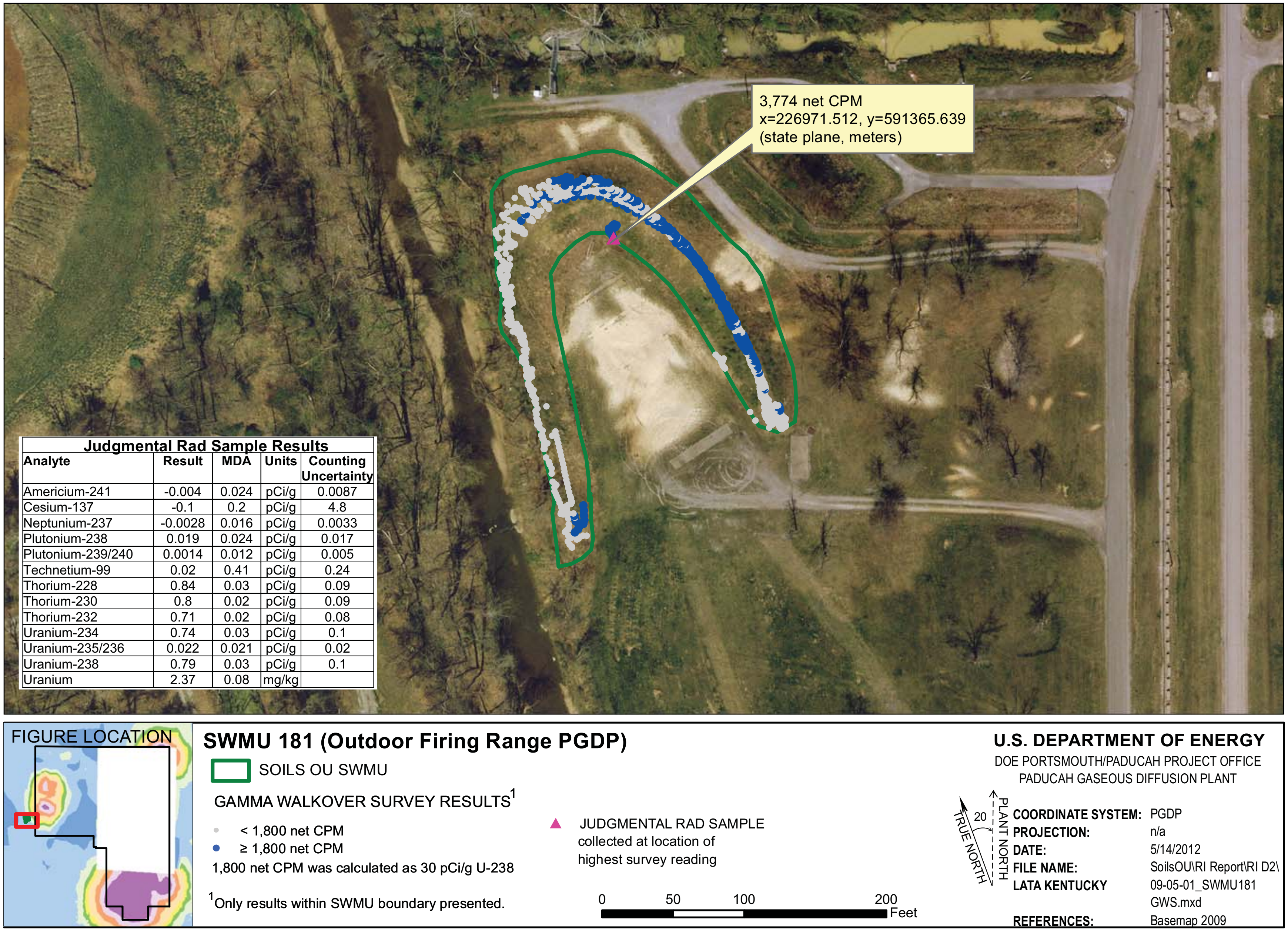
Metal	Grid
Antimony	East
Cadmium	Back, East
Thallium	East
Zinc	Back, East

*SWMU 181 consists of one EU.

No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater in the SWMU 181 surface soil.

PCBs

No PCBs were detected in the SWMU 181 surface soil.



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	-0.004	0.024	pCi/g	0.0087
Cesium-137	-0.1	0.2	pCi/g	4.8
Neptunium-237	-0.0028	0.016	pCi/g	0.0033
Plutonium-238	0.019	0.024	pCi/g	0.017
Plutonium-239/240	0.0014	0.012	pCi/g	0.005
Technetium-99	0.02	0.41	pCi/g	0.24
Thorium-228	0.84	0.03	pCi/g	0.09
Thorium-230	0.8	0.02	pCi/g	0.09
Thorium-232	0.71	0.02	pCi/g	0.08
Uranium-234	0.74	0.03	pCi/g	0.1
Uranium-235/236	0.022	0.021	pCi/g	0.02
Uranium-238	0.79	0.03	pCi/g	0.1
Uranium	2.37	0.08	mg/kg	

Figure 9.4.1. SWMU 181 Gamma Walkover Survey

Table 9.4.1. Surface Soil Historical Data Summary: SWMU 181 PGDP Firing Range

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.65E+03	9.47E+03	7.73E+03	0/16	16/16	0/16	1.30E+04	0/16	2.77E+04	0/16	8.91E+06	0/16	16/16	17 - 199
METAL	Antimony	mg/kg	1.90E-01	2.80E-01	2.40E-01	5/16	5/16	4/16	2.10E-01	0/16	1.78E+00	0/16	1.90E+03	0/16	2/16	1.7 - 8.34
METAL	Arsenic	mg/kg	3.95E+00	6.90E+00	5.47E+00	0/16	12/16	0/16	1.20E+01	12/16	1.02E+00	0/16	1.02E+02	0/16	12/16	0.852 - 4.97
METAL	Barium	mg/kg	8.79E+01	1.41E+02	1.12E+02	0/16	16/16	0/16	2.00E+02	0/16	4.15E+02	0/16	4.58E+05	0/16	16/16	2.1 - 2.49
METAL	Beryllium	mg/kg	4.50E-01	4.80E-01	4.62E-01	0/16	5/16	0/16	6.70E-01	5/16	1.29E-02	0/16	8.65E+00	0/16	0/16	0.17 - 0.497
METAL	Cadmium	mg/kg	4.60E-01	6.95E-01	5.64E-01	3/16	9/16	9/16	2.10E-01	0/16	3.14E+00	0/16	3.14E+02	0/16	9/16	0.426 - 2.49
METAL	Calcium	mg/kg	1.08E+05	1.82E+05	1.41E+05	0/16	16/16	0/16	2.00E+05	0/16	n/a	0/16	n/a	n/a	n/a	425 - 994
METAL	Chromium	mg/kg	9.91E+00	3.12E+01	1.40E+01	0/16	16/16	3/16	1.60E+01	0/16	7.15E+01	0/16	7.15E+03	0/16	0/16	0.42 - 2.49
METAL	Cobalt	mg/kg	5.98E+00	8.40E+00	7.33E+00	0/16	16/16	0/16	1.40E+01	0/16	8.45E+00	0/16	3.29E+03	16/16	16/16	0.42 - 4.97
METAL	Copper	mg/kg	2.07E+01	4.47E+01	3.34E+01	0/16	16/16	16/16	1.90E+01	0/16	1.13E+03	0/16	4.75E+05	0/16	0/16	4.2 - 12.4
METAL	Iron	mg/kg	1.40E+04	2.46E+04	1.92E+04	0/16	16/16	0/16	2.80E+04	5/16	1.98E+04	0/16	8.31E+06	16/16	16/16	17 - 65.5
METAL	Lead	mg/kg	2.14E+01	3.50E+01	2.70E+01	0/16	16/16	0/16	3.60E+01	0/16	4.00E+02	0/16	4.00E+02	0/16	16/16	4.2 - 4.97
METAL	Magnesium	mg/kg	2.32E+03	4.06E+03	3.05E+03	0/16	16/16	0/16	7.70E+03	0/16	n/a	0/16	n/a	n/a	n/a	4.26 - 109
METAL	Manganese	mg/kg	3.69E+02	5.12E+02	4.39E+02	0/16	16/16	0/16	1.50E+03	0/16	3.47E+03	0/16	2.94E+05	16/16	16/16	0.42 - 2.49
METAL	Mercury	mg/kg	6.50E-02	1.30E-01	9.56E-02	0/16	16/16	0/16	2.00E-01	0/16	6.25E-01	0/16	7.88E+02	0/16	4/16	0.015 - 0.037
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	1.42E+02	0/11	5.94E+04	0/11	0/11	4.26 - 4.97
METAL	Nickel	mg/kg	7.44E+00	1.03E+01	8.86E+00	0/16	16/16	0/16	2.10E+01	0/16	2.98E+01	0/16	3.07E+04	0/16	16/16	0.85 - 4.97
METAL	Potassium	mg/kg	6.96E+02	7.57E+02	7.24E+02	0/5	5/5	0/5	1.30E+03	0/5	n/a	0/5	n/a	n/a	n/a	106 - 109
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/16	0/16	0/16	8.00E-01	0/16	1.42E+02	0/16	5.93E+04	0/16	0/16	0.852 - 8.7
METAL	Silver	mg/kg	1.00E-01	1.60E-01	1.22E-01	5/16	5/16	0/16	2.30E+00	0/16	7.45E+00	0/16	8.07E+03	0/16	5/16	0.42 - 2.08
METAL	Sodium	mg/kg	2.27E+02	2.54E+02	2.40E+02	5/16	5/16	0/16	3.20E+02	0/16	n/a	0/16	n/a	n/a	n/a	170 - 1090
METAL	Thallium	mg/kg	3.50E+00	3.50E+00	3.50E+00	1/16	1/16	1/16	2.10E-01	1/16	2.27E+00	0/16	9.50E+02	0/16	1/16	1.7 - 13.1
METAL	Uranium	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	4.90E+00	0/11	8.49E+01	0/11	3.50E+04	0/11	0/11	0.852 - 4.97
METAL	Vanadium	mg/kg	1.15E+01	2.50E+01	1.66E+01	0/16	16/16	0/16	3.80E+01	16/16	1.04E-01	0/16	7.61E+01	16/16	16/16	0.85 - 2.49
METAL	Zinc	mg/kg	4.98E+01	8.55E+01	6.50E+01	0/16	16/16	5/16	6.50E+01	0/16	8.50E+03	0/16	3.56E+06	0/16	16/16	1.7 - 19.9
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/16	0/16	0/16	n/a	0/16	1.86E-01	0/16	1.86E+01	0/16	0/16	0.02 - 0.13
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	5.87E+02	0/5	1.76E+04	0/5	0/5	0.0078 - 0.0081
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.0078 - 0.0081
SVOA	Anthracene	mg/kg	3.60E-03	5.70E-03	4.65E-03	2/5	2/5	0/5	n/a	0/5	3.25E+03	0/5	9.74E+04	0/5	0/5	0.0078 - 0.0081
SVOA	Benzo(ghi)perylene	mg/kg	1.30E-02	2.00E-02	1.56E-02	0/5	5/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.0078 - 0.0081
SVOA	Fluoranthene	mg/kg	1.70E-02	4.60E-02	2.62E-02	0/5	5/5	0/5	n/a	0/5	4.47E+02	0/5	1.34E+04	0/5	0/5	0.0078 - 0.0081
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	4.19E+02	0/5	1.26E+04	0/5	0/5	0.0078 - 0.0081
SVOA	Naphthalene	mg/kg	4.50E-03	5.30E-03	4.90E-03	5/5	5/5	0/5	n/a	0/5	5.27E+00	0/5	5.27E+02	0/5	5/5	0.0078 - 0.0081
SVOA	Phenanthrene	mg/kg	1.40E-02	3.30E-02	1.98E-02	0/5	5/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.0078 - 0.0081
SVOA	Pyrene	mg/kg	2.30E-02	6.00E-02	3.32E-02	0/5	5/5	0/5	n/a	0/5	3.35E+02	0/5	1.00E+04	0/5	0/5	0.0078 - 0.0081
SVOA	Total PAH	mg/kg	2.11E-02	3.91E-02	2.76E-02	0/5	5/5	0/5	n/a	0/5	5.57E-02	0/5	5.57E+00	0/5	5/5	-
RADS	Americium-241	pCi/g	-6.59E-03	-6.75E-04	-4.20E-03	0/8	8/8	0/8	n/a	0/8	1.28E+01	0/8	1.28E+03	0/8	0/8	0.013 - 0.016
RADS	Cesium-137	pCi/g	2.18E-02	9.53E-02	5.73E-02	0/11	11/11	0/11	4.90E-01	0/11	1.98E-01	0/11	1.98E+01	0/11	0/11	0.0467 - 0.0935
RADS	Neptunium-237	pCi/g	-7.13E-03	1.13E-02	-1.99E-03	0/10	10/10	0/10	1.00E-01	0/10	6.26E-01	0/10	6.26E+01	0/10	1/10	0.0472 - 0.0483
RADS	Plutonium-238	pCi/g	-6.36E-03	-1.70E-05	-4.04E-03	0/11	11/11	0/11	7.30E-02	0/11	3.64E+01	0/11	3.64E+03	0/11	0/11	0.0104 - 0.0119
RADS	Plutonium-239/240	pCi/g	-5.97E-04	3.03E-03	1.08E-03	0/8	8/8	0/8	2.50E-02	0/8	3.56E+01	0/8	3.56E+03	0/8	0/8	0.0119 - 0.0132
RADS	Technetium-99	pCi/g	1.05E-02	1.18E+00	6.51E-01	0/11	11/11	0/11	2.50E+00	0/11	1.11E+03	0/11	1.11E+05	0/11	8/11	0.652 - 0.671
RADS	Thorium-228	pCi/g	2.20E-01	3.79E-01	2.80E-01	0/11	11/11	0/11	1.60E+00	0/11	n/a	0/11	n/a	n/a	n/a	0.0633 - 0.0876

FOD = frequency of detection

FOE = frequency of exceedance

n/a = not applicable

* For RADS, all results are reported.

Table 9.4.1. Surface Soil Historical Data Summary: SWMU 181 PGDP Firing Range (Continued)

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Teen Recreator FOE	Teen Recreator NAL	Teen Recreator FOE	Teen Recreator AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
RADS	Thorium-230	pCi/g	1.87E-01	3.56E-01	2.66E-01	0/11	11/11	0/11	1.50E+00	0/11	4.49E+01	0/11	4.49E+03	0/11	3/11	0.0578 - 0.0709
RADS	Thorium-232	pCi/g	1.64E-01	3.08E-01	2.35E-01	0/11	11/11	0/11	1.50E+00	0/11	n/a	0/11	n/a	n/a	n/a	0.036 - 0.0461
RADS	Uranium-234	pCi/g	8.45E-02	2.27E-01	1.49E-01	0/11	11/11	0/11	1.20E+00	0/11	6.25E+01	0/11	6.25E+03	0/11	0/11	0.111 - 0.117
RADS	Uranium-235	pCi/g	6.09E-04	1.33E-02	5.91E-03	0/11	11/11	0/11	6.00E-02	0/11	9.12E-01	0/11	9.12E+01	0/11	0/11	0.0109 - 0.0146
RADS	Uranium-238	pCi/g	8.73E-02	1.83E-01	1.29E-01	0/11	11/11	0/11	1.20E+00	0/11	4.02E+00	0/11	4.02E+02	0/11	0/11	0.1 - 0.107

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.4.2. Surface Soil RI Data Summary: SWMU 181 PGDP Firing Range

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Uranium	mg/kg	2.37E+00	2.37E+00	2.37E+00	0/1	1/1	0/1	4.90E+00	0/1	8.49E+01	0/1	3.50E+04	0/1	0/1	0.08 - 0.08
RADS	Alpha activity	pCi/g	2.23E+01	2.23E+01	2.23E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.5 - 5.5
RADS	Americium-241	pCi/g	-4.00E-03	-4.00E-03	-4.00E-03	0/1	1/1	0/1	n/a	0/1	1.28E+01	0/1	1.28E+03	0/1	0/1	0.024 - 0.024
RADS	Beta activity	pCi/g	2.25E+01	2.25E+01	2.25E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.4 - 3.4
RADS	Cesium-137	pCi/g	-1.00E-01	-1.00E-01	-1.00E-01	0/1	1/1	0/1	4.90E-01	0/1	1.98E-01	0/1	1.98E+01	0/1	0/1	0.2 - 0.2
RADS	Neptunium-237	pCi/g	-2.80E-03	-2.80E-03	-2.80E-03	0/1	1/1	0/1	1.00E-01	0/1	6.26E-01	0/1	6.26E+01	0/1	0/1	0.016 - 0.016
RADS	Plutonium-238	pCi/g	1.90E-02	1.90E-02	1.90E-02	0/1	1/1	0/1	7.30E-02	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.024 - 0.024
RADS	Plutonium-239/240	pCi/g	1.40E-03	1.40E-03	1.40E-03	0/1	1/1	0/1	2.50E-02	0/1	3.56E+01	0/1	3.56E+03	0/1	0/1	0.012 - 0.012
RADS	Technetium-99	pCi/g	2.00E-02	2.00E-02	2.00E-02	0/1	1/1	0/1	2.50E+00	0/1	1.11E+03	0/1	1.11E+05	0/1	0/1	0.41 - 0.41
RADS	Thorium-228	pCi/g	8.40E-01	8.40E-01	8.40E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.03 - 0.03
RADS	Thorium-230	pCi/g	8.00E-01	8.00E-01	8.00E-01	0/1	1/1	0/1	1.50E+00	0/1	4.49E+01	0/1	4.49E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	7.10E-01	7.10E-01	7.10E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Uranium-234	pCi/g	7.40E-01	7.40E-01	7.40E-01	0/1	1/1	0/1	1.20E+00	0/1	6.25E+01	0/1	6.25E+03	0/1	0/1	0.03 - 0.03
RADS	Uranium-235/236	pCi/g	2.20E-02	2.20E-02	2.20E-02	0/1	1/1	0/1	6.00E-02	0/1	9.12E-01	0/1	9.12E+01	0/1	0/1	0.021 - 0.021
RADS	Uranium-238	pCi/g	7.90E-01	7.90E-01	7.90E-01	0/1	1/1	0/1	1.20E+00	0/1	4.02E+00	0/1	4.02E+02	0/1	0/1	0.03 - 0.03

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

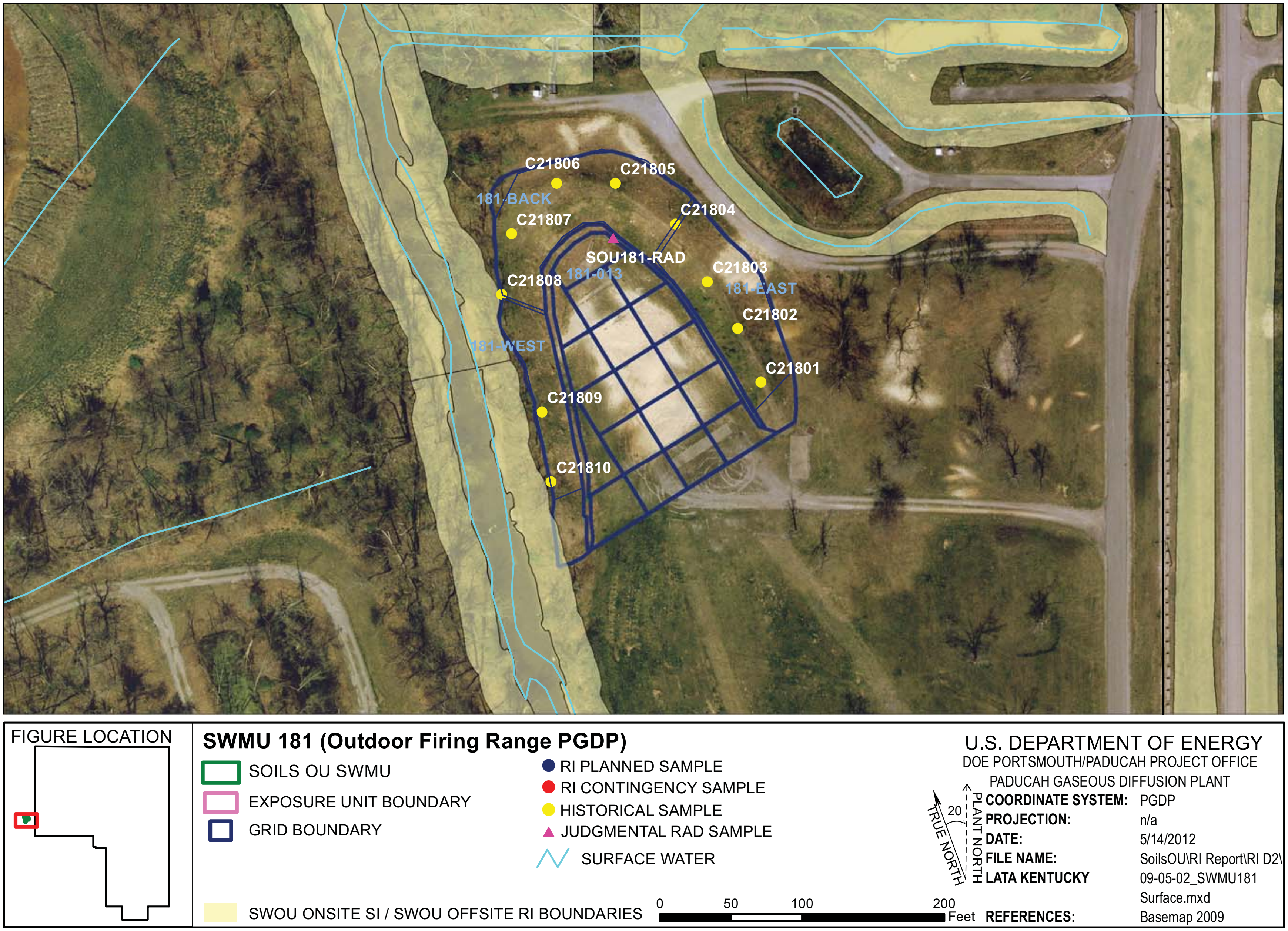


Figure 9.4.2. SWMU 181 Sample Locations - Surface Soil

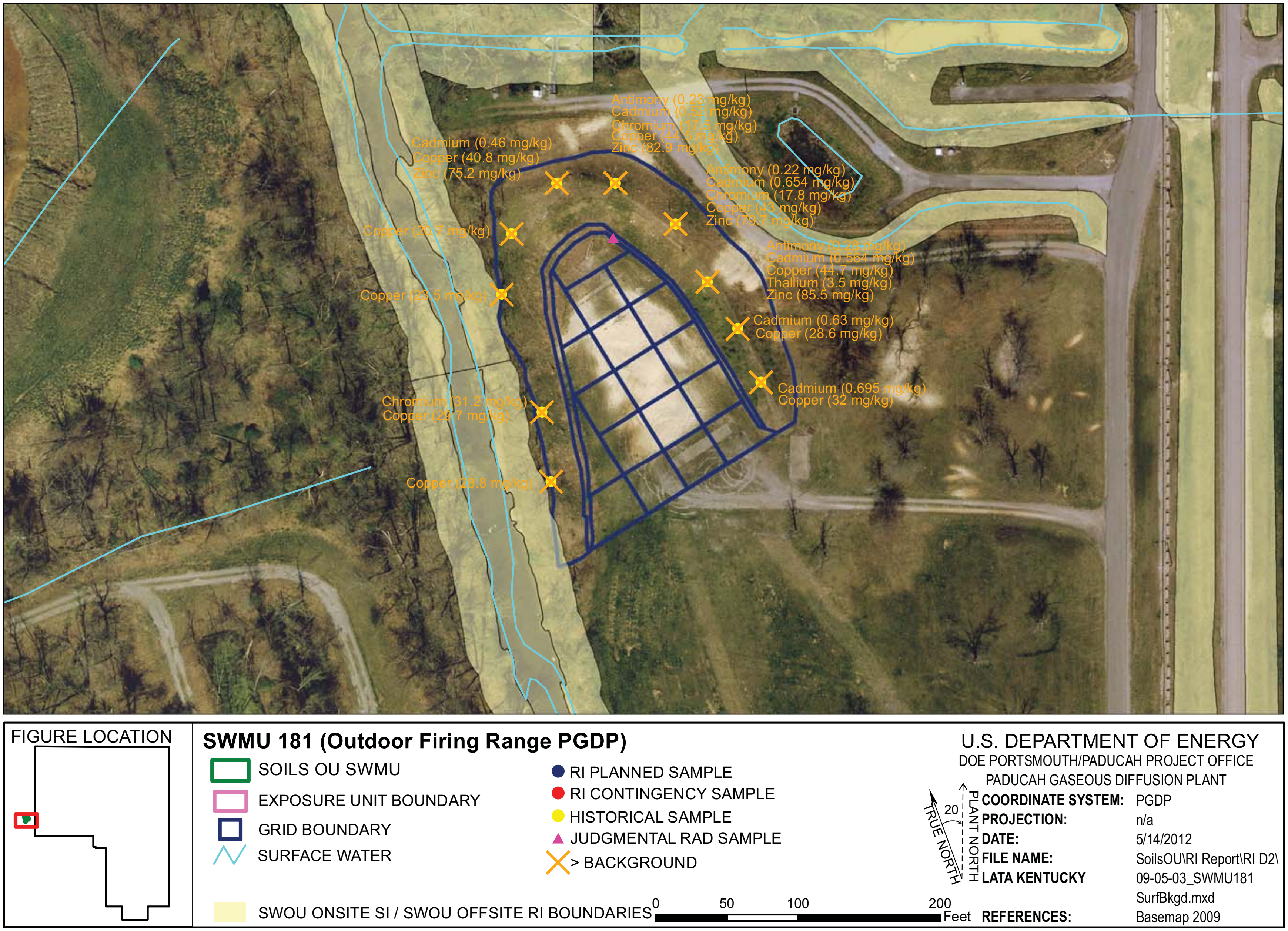


Figure 9.4.3. SWMU 181 Background Exceedances - Surface Soil

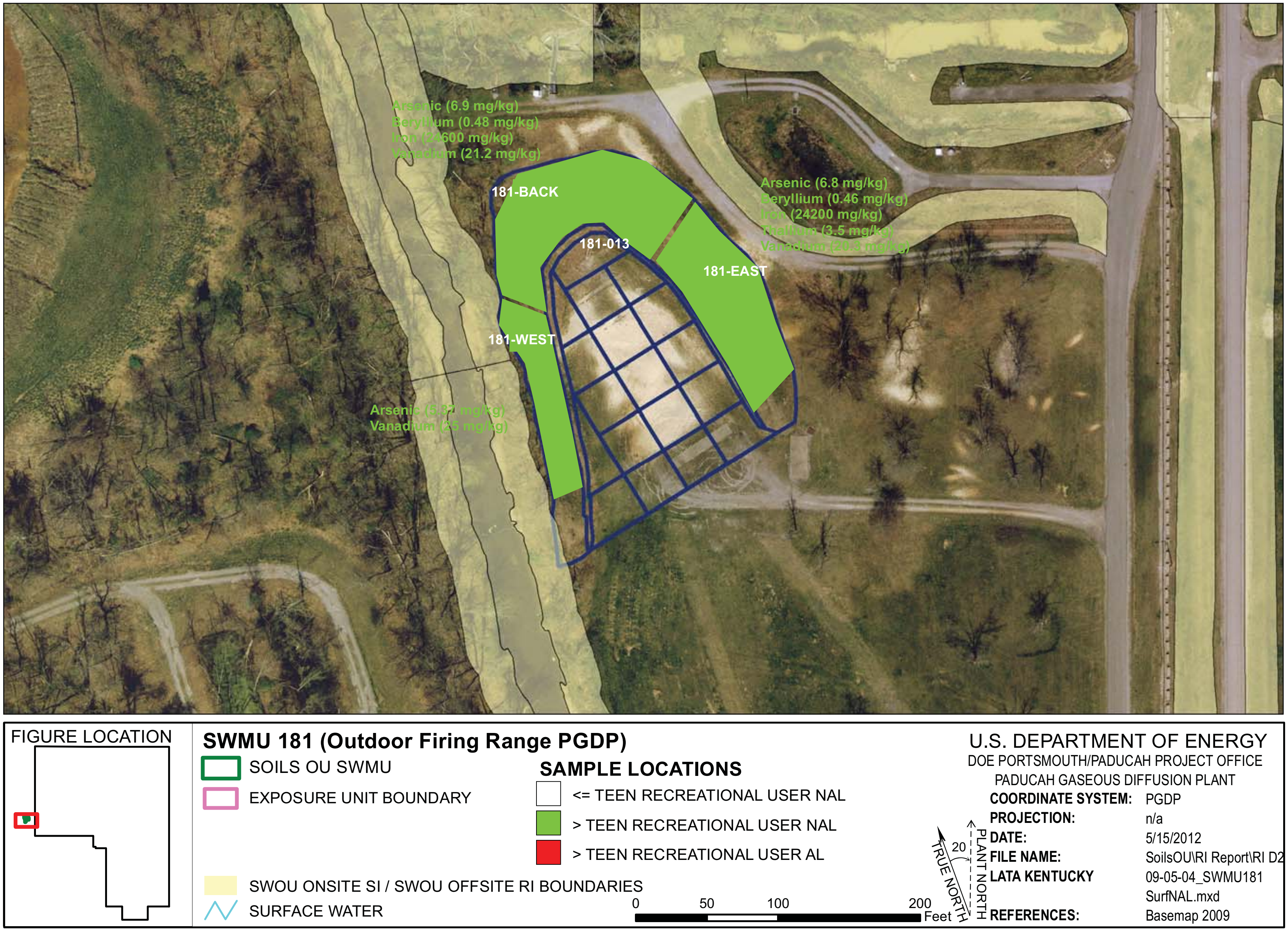


Figure 9.4.4. SWMU 181 NAL Exceedances - Surface Soil

SVOCs

No SVOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of RGA groundwater in the SWMU 181 surface soil.

Naphthalene and Total PAHs in grids Back and East were detected above the SSLs for the protection of UCRS groundwater in the SWMU 181 surface soil.

VOCs

No surface soil samples from SWMU 181 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 181 surface soil.

9.4.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 181, the representative data set for subsurface soils is presented in Table 9.4.3 and provides the nature of the contamination in SWMU 181 subsurface soils. Figures 9.4.5–9.4.7 illustrate the horizontal extent. A complete list of sampling results, including the sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 181 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 181 consists of one EU.

Metals

No metals were detected above both the background screening levels and the teen recreator NALs or ALs in the SWMU 181 subsurface soil.

The following are the metals detected in the SWMU 181 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Cadmium	East
Lead	1, 2, 3, 4, 5, 6, 7, 13, 17, 25, Back, East, West
Mercury	Back, East
Zinc	Back, East, West

*SWMU 181 consists of one EU.

No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater in the SWMU 181 subsurface soil.

Table 9.4.3. Subsurface Soil Historical Data Summary: SWMU 181 PGDP Firing Range

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.27E+03	1.05E+04	7.41E+03	0/38	38/38	0/38	1.20E+04	0/38	2.77E+04	0/38	8.91E+06	0/38	38/38	17.8 - 200
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/38	0/38	0/38	2.10E-01	0/38	1.78E+00	0/38	1.90E+03	0/38	0/38	6.35 - 8.85
METAL	Arsenic	mg/kg	3.88E+00	6.99E+00	4.84E+00	0/38	30/38	0/38	7.90E+00	30/38	1.02E+00	0/38	1.02E+02	0/38	30/38	0.917 - 4.99
METAL	Barium	mg/kg	9.23E+01	1.13E+02	1.03E+02	0/38	38/38	0/38	1.70E+02	0/38	4.15E+02	0/38	4.58E+05	0/38	38/38	2.22 - 2.5
METAL	Beryllium	mg/kg	4.54E-01	5.21E-01	4.88E-01	0/38	8/38	0/38	6.90E-01	8/38	1.29E-02	0/38	8.65E+00	0/38	0/38	0.444 - 0.499
METAL	Cadmium	mg/kg	5.28E-01	7.07E-01	6.29E-01	0/38	15/38	15/38	2.10E-01	0/38	3.14E+00	0/38	3.14E+02	0/38	15/38	0.458 - 2.5
METAL	Calcium	mg/kg	7.98E+04	1.52E+05	1.30E+05	0/38	38/38	38/38	6.10E+03	0/38	n/a	0/38	n/a	n/a	n/a	889 - 998
METAL	Chromium	mg/kg	9.99E+00	4.79E+01	1.61E+01	0/38	38/38	1/38	4.30E+01	0/38	7.15E+01	0/38	7.15E+03	0/38	0/38	2.22 - 2.5
METAL	Cobalt	mg/kg	5.81E+00	8.70E+00	7.11E+00	0/38	38/38	0/38	1.30E+01	2/38	8.45E+00	0/38	3.29E+03	38/38	38/38	0.917 - 4.99
METAL	Copper	mg/kg	2.01E+01	4.00E+01	2.93E+01	0/38	38/38	31/38	2.50E+01	0/38	1.13E+03	0/38	4.75E+05	0/38	0/38	11.1 - 12.5
METAL	Iron	mg/kg	1.36E+04	2.28E+04	1.75E+04	0/38	38/38	0/38	2.80E+04	2/38	1.98E+04	0/38	8.31E+06	38/38	38/38	17.8 - 20
METAL	Lead	mg/kg	8.20E+00	8.84E+01	2.09E+01	0/151	125/151	52/151	2.30E+01	0/151	4.00E+02	0/151	4.00E+02	0/151	90/151	0.997 - 19.6
METAL	Magnesium	mg/kg	2.41E+03	3.58E+03	2.98E+03	0/38	38/38	38/38	2.10E+03	0/38	n/a	0/38	n/a	n/a	n/a	4.44 - 4.99
METAL	Manganese	mg/kg	3.78E+02	5.51E+02	4.33E+02	0/38	38/38	0/38	8.20E+02	0/38	3.47E+03	0/38	2.94E+05	38/38	38/38	2.22 - 2.5
METAL	Mercury	mg/kg	7.00E-02	1.40E-01	9.56E-02	0/38	38/38	2/38	1.30E-01	0/38	6.25E-01	0/38	7.88E+02	0/38	7/38	0.015 - 0.017
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/38	0/38	0/38	n/a	0/38	1.42E+02	0/38	5.94E+04	0/38	0/38	4.44 - 4.99
METAL	Nickel	mg/kg	7.26E+00	1.01E+01	8.68E+00	0/38	38/38	0/38	2.20E+01	0/38	2.98E+01	0/38	3.07E+04	0/38	38/38	4.44 - 4.99
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/38	0/38	0/38	7.00E-01	0/38	1.42E+02	0/38	5.93E+04	0/38	0/38	0.917 - 4.99
METAL	Silver	mg/kg	n/a	n/a	n/a	0/38	0/38	0/38	2.70E+00	0/38	7.45E+00	0/38	8.07E+03	0/38	0/38	1.59 - 2.21
METAL	Sodium	mg/kg	n/a	n/a	n/a	0/38	0/38	0/38	3.40E+02	0/38	n/a	0/38	n/a	n/a	n/a	178 - 200
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/38	0/38	0/38	3.40E-01	0/38	2.27E+00	0/38	9.50E+02	0/38	0/38	1.83 - 9.98
METAL	Uranium	mg/kg	1.05E+00	1.05E+00	1.05E+00	0/38	1/38	0/38	4.60E+00	0/38	8.49E+01	0/38	3.50E+04	0/38	0/38	0.917 - 4.99
METAL	Vanadium	mg/kg	1.16E+01	2.52E+01	1.54E+01	0/38	38/38	0/38	3.70E+01	38/38	1.04E-01	0/38	7.61E+01	38/38	38/38	2.22 - 2.5
METAL	Zinc	mg/kg	4.62E+01	7.23E+01	6.09E+01	0/38	38/38	24/38	6.00E+01	0/38	8.50E+03	0/38	3.56E+06	0/38	38/38	17.8 - 20
PPCB	PCB, Total	mg/kg	1.70E-01	1.70E-01	1.70E-01	0/38	1/38	0/38	n/a	0/38	1.83E-01	0/38	1.83E+01	0/38	1/38	0.13 - 0.13
RADS	Americium-241	pCi/g	-6.57E-03	4.05E-03	-2.74E-03	0/37	37/37	0/37	n/a	0/37	1.28E+01	0/37	1.28E+03	0/37	0/37	0.0125 - 0.0167
RADS	Cesium-137	pCi/g	-6.90E-03	1.25E-01	7.31E-02	0/38	38/38	0/38	2.80E-01	0/38	1.98E-01	0/38	1.98E+01	0/38	0/38	0.0497 - 0.107
RADS	Neptunium-237	pCi/g	-1.13E-02	9.97E-03	-3.04E-03	0/36	36/36	0/36	n/a	0/36	6.26E-01	0/36	6.26E+01	0/36	3/36	0.0469 - 0.0539
RADS	Plutonium-238	pCi/g	-7.94E-03	7.80E-04	-4.57E-03	0/31	31/31	0/31	n/a	0/31	3.64E+01	0/31	3.64E+03	0/31	0/31	0.0101 - 0.0126
RADS	Plutonium-239/240	pCi/g	-3.18E-03	1.67E-02	2.53E-03	0/37	37/37	0/37	n/a	0/37	3.56E+01	0/37	3.56E+03	0/37	0/37	0.012 - 0.0142
RADS	Technetium-99	pCi/g	9.44E-02	1.57E+00	6.81E-01	0/38	38/38	0/38	2.80E+00	0/38	1.11E+03	0/38	1.11E+05	0/38	27/38	0.652 - 0.671
RADS	Thorium-228	pCi/g	1.90E-01	3.69E-01	2.78E-01	0/38	38/38	0/38	1.60E+00	0/38	n/a	0/38	n/a	n/a	n/a	0.0635 - 0.0886
RADS	Thorium-230	pCi/g	1.61E-01	3.62E-01	2.66E-01	0/38	38/38	0/38	1.40E+00	0/38	4.49E+01	0/38	4.49E+03	0/38	11/38	0.0577 - 0.0731
RADS	Thorium-232	pCi/g	1.83E-01	3.49E-01	2.51E-01	0/38	38/38	0/38	1.50E+00	0/38	n/a	0/38	n/a	n/a	n/a	0.0354 - 0.0516
RADS	Uranium-234	pCi/g	5.75E-02	3.29E-01	1.87E-01	0/38	38/38	0/38	1.20E+00	0/38	6.25E+01	0/38	6.25E+03	0/38	0/38	0.111 - 0.116
RADS	Uranium-235	pCi/g	-1.36E-03	1.57E-02	6.91E-03	0/37	37/37	0/37	6.00E-02	0/37	9.12E-01	0/37	9.12E+01	0/37	0/37	0.0116 - 0.021
RADS	Uranium-238	pCi/g	5.48E-02	4.17E-01	1.71E-01	0/38	38/38	0/38	1.20E+00	0/38	4.02E+00	0/38	4.02E+02	0/38	0/38	0.1 - 0.108

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

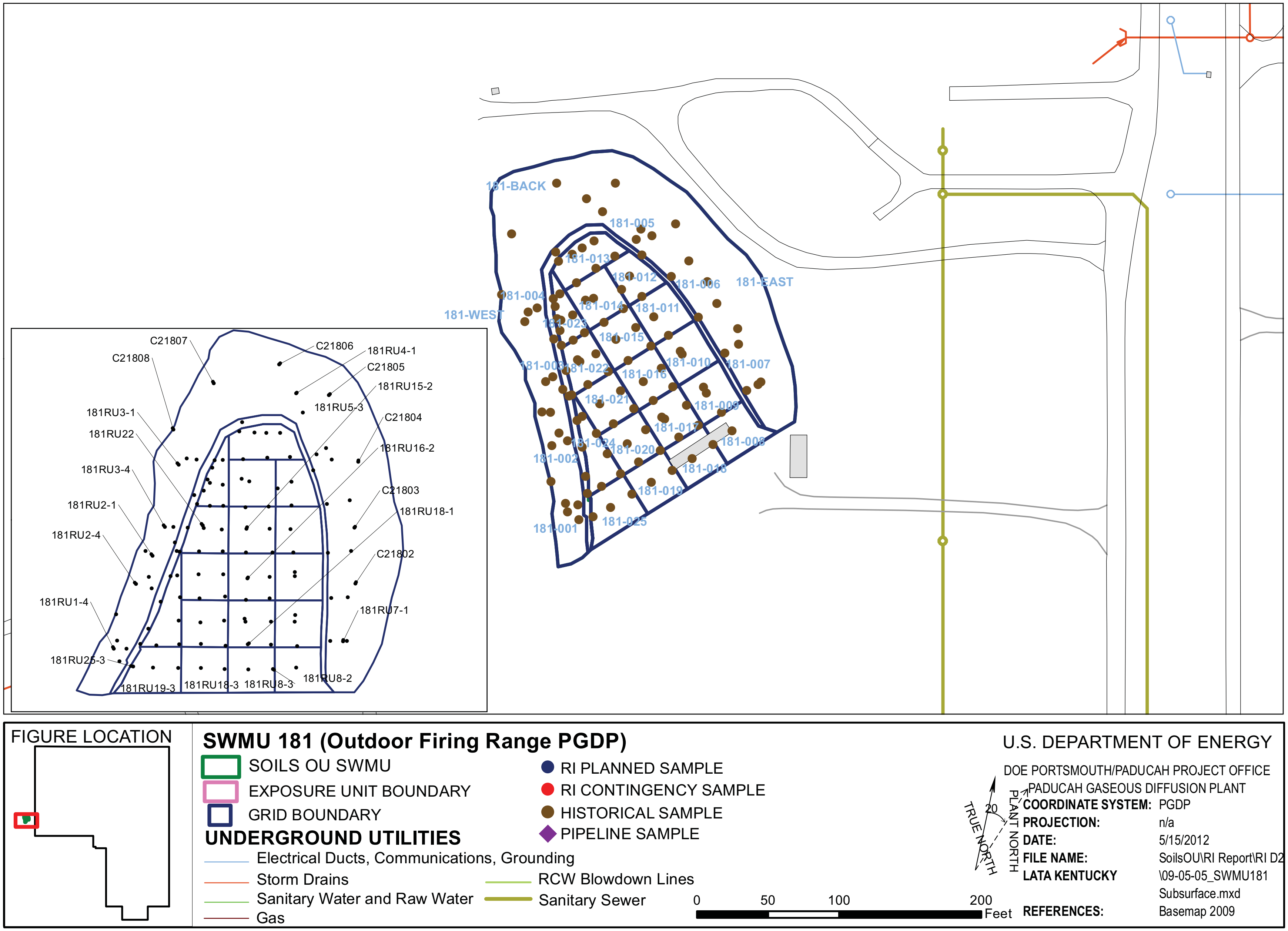


Figure 9.4.5. SWMU 181 Sample Locations - Subsurface Soil

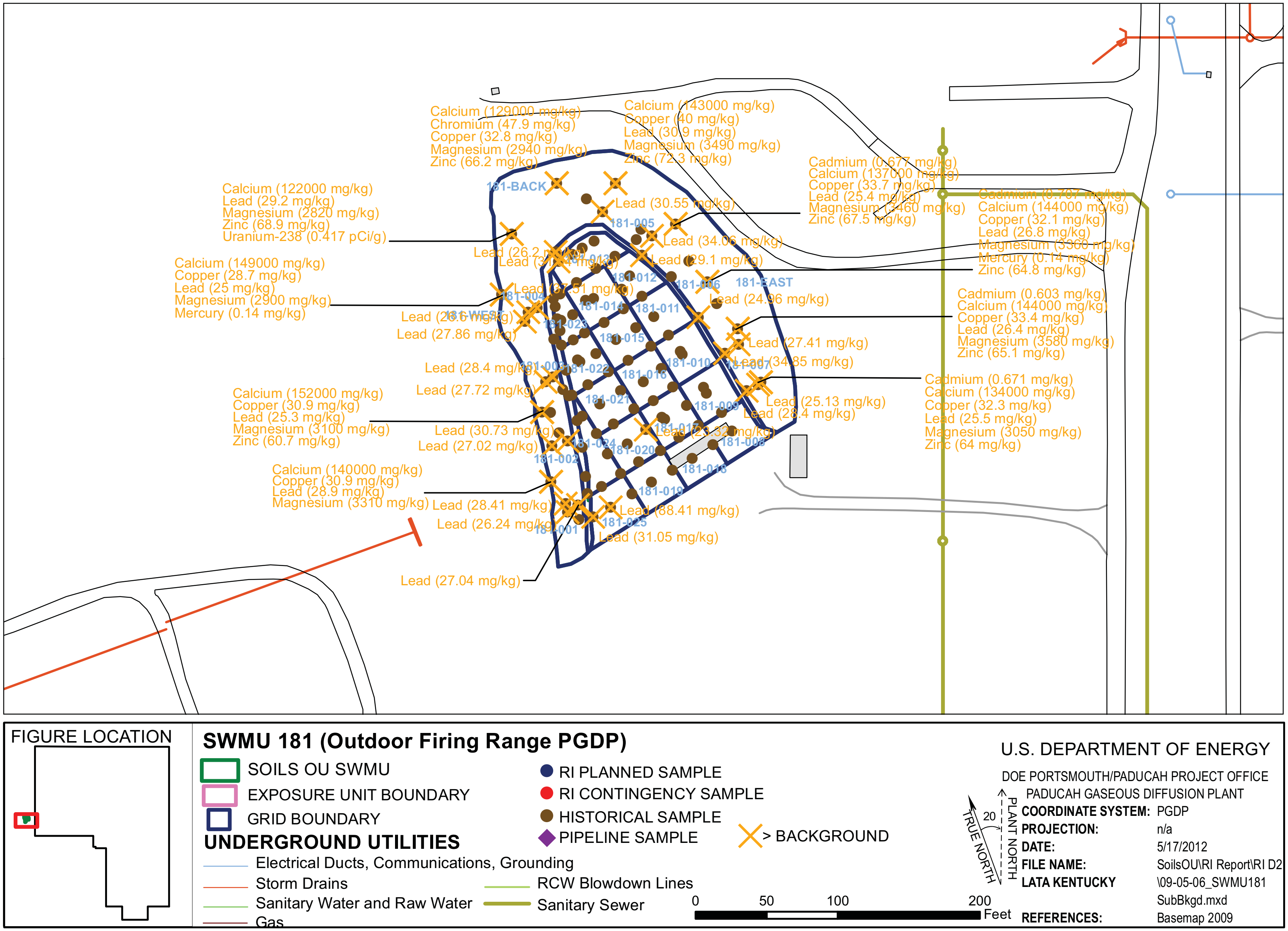


Figure 9.4.6. SWMU 181 Background Exceedances - Subsurface Soil

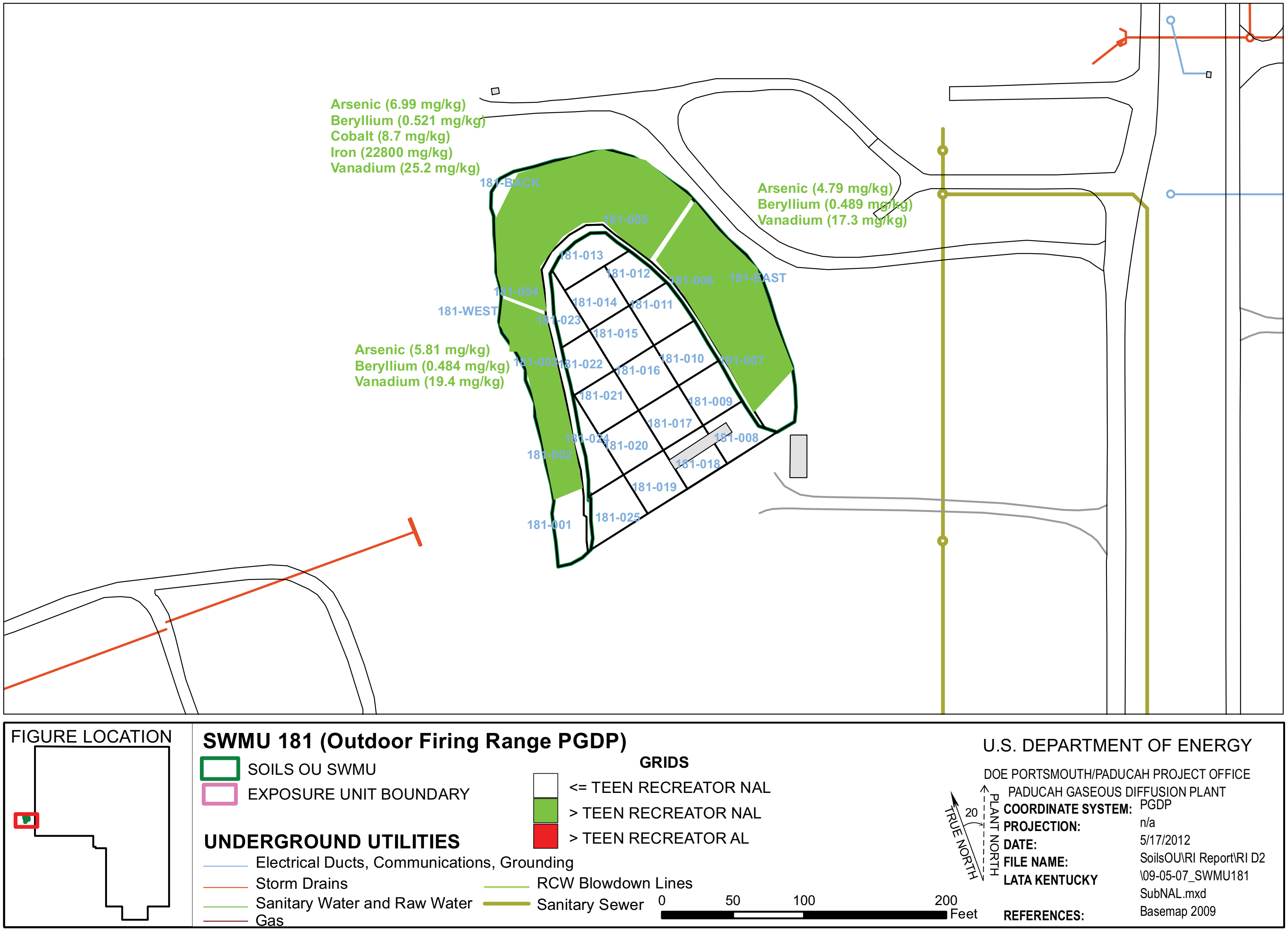


Figure 9.4.7. SWMU 181 NAL Exceedances - Subsurface Soil

PCBs

PCBs were not detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of RGA groundwater in the SWMU 181 subsurface soil. Total PCBs in grid Back were detected above the SSLs for the protection of UCRS groundwater.

SVOCs

No subsurface soil samples from SWMU 181 were analyzed for SVOCs.

VOCs

No subsurface soil samples from SWMU 181 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the teen recreator NALs or ALs in the SWMU 181 subsurface soil.

Neptunium-237 (no background value available) in grids Back and West were detected above and the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

9.4.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). SWMU 181 is on the banks of Bayou Creek, near the confluence of KPDES Outfall Ditch 008; however, SWMU 181 is grass-covered or otherwise stabilized and the contaminants are not likely to be transported attached to suspended soil particles. Outfall 008 above the weir was sampled as part of the SWOU SI (DOE 2008a). The SWOU On-Site achieved the cleanup goals determined for that removal action. A remedial action for these areas will be addressed as described in the SMP. Bayou Creek and Outfall 008 below the weir are scheduled to be investigated as part of the SWOU. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

9.4.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 181 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 181 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.4.4 for the hypothetical resident. The outdoor

Table 9.4.4. RGOs for SWMU 181

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Hypothetical Resident[5]											
1	Chromium	2.29E+01	mg/kg	1.5E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Total PAH	3.43E-02	mg/kg	1.8E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Cumulative			**3.2E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.56, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.56, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

worker (exposed to surface soils), the excavation worker, and the teen recreational user did not have any identified COCs. Table 9.4.4 also compares the EPC to the RGO for each COC under the exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under the exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 181 include metals. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 9.4.5.

Table 9.4.5. Ecological Screening for SWMU 181

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Grassy	No	39	Antimony	2.10E-01	4.17E+00	2.70E-01	15

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

9.4.7 SWMU 181 Summary

The following text summarizes the results for SWMU 181 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

A plant process that could have contributed to contamination is small arms firing practice resulting in lead bullets in the soil berm. As discussed in the background section, the removal action addressed this contamination. No other sources of contamination are known for SWMU 181.

COPCs for surface and subsurface soils from SWMU 181 are shown on Tables 9.4.1–9.4.2 as those analytes with green boxes under the “Teen Recreator/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. The COPCs identified for this SWMU are metals and SVOCs in the surface soil and metals, PCBs, and radionuclides in the subsurface soil. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 1 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 181 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMU 181. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the hypothetical residential scenario. COCs for this scenario for SWMU 181 are as follows:

- Outdoor worker (exposed to surface soil)
  - None

- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Chromium
  - Total PAHs
- Teen Recreational User
  - None

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 181.

For SWMU 181, COPECs exceed ESVs. The priority COPEC (i.e., maximum HQ ≥ 10) is the following:

- Antimony

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 181 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and additional excavation. SWMU 181 is not close to any other SWMUs or operating areas of PGDP. An additional response action here would not impact other SWMUs and would not have an impact on other integrator OUs.

9.4.8 SWMU 181 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 181; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for the scenario including the hypothetical resident (DOE 2010a). The reasonably anticipated future land use of SWMU 181 is recreational as shown in the SMP (DOE 2012a). This SWMU was addressed by a CERCLA removal action that excavated lead-contaminated soils. The action achieved it RAOs of reducing potential risks and hazards posed by reducing lead concentrations in soil to an average of less than the 400 mg/kg, the no action value for a residential scenario.

9.5 SWMU 195, SW PGDP CURLEE ROAD CONTAMINATED SOIL MOUNDS

9.5.1 Background

The Curlee Road Contaminated Soil Mounds (SWMU 195) are located in the southwest portion of the plant site. The site consists of two mounds of soil approximately 10–15 ft in height and covers 370,000 ft^2 in area. Historical knowledge indicates that potential COCs for SWMU 195 are radionuclides.

The area was created during original construction of the plant. The soil was unusable for fill due to its characteristics and was placed in this location. Some soil also came from excavation of drainage ditches and cleaning of the ditches. This SWMU is on the banks of KPDES Outfall 009.

9.5.2 Fieldwork Summary

Four hundred eighteen samples were planned and collected for the unit. Field laboratory results indicated that contingency samples were needed to determine the lateral and vertical extent of contamination because of elevated concentrations of arsenic, lead, cadmium, zinc, nickel, manganese, and vanadium from the field laboratory. Forty-nine out of 52 contingency samples were collected successfully. The sampling was limited because of concrete rubble. Figure A.16 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 9.5.1) using a FIDLER; the 65,535 measurements ranged from 4,007 to 15,628 gross cpm. A judgmental grab sample was collected for radiological constituents at the location indicating the highest reading, per the Work Plan (DOE 2010a). The area consists entirely of a soil and grass mix with concrete rubble in a few areas near the SWMU.

9.5.3 Nature and Extent of Contamination—Surface Soils

For SWMU 195, the representative data set for surface soils is presented in Table 9.5.1 and provides the nature of the contamination in SWMU 195 surface soils. Figures 9.5.2–9.5.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 195 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 195 consists of 17 EUs.

Metals

Metals were detected above the teen recreator NALs in the SWMU 195 surface soil. The following are the metals detected at or above both the background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Aluminum	115	11
Arsenic	73, 115	8, 11
Barium	115	11
Beryllium	73, 105	8, 12
Chromium	118, 195, 197	12, 17
Cobalt	73, 115	8, 11
Iron	115	11
Nickel	6, 16, 19, 24, 47, 48, 88, 108, 111, 114, 115, 117, 121, 145, 147, 149, 150, 158, 167, 180, 186, 193, 194, 205, 120B	1, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 16, 17
Silver	21, 33, 69, 110, 195	1, 2, 7, 10, 17
Vanadium	73, 115	8, 11

Grids 6, 19, 33 (EU 1), 21 (EU 2), 24 (EU 3), 16 (EU 4), 47 (EU 5), 48 (EU 6), 69, 88 (EU 7), 73 (EU 8), 108, 121(EU 9), 110, 111(EU 10), 114, 115 (EU 11), 105, 117, 118, (EU 12), 150 (EU 13), 145, 147, 149, 158 (EU 14), 167, 180, 186 (EU 16), 193, 194, 195, 197, and 205 (EU 17) are located within the administrative boundary of SWMU 195. Grid 120B (EU 12) is a grid in which step-out contingency sampling was performed in order to define the horizontal extent of contamination from SWMU 195, as described in the Soils OU Work Plan (DOE 2010a).

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.012	0.04	pCi/g	0.023
Cesium-137	0.44	0.072	pCi/g	0.093
Neptunium-237	0.01	0.045	pCi/g	0.023
Plutonium-238	0.006	0.031	pCi/g	0.016
Plutonium-239/240	0.025	0.021	pCi/g	0.018
Technetium-99	0.4	0.43	pCi/g	0.27
Thorium-228	0.86	0.02	pCi/g	0.09
Thorium-230	0.92	0.01	pCi/g	0.09
Thorium-232	0.93	0.01	pCi/g	0.09
Uranium-234	0.76	0.02	pCi/g	0.09
Uranium-235/236	0.054	0.016	pCi/g	0.026
Uranium-238	0.85	0.02	pCi/g	0.09
Uranium	2.55	0.06	mg/kg	

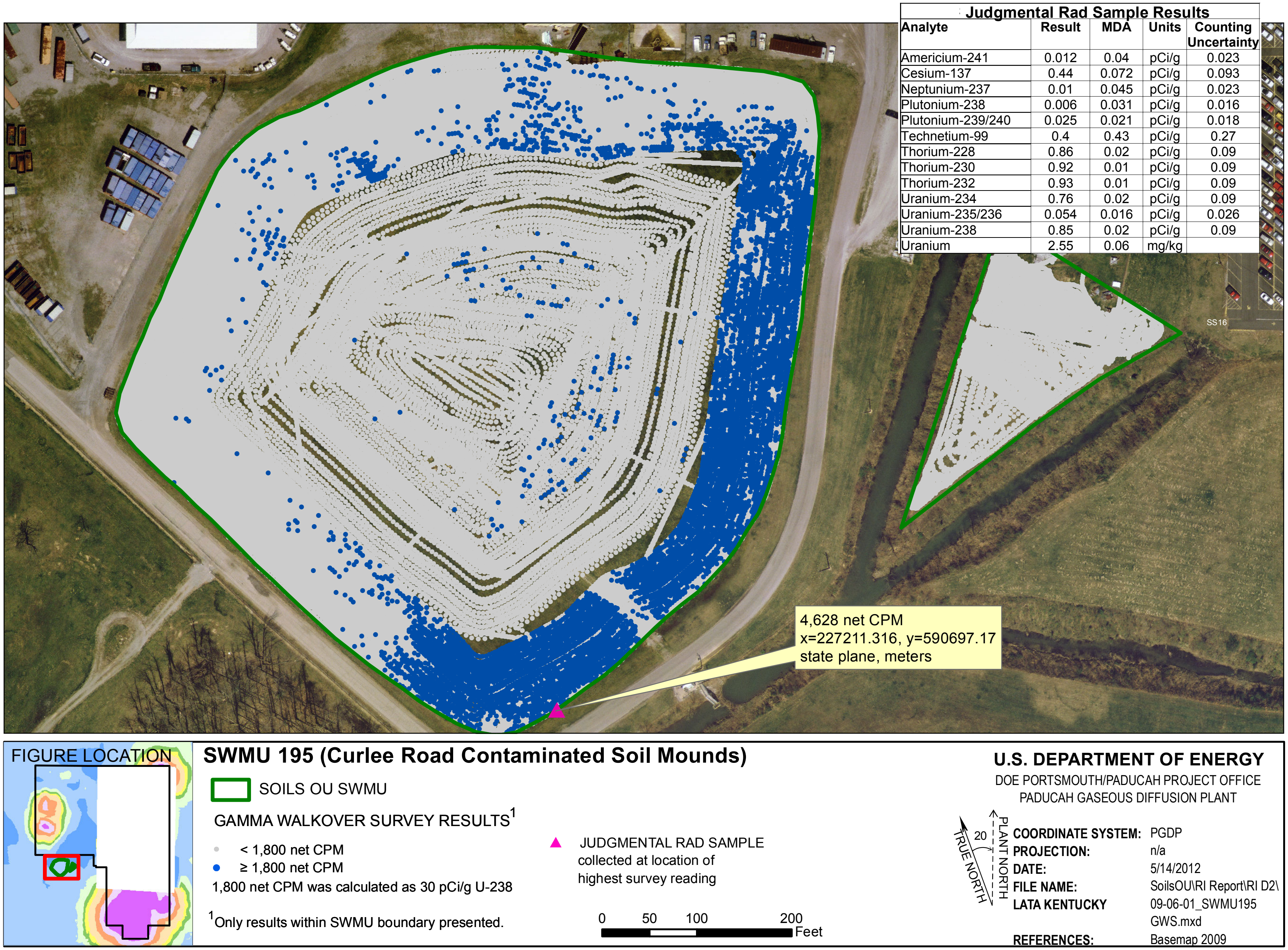


Figure 9.5.1. SWMU 195 Gamma Walkover Survey

Table 9.5.1. Surface Soil RI Data Summary: SWMU 195, Curlee Road Contaminated Soil Mounds

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Teen Recreator FOE	Teen Recreator NAL	Teen Recreator FOE	Teen Recreator AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
METAL	Aluminum	mg/kg	4.69E+03	2.81E+04	8.60E+03	0/17	17/17	1/17	1.30E+04	1/17	2.77E+04	0/17	8.91E+06	0/17	17/17	6 - 32.4
METAL	Antimony	mg/kg	9.50E-02	5.10E-01	2.43E-01	0/18	18/18	11/18	2.10E-01	0/18	1.78E+00	0/18	1.90E+03	0/18	5/18	0.6 - 0.7
METAL	Arsenic	mg/kg	2.80E+00	2.46E+01	7.94E+00	0/228	62/228	2/228	1.20E+01	62/228	1.02E+00	0/228	1.02E+02	1/228	62/228	1.2 - 11
METAL	Barium	mg/kg	6.26E+01	4.53E+02	1.19E+02	0/17	17/17	1/17	2.00E+02	1/17	4.15E+02	0/17	4.58E+05	0/17	12/17	2.4 - 12.9
METAL	Beryllium	mg/kg	1.10E-01	7.50E-01	3.84E-01	0/17	17/17	2/17	6.70E-01	17/17	1.29E-02	0/17	8.65E+00	0/17	0/17	0.12 - 3.5
METAL	Cadmium	mg/kg	4.00E-02	3.20E-01	1.04E-01	0/17	17/17	1/17	2.10E-01	0/17	3.14E+00	0/17	3.14E+02	0/17	0/17	0.06 - 0.32
METAL	Calcium	mg/kg	2.43E+03	8.43E+03	4.41E+03	0/17	17/17	0/17	2.00E+05	0/17	n/a	0/17	n/a	n/a	n/a	61.3 - 1740
METAL	Chromium	mg/kg	6.60E+00	1.21E+02	4.04E+01	0/228	114/228	110/228	1.60E+01	3/228	7.15E+01	0/228	7.15E+03	0/228	0/228	1.2 - 85
METAL	Cobalt	mg/kg	3.00E+00	2.77E+01	8.16E+00	0/17	17/17	2/17	1.40E+01	3/17	8.45E+00	0/17	3.29E+03	17/17	17/17	0.24 - 1.3
METAL	Copper	mg/kg	7.40E+00	4.46E+01	1.56E+01	0/228	26/228	12/228	1.90E+01	0/228	1.13E+03	0/228	4.75E+05	0/228	0/228	1.2 - 35
METAL	Iron	mg/kg	2.72E+03	4.60E+04	1.07E+04	0/228	228/228	1/228	2.80E+04	4/228	1.98E+04	0/228	8.31E+06	228/228	228/228	6 - 100
METAL	Lead	mg/kg	6.10E+00	4.17E+01	1.30E+01	0/228	203/228	1/228	3.60E+01	0/228	4.00E+02	0/228	4.00E+02	0/228	57/228	0.36 - 13
METAL	Magnesium	mg/kg	6.47E+02	4.00E+03	1.26E+03	0/17	17/17	0/17	7.70E+03	0/17	n/a	0/17	n/a	n/a	n/a	60.2 - 324
METAL	Manganese	mg/kg	5.50E+01	1.42E+03	2.47E+02	0/228	226/228	0/228	1.50E+03	0/228	3.47E+03	0/228	2.94E+05	219/228	226/228	0.25 - 85
METAL	Mercury	mg/kg	1.53E-02	4.17E-01	5.21E-02	0/228	17/228	1/228	2.00E-01	0/228	6.25E-01	0/228	7.88E+02	0/228	1/228	0.0399 - 10
METAL	Molybdenum	mg/kg	3.40E-01	5.60E+00	8.67E-01	0/228	18/228	0/228	n/a	0/228	1.42E+02	0/228	5.94E+04	0/228	18/228	0.6 - 15
METAL	Nickel	mg/kg	5.30E+00	9.81E+01	4.11E+01	0/228	38/228	25/228	2.10E+01	25/228	2.98E+01	0/228	3.07E+04	7/228	38/228	0.6 - 65
METAL	Selenium	mg/kg	1.00E-01	1.80E+00	7.96E-01	0/228	17/228	9/228	8.00E-01	0/228	1.42E+02	0/228	5.93E+04	0/228	12/228	0.6 - 20
METAL	Silver	mg/kg	3.20E-02	1.31E+01	1.36E+00	0/228	22/228	5/228	2.30E+00	5/228	7.45E+00	0/228	8.07E+03	5/228	14/228	0.24 - 10
METAL	Sodium	mg/kg	2.13E+01	1.08E+02	3.64E+01	0/17	16/17	0/17	3.20E+02	0/17	n/a	0/17	n/a	n/a	n/a	24.1 - 130
METAL	Thallium	mg/kg	8.60E-02	6.60E-01	2.50E-01	0/17	11/17	5/17	2.10E-01	0/17	2.27E+00	0/17	9.50E+02	0/17	5/17	0.24 - 1.3
METAL	Uranium	mg/kg	2.44E+00	1.16E+01	3.97E+00	0/229	23/229	6/229	4.90E+00	0/229	8.49E+01	0/229	3.50E+04	0/229	0/229	0.01 - 20
METAL	Vanadium	mg/kg	1.50E+01	7.97E+01	2.89E+01	0/17	17/17	2/17	3.80E+01	17/17	1.04E-01	1/17	7.61E+01	17/17	17/17	1.2 - 6.5
METAL	Zinc	mg/kg	1.19E+01	1.43E+02	3.43E+01	0/228	228/228	3/228	6.50E+01	0/228	8.50E+03	0/228	3.56E+06	0/228	222/228	2.5 - 69.7
PPCB	PCB, Total	mg/kg	7.40E-01	7.40E-01	7.40E-01	0/228	1/228	0/228	n/a	1/228	1.83E-01	0/228	1.83E+01	0/228	1/228	0.36 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	0/18	0/18	0.39 - 0.46
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	0/18	0/18	0.39 - 0.46
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	0/18	0/18	0.39 - 0.46
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	1.9 - 2.2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	1.9 - 2.2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	3.35E+00	0/18	1.00E+02	0/18	0/18	1.9 - 2.2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	1.9 - 2.2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	1.9 - 2.2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	1.9 - 2.2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	5.87E+02	0/18	1.76E+04	0/18	0/18	0.39 - 0.46
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Anthracene	mg/kg	5.20E-02	5.20E-02	5.20E-02	1/18	1/18	0/18	n/a	0/18	3.25E+03	0/18	9.74E+04	0/18	0/18	0.39 - 0.46
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Benzo(ghi)perylene	mg/kg	8.40E-02	1.30E-01	1.08E-01	3/18	3/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.5.1. Surface Soil RI Data Summary: SWMU 195, Curlee Road Contaminated Soil Mounds (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	1.9 - 2.2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.0079 - 0.0092
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	8.70E-02	2.00E-01	1.32E-01	4/18	4/18	0/18	n/a	0/18	n/a	0/18	n/a	0/18	0/18	0.39 - 0.46
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Fluoranthene	mg/kg	5.60E-02	4.60E-01	2.40E-01	5/18	6/18	0/18	n/a	0/18	4.47E+02	0/18	1.34E+04	0/18	0/18	0.39 - 0.46
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	4.19E+02	0/18	1.26E+04	0/18	0/18	0.39 - 0.46
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	1.78E-01	0/18	1.78E+01	0/18	0/18	0.39 - 0.46
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	1.9 - 2.2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.79 - 0.92
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	5.27E+00	0/18	5.27E+02	0/18	0/18	0.39 - 0.46
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	1.9 - 2.2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	6.10E-02	0/18	6.10E+00	0/18	0/18	0.0079 - 0.0092
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	0/18	0/18	1.9 - 2.2
SVOA	Phenanthrene	mg/kg	4.30E-02	2.30E-01	1.51E-01	4/18	4/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.39 - 0.46
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	1.9 - 2.2
SVOA	Pyrene	mg/kg	4.40E-02	3.50E-01	1.95E-01	6/18	6/18	0/18	n/a	0/18	3.35E+02	0/18	1.00E+04	0/18	0/18	0.39 - 0.46
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.79 - 0.92
SVOA	Total PAH	mg/kg	5.60E-03	3.16E-01	7.37E-02	0/18	13/18	0/18	n/a	3/18	5.57E-02	0/18	5.57E+00	1/18	13/18	-
RADS	Alpha activity	pCi/g	1.97E+01	3.42E+01	2.69E+01	0/19	19/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	3.9 - 6
RADS	Americium-241	pCi/g	-9.00E-04	4.00E-02	9.19E-03	3/19	19/19	0/19	n/a	0/19	1.28E+01	0/19	1.28E+03	0/19	0/19	0.0043 - 0.04
RADS	Beta activity	pCi/g	2.36E+01	3.73E+01	2.87E+01	0/19	19/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	3.1 - 6.6
RADS	Cesium-137	pCi/g	1.22E-01	4.40E-01	2.78E-01	0/19	19/19	0/19	4.90E-01	15/19	1.98E-01	0/19	1.98E+01	0/19	0/19	0.038 - 0.1
RADS	Neptunium-237	pCi/g	-5.30E-03	4.00E-02	5.03E-03	0/19	19/19	0/19	1.00E-01	0/19	6.26E-01	0/19	6.26E+01	0/19	7/19	0.027 - 0.046
RADS	Plutonium-238	pCi/g	-3.00E-03	2.50E-02	1.09E-02	3/19	19/19	0/19	7.30E-02	0/19	3.64E+01	0/19	3.64E+03	0/19	0/19	0.0081 - 0.031
RADS	Plutonium-239/240	pCi/g	-1.40E-03	1.66E-01	2.24E-02	12/19	19/19	1/19	2.50E-02	0/19	3.56E+01	0/19	3.56E+03	0/19	1/19	0.004 - 0.022
RADS	Technetium-99	pCi/g	-1.60E-01	2.43E+00	2.74E-01	1/19	19/19	0/19	2.50E+00	0/19	1.11E+03	0/19	1.11E+05	0/19	5/19	0.42 - 0.55
RADS	Thorium-228	pCi/g	7.63E-01	1.09E+00	8.73E-01	0/19	19/19	0/19	1.60E+00	0/19	n/a	0/19	n/a	n/a	n/a	0.01 - 0.04
RADS	Thorium-230	pCi/g	8.10E-01	1.17E+00	9.26E-01	0/19	19/19	0/19	1.50E+00	0/19	4.49E+01	0/19	4.49E+03	0/19	19/19	0.005 - 0.03
RADS	Thorium-232	pCi/g	7.70E-01	9.40E-01	8.68E-01	0/19	19/19	0/19	1.50E+00	0/19	n/a	0/19	n/a	n/a	n/a	0.004 - 0.03
RADS	Uranium-234	pCi/g	6.57E-01	1.70E+00	8.34E-01	0/19	19/19	1/19	1.20E+00	0/19	6.25E+01	0/19	6.25E+03	0/19	0/19	0.01 - 0.025
RADS	Uranium-235/236	pCi/g	2.00E-02	1.32E-01	4.88E-02	14/19	19/19	2/19	6.00E-02	0/19	9.12E-01	0/19	9.12E+01	0/19	0/19	0.005 - 0.024
RADS	Uranium-238	pCi/g	8.10E-01	2.48E+00	1.03E+00	0/19	19/19	1/19	1.20E+00	0/19	4.02E+00	0/19	4.02E+02	0/19	0/19	0.004 - 0.02

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.5.1. Surface Soil RI Data Summary: SWMU 195, Curlee Road Contaminated Soil Mounds (Continued)

(red)	One or more samples exceed AL value[1]
(green)	One or more samples exceed NAL value[2]
(orange)	One or more samples exceed background value
(light blue)	One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.

[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.

Thallium metal results are compared to thallium chloride action levels/no action levels.

Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).

Field replicates, or separate samples are counted independently.

The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

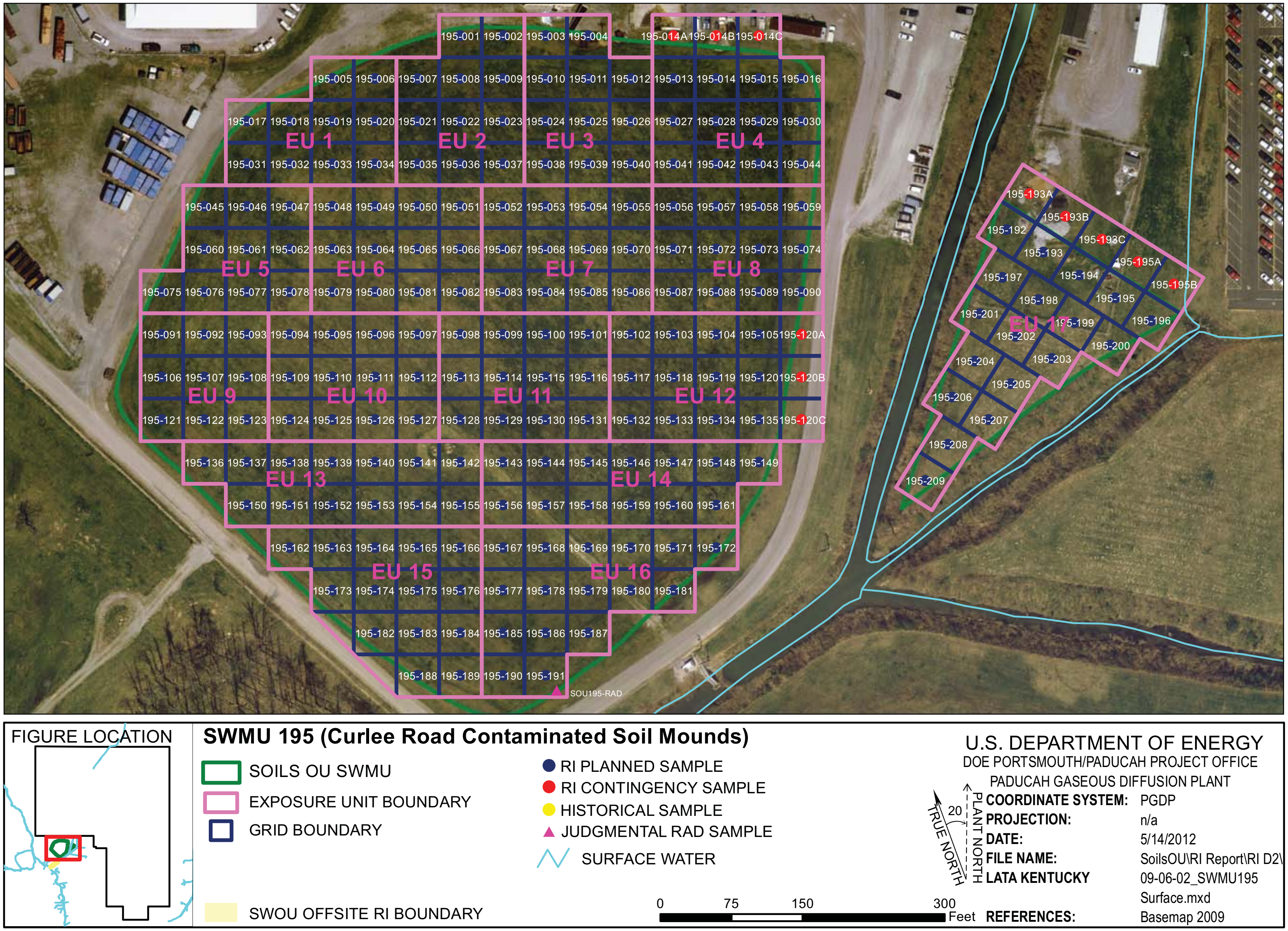


Figure 9.5.2. SWMU 195 Sample Locations - Surface Soil

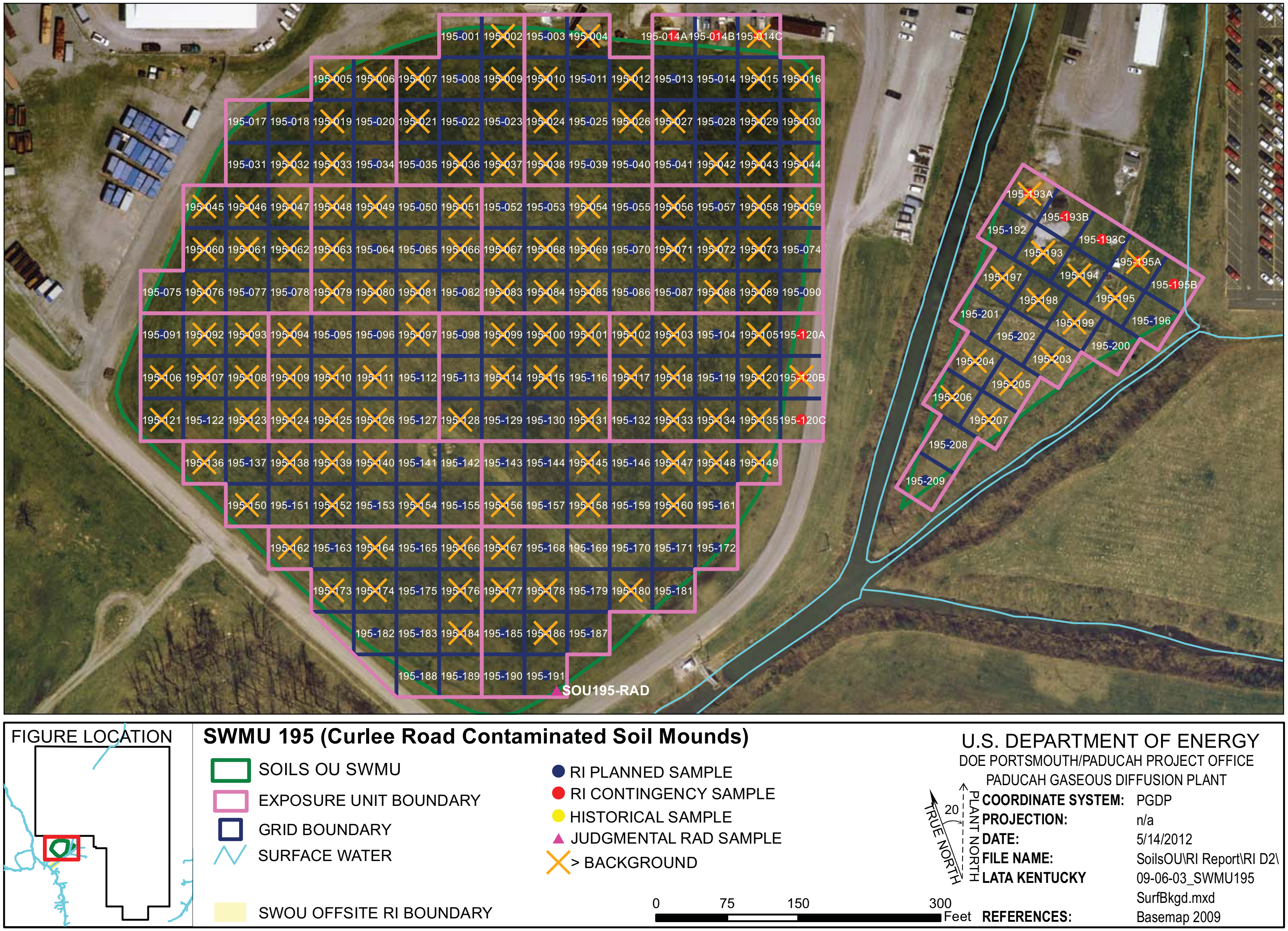


Figure 9.5.3. SWMU 195 Background Exceedances - Surface Soil

Station	Results Exceeding Background
SOU195-002	Chromium (34.78 mg/kg)
	Copper (24.65 mg/kg)
SOU195-004	Chromium (33.31 mg/kg)
SOU195-005	Copper (30.72 mg/kg)
SOU195-006	Nickel (70.2 mg/kg)
SOU195-007	Antimony (0.31 mg/kg)
	Chromium (39.56 mg/kg)
SOU195-009	Chromium (45.2 mg/kg)
SOU195-010	Chromium (31.12 mg/kg)
SOU195-012	Antimony (0.26 mg/kg)
	Copper (21.7 mg/kg)
SOU195-014C	Zinc (112.75 mg/kg)
SOU195-015	Chromium (43.73 mg/kg)

Station	Results Exceeding Background
SOU195-016	Nickel (62.28 mg/kg)
SOU195-019	Chromium (35.84 mg/kg)
	Nickel (52.64 mg/kg)
SOU195-021	Chromium (44.64 mg/kg)
	Silver (9.48 mg/kg)
SOU195-024	Chromium (47.67 mg/kg)
	Nickel (52.15 mg/kg)
SOU195-026	Chromium (50.3 mg/kg)
SOU195-027	Chromium (34.49 mg/kg)
SOU195-029	Chromium (42.91 mg/kg)
SOU195-030	Chromium (31.26 mg/kg)
SOU195-032	Chromium (51.86 mg/kg)
	Selenium (1.3 mg/kg)

Station	Results Exceeding Background
SOU195-033	Chromium (63.27 mg/kg)
	Silver (9.37 mg/kg)
SOU195-036	Chromium (44.31 mg/kg)
SOU195-037	Chromium (44.47 mg/kg)
SOU195-038	Chromium (39.09 mg/kg)
SOU195-042	Chromium (49.8 mg/kg)
SOU195-043	Antimony (0.41 mg/kg)
	Chromium (52.9 mg/kg)
	Selenium (1.3 mg/kg)
SOU195-044	Chromium (35.33 mg/kg)
SOU195-045	Chromium (32.34 mg/kg)
SOU195-046	Chromium (42.7 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.5.3. SWMU 195 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU195-047	Chromium (57.41 mg/kg)
	Nickel (81.1 mg/kg)

Station	Results Exceeding Background
SOU195-048	Chromium (44.54 mg/kg)
	Nickel (98.09 mg/kg)

Station	Results Exceeding Background
SOU195-049	Chromium (42.75 mg/kg)

Station	Results Exceeding Background
SOU195-051	Chromium (32.42 mg/kg)

Station	Results Exceeding Background
SOU195-054	Chromium (34.18 mg/kg)

Station	Results Exceeding Background
SOU195-056	Chromium (65.61 mg/kg)

Station	Results Exceeding Background
SOU195-058	Chromium (46.17 mg/kg)

Station	Results Exceeding Background
SOU195-059	Chromium (67.93 mg/kg)

Station	Results Exceeding Background
SOU195-060	Chromium (39.21 mg/kg)

Station	Results Exceeding Background
SOU195-061	Antimony (0.41 mg/kg)
	Chromium (44.33 mg/kg)
	Selenium (1.3 mg/kg)
	Thallium (0.31 mg/kg)

Station	Results Exceeding Background
SOU195-062	Chromium (32.28 mg/kg)

Station	Results Exceeding Background
SOU195-063	Chromium (40.85 mg/kg)

Station	Results Exceeding Background
SOU195-066	Chromium (30.92 mg/kg)

Station	Results Exceeding Background
SOU195-067	Chromium (41.86 mg/kg)

Station	Results Exceeding Background
SOU195-068	Antimony (0.24 mg/kg)
	Chromium (34.77 mg/kg)
	Selenium (1.4 mg/kg)

Station	Results Exceeding Background
SOU195-069	Chromium (49.26 mg/kg)
	Silver (8.06 mg/kg)

Station	Results Exceeding Background
SOU195-071	Chromium (44.42 mg/kg)

Station	Results Exceeding Background
SOU195-072	Chromium (36.67 mg/kg)

Station	Results Exceeding Background
SOU195-073	Arsenic (13.8 mg/kg)
	Beryllium (0.74 mg/kg)
	Chromium (17.7 mg/kg)
	Cobalt (18.2 mg/kg)
	Selenium (1.8 mg/kg)
	Vanadium (40.4 mg/kg)

Station	Results Exceeding Background
SOU195-076	Chromium (41.48 mg/kg)

Station	Results Exceeding Background
SOU195-079	Chromium (35.18 mg/kg)
	Selenium (1.2 mg/kg)

Station	Results Exceeding Background
SOU195-080	Chromium (33.16 mg/kg)

Station	Results Exceeding Background
SOU195-081	Chromium (31.94 mg/kg)

Station	Results Exceeding Background
SOU195-083	Chromium (34.42 mg/kg)

Station	Results Exceeding Background
SOU195-084	Chromium (36.72 mg/kg)

Station	Results Exceeding Background
SOU195-085	Chromium (38.47 mg/kg)

Station	Results Exceeding Background
SOU195-088	Nickel (81.74 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.5.3. SWMU 195 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU195-089	Chromium (42.31 mg/kg)
SOU195-092	Chromium (52.98 mg/kg)
SOU195-093	Chromium (60.8 mg/kg)
SOU195-094	Chromium (40.77 mg/kg)
SOU195-097	Copper (29.72 mg/kg)
SOU195-099	Chromium (32.91 mg/kg)
SOU195-100	Chromium (37.66 mg/kg)
SOU195-101	Chromium (45.71 mg/kg)
SOU195-102	Chromium (43.43 mg/kg)
SOU195-103	Chromium (48.19 mg/kg)

Station	Results Exceeding Background
SOU195-105	Antimony (0.51 mg/kg)
	Beryllium (0.75 mg/kg)
	Chromium (30.41 mg/kg)
	Selenium (1.7 mg/kg)
	Uranium-235/236 (0.074 pCi/g)
SOU195-106	Chromium (31.48 mg/kg)
SOU195-107	Chromium (35.94 mg/kg)
SOU195-108	Chromium (47.51 mg/kg)
	Nickel (79.17 mg/kg)
SOU195-109	Chromium (37.89 mg/kg)
SOU195-110	Chromium (39.08 mg/kg)
	Silver (13.11 mg/kg)
SOU195-111	Chromium (45.07 mg/kg)
	Nickel (74.02 mg/kg)
SOU195-114	Chromium (39.76 mg/kg)
	Nickel (73.09 mg/kg)

Station	Results Exceeding Background
SOU195-115	Aluminum (28100 mg/kg)
	Arsenic (24.6 mg/kg)
	Barium (453 mg/kg)
	Cadmium (0.32 mg/kg)
	Chromium (50.5 mg/kg)
	Cobalt (27.7 mg/kg)
	Copper (44.6 mg/kg)
	Iron (46000 mg/kg)
	Nickel (38.9 mg/kg)
	Selenium (0.83 mg/kg)
	Thallium (0.66 mg/kg)
	Uranium (8.4 mg/kg)
	Vanadium (79.7 mg/kg)
SOU195-117	Chromium (32.45 mg/kg)
	Nickel (68.97 mg/kg)
SOU195-118	Chromium (74.38 mg/kg)
SOU195-120	Chromium (40.81 mg/kg)
	Lead (41.69 mg/kg)
SOU195-120B	Copper (23.24 mg/kg)
	Nickel (60.76 mg/kg)
SOU195-121	Nickel (79.27 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.5.3. SWMU 195 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU195-123	Chromium (35.12 mg/kg)
SOU195-124	Chromium (36.42 mg/kg) Copper (25.36 mg/kg)
SOU195-125	Antimony (0.24 mg/kg) Thallium (0.36 mg/kg)
SOU195-126	Chromium (34.17 mg/kg)
SOU195-128	Chromium (38.31 mg/kg)
SOU195-131	Chromium (35.4 mg/kg)
SOU195-133	Chromium (40.29 mg/kg)
SOU195-134	Chromium (39.15 mg/kg)
SOU195-135	Chromium (35.75 mg/kg)
SOU195-136	Chromium (64.24 mg/kg)
SOU195-138	Chromium (65.51 mg/kg)
SOU195-139	Chromium (40.92 mg/kg)
SOU195-140	Chromium (36.31 mg/kg)
SOU195-145	Nickel (82.18 mg/kg)
SOU195-147	Chromium (34.85 mg/kg) Nickel (70.05 mg/kg) Uranium (8.56 mg/kg)
SOU195-148	Chromium (28.49 mg/kg)
SOU195-149	Chromium (59.44 mg/kg) Nickel (57.88 mg/kg)
SOU195-150	Nickel (73.51 mg/kg)
SOU195-152	Chromium (43.19 mg/kg)
SOU195-154	Chromium (46.86 mg/kg)
SOU195-156	Chromium (58.11 mg/kg)
SOU195-158	Chromium (18.2 mg/kg) Nickel (78.46 mg/kg) Thallium (0.23 mg/kg)
SOU195-160	Chromium (33.43 mg/kg)
SOU195-162	Antimony (0.26 mg/kg)
SOU195-164	Chromium (33.2 mg/kg)
SOU195-166	Chromium (44.28 mg/kg)
SOU195-167	Chromium (44.46 mg/kg) Nickel (77.24 mg/kg)
SOU195-173	Chromium (37.92 mg/kg)
SOU195-174	Chromium (31.79 mg/kg)
SOU195-176	Chromium (38.61 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.5.3. SWMU 195 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU195-177	Antimony (0.22 mg/kg)
	Chromium (40.16 mg/kg)

Station	Results Exceeding Background
SOU195-178	Chromium (35.25 mg/kg)

Station	Results Exceeding Background
SOU195-180	Nickel (72.82 mg/kg)

Station	Results Exceeding Background
SOU195-184	Chromium (48.17 mg/kg)

Station	Results Exceeding Background
SOU195-186	Chromium (39.59 mg/kg)
	Nickel (85.7 mg/kg)

Station	Results Exceeding Background
SOU195-193	Antimony (0.38 mg/kg)
	Chromium (43.1 mg/kg)
	Copper (23.7 mg/kg)
	Mercury (0.417 mg/kg)
	Nickel (51 mg/kg)
	Selenium (1.1 mg/kg)
	Thallium (0.54 mg/kg)
	Uranium (11.6 mg/kg)
	Zinc (143 mg/kg)
	Plutonium-239/240 (0.166 pCi/g)
	Uranium-234 (1.7 pCi/g)
	Uranium-235/236 (0.132 pCi/g)
	Uranium-238 (2.48 pCi/g)

Station	Results Exceeding Background
SOU195-193A	Chromium (33.69 mg/kg)

Station	Results Exceeding Background
SOU195-194	Chromium (34.44 mg/kg)
	Copper (25.48 mg/kg)
	Nickel (56.64 mg/kg)

Station	Results Exceeding Background
SOU195-195	Chromium (100.65 mg/kg)
	Silver (10.14 mg/kg)
	Uranium (8.76 mg/kg)

Station	Results Exceeding Background
SOU195-195A	Uranium (6.93 mg/kg)

Station	Results Exceeding Background
SOU195-197	Chromium (120.84 mg/kg)

Station	Results Exceeding Background
SOU195-198	Copper (23.36 mg/kg)

Station	Results Exceeding Background
SOU195-199	Zinc (120.99 mg/kg)

Station	Results Exceeding Background
SOU195-203	Chromium (42.12 mg/kg)
	Copper (22.24 mg/kg)

Station	Results Exceeding Background
SOU195-204	Chromium (44.62 mg/kg)
	Copper (19.33 mg/kg)

Station	Results Exceeding Background
SOU195-205	Nickel (59.34 mg/kg)

Station	Results Exceeding Background
SOU195-206	Chromium (39.91 mg/kg)

Station	Results Exceeding Background
SOU195-207	Chromium (60.62 mg/kg)
	Uranium (8.56 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.5.3. SWMU 195 Background Exceedances – Surface (Continued)

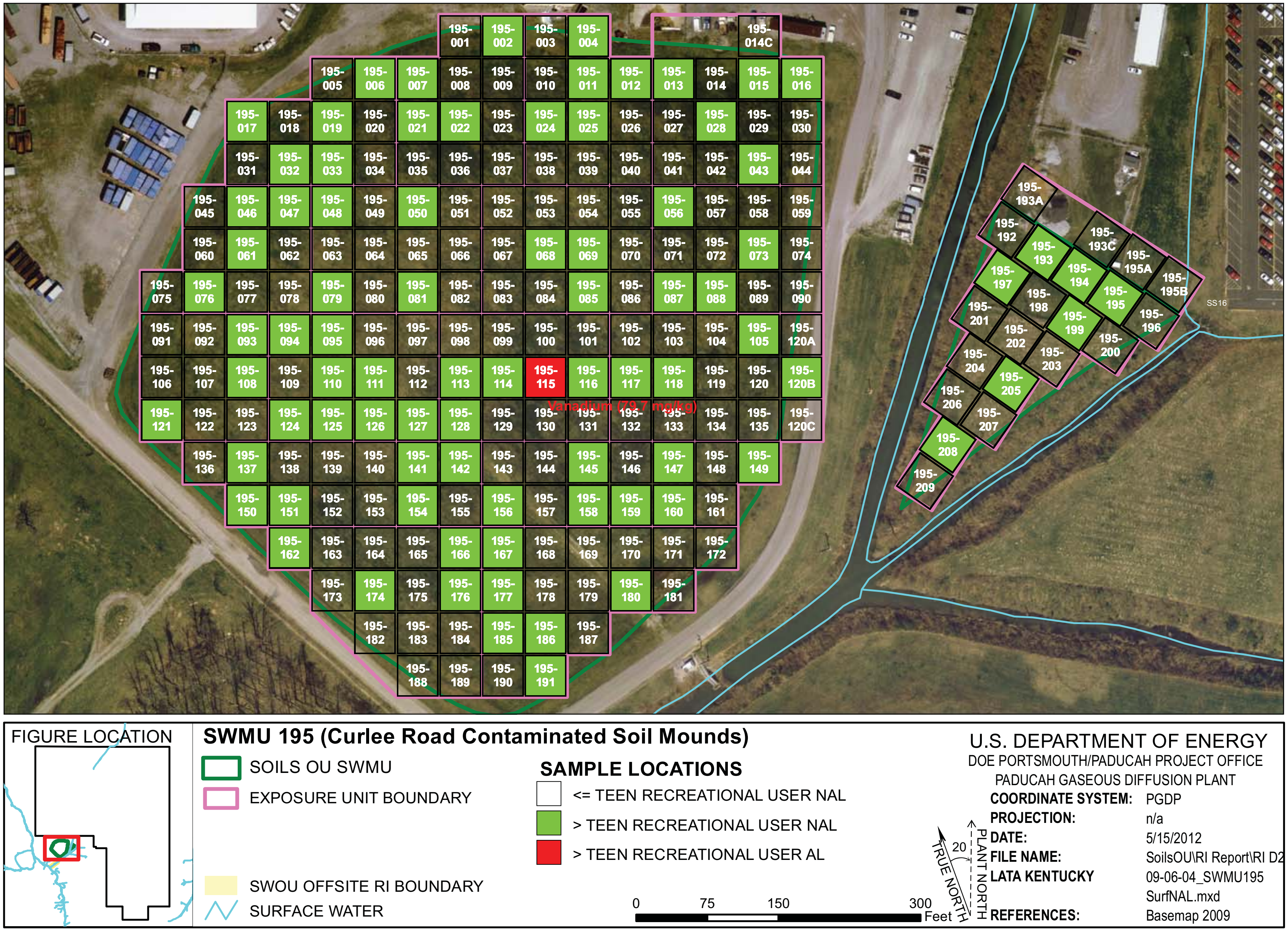


Figure 9.5.4. SWMU 195 NAL Exceedances - Surface Soil

SOU195-002	Arsenic (7.6 mg/kg)
SOU195-004	Arsenic (11.08 mg/kg)
SOU195-006	Nickel (70.2 mg/kg)
SOU195-007	Arsenic (7.24 mg/kg) Beryllium (0.22 mg/kg) Vanadium (19.3 mg/kg) Cesium-137 (0.26 pCi/g)
SOU195-011	Arsenic (6.95 mg/kg)
SOU195-012	Arsenic (8.2 mg/kg) Beryllium (0.33 mg/kg) Vanadium (35.1 mg/kg) Cesium-137 (0.27 pCi/g)
SOU195-013	Arsenic (6.79 mg/kg)
SOU195-015	Arsenic (5.6 mg/kg)
SOU195-016	Arsenic (10.05 mg/kg) Nickel (62.28 mg/kg)
SOU195-017	Arsenic (5.93 mg/kg)
SOU195-019	Nickel (52.64 mg/kg)
SOU195-021	Silver (9.48 mg/kg)
SOU195-022	Arsenic (6.97 mg/kg)
SOU195-024	Nickel (52.15 mg/kg)
SOU195-025	Arsenic (9.99 mg/kg)
SOU195-028	Arsenic (7.47 mg/kg)
SOU195-032	Arsenic (6.1 mg/kg) Beryllium (0.49 mg/kg) Vanadium (26 mg/kg) Cesium-137 (0.44 pCi/g)
SOU195-033	Iron (21482.34 mg/kg) Silver (9.37 mg/kg)
SOU195-043	Arsenic (5 mg/kg) Beryllium (0.46 mg/kg) Vanadium (22.8 mg/kg) Cesium-137 (0.263 pCi/g)
SOU195-046	Arsenic (8.8 mg/kg)
SOU195-047	Nickel (81.1 mg/kg)
SOU195-048	Nickel (98.09 mg/kg)
SOU195-050	Arsenic (8.94 mg/kg)
SOU195-056	Arsenic (10.06 mg/kg)
SOU195-061	Arsenic (6.3 mg/kg) Beryllium (0.51 mg/kg) Vanadium (26.9 mg/kg) Cesium-137 (0.341 pCi/g)
SOU195-068	Arsenic (6.6 mg/kg) Beryllium (0.52 mg/kg) Vanadium (26.4 mg/kg) Cesium-137 (0.222 pCi/g)
SOU195-069	Silver (8.06 mg/kg)
SOU195-073	Arsenic (13.8 mg/kg) Beryllium (0.74 mg/kg) Cobalt (18.2 mg/kg) Iron (24100 mg/kg) Vanadium (40.4 mg/kg) Cesium-137 (0.37 pCi/g) Total PAH (0.21558 mg/kg)
SOU195-076	Arsenic (7 mg/kg)
SOU195-079	Arsenic (5.7 mg/kg) Beryllium (0.48 mg/kg) Vanadium (24 mg/kg) Cesium-137 (0.298 pCi/g) Total PAH (0.2477 mg/kg)
SOU195-081	Arsenic (8.78 mg/kg)
SOU195-085	Arsenic (8.09 mg/kg)
SOU195-087	Arsenic (8.01 mg/kg)
SOU195-088	Nickel (81.74 mg/kg)
SOU195-093	Arsenic (10.13 mg/kg)
SOU195-094	Arsenic (7.91 mg/kg)
SOU195-095	Arsenic (9.62 mg/kg)
SOU195-105	Arsenic (11.5 mg/kg) Beryllium (0.75 mg/kg) Cobalt (9.3 mg/kg) Iron (20800 mg/kg) Vanadium (37.9 mg/kg) Cesium-137 (0.216 pCi/g)
SOU195-108	Nickel (79.17 mg/kg)
SOU195-110	Silver (13.11 mg/kg)
SOU195-111	Nickel (74.02 mg/kg)
SOU195-113	Arsenic (8.62 mg/kg)
SOU195-114	Arsenic (8.02 mg/kg) Nickel (73.09 mg/kg)
SOU195-115	Aluminum (28100 mg/kg) Arsenic (24.6 mg/kg) Barium (453 mg/kg) Beryllium (0.11 mg/kg) Cobalt (27.7 mg/kg) Iron (46000 mg/kg) Nickel (38.9 mg/kg) Vanadium (79.7 mg/kg) Cesium-137 (0.325 pCi/g)
SOU195-116	Arsenic (7.77 mg/kg)
SOU195-117	Nickel (68.97 mg/kg)
SOU195-118	Chromium (74.38 mg/kg)
SOU195-120B	Nickel (60.76 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.5.4. SWMU 195 NAL Exceedances – Surface (Continued)

SOU195-121	Arsenic (5.6 mg/kg) Beryllium (0.18 mg/kg) Nickel (79.27 mg/kg) Vanadium (18.5 mg/kg)
SOU195-124	Arsenic (9.83 mg/kg)
SOU195-125	Arsenic (2.8 mg/kg) Beryllium (0.49 mg/kg) Vanadium (15 mg/kg) Cesium-137 (0.275 pCi/g)
SOU195-126	Arsenic (9.48 mg/kg)
SOU195-127	Arsenic (8.01 mg/kg)
SOU195-128	Arsenic (7.54 mg/kg)
SOU195-137	Arsenic (7.15 mg/kg)
SOU195-141	Arsenic (8.73 mg/kg)
SOU195-142	Arsenic (7.94 mg/kg)
SOU195-145	Nickel (82.18 mg/kg)
SOU195-147	Nickel (70.05 mg/kg)
SOU195-149	Arsenic (9.22 mg/kg) Nickel (57.88 mg/kg)
SOU195-150	Nickel (73.51 mg/kg)
SOU195-151	Arsenic (8.47 mg/kg)
SOU195-154	Arsenic (5.5 mg/kg) Beryllium (0.2 mg/kg) Vanadium (30.4 mg/kg)
SOU195-156	Arsenic (7.9 mg/kg)
SOU195-158	Arsenic (7.9 mg/kg) Beryllium (0.31 mg/kg) Nickel (78.46 mg/kg) Vanadium (35.5 mg/kg) Cesium-137 (0.249 pCi/g)
SOU195-159	Arsenic (8.12 mg/kg)
SOU195-160	Arsenic (7.49 mg/kg)

NOTE: maximum detections only shown for location.

SOU195-162	Arsenic (4.4 mg/kg) Beryllium (0.18 mg/kg) Vanadium (15.7 mg/kg) Cesium-137 (0.358 pCi/g)
SOU195-166	Arsenic (9.15 mg/kg)
SOU195-167	Nickel (77.24 mg/kg)
SOU195-174	Arsenic (7.68 mg/kg)
SOU195-176	Arsenic (7.53 mg/kg)
SOU195-177	Arsenic (5.5 mg/kg) Beryllium (0.13 mg/kg) Vanadium (16.3 mg/kg)
SOU195-180	Nickel (72.82 mg/kg)
SOU195-185	Arsenic (7.22 mg/kg)
SOU195-186	Nickel (85.7 mg/kg)
SOU195-191	Cesium-137 (0.44 pCi/g)
SOU195-193	Arsenic (5.1 mg/kg) Beryllium (0.42 mg/kg) Nickel (51 mg/kg) Vanadium (20.8 mg/kg) PCB, Total (0.74 mg/kg) Total PAH (0.3159 mg/kg)
SOU195-194	Arsenic (5.42 mg/kg) Nickel (56.64 mg/kg)
SOU195-195	Chromium (100.65 mg/kg) Silver (10.14 mg/kg)
SOU195-197	Chromium (120.84 mg/kg)
SOU195-199	Arsenic (7.24 mg/kg)
SOU195-205	Nickel (59.34 mg/kg)
SOU195-208	Arsenic (9.36 mg/kg)

Figure 9.5.4. SWMU 195 NAL Exceedances – Surface (Continued)

Vanadium was detected above both the background screening level and the teen recreator ALs in the SWMU 195 surface soil.

The following are the metals detected in the SWMU 195 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Aluminum	115	11
Antimony	7, 43, 61, 105, 193	2, 4, 5, 11, 12, 17
Arsenic	73, 115	8, 11
Barium	115	11
Cobalt	73, 115	8, 11
Iron	115	11
Lead	120	12
Mercury	193	17
Molybdenum[1]	2, 7, 12, 32, 43, 61, 68, 73, 79, 105, 115, 121, 125, 154, 158, 162, 177, 193	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17
Nickel	6, 16, 19, 24, 47, 48, 88, 108, 111, 114, 115, 117, 121, 120B, 145, 147, 149, 150, 158, 167, 180, 186, 193, 194, 205	1, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 16, 17
Selenium	32, 43, 61, 68, 73, 79, 105, 115, 193	1, 4, 5, 6, 7, 8, 11, 12, 17
Silver	21, 33, 69, 110, 195	1,2, 7, 10, 17
Thallium	61, 115, 158, 193	5, 17, 11, 14
Vanadium	73, 115	8, 11
Zinc	14C, 193, 199	4, 17

[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	115	11
Cobalt	73, 115	8, 11
Iron	115	11
Nickel	47, 48, 88, 108, 121, 145, 186	5, 6, 8, 9, 14, 16
Silver	21, 33, 69, 110, 195	1, 2, 7, 10, 17
Vanadium	73, 115	8, 11

PCBs

Total PCBs were detected above the teen recreator NALs in the surface soil of grid 193 (EU 17).

No PCBs were detected in the SWMU 195 surface soils above the teen recreator ALs or the SSLs for the protection of RGA groundwater. Total PCBs were detected in grid 193 (EU 17) above the SSLs for the protection of UCRS groundwater.

SVOCs

Total PAHs were detected above the teen recreator NALs in the surface soil of grids 73 (EU 8), 79 (EU 6), and 193 (EU 17).

No SVOCs were detected above the teen recreator ALs in the SWMU 195 surface soil.

Total PAHs were detected in the SWMU 195 surface soil above the SSLs for the protection of UCRS groundwater in grids 7 (EU 2), 12 (EU 3), 32 (EU 1), 43 (EU 4), 61 (EU 5), 68 (EU 7), 73 (EU 8), 79 (EU 6), 105 (EU 12), 121 (EU 9), 125 (EU 10), and 193 (EU 17). Total PAHs were detected above the SSLs for the protection of RGA groundwater in grid 193 (EU 17).

VOCs

No surface soil samples from SWMU 195 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the teen recreator NALs or ALs in the SWMU 195 surface soil.

Plutonium-239/240 was detected above both the background screening level and the SSL for the protection of UCRS groundwater in grid 193 (EU 17). No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

9.5.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 195, the representative data set for subsurface soils is presented in Table 9.5.2 and provides the nature of the contamination in SWMU 195 subsurface soils. Figures 9.5.5–9.5.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 195 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 195 consists of 17 EUs.

Metals

Metals were detected above the teen recreator NALs in the SWMU 195 subsurface soil. The following are the metals detected at or above both the background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	6, 13, 16, 19, 46, 49, 50, 70. 71, 72, 74, 87, 92, 95, 107, 117, 124, 129, 131, 132, 138, 139, 141, 144, 151, 158, 176, 14B, 14C, 193B	1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17
Cobalt	85	7
Mercury	149, 178, 185, 193A	14, 16, 17
Nickel	5, 6, 10, 24, 25, 32, 33, 49, 58, 65, 72, 80, 93, 102, 114, 125, 132, 135, 146, 148, 155, 168, 171, 180, 181, 191, 203, 208, 14B, 14C, 120A, 120C, 193B, 193C.	1, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17
Silver	13, 56, 77, 80, 94, 100, 107, 139, 143, 155, 193A	
Vanadium	118	12

Table 9.5.2. Subsurface Soil RI Data Summary: SWMU 195, Curlee Road Contaminated Soil Mounds

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	3.52E+03	9.81E+03	7.85E+03	0/23	23/23	0/23	1.20E+04	0/23	2.77E+04	0/23	8.91E+06	0/23	23/23	5.6 - 30.8
METAL	Antimony	mg/kg	1.00E-01	4.90E-01	2.79E-01	1/23	20/23	14/23	2.10E-01	0/23	1.78E+00	0/23	1.90E+03	0/23	10/23	0.56 - 0.74
METAL	Arsenic	mg/kg	2.00E+00	1.69E+01	6.92E+00	0/261	77/261	34/261	7.90E+00	77/261	1.02E+00	0/261	1.02E+02	0/261	77/261	1.1 - 11
METAL	Barium	mg/kg	3.59E+01	1.40E+02	9.71E+01	0/23	23/23	0/23	1.70E+02	0/23	4.15E+02	0/23	4.58E+05	0/23	21/23	2.2 - 2.9
METAL	Beryllium	mg/kg	1.20E-01	6.20E-01	3.90E-01	0/23	23/23	0/23	6.90E-01	23/23	1.29E-02	0/23	8.65E+00	0/23	0/23	0.11 - 3.1
METAL	Cadmium	mg/kg	1.40E-02	1.00E-01	4.56E-02	0/23	18/23	0/23	2.10E-01	0/23	3.14E+00	0/23	3.14E+02	0/23	0/23	0.056 - 0.074
METAL	Calcium	mg/kg	3.77E+02	8.00E+04	7.78E+03	0/23	23/23	4/23	6.10E+03	0/23	n/a	0/23	n/a	n/a	n/a	55.7 - 1560
METAL	Chromium	mg/kg	8.60E+00	6.54E+01	4.00E+01	0/261	169/261	70/261	4.30E+01	0/261	7.15E+01	0/261	7.15E+03	0/261	0/261	1.1 - 85
METAL	Cobalt	mg/kg	2.90E+00	1.39E+01	5.90E+00	0/23	23/23	1/23	1.30E+01	1/23	8.45E+00	0/23	3.29E+03	23/23	23/23	0.22 - 1.2
METAL	Copper	mg/kg	4.10E+00	3.12E+01	1.20E+01	0/261	33/261	6/261	2.50E+01	0/261	1.13E+03	0/261	4.75E+05	0/261	0/261	1.1 - 35
METAL	Iron	mg/kg	3.96E+03	2.21E+04	1.11E+04	0/261	261/261	0/261	2.80E+04	4/261	1.98E+04	0/261	8.31E+06	261/261	261/261	5.6 - 100
METAL	Lead	mg/kg	5.60E+00	6.61E+01	1.18E+01	0/261	202/261	3/261	2.30E+01	0/261	4.00E+02	0/261	4.00E+02	0/261	41/261	0.33 - 13
METAL	Magnesium	mg/kg	6.78E+02	3.76E+03	1.43E+03	0/23	23/23	2/23	2.10E+03	0/23	n/a	0/23	n/a	n/a	n/a	55.7 - 308
METAL	Manganese	mg/kg	6.29E+01	1.14E+03	2.41E+02	0/261	252/261	2/261	8.20E+02	0/261	3.47E+03	0/261	2.94E+05	241/261	252/261	0.22 - 85
METAL	Mercury	mg/kg	1.27E-02	8.43E+00	7.57E-01	0/261	26/261	4/261	1.30E-01	4/261	6.25E-01	0/261	7.88E+02	4/261	4/261	0.0371 - 10
METAL	Molybdenum	mg/kg	2.20E-01	8.30E-01	4.54E-01	0/261	23/261	0/261	n/a	0/261	1.42E+02	0/261	5.94E+04	0/261	23/261	0.56 - 15
METAL	Nickel	mg/kg	4.20E+00	1.02E+02	4.40E+01	0/261	57/261	37/261	2.20E+01	37/261	2.98E+01	0/261	3.07E+04	17/261	57/261	0.56 - 65
METAL	Selenium	mg/kg	6.00E-02	3.06E+00	9.49E-01	0/261	21/261	14/261	7.00E-01	0/261	1.42E+02	0/261	5.93E+04	0/261	15/261	0.56 - 20
METAL	Silver	mg/kg	2.50E-02	1.29E+01	2.46E+00	0/261	31/261	11/261	2.70E+00	11/261	7.45E+00	0/261	8.07E+03	11/261	20/261	0.22 - 10
METAL	Sodium	mg/kg	2.17E+01	3.62E+02	6.77E+01	0/23	23/23	1/23	3.40E+02	0/23	n/a	0/23	n/a	n/a	n/a	22.3 - 123
METAL	Thallium	mg/kg	7.50E-02	6.90E-01	2.45E-01	0/23	18/23	4/23	3.40E-01	0/23	2.27E+00	0/23	9.50E+02	0/23	11/23	0.22 - 0.29
METAL	Uranium	mg/kg	6.50E-01	1.20E+01	2.31E+00	0/261	27/261	3/261	4.60E+00	0/261	8.49E+01	0/261	3.50E+04	0/261	0/261	0.02 - 20
METAL	Vanadium	mg/kg	1.20E+01	4.24E+01	2.49E+01	0/23	23/23	1/23	3.70E+01	23/23	1.04E-01	0/23	7.61E+01	23/23	23/23	1.1 - 6.2
METAL	Zinc	mg/kg	1.13E+01	1.88E+02	3.17E+01	0/261	259/261	2/261	6.00E+01	0/261	8.50E+03	0/261	3.56E+06	0/261	233/261	2.2 - 62.2
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/252	0/252	0/252	n/a	0/252	1.83E-01	0/252	1.83E+01	0/252	0/252	0.33 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	0/19	0/19	0.37 - 0.49
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	0/19	0/19	0.37 - 0.49
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	0/19	0/19	0.37 - 0.49
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	1.8 - 2.4
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	1.8 - 2.4
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	3.35E+00	0/19	1.00E+02	0/19	0/19	1.8 - 2.4
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	1.8 - 2.4
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	1.8 - 2.4
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	1.8 - 2.4
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	5.87E+02	0/19	1.76E+04	0/19	0/19	0.37 - 0.49
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	3.25E+03	0/19	9.74E+04	0/19	0/19	0.37 - 0.49
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported

Table 9.5.2. Subsurface Soil RI Data Summary: SWMU 195, Curlee Road Contaminated Soil Mounds (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	1.8 - 2.4
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.0073 - 0.0097
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	1.10E-01	3.10E-01	2.10E-01	2/19	2/19	0/19	n/a	0/19	n/a	0/19	n/a	0/19	0/19	0.37 - 0.49
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Fluoranthene	mg/kg	5.00E-02	9.10E-02	6.77E-02	3/19	3/19	0/19	n/a	0/19	4.47E+02	0/19	1.34E+04	0/19	0/19	0.37 - 0.49
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	4.19E+02	0/19	1.26E+04	0/19	0/19	0.37 - 0.49
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	1.78E-01	0/19	1.78E+01	0/19	0/19	0.37 - 0.49
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	1.8 - 2.4
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.73 - 0.97
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	5.27E+00	0/19	5.27E+02	0/19	0/19	0.37 - 0.49
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	1.8 - 2.4
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	6.10E-02	0/19	6.10E+00	0/19	0/19	0.0073 - 0.0097
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	0/19	0/19	1.8 - 2.4
SVOA	Phenanthrene	mg/kg	4.70E-02	4.70E-02	4.70E-02	1/19	1/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.37 - 0.49
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	1.8 - 2.4
SVOA	Pyrene	mg/kg	4.10E-02	7.30E-02	5.40E-02	3/19	3/19	0/19	n/a	0/19	3.35E+02	0/19	1.00E+04	0/19	0/19	0.37 - 0.49
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/19	0/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	0.73 - 0.97
SVOA	Total PAH	mg/kg	4.20E-03	4.09E-02	1.30E-02	0/19	12/19	0/19	n/a	0/19	5.57E-02	0/19	5.57E+00	0/19	11/19	-
RADS	Alpha activity	pCi/g	1.73E+01	3.20E+01	2.40E+01	0/19	19/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	3.9 - 5.6
RADS	Americium-241	pCi/g	-2.40E-03	1.20E-02	6.04E-03	1/19	19/19	0/19	n/a	0/19	1.28E+01	0/19	1.28E+03	0/19	0/19	0.0042 - 0.035
RADS	Beta activity	pCi/g	1.76E+01	3.59E+01	2.66E+01	0/19	19/19	0/19	n/a	0/19	n/a	0/19	n/a	n/a	n/a	3.1 - 6.4
RADS	Cesium-137	pCi/g	-2.60E-02	4.60E-02	1.29E-02	0/19	19/19	0/19	2.80E-01	0/19	1.98E-01	0/19	1.98E+01	0/19	0/19	0.051 - 0.15
RADS	Neptunium-237	pCi/g	-6.80E-03	9.00E-03	1.16E-03	0/19	19/19	0/19	n/a	0/19	6.26E-01	0/19	6.26E+01	0/19	4/19	0.021 - 0.046
RADS	Plutonium-238	pCi/g	1.30E-03	2.10E-02	1.18E-02	1/19	19/19	0/19	n/a	0/19	3.64E+01	0/19	3.64E+03	0/19	0/19	0.012 - 0.028
RADS	Plutonium-239/240	pCi/g	1.60E-03	1.80E-02	6.09E-03	4/19	19/19	0/19	n/a	0/19	3.56E+01	0/19	3.56E+03	0/19	0/19	0.0033 - 0.02
RADS	Technetium-99	pCi/g	-3.80E-01	2.90E-01	-3.05E-02	0/19	19/19	0/19	2.80E+00	0/19	1.11E+03	0/19	1.11E+05	0/19	0/19	0.38 - 0.54
RADS	Thorium-228	pCi/g	6.99E-01	1.05E+00	8.85E-01	0/19	19/19	0/19	1.60E+00	0/19	n/a	0/19	n/a	n/a	n/a	0.02 - 0.033
RADS	Thorium-230	pCi/g	7.68E-01	1.16E+00	9.39E-01	0/19	19/19	0/19	1.40E+00	0/19	4.49E+01	0/19	4.49E+03	0/19	19/19	0.01 - 0.02
RADS	Thorium-232	pCi/g	7.24E-01	1.06E+00	8.69E-01	0/19	19/19	0/19	1.50E+00	0/19	n/a	0/19	n/a	n/a	n/a	0.005 - 0.02
RADS	Uranium-234	pCi/g	5.22E-01	8.20E-01	6.57E-01	0/19	19/19	0/19	1.20E+00	0/19	6.25E+01	0/19	6.25E+03	0/19	0/19	0.009 - 0.024
RADS	Uranium-235/236	pCi/g	2.00E-02	5.40E-02	3.62E-02	18/19	19/19	0/19	6.00E-02	0/19	9.12E-01	0/19	9.12E+01	0/19	0/19	0.005 - 0.02
RADS	Uranium-238	pCi/g	5.60E-01	8.50E-01	7.01E-01	0/19	19/19	0/19	1.20E+00	0/19	4.02E+00	0/19	4.02E+02	0/19	0/19	0.005 - 0.02

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.5.2. Subsurface Soil RI Data Summary: SWMU 195, Curlee Road Contaminated Soil Mounds (Continued)

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

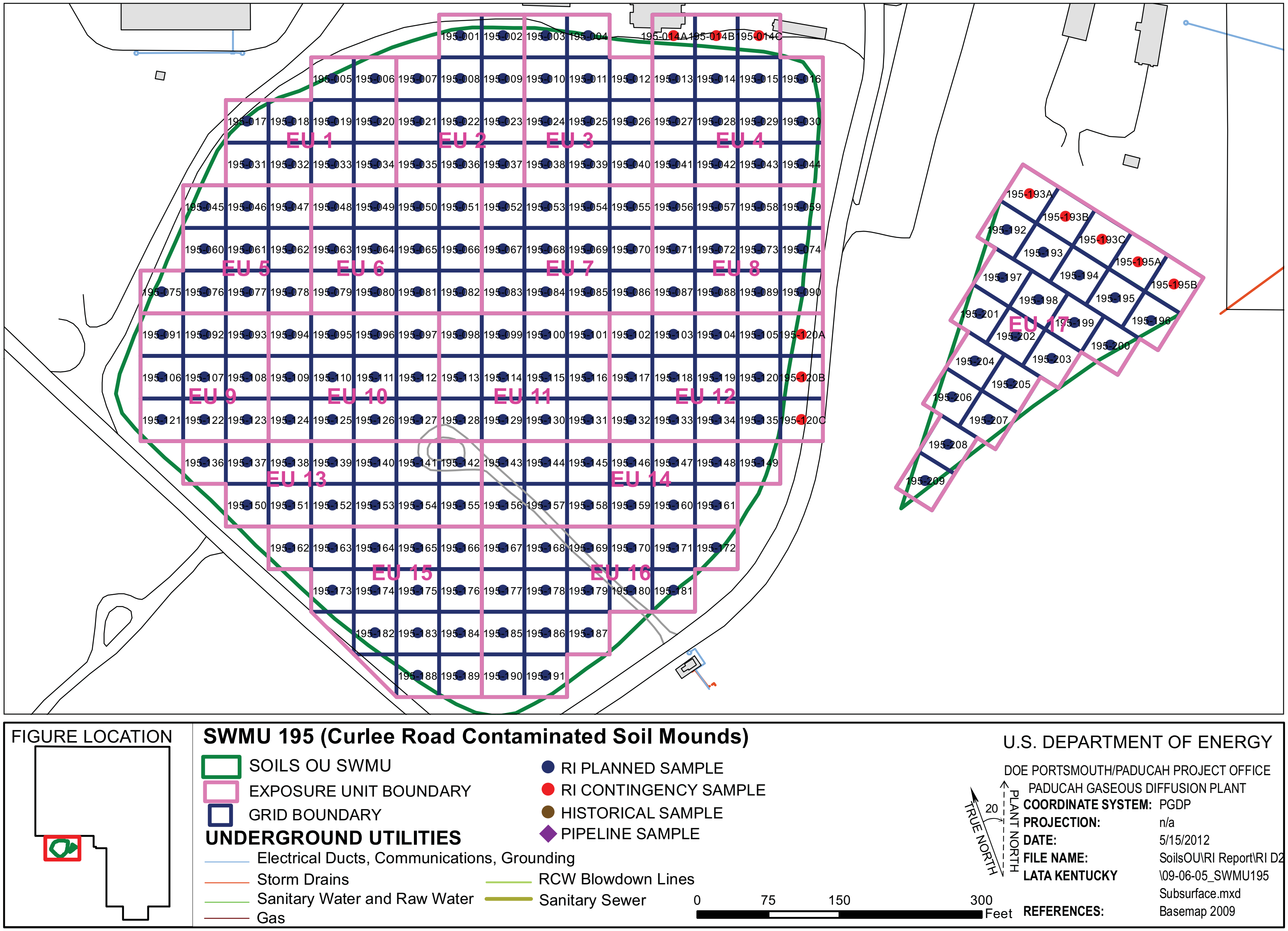


Figure 9.5.5. SWMU 195 Sample Locations - Subsurface Soil

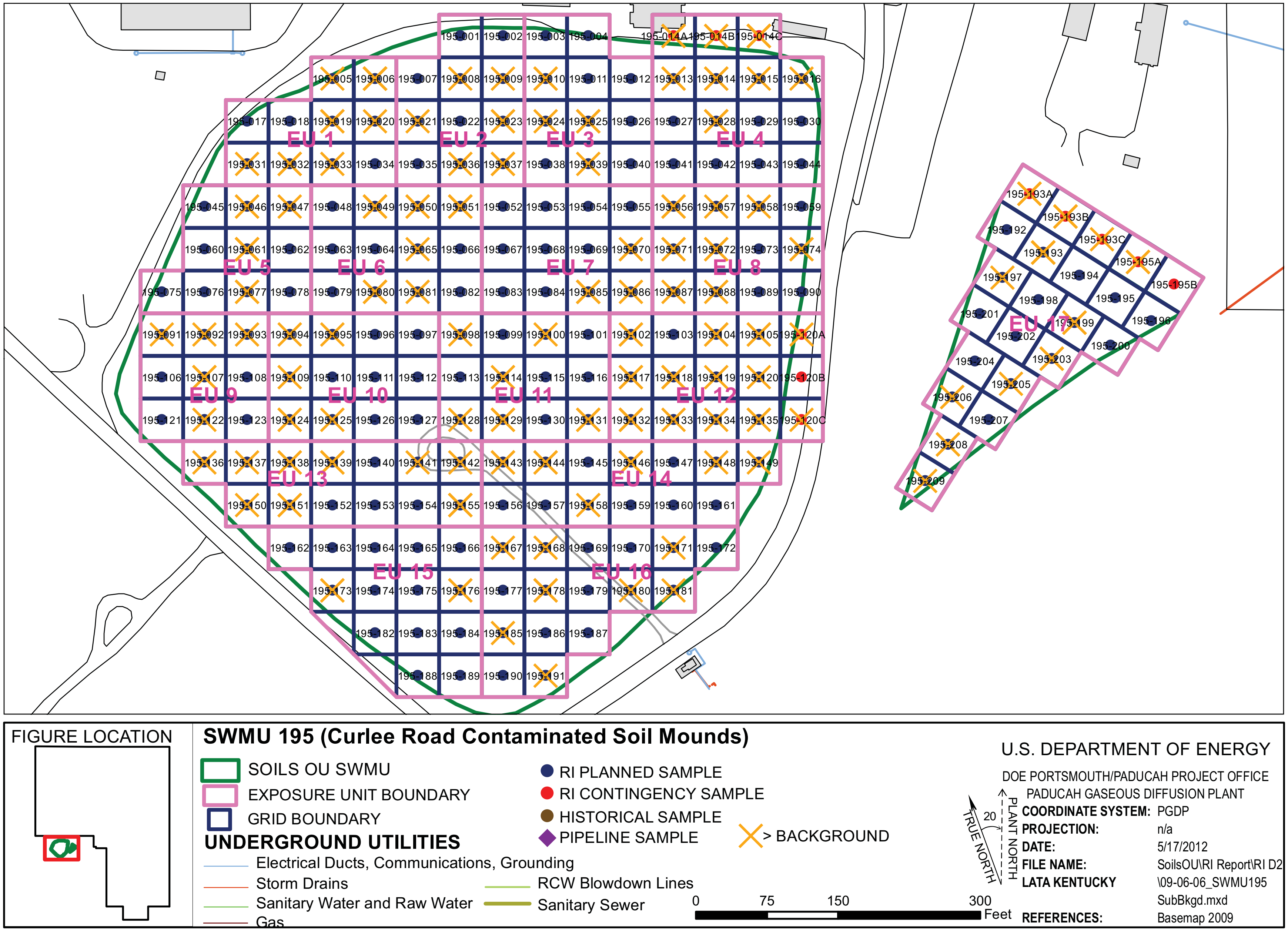


Figure 9.5.6. SWMU 195 Background Exceedances - Subsurface Soil

Station	Results Exceeding Background
SOU195-005	Nickel (82.89 mg/kg)

Station	Results Exceeding Background
SOU195-006	Antimony (0.27 mg/kg)
	Arsenic (16.88 mg/kg)
	Chromium (46.28 mg/kg)
	Nickel (67.91 mg/kg)
	Selenium (1.2 mg/kg)
	Thallium (0.42 mg/kg)

Station	Results Exceeding Background
SOU195-008	Chromium (44.74 mg/kg)

Station	Results Exceeding Background
SOU195-009	Copper (26.87 mg/kg)

Station	Results Exceeding Background
SOU195-010	Antimony (0.3 mg/kg)
	Nickel (97.83 mg/kg)

Station	Results Exceeding Background
SOU195-013	Arsenic (8.53 mg/kg)
	Silver (8.8 mg/kg)

Station	Results Exceeding Background
SOU195-014	Chromium (48.51 mg/kg)
	Zinc (187.73 mg/kg)

Station	Results Exceeding Background
SOU195-014A	Antimony (0.29 mg/kg)
	Chromium (43.09 mg/kg)
	Selenium (1 mg/kg)

Station	Results Exceeding Background
SOU195-014B	Arsenic (10.61 mg/kg)
	Nickel (86.9 mg/kg)

Station	Results Exceeding Background
SOU195-014C	Arsenic (8.53 mg/kg)
	Chromium (57.79 mg/kg)
	Nickel (77.74 mg/kg)
	Selenium (0.95 mg/kg)
	Sodium (362 mg/kg)
	Thallium (0.42 mg/kg)

Station	Results Exceeding Background
SOU195-015	Chromium (44.99 mg/kg)

Station	Results Exceeding Background
SOU195-016	Arsenic (10.93 mg/kg)

Station	Results Exceeding Background
SOU195-019	Arsenic (8.02 mg/kg)
	Chromium (48.05 mg/kg)

Station	Results Exceeding Background
SOU195-020	Chromium (55.27 mg/kg)

Station	Results Exceeding Background
SOU195-021	Chromium (57.83 mg/kg)

Station	Results Exceeding Background
SOU195-023	Chromium (50.84 mg/kg)
	Uranium (9.09 mg/kg)

Station	Results Exceeding Background
SOU195-024	Nickel (62.62 mg/kg)

Station	Results Exceeding Background
SOU195-025	Chromium (44.85 mg/kg)
	Manganese (1136.85 mg/kg)
	Nickel (102.36 mg/kg)

Station	Results Exceeding Background
SOU195-028	Calcium (12200 mg/kg)
	Magnesium (3760 mg/kg)
	Selenium (1.4 mg/kg)

Station	Results Exceeding Background
SOU195-031	Selenium (1.2 mg/kg)

Station	Results Exceeding Background
SOU195-032	Chromium (48.37 mg/kg)
	Nickel (99.99 mg/kg)

Station	Results Exceeding Background
SOU195-033	Nickel (84.77 mg/kg)

Station	Results Exceeding Background
SOU195-036	Selenium (1.2 mg/kg)

Station	Results Exceeding Background
SOU195-037	Chromium (52.64 mg/kg)
	Copper (31.18 mg/kg)

Station	Results Exceeding Background
SOU195-039	Chromium (55.47 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.5.6. SWMU 195 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU195-046	Arsenic (8.08 mg/kg)
	Chromium (48.96 mg/kg)
SOU195-047	Chromium (53.67 mg/kg)
SOU195-049	Arsenic (10.49 mg/kg)
	Lead (66.05 mg/kg)
	Nickel (75.44 mg/kg)
SOU195-050	Arsenic (10.12 mg/kg)
	Chromium (43.65 mg/kg)
SOU195-051	Antimony (0.26 mg/kg)
	Calcium (9840 mg/kg)
	Chromium (50.98 mg/kg)
	Selenium (1.1 mg/kg)
SOU195-056	Antimony (0.27 mg/kg)
	Selenium (1.5 mg/kg)
	Silver (8.51 mg/kg)
SOU195-057	Copper (26.94 mg/kg)
SOU195-058	Nickel (69.68 mg/kg)
SOU195-061	Antimony (0.49 mg/kg)
	Chromium (55.51 mg/kg)
	Selenium (1.2 mg/kg)
	Thallium (0.55 mg/kg)
SOU195-065	Nickel (81.33 mg/kg)
SOU195-070	Arsenic (8.49 mg/kg)
	Chromium (57.3 mg/kg)
SOU195-071	Arsenic (8 mg/kg)
	Chromium (44.92 mg/kg)
SOU195-072	Arsenic (8.4 mg/kg)
	Nickel (91.1 mg/kg)
SOU195-074	Arsenic (9.13 mg/kg)
	Chromium (58.81 mg/kg)
SOU195-077	Chromium (52.01 mg/kg)
	Silver (8.41 mg/kg)
SOU195-080	Chromium (55.11 mg/kg)
	Nickel (96.82 mg/kg)
	Silver (10.01 mg/kg)
SOU195-081	Chromium (59.56 mg/kg)
SOU195-085	Antimony (0.49 mg/kg)
	Chromium (48.22 mg/kg)
	Cobalt (13.9 mg/kg)
	Selenium (1.4 mg/kg)
SOU195-086	Chromium (61.47 mg/kg)
SOU195-087	Arsenic (8.19 mg/kg)
SOU195-088	Chromium (44.11 mg/kg)
SOU195-091	Chromium (45.78 mg/kg)
SOU195-092	Arsenic (8.73 mg/kg)
SOU195-093	Nickel (91.18 mg/kg)
SOU195-094	Silver (12.92 mg/kg)
SOU195-095	Arsenic (9.02 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.5.6. SWMU 195 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU195-098	Chromium (65.4 mg/kg)

Station	Results Exceeding Background
SOU195-100	Silver (8.26 mg/kg)

Station	Results Exceeding Background
SOU195-102	Manganese (978.58 mg/kg)
	Nickel (83.15 mg/kg)

Station	Results Exceeding Background
SOU195-104	Antimony (0.32 mg/kg)
	Selenium (1.3 mg/kg)

Station	Results Exceeding Background
SOU195-105	Chromium (56.93 mg/kg)
	Copper (25.76 mg/kg)

Station	Results Exceeding Background
SOU195-107	Arsenic (10.33 mg/kg)
	Silver (9.33 mg/kg)

Station	Results Exceeding Background
SOU195-109	Chromium (54.96 mg/kg)

Station	Results Exceeding Background
SOU195-114	Nickel (83.79 mg/kg)

Station	Results Exceeding Background
SOU195-117	Arsenic (9.02 mg/kg)
	Chromium (49.29 mg/kg)

Station	Results Exceeding Background
SOU195-118	Antimony (0.27 mg/kg)
	Chromium (45.05 mg/kg)
	Vanadium (42.4 mg/kg)

Station	Results Exceeding Background
SOU195-119	Chromium (48.6 mg/kg)

Station	Results Exceeding Background
SOU195-120	Chromium (46.67 mg/kg)

Station	Results Exceeding Background
SOU195-120A	Nickel (75.95 mg/kg)

Station	Results Exceeding Background
SOU195-120C	Nickel (88.89 mg/kg)

Station	Results Exceeding Background
SOU195-122	Chromium (44.15 mg/kg)

Station	Results Exceeding Background
SOU195-124	Arsenic (8.16 mg/kg)
	Chromium (46.34 mg/kg)

Station	Results Exceeding Background
SOU195-125	Nickel (79.83 mg/kg)

Station	Results Exceeding Background
SOU195-128	Chromium (53.34 mg/kg)

Station	Results Exceeding Background
SOU195-129	Arsenic (10 mg/kg)
	Chromium (46.67 mg/kg)

Station	Results Exceeding Background
SOU195-131	Arsenic (8.17 mg/kg)
	Chromium (48.85 mg/kg)

Station	Results Exceeding Background
SOU195-132	Arsenic (8.64 mg/kg)
	Chromium (49.31 mg/kg)
	Nickel (72.63 mg/kg)

Station	Results Exceeding Background
SOU195-133	Chromium (59.51 mg/kg)

Station	Results Exceeding Background
SOU195-134	Chromium (46.06 mg/kg)

Station	Results Exceeding Background
SOU195-135	Copper (26.45 mg/kg)
	Nickel (99.76 mg/kg)

Station	Results Exceeding Background
SOU195-136	Chromium (45.29 mg/kg)

Station	Results Exceeding Background
SOU195-137	Chromium (44.68 mg/kg)

Station	Results Exceeding Background
SOU195-138	Arsenic (8.29 mg/kg)
	Chromium (56.42 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.5.6. SWMU 195 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU195-139	Arsenic (9.12 mg/kg) Chromium (52.85 mg/kg) Silver (8.71 mg/kg)
SOU195-141	Arsenic (8.3 mg/kg)
SOU195-142	Chromium (47.58 mg/kg)
SOU195-143	Chromium (44.51 mg/kg) Silver (8.87 mg/kg)
SOU195-144	Arsenic (10.39 mg/kg) Chromium (53.38 mg/kg)
SOU195-146	Chromium (52.74 mg/kg) Nickel (59.97 mg/kg)
SOU195-148	Nickel (67.02 mg/kg)
SOU195-149	Mercury (6.49 mg/kg)
SOU195-150	Chromium (51.2 mg/kg)
SOU195-151	Arsenic (8.84 mg/kg) Chromium (52.48 mg/kg)
SOU195-155	Antimony (0.33 mg/kg) Nickel (86.4 mg/kg) Silver (8.59 mg/kg)
SOU195-158	Arsenic (8.8 mg/kg)
SOU195-167	Chromium (52.22 mg/kg)
SOU195-168	Nickel (85.86 mg/kg)
SOU195-171	Nickel (77.26 mg/kg)
SOU195-173	Antimony (0.3 mg/kg) Chromium (44.19 mg/kg)
SOU195-176	Arsenic (8.41 mg/kg) Chromium (53.43 mg/kg)
SOU195-178	Antimony (0.47 mg/kg) Mercury (7 mg/kg) Selenium (3.06 mg/kg)
SOU195-180	Nickel (68.41 mg/kg)
SOU195-181	Nickel (57.52 mg/kg)
SOU195-185	Mercury (8.43 mg/kg)
SOU195-191	Nickel (58.48 mg/kg)
SOU195-193	Calcium (80000 mg/kg) Chromium (50.29 mg/kg) Lead (23.67 mg/kg) Magnesium (2970 mg/kg) Selenium (0.85 mg/kg) Uranium (7.39 mg/kg) Zinc (76.71 mg/kg)
SOU195-193A	Chromium (43.76 mg/kg) Mercury (7.24 mg/kg) Silver (12.38 mg/kg)
SOU195-193B	Arsenic (8.2 mg/kg) Chromium (45.64 mg/kg) Nickel (70.86 mg/kg) Uranium (12.02 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.5.6. SWMU 195 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU195-193C	Nickel (65.9 mg/kg)

Station	Results Exceeding Background
SOU195-195A	Antimony (0.31 mg/kg)
	Calcium (14100 mg/kg)
	Chromium (49.89 mg/kg)

Station	Results Exceeding Background
SOU195-197	Chromium (63.1 mg/kg)

Station	Results Exceeding Background
SOU195-199	Antimony (0.39 mg/kg)
	Selenium (1.4 mg/kg)
	Thallium (0.69 mg/kg)

Station	Results Exceeding Background
SOU195-203	Chromium (56.12 mg/kg)
	Lead (33.27 mg/kg)
	Nickel (64.72 mg/kg)

Station	Results Exceeding Background
SOU195-205	Chromium (49.79 mg/kg)

Station	Results Exceeding Background
SOU195-206	Chromium (47.86 mg/kg)
	Copper (28.08 mg/kg)

Station	Results Exceeding Background
SOU195-208	Chromium (51.93 mg/kg)
	Nickel (59.68 mg/kg)

Station	Results Exceeding Background
SOU195-209	Chromium (50.85 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.5.6. SWMU 195 Background Exceedances – Subsurface (Continued)

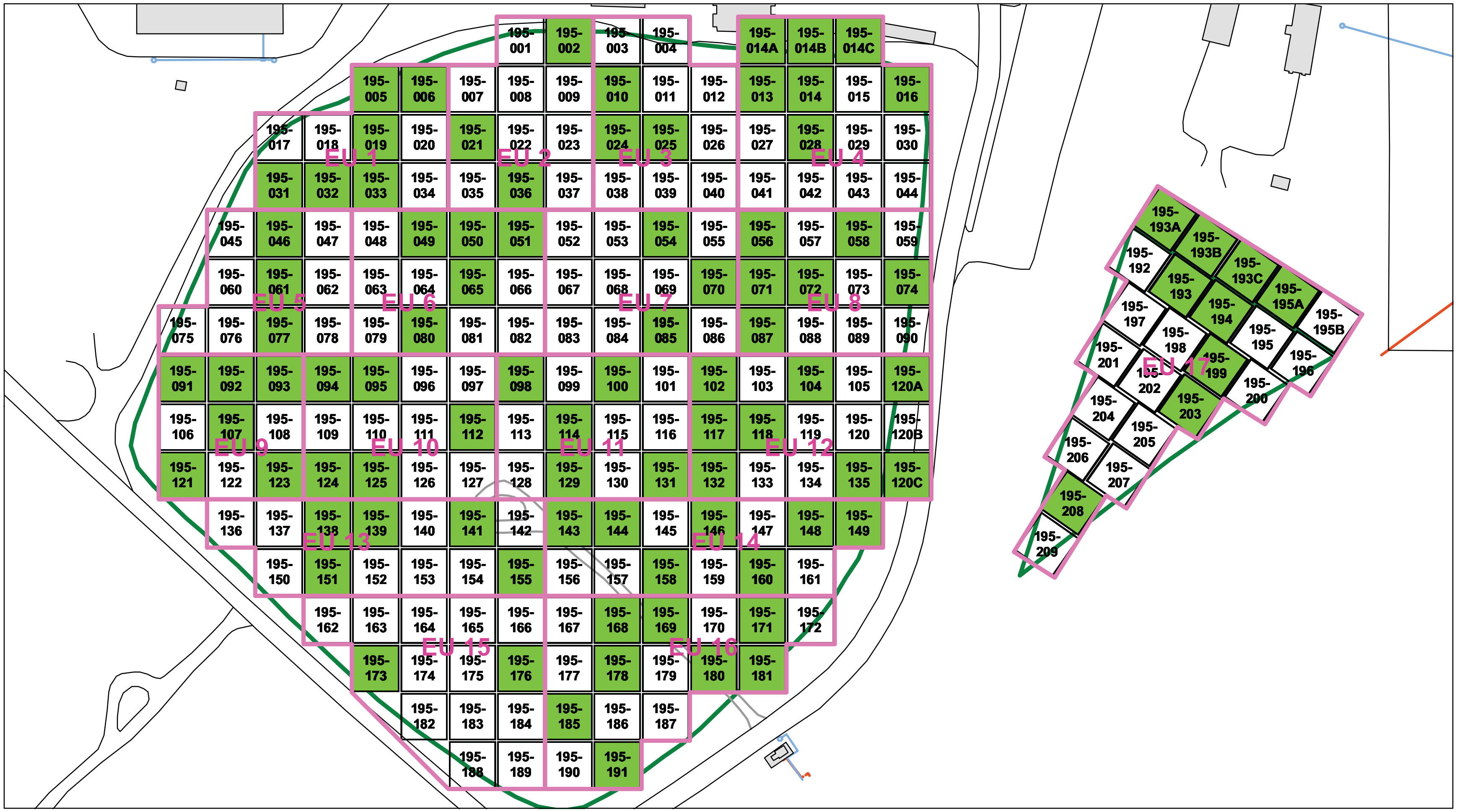


FIGURE LOCATION

SWMU 195 (Curlee Road Contaminated Soil Mounds)

SOILS OU SWMU

EXPOSURE UNIT BOUNDARY

GRIDS

<= TEEN RECREATOR NAL

> TEEN RECREATOR NAL

> TEEN RECREATOR AL

UNDERGROUND UTILITIES

Electrical Ducts, Communications, Grounding

Storm Drains

Sanitary Water and Raw Water

Gas

RCW Blowdown Lines

Sanitary Sewer

0 50 100 200 Feet

U.S. DEPARTMENT OF ENERGY

DOE PORTSMOUTH/PADUCAH PROJECT OFFICE

PADUCAH GASEOUS DIFFUSION PLANT

TRUE NORTH 20 PLANT NORTH

COORDINATE SYSTEM: PGDP

PROJECTION: n/a

DATE: 5/17/2012

FILE NAME: SoilsOU\RI Report\RI D2 \09-06-07_SWMU195 SubNAL.mxd

LATA KENTUCKY

REFERENCES: Basemap 2009

Figure 9.5.7. SWMU 195 NAL Exceedances - Subsurface Soil

SOU195-002	Arsenic (7.77 mg/kg)
SOU195-005	Nickel (82.89 mg/kg)
SOU195-006	Arsenic (16.88 mg/kg) Beryllium (0.43 mg/kg) Iron (22051.09 mg/kg) Nickel (67.91 mg/kg) Vanadium (20.1 mg/kg)
SOU195-010	Arsenic (7.14 mg/kg) Beryllium (0.26 mg/kg) Nickel (97.83 mg/kg) Vanadium (36.4 mg/kg)
SOU195-013	Arsenic (8.53 mg/kg) Iron (20570.19 mg/kg) Silver (8.8 mg/kg)
SOU195-014	Arsenic (6.51 mg/kg)
SOU195-014A	Arsenic (6.2 mg/kg) Beryllium (0.56 mg/kg) Vanadium (24.9 mg/kg)
SOU195-014B	Arsenic (10.61 mg/kg) Nickel (86.9 mg/kg)
SOU195-014C	Arsenic (8.53 mg/kg) Beryllium (0.54 mg/kg) Nickel (77.74 mg/kg) Vanadium (22.7 mg/kg)
SOU195-016	Arsenic (10.93 mg/kg)
SOU195-019	Arsenic (8.02 mg/kg)
SOU195-021	Arsenic (7.12 mg/kg)
SOU195-024	Nickel (62.62 mg/kg)
SOU195-025	Arsenic (5.69 mg/kg) Nickel (102.36 mg/kg)
SOU195-028	Arsenic (5.9 mg/kg) Beryllium (0.51 mg/kg) Vanadium (25.8 mg/kg)

SOU195-031	Arsenic (4.6 mg/kg) Beryllium (0.39 mg/kg) Vanadium (19.2 mg/kg)
SOU195-032	Nickel (99.99 mg/kg)
SOU195-033	Nickel (84.77 mg/kg)
SOU195-036	Arsenic (4.9 mg/kg) Beryllium (0.38 mg/kg) Vanadium (21.5 mg/kg)
SOU195-046	Arsenic (8.08 mg/kg)
SOU195-049	Arsenic (10.49 mg/kg) Nickel (75.44 mg/kg)
SOU195-050	Arsenic (10.12 mg/kg)
SOU195-051	Arsenic (4.4 mg/kg) Beryllium (0.45 mg/kg) Vanadium (22.3 mg/kg)
SOU195-054	Arsenic (6.96 mg/kg)
SOU195-056	Arsenic (7.8 mg/kg) Beryllium (0.58 mg/kg) Silver (8.51 mg/kg) Vanadium (31.6 mg/kg)
SOU195-058	Nickel (69.68 mg/kg)
SOU195-061	Arsenic (4.7 mg/kg) Beryllium (0.49 mg/kg) Iron (19818.41 mg/kg) Vanadium (23.4 mg/kg)
SOU195-065	Nickel (81.33 mg/kg)
SOU195-070	Arsenic (8.49 mg/kg)
SOU195-071	Arsenic (8 mg/kg)
SOU195-072	Arsenic (8.4 mg/kg) Nickel (91.1 mg/kg)
SOU195-074	Arsenic (9.13 mg/kg)

SOU195-077	Arsenic (6.12 mg/kg) Silver (8.41 mg/kg)
SOU195-080	Nickel (96.82 mg/kg) Silver (10.01 mg/kg)
SOU195-085	Arsenic (6.9 mg/kg) Beryllium (0.62 mg/kg) Cobalt (13.9 mg/kg) Vanadium (34.7 mg/kg)
SOU195-087	Arsenic (8.19 mg/kg)
SOU195-091	Arsenic (7.14 mg/kg)
SOU195-092	Arsenic (8.73 mg/kg)
SOU195-093	Nickel (91.18 mg/kg)
SOU195-094	Silver (12.92 mg/kg)
SOU195-095	Arsenic (9.02 mg/kg)
SOU195-098	Arsenic (7.59 mg/kg) Beryllium (0.12 mg/kg) Vanadium (17.5 mg/kg)
SOU195-100	Silver (8.26 mg/kg)
SOU195-102	Nickel (83.15 mg/kg)
SOU195-104	Arsenic (6.2 mg/kg) Beryllium (0.51 mg/kg) Vanadium (25.6 mg/kg)
SOU195-107	Arsenic (10.33 mg/kg) Beryllium (0.31 mg/kg) Silver (9.33 mg/kg) Vanadium (34 mg/kg)
SOU195-112	Arsenic (5.3 mg/kg) Beryllium (0.19 mg/kg) Vanadium (29.3 mg/kg)
SOU195-114	Nickel (83.79 mg/kg)
SOU195-117	Arsenic (9.02 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.5.7. SWMU 195 NAL Exceedances – Subsurface (Continued)

SOU195-118	Arsenic (7.6 mg/kg) Beryllium (0.54 mg/kg) Iron (20000 mg/kg) Vanadium (42.4 mg/kg)
SOU195-120A	Nickel (75.95 mg/kg)
SOU195-120C	Nickel (88.89 mg/kg)
SOU195-121	Arsenic (6.69 mg/kg)
SOU195-123	Arsenic (6.6 mg/kg)
SOU195-124	Arsenic (8.16 mg/kg)
SOU195-125	Nickel (79.83 mg/kg)
SOU195-129	Arsenic (10 mg/kg)
SOU195-131	Arsenic (8.17 mg/kg)
SOU195-132	Arsenic (8.64 mg/kg) Nickel (72.63 mg/kg)
SOU195-135	Arsenic (7.89 mg/kg) Nickel (99.76 mg/kg)
SOU195-138	Arsenic (8.29 mg/kg)
SOU195-139	Arsenic (9.12 mg/kg) Silver (8.71 mg/kg)
SOU195-141	Arsenic (8.3 mg/kg)
SOU195-143	Silver (8.87 mg/kg)
SOU195-144	Arsenic (10.39 mg/kg)
SOU195-146	Arsenic (7.27 mg/kg) Nickel (59.97 mg/kg)
SOU195-148	Arsenic (6.38 mg/kg) Nickel (67.02 mg/kg)
SOU195-149	Mercury (6.49 mg/kg)
SOU195-151	Arsenic (8.84 mg/kg)
SOU195-155	Arsenic (4.8 mg/kg) Beryllium (0.18 mg/kg) Nickel (86.4 mg/kg) Silver (8.59 mg/kg) Vanadium (28.5 mg/kg)
SOU195-158	Arsenic (8.8 mg/kg)
SOU195-160	Arsenic (4.7 mg/kg) Beryllium (0.2 mg/kg) Vanadium (17.8 mg/kg)
SOU195-168	Nickel (85.86 mg/kg)
SOU195-169	Arsenic (6.89 mg/kg)
SOU195-171	Nickel (77.26 mg/kg)
SOU195-173	Arsenic (4.7 mg/kg) Beryllium (0.34 mg/kg) Vanadium (28.8 mg/kg)
SOU195-176	Arsenic (8.41 mg/kg)
SOU195-178	Arsenic (2 mg/kg) Beryllium (0.2 mg/kg) Mercury (7 mg/kg) Vanadium (12 mg/kg)
SOU195-180	Nickel (68.41 mg/kg)
SOU195-181	Nickel (57.52 mg/kg)
SOU195-185	Mercury (8.43 mg/kg)
SOU195-191	Nickel (58.48 mg/kg)
SOU195-193	Arsenic (4.8 mg/kg) Beryllium (0.4 mg/kg) Vanadium (19.1 mg/kg)
SOU195-193A	Arsenic (6.16 mg/kg) Mercury (7.24 mg/kg) Silver (12.38 mg/kg)
SOU195-193B	Arsenic (8.2 mg/kg) Nickel (70.86 mg/kg)
SOU195-193C	Arsenic (7.2 mg/kg) Nickel (65.9 mg/kg)
SOU195-194	Arsenic (5.7 mg/kg)
SOU195-195A	Arsenic (4 mg/kg) Beryllium (0.31 mg/kg) Vanadium (14 mg/kg)
SOU195-199	Arsenic (5.6 mg/kg) Beryllium (0.46 mg/kg) Vanadium (21.2 mg/kg)
SOU195-203	Nickel (64.72 mg/kg)
SOU195-208	Nickel (59.68 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.5.7. SWMU 195 NAL Exceedances – Subsurface (Continued)

Grids 5, 6, 19, 32, 33 (EU 1), 10, 24, 25 (EU 3), 13, 16 (EU 4), 46, 77, 80 (EU 5), 49, 50, 65, 85 (EU 6), 70 (EU 7), 56, 58, 71, 72, 74, 87 (EU 8), 92, 93, 107 (EU 9), 94, 95, 124, 125 (EU 10), 100, 114, 129, 131 (EU 11), 102, 117, 118, 132, 135 (EU 12), 138, 139, 141, 151, 155 (EU 13), 143, 144, 146, 148, 149, 158 (EU 14), 176 (EU 15), 168, 171, 178, 180, 181, 185, 191 (EU 16), and 203, 208(EU 17) are located within the administrative boundary of SWMU 195. Grids 14B, 14C (EU 4), 120A, 120C (EU 12), 193A, 193B, and 193C (EU 17) are grids in which step-out contingency sampling was performed in order to define the horizontal extent of contamination in SWMU 195, as described in the Soils OU Work Plan (DOE 2010a).

The maximum depth at which metals were detected at or above both the background screening levels and the teen recreator NALs was 10 ft bgs. The end depths of the boreholes taken from grids 6, 16, 19, 21, 24, 33, 47, 48, 69, 73, 88, 105, 108, 110, 111, 114, 115, 117, 118, 121, 145, 147, 149, 150, 158, 167, 180, 186, 193, 194, 195, 197, 205, and 120B ranged from 4 to 10 ft bgs.

No metals were detected above both the background screening levels and the teen recreator ALs in the SWMU 195 subsurface soil.

The following are the metals detected in the SWMU 195 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	**Grid**	**EU**
Antimony	10, 14A, 61, 85, 104, 155, 173, 178, 195A, 199	3,4, 5, 7, 12, 13, 15, 16, 17
Arsenic	6, 13, 14B, 14C, 16, 19, 46, 49, 50, 70, 71, 72, 74, 87, 92, 95, 107, 117, 124, 129, 131, 132, 138, 139, 141, 144, 151, 158, 176, 193B	1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17
Cobalt	85	7
Lead	49, 193, 203	6, 17
Manganese	25, 102	3, 12
Mercury	149, 178, 185, 193A	14, 16, 17
Molybdenum[1]	6, 10, 14A, 14C, 28, 31, 36, 51, 85, 98, 104, 107, 112, 118, 155, 160, 173, 178, 193, 195A, 199	1,2,3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17
Nickel	5, 6, 10, 14B, 14C, 24, 25, 32, 33, 49, 58, 65, 72, 80, 93, 102, 114, 120A, 120C, 125, 132, 135, 146, 148, 146, 148, 155, 168, 171, 180, 181, 191, 193B, 193C, 203, 208	1, 3, 4, 6, 8, 9, 10, 11, 12, 13, 14, 16, 17
Selenium	6, 14a, 14C, 28, 31, 36, 51, 56, 61, 85, 104, 178, 193, 199	1, 2, 4, 5, 6, 7, 8, 12, 16, 17
Silver	13, 56, 77, 80, 94, 100, 107, 139, 143, 155, 193A	4, 5, 6, 8, 9, 10, 11, 13,1 4, 17
Thallium	6, 14C, 61, 199	1, 4, 5, 17
Vanadium	118	12
Zinc	14, 193	4, 17

[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Cobalt	85	7
Manganese	25, 102	3, 12
Mercury	149, 178, 185, 193A	14, 16, 17
Nickel	5, 10, 25, 14B, 32, 33, 65, 72, 80, 93, 102, 114, 120C, 125, 135, 155, 168,	1, 3, 4, 6, 8, 9, 10, 11, 12, 13, 16
Silver	13, 56, 77, 80, 94, 100, 107, 139, 143, 155, 193A,	4, 5, 6, 8, 9, 10, 11, 13, 14, 17
Vanadium	118	12

PCBs

PCBs were not detected in the SWMU 195 subsurface soil.

SVOCs

SVOCs were not detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of RGA groundwater in the SWMU 195 subsurface soil. Total PAHs were detected above the SSLs for the protection of UCRS groundwater in grids 31 (EU 1), 36 (EU 2), 51 (EU 6), 56 (EU 8), 61 (EU 5), 98 (EU 11), 104 (EU 12), 112 (EU 10), 155 (EU 13), 173 (EU 15), and 199 (EU 17).

VOCs

No subsurface soil samples from SWMU 195 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the teen recreator NALs or ALs in the SWMU 195 subsurface soil.

Neptunium-237 (no background value available) was detected above the SSL for the protection of UCRS groundwater in grid 28 (EU 4), 112 (EU 10), 118 (EU 12), and 178 (EU 16). No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

9.5.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). SWMU 195 is on the banks of KPDES Outfall Ditch 009, southwest of the industrialized area of PGDP; however, SWMU 195 is grass-covered or otherwise stabilized and the contaminants are not likely to be transported attached to suspended soil particles. Outfall 009 was evaluated during the SWOU SI (DOE 2008a). The SWOU On-Site achieved the cleanup goals determined for that removal action. A remedial action for these areas will be addressed as described in the SMP. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

9.5.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 195 are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for one or more EUs at SWMU 195 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios. As stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.5.3 for the outdoor worker (exposed to surface soils), the hypothetical resident, and the teen recreational user. The excavation worker did not have any identified COCs. Table 9.5.3 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 195 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 9.5.4.

9.5.7 SWMU 195 Summary

The following text summarizes the results for SWMU 195 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

A plant process that could have contributed to contamination at this area is distribution of contaminated soil during plant construction and clean out of plant drainage ditches in the past.

COPCs for surface and subsurface soils from SWMU 195 are shown on Tables 9.5.1 and 9.5.2 as those analytes with green boxes under the "Teen Recreator/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 10 ft bgs. A complete list of sampling results is provided in Appendix G. The COPCs for SWMU 195 for each EU are as follows:

- EU 1
    - Surface—metals, SVOCs
    - Subsurface—metals, SVOCs
- EU 2
    - Surface—metals, SVOCs

Table 9.5.3. RGOs for SWMU 195

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	**COC**	**EPC[1]**	**Units**	**ELCR[2]**	**1 x 10^{-6}**	**1 x 10^{-5}**	**1 x 10^{-4}**	**HI[4]**	**0.1**	**1**	**3**
Outdoor Worker (exposed to surface soil)											
1	Chromium	6.33E+01	mg/kg	1.6E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.6E-06**				**< 1**			
2	Chromium	4.52E+01	mg/kg	1.1E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.1E-06**				**< 1**			
3	Chromium	5.03E+01	mg/kg	1.2E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.2E-06**				**< 1**			
4	Chromium	5.29E+01	mg/kg	1.3E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.3E-06**				**< 1**			
5	Chromium	5.74E+01	mg/kg	1.4E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.4E-06**				**< 1**			
6	Chromium	4.45E+01	mg/kg	1.1E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Total PAH	2.48E-01	mg/kg	5.1E-06	4.85E-02	4.85E-01	4.85E+00	< 1	n/a	n/a	n/a
	Cumulative			**6.2E-06**				**< 1**			
7	Chromium	4.93E+01	mg/kg	1.2E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.2E-06**				**< 1**			
8	Arsenic	1.16E+01	mg/kg	2.8E-05	4.15E-01	4.15E+00	4.15E+01	< 1	n/a	n/a	n/a
	Chromium	6.79E+01	mg/kg	1.7E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Total PAH	2.16E-01	mg/kg	4.4E-06	4.85E-02	4.85E-01	4.85E+00	< 1	n/a	n/a	n/a
	Cumulative			**3.4E-05**				**< 1**			
9	Chromium	6.08E+01	mg/kg	1.5E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.5E-06**				**< 1**			
10	Chromium	4.51E+01	mg/kg	1.1E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.1E-06**				**< 1**			
11	Arsenic	1.35E+01	mg/kg	3.2E-05	4.15E-01	4.15E+00	4.15E+01	< 1	n/a	n/a	n/a
	Chromium	5.05E+01	mg/kg	1.2E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**3.4E-05**				**< 1**			
12	Chromium	7.04E+01	mg/kg	1.7E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.7E-06**				**< 1**			
13	Chromium	6.55E+01	mg/kg	1.6E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.6E-06**				**< 1**			
14	Chromium	5.94E+01	mg/kg	1.5E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.5E-06**				**< 1**			

Table 9.5.3. RGOs for SWMU 195 (Continued)

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	**COC**	**EPC[1]**	**Units**	**ELCR[2]**	**1 x 10^{-6}**	**1 x 10^{-5}**	**1 x 10^{-4}**	**HI[4]**	**0.1**	**1**	**3**
15	Chromium	4.82E+01	mg/kg	1.2E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.2E-06**				**< 1**			
16	Chromium	4.45E+01	mg/kg	1.1E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.1E-06**				**< 1**			
17	Chromium	8.22E+01	mg/kg	2.0E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	PCB, Total	7.40E-01	mg/kg	4.6E-06	1.62E-01	1.62E+00	1.62E+01	< 1	n/a	n/a	n/a
	Total PAH	3.16E-01	mg/kg	6.5E-06	4.85E-02	4.85E-01	4.85E+00	<1	n/a	n/a	n/a
	Uranium-238	2.48E+00	pCi/g	2.1E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.5E-05**				**< 1**			
Hypothetical Resident[5]											
1	Chromium	6.33E+01	mg/kg	4.1E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**4.1E-06**				**< 1**			
2	Chromium	4.52E+01	mg/kg	2.9E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Total PAH	2.68E-02	mg/kg	1.4E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Cumulative			**4.3E-06**				**< 1**			
3	Chromium	5.03E+01	mg/kg	3.2E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Total PAH	4.06E-02	mg/kg	2.1E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Cumulative			**5.3E-06**				**< 1**			
4	Chromium	5.29E+01	mg/kg	3.4E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**3.4E-06**				**< 1**			
5	Chromium	5.74E+01	mg/kg	3.7E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Total PAH	2.40E-02	mg/kg	1.2E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Cumulative			**4.9E-06**				**< 1**			
6	Chromium	4.45E+01	mg/kg	2.9E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Total PAH	2.48E-01	mg/kg	1.3E-05	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Cumulative			**1.6E-05**				**< 1**			
7	Chromium	4.93E+01	mg/kg	3.2E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**3.2E-06**				**< 1**			
8	Arsenic	1.16E+01	mg/kg	4.9E-05	2.35E-01	2.35E+00	2.35E+01	0.7	1.64E+00	1.64E+01	4.93E+01
	Chromium	6.79E+01	mg/kg	4.4E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Cobalt	1.82E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.8	2.30E+00	2.30E+01	6.91E+01
	Total PAH	2.16E-01	mg/kg	1.1E-05	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Vanadium	4.04E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	3.91E+01	3.91E+02	1.17E+03
	Cumulative			**6.5E-05**				**1.6**			

Table 9.5.3. RGOs for SWMU 195 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
9	Chromium	6.08E+01	mg/kg	3.9E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**3.9E-06**				**< 1**			
10	Chromium	4.51E+01	mg/kg	2.9E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**2.9E-06**				**< 1**			
11	Aluminum	2.81E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.4	7.27E+03	7.27E+04	2.18E+05
	Arsenic	1.35E+01	mg/kg	5.7E-05	2.35E-01	2.35E+00	2.35E+01	0.8	1.64E+00	1.64E+01	4.93E+01
	Chromium	5.05E+01	mg/kg	3.2E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Cobalt	2.77E+01	mg/kg	< 1E-06	n/a	n/a	n/a	1.2	2.30E+00	2.30E+01	6.91E+01
	Iron	1.97E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.4	5.47E+03	5.48E+04	1.64E+05
	Thallium	6.60E-01	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	6.26E-01	6.26E+00	1.88E+01
	Vanadium	7.97E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	3.91E+01	3.91E+02	1.17E+03
	Cumulative			**6.0E-05**				**3.1**			
12	Chromium	7.04E+01	mg/kg	4.5E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**4.5E-06**				**< 1**			
13	Chromium	6.55E+01	mg/kg	4.2E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**4.2E-06**				**< 1**			
14	Chromium	5.94E+01	mg/kg	3.8E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**3.8E-06**				**< 1**			
15	Chromium	4.82E+01	mg/kg	3.1E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**3.1E-06**				**< 1**			
16	Chromium	4.45E+01	mg/kg	2.9E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Cumulative			**2.9E-06**				**< 1**			
17	Chromium	8.22E+01	mg/kg	5.3E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	PCB, Total	7.40E-01	mg/kg	1.2E-05	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Total PAH	3.16E-01	mg/kg	1.6E-05	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-235	1.32E-01	pCi/g	1.7E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	2.48E+00	pCi/g	7.2E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**4.2E-05**				**< 1**			

Table 9.5.3. RGOs for SWMU 195 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Teen Recreational User											
6	Total PAH	2.48E-01	mg/kg	2.8E-06	8.99E-02	8.99E-01	8.99E+00	< 1	n/a	n/a	n/a
	Cumulative			**2.8E-06**				**< 1**			
8	Arsenic	1.16E+01	mg/kg	6.5E-06	1.77E+00	1.77E+01	1.77E+02	< 1	n/a	n/a	n/a
	Total PAH	2.16E-01	mg/kg	2.4E-06	8.99E-02	8.99E-01	8.99E+00	< 1	n/a	n/a	n/a
	Cumulative			**8.9E-06**				**< 1**			
11	Arsenic	1.35E+01	mg/kg	7.6E-06	1.77E+00	1.77E+01	1.77E+02	< 1	n/a	n/a	n/a
	Cumulative			**7.6E-06**				**< 1**			
17	PCB, Total	7.40E-01	mg/kg	2.5E-06	2.99E-01	2.99E+00	2.99E+01	< 1	n/a	n/a	n/a
	Total PAH	3.16E-01	mg/kg	3.5E-06	8.99E-02	8.99E-01	8.99E+00	< 1	n/a	n/a	n/a
	Cumulative			**6.0E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.58, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.58, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 9.5.4 Ecological Screening for SWMU 195

Ground Cover	Near a Surface Water Body?	Total HI (max) [a]	Priority COPECs	Background (mg/kg) [b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Grassy	Yes	243	Mercury	2.00E-01	5.00E+00	1.00E-01	50
			PCB, Total	n/a	2.50E+00	2.00E-02	125
			Selenium	8.00E-01	1.00E+01	5.20E-01	19
			Vanadium	3.80E+01	7.97E+01	7.80E+00	10

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

- Subsurface—SVOCs

- EU 3
  - Surface—metals, SVOCs
  - Subsurface—metals

- EU 4
  - Surface—metals, SVOCs
  - Subsurface—metals, radionuclides

- EU 5
  - Surface—metals, SVOCs
  - Subsurface—metals, SVOCs

- EU 6
  - Surface—metals, SVOCs
  - Subsurface—metals, SVOCs

- EU 7
  - Surface—metals, SVOCs
  - Subsurface—metals

- EU 8
  - Surface—metals, SVOCs
  - Subsurface—metals, SVOCs

- EU 9
  - Surface—metals, SVOCs
  - Subsurface—metals

- EU 10
  - Surface—metals, SVOCs
  - Subsurface—metals, SVOCs, radionuclides

- EU 11
  - Surface—metals
  - Subsurface—metals, SVOCs

- EU 12
  - Surface—metals, SVOCs, VOCs
  - Subsurface—metals, SVOCs, radionuclides

- EU 13
  - Surface—metals
  - Subsurface—metals, SVOCs
- EU 14
  - Surface—metals
  - Subsurface—metals
- EU 15
  - Surface—none
  - Subsurface—metals, SVOCs
- EU 16
  - Surface—metals
  - Subsurface—metals, radionuclides
- EU 17
  - Surface—metals, PCBs, SVOCs, radionuclides
  - Subsurface—metals, SVOCs

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 195 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMU 195. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soil), hypothetical residential, and teen recreational user scenarios. COCs for these scenarios for SWMU 195 are as follows:

- Outdoor worker (exposed to surface soil)
  - Arsenic
  - Chromium
  - Total PAHs
  - Total PCBs
  - Uranium-238
- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)

— Aluminum
— Arsenic
— Chromium
— Cobalt
— Iron
— Thallium
— Total PAHs
— Total PCBs
— Uranium-235
— Uranium-238
— Vanadium

- Teen Recreational User

— Arsenic
— Total PAHs
— Total PCBs

Of the above, for the hypothetical resident, cobalt is a priority COC (i.e., HQ > 1 or chemical-specific ELCR > 1E-04). There are no other priority COCs for other scenarios.

For SWMU 195, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Mercury
- Total PCBs
- Selenium
- Vanadium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 195 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 195 overlaps a portion of SWMU 420, G-752-C-02, a non-RCRA and non-TSCA waste storage area, which is an NFA site in the 2012 SMP. Also, the south side of SWMU 195 is along the banks of Outfall Ditch 009, which was the subject of a SWOU CERCLA removal action in the summer of 2010. A response action at SWMU 195 could have an impact on that SWOU SWMU.

9.5.8 SWMU 195 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 195; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including outdoor worker (exposed to surface soil), hypothetical resident, and teen recreational user (DOE 2010a). The reasonably anticipated future land use of this SWMU is recreational as shown in the SMP (DOE 2012a).

9.6 SWMU 486, WEST OF PGDP RUBBLE PILE WKWMA

9.6.1 Background

The rubble pile is on the west side of Rice Spring Road, approximately 116 ft off the roadside. It is in the vicinity of the former locations of the C-611-M Water Tower in the Kentucky Ordnance Works area. It is approximately 55 ft by 55 ft, and near the headwaters of a small tributary stream to Bayou Creek.

The history of this site is unknown, but may have been used as a disposal area for waste material or a storage location for equipment during plant construction. Waste material listed in the SAR and found at the site during the RI consists of cement piping, insulators, and other miscellaneous material that appears to be from plant construction. The site also contains large electrical insulators and conduit pipe with potential asbestos (non-friable) containing material. The quantity of debris is a small amount of scattered debris, approximately 1,000 ft^3.

In April 2001, a radiological survey of the area and materials was performed. Results of the survey indicate no radiological contamination is present.

9.6.2 Fieldwork Summary

There were no planned grid soil samples for SWMU 486, which is consistent with the SAP for the Rubble Areas (DOE 2008c); therefore, no grid sampling was performed per the Work Plan (DOE 2010a).

A gamma radiological walkover survey (Figure 9.6.1) was conducted using a FIDLER; the 174 measurements ranged from 6,422 to 14,182 gross cpm. The area consists entirely of debris, soil, and grass with trees. One judgmental grab sample was taken at the highest reading for fixed-base laboratory analysis. One hundred percent of accessible surfaces were surveyed; areas not surveyed were due to dense vegetative growth. The SWMU boundary has been updated using GPS to present the location more accurately.

9.6.3 Nature and Extent of Contamination—Surface Soils

For SWMU 486, the representative data set for surface soils is presented in Table 9.6.1 and provides the nature of the contamination in SWMU 486 surface soils. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

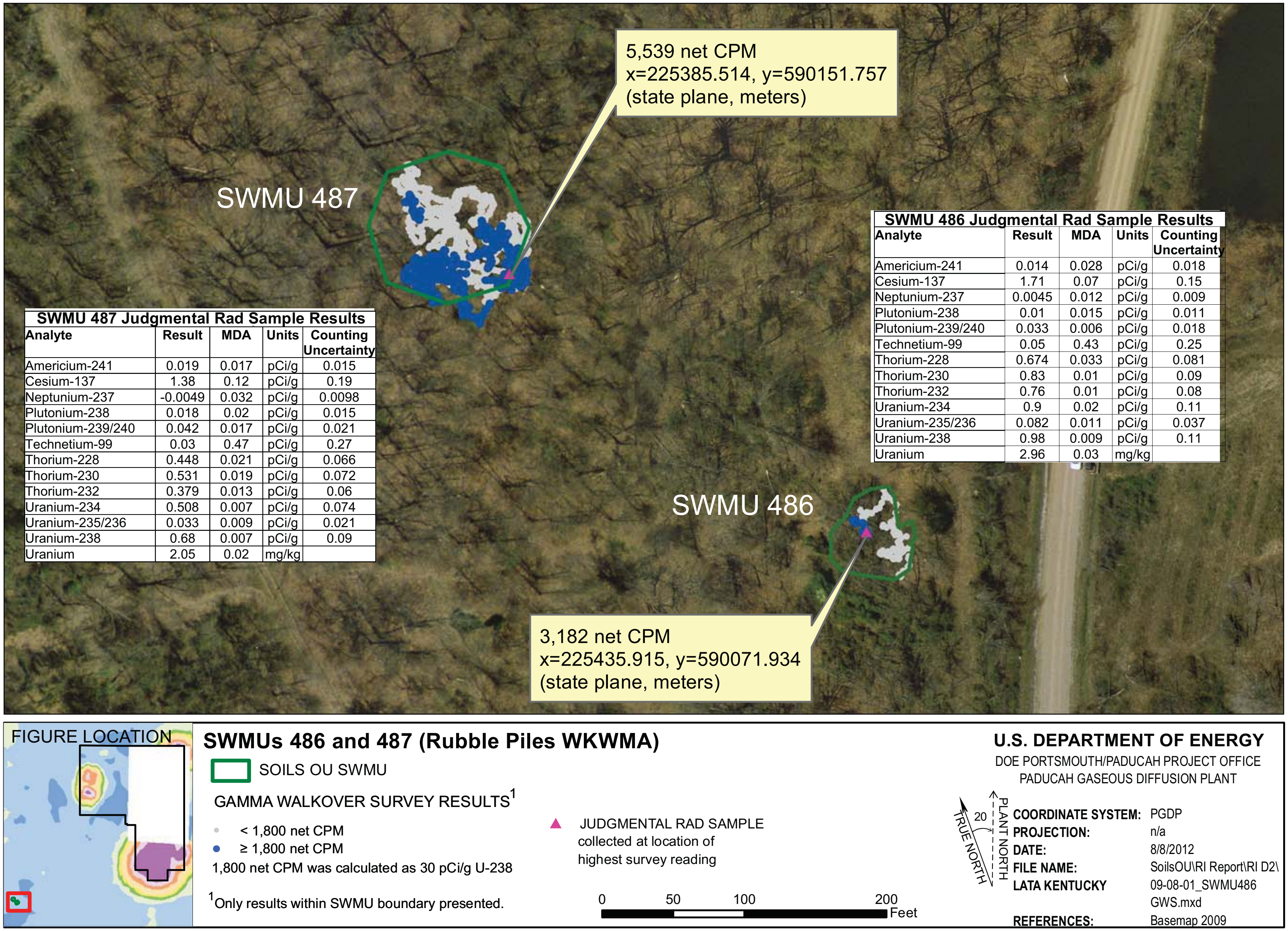
Using the results of the gamma radiological walkover survey and the judgmental grab sample, the horizontal extent of SWMU 486 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 486 consists of one EU.

<u>Metals</u>

One surface soil sample from SWMU 486 was analyzed for uranium metal. Uranium was not detected above both the background screening level and the teen recreator NAL, teen recreator AL, or the SSLs for the protection of UCRS and RGA groundwater in the single grid.

<u>PCBs</u>

No surface soil samples from SWMU 486 were analyzed for PCBs.



SWMU 487 Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.019	0.017	pCi/g	0.015
Cesium-137	1.38	0.12	pCi/g	0.19
Neptunium-237	-0.0049	0.032	pCi/g	0.0098
Plutonium-238	0.018	0.02	pCi/g	0.015
Plutonium-239/240	0.042	0.017	pCi/g	0.021
Technetium-99	0.03	0.47	pCi/g	0.27
Thorium-228	0.448	0.021	pCi/g	0.066
Thorium-230	0.531	0.019	pCi/g	0.072
Thorium-232	0.379	0.013	pCi/g	0.06
Uranium-234	0.508	0.007	pCi/g	0.074
Uranium-235/236	0.033	0.009	pCi/g	0.021
Uranium-238	0.68	0.007	pCi/g	0.09
Uranium	2.05	0.02	mg/kg	

SWMU 486 Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.014	0.028	pCi/g	0.018
Cesium-137	1.71	0.07	pCi/g	0.15
Neptunium-237	0.0045	0.012	pCi/g	0.009
Plutonium-238	0.01	0.015	pCi/g	0.011
Plutonium-239/240	0.033	0.006	pCi/g	0.018
Technetium-99	0.05	0.43	pCi/g	0.25
Thorium-228	0.674	0.033	pCi/g	0.081
Thorium-230	0.83	0.01	pCi/g	0.09
Thorium-232	0.76	0.01	pCi/g	0.08
Uranium-234	0.9	0.02	pCi/g	0.11
Uranium-235/236	0.082	0.011	pCi/g	0.037
Uranium-238	0.98	0.009	pCi/g	0.11
Uranium	2.96	0.03	mg/kg	

Figure 9.6.1. SWMUs 486 and 487 Gamma Walkover Survey

Table 9.6.1. Surface Soil RI Data Summary: SWMU 486 Rubble Pile WKWMA

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Uranium	mg/kg	2.96E+00	2.96E+00	2.96E+00	0/1	1/1	0/1	4.90E+00	0/1	8.49E+01	0/1	3.50E+04	0/1	0/1	0.03 - 0.03
RADS	Alpha activity	pCi/g	3.09E+01	3.09E+01	3.09E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	6.4 - 6.4
RADS	Americium-241	pCi/g	1.40E-02	1.40E-02	1.40E-02	0/1	1/1	0/1	n/a	0/1	1.28E+01	0/1	1.28E+03	0/1	0/1	0.028 - 0.028
RADS	Beta activity	pCi/g	2.95E+01	2.95E+01	2.95E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.8 - 2.8
RADS	Cesium-137	pCi/g	1.71E+00	1.71E+00	1.71E+00	0/1	1/1	1/1	4.90E-01	1/1	1.98E-01	0/1	1.98E+01	0/1	0/1	0.07 - 0.07
RADS	Neptunium-237	pCi/g	4.50E-03	4.50E-03	4.50E-03	0/1	1/1	0/1	1.00E-01	0/1	6.26E-01	0/1	6.26E+01	0/1	0/1	0.012 - 0.012
RADS	Plutonium-238	pCi/g	1.00E-02	1.00E-02	1.00E-02	0/1	1/1	0/1	7.30E-02	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.015 - 0.015
RADS	Plutonium-239/240	pCi/g	3.30E-02	3.30E-02	3.30E-02	0/1	1/1	1/1	2.50E-02	0/1	3.56E+01	0/1	3.56E+03	0/1	0/1	0.006 - 0.006
RADS	Technetium-99	pCi/g	5.00E-02	5.00E-02	5.00E-02	0/1	1/1	0/1	2.50E+00	0/1	1.11E+03	0/1	1.11E+05	0/1	0/1	0.43 - 0.43
RADS	Thorium-228	pCi/g	6.74E-01	6.74E-01	6.74E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.033 - 0.033
RADS	Thorium-230	pCi/g	8.30E-01	8.30E-01	8.30E-01	0/1	1/1	0/1	1.50E+00	0/1	4.49E+01	0/1	4.49E+03	0/1	1/1	0.01 - 0.01
RADS	Thorium-232	pCi/g	7.60E-01	7.60E-01	7.60E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
RADS	Uranium-234	pCi/g	9.00E-01	9.00E-01	9.00E-01	0/1	1/1	0/1	1.20E+00	0/1	6.25E+01	0/1	6.25E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	8.20E-02	8.20E-02	8.20E-02	0/1	1/1	1/1	6.00E-02	0/1	9.12E-01	0/1	9.12E+01	0/1	0/1	0.011 - 0.011
RADS	Uranium-238	pCi/g	9.80E-01	9.80E-01	9.80E-01	0/1	1/1	0/1	1.20E+00	0/1	4.02E+00	0/1	4.02E+02	0/1	0/1	0.009 - 0.009

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

SVOCs

No surface soil samples from SWMU 486 were analyzed for SVOCs.

VOCs

No surface soil samples from SWMU 486 were analyzed for VOCs.

Radionuclides

One surface soil sample from SWMU 486 was analyzed for radionuclides. Cesium-137 was detected above both the background screening level and the teen recreator NAL in the SWMU 486 surface soil.

No radionuclides were detected above both the background screening levels and the teen recreator ALs or the SSLs for the protection of UCRS and RGA groundwater.

9.6.4 Nature and Extent of Contamination—Subsurface Soils

N/A—Subsurface soil samples were not collected from SWMU 486.

9.6.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport. There is a potential for runoff from this site to the northeast toward an unnamed tributary of Bayou Creek, upstream of PGDP; however, SWMU 486 is a scattered debris area and is grass-covered or otherwise stabilized and the contaminants are not likely to be transported attached to suspended soil particles. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

9.6.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 486 are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 486 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.6.2 for the outdoor worker (exposed to surface soils), the hypothetical resident, and the teen recreational user. The excavation worker did not have any identified COCs. Table 9.6.2 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Table 9.6.2. RGOs for SWMU 486

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3] 1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}	HI[4]	RGOs for HI[3] 0.1	1	3
Outdoor Worker (exposed to surface soil)											
1	Cesium-137	1.71E+00	pCi/g	1.5E-05	1.15E-01	1.15E+00	1.15E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.5E-05**				**< 1**			
Hypothetical Resident[5]											
1	Cesium-137	1.71E+00	pCi/g	1.0E-04	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Cumulative			**1.0E-04**				**< 1**			
Teen Recreational User											
1	Cesium-137	1.71E+00	pCi/g	4.2E-06	4.10E-01	4.10E+00	4.10E+01	n/a	n/a	n/a	n/a
	Cumulative			**4.2E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.60, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.60, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Ecological Screening. There were no COPECs identified for SWMU 486.

9.6.7 SWMU 486 Summary

The following text summarizes the results for SWMU 486 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Plant processes that could have contributed to contamination here are unknown. The rubble may have been placed at the location of AOC 486 from PGDP, but that is uncertain.

COPCs for surface and subsurface soils from AOC 486 are shown on Table 9.6.1 as those analytes with green boxes under the "Teen Recreator/FOE" columns for surface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The only COPC identified for SWMU 486 in surface soil was cesium-137. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 1 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 486 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMU 486. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soil), hypothetical residential, and teen recreational user scenarios. COCs for these scenarios for SWMU 486 are as follows:

- Outdoor worker (exposed to surface soil)
  - Cesium-137
- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Cesium-137
- Teen Recreational User
  - Cesium-137

Of the above, for the hypothetical resident, cesium-137 is a priority COC (i.e., HQ > 1 or chemical-specific ELCR > 1E-04). There are no other priority COCs for SWMU 486.

For SWMU 486, there were no COPECs exceeding ESVs.

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 486 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment and excavation. This AOC is isolated from other SWMU/AOCs. The SWMU or AOC closest to it is AOC 487, which is part of this Soils OU. A response action at SWMU 486 will not have an impact on other integrator OUs.

9.6.8 SWMU 486 Conclusion

The only sample collected during the RI for SWMU 486 was the judgmental sampling location based on the gamma radiological walkover survey, which is consistent with the SAP for the Rubble Areas (DOE 2008c). Similar studies such as *Site Evaluation Report for Rubble Areas at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/LX/07-0227&D2/R1 (DOE 2010d); WAG 17 (DOE 1997e); and 2001 radiological survey data indicate there is no widespread contamination in rubble areas.

The RI adequately defined the nature and extent of contamination in soils at SWMU 486; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including outdoor worker (exposed to surface soil), hypothetical resident, and teen recreational user (DOE 2010a). The reasonably anticipated future land use for this SWMU is recreational as shown in the SMP (DOE 2012a).

9.7 SWMU 487, WEST OF PGDP RUBBLE PILE WKWMA

9.7.1 Background

The rubble pile is on the west side of Rice Spring Road and is approximately 483 ft off the roadside. The pile is in the vicinity of the former location of the C-611-M Water Tower and is in the Kentucky Ordnance Works area. The pile is approximately 80 ft by 80 ft, and near the headwaters to a small tributary stream to Bayou Creek.

The history of this site is unknown, but may have been used as a disposal area for waste material or a storage location for equipment during plant construction.

In April of 2001, a radiological survey of the area and materials was performed. Results of the survey indicate no radiological contamination is present.

9.7.2 Fieldwork Summary

There were no planned grid soil samples for SWMU 487, which is consistent with the SAP for the Rubble Areas (DOE 2008c); therefore, no grid sampling was performed per the Work Plan (DOE 2010a).

A gamma radiological walkover survey (Figure 9.6.1) was conducted using a FIDLER; the 1,481 measurements ranged from 7,647 to 16,539 gross cpm. The area consists entirely of debris, soil, and grass with trees. 100% of accessible surfaces were surveyed. One judgmental grab sample was taken at the highest reading for fixed base laboratory analysis.

9.7.3 Nature and Extent of Contamination—Surface Soils

For SWMU 487, the representative data set for surface soils is presented in Table 9.7.1 and provides the nature of the contamination in SWMU 487 surface soils. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

Using the results of the gamma radiological walkover survey and the judgmental grab sample, the horizontal extent of SWMU 487 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 487 consists of one EU.

Metals

One surface soil sample from SWMU 487 was analyzed for uranium metal. Uranium was not detected above both the background screening level and the teen recreator NAL, teen recreator AL, or the SSLs for the protection of UCRS and RGA groundwater in the single grid.

PCBs

No surface soil samples from SWMU 487 were analyzed for PCBs.

SVOCs

No surface soil samples from SWMU 487 were analyzed for SVOCs.

VOCs

No surface soil samples from SWMU 487 were analyzed for VOCs.

Radionuclides

One surface soil sample from SWMU 487 was analyzed for radionuclides. Cesium-137 was detected above both the background screening level and the teen recreator NAL in the SWMU 487 surface soil.

No radionuclides were detected above both the background screening levels and the teen recreator ALs or the SSLs for the protection of UCRS and RGA groundwater.

9.7.4 Nature and Extent of Contamination—Subsurface Soils

N/A—Subsurface soil samples were not collected from SWMU 487.

9.7.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport. There is a potential for runoff from this site to the northeast toward an unnamed tributary of Bayou Creek, upstream of PGDP; however, SWMU 487 is a scattered debris and grass-covered or otherwise stabilized and the contaminants are not likely to be transported attached to suspended soil particles. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

Table 9.7.1. Surface Soil RI Data Summary: SWMU 487 Rubble Pile WKWMA

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Uranium	mg/kg	2.05E+00	2.05E+00	2.05E+00	0/1	1/1	0/1	4.90E+00	0/1	8.49E+01	0/1	3.50E+04	0/1	0/1	0.02 - 0.02
RADS	Alpha activity	pCi/g	3.65E+01	3.65E+01	3.65E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	4.3 - 4.3
RADS	Americium-241	pCi/g	1.90E-02	1.90E-02	1.90E-02	0/1	1/1	0/1	n/a	0/1	1.28E+01	0/1	1.28E+03	0/1	0/1	0.017 - 0.017
RADS	Beta activity	pCi/g	3.55E+01	3.55E+01	3.55E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.4 - 2.4
RADS	Cesium-137	pCi/g	1.38E+00	1.38E+00	1.38E+00	0/1	1/1	1/1	4.90E-01	1/1	1.98E-01	0/1	1.98E+01	0/1	0/1	0.12 - 0.12
RADS	Neptunium-237	pCi/g	-4.90E-03	-4.90E-03	-4.90E-03	0/1	1/1	0/1	1.00E-01	0/1	6.26E-01	0/1	6.26E+01	0/1	0/1	0.032 - 0.032
RADS	Plutonium-238	pCi/g	1.80E-02	1.80E-02	1.80E-02	0/1	1/1	0/1	7.30E-02	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.02 - 0.02
RADS	Plutonium-239/240	pCi/g	4.20E-02	4.20E-02	4.20E-02	0/1	1/1	1/1	2.50E-02	0/1	3.56E+01	0/1	3.56E+03	0/1	0/1	0.017 - 0.017
RADS	Technetium-99	pCi/g	3.00E-02	3.00E-02	3.00E-02	0/1	1/1	0/1	2.50E+00	0/1	1.11E+03	0/1	1.11E+05	0/1	0/1	0.47 - 0.47
RADS	Thorium-228	pCi/g	4.48E-01	4.48E-01	4.48E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.021 - 0.021
RADS	Thorium-230	pCi/g	5.31E-01	5.31E-01	5.31E-01	0/1	1/1	0/1	1.50E+00	0/1	4.49E+01	0/1	4.49E+03	0/1	1/1	0.019 - 0.019
RADS	Thorium-232	pCi/g	3.79E-01	3.79E-01	3.79E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.013 - 0.013
RADS	Uranium-234	pCi/g	5.08E-01	5.08E-01	5.08E-01	0/1	1/1	0/1	1.20E+00	0/1	6.25E+01	0/1	6.25E+03	0/1	0/1	0.007 - 0.007
RADS	Uranium-235/236	pCi/g	3.30E-02	3.30E-02	3.30E-02	0/1	1/1	0/1	6.00E-02	0/1	9.12E-01	0/1	9.12E+01	0/1	0/1	0.009 - 0.009
RADS	Uranium-238	pCi/g	6.80E-01	6.80E-01	6.80E-01	0/1	1/1	0/1	1.20E+00	0/1	4.02E+00	0/1	4.02E+02	0/1	0/1	0.007 - 0.007

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

9.7.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 487 are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 487 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.7.2 for the outdoor worker (exposed to surface soils), the hypothetical resident, and the teen recreational user. The excavation worker did not have any identified COCs. Table 9.7.2 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. There were no COPECs identified for SWMU 487.

9.7.7 SWMU 487 Summary

The following text summarizes the results for SWMU 487 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Plant processes that could have contributed to contamination here are unknown. The rubble may have been placed at the location of SWMU 487 from PGDP, but that is uncertain.

COPCs for surface and subsurface soils from SWMU 487 are shown on Table 9.7.1 as those analytes with green boxes under the “Teen Recreator/FOE” columns for surface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. The only COPC identified at this SWMU in surface soil is one radionuclide, cesium-137. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 1 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 487 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMU 487. The CSM can be found in Appendix D.

Table 9.7.2. RGOs for SWMU 487

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	**COC**	**EPC[1]**	**Units**	**ELCR[2]**	**1 x 10^{-6}**	**1 x 10^{-5}**	**1 x 10^{-4}**	**HI[4]**	**0.1**	**1**	**3**
Outdoor Worker (exposed to surface soil)											
1	Cesium-137	1.38E+00	pCi/g	1.2E-05	1.15E-01	1.15E+00	1.15E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.2E-05**				**< 1**			
Hypothetical Resident[5]											
1	Cesium-137	1.38E+00	pCi/g	8.1E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Cumulative			**8.1E-05**				**< 1**			
Teen Recreational User											
1	Cesium-137	1.38E+00	pCi/g	3.4E-06	4.10E-01	4.10E+00	4.10E+01	n/a	n/a	n/a	n/a
	Cumulative			**3.4E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.62, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.62, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soil), hypothetical residential, and teen recreational user scenarios. COCs for these scenarios for SWMU 487 are as follows:

- Outdoor worker (exposed to surface soil)
  - Cesium-137
- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Cesium-137
- Teen Recreational User
  - Cesium-137

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 487.

For SWMU 487, there were no COPECs exceeding ESVs.

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 487 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. This AOC is isolated from other SWMU/AOCs. The SWMU or AOC closest to it is AOC 486, which is part of this Soils OU. A response action at SWMU 487 will not have an impact on other integrator OUs.

9.7.8 SWMU 487 Conclusion

The only sample collected during the RI for SWMU 487 was the judgmental sampling location based on the gamma radiological walkover survey, which is consistent with the SAP for the Rubble Areas (DOE 2008c). Similar studies such as *Site Evaluation Report for Rubble Areas at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0227&D2/R1 (DOE 2010d); WAG 17 (DOE 1997e); and to 2001 radiological survey data indicate there is no widespread contamination in rubble areas.

The RI adequately defined the nature and extent of contamination in soils at SWMU 487; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark (DOE 2010a) for scenarios including outdoor worker (exposed to surface soil), hypothetical resident, and teen recreational user. The reasonably anticipated future land use for this SWMU is recreational as shown in the SMP (DOE 2012a).

9.8 AOC 492, CONTAMINATED SOIL AREA, NORTH OF OUTFALL 010

9.8.1 Background

The contaminated soil area, north of Outfall 010 (AOC 492) is located east of the plant site, on the banks of Little Bayou Creek. AOC 492 is approximately 450 ft^2 (15 ft x 30 ft).

AOC 492 was discovered during routine radiological surveys in support of sampling activities. This area likely was generated from past plant maintenance activities.

An area with elevated radiological readings was detected on July 30, 2001. This area was sampled (surface) and analytical results received on August 29, 2001, indicated the presence of elevated levels of PCBs and radiological constituents. Data from three locations sampled in the AOC were evaluated. Analytical results indicate the presence of metals (chromium), PCBs, and radionuclides (uranium-238). The area also was sampled in 2008 by the Kentucky Research Consortium for Energy and Environment and as part of the Addendum 1-B to the Sampling and Analysis Plan for Soil Piles (DOE 2009e).

During the Addendum I-B Site Evaluation, AOC 492 was sampled using a systematic approach by means of a grid spacing of 10 ft. This approach was designed to ensure sampling results were sufficient to determine the concentration and distribution of constituents throughout the study area. Findings for AOC 492 from the Addendum I-B sampling were similar to the findings from a 2002 soil sampling effort to assess initial site conditions. The results of the initial sampling effort indicated detections of PCBs and uranium above background.

Also of note is that Kentucky Research Consortium for Energy and Environment (KRCEE) performed a real-time demonstration of *in situ* analysis and field testing at AOC 492 during 2008 that included removal of approximately 18 yd^3 of soil. This is described in *Real Time Technology Application Demonstration Project Final Report* (KRCEE 2008).

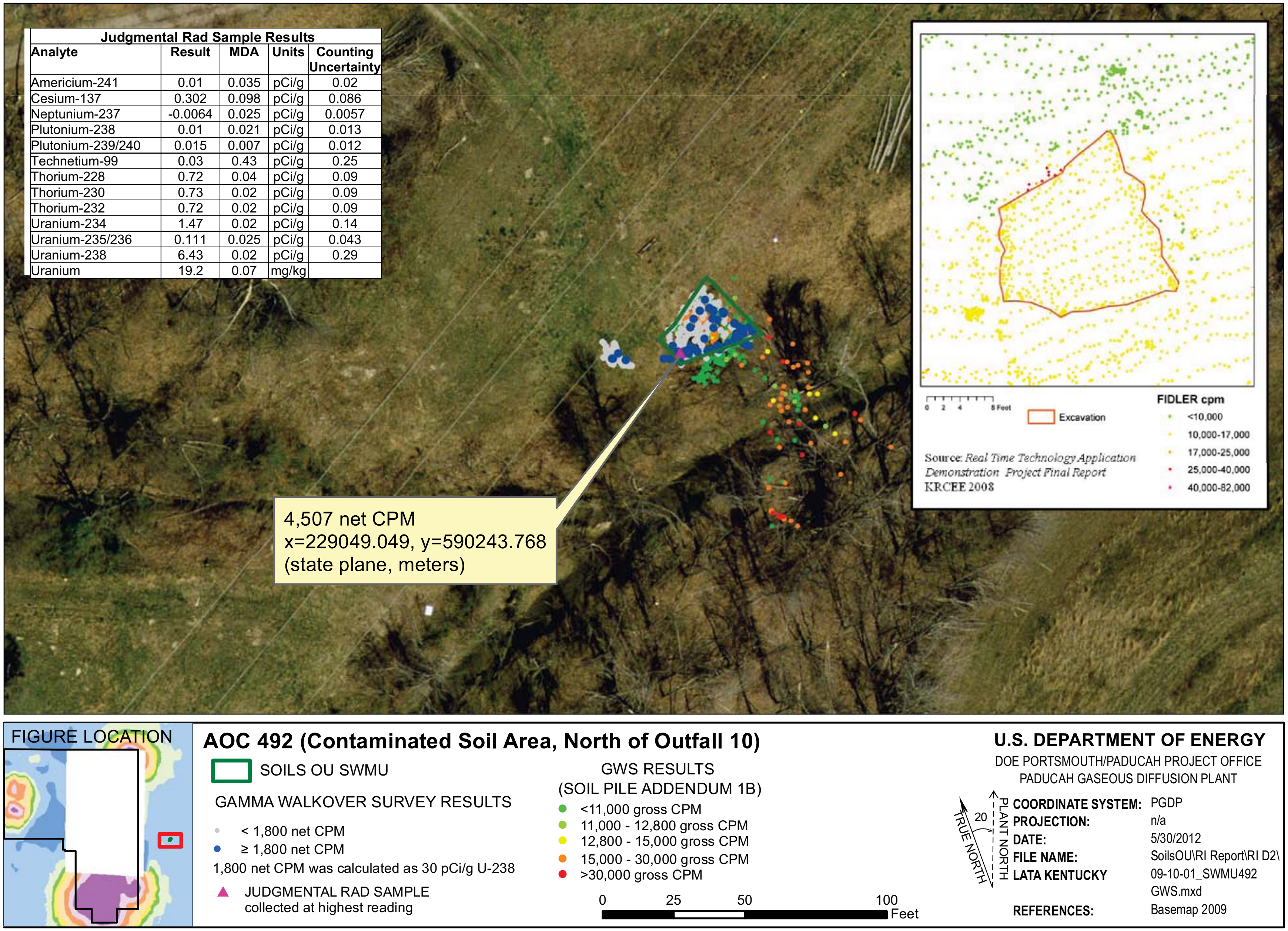
9.8.2 Fieldwork Summary

The historical data are representative of the nature and adequately delineate the extent of the contamination; therefore, no samples were collected from AOC 492 during the Soils OU RI sampling effort (DOE 2010a). Confirmation data from the KRCEE real-time demonstration were not included in the data set because the electronic data were not available. Confirmation data reported by KRCEE are consistent with data included for the RI; however, data included for the RI that are located within the area of the removal were collected after the removal occurred.

A gamma radiological walkover survey (Figure 9.8.1) was conducted using a FIDLER; the 616 measurements ranged from 8,095 to 15,507 gross cpm. The area consists entirely of soil and grass with trees. A judgmental sample was collected for radiological constituents. Soil Pile Addendum 1B survey data has been added to Figure 9.8.1 to supplement the existing data, as discussed during comment resolution meetings (DOE 2009c). The Addendum 1B data was collected using a 2 x 2 sodium iodide (NaI) probe.

9.8.3 Nature and Extent of Contamination—Surface Soils

For AOC 492, the representative data set for surface soils is presented in Tables 9.8.1 and 9.8.2 and provides the nature of the contamination in AOC 492 surface soils. Figures 9.8.2–9.8.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.01	0.035	pCi/g	0.02
Cesium-137	0.302	0.098	pCi/g	0.086
Neptunium-237	-0.0064	0.025	pCi/g	0.0057
Plutonium-238	0.01	0.021	pCi/g	0.013
Plutonium-239/240	0.015	0.007	pCi/g	0.012
Technetium-99	0.03	0.43	pCi/g	0.25
Thorium-228	0.72	0.04	pCi/g	0.09
Thorium-230	0.73	0.02	pCi/g	0.09
Thorium-232	0.72	0.02	pCi/g	0.09
Uranium-234	1.47	0.02	pCi/g	0.14
Uranium-235/236	0.111	0.025	pCi/g	0.043
Uranium-238	6.43	0.02	pCi/g	0.29
Uranium	19.2	0.07	mg/kg	

Figure 9.8.1. AOC 492 Gamma Walkover Survey

Table 9.8.1. Surface Soil Historical Data Summary: SWMU 492 Outfall 011 Contaminated Soil Area

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	3.04E+03	9.92E+03	6.47E+03	0/6	6/6	0/6	1.30E+04	0/6	2.77E+04	0/6	8.91E+06	0/6	6/6	18.7 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	2.10E-01	0/6	1.78E+00	0/6	1.90E+03	0/6	0/6	0.38 - 20
METAL	Arsenic	mg/kg	3.41E+00	1.47E+01	7.36E+00	0/6	6/6	1/6	1.20E+01	6/6	1.02E+00	0/6	1.02E+02	0/6	6/6	0.937 - 5
METAL	Barium	mg/kg	3.53E+01	1.02E+02	6.91E+01	0/6	6/6	0/6	2.00E+02	0/6	4.15E+02	0/6	4.58E+05	0/6	2/6	2.34 - 5
METAL	Beryllium	mg/kg	5.20E-01	1.04E+01	4.33E+00	0/6	5/6	2/6	6.70E-01	5/6	1.29E-02	2/6	8.65E+00	0/6	2/6	0.468 - 0.5
METAL	Cadmium	mg/kg	1.60E+00	3.14E+00	2.45E+00	0/6	5/6	5/6	2.10E-01	0/6	3.14E+00	0/6	3.14E+02	0/6	5/6	0.468 - 2
METAL	Calcium	mg/kg	5.30E+02	2.11E+03	1.41E+03	0/6	6/6	0/6	2.00E+05	0/6	n/a	0/6	n/a	n/a	n/a	93.7 - 100
METAL	Chromium	mg/kg	8.94E+00	1.04E+03	2.90E+02	0/11	6/11	5/11	1.60E+01	3/11	7.15E+01	0/11	7.15E+03	0/11	0/11	2.34 - 2.5
METAL	Cobalt	mg/kg	4.79E+00	1.07E+01	6.85E+00	0/6	6/6	0/6	1.40E+01	2/6	8.45E+00	0/6	3.29E+03	6/6	6/6	0.937 - 2.5
METAL	Copper	mg/kg	4.50E+00	8.47E+01	2.98E+01	0/6	6/6	3/6	1.90E+01	0/6	1.13E+03	0/6	4.75E+05	0/6	2/6	2.34 - 2.5
METAL	Iron	mg/kg	7.95E+03	1.69E+04	1.22E+04	0/6	6/6	0/6	2.80E+04	0/6	1.98E+04	0/6	8.31E+06	6/6	6/6	18.7 - 20
METAL	Lead	mg/kg	8.51E+00	2.80E+01	1.56E+01	0/11	9/11	0/11	3.60E+01	0/11	4.00E+02	0/11	4.00E+02	0/11	5/11	0.937 - 20
METAL	Magnesium	mg/kg	3.21E+02	1.25E+03	7.98E+02	0/6	6/6	0/6	7.70E+03	0/6	n/a	0/6	n/a	n/a	n/a	4.68 - 15
METAL	Manganese	mg/kg	1.81E+02	4.26E+02	3.33E+02	0/6	6/6	0/6	1.50E+03	0/6	3.47E+03	0/6	2.94E+05	6/6	6/6	2.34 - 10
METAL	Mercury	mg/kg	2.00E-02	2.00E-02	2.00E-02	0/6	1/6	0/6	2.00E-01	0/6	6.25E-01	0/6	7.88E+02	0/6	0/6	0.015 - 0.2
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.42E+02	0/1	5.94E+04	0/1	0/1	4.68 - 4.68
METAL	Nickel	mg/kg	5.90E+00	1.67E+01	1.13E+01	0/6	6/6	0/6	2.10E+01	0/6	2.98E+01	0/6	3.07E+04	0/6	6/6	4.68 - 5
METAL	Selenium	mg/kg	3.40E-01	6.50E-01	4.95E-01	0/3	2/3	0/3	8.00E-01	0/3	1.42E+02	0/3	5.93E+04	0/3	2/3	0.937 - 0.937
METAL	Silver	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	2.30E+00	0/6	7.45E+00	0/6	8.07E+03	0/6	0/6	1.3 - 4
METAL	Sodium	mg/kg	4.04E+01	2.97E+02	1.69E+02	0/6	2/6	0/6	3.20E+02	0/6	n/a	0/6	n/a	n/a	n/a	25.2 - 200
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	2.10E-01	0/6	2.27E+00	0/6	9.50E+02	0/6	0/6	0.25 - 20
METAL	Uranium	mg/kg	1.16E+00	1.77E+03	7.53E+02	0/9	4/9	3/9	4.90E+00	3/9	8.49E+01	0/9	3.50E+04	2/9	3/9	0.937 - 200
METAL	Vanadium	mg/kg	1.35E+01	4.32E+01	2.51E+01	0/6	6/6	1/6	3.80E+01	6/6	1.04E-01	0/6	7.61E+01	6/6	6/6	2.34 - 2.5
METAL	Zinc	mg/kg	2.50E+01	6.62E+02	2.10E+02	0/6	6/6	3/6	6.50E+01	0/6	8.50E+03	0/6	3.56E+06	0/6	6/6	18.7 - 20
PPCB	PCB, Total	mg/kg	1.09E+01	4.41E+01	2.79E+01	0/11	3/11	0/11	n/a	3/11	1.83E-01	2/11	1.83E+01	3/11	3/11	0.13 - 0.9
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.41 - 0.41
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.41 - 0.41
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.41 - 0.41
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2 - 2
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2 - 2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2 - 2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.35E+00	0/2	1.00E+02	0/2	0/2	2 - 2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.82 - 0.82
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2 - 2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2 - 2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.87E+02	0/3	1.76E+04	0/3	0/3	0.41 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.41 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	3.25E+03	0/3	9.74E+04	0/3	0/3	0.41 - 0.5
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.41 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.8.1. Surface Soil Historical Data Summary: SWMU 492 Outfall 011 Contaminated Soil Area (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2 - 2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.41 - 0.41
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.47E+02	0/3	1.34E+04	0/3	0/3	0.41 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.19E+02	0/3	1.26E+04	0/3	0/3	0.41 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.78E-01	0/2	1.78E+01	0/2	0/2	0.41 - 0.41
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.27E+00	0/3	5.27E+02	0/3	0/3	0.41 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.10E-02	0/2	6.10E+00	0/2	0/2	0.41 - 0.41
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	2 - 2
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.41 - 0.5
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.41 - 0.41
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2 - 2
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	3.35E+02	0/3	1.00E+04	0/3	0/3	0.41 - 0.5
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	5.57E-02	0/8	5.57E+00	0/8	0/8	0.2 - 0.2
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	9.45E-02	0/2	1.29E+01	0/2	0/2	0.006 - 0.006
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.20E+01	0/2	4.57E+02	0/2	0/2	0.006 - 0.006
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.28E+00	0/2	1.91E+02	0/2	0/2	0.006 - 0.006
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.8.1. Surface Soil Historical Data Summary: SWMU 492 Outfall 011 Contaminated Soil Area (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	9.30E-01	0/2	1.34E+02	0/2	0/2	0.006 - 0.006
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.38E-01	0/2	5.85E+01	0/2	0/2	0.006 - 0.006
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.11E+00	0/2	8.90E+02	0/2	0/2	0.006 - 0.006
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.26E-01	0/2	1.48E+02	0/2	0/2	0.006 - 0.006
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	Total Xylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	8.66E+01	0/2	2.79E+03	0/2	0/2	0.006 - 0.006
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	9.91E-02	0/2	1.17E+01	0/2	0/2	0.006 - 0.006
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.39E-01	0/2	1.02E+02	0/2	0/2	0.012 - 0.012
RADS	Americium-241	pCi/g	-2.51E-03	7.39E-01	4.15E-01	0/4	4/4	0/4	n/a	0/4	1.28E+01	0/4	1.28E+03	0/4	3/4	0.0218 - 0.582
RADS	Cesium-137	pCi/g	4.10E-02	3.46E-01	2.52E-01	0/4	4/4	0/4	4.90E-01	3/4	1.98E-01	0/4	1.98E+01	0/4	0/4	0.046 - 0.0871
RADS	Cobalt-60	pCi/g	-5.83E-03	9.63E-03	-6.53E-04	0/3	3/3	0/3	n/a	0/3	4.06E-02	0/3	4.06E+00	0/3	0/3	0.0322 - 0.0379
RADS	Neptunium-237	pCi/g	-4.08E-03	2.09E-01	1.12E-01	0/4	4/4	2/4	1.00E-01	0/4	6.26E-01	0/4	6.26E+01	0/4	3/4	0.048 - 0.105
RADS	Plutonium-238	pCi/g	-4.16E-03	3.36E-02	1.86E-02	0/4	4/4	0/4	7.30E-02	0/4	3.64E+01	0/4	3.64E+03	0/4	0/4	0.0115 - 0.0568
RADS	Plutonium-239/240	pCi/g	4.39E-03	5.31E-02	2.83E-02	0/4	4/4	2/4	2.50E-02	0/4	3.56E+01	0/4	3.56E+03	0/4	0/4	0.00896 - 0.0125
RADS	Technetium-99	pCi/g	5.70E-01	1.40E+01	5.94E+00	0/4	4/4	2/4	2.50E+00	0/4	1.11E+03	0/4	1.11E+05	0/4	4/4	0.127 - 0.662
RADS	Thorium-228	pCi/g	2.74E-01	7.38E-01	5.98E-01	0/4	4/4	0/4	1.60E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.00984 - 0.0853
RADS	Thorium-230	pCi/g	1.99E-01	9.71E-01	6.43E-01	0/4	4/4	0/4	1.50E+00	0/4	4.49E+01	0/4	4.49E+03	0/4	3/4	0.0175 - 0.0568
RADS	Thorium-232	pCi/g	2.98E-01	7.03E-01	5.79E-01	0/4	4/4	0/4	1.50E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.0134 - 0.0348
RADS	Uranium-234	pCi/g	1.33E-01	5.39E+01	2.72E+01	0/4	4/4	3/4	1.20E+00	0/4	6.25E+01	0/4	6.25E+03	0/4	0/4	0.112 - 0.492
RADS	Uranium-235	pCi/g	8.27E-03	5.72E+00	3.01E+00	0/4	4/4	3/4	6.00E-02	3/4	9.12E-01	0/4	9.12E+01	0/4	0/4	0.0132 - 0.0814

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.8.1. Surface Soil Historical Data Summary: SWMU 492 Outfall 011 Contaminated Soil Area (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified	FOD	Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD		FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
RADS	Uranium-238	pCi/g	2.73E-01	3.83E+02	2.07E+02	0/4	4/4	3/4	1.20E+00	3/4	4.02E+00	0/4	4.02E+02	2/4	3/4	0.0983 - 3.49

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.8.2. Surface Soil RI Data Summary: SWMU 492 Outfall 011 Contaminated Soil Area

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Uranium	mg/kg	1.92E+01	1.92E+01	1.92E+01	0/1	1/1	1/1	4.90E+00	0/1	8.49E+01	0/1	3.50E+04	0/1	1/1	0.07 - 0.07
RADS	Alpha activity	pCi/g	3.73E+01	3.73E+01	3.73E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.4 - 5.4
RADS	Americium-241	pCi/g	1.00E-02	1.00E-02	1.00E-02	0/1	1/1	0/1	n/a	0/1	1.28E+01	0/1	1.28E+03	0/1	0/1	0.035 - 0.035
RADS	Beta activity	pCi/g	3.41E+01	3.41E+01	3.41E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.5 - 2.5
RADS	Cesium-137	pCi/g	3.02E-01	3.02E-01	3.02E-01	0/1	1/1	0/1	4.90E-01	1/1	1.98E-01	0/1	1.98E+01	0/1	0/1	0.098 - 0.098
RADS	Neptunium-237	pCi/g	-6.40E-03	-6.40E-03	-6.40E-03	0/1	1/1	0/1	1.00E-01	0/1	6.26E-01	0/1	6.26E+01	0/1	0/1	0.025 - 0.025
RADS	Plutonium-238	pCi/g	1.00E-02	1.00E-02	1.00E-02	0/1	1/1	0/1	7.30E-02	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.021 - 0.021
RADS	Plutonium-239/240	pCi/g	1.50E-02	1.50E-02	1.50E-02	0/1	1/1	0/1	2.50E-02	0/1	3.56E+01	0/1	3.56E+03	0/1	0/1	0.007 - 0.007
RADS	Technetium-99	pCi/g	3.00E-02	3.00E-02	3.00E-02	0/1	1/1	0/1	2.50E+00	0/1	1.11E+03	0/1	1.11E+05	0/1	0/1	0.43 - 0.43
RADS	Thorium-228	pCi/g	7.20E-01	7.20E-01	7.20E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.04 - 0.04
RADS	Thorium-230	pCi/g	7.30E-01	7.30E-01	7.30E-01	0/1	1/1	0/1	1.50E+00	0/1	4.49E+01	0/1	4.49E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	7.20E-01	7.20E-01	7.20E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Uranium-234	pCi/g	1.47E+00	1.47E+00	1.47E+00	0/1	1/1	1/1	1.20E+00	0/1	6.25E+01	0/1	6.25E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	1.11E-01	1.11E-01	1.11E-01	0/1	1/1	1/1	6.00E-02	0/1	9.12E-01	0/1	9.12E+01	0/1	0/1	0.025 - 0.025
RADS	Uranium-238	pCi/g	6.43E+00	6.43E+00	6.43E+00	0/1	1/1	1/1	1.20E+00	1/1	4.02E+00	0/1	4.02E+02	0/1	1/1	0.02 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

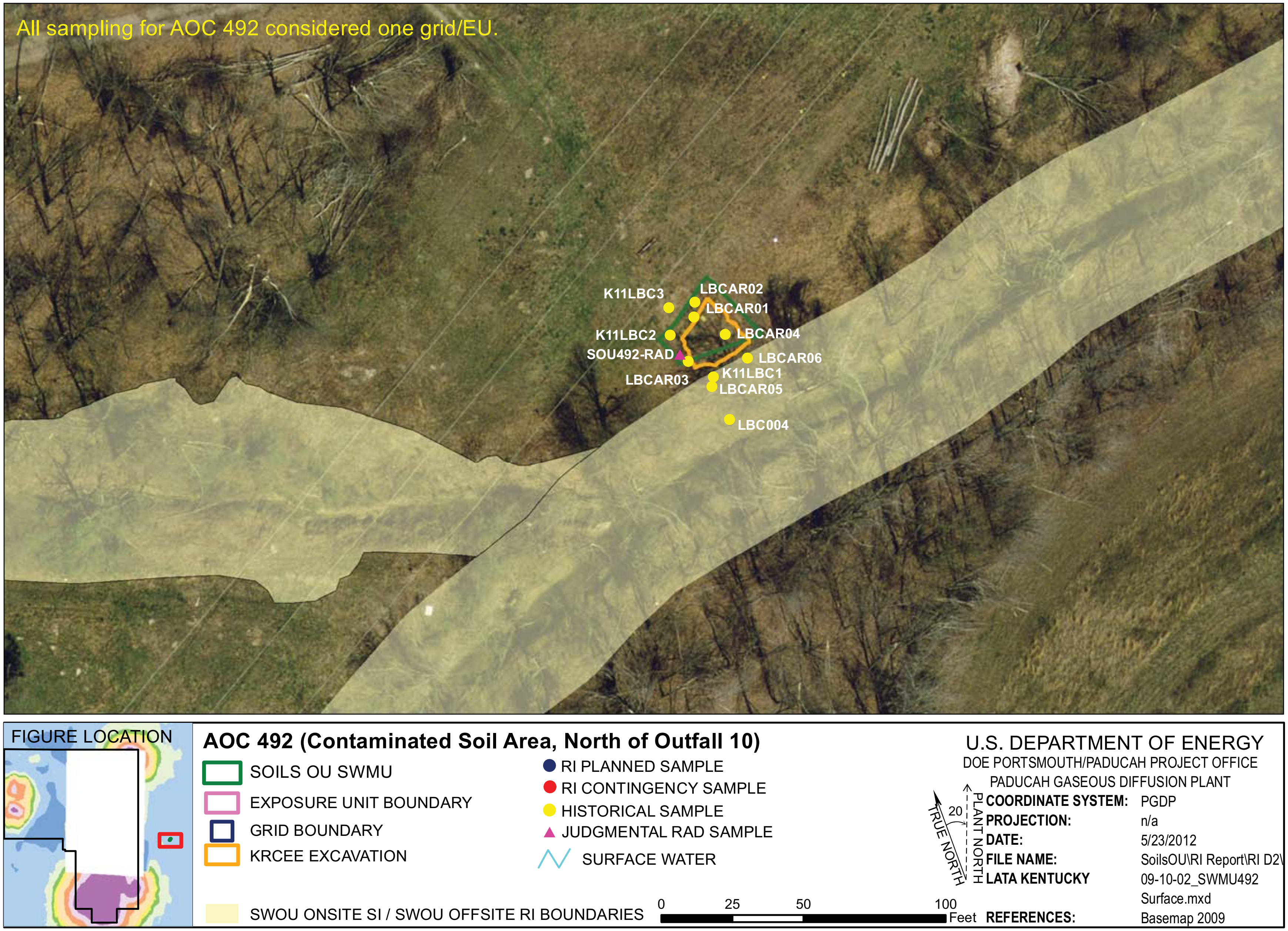


Figure 9.8.2. AOC 492 Sample Locations - Surface Soil

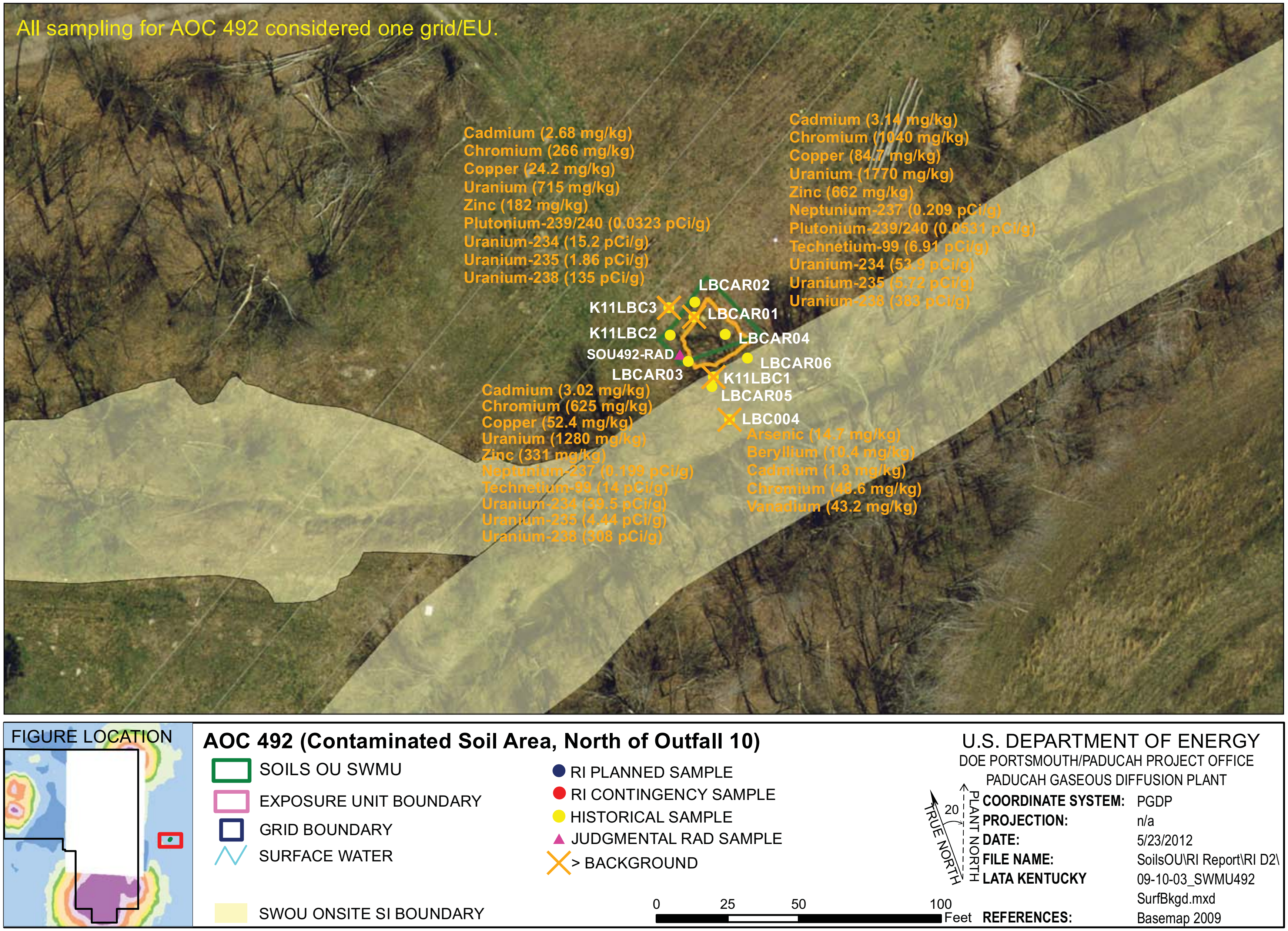


Figure 9.8.3. AOC 492 Background Exceedances - Surface Soil

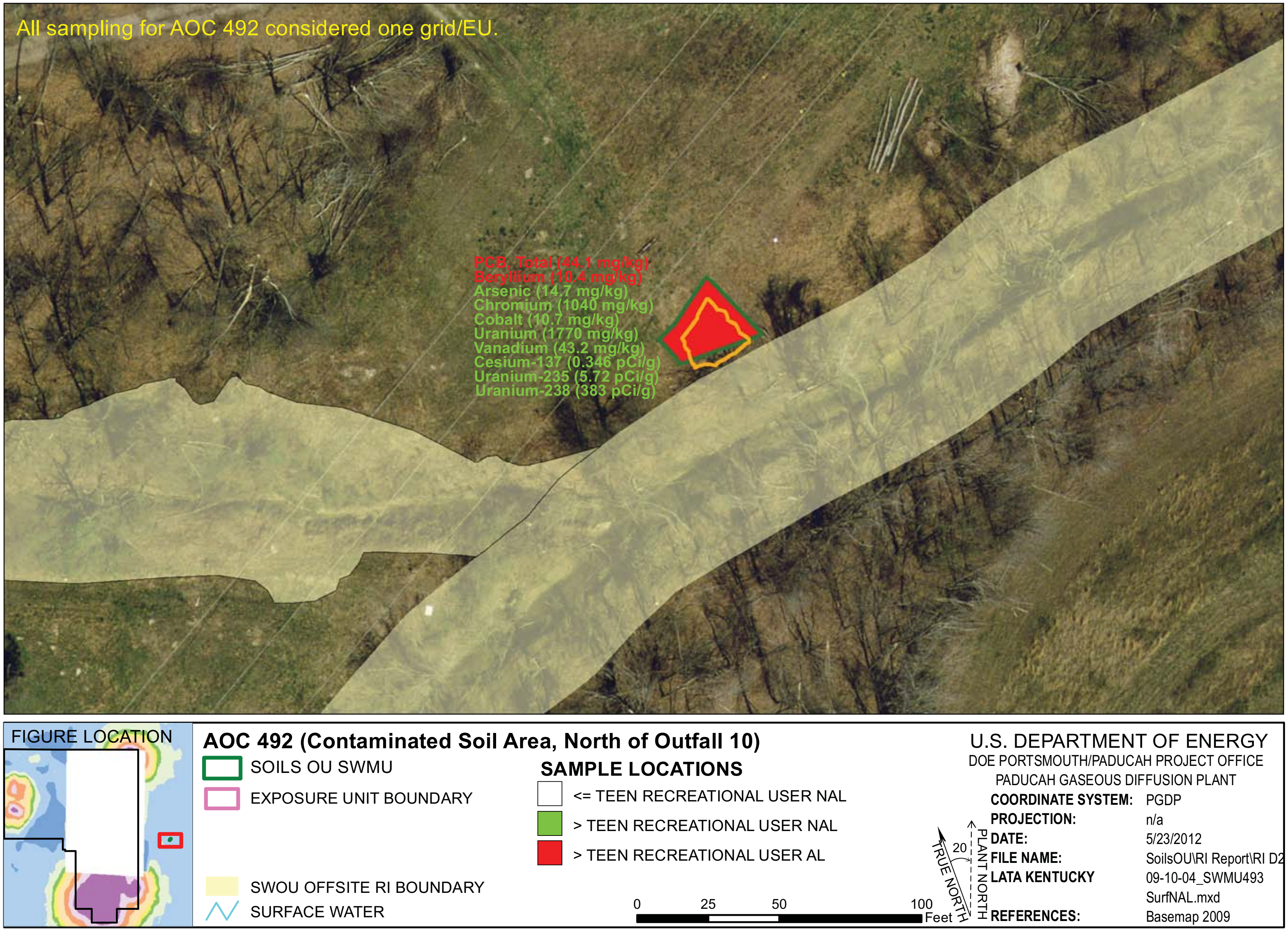


Figure 9.8.4. AOC 492 NAL Exceedances - Surface Soil

below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of AOC 492 surface soil contamination is considered adequately defined for support the BRA and FS. AOC 492 consists of one grid and one EU.

Metals

Metals were detected above the teen recreator NALs in the AOC 492 surface soil. Metals detected at or above both the background screening levels and the teen recreator NALs in the single grid were arsenic, beryllium, chromium, uranium, and vanadium.

Grid 1 is located within the administrative boundary of AOC 492.

Beryllium was detected above both the background screening level and the teen recreator AL in the AOC 492 surface soil.

The following metals were detected in the AOC 492 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater: arsenic, beryllium, cadmium, copper, uranium, vanadium, and zinc. Uranium and vanadium were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the teen recreator NAL, teen recreator AL, and the SSLs for the protection of UCRS and RGA groundwater in the AOC 492 surface soil.

SVOCs

No SVOCs were detected in the AOC 492 surface soil.

VOCs

No VOCs were detected in the AOC 492 surface soil.

Radionuclides

Uranium-235 and uranium-238 were detected at or above both the background screening levels and the teen recreator NALs in the AOC 492 surface soil.

No radionuclides were detected above both the background screening levels and the teen recreator ALs in the AOC 492 surface soil.

Americium-241 (no background value available), neptunium-237, technetium-99 and uranium-238 were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater. Uranium-238 was detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

9.8.4 Nature and Extent of Contamination—Subsurface Soils

For AOC 492, the representative data set for subsurface soils is presented in Table 9.8.3 and provides the nature of the contamination in AOC 492 subsurface soils. Figures 9.8.5–9.8.7 illustrate the horizontal extent. A complete list of detailed sampling results, including depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of AOC 492 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. AOC 492 consists of one grid and one EU.

Metals

No metals were detected at or above both the background screening levels and the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the single grid of the AOC 492 subsurface soil.

PCBs

PCBs were not detected in the AOC 492 subsurface soil.

SVOCs

No SVOCs were detected in the AOC 492 subsurface soil.

VOCs

No subsurface soil samples from AOC 492 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the AOC 492 subsurface soil.

9.8.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport. There is the potential for runoff into Little Bayou Creek, because this SWMU is at the confluence of KPDES Outfall Ditch 011 and Little Bayou Creek; however, AOC 492 is grass-covered or otherwise stabilized and the contaminants are not likely to be transported attached to suspended soil particles. Based on results from the Site Evaluation Report for Soil Pile I (SWMU 561), potential contaminants are not migrating away from the soil piles (DOE 2008d). Soil piles are believed to have similar origin. Outfall 011 was evaluated during the SWOU SI (DOE 2008a). The SWOU On-Site achieved the cleanup goals determined for that removal action. A remedial action for these areas will be addressed as described in the SMP. Little Bayou Creek is scheduled to be investigated as part of the SWOU. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

Table 9.8.3. Subsurface Soil Historical Data Summary: SWMU 492 Outfall 011 Contaminated Soil Area

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	4.17E+03	4.17E+03	4.17E+03	0/1	1/1	0/1	1.20E+04	0/1	2.77E+04	0/1	8.91E+06	0/1	1/1	19.1 - 19.1
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	1.78E+00	0/1	1.90E+03	0/1	0/1	6.2 - 6.2
METAL	Arsenic	mg/kg	2.76E+00	2.76E+00	2.76E+00	0/1	1/1	0/1	7.90E+00	1/1	1.02E+00	0/1	1.02E+02	0/1	1/1	0.956 - 0.956
METAL	Barium	mg/kg	5.65E+01	5.65E+01	5.65E+01	0/1	1/1	0/1	1.70E+02	0/1	4.15E+02	0/1	4.58E+05	0/1	0/1	2.39 - 2.39
METAL	Beryllium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	6.90E-01	0/1	1.29E-02	0/1	8.65E+00	0/1	0/1	0.478 - 0.478
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	3.14E+00	0/1	3.14E+02	0/1	0/1	0.478 - 0.478
METAL	Calcium	mg/kg	1.22E+03	1.22E+03	1.22E+03	0/1	1/1	0/1	6.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	95.6 - 95.6
METAL	Chromium	mg/kg	6.20E+00	6.20E+00	6.20E+00	0/6	1/6	0/6	4.30E+01	0/6	7.15E+01	0/6	7.15E+03	0/6	0/6	2.39 - 2.39
METAL	Cobalt	mg/kg	3.34E+00	3.34E+00	3.34E+00	0/1	1/1	0/1	1.30E+01	0/1	8.45E+00	0/1	3.29E+03	1/1	1/1	0.956 - 0.956
METAL	Copper	mg/kg	4.99E+00	4.99E+00	4.99E+00	0/1	1/1	0/1	2.50E+01	0/1	1.13E+03	0/1	4.75E+05	0/1	0/1	2.39 - 2.39
METAL	Iron	mg/kg	6.91E+03	6.91E+03	6.91E+03	0/1	1/1	0/1	2.80E+04	0/1	1.98E+04	0/1	8.31E+06	1/1	1/1	19.1 - 19.1
METAL	Lead	mg/kg	8.58E+00	1.76E+01	1.19E+01	0/6	6/6	0/6	2.30E+01	0/6	4.00E+02	0/6	4.00E+02	0/6	2/6	0.956 - 0.956
METAL	Magnesium	mg/kg	5.57E+02	5.57E+02	5.57E+02	0/1	1/1	0/1	2.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	4.78 - 4.78
METAL	Manganese	mg/kg	3.84E+02	3.84E+02	3.84E+02	0/1	1/1	0/1	8.20E+02	0/1	3.47E+03	0/1	2.94E+05	1/1	1/1	2.39 - 2.39
METAL	Mercury	mg/kg	1.70E-02	1.70E-02	1.70E-02	0/1	1/1	0/1	1.30E-01	0/1	6.25E-01	0/1	7.88E+02	0/1	0/1	0.014 - 0.014
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.42E+02	0/1	5.94E+04	0/1	0/1	4.78 - 4.78
METAL	Nickel	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.20E+01	0/1	2.98E+01	0/1	3.07E+04	0/1	0/1	4.78 - 4.78
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	7.00E-01	0/1	1.42E+02	0/1	5.93E+04	0/1	0/1	0.956 - 0.956
METAL	Silver	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.70E+00	0/1	7.45E+00	0/1	8.07E+03	0/1	0/1	1.55 - 1.55
METAL	Sodium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	3.40E+02	0/1	n/a	0/1	n/a	n/a	n/a	191 - 191
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	3.40E-01	0/1	2.27E+00	0/1	9.50E+02	0/1	0/1	1.91 - 1.91
METAL	Uranium	mg/kg	1.03E+00	1.03E+00	1.03E+00	0/6	1/6	0/6	4.60E+00	0/6	8.49E+01	0/6	3.50E+04	0/6	0/6	0.956 - 0.956
METAL	Vanadium	mg/kg	1.03E+01	1.03E+01	1.03E+01	0/1	1/1	0/1	3.70E+01	1/1	1.04E-01	0/1	7.61E+01	1/1	1/1	2.39 - 2.39
METAL	Zinc	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	6.00E+01	0/1	8.50E+03	0/1	3.56E+06	0/1	0/1	19.1 - 19.1
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	1.83E-01	0/6	1.83E+01	0/6	0/6	0.13 - 0.13
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.87E+02	0/1	1.76E+04	0/1	0/1	0.48 - 0.48
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.48 - 0.48
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.25E+03	0/1	9.74E+04	0/1	0/1	0.48 - 0.48
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.48 - 0.48
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.47E+02	0/1	1.34E+04	0/1	0/1	0.48 - 0.48
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.19E+02	0/1	1.26E+04	0/1	0/1	0.48 - 0.48
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.27E+00	0/1	5.27E+02	0/1	0/1	0.48 - 0.48
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.48 - 0.48
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.35E+02	0/1	1.00E+04	0/1	0/1	0.48 - 0.48
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.57E-02	0/6	5.57E+00	0/6	0/6	0.2 - 0.2
RADS	Americium-241	pCi/g	3.20E-03	3.20E-03	3.20E-03	0/1	1/1	0/1	n/a	0/1	1.28E+01	0/1	1.28E+03	0/1	0/1	0.0221 - 0.0221
RADS	Cesium-137	pCi/g	2.79E-02	2.79E-02	2.79E-02	0/1	1/1	0/1	2.80E-01	0/1	1.98E-01	0/1	1.98E+01	0/1	0/1	0.082 - 0.082
RADS	Neptunium-237	pCi/g	-3.47E-03	-3.47E-03	-3.47E-03	0/1	1/1	0/1	n/a	0/1	6.26E-01	0/1	6.26E+01	0/1	0/1	0.0475 - 0.0475
RADS	Plutonium-238	pCi/g	-2.79E-03	-2.79E-03	-2.79E-03	0/1	1/1	0/1	n/a	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.0111 - 0.0111
RADS	Plutonium-239/240	pCi/g	-8.91E-04	-8.91E-04	-8.91E-04	0/1	1/1	0/1	n/a	0/1	3.56E+01	0/1	3.56E+03	0/1	0/1	0.0123 - 0.0123
RADS	Technetium-99	pCi/g	-3.46E-02	-3.46E-02	-3.46E-02	0/1	1/1	0/1	2.80E+00	0/1	1.11E+03	0/1	1.11E+05	0/1	0/1	0.662 - 0.662
RADS	Thorium-228	pCi/g	3.34E-01	3.34E-01	3.34E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.0855 - 0.0855
RADS	Thorium-230	pCi/g	1.92E-01	1.92E-01	1.92E-01	0/1	1/1	0/1	1.40E+00	0/1	4.49E+01	0/1	4.49E+03	0/1	0/1	0.0566 - 0.0566

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.8.3. Subsurface Soil Historical Data Summary: SWMU 492 Outfall 011 Contaminated Soil Area (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
RADS	Thorium-232	pCi/g	3.51E-01	3.51E-01	3.51E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.0354 - 0.0354
RADS	Uranium-234	pCi/g	1.64E-01	1.64E-01	1.64E-01	0/1	1/1	0/1	1.20E+00	0/1	6.25E+01	0/1	6.25E+03	0/1	0/1	0.112 - 0.112
RADS	Uranium-235	pCi/g	3.12E-03	3.12E-03	3.12E-03	0/1	1/1	0/1	6.00E-02	0/1	9.12E-01	0/1	9.12E+01	0/1	0/1	0.0152 - 0.0152
RADS	Uranium-238	pCi/g	2.34E-01	2.34E-01	2.34E-01	0/1	1/1	0/1	1.20E+00	0/1	4.02E+00	0/1	4.02E+02	0/1	0/1	0.0984 - 0.0984

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

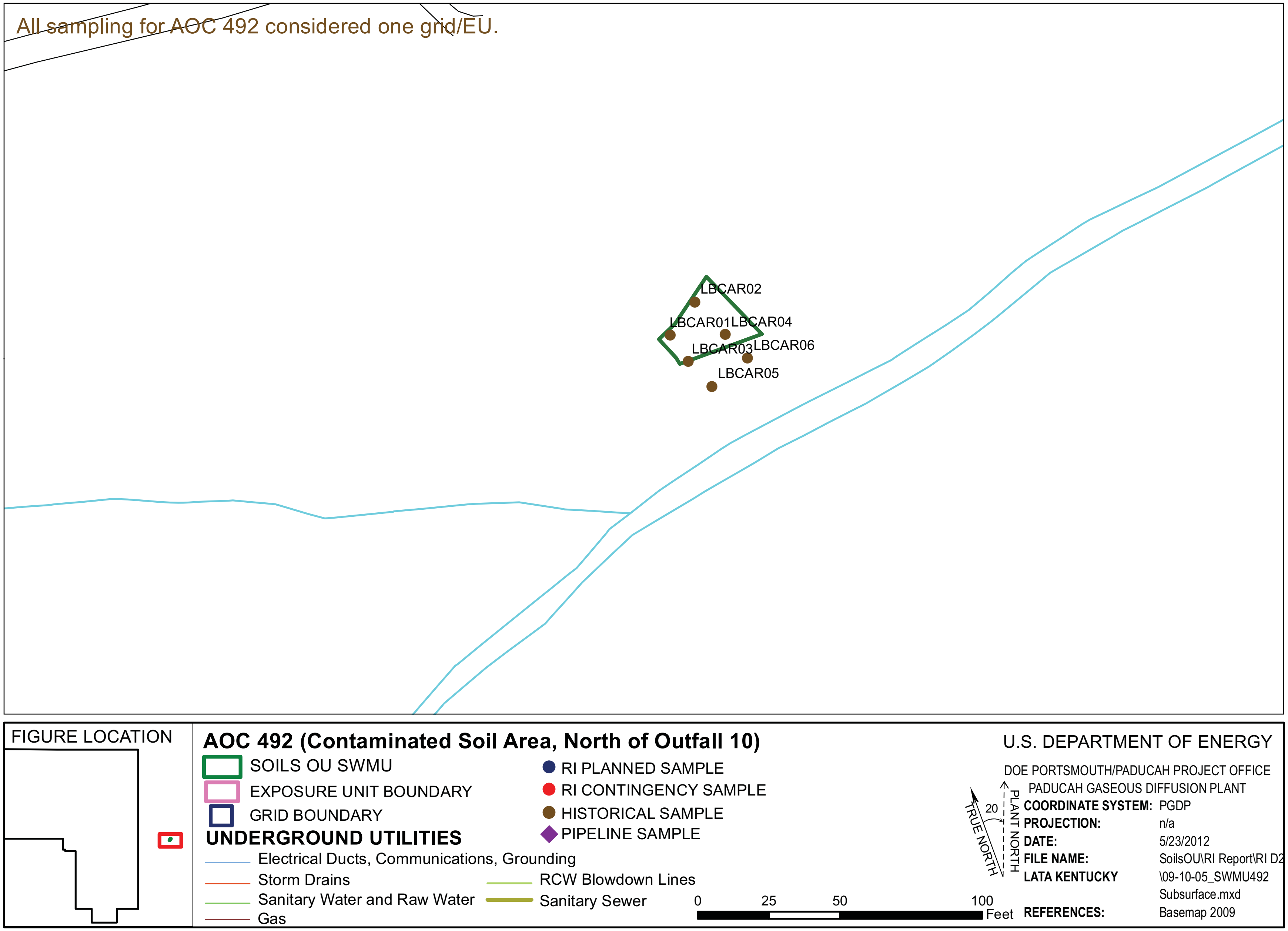


Figure 9.8.5. AOC 492 Sample Locations - Subsurface Soil

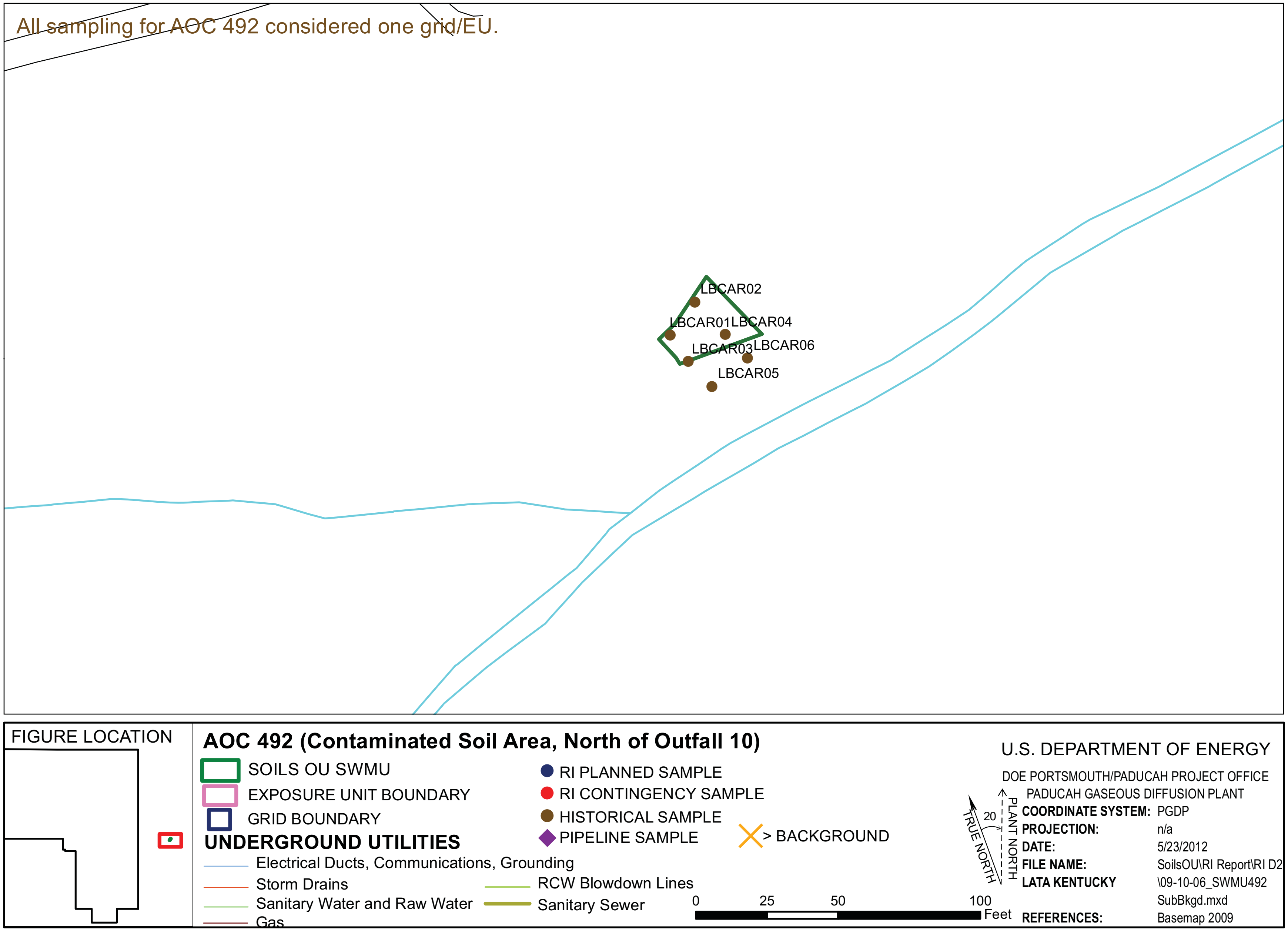


Figure 9.8.6. AOC 492 Background Exceedances - Subsurface Soil

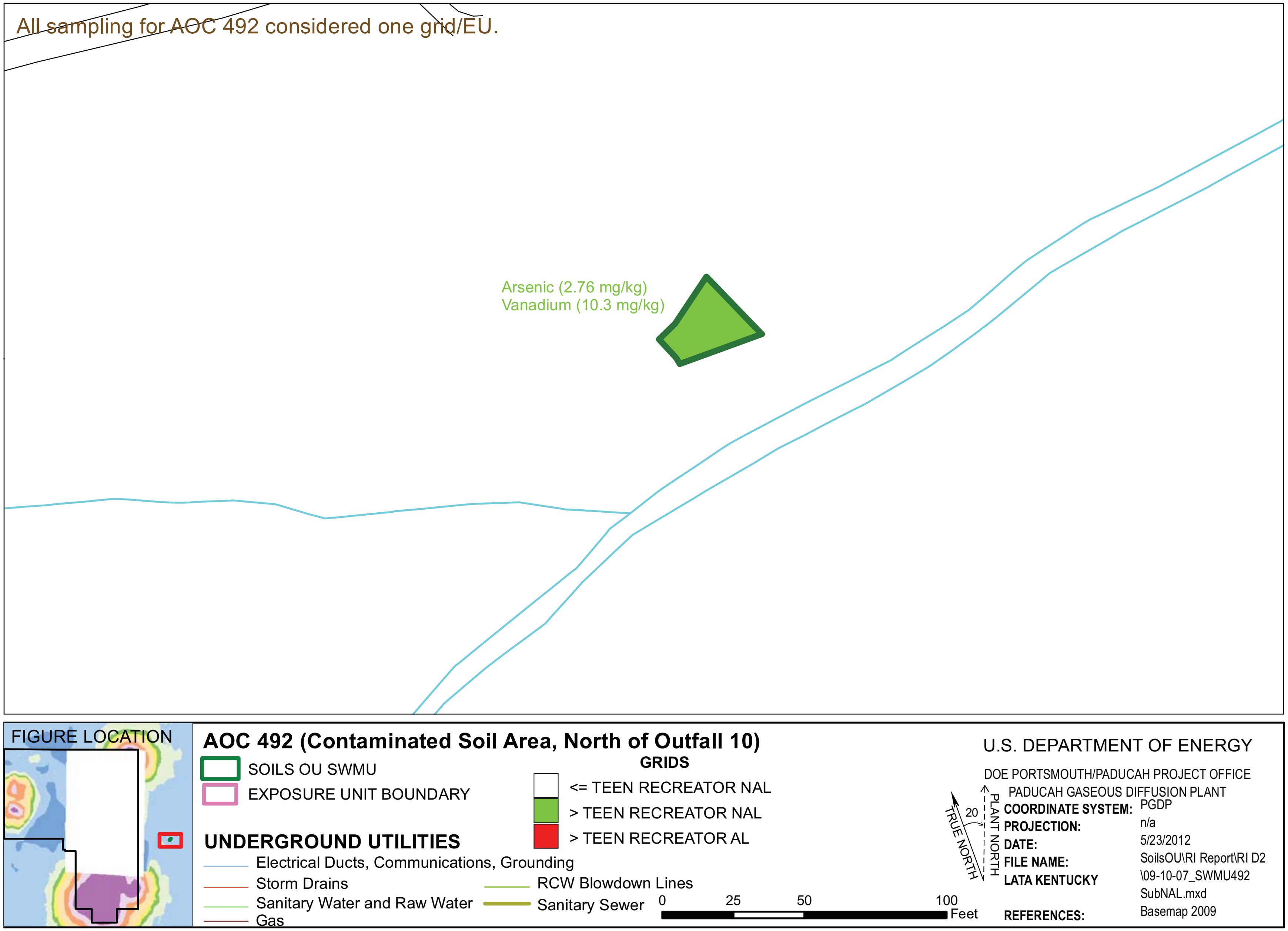


Figure 9.8.7. AOC 492 NAL Exceedances - Subsurface Soil

9.8.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for AOC 492 are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for AOC 492 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this AOC will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.8.4 for the outdoor worker (exposed to surface soils), the excavation worker, the hypothetical resident, and the teen recreational user. Table 9.8.4 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this AOC under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for AOC 492 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 9.8.5.

Table 9.8.4. RGOs for AOC 492

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Outdoor Worker (exposed to surface soil)											
1	Arsenic	1.47E+01	mg/kg	3.5E-05	4.15E-01	4.15E+00	4.15E+01	0.2	6.65E+00	6.65E+01	1.99E+02
	Chromium	1.04E+03	mg/kg	2.6E-05	4.08E+01	4.08E+02	4.08E+03	< 0.1	n/a	n/a	n/a
	PCB, Total	4.41E+01	mg/kg	2.7E-04	1.62E-01	1.62E+00	1.62E+01	< 0.1	n/a	n/a	n/a
	Uranium	1.77E+03	mg/kg	< 1E-06	n/a	n/a	n/a	2.1	8.61E+01	8.61E+02	2.58E+03
	Uranium-234	5.39E+01	pCi/g	1.9E-05	2.83E+00	2.83E+01	2.83E+02	n/a	n/a	n/a	n/a
	Uranium-235	5.72E+00	pCi/g	1.3E-05	4.55E-01	4.55E+00	4.55E+01	n/a	n/a	n/a	n/a
	Uranium-238	3.83E+02	pCi/g	3.3E-04	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.9E-04**				**2.3**			
Excavation Worker											
1	PCB, Total	4.41E+01	mg/kg	3.4E-06	1.30E+01	1.30E+02	1.30E+03	< 0.1	n/a	n/a	n/a
	Uranium-238	3.83E+02	pCi/g	4.1E-06	9.38E+01	9.38E+02	9.38E+03	n/a	n/a	n/a	n/a
	Cumulative			**7.5E-06**				**< 1**			
Hypothetical Resident[5]											
1	Arsenic	1.47E+01	mg/kg	6.2E-05	2.35E-01	2.35E+00	2.35E+01	0.9	1.64E+00	1.64E+01	4.93E+01
	Chromium	1.04E+03	mg/kg	6.7E-05	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Neptunium-237	2.09E-01	pCi/g	3.9E-06	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	PCB, Total	4.41E+01	mg/kg	6.9E-04	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Uranium	1.77E+03	mg/kg	< 1E-06	n/a	n/a	n/a	7.6	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	5.39E+01	pCi/g	1.1E-05	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	5.72E+00	pCi/g	7.3E-05	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	3.83E+02	pCi/g	1.1E-03	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Vanadium	4.32E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	3.91E+01	3.91E+02	1.17E+03
	Cumulative			**2.0E-03**				**8.6**			
Teen Recreational User											
1	Arsenic	1.47E+01	mg/kg	8.3E-06	1.77E+00	1.77E+01	1.77E+02	< 1	n/a	n/a	n/a
1	Chromium	1.04E+03	mg/kg	6.3E-06	1.65E+02	1.65E+03	1.65E+04	< 1	n/a	n/a	n/a
1	PCB, Total	4.41E+01	mg/kg	1.5E-04	2.99E-01	2.99E+00	2.99E+01	< 1	n/a	n/a	n/a
1	Uranium-235	5.72E+00	pCi/g	3.0E-06	1.90E+00	1.90E+01	1.90E+02	n/a	n/a	n/a	n/a
1	Uranium-238	3.83E+02	pCi/g	4.5E-05	8.56E+00	8.56E+01	8.56E+02	n/a	n/a	n/a	n/a
	Cumulative			**2.1E-04**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.64, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.64, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 9.8.5 Ecological Screening for AOC 492

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg) [b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Grassy	Yes	2641	Chromium	1.60E+01	1.04E+03	2.60E+01	40
			PCB, Total	n/a	4.41E+01	2.00E-02	2205
			Uranium	4.90E+00	1.77E+03	5.00E+00	354
			Zinc	6.50E+01	6.62E+02	4.60E+01	14

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

9.8.7 AOC 492 Summary

The following text summarizes the results for AOC 492 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

The most likely plant process that resulted in contamination at AOC 492 is dredging Little Bayou Creek to keep it clear for PGDP drainage. Discharges from the east side of PGDP flow into plant drainage ditches that flow into Little Bayou Creek.

COPCs for surface and subsurface soils from AOC 492 are shown on Tables 9.8.1–9.8.3 as those analytes with green boxes under the "Teen Recreator/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The COPCs identified in surface soil for AOC 492 are metals, PCBs, and radioisotopes. No COPCs were identified for subsurface soil. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 1 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at AOC 492 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at AOC 492. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soil), excavation worker, hypothetical residential, and teen recreational user scenarios. COCs for these scenarios for AOC 492 are as follows:

- Outdoor worker (exposed to surface soil)
  - Arsenic
  - Chromium
  - Total PCBs
  - Uranium
  - Uranium-234

- Uranium-235
- Uranium-238

- Excavation worker

  - Total PCBs
  - Uranium-238

- Hypothetical Resident (hazards evaluated against the child resident)

  - Arsenic
  - Chromium
  - Neptunium-237
  - Total PCBs
  - Uranium
  - Uranium-234
  - Uranium-235
  - Uranium-238
  - Vanadium

- Teen Recreational User

  - Arsenic
  - Chromium
  - Total PCBs
  - Uranium-235
  - Uranium-238

Of the above, Total PCBs, uranium, and uranium-238 for the outdoor worker (exposed to surface soil) and the hypothetical resident and Total PCBs for the teen recreational user are priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04). Priority COCs for other scenarios are described in Appendix D. Figure 9.8.8 also shows the COCs exceeding RGOs for the teen recreator.

For AOC 492, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Chromium
- Total PCBs
- Uranium
- Zinc

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for AOC 492 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. AOC 492 is near the confluence of Little Bayou Creek and SWMU 67, C-375-E4 Effluent Ditch (C-340 Ditch), which is part of the SWOU. SWMU 67 was the subject of a CERCLA removal action in 2010. Because the most highly contaminated soils have been excavated as part of the real-time technology demonstration, additional response actions at AOC 492 would not have an impact on other integrator OUs. The Addendum 1B SER (DOE 2009d) stated that PGDP monitoring data indicates that little to no

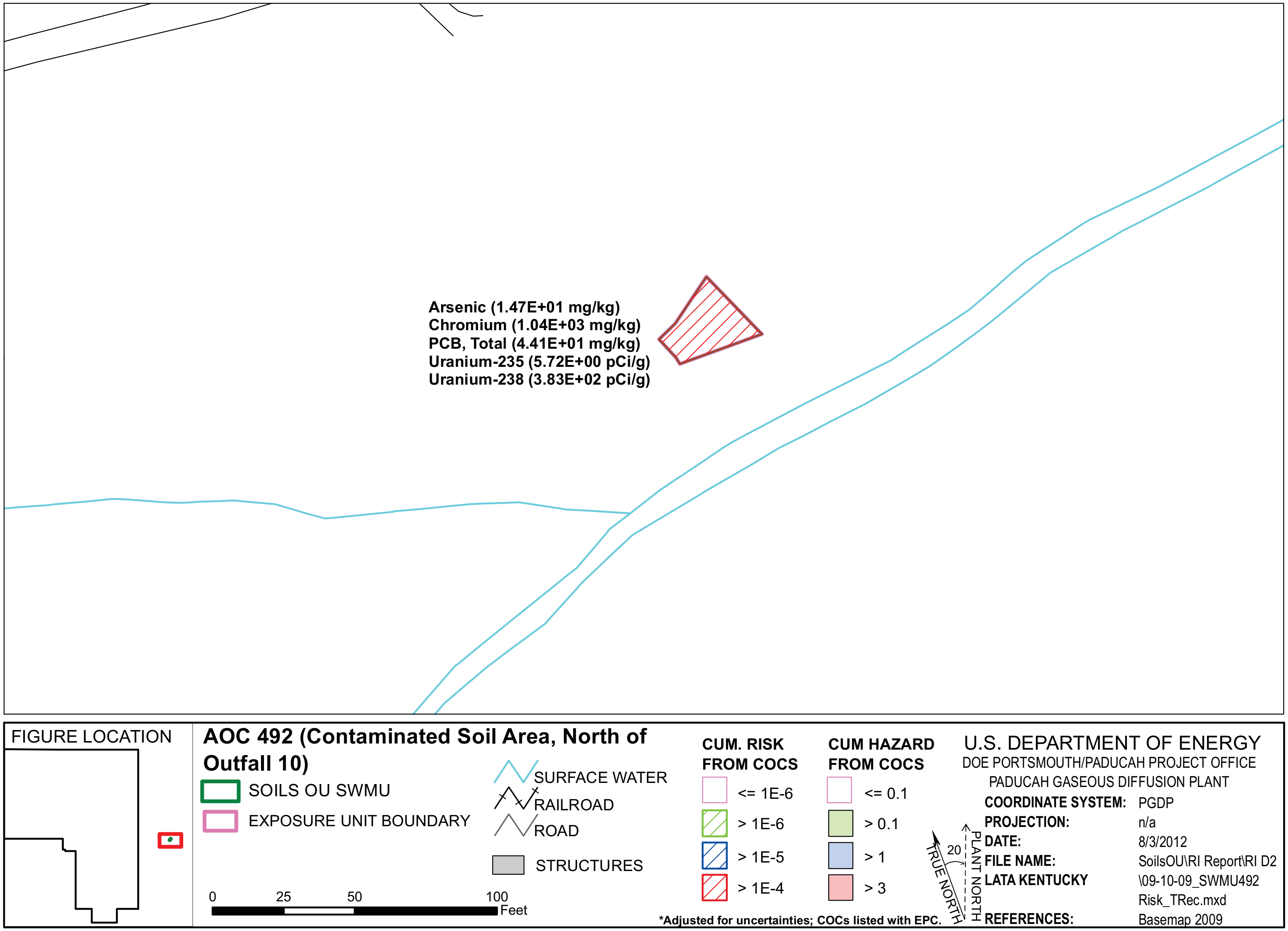


Figure 9.8.8. Summary of COCs Contributing to Risk to the Teen Recreator at AOC 492

migration has taken place to date from these piles. Because of this, a response action at these piles would have no effect on the surface water integrator OU.

9.8.8 AOC 492 Conclusion

The RI adequately defined the nature and extent of contamination in soils at AOC 492; an FS is appropriate for the AOC due to risk exceeding the decision rule benchmark for scenarios including outdoor worker (exposed to surface soil), excavation worker, hypothetical resident, and teen recreational user (DOE 2010a). The reasonably anticipated future land use for AOC 492 is recreational as shown in the SMP (DOE 2012a).

9.9 SWMU 493, CONCRETE RUBBLE PILES NEAR OUTFALL 001

9.9.1 Background

In 2001, the PGDP remediation subcontractor constructed the C-613 Sedimentation Basin, which is a storm water control facility for the watershed that drains the northwest corner scrap yards. The purpose of the basin was to catch contaminated surface soil loosened from disturbing the piles of scrap metal that were located in the scrap yards at the time and to prevent the contaminated soil from being transported off-site. In November 2001, the construction subcontractor came upon an area of concrete rubble between the west side of the C-613 Basin and a small creek that connected the C-616 Lagoons with the East-West Diversion Ditch, just north of the KPDES Outfall 001. Today this area is known as SWMU 493. The two piles making up SWMU 493 are approximately 450 ft^2 and 270 ft^2. The concrete rubble piles appear to have been placed along the bank for erosion control. It is unknown where the rubble originated, but it is assumed to have come from the PGDP.

The concrete was surveyed by HP and some of the debris items were found to be radiologically contaminated. These items were removed for later sampling. The material not removed by HP was excavated, placed into a dump truck, and moved to an area just south of the KPDES Outfall Ditch 001 called SWMU 474.

Per a request from Kentucky, the first foot of soil under the concrete was excavated, relocated to SWMU 474, and placed on plastic. After removal of the concrete, excavation and relocation of the first foot of soil began; the excavated soil was surveyed routinely throughout the excavation. Pieces of metal shavings and filings, such as that from a machine shop, and other pieces of scrap metal, along with a few gaskets and litter, were discovered in the relocated soil. Some fixed radiological activity was present on these materials, but was below release limits. These items were surveyed, packaged, and placed into proper storage. As a result of this discovery, the excavation of the SWMU 493 area was discontinued and the site inspected visually. Minute amounts of metal shavings, filings, and litter were observed on the ground. In addition, a valve cap was discovered. Fixed radiological contamination was detected on the valve cap. The valve cap was removed from the area, packaged, and placed into proper storage. The area was radiologically posted.

In February 2002, sampling requests were made to sample the soil and debris. Although the sampling requests and plans were for sampling the waste where it was discovered, the field notes and subsequent reports describe sampling waste in the location where it was relocated, SWMU 474. The sampling request included analysis for full radiological constituents, PCBs, bulk metals, bulk VOCs, and bulk SVOCs.

Ten soil samples were collected in February and March 2002 and analyzed for metals, PCBs, radionuclides, SVOCs, and VOCs. The detection limits were sufficiently low enough to ensure that Toxicity Characteristic Leaching procedure (TCLP) thresholds would not be exceeded. Low concentrations of PCBs; an SVOC, di-n-butyl-phthalate; and a VOC, methylene chloride, were detected in a small number of samples. No RCRA-hazardous constituents were detected in any soil samples from the waste removed from SWMU 493 and relocated to SWMU 474.

There also were samples collected from metal shavings, concrete, fiber board, a fire blanket, and a "black piece of material." None of these samples indicated that the wastes should be either RCRA-hazardous or TSCA-regulated. The detection limits of these samples also were sufficiently low enough to ensure that TCLP thresholds would not be exceeded.

9.9.2 Fieldwork Summary

There were no planned soil samples from within the boundary of SWMU 493 per the Work Plan (DOE 2010a). Two grid sample locations for both surface and subsurface were planned and collected from the soil pile that was excavated from SWMU 493, but now located at SWMU 474. One sample from each horizon was selected randomly and submitted for fixed-base laboratory analysis. These samples will not be used within this RI to evaluate SWMU 493; however, they will be used to evaluate SWMU 474 under the Soils and Slabs OU.

The SWMU underwent a gamma radiological walkover survey (Figure 9.9.1) using a FIDLER; the 1,632 measurements ranged from 4,171 to 39,511 gross cpm. The survey included the area within the SWMU 493 boundary and the excavated soil pile located in SWMU 474. A judgmental grab sample was collected from the excavated soil pile for radiological constituents. The judgmental sample and gamma radiological walkover survey of the excavated soil pile will not be used within this RI to evaluate SWMU 493; however, they will be used to evaluate SWMU 474 under the Soils and Slabs OU. The area within SWMU 474 consists of concrete rubble with soil. The area within SWMU 493 consists of gravel/rip rap.

9.9.3 Nature and Extent of Contamination—Surface Soils

For SWMU 493, the representative data set for surface soils is presented in Tables 9.9.1 and 9.9.2 and provides the nature of the contamination in SWMU 493 surface soils. Figures 9.9.2–9.9.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 493 surface soil contamination is considered adequately defined for supporting the BRA and FS using historical *in situ* sampling data. Additionally, the gamma radiological walkover survey provided input to the horizontal extent of surface soil contamination. SWMU 493 consists of one grid and one EU.

Metals

Metals were detected above the teen recreator NALs in the SWMU 493 surface soil. Metals detected at or above both the background screening levels and the teen recreator NALs in the single grid were beryllium, cobalt, manganese, nickel, and vanadium.

No metals were detected above both the background screening levels and the teen recreator ALs in the SWMU 493 surface soil.

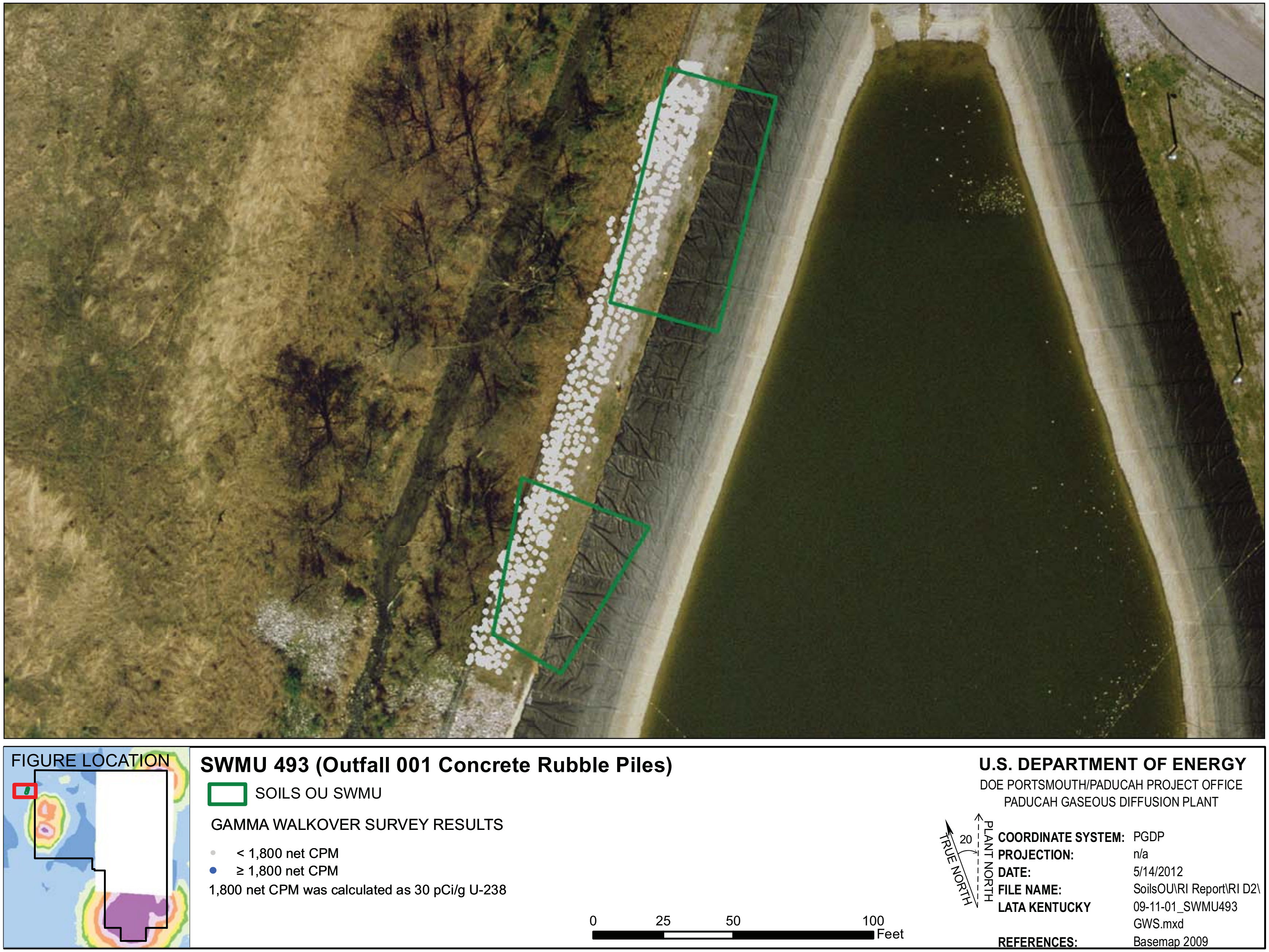


Figure 9.9.1. SWMU 493 Gamma Walkover Survey

Table 9.9.1. Surface Soil Historical Data Summary: SWMU 493 Concrete Rubble Piles

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.27E+03	1.44E+04	9.92E+03	0/20	20/20	1/20	1.30E+04	0/20	2.77E+04	0/20	8.91E+06	0/20	20/20	20 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	2.10E-01	0/20	1.78E+00	0/20	1.90E+03	0/20	0/20	20 - 20
METAL	Arsenic	mg/kg	5.27E+00	1.18E+01	7.89E+00	0/20	11/20	0/20	1.20E+01	11/20	1.02E+00	0/20	1.02E+02	0/20	11/20	5 - 5
METAL	Barium	mg/kg	4.05E+01	4.04E+02	9.43E+01	0/20	20/20	1/20	2.00E+02	0/20	4.15E+02	0/20	4.58E+05	0/20	6/20	2.5 - 5
METAL	Beryllium	mg/kg	5.22E-01	9.91E-01	7.19E-01	0/20	9/20	4/20	6.70E-01	9/20	1.29E-02	0/20	8.65E+00	0/20	0/20	0.5 - 0.5
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	2.10E-01	0/20	3.14E+00	0/20	3.14E+02	0/20	0/20	2 - 2
METAL	Calcium	mg/kg	1.15E+03	1.56E+05	2.64E+04	0/20	20/20	0/20	2.00E+05	0/20	n/a	0/20	n/a	n/a	n/a	200 - 2000
METAL	Chromium	mg/kg	7.38E+00	6.61E+01	1.62E+01	0/20	20/20	4/20	1.60E+01	0/20	7.15E+01	0/20	7.15E+03	0/20	0/20	2.5 - 2.5
METAL	Cobalt	mg/kg	2.61E+00	3.79E+01	5.97E+00	0/20	19/20	1/20	1.40E+01	1/20	8.45E+00	0/20	3.29E+03	19/20	19/20	2.5 - 2.5
METAL	Copper	mg/kg	4.41E+00	9.87E+01	1.32E+01	0/20	20/20	2/20	1.90E+01	0/20	1.13E+03	0/20	4.75E+05	0/20	1/20	2.5 - 2.5
METAL	Iron	mg/kg	6.42E+03	2.41E+04	1.34E+04	0/20	20/20	0/20	2.80E+04	3/20	1.98E+04	0/20	8.31E+06	20/20	20/20	20 - 20
METAL	Lead	mg/kg	3.61E+01	4.79E+01	4.20E+01	0/20	2/20	2/20	3.60E+01	0/20	4.00E+02	0/20	4.00E+02	0/20	2/20	20 - 200
METAL	Magnesium	mg/kg	8.55E+02	8.60E+03	1.87E+03	0/20	20/20	1/20	7.70E+03	0/20	n/a	0/20	n/a	n/a	n/a	2.5 - 15
METAL	Manganese	mg/kg	1.66E+02	3.55E+03	4.62E+02	0/20	20/20	1/20	1.50E+03	1/20	3.47E+03	0/20	2.94E+05	20/20	20/20	2.5 - 10
METAL	Mercury	mg/kg	2.60E-01	2.60E-01	2.60E-01	0/20	1/20	1/20	2.00E-01	0/20	6.25E-01	0/20	7.88E+02	0/20	1/20	0.2 - 0.2
METAL	Nickel	mg/kg	5.91E+00	2.13E+02	2.41E+01	0/20	20/20	2/20	2.10E+01	2/20	2.98E+01	0/20	3.07E+04	1/20	20/20	5 - 5
METAL	Selenium	mg/kg	1.06E+00	1.31E+00	1.15E+00	0/20	5/20	5/20	8.00E-01	0/20	1.42E+02	0/20	5.93E+04	0/20	5/20	1 - 1
METAL	Silver	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	2.30E+00	0/20	7.45E+00	0/20	8.07E+03	0/20	0/20	2.5 - 4
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	2.10E-01	0/20	2.27E+00	0/20	9.50E+02	0/20	0/20	20 - 20
METAL	Uranium	mg/kg	n/a	n/a	n/a	0/20	0/20	0/20	4.90E+00	0/20	8.49E+01	0/20	3.50E+04	0/20	0/20	100 - 2000
METAL	Vanadium	mg/kg	1.11E+01	4.05E+01	2.49E+01	0/20	20/20	1/20	3.80E+01	20/20	1.04E-01	0/20	7.61E+01	20/20	20/20	2.5 - 2.5
METAL	Zinc	mg/kg	2.02E+01	7.59E+01	3.62E+01	0/20	18/20	1/20	6.50E+01	0/20	8.50E+03	0/20	3.56E+06	0/20	18/20	10 - 200
PPCB	PCB, Total	mg/kg	1.80E-01	2.60E-01	2.20E-01	0/13	2/13	0/13	n/a	1/13	1.83E-01	0/13	1.83E+01	0/13	2/13	0.06 - 0.1
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	0/13	0/13	0.46 - 0.5
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	0/13	0/13	0.46 - 0.5
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	0/13	0/13	0.46 - 0.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	3.35E+00	0/13	1.00E+02	0/13	0/13	0.46 - 0.5
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	5.87E+02	0/13	1.76E+04	0/13	0/13	0.46 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	3.25E+03	0/13	9.74E+04	0/13	0/13	0.46 - 0.5
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.9.1. Surface Soil Historical Data Summary: SWMU 493 Concrete Rubble Piles (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	0/13	0/13	0.46 - 0.5
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	2.61E+01	0/13	2.61E+03	n/a	n/a	0.46 - 0.5
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Di-n-butyl phthalate	mg/kg	7.80E-01	9.80E-01	8.80E-01	4/10	4/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	4.47E+02	0/10	1.34E+04	0/10	0/10	0.46 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	4.19E+02	0/13	1.26E+04	0/13	0/13	0.46 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	1.78E-01	0/10	1.78E+01	0/10	0/10	0.46 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	5.27E+00	0/13	5.27E+02	0/13	0/13	0.46 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	6.10E-02	0/13	6.10E+00	0/13	0/13	0.46 - 0.5
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	0/13	0/13	0.46 - 0.5
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	3.35E+02	0/13	1.00E+04	0/13	0/13	0.46 - 0.5
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.46 - 0.5
SVOA	Total PAH	mg/kg	4.60E-01	5.00E-01	4.86E-01	0/13	13/13	0/13	n/a	13/13	5.57E-02	0/13	5.57E+00	13/13	13/13	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	0/13	0/13	0.01 - 0.01
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	0/13	0/13	0.01 - 0.01
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	9.45E-02	0/13	1.29E+01	0/13	0/13	0.01 - 0.01
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	0/13	0/13	0.01 - 0.01
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.01 - 0.01
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	4.50E+02	0/13	2.11E+04	0/13	0/13	0.01 - 0.01
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.01 - 0.01
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.01 - 0.01
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.01 - 0.01
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.01 - 0.01
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	1.28E+00	0/13	1.91E+02	0/13	0/13	0.01 - 0.01
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	9.30E-01	0/13	1.34E+02	0/13	0/13	0.01 - 0.01
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	0/13	0/13	0.01 - 0.01
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	7.03E+00	0/10	4.84E+02	0/10	0/10	0.01 - 0.01
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	6.11E+00	0/13	8.90E+02	0/13	0/13	0.01 - 0.01
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	8.66E+01	0/13	2.79E+03	0/13	0/13	0.02 - 0.02
VOA	Methylene chloride	mg/kg	3.20E-02	3.20E-02	3.20E-02	1/13	1/13	0/13	n/a	0/13	n/a	0/13	n/a	0/13	1/13	0.01 - 0.01
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	0/13	0/13	0.01 - 0.01
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	3.26E-01	0/13	1.48E+02	0/13	0/13	0.01 - 0.01
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	0/13	0/13	0.01 - 0.01

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.9.1. Surface Soil Historical Data Summary: SWMU 493 Concrete Rubble Piles (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	2.39E+01	0/13	8.87E+02	0/13	0/13	0.01 - 0.01
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	n/a	0/13	n/a	n/a	n/a	0.01 - 0.01
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	9.91E-02	0/13	1.17E+01	0/13	0/13	0.01 - 0.01
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	2.39E-01	0/10	1.02E+02	0/10	0/10	0.01 - 0.01
RADS	Americium-241	pCi/g	-4.40E-02	7.71E-02	-1.08E-03	0/13	13/13	0/13	n/a	0/13	1.28E+01	0/13	1.28E+03	0/13	0/13	0.0647 - 0.108
RADS	Cesium-137	pCi/g	1.49E-02	1.85E-01	7.86E-02	0/13	13/13	0/13	4.90E-01	0/13	1.98E-01	0/13	1.98E+01	0/13	0/13	0.0194 - 0.032
RADS	Cobalt-60	pCi/g	-2.53E-02	1.36E-02	-4.62E-03	0/13	13/13	0/13	n/a	0/13	4.06E-02	0/13	4.06E+00	0/13	0/13	0.0212 - 0.0322
RADS	Neptunium-237	pCi/g	-1.24E-02	1.22E-01	1.21E-02	0/13	13/13	1/13	1.00E-01	0/13	6.26E-01	0/13	6.26E+01	0/13	6/13	0.0319 - 0.0601
RADS	Plutonium-238	pCi/g	-5.14E-02	-1.61E-02	-3.02E-02	0/13	13/13	0/13	7.30E-02	0/13	3.64E+01	0/13	3.64E+03	0/13	0/13	0.191 - 0.216
RADS	Plutonium-239/240	pCi/g	-7.89E-03	4.31E-02	5.44E-03	0/13	13/13	1/13	2.50E-02	0/13	3.56E+01	0/13	3.56E+03	0/13	0/13	0.0367 - 0.0436
RADS	Technetium-99	pCi/g	4.06E-01	3.86E+01	6.18E+00	0/10	10/10	5/10	2.50E+00	0/10	1.11E+03	0/10	1.11E+05	1/10	10/10	3.05 - 3.05
RADS	Thorium-228	pCi/g	2.77E-01	4.19E-01	3.65E-01	0/13	13/13	0/13	1.60E+00	0/13	n/a	0/13	n/a	n/a	n/a	0.0302 - 0.0408
RADS	Thorium-230	pCi/g	3.15E-01	4.42E-01	3.77E-01	0/13	13/13	0/13	1.50E+00	0/13	4.49E+01	0/13	4.49E+03	0/13	13/13	0.14 - 0.223
RADS	Thorium-232	pCi/g	2.99E-01	4.74E-01	3.71E-01	0/13	13/13	0/13	1.50E+00	0/13	n/a	0/13	n/a	n/a	n/a	0.0426 - 0.0632
RADS	Uranium-234	pCi/g	3.86E-01	2.37E+00	9.17E-01	10/13	13/13	2/13	1.20E+00	0/13	6.25E+01	0/13	6.25E+03	0/13	0/13	0.0693 - 0.558
RADS	Uranium-235	pCi/g	2.62E-02	1.65E-01	5.76E-02	0/13	13/13	3/13	6.00E-02	0/13	9.12E-01	0/13	9.12E+01	0/13	0/13	0.0227 - 0.0335
RADS	Uranium-238	pCi/g	7.91E-01	5.50E+00	1.56E+00	10/13	13/13	8/13	1.20E+00	1/13	4.02E+00	0/13	4.02E+02	0/13	1/13	0.132 - 0.655

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.9.2. Surface Soil RI Data Summary: SWMU 493, Concrete Rubble Piles near Outfall 001

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	9.20E+03	9.20E+03	9.20E+03	0/1	1/1	0/1	1.30E+04	0/1	2.77E+04	0/1	8.91E+06	n/a	n/a	6.2 - 6.2
METAL	Antimony	mg/kg	3.10E-01	3.10E-01	3.10E-01	0/1	1/1	1/1	2.10E-01	0/1	1.78E+00	0/1	1.90E+03	0/1	1/1	0.62 - 0.62
METAL	Arsenic	mg/kg	6.34E+00	6.34E+00	6.34E+00	0/2	1/2	0/2	1.20E+01	1/2	1.02E+00	0/2	1.02E+02	0/2	1/2	1.2 - 11
METAL	Barium	mg/kg	1.07E+02	1.07E+02	1.07E+02	0/1	1/1	0/1	2.00E+02	0/1	4.15E+02	0/1	4.58E+05	0/1	1/1	2.5 - 2.5
METAL	Beryllium	mg/kg	5.50E-01	5.50E-01	5.50E-01	0/1	1/1	0/1	6.70E-01	1/1	1.29E-02	0/1	8.65E+00	0/1	0/1	0.12 - 0.12
METAL	Cadmium	mg/kg	1.00E-01	1.00E-01	1.00E-01	0/1	1/1	0/1	2.10E-01	0/1	3.14E+00	0/1	3.14E+02	0/1	0/1	0.062 - 0.062
METAL	Calcium	mg/kg	4.26E+03	4.26E+03	4.26E+03	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	62.1 - 62.1
METAL	Chromium	mg/kg	1.44E+01	1.44E+01	1.44E+01	0/2	1/2	0/2	1.60E+01	0/2	7.15E+01	0/2	7.15E+03	0/2	1/2	1.2 - 85
METAL	Cobalt	mg/kg	6.80E+00	6.80E+00	6.80E+00	0/1	1/1	0/1	1.40E+01	0/1	8.45E+00	0/1	3.29E+03	n/a	n/a	0.25 - 0.25
METAL	Copper	mg/kg	9.60E+00	9.60E+00	9.60E+00	0/2	1/2	0/2	1.90E+01	0/2	1.13E+03	0/2	4.75E+05	0/2	0/2	1.2 - 35
METAL	Iron	mg/kg	8.62E+03	1.42E+04	1.23E+04	0/2	2/2	0/2	2.80E+04	0/2	1.98E+04	0/2	8.31E+06	2/2	2/2	6.2 - 100
METAL	Lead	mg/kg	8.25E+00	1.27E+01	1.12E+01	0/2	2/2	0/2	3.60E+01	0/2	4.00E+02	0/2	4.00E+02	0/2	2/2	0.37 - 13
METAL	Magnesium	mg/kg	1.18E+03	1.18E+03	1.18E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	62.1 - 62.1
METAL	Manganese	mg/kg	4.40E+02	5.31E+02	5.01E+02	0/2	2/2	0/2	1.50E+03	0/2	3.47E+03	0/2	2.94E+05	2/2	2/2	0.25 - 85
METAL	Mercury	mg/kg	2.55E-02	2.55E-02	2.55E-02	0/2	1/2	0/2	2.00E-01	0/2	6.25E-01	0/2	7.88E+02	0/2	0/2	0.0414 - 10
METAL	Molybdenum	mg/kg	7.40E-01	7.40E-01	7.40E-01	0/2	1/2	0/2	n/a	0/2	1.42E+02	0/2	5.94E+04	0/2	1/2	0.62 - 15
METAL	Nickel	mg/kg	1.16E+01	1.16E+01	1.16E+01	0/2	1/2	0/2	2.10E+01	0/2	2.98E+01	0/2	3.07E+04	0/2	0/2	0.62 - 65
METAL	Selenium	mg/kg	1.70E+00	1.70E+00	1.70E+00	0/2	1/2	1/2	8.00E-01	0/2	1.42E+02	0/2	5.93E+04	0/2	1/2	0.62 - 20
METAL	Silver	mg/kg	3.40E-02	3.40E-02	3.40E-02	0/2	1/2	0/2	2.30E+00	0/2	7.45E+00	0/2	8.07E+03	0/2	0/2	0.25 - 10
METAL	Sodium	mg/kg	2.77E+01	2.77E+01	2.77E+01	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	24.8 - 24.8
METAL	Thallium	mg/kg	3.40E-01	3.40E-01	3.40E-01	0/1	1/1	1/1	2.10E-01	0/1	2.27E+00	0/1	9.50E+02	0/1	1/1	0.25 - 0.25
METAL	Uranium	mg/kg	3.00E+00	1.07E+01	5.13E+00	0/3	3/3	2/3	4.90E+00	0/3	8.49E+01	0/3	3.50E+04	0/3	3/3	0.02 - 20
METAL	Vanadium	mg/kg	2.89E+01	2.89E+01	2.89E+01	0/1	1/1	0/1	3.80E+01	1/1	1.04E-01	0/1	7.61E+01	n/a	n/a	1.2 - 1.2
METAL	Zinc	mg/kg	2.70E+01	3.15E+01	2.85E+01	0/2	2/2	0/2	6.50E+01	0/2	8.50E+03	0/2	3.56E+06	0/2	0/2	2.5 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.83E-01	0/2	1.83E+01	0/2	0/2	0.37 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	2 - 2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.35E+00	0/1	1.00E+02	n/a	n/a	2 - 2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.87E+02	0/1	1.76E+04	n/a	n/a	0.41 - 0.41
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.25E+03	0/1	9.74E+04	0/1	0/1	0.41 - 0.41
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41

FOD = frequency of detection
FOE - frequency of exceedance
n/a = not applicable
For RADS, all results are reported.

Table 9.9.2. Surface Soil RI Data Summary: SWMU 493, Concrete Rubble Piles near Outfall 001 (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0082 - 0.0082
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.47E+02	0/1	1.34E+04	n/a	n/a	0.41 - 0.41
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.19E+02	0/1	1.26E+04	n/a	n/a	0.41 - 0.41
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.78E-01	0/1	1.78E+01	0/1	0/1	0.41 - 0.41
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	2 - 2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.82 - 0.82
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.27E+00	0/1	5.27E+02	n/a	n/a	0.41 - 0.41
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.10E-02	0/1	6.10E+00	n/a	n/a	0.0082 - 0.0082
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	2 - 2
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.35E+02	0/1	1.00E+04	n/a	n/a	0.41 - 0.41
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.82 - 0.82
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.57E-02	0/1	5.57E+00	0/1	0/1	-
RADS	Alpha activity	pCi/g	2.74E+01	2.83E+01	2.79E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.7 - 5.5
RADS	Americium-241	pCi/g	-2.80E-03	3.00E-03	1.00E-04	0/2	2/2	0/2	n/a	0/2	1.28E+01	0/2	1.28E+03	n/a	n/a	0.022 - 0.033
RADS	Beta activity	pCi/g	2.52E+01	2.84E+01	2.68E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.6 - 5.8
RADS	Cesium-137	pCi/g	2.88E-01	2.92E-01	2.90E-01	0/2	2/2	0/2	4.90E-01	2/2	1.98E-01	0/2	1.98E+01	n/a	n/a	0.064 - 0.075
RADS	Neptunium-237	pCi/g	3.00E-03	1.80E-02	1.05E-02	0/2	2/2	0/2	1.00E-01	0/2	6.26E-01	0/2	6.26E+01	n/a	n/a	0.025 - 0.063
RADS	Plutonium-238	pCi/g	2.20E-02	2.20E-02	2.20E-02	1/2	2/2	0/2	7.30E-02	0/2	3.64E+01	0/2	3.64E+03	n/a	n/a	0.021 - 0.031
RADS	Plutonium-239/240	pCi/g	1.30E-02	1.90E-02	1.60E-02	0/2	2/2	0/2	2.50E-02	0/2	3.56E+01	0/2	3.56E+03	n/a	n/a	0.016 - 0.018
RADS	Technetium-99	pCi/g	3.30E-01	1.69E+00	1.01E+00	0/2	2/2	0/2	2.50E+00	0/2	1.11E+03	0/2	1.11E+05	n/a	n/a	0.43 - 0.49
RADS	Thorium-228	pCi/g	7.90E-01	9.90E-01	8.90E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.03 - 0.04
RADS	Thorium-230	pCi/g	9.50E-01	1.19E+00	1.07E+00	0/2	2/2	0/2	1.50E+00	0/2	4.49E+01	0/2	4.49E+03	n/a	n/a	0.01 - 0.02
RADS	Thorium-232	pCi/g	8.20E-01	1.00E+00	9.10E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.007 - 0.02
RADS	Uranium-234	pCi/g	8.70E-01	2.37E+00	1.62E+00	0/2	2/2	1/2	1.20E+00	0/2	6.25E+01	0/2	6.25E+03	n/a	n/a	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	4.60E-02	1.65E-01	1.06E-01	1/2	2/2	1/2	6.00E-02	0/2	9.12E-01	0/2	9.12E+01	n/a	n/a	0.009 - 0.031
RADS	Uranium-238	pCi/g	1.00E+00	3.58E+00	2.29E+00	0/2	2/2	1/2	1.20E+00	0/2	4.02E+00	0/2	4.02E+02	n/a	n/a	0.007 - 0.009

FOD = frequency of detection
FOE - frequency of exceedance
n/a = not applicable
For RADS, all results are reported.

Table 9.9.2. Surface Soil RI Data Summary: SWMU 493, Concrete Rubble Piles near Outfall 001 (Continued)

(red)	One or more samples exceed AL value[1]
(green)	One or more samples exceed NAL value[2]
(orange)	One or more samples exceed background value
(light blue)	One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE - frequency of exceedance
n/a = not applicable
For RADS, all results are reported.

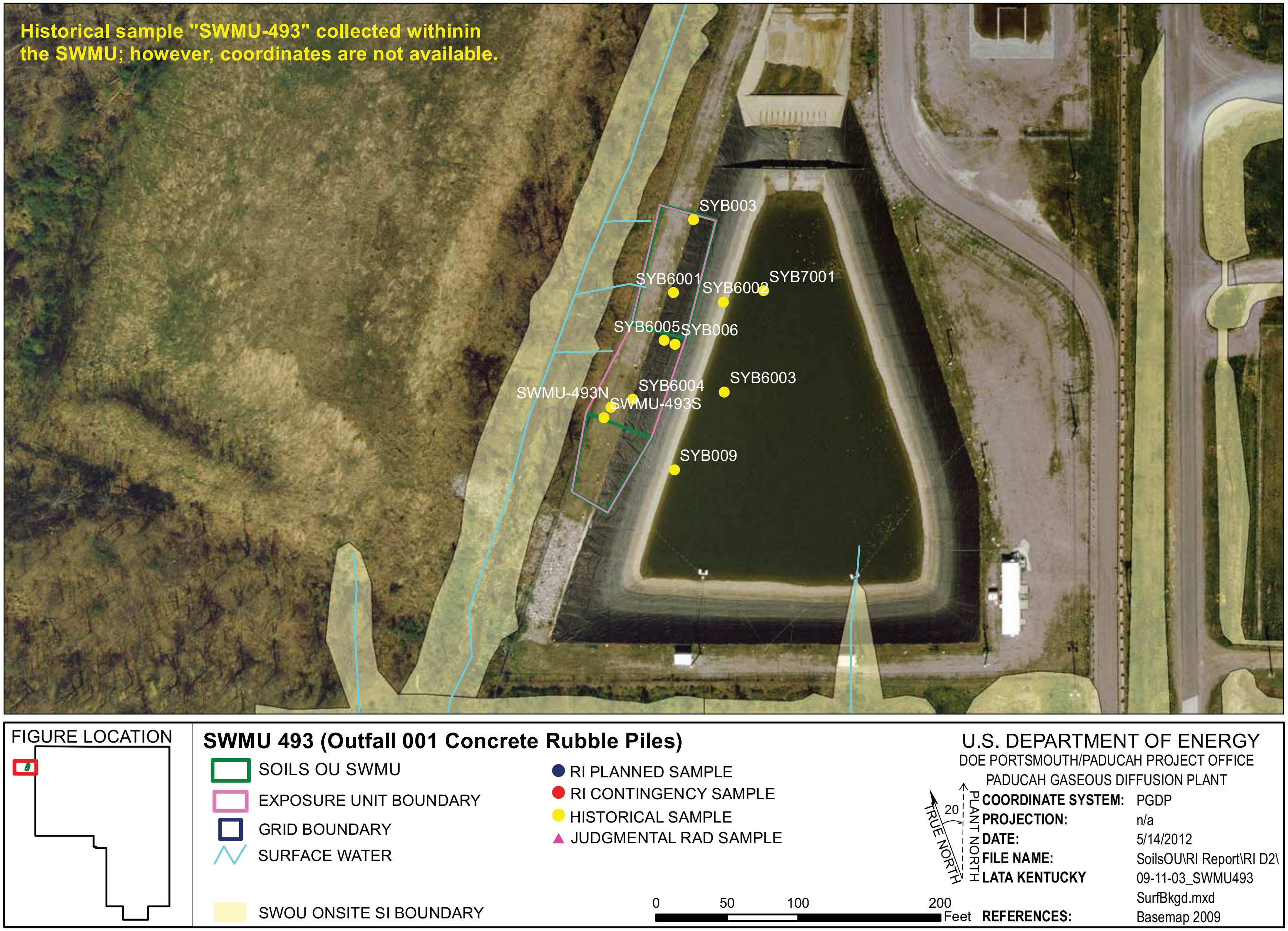


Figure 9.9.2. SWMU 493 Sample Locations - Surface Soil

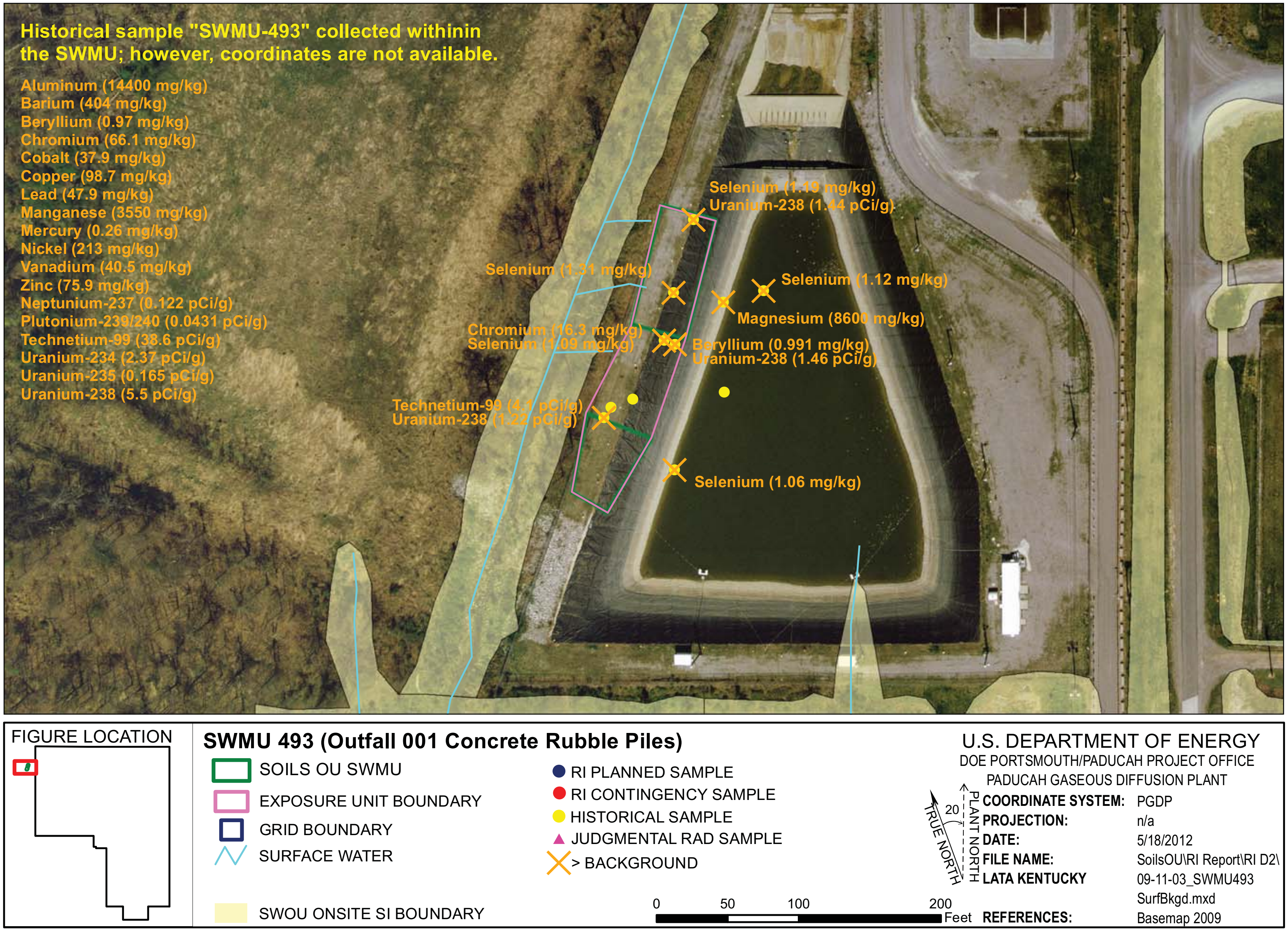


Figure 9.9.3. SWMU 493 Background Exceedances - Surface Soil

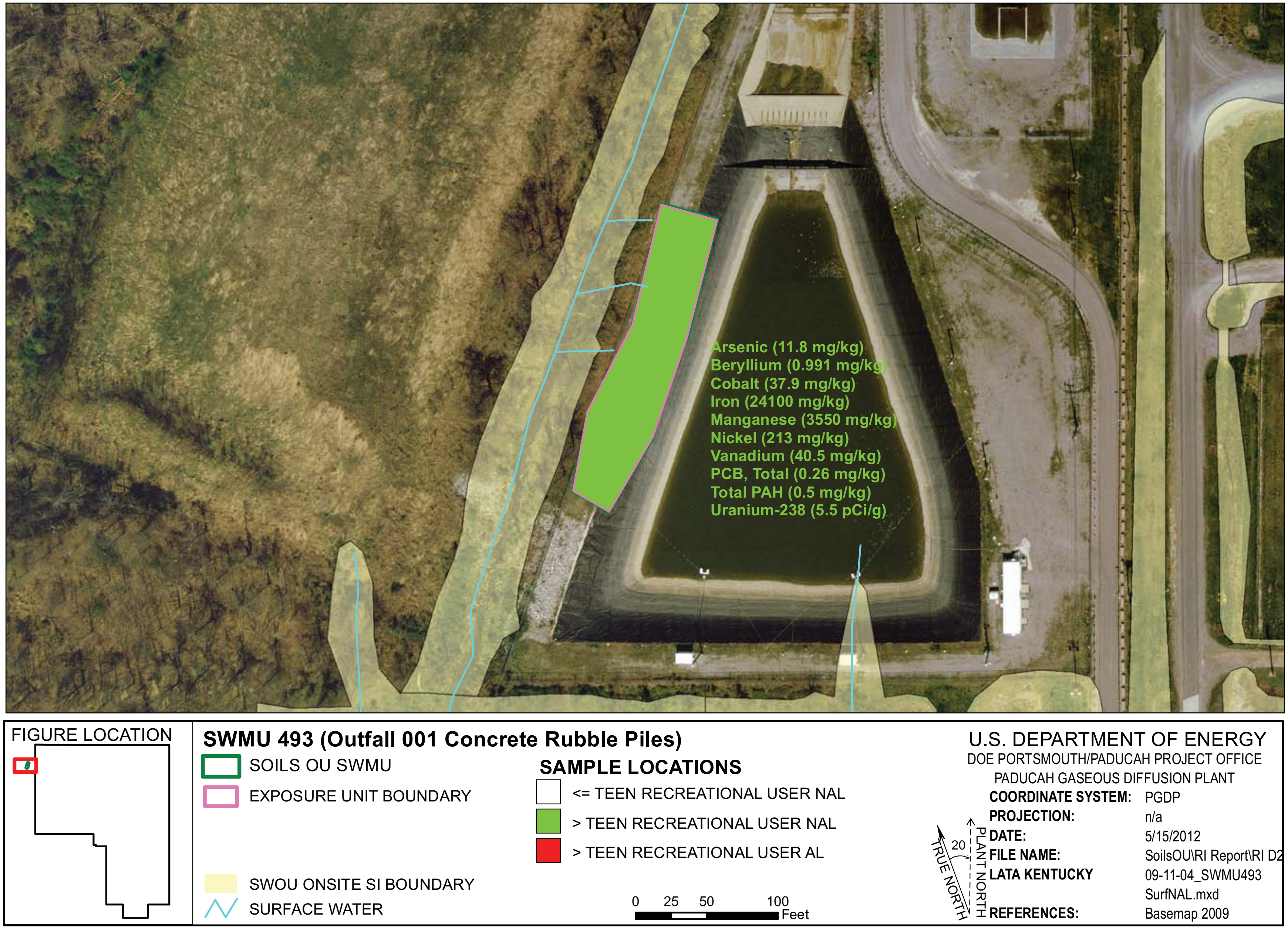


Figure 9.9.4. SWMU 493 NAL Exceedances - Surface Soil

The following metals were detected in the SWMU 493 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater: aluminum, antimony, barium, cobalt, copper, lead, manganese, mercury, nickel, selenium, thallium, uranium, vanadium, and zinc. Cobalt, manganese, nickel, and vanadium were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected in the SWMU 493 surface soil above the teen recreator NALs and the SSLs for the protection of UCRS groundwater.

PCBs were not detected above the teen recreator ALs or the SSLs for the protection of RGA groundwater.

SVOCs

Total PAHs were detected in the SWMU 493 surface soil above the teen recreator NALs and the SSLs for the protection of the UCRS and RGA groundwater. SVOCs were not detected above the teen recreator ALs in the SWMU 493 surface soil.

VOCs

No VOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of RGA groundwater in the SWMU 493 surface soil.

Methylene chloride was detected above the SSLs for the protection of UCRS groundwater in the SWMU 493 surface soil.

Radionuclides

Uranium-238 was detected above both the background screening level and teen recreator NAL in the SWMU 493 surface soil.

No radionuclides were detected above both the background screening levels and the teen recreator ALs in the SWMU 493 surface soil.

Neptunium-237, technetium-99 and uranium-238 were detected above the SSLs for the protection of UCRS groundwater. Technetium-99 was detected above the SSLs for the protection of RGA groundwater.

9.9.4 Nature and Extent of Contamination—Subsurface Soils

N/A—Subsurface soil samples were not collected from SWMU 493.

9.9.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is a potential for runoff because this SWMU is on the banks of KPDES Outfall Ditch 001; however, SWMU 493 is covered by gravel and the liner for the C-613 Sedimentation Basin. As a result, contaminants are not likely to be transported attached to suspended soil particles. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

9.9.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 493 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for SWMU 493 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.9.3 for the outdoor worker (exposed to surface soils), the hypothetical resident, and the teen recreational user. The excavation worker did not have any identified COCs. Table 9.9.3 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 493 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 9.9.4.

Table 9.9.3. RGOs for SWMU 493

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Outdoor Worker (exposed to surface soil)											
1	Chromium	6.61E+01	mg/kg	1.6E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	PCB, Total	2.60E-01	mg/kg	1.6E-06	1.62E-01	1.62E+00	1.62E+01	< 1	n/a	n/a	n/a
	Total PAH	5.00E-01	mg/kg	1.0E-05	4.85E-02	4.85E-01	4.85E+00	< 1	n/a	n/a	n/a
	Uranium-238	5.50E+00	pCi/g	4.7E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.8E-05**				**< 1**			
Hypothetical Resident[5]											
1	Aluminum	1.44E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	7.27E+03	7.27E+04	2.18E+05
	Chromium	6.61E+01	mg/kg	4.3E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Cobalt	3.79E+01	mg/kg	< 1E-06	n/a	n/a	n/a	1.6	2.30E+00	2.30E+01	6.91E+01
	Manganese	3.55E+03	mg/kg	< 1E-06	n/a	n/a	n/a	0.7	5.34E+02	5.34E+03	1.60E+04
	Neptunium-237	1.22E-01	pCi/g	2.3E-06	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Nickel	2.13E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	1.44E+02	1.44E+03	4.33E+03
	PCB, Total	2.60E-01	mg/kg	4.1E-06	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Total PAH	5.00E-01	mg/kg	2.6E-05	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium-235	1.65E-01	pCi/g	2.1E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	5.50E+00	pCi/g	1.6E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Vanadium	4.05E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	3.91E+01	3.91E+02	1.17E+03
	Cumulative			**5.4E-05**				**2.8**			
Teen Recreational User											
1	Total PAH	5.00E-01	mg/kg	5.6E-06	8.99E-02	8.99E-01	8.99E+00	< 1	n/a	n/a	n/a
	Cumulative			**5.6E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.66, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.66, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 9.9.4. Ecological Screening for SWMU 493

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg) [b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Concrete piles	Yes	67	Manganese	1.50E+03	3.55E+03	2.20E+02	16
			PCB, Total	n/a	2.60E-01	2.00E-02	13

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

9.9.7 SWMU 493 Summary

The following text summarizes the results for SWMU 493 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

The plant processes that contributed to contamination at this site are unknown, but are assumed to be disposal of waste generated in support facilities of the uranium enrichment process.

COPCs for surface soils from SWMU 493 are shown on Tables 9.9.1–9.9.2 as those analytes with green boxes under the “Teen Recreator/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. The COPCs identified for this SWMU are metals, PCBs, SVOCs, and radionuclides in surface soil. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 1 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 493 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMU 493. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soil), hypothetical residential, and teen recreational user scenarios. COCs for these scenarios for SWMU 493 are as follows:

- Outdoor worker (exposed to surface soil)
  - Chromium
  - Total PAHs
  - Total PCBs
  - Uranium-238
- Excavation worker
  - None

- Hypothetical Resident (hazards evaluated against the child resident)

  - Aluminum
  - Chromium
  - Cobalt
  - Manganese
  - Neptunium-237
  - Nickel
  - Total PAHs
  - Total PCBs
  - Uranium-235
  - Uranium-238
  - Vanadium

- Teen Recreational User

  - Total PAHs

Of the above, for the hypothetical resident, cobalt is a priority COC (i.e., HQ > 1 or chemical-specific ELCR > 1E-04). There are no other priority COCs for other scenarios.

For SWMU 493, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Manganese
- Total PCBs

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 493 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 493 is under the liner of the C-613 Sedimentation Basin, so a response action there will affect the response action that was conducted for the scrap yards. SWMU 474, the SWMU where material from SWMU 493 was placed, is to be addressed by the Soils and Slabs OU, per the 2012 SMP.

9.9.8 SWMU 493 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 493; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including outdoor worker (exposed to surface soil), hypothetical resident, and teen recreational user (DOE 2010a). The reasonably anticipated land use for this site is recreational as shown in the SMP (DOE 2012a). Although SWMU 493 is currently industrial, it is located outside the limited area but easy access by the recreational user is restricted by plant drainage ditches.

9.10 SWMU 517, RUBBLE AND DEBRIS EROSION CONTROL FILL AREA

9.10.1 Background

In 2001, the DOE remediation contractor constructed the C-613 Sedimentation Basin, a storm water control facility for the northwest corner watershed. The purpose of the basin was to catch contaminated surface soil loosened from disturbing the piles of scrap metal that were located there at the time and to prevent the contaminated soil from being transported off-site. In December 2001, the construction subcontractor came upon an area of radiologically contaminated material and concrete rubble on the southeast side of the C-613 Basin in an area that was being excavated for a trench to install a discharge water line from the basin into the East-West Diversion Ditch. Today this area is known as SWMU 517.

The contaminated material and concrete rubble was surveyed by HP and was determined to be uncontaminated. In accordance with a request by DOE that was approved by KDEP, the area was to be excavated, relocated to SWMU 474, and placed on plastic. After removal of the contaminated material and concrete rubble, excavation of the area continued. During removal of the first bucket of the second truckload, additional material and concrete rubble was discovered. The soil and debris were surveyed by HP and were found to be contaminated. Small pieces of radiologically contaminated concrete and soil were removed from the SWMU by HP personnel and placed in appropriate storage. The remaining soil and debris in the bucket were placed back in the SWMU. The excavation was discontinued. The area was backfilled with gravel and graded before being posted as a contamination area and covered with plastic.

In February 2002, sampling requests were made to sample the soil and debris. Although the sampling requests and plans were to sample the waste where it was discovered, the field notes and subsequent reports describe sampling waste at SWMU 517 that was relocated to SWMU 474. The sampling request included analysis for full radiological constituents, PCBs, bulk metals, bulk VOCs, and bulk SVOCs.

Four soil samples of the material from SWMU 517 were analyzed for metals, PCBs, radionuclides, SVOCs, and VOCs. The detection limits of these samples were lower than TCLP thresholds. None of these samples indicated that the soils should be considered either RCRA-hazardous or TSCA-regulated.

Samples of non-soil solids collected from the material removed from SWMU 517 include a cutting wheel, metal shavings, concrete, concrete tile, fiber board, a fiber board composite, and woven cloth.

9.10.2 Fieldwork Summary

There were no planned soil samples from within the boundary of SWMU 517 per the Work Plan (DOE 2010a). Two samples were planned and collected from the soil pile that was excavated from SWMU 517 and currently located in SWMU 474. One sample from each horizon was selected randomly and submitted for fixed-base laboratory analysis. These samples will not be used within this RI to evaluate SWMU 517; however, they will be used to evaluate SWMU 474 in the Soils and Slabs OU.

The SWMU underwent a gamma radiological walkover survey (Figure 9.10.1) using a FIDLER; the 748 measurements ranged from 5,748 to 14,813 gross cpm. The area consists of grass, concrete rubble, and soil. A judgmental grab sample was collected for radiological constituents from the excavated soil pile that is located within SWMU 474. The judgmental sample and gamma radiological walkover survey of the excavated soil pile will not be used within this RI to evaluate SWMU 517; however, they will be used to evaluate SWMU 474 under the Soils and Slabs OU. A survey of SWMU 517 from 2012 has been included as an inset on Figure 9.10.1. The elevated reading shown on Figure 9.10.1 is associated with Outfall 010, which is part of the Surface Water OU.

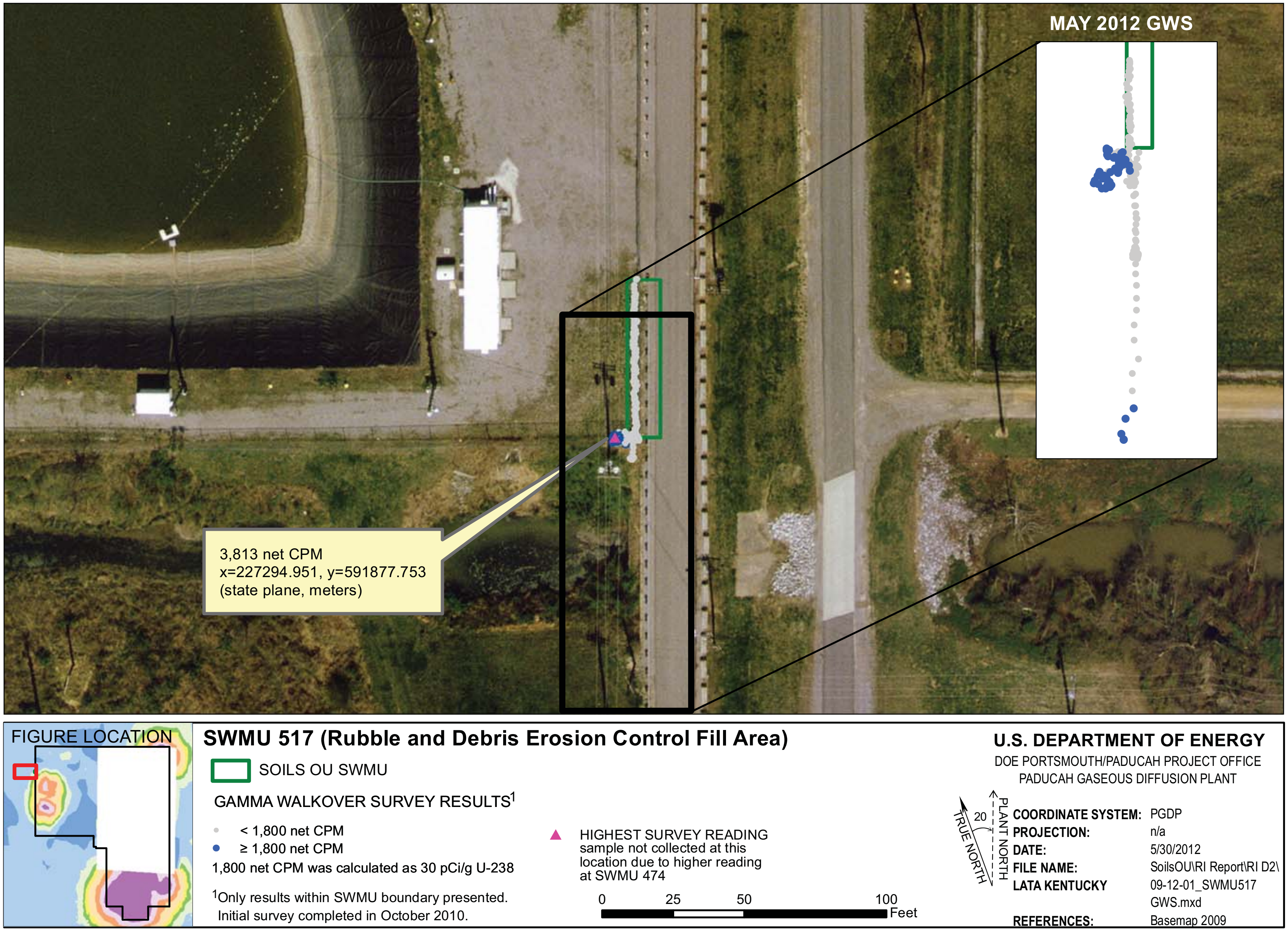


Figure 9.10.1. SWMU 517 Gamma Walkover Survey

9.10.3 Nature and Extent of Contamination—Surface Soils

For SWMU 517, the representative data set for surface soils is presented in Table 9.10.1 and provides the nature of the contamination in SWMU 517 surface soils. Figures 9.10.2–9.10.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 517 surface soil contamination is considered adequately defined for supporting the BRA and FS using historical *in situ* sampling data. Additionally, the gamma radiological walkover survey provided input to the horizontal extent of surface soil contamination. SWMU 517 consists of one grid and one EU.

Metals

Metals were detected above the teen recreator NALs in the SWMU 517 surface soil. Metals detected at or above both the background screening levels and the teen recreator NALs were beryllium and nickel in the single grid.

No metals were detected above both the background screening levels and the teen recreator ALs in the SWMU 517 surface soil.

The following metals were detected in the SWMU 517 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater: chromium, molybdenum (no background value available), nickel, selenium, thallium, and zinc. Nickel and zinc were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the teen recreator NALs and the SSLs for the protection of UCRS groundwater in the SWMU 517 surface soil.

No PCBs were detected above the teen recreator ALs or the SSLs for the protection of RGA groundwater in the SWMU 517 surface soil.

SVOCs

No SVOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 517 surface soil.

VOCs

No VOCs were detected above the teen recreator NALs or ALs in the SWMU 517 surface soil.

Methylene chloride was detected above the SSLs for the protection of UCRS and RGA groundwater in the SWMU 517 surface soil.

Radionuclides

Neptunium-237 was detected above both the background screening level and the teen recreator NAL in the SWMU 517 surface soil.

Table 9.10.1. Surface Soil Historical Data Summary: SWMU 517 Rubble and Debris, Erosion Control Fill Area

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	8.88E+03	1.20E+04	1.01E+04	0/4	4/4	0/4	1.30E+04	0/4	2.77E+04	0/4	8.91E+06	0/4	4/4	20 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	2.10E-01	0/4	1.78E+00	0/4	1.90E+03	0/4	0/4	20 - 20
METAL	Arsenic	mg/kg	6.47E+00	6.73E+00	6.60E+00	0/4	2/4	0/4	1.20E+01	2/4	1.02E+00	0/4	1.02E+02	0/4	2/4	5 - 5
METAL	Barium	mg/kg	8.07E+01	1.13E+02	9.11E+01	0/4	4/4	0/4	2.00E+02	0/4	4.15E+02	0/4	4.58E+05	0/4	3/4	2.5 - 2.5
METAL	Beryllium	mg/kg	5.04E-01	7.39E-01	5.94E-01	0/4	3/4	1/4	6.70E-01	3/4	1.29E-02	0/4	8.65E+00	0/4	0/4	0.5 - 0.5
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	2.10E-01	0/4	3.14E+00	0/4	3.14E+02	0/4	0/4	2 - 2
METAL	Calcium	mg/kg	3.53E+03	1.22E+04	8.12E+03	0/4	4/4	0/4	2.00E+05	0/4	n/a	0/4	n/a	n/a	n/a	200 - 200
METAL	Chromium	mg/kg	1.49E+01	4.91E+01	2.47E+01	0/4	4/4	2/4	1.60E+01	0/4	7.15E+01	0/4	7.15E+03	0/4	0/4	2.5 - 2.5
METAL	Cobalt	mg/kg	3.78E+00	5.33E+00	4.61E+00	0/4	4/4	0/4	1.40E+01	0/4	8.45E+00	0/4	3.29E+03	4/4	4/4	2.5 - 2.5
METAL	Copper	mg/kg	8.17E+00	3.37E+01	1.54E+01	0/4	4/4	1/4	1.90E+01	0/4	1.13E+03	0/4	4.75E+05	0/4	0/4	2.5 - 2.5
METAL	Iron	mg/kg	1.21E+04	2.08E+04	1.46E+04	0/4	4/4	0/4	2.80E+04	1/4	1.98E+04	0/4	8.31E+06	4/4	4/4	20 - 20
METAL	Lead	mg/kg	3.22E+01	3.22E+01	3.22E+01	0/4	1/4	0/4	3.60E+01	0/4	4.00E+02	0/4	4.00E+02	0/4	1/4	20 - 20
METAL	Magnesium	mg/kg	8.76E+02	1.87E+03	1.39E+03	0/4	4/4	0/4	7.70E+03	0/4	n/a	0/4	n/a	n/a	n/a	2.5 - 2.5
METAL	Manganese	mg/kg	2.37E+02	3.42E+02	3.02E+02	0/4	4/4	0/4	1.50E+03	0/4	3.47E+03	0/4	2.94E+05	4/4	4/4	2.5 - 2.5
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	2.00E-01	0/4	6.25E-01	0/4	7.88E+02	0/4	0/4	0.2 - 0.2
METAL	Nickel	mg/kg	1.43E+01	1.72E+02	5.65E+01	0/4	4/4	2/4	2.10E+01	1/4	2.98E+01	0/4	3.07E+04	1/4	4/4	5 - 5
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	8.00E-01	0/4	1.42E+02	0/4	5.93E+04	0/4	0/4	1 - 1
METAL	Silver	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	2.30E+00	0/4	7.45E+00	0/4	8.07E+03	0/4	0/4	2.5 - 2.5
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	2.10E-01	0/4	2.27E+00	0/4	9.50E+02	0/4	0/4	20 - 20
METAL	Uranium	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	4.90E+00	0/4	8.49E+01	0/4	3.50E+04	0/4	0/4	100 - 100
METAL	Vanadium	mg/kg	2.55E+01	2.67E+01	2.61E+01	0/4	4/4	0/4	3.80E+01	4/4	1.04E-01	0/4	7.61E+01	4/4	4/4	2.5 - 2.5
METAL	Zinc	mg/kg	5.01E+01	1.25E+03	3.74E+02	0/4	4/4	3/4	6.50E+01	0/4	8.50E+03	0/4	3.56E+06	1/4	4/4	10 - 10
PPCB	PCB, Total	mg/kg	5.00E-01	5.00E-01	5.00E-01	0/4	1/4	0/4	n/a	1/4	1.83E-01	0/4	1.83E+01	0/4	1/4	0.06 - 0.1
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.47 - 0.49
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.47 - 0.49
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.47 - 0.49
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	3.35E+00	0/4	1.00E+02	0/4	0/4	0.47 - 0.49
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	5.87E+02	0/4	1.76E+04	0/4	0/4	0.47 - 0.49
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	3.25E+03	0/4	9.74E+04	0/4	0/4	0.47 - 0.49
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.10.1. Surface Soil Historical Data Summary: SWMU 517 Rubble and Debris, Erosion Control Fill Area (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.47 - 0.49
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	2.61E+01	0/4	2.61E+03	n/a	n/a	0.47 - 0.49
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Di-n-butyl phthalate	mg/kg	1.20E+00	2.00E+00	1.60E+00	0/4	2/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Fluoranthene	mg/kg	6.70E-01	6.70E-01	6.70E-01	1/4	1/4	0/4	n/a	0/4	4.47E+02	0/4	1.34E+04	0/4	0/4	0.47 - 0.49
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.19E+02	0/4	1.26E+04	0/4	0/4	0.47 - 0.49
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.78E-01	0/4	1.78E+01	0/4	0/4	0.47 - 0.49
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	5.27E+00	0/4	5.27E+02	0/4	0/4	0.47 - 0.49
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	6.10E-02	0/4	6.10E+00	0/4	0/4	0.47 - 0.49
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.47 - 0.49
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Pyrene	mg/kg	5.40E-01	5.40E-01	5.40E-01	1/4	1/4	0/4	n/a	0/4	3.35E+02	0/4	1.00E+04	0/4	0/4	0.47 - 0.49
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.47 - 0.49
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	5.57E-02	0/4	5.57E+00	0/4	0/4	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.01 - 0.01
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.01 - 0.01
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	9.45E-02	0/4	1.29E+01	0/4	0/4	0.01 - 0.01
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.01 - 0.01
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.50E+02	0/4	2.11E+04	0/4	0/4	0.01 - 0.01
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.28E+00	0/4	1.91E+02	0/4	0/4	0.01 - 0.01
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	9.30E-01	0/4	1.34E+02	0/4	0/4	0.01 - 0.01
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.01 - 0.01
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	7.03E+00	0/4	4.84E+02	0/4	0/4	0.01 - 0.01
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	6.11E+00	0/4	8.90E+02	0/4	0/4	0.01 - 0.01
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	8.66E+01	0/4	2.79E+03	0/4	0/4	0.02 - 0.02
VOA	Methylene chloride	mg/kg	1.10E-02	1.10E-02	1.10E-02	0/4	1/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	1/4	0.01 - 0.01
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.01 - 0.01
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	3.26E-01	0/4	1.48E+02	0/4	0/4	0.01 - 0.01
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.01 - 0.01

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.10.1. Surface Soil Historical Data Summary: SWMU 517 Rubble and Debris, Erosion Control Fill Area (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	2.39E+01	0/4	8.87E+02	0/4	0/4	0.01 - 0.01
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	9.91E-02	0/4	1.17E+01	0/4	0/4	0.01 - 0.01
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	2.39E-01	0/4	1.02E+02	0/4	0/4	0.01 - 0.01
RADS	Americium-241	pCi/g	-4.79E-02	7.56E-02	4.08E-03	0/4	4/4	0/4	n/a	0/4	1.28E+01	0/4	1.28E+03	0/4	0/4	0.072 - 0.108
RADS	Cesium-137	pCi/g	3.46E-02	7.88E-02	6.14E-02	0/4	4/4	0/4	4.90E-01	0/4	1.98E-01	0/4	1.98E+01	0/4	0/4	0.0226 - 0.0265
RADS	Cobalt-60	pCi/g	-1.57E-02	6.39E-03	-5.32E-03	0/4	4/4	0/4	n/a	0/4	4.06E-02	0/4	4.06E+00	0/4	0/4	0.0224 - 0.0291
RADS	Neptunium-237	pCi/g	3.53E-02	1.07E+00	3.04E-01	0/4	4/4	1/4	1.00E-01	1/4	6.26E-01	0/4	6.26E+01	1/4	4/4	0.0403 - 0.0479
RADS	Plutonium-238	pCi/g	-3.59E-02	-1.32E-02	-2.85E-02	0/4	4/4	0/4	7.30E-02	0/4	3.64E+01	0/4	3.64E+03	0/4	0/4	0.215 - 0.216
RADS	Plutonium-239/240	pCi/g	1.63E-02	1.78E-01	5.91E-02	0/4	4/4	2/4	2.50E-02	0/4	3.56E+01	0/4	3.56E+03	0/4	1/4	0.0362 - 0.0381
RADS	Technetium-99	pCi/g	4.33E+00	8.32E+01	2.43E+01	0/4	4/4	4/4	2.50E+00	0/4	1.11E+03	0/4	1.11E+05	1/4	4/4	3.05 - 3.05
RADS	Thorium-228	pCi/g	2.74E-01	3.91E-01	3.20E-01	0/4	4/4	0/4	1.60E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.0292 - 0.0299
RADS	Thorium-230	pCi/g	3.86E-01	6.26E-01	4.74E-01	0/4	4/4	0/4	1.50E+00	0/4	4.49E+01	0/4	4.49E+03	0/4	4/4	0.222 - 0.222
RADS	Thorium-232	pCi/g	3.14E-01	4.02E-01	3.46E-01	0/4	4/4	0/4	1.50E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.061 - 0.0623
RADS	Uranium-234	pCi/g	4.15E-01	2.48E+00	1.06E+00	4/4	4/4	1/4	1.20E+00	0/4	6.25E+01	0/4	6.25E+03	0/4	0/4	0.147 - 0.468
RADS	Uranium-235	pCi/g	3.07E-02	1.60E-01	7.01E-02	0/4	4/4	1/4	6.00E-02	0/4	9.12E-01	0/4	9.12E+01	0/4	0/4	0.0271 - 0.0369
RADS	Uranium-238	pCi/g	1.13E+00	3.89E+00	1.92E+00	4/4	4/4	3/4	1.20E+00	0/4	4.02E+00	0/4	4.02E+02	0/4	0/4	0.448 - 0.733

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

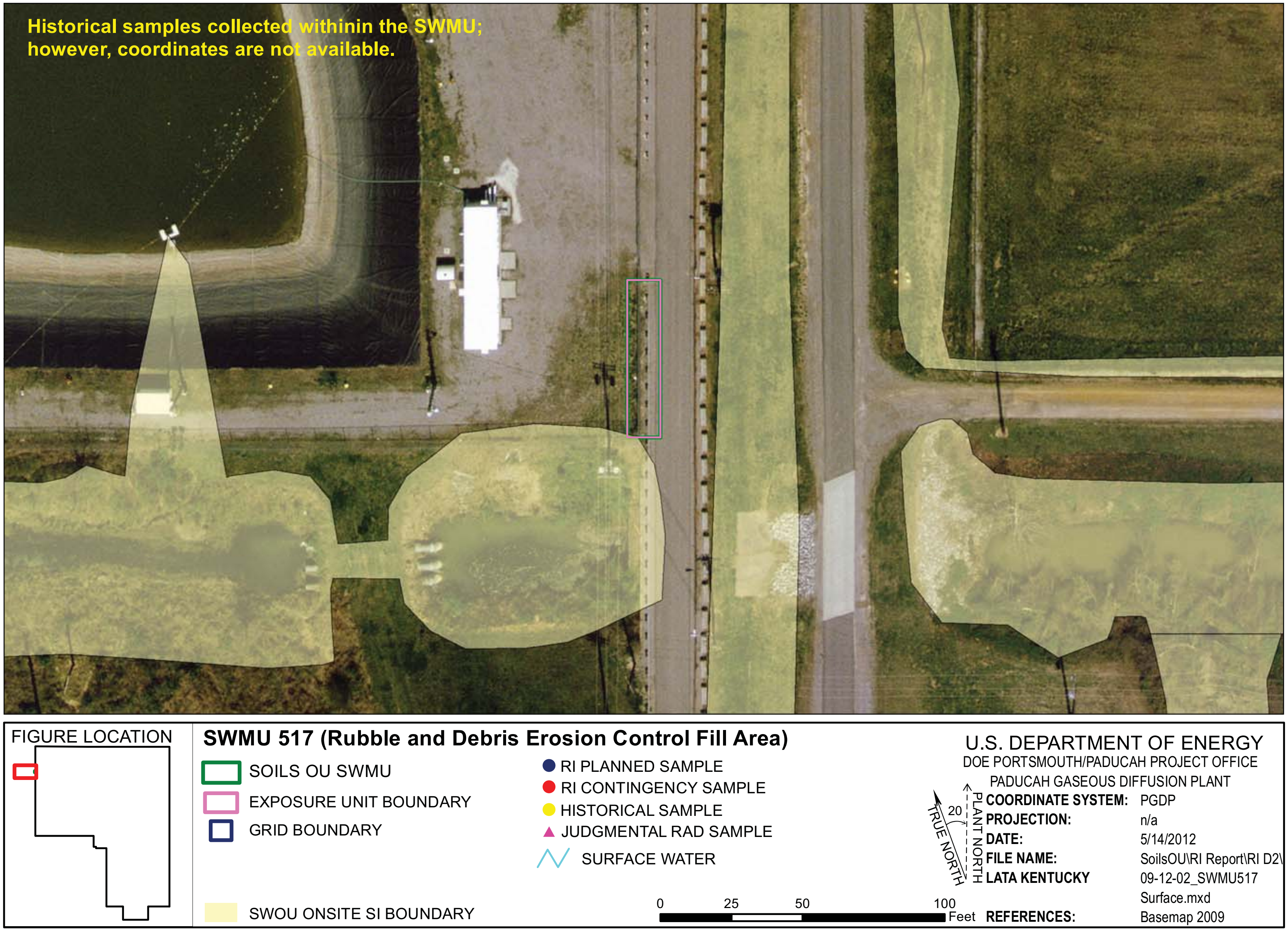


Figure 9.10.2. SWMU 517 Sample Locations - Surface Soil

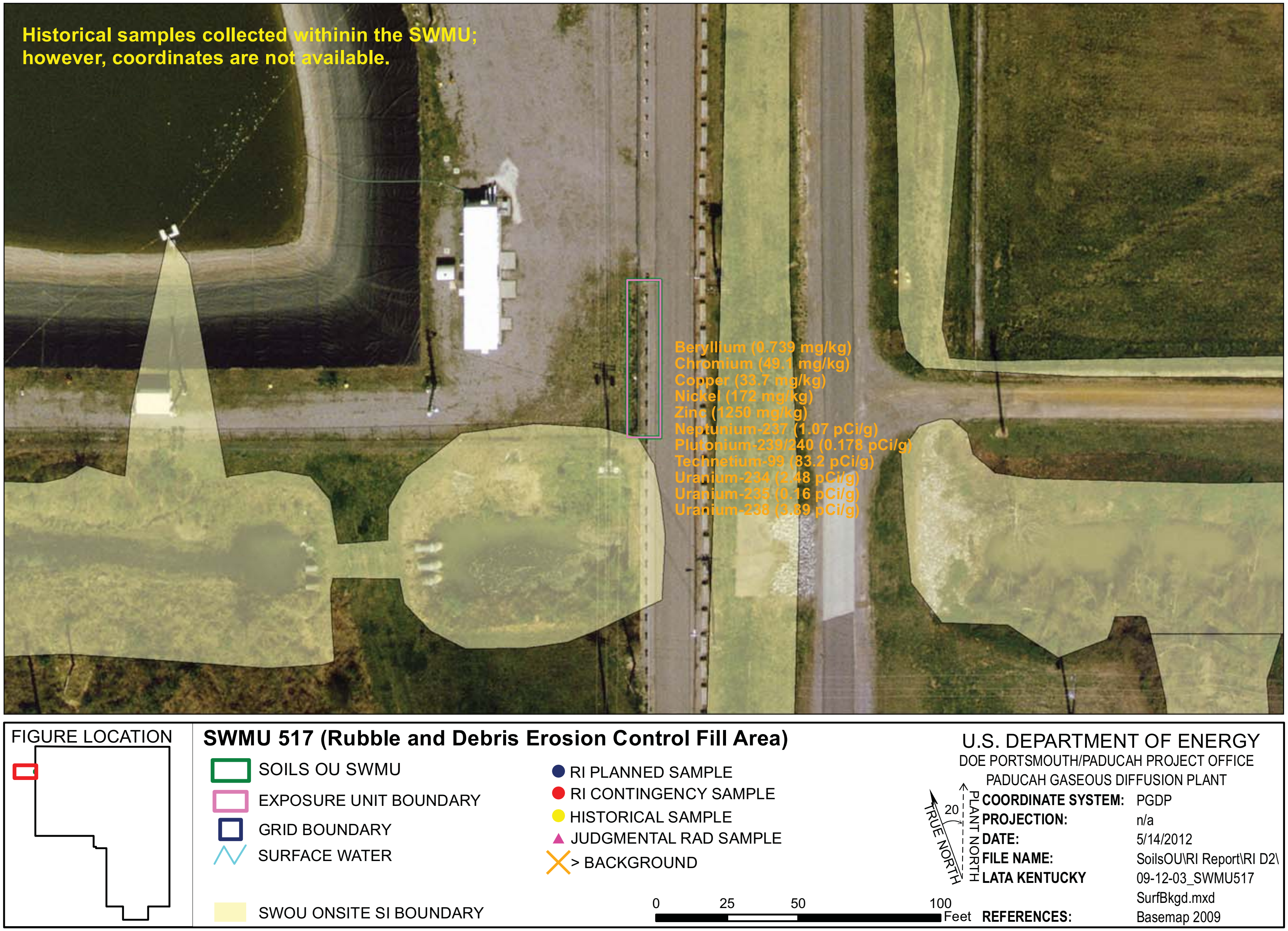


Figure 9.10.3. SWMU 517 Background Exceedances - Surface Soil

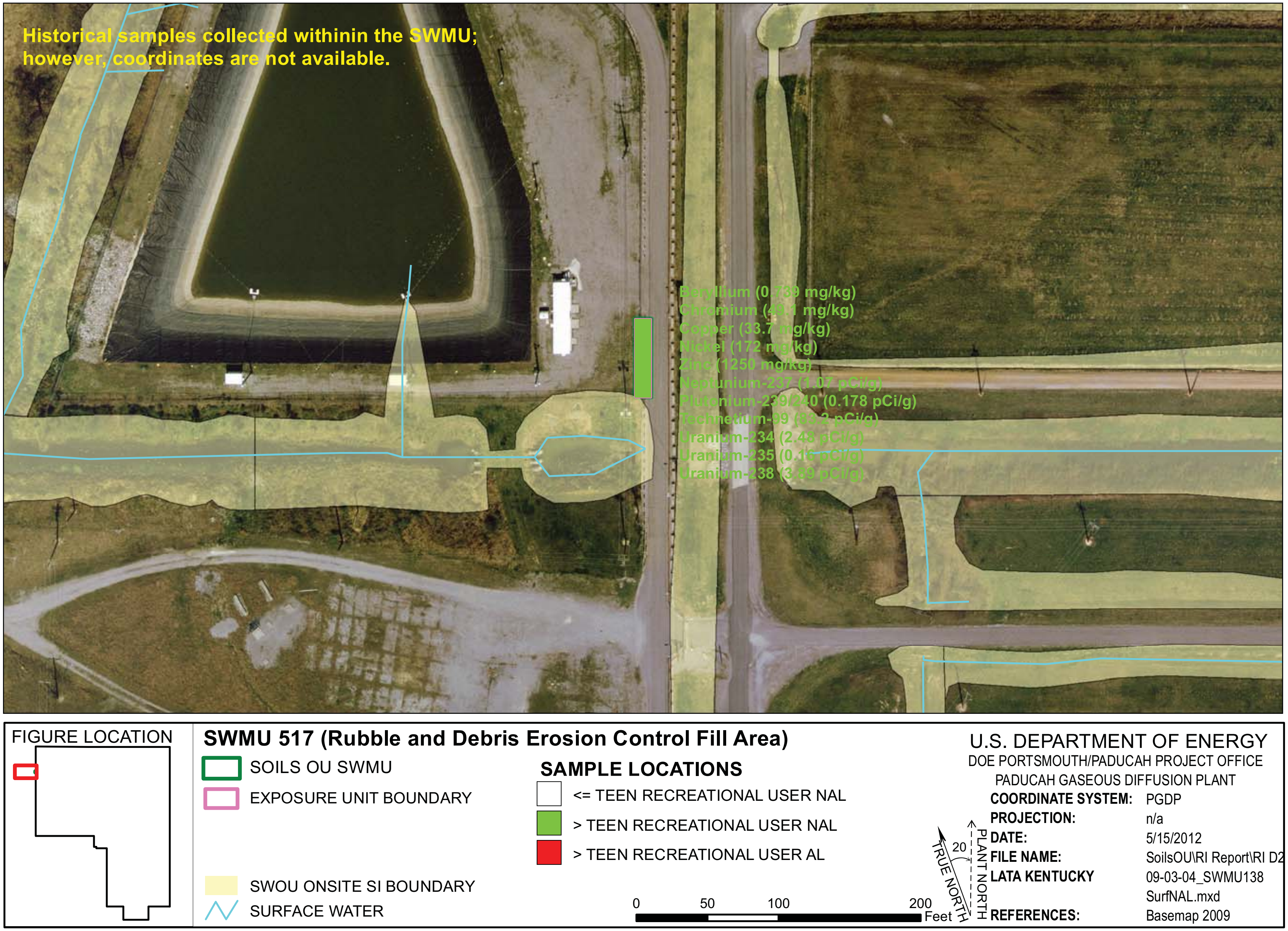


Figure 9.10.4. SWMU 517 NAL Exceedances - Surface Soil

No radionuclides were detected above both the background screening levels and the teen recreator ALs in the SWMU 517 surface soil.

Neptunium-237, plutonium-239/240, and technetium-99 were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater. Neptunium-237 and technetium-99 were detected above both the background screening level and the SSLs for the protection of RGA groundwater.

9.10.4 Nature and Extent of Contamination—Subsurface Soils

N/A—Subsurface soil samples were not collected from SWMU 517.

9.10.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4.) There is potential for runoff because this SWMU is on the banks of KPDES Outfall Ditch 001; however, SWMU 517 is grass-covered or otherwise stabilized and the contaminants are not likely to be transported attached to suspended soil particles. The SWOU SI investigated Outfall 001, downstream of SWMU 517 (DOE 2008a). The SWOU On-Site achieved the cleanup goals determined for that removal action. A remedial action for these areas will be addressed, as described in the SMP. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

9.10.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 517 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 517 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.10.2 for the outdoor worker (exposed to surface soils), the hypothetical resident, and the teen recreational user. The excavation worker did not have any identified COCs. Table 9.10.2 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 517 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 9.10.3.

Table 9.10.2. RGOs for SWMU 517

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3] 1 x 10^{-6}	RGOs for ELCR[3] 1 x 10^{-5}	RGOs for ELCR[3] 1 x 10^{-4}	HI[4]	RGOs for HI[3] 0.1	RGOs for HI[3] 1	RGOs for HI[3] 3
Outdoor Worker (exposed to surface soil)											
1	Chromium	4.91E+01	mg/kg	1.2E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Neptunium-237	1.07E+00	pCi/g	3.3E-06	3.28E-01	3.28E+00	3.28E+01	n/a	n/a	n/a	n/a
	PCB, Total	5.00E-01	mg/kg	3.1E-06	1.62E-01	1.62E+00	1.62E+01	< 1	n/a	n/a	n/a
	Uranium-238	3.89E+00	pCi/g	3.3E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.1E-05**				**< 1**			
Hypothetical Resident[5]											
1	Chromium	4.91E+01	mg/kg	3.2E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Neptunium-237	1.07E+00	pCi/g	2.0E-05	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	PCB, Total	5.00E-01	mg/kg	7.8E-06	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Uranium-235	1.60E-01	pCi/g	2.0E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	3.89E+00	pCi/g	1.1E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**4.4E-05**				**< 1**			
Teen Recreational User											
1	PCB, Total	5.00E-01	mg/kg	1.7E-06	2.99E-01	2.99E+00	2.99E+01	< 0.1	n/a	n/a	n/a
	Cumulative			**1.7E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.68, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.68, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 9.10.3. Ecological Screening for SWMU 517

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Grass/concrete rubble with soil	Yes	68	PCB, Total	n/a	5.00E-01	2.00E-02	25
			Zinc	6.50E+01	1.25E+03	4.60E+01	27

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

9.10.7 SWMU 517 Summary

The following text summarizes the results for SWMU 517 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

The plant processes that contributed to contamination at this site are unknown, but are assumed to be disposal of waste generated in support facilities of the uranium enrichment process.

COPCs for surface soils from SWMU 517 are shown on Table 9.10.1 as those analytes with green boxes under the "Teen Recreator/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. COPCs identified for SWMU 517 are metals, Total PCBs, VOCs and radionuclides in surface soil. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 1 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 517 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMU 517. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soil), hypothetical residential, and teen recreational user scenarios. COCs for these scenarios for SWMU 517 are as follows:

- Outdoor worker (exposed to surface soil)
    - Chromium
    - Neptunium-237
    - Total PCBs
    - Uranium-238
- Excavation worker
    - None
- Hypothetical Resident (hazards evaluated against the child resident)
    - Chromium
    - Neptunium-237
    - Total PCBs
    - Uranium-235
    - Uranium-238
- Teen Recreational User
    - Total PCBs

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 517.

For SWMU 517, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Total PCBs
- Zinc

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 517 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 474, the SWMU where material from SWMU 517 was placed, is to be addressed by the Soils and Slabs OU, per the 2012 SMP.

9.10.8 SWMU 517 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 517; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark (DOE 2010a) for scenarios including outdoor worker (exposed to surface soil), hypothetical resident, and teen recreational user. The reasonably anticipated future land use for this SWMU is recreational, as shown in the SMP (DOE 2012a). Although SWMU 517 is currently industrial, it is located outside the limited area but easy access by the recreational user is restricted by plant drainage ditches.

9.11 AOC 541, CONTAMINATED AREA BY OUTFALL 011

9.11.1 Background

The Contaminated Soil Area South of Outfall 011 (AOC 541) is located in an area of heavy undergrowth, approximately 75 ft from the south bank of Outfall 011. AOC 541 is located east of PGDP, is outside of the secure area, and is approximately 100,800 ft^2 (480 ft x 210 ft).

AOC 541 was discovered during routine radiological surveys in support of sampling activities. The area contained soil piles that likely were generated as a result of past maintenance activities.

This area was sampled in September 2002. Analytical results indicate the presence of metals (chromium), PCBs, SVOCs, and radionuclides (uranium-238). The area also was sampled during the winter of 2008, with findings presented in Site Evaluation (DOE 2009d).

In December 2008, 242 soil samples were collected for field screening, with 24 samples being sent to a fixed-base laboratory for analysis. As a result of the 2008 sampling event, additional areas within the AOC were determined to have levels of PCBs and uranium that were similar to the original five sample results collected in 2002. Recommendations from the Site Evaluation included consideration of an early action for Soil Pile O within AOC 541(DOE 2009d). It was determined that an early action was not warranted.

9.11.2 Fieldwork Summary

The historical data are representative of the nature and adequately delineate the extent of the contamination; therefore, no samples were collected from AOC 541 during the Soils OU RI sampling effort (DOE 2010a).

The AOC underwent a gamma radiological walkover survey (Figure 9.11.1) using a FIDLER; the 12,531 measurements ranged from 4,153 to 351,471 gross cpm. Soil Pile Addendum 1B survey data has been added to Figure 9.11.1 to supplement the existing data. (DOE 2009d). The Addendum 1B data was collected using a 2 x 2 NaI probe. The area consists entirely of soil and grass with trees. A judgmental grab sample was collected for radiological constituents.

9.11.3 Nature and Extent of Contamination—Surface Soils

For AOC 541, the representative data set for surface is presented in Tables 9.11.1 and 9.11.2 and provides the nature of the contamination in AOC 541 surface soils. Figures 9.11.2–9.11.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the Figures. Figures contain the SWMU/AOC#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of AOC 541 surface soil contamination is considered adequately defined for supporting the BRA and FS. AOC 541 consists of one EU.

<u>**Metals**</u>

Metals were detected above the teen recreator NALs in the AOC 541 surface soil. The following are the metals detected at or above both the background screening levels and the teen recreator NALs and the grids in which they were detected.

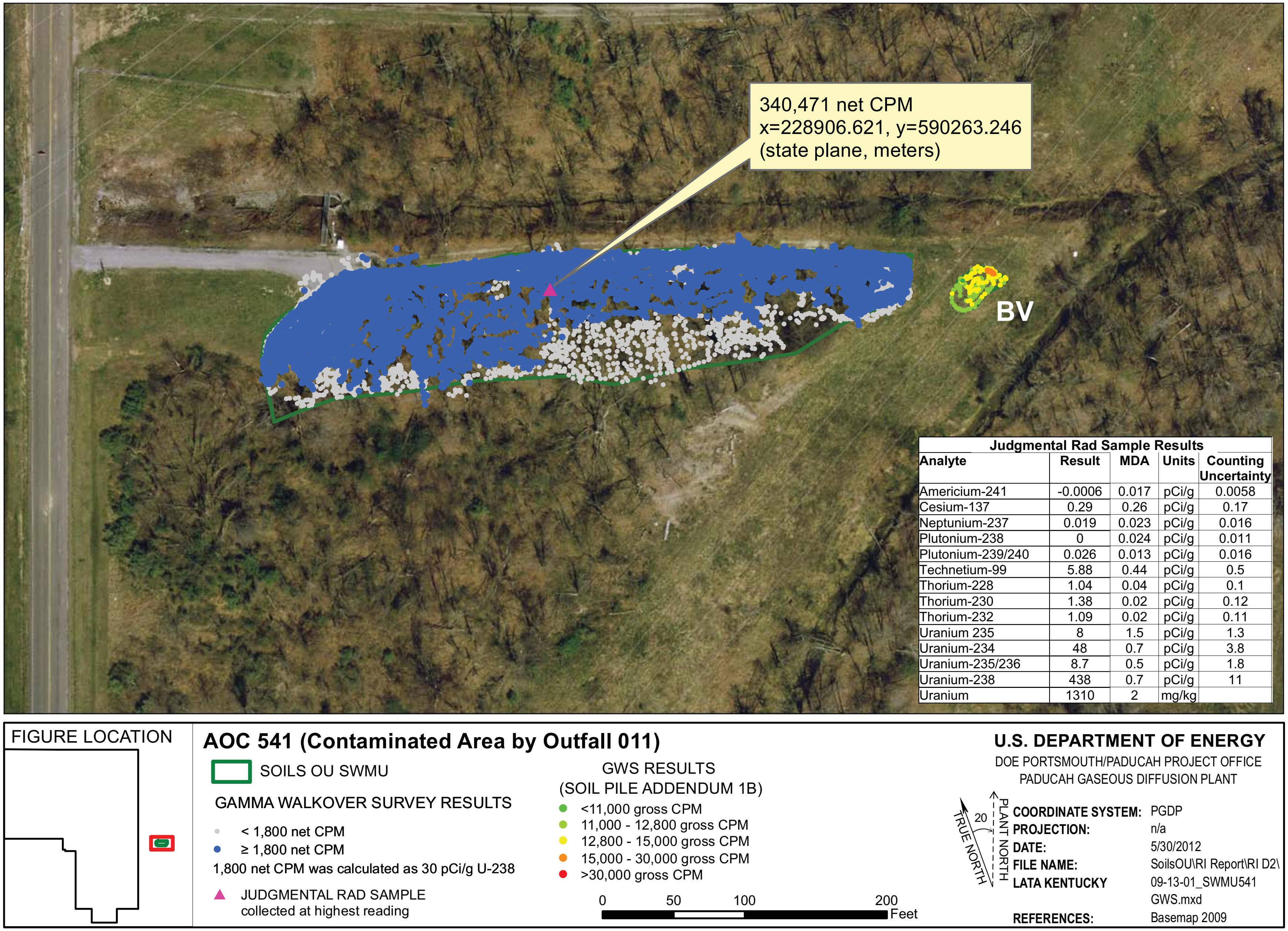
Metal	Grid
Beryllium	6, 7
Chromium	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 19
Iron	6
Nickel	7
Uranium	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21
Vanadium	6, 7

* AOC 541 consists of one EU.

All grids are located within the administrative boundary of AOC 541.

No metals were detected above both the background screening levels and the teen recreator AL in the AOC 541 surface soil.

The following are the metals detected in the AOC 541 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	-0.0006	0.017	pCi/g	0.0058
Cesium-137	0.29	0.26	pCi/g	0.17
Neptunium-237	0.019	0.023	pCi/g	0.016
Plutonium-238	0	0.024	pCi/g	0.011
Plutonium-239/240	0.026	0.013	pCi/g	0.016
Technetium-99	5.88	0.44	pCi/g	0.5
Thorium-228	1.04	0.04	pCi/g	0.1
Thorium-230	1.38	0.02	pCi/g	0.12
Thorium-232	1.09	0.02	pCi/g	0.11
Uranium 235	8	1.5	pCi/g	1.3
Uranium-234	48	0.7	pCi/g	3.8
Uranium-235/236	8.7	0.5	pCi/g	1.8
Uranium-238	438	0.7	pCi/g	11
Uranium	1310	2	mg/kg	

Figure 9.11.1. AOC 541 Gamma Walkover Survey

Table 9.11.1. Surface Soil Historical Data Summary: SWMU 541 Outfall 011 Contaminated Soil Area

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.07E+03	1.92E+04	1.20E+04	0/41	41/41	15/41	1.30E+04	0/41	2.77E+04	0/41	8.91E+06	0/41	41/41	16.5 - 199
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	2.10E-01	0/41	1.78E+00	0/41	1.90E+03	0/41	0/41	1.6 - 20
METAL	Arsenic	mg/kg	1.28E+00	9.98E+00	5.80E+00	0/41	36/41	0/41	1.20E+01	36/41	1.02E+00	0/41	1.02E+02	0/41	36/41	0.848 - 5
METAL	Barium	mg/kg	6.30E+01	2.30E+02	1.08E+02	0/41	41/41	1/41	2.00E+02	0/41	4.15E+02	0/41	4.58E+05	0/41	32/41	0.41 - 2.5
METAL	Beryllium	mg/kg	3.40E-01	1.46E+00	7.28E-01	0/41	17/41	6/41	6.70E-01	17/41	1.29E-02	0/41	8.65E+00	0/41	0/41	0.16 - 0.5
METAL	Cadmium	mg/kg	4.60E-02	2.75E+00	8.43E-01	2/41	18/41	16/41	2.10E-01	0/41	3.14E+00	0/41	3.14E+02	0/41	16/41	0.424 - 2.49
METAL	Calcium	mg/kg	7.72E+02	2.38E+04	2.76E+03	0/41	41/41	0/41	2.00E+05	0/41	n/a	0/41	n/a	n/a	n/a	82.4 - 200
METAL	Chromium	mg/kg	8.77E+00	3.35E+03	1.31E+02	0/259	161/259	152/259	1.60E+01	61/259	7.15E+01	0/259	7.15E+03	0/259	0/259	0.41 - 2.5
METAL	Cobalt	mg/kg	2.88E+00	1.23E+01	6.09E+00	0/41	41/41	0/41	1.40E+01	5/41	8.45E+00	0/41	3.29E+03	41/41	41/41	0.41 - 4.97
METAL	Copper	mg/kg	5.80E+00	1.61E+02	2.25E+01	1/41	40/41	10/41	1.90E+01	0/41	1.13E+03	0/41	4.75E+05	0/41	3/41	0.82 - 12.5
METAL	Iron	mg/kg	7.08E+03	2.96E+04	1.36E+04	0/41	41/41	1/41	2.80E+04	3/41	1.98E+04	0/41	8.31E+06	41/41	41/41	12.4 - 20
METAL	Lead	mg/kg	5.91E+00	9.43E+01	1.58E+01	0/259	236/259	8/259	3.60E+01	0/259	4.00E+02	0/259	4.00E+02	0/259	107/259	0.82 - 20
METAL	Magnesium	mg/kg	6.39E+02	4.42E+03	1.65E+03	0/41	41/41	0/41	7.70E+03	0/41	n/a	0/41	n/a	n/a	n/a	2.5 - 21.4
METAL	Manganese	mg/kg	8.70E+01	8.21E+02	3.28E+02	0/41	41/41	0/41	1.50E+03	0/41	3.47E+03	0/41	2.94E+05	39/41	41/41	0.41 - 2.5
METAL	Mercury	mg/kg	1.60E-02	2.30E-01	4.21E-02	1/41	27/41	2/41	2.00E-01	0/41	6.25E-01	0/41	7.88E+02	0/41	2/41	0.012 - 0.2
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/26	0/26	0/26	n/a	0/26	1.42E+02	0/26	5.94E+04	0/26	0/26	4.24 - 5
METAL	Nickel	mg/kg	5.19E+00	3.28E+01	1.12E+01	0/41	41/41	3/41	2.10E+01	1/41	2.98E+01	0/41	3.07E+04	0/41	41/41	0.82 - 5
METAL	Selenium	mg/kg	1.02E+00	2.00E+00	1.40E+00	2/41	9/41	9/41	8.00E-01	0/41	1.42E+02	0/41	5.93E+04	0/41	9/41	0.848 - 4.97
METAL	Silver	mg/kg	3.30E-01	3.30E-01	3.30E-01	1/41	1/41	0/41	2.30E+00	0/41	7.45E+00	0/41	8.07E+03	0/41	1/41	0.41 - 2.5
METAL	Sodium	mg/kg	3.57E+01	4.50E+01	4.01E+01	3/39	3/39	0/39	3.20E+02	0/39	n/a	0/39	n/a	n/a	n/a	170 - 250
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/41	0/41	0/41	2.10E-01	0/41	2.27E+00	0/41	9.50E+02	0/41	0/41	1.7 - 20
METAL	Uranium	mg/kg	1.39E+00	2.02E+04	7.56E+02	1/256	241/256	237/256	4.90E+00	164/256	8.49E+01	0/256	3.50E+04	48/256	230/256	0.889 - 214
METAL	Vanadium	mg/kg	1.25E+01	4.97E+01	2.58E+01	0/41	41/41	3/41	3.80E+01	41/41	1.04E-01	0/41	7.61E+01	41/41	41/41	0.82 - 2.5
METAL	Zinc	mg/kg	2.01E+01	1.09E+03	1.28E+02	0/41	40/41	13/41	6.50E+01	0/41	8.50E+03	0/41	3.56E+06	0/41	40/41	1.6 - 20
PPCB	PCB, Total	mg/kg	1.50E-01	9.40E+01	2.37E+01	0/261	49/261	0/261	n/a	48/261	1.83E-01	26/261	1.83E+01	35/261	49/261	0.02 - 0.65
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	0/12	0/12	0.46 - 0.5
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	0/12	0/12	0.46 - 0.5
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	0/12	0/12	0.46 - 0.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	3.35E+00	0/12	1.00E+02	0/12	0/12	0.46 - 0.5
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	Acenaphthene	mg/kg	5.40E-01	2.00E+00	1.13E+00	0/38	3/38	0/38	n/a	0/38	5.87E+02	0/38	1.76E+04	0/38	3/38	0.46 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/38	0/38	0/38	n/a	0/38	n/a	0/38	n/a	n/a	n/a	0.46 - 0.5
SVOA	Anthracene	mg/kg	6.40E-01	2.60E+00	1.45E+00	0/38	4/38	0/38	n/a	0/38	3.25E+03	0/38	9.74E+04	0/38	1/38	0.46 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	8.70E-01	1.80E+00	1.24E+00	1/38	6/38	0/38	n/a	0/38	n/a	0/38	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.11.1. Surface Soil Historical Data Summary: SWMU 541 Outfall 011 Contaminated Soil Area (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	0/12	0/12	0.46 - 0.5
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	Carbazole	mg/kg	6.40E-01	1.00E+00	8.20E-01	0/12	2/12	0/12	n/a	0/12	2.61E+01	0/12	2.61E+03	n/a	n/a	0.46 - 0.5
SVOA	Dibenzofuran	mg/kg	6.00E-01	6.00E-01	6.00E-01	0/11	1/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.46 - 0.5
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Di-n-butyl phthalate	mg/kg	6.40E-01	1.40E+00	8.83E-01	4/10	6/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	Fluoranthene	mg/kg	4.60E-01	2.40E+01	5.24E+00	6/36	11/36	0/36	n/a	0/36	4.47E+02	0/36	1.34E+04	0/36	6/36	0.46 - 1.9
SVOA	Fluorene	mg/kg	8.10E-01	1.50E+00	1.16E+00	0/38	2/38	0/38	n/a	0/38	4.19E+02	0/38	1.26E+04	0/38	2/38	0.46 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	1.78E-01	0/10	1.78E+01	0/10	0/10	0.46 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.46 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	Naphthalene	mg/kg	1.80E+00	1.80E+00	1.80E+00	0/38	1/38	0/38	n/a	0/38	5.27E+00	0/38	5.27E+02	1/38	1/38	0.46 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	6.10E-02	0/12	6.10E+00	0/12	0/12	0.46 - 0.5
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	0/12	0/12	0.46 - 0.5
SVOA	Phenanthrene	mg/kg	4.60E-01	1.90E+01	4.85E+00	3/38	9/38	0/38	n/a	0/38	n/a	0/38	n/a	n/a	n/a	0.46 - 0.97
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pyrene	mg/kg	4.80E-01	1.40E+01	4.78E+00	3/38	9/38	0/38	n/a	0/38	3.35E+02	0/38	1.00E+04	0/38	8/38	0.46 - 0.97
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.46 - 0.5
SVOA	Total PAH	mg/kg	2.00E-05	7.63E+00	1.25E+00	0/256	33/256	0/256	n/a	31/256	5.57E-02	2/256	5.57E+00	21/256	31/256	0.2 - 0.2
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.01 - 0.01
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.01 - 0.01
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	9.45E-02	0/10	1.29E+01	0/10	0/10	0.01 - 0.01
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.01 - 0.01
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	4.50E+02	0/10	2.11E+04	0/10	0/10	0.01 - 0.01
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	1.28E+00	0/10	1.91E+02	0/10	0/10	0.01 - 0.01
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	9.30E-01	0/10	1.34E+02	0/10	0/10	0.01 - 0.01
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.01 - 0.01
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	5.38E-01	0/10	5.85E+01	0/10	0/10	0.01 - 0.01
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	7.03E+00	0/10	4.84E+02	0/10	0/10	0.01 - 0.01
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.01 - 0.01
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	6.11E+00	0/10	8.90E+02	0/10	0/10	0.01 - 0.01
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	8.66E+01	0/10	2.79E+03	0/10	0/10	0.02 - 0.02

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.11.1. Surface Soil Historical Data Summary: SWMU 541 Outfall 011 Contaminated Soil Area (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
VOA	Methylene chloride	mg/kg	1.10E-02	1.10E-02	1.10E-02	1/10	1/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	1/10	0.01 - 0.01
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.01 - 0.01
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	3.26E-01	0/10	1.48E+02	0/10	0/10	0.01 - 0.01
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.01 - 0.01
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	2.39E+01	0/10	8.87E+02	0/10	0/10	0.01 - 0.01
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.01 - 0.01
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	9.91E-02	0/10	1.17E+01	0/10	0/10	0.01 - 0.01
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	2.39E-01	0/10	1.02E+02	0/10	0/10	0.01 - 0.01
RADS	Americium-241	pCi/g	-5.12E-02	2.73E+01	1.14E+00	0/40	40/40	0/40	n/a	1/40	1.28E+01	0/40	1.28E+03	2/40	8/40	0.0154 - 2.01
RADS	Cesium-137	pCi/g	-2.36E-02	2.33E+00	2.95E-01	0/40	40/40	4/40	4.90E-01	15/40	1.98E-01	0/40	1.98E+01	0/40	0/40	0.0234 - 0.241
RADS	Cobalt-60	pCi/g	-2.02E-02	1.83E-02	-2.09E-03	0/12	12/12	0/12	n/a	0/12	4.06E-02	0/12	4.06E+00	0/12	0/12	0.0255 - 0.106
RADS	Neptunium-237	pCi/g	-2.85E-02	1.81E-01	8.95E-03	0/37	37/37	1/37	1.00E-01	0/37	6.26E-01	0/37	6.26E+01	0/37	11/37	0.0192 - 0.361
RADS	Plutonium-238	pCi/g	-4.65E-02	1.70E-02	-1.12E-02	0/35	35/35	0/35	7.30E-02	0/35	3.64E+01	0/35	3.64E+03	0/35	0/35	0.00948 - 0.264
RADS	Plutonium-239/240	pCi/g	-8.68E-03	1.56E-01	1.67E-02	0/40	40/40	7/40	2.50E-02	0/40	3.56E+01	0/40	3.56E+03	0/40	2/40	0.0114 - 0.0596
RADS	Technetium-99	pCi/g	2.01E-02	3.65E+01	4.64E+00	0/38	38/38	9/38	2.50E+00	0/38	1.11E+03	0/38	1.11E+05	3/38	35/38	0.537 - 3.57
RADS	Thorium-228	pCi/g	3.03E-01	1.07E+00	4.88E-01	0/40	40/40	0/40	1.60E+00	0/40	n/a	0/40	n/a	n/a	n/a	0.0412 - 0.208
RADS	Thorium-230	pCi/g	2.66E-01	1.33E+00	4.92E-01	0/40	40/40	0/40	1.50E+00	0/40	4.49E+01	0/40	4.49E+03	0/40	36/40	0.0614 - 0.228
RADS	Thorium-232	pCi/g	2.96E-01	1.08E+00	4.83E-01	0/40	40/40	0/40	1.50E+00	0/40	n/a	0/40	n/a	n/a	n/a	0.0373 - 0.131
RADS	Uranium-234	pCi/g	8.20E-02	7.13E+02	4.93E+01	12/40	40/40	31/40	1.20E+00	6/40	6.25E+01	0/40	6.25E+03	0/40	0/40	0.1 - 2.05
RADS	Uranium-235	pCi/g	8.64E-03	6.51E+01	6.04E+00	0/40	40/40	35/40	6.00E-02	21/40	9.12E-01	0/40	9.12E+01	0/40	0/40	0.0121 - 0.233
RADS	Uranium-238	pCi/g	3.49E-01	4.54E+03	3.49E+02	12/40	40/40	37/40	1.20E+00	34/40	4.02E+00	7/40	4.02E+02	10/40	33/40	0.107 - 13.1

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.11.2. Surface Soil RI Data Summary: SWMU 541 Outfall 011 Contaminated Soil Area

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Uranium	mg/kg	1.31E+03	1.31E+03	1.31E+03	0/1	1/1	1/1	4.90E+00	1/1	8.49E+01	0/1	3.50E+04	1/1	1/1	2 - 2
RADS	Alpha activity	pCi/g	8.97E+02	8.97E+02	8.97E+02	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5 - 5
RADS	Americium-241	pCi/g	-6.00E-04	-6.00E-04	-6.00E-04	0/1	1/1	0/1	n/a	0/1	1.28E+01	0/1	1.28E+03	0/1	0/1	0.017 - 0.017
RADS	Beta activity	pCi/g	1.08E+03	1.08E+03	1.08E+03	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3 - 3
RADS	Cesium-137	pCi/g	2.90E-01	2.90E-01	2.90E-01	0/1	1/1	0/1	4.90E-01	1/1	1.98E-01	0/1	1.98E+01	0/1	0/1	0.26 - 0.26
RADS	Neptunium-237	pCi/g	1.90E-02	1.90E-02	1.90E-02	0/1	1/1	0/1	1.00E-01	0/1	6.26E-01	0/1	6.26E+01	0/1	1/1	0.023 - 0.023
RADS	Plutonium-238	pCi/g	0.00E+00	0.00E+00	0.00E+00	0/1	1/1	0/1	7.30E-02	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.024 - 0.024
RADS	Plutonium-239/240	pCi/g	2.60E-02	2.60E-02	2.60E-02	0/1	1/1	1/1	2.50E-02	0/1	3.56E+01	0/1	3.56E+03	0/1	0/1	0.013 - 0.013
RADS	Technetium-99	pCi/g	5.88E+00	5.88E+00	5.88E+00	0/1	1/1	1/1	2.50E+00	0/1	1.11E+03	0/1	1.11E+05	0/1	1/1	0.44 - 0.44
RADS	Thorium-228	pCi/g	1.04E+00	1.04E+00	1.04E+00	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.04 - 0.04
RADS	Thorium-230	pCi/g	1.38E+00	1.38E+00	1.38E+00	0/1	1/1	0/1	1.50E+00	0/1	4.49E+01	0/1	4.49E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	1.09E+00	1.09E+00	1.09E+00	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Uranium-234	pCi/g	4.80E+01	4.80E+01	4.80E+01	0/1	1/1	1/1	1.20E+00	0/1	6.25E+01	0/1	6.25E+03	0/1	0/1	0.7 - 0.7
RADS	Uranium-235/236	pCi/g	8.70E+00	8.70E+00	8.70E+00	0/1	1/1	1/1	6.00E-02	1/1	9.12E-01	0/1	9.12E+01	0/1	0/1	0.5 - 0.5
RADS	Uranium-238	pCi/g	4.38E+02	4.38E+02	4.38E+02	0/1	1/1	1/1	1.20E+00	1/1	4.02E+00	1/1	4.02E+02	1/1	1/1	0.7 - 0.7

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
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n/a = not applicable
* For RADS, all results are reported.

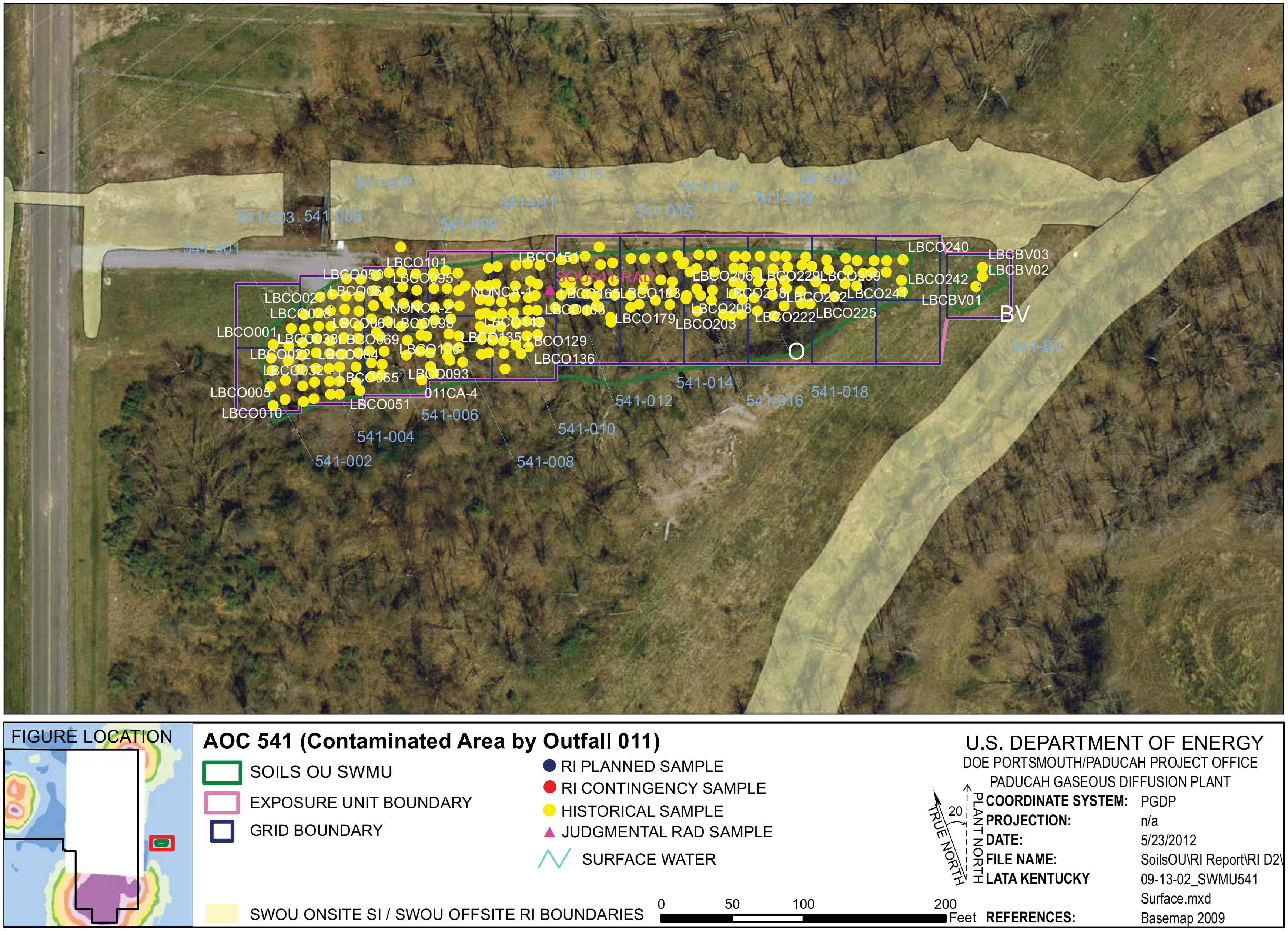


Figure 9.11.2. AOC 541 Sample Locations - Surface Soil

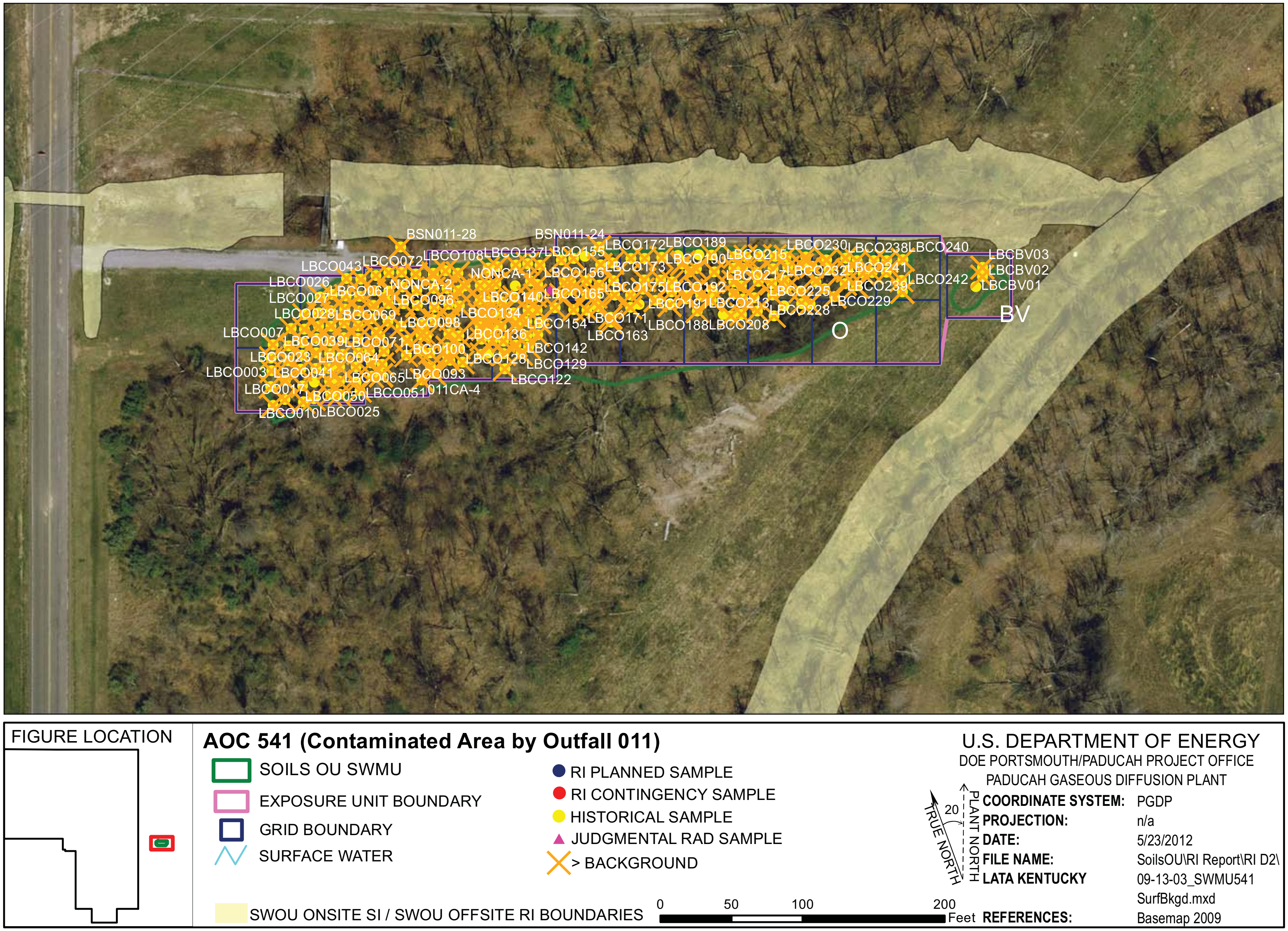


Figure 9.11.3. AOC 541 Background Exceedances - Surface Soil

Station	Results Exceeding Background
011CA-1	Aluminum (16000 mg/kg)
	Beryllium (1.24 mg/kg)
	Cadmium (2.28 mg/kg)
	Chromium (455 mg/kg)
	Copper (73.8 mg/kg)
	Lead (84.1 mg/kg)
	Mercury (0.21 mg/kg)
	Nickel (28.4 mg/kg)
	Selenium (1.23 mg/kg)
	Uranium (20200 mg/kg)
	Zinc (613 mg/kg)
	Cesium-137 (2.33 pCi/g)
	Plutonium-239/240 (0.156 pCi/g)
	Technetium-99 (36.5 pCi/g)
	Uranium-234 (713 pCi/g)
	Uranium-235 (65.1 pCi/g)
	Uranium-238 (4540 pCi/g)

Station	Results Exceeding Background
011CA-12	Chromium (42.2 mg/kg)
	Selenium (1.26 mg/kg)
	Uranium (5210 mg/kg)
	Uranium-234 (178 pCi/g)
	Uranium-235 (16.4 pCi/g)
	Uranium-238 (1160 pCi/g)

Station	Results Exceeding Background
011CA-13	Aluminum (15200 mg/kg)
	Beryllium (0.885 mg/kg)
	Chromium (1030 mg/kg)
	Copper (108 mg/kg)
	Lead (65.7 mg/kg)
	Nickel (23.1 mg/kg)
	Selenium (2 mg/kg)
	Uranium (6480 mg/kg)
	Zinc (722 mg/kg)
	Cesium-137 (0.743 pCi/g)
	Plutonium-239/240 (0.0624 pCi/g)
	Technetium-99 (35.1 pCi/g)
	Uranium-234 (253 pCi/g)
	Uranium-235 (22.3 pCi/g)
	Uranium-238 (1440 pCi/g)

Station	Results Exceeding Background
011CA-4	Beryllium (1.46 mg/kg)
	Chromium (60.6 mg/kg)
	Iron (29600 mg/kg)
	Selenium (1.02 mg/kg)
	Uranium (839 mg/kg)
	Vanadium (49.7 mg/kg)
	Zinc (72.6 mg/kg)
	Uranium-234 (15.7 pCi/g)
	Uranium-235 (1.44 pCi/g)
	Uranium-238 (102 pCi/g)

Station	Results Exceeding Background
011CA-9	Aluminum (19200 mg/kg)
	Beryllium (1.28 mg/kg)
	Cadmium (2.75 mg/kg)
	Chromium (688 mg/kg)
	Copper (161 mg/kg)
	Lead (94.3 mg/kg)
	Nickel (32.8 mg/kg)
	Selenium (1.48 mg/kg)
	Uranium (8800 mg/kg)
	Vanadium (46.2 mg/kg)
	Zinc (1090 mg/kg)
	Cesium-137 (1.92 pCi/g)
	Neptunium-237 (0.181 pCi/g)
	Plutonium-239/240 (0.137 pCi/g)
	Technetium-99 (30.7 pCi/g)
	Uranium-234 (253 pCi/g)
	Uranium-235 (23.5 pCi/g)
	Uranium-238 (1690 pCi/g)

Station	Results Exceeding Background
BSN011-24	Uranium-234 (1.44 pCi/g)
	Uranium-235 (0.109 pCi/g)
	Uranium-238 (4.77 pCi/g)

Station	Results Exceeding Background
BSN011-28	Barium (230 mg/kg)
	Mercury (0.23 mg/kg)
	Uranium-234 (1.51 pCi/g)
	Uranium-235 (0.116 pCi/g)
	Uranium-238 (5.32 pCi/g)

Station	Results Exceeding Background
LBCBV02	Uranium-235 (0.0719 pCi/g)
	Uranium-238 (3.32 pCi/g)

Station	Results Exceeding Background
LBCBV03	Uranium-234 (2.3 pCi/g)
	Uranium-235 (0.295 pCi/g)
	Uranium-238 (17.4 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.11.3. AOC 541 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBCO001	Chromium (47.25 mg/kg) Uranium (168.01 mg/kg) Technetium-99 (2.6 pCi/g) Uranium-234 (4.9 pCi/g) Uranium-235 (0.642 pCi/g) Uranium-238 (45.6 pCi/g)
LBCO002	Uranium (59.23 mg/kg)
LBCO003	Chromium (55.52 mg/kg) Uranium (60.85 mg/kg)
LBCO004	Chromium (40.15 mg/kg) Uranium (75.67 mg/kg)
LBCO005	Chromium (44.2 mg/kg) Uranium (29.7 mg/kg)
LBCO006	Uranium (34.19 mg/kg)
LBCO007	Uranium (245.26 mg/kg)
LBCO008	Chromium (204.19 mg/kg) Uranium (1149.69 mg/kg)
LBCO009	Aluminum (15900 mg/kg) Chromium (71.97 mg/kg) Uranium (673 mg/kg) Zinc (73.2 mg/kg) Uranium-234 (15.4 pCi/g) Uranium-235 (2.33 pCi/g) Uranium-238 (136 pCi/g)
LBCO010	Uranium (48.04 mg/kg)
LBCO011	Chromium (47.87 mg/kg) Uranium (100.93 mg/kg)
LBCO012	Chromium (62.13 mg/kg) Uranium (331.24 mg/kg)
LBCO013	Chromium (84.53 mg/kg) Uranium (527.46 mg/kg)
LBCO014	Uranium (200.27 mg/kg)
LBCO015	Uranium (552.25 mg/kg)
LBCO016	Uranium (475.47 mg/kg)
LBCO017	Chromium (40.3 mg/kg) Uranium (23.34 mg/kg)
LBCO018	Chromium (412.68 mg/kg) Lead (38.64 mg/kg) Uranium (3048.56 mg/kg)
LBCO019	Chromium (126.24 mg/kg) Uranium (1183.76 mg/kg)
LBCO020	Chromium (52.64 mg/kg) Uranium (320.4 mg/kg)
LBCO021	Aluminum (14400 mg/kg) Chromium (67.13 mg/kg) Uranium (510.64 mg/kg) Uranium-234 (14.2 pCi/g) Uranium-235 (2.14 pCi/g) Uranium-238 (142 pCi/g)
LBCO022	Chromium (96.32 mg/kg) Uranium (852.35 mg/kg)
LBCO023	Uranium (169.35 mg/kg)
LBCO025	Uranium (70.21 mg/kg)
LBCO026	Uranium (122.1 mg/kg)
LBCO027	Uranium (176.45 mg/kg)
LBCO028	Chromium (72.9 mg/kg) Uranium (659.62 mg/kg)
LBCO029	Chromium (42.33 mg/kg) Uranium (710.46 mg/kg)
LBCO030	Aluminum (16300 mg/kg) Chromium (35.9 mg/kg) Uranium (424 mg/kg) Uranium-234 (20.7 pCi/g) Uranium-235 (2.83 pCi/g) Uranium-238 (198 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.11.3. AOC 541 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBCO031	Uranium (36.04 mg/kg)
LBCO032	Uranium (12.4 mg/kg)
LBCO033	Uranium (23.62 mg/kg)
LBCO034	Chromium (40.58 mg/kg) Uranium (166.24 mg/kg)
LBCO035	Chromium (175.39 mg/kg) Uranium (2848.03 mg/kg)
LBCO036	Chromium (33.66 mg/kg) Uranium (130.68 mg/kg)
LBCO037	Chromium (173.08 mg/kg) Uranium (1795.58 mg/kg)
LBCO038	Chromium (35.29 mg/kg) Uranium (220.85 mg/kg)
LBCO039	Chromium (55.62 mg/kg) Uranium (466.06 mg/kg)
LBCO040	Uranium (285.79 mg/kg)
LBCO041	Uranium (17.88 mg/kg)
LBCO042	Uranium (76.63 mg/kg)
LBCO043	Uranium (273.19 mg/kg)
LBCO044	Chromium (37.95 mg/kg) Uranium (818.53 mg/kg)
LBCO045	Uranium (20.83 mg/kg)
LBCO046	Chromium (46.26 mg/kg) Uranium (533.79 mg/kg)
LBCO047	Chromium (63.05 mg/kg) Uranium (319.69 mg/kg)
LBCO048	Chromium (123.14 mg/kg) Uranium (1417.84 mg/kg)
LBCO049	Uranium (296.18 mg/kg)
LBCO050	Uranium (31.13 mg/kg)
LBCO051	Uranium (27.58 mg/kg)
LBCO052	Uranium (129.53 mg/kg)
LBCO053	Uranium (128.97 mg/kg)
LBCO054	Uranium (99.35 mg/kg)
LBCO055	Aluminum (16400 mg/kg) Cadmium (1.13 mg/kg) Chromium (138 mg/kg) Copper (34.8 mg/kg) Uranium (1480 mg/kg) Zinc (217 mg/kg) Plutonium-239/240 (0.0394 pCi/g) Technetium-99 (9.41 pCi/g) Uranium-234 (59.1 pCi/g) Uranium-235 (8.84 pCi/g) Uranium-238 (502 pCi/g)
LBCO056	Chromium (67.43 mg/kg) Uranium (5851.3 mg/kg)
LBCO057	Uranium (69.38 mg/kg)
LBCO058	Uranium (105.93 mg/kg)
LBCO059	Uranium (15.42 mg/kg)
LBCO060	Uranium (335.91 mg/kg)
LBCO061	Uranium (67.35 mg/kg)
LBCO062	Uranium (261.37 mg/kg)
LBCO063	Chromium (61.74 mg/kg) Uranium (1011.58 mg/kg)
LBCO064	Uranium (484.78 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.11.3. AOC 541 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBCO065	Uranium (70.92 mg/kg)

Station	Results Exceeding Background
LBCO066	Uranium (197.86 mg/kg)

Station	Results Exceeding Background
LBCO067	Chromium (366.52 mg/kg)
	Lead (41.52 mg/kg)
	Uranium (6033.1 mg/kg)

Station	Results Exceeding Background
LBCO068	Chromium (102.87 mg/kg)
	Uranium (727.37 mg/kg)

Station	Results Exceeding Background
LBCO069	Chromium (42.4 mg/kg)
	Uranium (245.77 mg/kg)

Station	Results Exceeding Background
LBCO070	Aluminum (14300 mg/kg)
	Selenium (1.7 mg/kg)
	Uranium (216 mg/kg)
	Uranium-234 (1.62 pCi/g)
	Uranium-235 (0.231 pCi/g)
	Uranium-238 (14 pCi/g)

Station	Results Exceeding Background
LBCO071	Uranium (23.67 mg/kg)

Station	Results Exceeding Background
LBCO072	Chromium (31.7 mg/kg)
	Selenium (1.2 mg/kg)
	Uranium (320 mg/kg)
	Uranium-234 (15 pCi/g)
	Uranium-235 (2.31 pCi/g)
	Uranium-238 (145 pCi/g)

Station	Results Exceeding Background
LBCO073	Chromium (129.33 mg/kg)
	Uranium (915.42 mg/kg)

Station	Results Exceeding Background
LBCO074	Cadmium (0.723 mg/kg)
	Chromium (137.49 mg/kg)
	Uranium (1192.56 mg/kg)
	Zinc (80 mg/kg)
	Uranium-234 (28 pCi/g)
	Uranium-235 (4.05 pCi/g)
	Uranium-238 (266 pCi/g)

Station	Results Exceeding Background
LBCO075	Uranium (235.75 mg/kg)

Station	Results Exceeding Background
LBCO076	Chromium (51.48 mg/kg)
	Uranium (359.34 mg/kg)

Station	Results Exceeding Background
LBCO077	Chromium (45.92 mg/kg)
	Uranium (423.97 mg/kg)

Station	Results Exceeding Background
LBCO078	Uranium (93.23 mg/kg)

Station	Results Exceeding Background
LBCO079	Chromium (39.34 mg/kg)
	Uranium (558.35 mg/kg)

Station	Results Exceeding Background
LBCO080	Chromium (41.54 mg/kg)
	Uranium (89.44 mg/kg)

Station	Results Exceeding Background
LBCO081	Chromium (135.65 mg/kg)
	Uranium (431.09 mg/kg)

Station	Results Exceeding Background
LBCO082	Uranium (240.14 mg/kg)

Station	Results Exceeding Background
LBCO083	Chromium (88.99 mg/kg)
	Uranium (486.65 mg/kg)

Station	Results Exceeding Background
LBCO084	Chromium (72.51 mg/kg)
	Uranium (1046.43 mg/kg)

Station	Results Exceeding Background
LBCO085	Chromium (78.21 mg/kg)
	Uranium (853.46 mg/kg)

Station	Results Exceeding Background
LBCO086	Uranium (88.86 mg/kg)

Station	Results Exceeding Background
LBCO087	Chromium (86.43 mg/kg)
	Uranium (706.35 mg/kg)

Station	Results Exceeding Background
LBCO088	Uranium (34.59 mg/kg)

Station	Results Exceeding Background
LBCO089	Chromium (1436.27 mg/kg)
	Lead (46.23 mg/kg)
	Uranium (5998.8 mg/kg)

Station	Results Exceeding Background
LBCO090	Chromium (90.63 mg/kg)
	Uranium (743.37 mg/kg)

Station	Results Exceeding Background
LBCO091	Chromium (229.89 mg/kg)
	Uranium (2021.47 mg/kg)

Station	Results Exceeding Background
LBCO092	Chromium (131.94 mg/kg)
	Uranium (1047.05 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.11.3. AOC 541 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBCO093	Aluminum (13700 mg/kg) Chromium (151.16 mg/kg) Copper (20 mg/kg) Uranium (1127.65 mg/kg) Zinc (104 mg/kg) Plutonium-239/240 (0.0273 pCi/g) Technetium-99 (2.92 pCi/g) Uranium-234 (25.6 pCi/g) Uranium-235 (15.5 pCi/g) Uranium-238 (376 pCi/g)
LBCO094	Aluminum (15400 mg/kg) Chromium (46.6 mg/kg) Uranium (83.61 mg/kg) Uranium-234 (2.72 pCi/g) Uranium-235 (0.414 pCi/g) Uranium-238 (25.8 pCi/g)
LBCO095	Cadmium (0.626 mg/kg) Chromium (47.5 mg/kg) Uranium (302.92 mg/kg) Uranium-234 (11 pCi/g) Uranium-235 (1.87 pCi/g) Uranium-238 (113 pCi/g)
LBCO096	Chromium (33.83 mg/kg) Uranium (306.71 mg/kg)
LBCO098	Chromium (73.51 mg/kg) Uranium (372.05 mg/kg)
LBCO099	Uranium (167.32 mg/kg)

Station	Results Exceeding Background
LBCO100	Uranium (102.48 mg/kg)
LBCO101	Uranium (43.23 mg/kg)
LBCO102	Uranium (260 mg/kg)
LBCO103	Chromium (32.86 mg/kg) Uranium (169.98 mg/kg)
LBCO104	Chromium (914.79 mg/kg) Lead (75.57 mg/kg) Uranium (10800.12 mg/kg)
LBCO105	Chromium (31.87 mg/kg) Uranium (74.57 mg/kg)
LBCO106	Chromium (49.2 mg/kg) Uranium (368.06 mg/kg)
LBCO107	Uranium (34.25 mg/kg)
LBCO108	Uranium (84.1 mg/kg)
LBCO109	Chromium (51.3 mg/kg) Uranium (22.69 mg/kg)
LBCO110	Chromium (37.67 mg/kg)
LBCO111	Chromium (116.24 mg/kg) Uranium (2045.96 mg/kg)

Station	Results Exceeding Background
LBCO112	Chromium (33.43 mg/kg) Uranium (328.97 mg/kg)
LBCO113	Chromium (112.19 mg/kg) Uranium (1228.68 mg/kg)
LBCO115	Chromium (34.25 mg/kg) Uranium (152.85 mg/kg)
LBCO116	Uranium (14 mg/kg)
LBCO117	Chromium (44.89 mg/kg) Uranium (80.12 mg/kg)
LBCO118	Uranium (19.99 mg/kg)
LBCO119	Chromium (544.44 mg/kg) Uranium (1821.01 mg/kg)
LBCO120	Chromium (71.09 mg/kg) Uranium (709.17 mg/kg)
LBCO121	Chromium (40.47 mg/kg) Uranium (465.1 mg/kg)
LBCO122	Uranium (94.43 mg/kg)
LBCO123	Uranium (158.38 mg/kg)
LBCO125	Uranium (308.47 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.11.3. AOC 541 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBCO126	Chromium (43.92 mg/kg)
	Uranium (24.46 mg/kg)

Station	Results Exceeding Background
LBCO127	Cadmium (0.612 mg/kg)
	Chromium (61.9 mg/kg)
	Uranium (136.6 mg/kg)
	Uranium-234 (7.65 pCi/g)
	Uranium-235 (1.29 pCi/g)
	Uranium-238 (84.3 pCi/g)

Station	Results Exceeding Background
LBCO128	Chromium (35.7 mg/kg)
	Uranium (726.24 mg/kg)

Station	Results Exceeding Background
LBCO129	Chromium (222.89 mg/kg)
	Uranium (3218.15 mg/kg)

Station	Results Exceeding Background
LBCO130	Uranium (12.69 mg/kg)

Station	Results Exceeding Background
LBCO131	Uranium (75.51 mg/kg)

Station	Results Exceeding Background
LBCO132	Chromium (42.55 mg/kg)
	Uranium (6128.98 mg/kg)

Station	Results Exceeding Background
LBCO133	Chromium (44.14 mg/kg)
	Uranium (61.56 mg/kg)

Station	Results Exceeding Background
LBCO134	Aluminum (14000 mg/kg)
	Cadmium (0.784 mg/kg)
	Chromium (18.7 mg/kg)
	Uranium (40.12 mg/kg)
	Uranium-234 (1.8 pCi/g)
	Uranium-235 (0.284 pCi/g)
	Uranium-238 (16.5 pCi/g)

Station	Results Exceeding Background
LBCO135	Chromium (53.63 mg/kg)
	Uranium (500.15 mg/kg)

Station	Results Exceeding Background
LBCO136	Chromium (38.42 mg/kg)
	Uranium (570.89 mg/kg)

Station	Results Exceeding Background
LBCO137	Chromium (57.77 mg/kg)
	Uranium (62.03 mg/kg)

Station	Results Exceeding Background
LBCO138	Chromium (46.83 mg/kg)
	Uranium (38.15 mg/kg)

Station	Results Exceeding Background
LBCO139	Chromium (814.56 mg/kg)
	Uranium (1102.67 mg/kg)

Station	Results Exceeding Background
LBCO140	Uranium (12.87 mg/kg)

Station	Results Exceeding Background
LBCO141	Cadmium (0.543 mg/kg)
	Chromium (45.61 mg/kg)
	Uranium-238 (1.74 pCi/g)

Station	Results Exceeding Background
LBCO142	Uranium (86.16 mg/kg)

Station	Results Exceeding Background
LBCO143	Chromium (40.28 mg/kg)
	Uranium (32.46 mg/kg)

Station	Results Exceeding Background
LBCO144	Chromium (78.61 mg/kg)
	Uranium (1084.88 mg/kg)

Station	Results Exceeding Background
LBCO145	Uranium (443.65 mg/kg)

Station	Results Exceeding Background
LBCO146	Uranium (13.15 mg/kg)

Station	Results Exceeding Background
LBCO147	Uranium (23.52 mg/kg)

Station	Results Exceeding Background
LBCO148	Chromium (398.95 mg/kg)
	Uranium (311.1 mg/kg)

Station	Results Exceeding Background
LBCO149	Chromium (82.18 mg/kg)
	Uranium (1092.76 mg/kg)

Station	Results Exceeding Background
LBCO150	Chromium (34.85 mg/kg)
	Uranium (225.73 mg/kg)

Station	Results Exceeding Background
LBCO152	Chromium (109.9 mg/kg)
	Uranium (737.47 mg/kg)

Station	Results Exceeding Background
LBCO153	Chromium (50.81 mg/kg)
	Uranium (16.19 mg/kg)

Station	Results Exceeding Background
LBCO154	Chromium (35.06 mg/kg)
	Uranium (69.83 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.11.3. AOC 541 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBCO155	Aluminum (13900 mg/kg) Cadmium (0.714 mg/kg) Chromium (18.1 mg/kg)
LBCO156	Uranium (134.58 mg/kg)
LBCO157	Aluminum (15700 mg/kg) Cadmium (0.822 mg/kg) Chromium (34.9 mg/kg) Uranium (59.3 mg/kg) Uranium-235 (0.169 pCi/g) Uranium-238 (10.2 pCi/g)
LBCO159	Chromium (44.4 mg/kg) Uranium (22.3 mg/kg)
LBCO160	Uranium (86.61 mg/kg)
LBCO161	Chromium (35.67 mg/kg) Uranium (149.82 mg/kg)
LBCO162	Cadmium (0.842 mg/kg) Chromium (227 mg/kg) Copper (22.8 mg/kg) Uranium (1600 mg/kg) Zinc (171 mg/kg) Uranium-234 (34.2 pCi/g) Uranium-235 (4.59 pCi/g) Uranium-238 (350 pCi/g)
LBCO163	Chromium (47.49 mg/kg) Uranium (126.14 mg/kg)
LBCO164	Uranium (26.51 mg/kg)
LBCO165	Chromium (256.83 mg/kg) Uranium (3778.16 mg/kg)
LBCO166	Chromium (112.36 mg/kg) Uranium (512.96 mg/kg)
LBCO167	Chromium (69.56 mg/kg) Uranium (667.07 mg/kg)
LBCO168	Uranium (60.43 mg/kg)
LBCO169	Cadmium (0.892 mg/kg) Chromium (178.47 mg/kg) Copper (36.6 mg/kg) Uranium (3754.74 mg/kg) Zinc (248 mg/kg) Cesium-137 (0.962 pCi/g) Plutonium-239/240 (0.058 pCi/g) Technetium-99 (5.97 pCi/g) Uranium-234 (84.7 pCi/g) Uranium-235 (43 pCi/g) Uranium-238 (1020 pCi/g)
LBCO170	Chromium (56.4 mg/kg) Uranium (3146.21 mg/kg)
LBCO172	Chromium (45.64 mg/kg) Uranium (19.08 mg/kg)
LBCO173	Uranium (19.74 mg/kg)
LBCO174	Chromium (273.84 mg/kg) Uranium (589.69 mg/kg)
LBCO175	Chromium (36.11 mg/kg) Uranium (15.94 mg/kg)
LBCO177	Uranium (27.67 mg/kg)
LBCO178	Chromium (76.18 mg/kg) Uranium (184.6 mg/kg)
LBCO179	Uranium (41.09 mg/kg) Uranium-235 (0.111 pCi/g) Uranium-238 (8.93 pCi/g)
LBCO180	Uranium (28.16 mg/kg)
LBCO181	Chromium (32.56 mg/kg)
LBCO182	Chromium (33.26 mg/kg) Uranium (89.25 mg/kg)
LBCO183	Uranium (195.86 mg/kg)
LBCO185	Chromium (43.98 mg/kg)
LBCO186	Chromium (42.25 mg/kg) Uranium (199.83 mg/kg)
LBCO187	Uranium (51.11 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.11.3. AOC 541 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBCO188	Uranium (12.18 mg/kg)
LBCO189	Uranium (33.93 mg/kg)
LBCO190	Chromium (258.02 mg/kg)
	Uranium (927.59 mg/kg)
LBCO191	Chromium (120.76 mg/kg)
	Uranium (479.6 mg/kg)
LBCO192	Chromium (141.17 mg/kg)
	Uranium (538.99 mg/kg)
LBCO194	Chromium (43.49 mg/kg)
	Uranium (200.75 mg/kg)
LBCO195	Chromium (59.06 mg/kg)
	Uranium (224.53 mg/kg)
LBCO196	Chromium (40.79 mg/kg)
	Uranium (609.25 mg/kg)
LBCO197	Chromium (71.23 mg/kg)
	Uranium (1917.94 mg/kg)
LBCO198	Uranium (11.21 mg/kg)
LBCO199	Uranium (431.21 mg/kg)
LBCO200	Uranium (258.36 mg/kg)
LBCO201	Chromium (450.73 mg/kg)
	Uranium (2250.95 mg/kg)
LBCO202	Chromium (45.23 mg/kg)
	Uranium (101.27 mg/kg)
LBCO203	Uranium (14.97 mg/kg)
LBCO204	Uranium (229.09 mg/kg)
LBCO205	Chromium (42.22 mg/kg)
	Uranium (22.48 mg/kg)
LBCO206	Uranium (1266.36 mg/kg)
LBCO207	Chromium (3352.5 mg/kg)
	Lead (70.16 mg/kg)
	Uranium (6830.32 mg/kg)
LBCO208	Uranium (41.78 mg/kg)
LBCO209	Uranium (65.13 mg/kg)
LBCO210	Uranium (34.87 mg/kg)
LBCO211	Uranium (39.41 mg/kg)
LBCO212	Chromium (494.95 mg/kg)
	Uranium (500.43 mg/kg)
LBCO213	Uranium (16.33 mg/kg)
LBCO214	Chromium (157.65 mg/kg)
	Uranium (220.7 mg/kg)
LBCO215	Chromium (40.08 mg/kg)
	Uranium (92.71 mg/kg)
LBCO216	Chromium (96.71 mg/kg)
	Uranium (689.67 mg/kg)
LBCO217	Chromium (531.56 mg/kg)
	Uranium (2860.72 mg/kg)
LBCO219	Chromium (127.78 mg/kg)
	Uranium (234.33 mg/kg)
LBCO220	Chromium (98.35 mg/kg)
	Uranium (609.83 mg/kg)
LBCO221	Uranium (13.56 mg/kg)
LBCO222	Uranium (31.3 mg/kg)
LBCO223	Cadmium (0.508 mg/kg)
	Chromium (59.27 mg/kg)
	Uranium (189.11 mg/kg)
	Uranium-234 (7.18 pCi/g)
	Uranium-235 (0.866 pCi/g)
	Uranium-238 (61 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.11.3. AOC 541 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBCO224	Uranium (142.97 mg/kg)

Station	Results Exceeding Background
LBCO225	Uranium (14.04 mg/kg)

Station	Results Exceeding Background
LBCO226	Chromium (146.5 mg/kg)
	Uranium (600.71 mg/kg)

Station	Results Exceeding Background
LBCO227	Chromium (62.76 mg/kg)
	Uranium (3126.14 mg/kg)

Station	Results Exceeding Background
LBCO228	Chromium (40.09 mg/kg)
	Uranium (148.24 mg/kg)

Station	Results Exceeding Background
LBCO229	Cadmium (0.502 mg/kg)
	Uranium (24.09 mg/kg)
	Uranium-235 (0.0768 pCi/g)
	Uranium-238 (4.14 pCi/g)

Station	Results Exceeding Background
LBCO230	Chromium (47.38 mg/kg)
	Uranium (344.96 mg/kg)

Station	Results Exceeding Background
LBCO231	Chromium (38.26 mg/kg)
	Uranium (115.4 mg/kg)

Station	Results Exceeding Background
LBCO232	Chromium (61.25 mg/kg)
	Uranium (326.51 mg/kg)

Station	Results Exceeding Background
LBCO233	Uranium (8.6 mg/kg)
	Uranium-238 (3.73 pCi/g)

Station	Results Exceeding Background
LBCO234	Chromium (116.99 mg/kg)
	Uranium (1251.63 mg/kg)

Station	Results Exceeding Background
LBCO235	Cadmium (0.633 mg/kg)
	Chromium (231 mg/kg)
	Copper (25.2 mg/kg)
	Uranium (1470 mg/kg)
	Zinc (142 mg/kg)
	Technetium-99 (2.63 pCi/g)
	Uranium-234 (28.6 pCi/g)
	Uranium-235 (3.27 pCi/g)
	Uranium-238 (255 pCi/g)

Station	Results Exceeding Background
LBCO236	Uranium (38.86 mg/kg)

Station	Results Exceeding Background
LBCO237	Uranium (37.21 mg/kg)

Station	Results Exceeding Background
LBCO238	Chromium (29.56 mg/kg)
	Uranium (108.46 mg/kg)

Station	Results Exceeding Background
LBCO239	Uranium (32.12 mg/kg)

Station	Results Exceeding Background
LBCO240	Chromium (42.31 mg/kg)
	Uranium (275.24 mg/kg)

Station	Results Exceeding Background
LBCO241	Uranium (105.35 mg/kg)

Station	Results Exceeding Background
LBCO242	Cadmium (0.583 mg/kg)
	Chromium (28.7 mg/kg)
	Uranium (105 mg/kg)
	Uranium-234 (7.07 pCi/g)
	Uranium-235 (1.01 pCi/g)
	Uranium-238 (68.6 pCi/g)

Station	Results Exceeding Background
NONCA-1	Aluminum (16400 mg/kg)
	Beryllium (0.959 mg/kg)
	Chromium (35 mg/kg)
	Uranium (246 mg/kg)
	Vanadium (39.1 mg/kg)
	Uranium-234 (6.94 pCi/g)
	Uranium-235 (0.598 pCi/g)
	Uranium-238 (38.1 pCi/g)

Station	Results Exceeding Background
NONCA-2	Chromium (39.3 mg/kg)
	Selenium (1.36 mg/kg)
	Uranium (391 mg/kg)
	Uranium-234 (15.1 pCi/g)
	Uranium-235 (1.43 pCi/g)
	Uranium-238 (106 pCi/g)

Station	Results Exceeding Background
SOU541-RAD	Uranium (1310 mg/kg)
	Plutonium-239/240 (0.026 pCi/g)
	Technetium-99 (5.88 pCi/g)
	Uranium-234 (48 pCi/g)
	Uranium-235/236 (8.7 pCi/g)
	Uranium-238 (438 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.11.3. AOC 541 Background Exceedances – Surface (Continued)

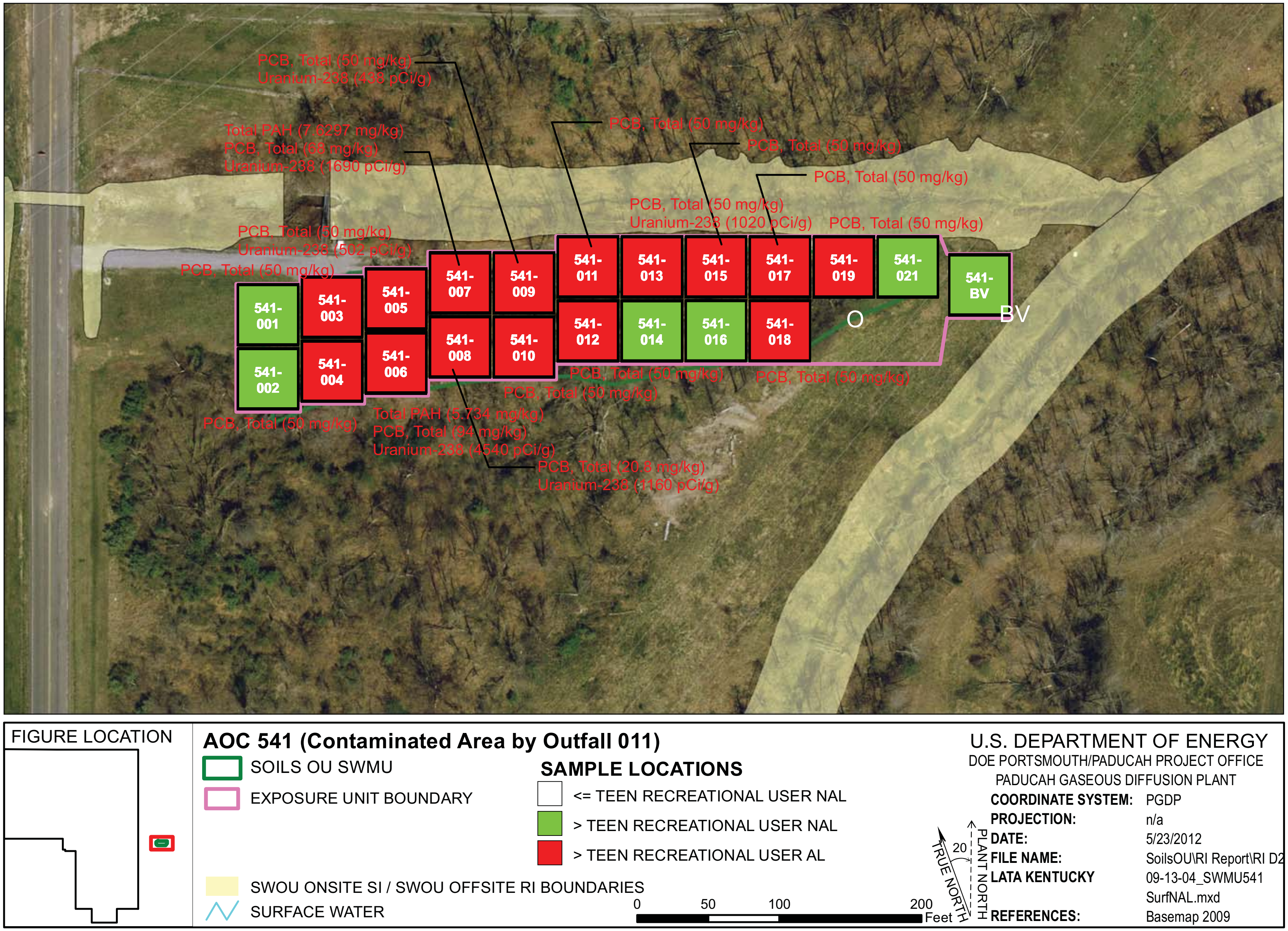


Figure 9.11.4. AOC 541 NAL Exceedances - Surface Soil

SOU541-001	Arsenic (4.71 mg/kg) Uranium (245.26 mg/kg) Vanadium (24.8 mg/kg) PCB, Total (6.08 mg/kg) Uranium-238 (45.6 pCi/g) Total PAH (2.4434 mg/kg)
SOU541-002	Arsenic (6.47 mg/kg) Beryllium (0.519 mg/kg) Chromium (204.19 mg/kg) Uranium (1149.69 mg/kg) Vanadium (32.2 mg/kg) PCB, Total (12.2 mg/kg) Cesium-137 (0.21 pCi/g) Uranium-235 (2.33 pCi/g) Uranium-238 (136 pCi/g)
SOU541-003	Arsenic (7.29 mg/kg) Beryllium (0.588 mg/kg) Chromium (412.68 mg/kg) Uranium (3048.56 mg/kg) Vanadium (33.1 mg/kg) PCB, Total (50 mg/kg) Uranium-235 (2.14 pCi/g) Uranium-238 (142 pCi/g) Total PAH (0.22 mg/kg)
SOU541-004	Arsenic (5.97 mg/kg) Beryllium (0.484 mg/kg) Chromium (123.14 mg/kg) Uranium (1417.84 mg/kg) Vanadium (30 mg/kg) PCB, Total (50 mg/kg) Cesium-137 (0.221 pCi/g) Uranium-235 (2.83 pCi/g) Uranium-238 (198 pCi/g) Total PAH (0.26 mg/kg)
SOU541-005	Arsenic (9.98 mg/kg) Beryllium (0.641 mg/kg) Chromium (366.52 mg/kg) Uranium (6033.1 mg/kg) Vanadium (28 mg/kg) PCB, Total (50 mg/kg) Cesium-137 (0.382 pCi/g) Uranium-235 (8.84 pCi/g) Uranium-238 (502 pCi/g) Total PAH (0.73269 mg/kg)
SOU541-006	Arsenic (7.26 mg/kg) Beryllium (1.46 mg/kg) Chromium (1030 mg/kg) Cobalt (11.1 mg/kg) Iron (29600 mg/kg) Uranium (20200 mg/kg) Vanadium (49.7 mg/kg) PCB, Total (94 mg/kg) Cesium-137 (2.33 pCi/g) Uranium-234 (713 pCi/g) Uranium-235 (65.1 pCi/g) Uranium-238 (4540 pCi/g) Total PAH (5.734 mg/kg)
SOU541-007	Arsenic (7.75 mg/kg) Beryllium (1.28 mg/kg) Chromium (914.79 mg/kg) Cobalt (12.3 mg/kg) Iron (22600 mg/kg) Nickel (32.8 mg/kg) Uranium (10800.12 mg/kg) Vanadium (46.2 mg/kg) PCB, Total (68 mg/kg) Americium-241 (27.3 pCi/g) Cesium-137 (1.92 pCi/g) Uranium-234 (253 pCi/g) Uranium-235 (23.5 pCi/g) Uranium-238 (1690 pCi/g) Total PAH (7.6297 mg/kg)
SOU541-008	Arsenic (5.25 mg/kg) Beryllium (0.656 mg/kg) Chromium (1436.27 mg/kg Uranium (5998.8 mg/kg) Vanadium (25.7 mg/kg) PCB, Total (20.8 mg/kg) Cesium-137 (0.258 pCi/g) Uranium-234 (178 pCi/g) Uranium-235 (16.4 pCi/g) Uranium-238 (1160 pCi/g) Total PAH (1.37 mg/kg)
SOU541-009	Chromium (814.56 mg/kg) Uranium (6128.98 mg/kg) PCB, Total (50 mg/kg) Cesium-137 (0.29 pCi/g) Uranium-235/236 (8.7 pCi/g Uranium-238 (438 pCi/g) Total PAH (0.22 mg/kg)
SOU541-010	Arsenic (5.02 mg/kg) Chromium (544.44 mg/kg) Cobalt (9.88 mg/kg) Uranium (3218.15 mg/kg) Vanadium (24.1 mg/kg) PCB, Total (50 mg/kg) Uranium-235 (1.29 pCi/g) Uranium-238 (84.3 pCi/g) Total PAH (0.8 mg/kg)
SOU541-011	Arsenic (5.53 mg/kg) Chromium (398.95 mg/kg) Uranium (1092.76 mg/kg) Vanadium (29.6 mg/kg) PCB, Total (50 mg/kg) Uranium-238 (10.2 pCi/g) Total PAH (0.22 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.11.4. SWMU 541 NAL Exceedances – Surface (Continued)

SOU541-012	Arsenic (5.35 mg/kg) Chromium (256.83 mg/kg) Uranium (3778.16 mg/kg) Vanadium (26.5 mg/kg) PCB, Total (50 mg/kg) Uranium-235 (4.59 pCi/g) Uranium-238 (350 pCi/g) Total PAH (0.23 mg/kg)
SOU541-013	Arsenic (6.06 mg/kg) Chromium (273.84 mg/kg) Uranium (3754.74 mg/kg) Vanadium (23.3 mg/kg) PCB, Total (50 mg/kg) Cesium-137 (0.962 pCi/g) Uranium-234 (84.7 pCi/g) Uranium-235 (43 pCi/g) Uranium-238 (1020 pCi/g) Total PAH (0.88407 mg/kg)
SOU541-014	Arsenic (1.28 mg/kg) Uranium (667.07 mg/kg) Vanadium (12.5 mg/kg) Uranium-238 (8.93 pCi/g)
SOU541-015	Chromium (450.73 mg/kg) Uranium (2250.95 mg/kg) PCB, Total (50 mg/kg) Total PAH (0.32 mg/kg)
SOU541-016	Chromium (141.17 mg/kg) Uranium (538.99 mg/kg)
SOU541-017	Arsenic (5.45 mg/kg) Chromium (3352.5 mg/kg) Uranium (6830.32 mg/kg) Vanadium (19.5 mg/kg) PCB, Total (50 mg/kg) Cesium-137 (0.251 pCi/g) Uranium-238 (61 pCi/g)
SOU541-018	PCB, Total (50 mg/kg)
SOU541-019	Arsenic (8.78 mg/kg) Beryllium (0.577 mg/kg) Chromium (231 mg/kg) Uranium (3126.14 mg/kg) Vanadium (22.6 mg/kg) PCB, Total (50 mg/kg) Uranium-235 (3.27 pCi/g) Uranium-238 (255 pCi/g)
SOU541-021	Arsenic (4.56 mg/kg) Uranium (275.24 mg/kg) Vanadium (24 mg/kg) PCB, Total (3.62 mg/kg) Uranium-235 (1.01 pCi/g) Uranium-238 (68.6 pCi/g)
SOU541-BV	Arsenic (6.24 mg/kg) Vanadium (17.7 mg/kg) Uranium-238 (17.4 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.11.4. SWMU 541 NAL Exceedances – Surface (Continued)

Metal	Grid
Aluminum	2, 3, 4, 5, 6, 7, 8, 10, 11
Barium	5
Cadmium	5, 6, 7, 10, 11, 12, 13, 17, 19, 21
Copper	6, 7
Iron	6
Lead	3, 5, 6, 7, 8, 17
Mercury	5, 6
Nickel	6, 7
Selenium	5, 6, 7, 8
Uranium	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 15, 16, 17, 18, 19, 21
Vanadium	6, 7
Zinc	2, 5, 6, 7, 8, 12, 13, 19

* AOC 541 consists of one EU.

Iron in grid 6, uranium in grids 2-13, 15, 17, and 19, and vanadium in grids 6 and 7 were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the teen recreator NAL in the surface soil of grids 1–13, 15, 17, 18, 19, and 21. Total PCBs were detected above the teen recreator AL in grids 3–13, 15, 17, 18, and 19.

Total PCBs in grids 1–13, 15, 17, 18, 19, and 21 were detected above the SSL for the protection of UCRS groundwater and in grids 1–13, 15, 17, 18, and 19 above the SSLs for the protection of RGA groundwater in the AOC 541 surface soil.

SVOCs

Total PAHs were detected above the teen recreator NAL in the surface soil of grids 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 15.

Total PAHs were detected above the teen recreator AL in the surface soil of grids 6 and 7.

The following are the SVOCs detected above the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

SVOC	Grid
Acenaphthene	1, 6, 7
Anthracene	7
Fluoranthene	1, 6, 7
Fluorene	6, 7
Naphthalene	7
Pyrene	1, 5, 6, 7
Total PAHs	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15

* AOC 541 consists of one EU.

Naphthalene in grid 7 and Total PAHs in grids 1, 4–8, 10, 13, and 15 were detected above the SSLs for the protection of RGA groundwater.

VOCs

No VOCs were detected above the teen recreator NALs or ALs in the AOC 541 surface soil.

Methylene chloride in grid 7 was detected above the SSL for the protection of UCRS groundwater in the AOC 541 surface soil. No VOCs were detected above the SSLs for the protection of RGA groundwater.

<u>**Radionuclides**</u>

Radionuclides were detected above the teen recreator NALs in the AOC 541 surface soil. The following are the radionuclides detected at or above both the background screening levels and the teen recreator NALs and the grids in which they were detected.

Radionuclide	Grid
Cesium-137	3, 6, 7
Uranium-234	6, 7, 8, 13
Uranium-235	2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 19, 21
Uranium-235/236	9
Uranium-238	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 19, 21, BV

* AOC 541 consists of one EU.

All grids are located within the administrative boundary of AOC 541.

Uranium-238 was detected above both the background screening level and the teen recreator AL in the AOC 541 surface soil.

The following are the radionuclides detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Radionuclide	Grid
Americium-241[1]	5, 6, 7, 8
Neptunium-237	7
Plutonium-239/240	6, 7
Technetium-99	1, 5, 6, 7, 8, 9, 13, 19
Uranium-238	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 19, 21, BV

* AOC 541 consists of one EU.
[1] No background value is available.

Americium-241 (no background value available) and technetium-99 in grids 6 and 7 and uranium-238 in grids 5–9, 12, and 13 were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

9.11.4 Nature and Extent of Contamination—Subsurface Soils

For AOC 541, the representative data set for subsurface soils is presented in Table 9.11.3 and provides the nature of the contamination in AOC 541 subsurface soils. Figures 9.11.5–9.11.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU/AOC#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of AOC 541 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. AOC 541 consists of one EU.

Table 9.11.3. Subsurface Soil Historical Data Summary: SWMU 541 Outfall 011 Contaminated Soil Area

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	8.59E+03	1.58E+04	1.28E+04	0/26	26/26	17/26	1.20E+04	0/26	2.77E+04	0/26	8.91E+06	0/26	26/26	17.1 - 197
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/26	0/26	0/26	2.10E-01	0/26	1.78E+00	0/26	1.90E+03	0/26	0/26	6.83 - 20
METAL	Arsenic	mg/kg	1.87E+00	2.33E+01	6.56E+00	0/26	22/26	4/26	7.90E+00	22/26	1.02E+00	0/26	1.02E+02	1/26	22/26	0.853 - 5
METAL	Barium	mg/kg	8.12E+01	1.39E+02	1.02E+02	0/26	26/26	0/26	1.70E+02	0/26	4.15E+02	0/26	4.58E+05	0/26	25/26	2.13 - 2.5
METAL	Beryllium	mg/kg	4.60E-01	9.57E-01	6.57E-01	0/26	11/26	4/26	6.90E-01	11/26	1.29E-02	0/26	8.65E+00	0/26	0/26	0.427 - 0.5
METAL	Cadmium	mg/kg	4.96E-01	9.90E-01	7.18E-01	0/26	14/26	14/26	2.10E-01	0/26	3.14E+00	0/26	3.14E+02	0/26	14/26	0.427 - 2.46
METAL	Calcium	mg/kg	6.82E+02	5.92E+04	4.76E+03	0/26	26/26	2/26	6.10E+03	0/26	n/a	0/26	n/a	n/a	n/a	85.3 - 877
METAL	Chromium	mg/kg	1.60E+01	2.96E+03	1.40E+02	0/179	126/179	97/179	4.30E+01	59/179	7.15E+01	0/179	7.15E+03	0/179	0/179	2.13 - 2.5
METAL	Cobalt	mg/kg	3.26E+00	1.08E+01	6.00E+00	0/26	26/26	0/26	1.30E+01	2/26	8.45E+00	0/26	3.29E+03	26/26	26/26	0.853 - 4.92
METAL	Copper	mg/kg	8.34E+00	3.46E+01	1.62E+01	4/26	26/26	3/26	2.50E+01	0/26	1.13E+03	0/26	4.75E+05	0/26	0/26	2.13 - 12.3
METAL	Iron	mg/kg	9.91E+03	2.87E+04	1.45E+04	0/26	26/26	1/26	2.80E+04	1/26	1.98E+04	0/26	8.31E+06	26/26	26/26	17.1 - 20
METAL	Lead	mg/kg	7.05E+00	7.34E+01	1.78E+01	0/179	166/179	27/179	2.30E+01	0/179	4.00E+02	0/179	4.00E+02	0/179	97/179	0.853 - 20
METAL	Magnesium	mg/kg	9.98E+02	2.28E+03	1.55E+03	0/26	26/26	3/26	2.10E+03	0/26	n/a	0/26	n/a	n/a	n/a	2.5 - 4.99
METAL	Manganese	mg/kg	1.04E+02	6.38E+02	2.94E+02	0/26	26/26	0/26	8.20E+02	0/26	3.47E+03	0/26	2.94E+05	26/26	26/26	2.13 - 2.5
METAL	Mercury	mg/kg	1.70E-02	6.70E-01	5.43E-02	0/26	21/26	1/26	1.30E-01	1/26	6.25E-01	0/26	7.88E+02	0/26	1/26	0.011 - 0.2
METAL	Molybdenum	mg/kg	5.62E+00	5.62E+00	5.62E+00	0/22	1/22	0/22	n/a	0/22	1.42E+02	0/22	5.94E+04	0/22	1/22	4.27 - 4.99
METAL	Nickel	mg/kg	7.40E+00	1.53E+01	1.00E+01	0/26	26/26	0/26	2.20E+01	0/26	2.98E+01	0/26	3.07E+04	0/26	26/26	4.27 - 5
METAL	Selenium	mg/kg	1.08E+00	1.10E+00	1.09E+00	0/26	2/26	2/26	7.00E-01	0/26	1.42E+02	0/26	5.93E+04	0/26	2/26	0.853 - 4.92
METAL	Silver	mg/kg	n/a	n/a	n/a	0/26	0/26	0/26	2.70E+00	0/26	7.45E+00	0/26	8.07E+03	0/26	0/26	1.71 - 2.5
METAL	Sodium	mg/kg	n/a	n/a	n/a	0/26	0/26	0/26	3.40E+02	0/26	n/a	0/26	n/a	n/a	n/a	171 - 250
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/26	0/26	0/26	3.40E-01	0/26	2.27E+00	0/26	9.50E+02	0/26	0/26	1.71 - 20
METAL	Uranium	mg/kg	1.17E+01	8.52E+03	7.91E+02	4/179	169/179	169/179	4.60E+00	135/179	8.49E+01	0/179	3.50E+04	51/179	166/179	0.951 - 243
METAL	Vanadium	mg/kg	1.63E+01	5.17E+01	2.79E+01	0/26	26/26	4/26	3.70E+01	26/26	1.04E-01	0/26	7.61E+01	26/26	26/26	2.13 - 2.5
METAL	Zinc	mg/kg	2.36E+01	1.82E+02	6.83E+01	0/26	26/26	10/26	6.00E+01	0/26	8.50E+03	0/26	3.56E+06	0/26	26/26	10 - 20
PPCB	PCB, Total	mg/kg	5.10E-01	5.00E+01	2.44E+01	0/179	46/179	0/179	n/a	46/179	1.83E-01	27/179	1.83E+01	34/179	46/179	0.1 - 1.29
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.49 - 0.5
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.49 - 0.5
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.49 - 0.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	3.35E+00	0/4	1.00E+02	0/4	0/4	0.49 - 0.5
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Acenaphthene	mg/kg	9.30E-01	9.30E-01	9.30E-01	1/26	1/26	0/26	n/a	0/26	5.87E+02	0/26	1.76E+04	0/26	1/26	0.46 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/26	0/26	0/26	n/a	0/26	n/a	0/26	n/a	n/a	n/a	0.46 - 0.5
SVOA	Anthracene	mg/kg	1.40E+00	1.40E+00	1.40E+00	1/26	1/26	0/26	n/a	0/26	3.25E+03	0/26	9.74E+04	0/26	0/26	0.46 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	5.30E-01	1.20E+00	8.65E-01	2/26	2/26	0/26	n/a	0/26	n/a	0/26	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.11.3. Subsurface Soil Historical Data Summary: SWMU 541 Outfall 011 Contaminated Soil Area (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.49 - 0.5
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	2.61E+01	0/4	2.61E+03	n/a	n/a	0.49 - 0.5
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Di-n-butyl phthalate	mg/kg	7.80E-01	1.20E+00	9.90E-01	2/4	2/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Fluoranthene	mg/kg	9.10E-01	1.20E+01	4.14E+00	3/26	5/26	0/26	n/a	0/26	4.47E+02	0/26	1.34E+04	0/26	3/26	0.46 - 0.5
SVOA	Fluorene	mg/kg	5.50E-01	5.50E-01	5.50E-01	1/26	1/26	0/26	n/a	0/26	4.19E+02	0/26	1.26E+04	0/26	1/26	0.46 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.78E-01	0/4	1.78E+01	0/4	0/4	0.49 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Naphthalene	mg/kg	5.00E-01	5.00E-01	5.00E-01	0/26	1/26	0/26	n/a	0/26	5.27E+00	0/26	5.27E+02	1/26	1/26	0.46 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	6.10E-02	0/4	6.10E+00	0/4	0/4	0.49 - 0.5
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.49 - 0.5
SVOA	Phenanthrene	mg/kg	6.70E-01	7.40E+00	2.71E+00	3/26	5/26	0/26	n/a	0/26	n/a	0/26	n/a	n/a	n/a	0.46 - 0.5
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Pyrene	mg/kg	5.30E-01	9.90E+00	3.21E+00	3/26	5/26	0/26	n/a	0/26	3.35E+02	0/26	1.00E+04	0/26	4/26	0.46 - 0.5
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.49 - 0.5
SVOA	Total PAH	mg/kg	3.00E-05	5.04E+00	8.24E-01	0/179	27/179	0/179	n/a	24/179	5.57E-02	0/179	5.57E+00	20/179	24/179	0.2 - 0.2
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.01 - 0.01
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.01 - 0.01
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	9.45E-02	0/4	1.29E+01	0/4	0/4	0.01 - 0.01
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.01 - 0.01
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.50E+02	0/4	2.11E+04	0/4	0/4	0.01 - 0.01
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.28E+00	0/4	1.91E+02	0/4	0/4	0.01 - 0.01
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	9.30E-01	0/4	1.34E+02	0/4	0/4	0.01 - 0.01
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.01 - 0.01
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	5.38E-01	0/4	5.85E+01	0/4	0/4	0.01 - 0.01
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	7.03E+00	0/4	4.84E+02	0/4	0/4	0.01 - 0.01
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.01 - 0.01
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	6.11E+00	0/4	8.90E+02	0/4	0/4	0.01 - 0.01
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	8.66E+01	0/4	2.79E+03	0/4	0/4	0.02 - 0.02

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.11.3. Subsurface Soil Historical Data Summary: SWMU 541 Outfall 011 Contaminated Soil Area (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
VOA	Methylene chloride	mg/kg	1.00E-02	1.20E-02	1.10E-02	4/4	4/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	4/4	0.01 - 0.01
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.01 - 0.01
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	3.26E-01	0/4	1.48E+02	0/4	0/4	0.01 - 0.01
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.01 - 0.01
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	2.39E+01	0/4	8.87E+02	0/4	0/4	0.01 - 0.01
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.01 - 0.01
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	9.91E-02	0/4	1.17E+01	0/4	0/4	0.01 - 0.01
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	2.39E-01	0/4	1.02E+02	0/4	0/4	0.01 - 0.01
RADS	Americium-241	pCi/g	-5.57E-03	1.03E+00	6.80E-02	0/24	24/24	0/24	n/a	0/24	1.28E+01	0/24	1.28E+03	0/24	3/24	0.0152 - 0.549
RADS	Cesium-137	pCi/g	7.30E-03	5.06E-01	1.48E-01	0/26	26/26	2/26	2.80E-01	7/26	1.98E-01	0/26	1.98E+01	0/26	0/26	0.0124 - 0.182
RADS	Cobalt-60	pCi/g	-1.04E-02	2.58E-03	-3.10E-03	0/4	4/4	0/4	n/a	0/4	4.06E-02	0/4	4.06E+00	0/4	0/4	0.0244 - 0.0388
RADS	Neptunium-237	pCi/g	-1.22E-02	1.69E-02	5.96E-04	0/24	24/24	0/24	n/a	0/24	6.26E-01	0/24	6.26E+01	0/24	6/24	0.0466 - 0.142
RADS	Plutonium-238	pCi/g	-3.29E-02	6.32E-03	-7.51E-03	0/22	22/22	0/22	n/a	0/22	3.64E+01	0/22	3.64E+03	0/22	0/22	0.01 - 0.257
RADS	Plutonium-239/240	pCi/g	-4.24E-03	1.84E-02	7.24E-03	0/26	26/26	0/26	n/a	0/26	3.56E+01	0/26	3.56E+03	0/26	0/26	0.0122 - 0.0553
RADS	Technetium-99	pCi/g	1.21E-01	4.80E+00	1.62E+00	0/26	26/26	3/26	2.80E+00	0/26	1.11E+03	0/26	1.11E+05	0/26	24/26	0.536 - 3.13
RADS	Thorium-228	pCi/g	3.57E-01	9.08E-01	5.12E-01	0/26	26/26	0/26	1.60E+00	0/26	n/a	0/26	n/a	n/a	n/a	0.04 - 0.208
RADS	Thorium-230	pCi/g	3.05E-01	7.58E-01	4.44E-01	0/26	26/26	0/26	1.40E+00	0/26	4.49E+01	0/26	4.49E+03	0/26	26/26	0.0619 - 0.226
RADS	Thorium-232	pCi/g	3.74E-01	8.73E-01	4.88E-01	0/26	26/26	0/26	1.50E+00	0/26	n/a	0/26	n/a	n/a	n/a	0.0378 - 0.131
RADS	Uranium-234	pCi/g	3.09E-01	7.96E+01	1.51E+01	4/26	26/26	23/26	1.20E+00	2/26	6.25E+01	0/26	6.25E+03	0/26	0/26	0.102 - 0.473
RADS	Uranium-235	pCi/g	8.94E-05	5.48E+01	3.88E+00	0/26	26/26	25/26	6.00E-02	15/26	9.12E-01	0/26	9.12E+01	0/26	0/26	0.0137 - 0.0919
RADS	Uranium-238	pCi/g	1.24E+00	1.66E+03	1.74E+02	4/26	26/26	26/26	1.20E+00	25/26	4.02E+00	2/26	4.02E+02	3/26	25/26	0.107 - 3.84

One or more samples exceed AL value[1]

One or more samples exceed NAL value[2]

One or more samples exceed background value

One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.

[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.

Thallium metal results are compared to thallium chloride action levels/no action levels.

Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).

Field replicates, or separate samples are counted independently.

The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection

FOE = frequency of exceedance

n/a = not applicable

* For RADS, all results are reported.

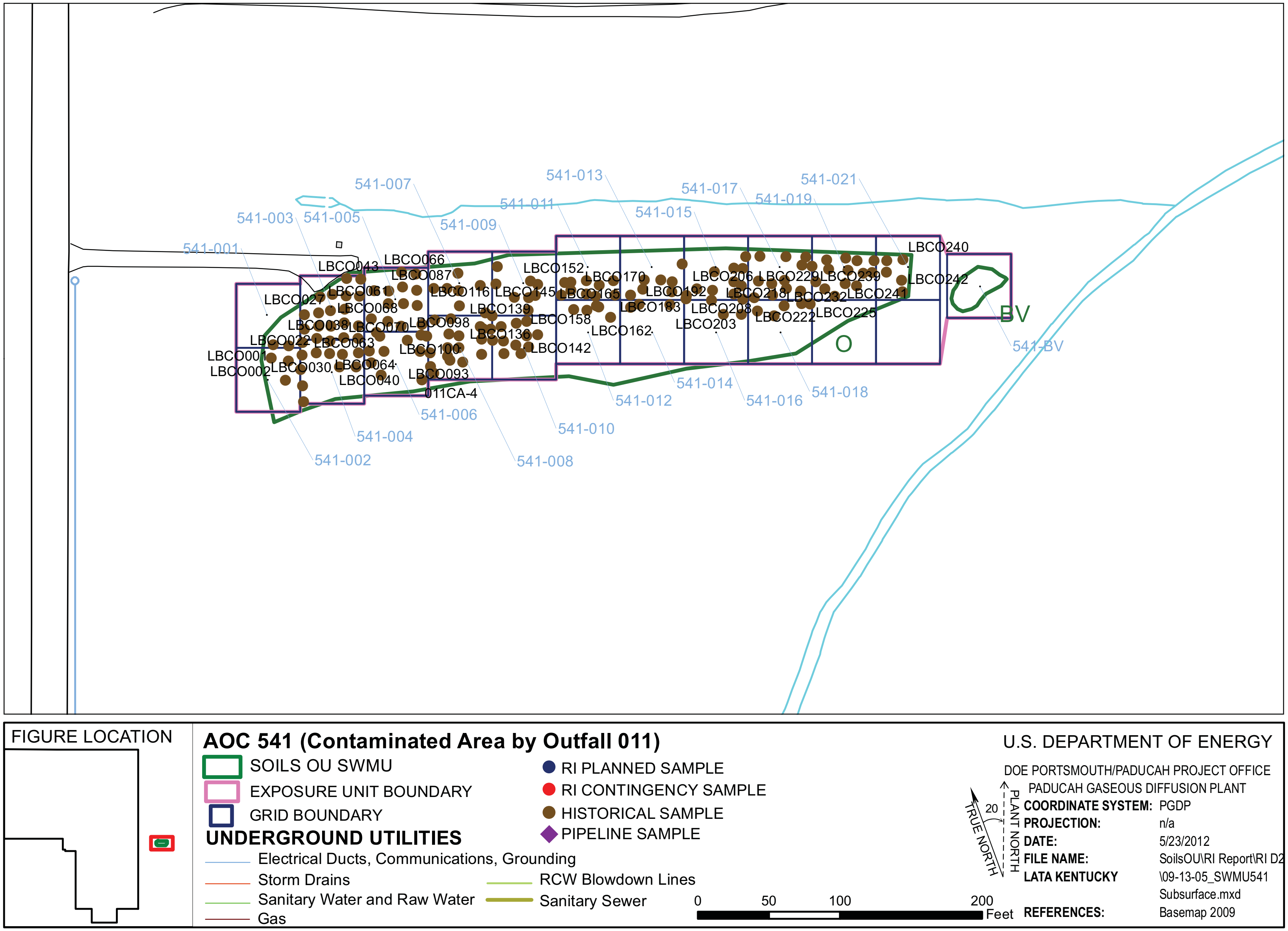


Figure 9.11.5. AOC 541 Sample Locations - Subsurface Soil

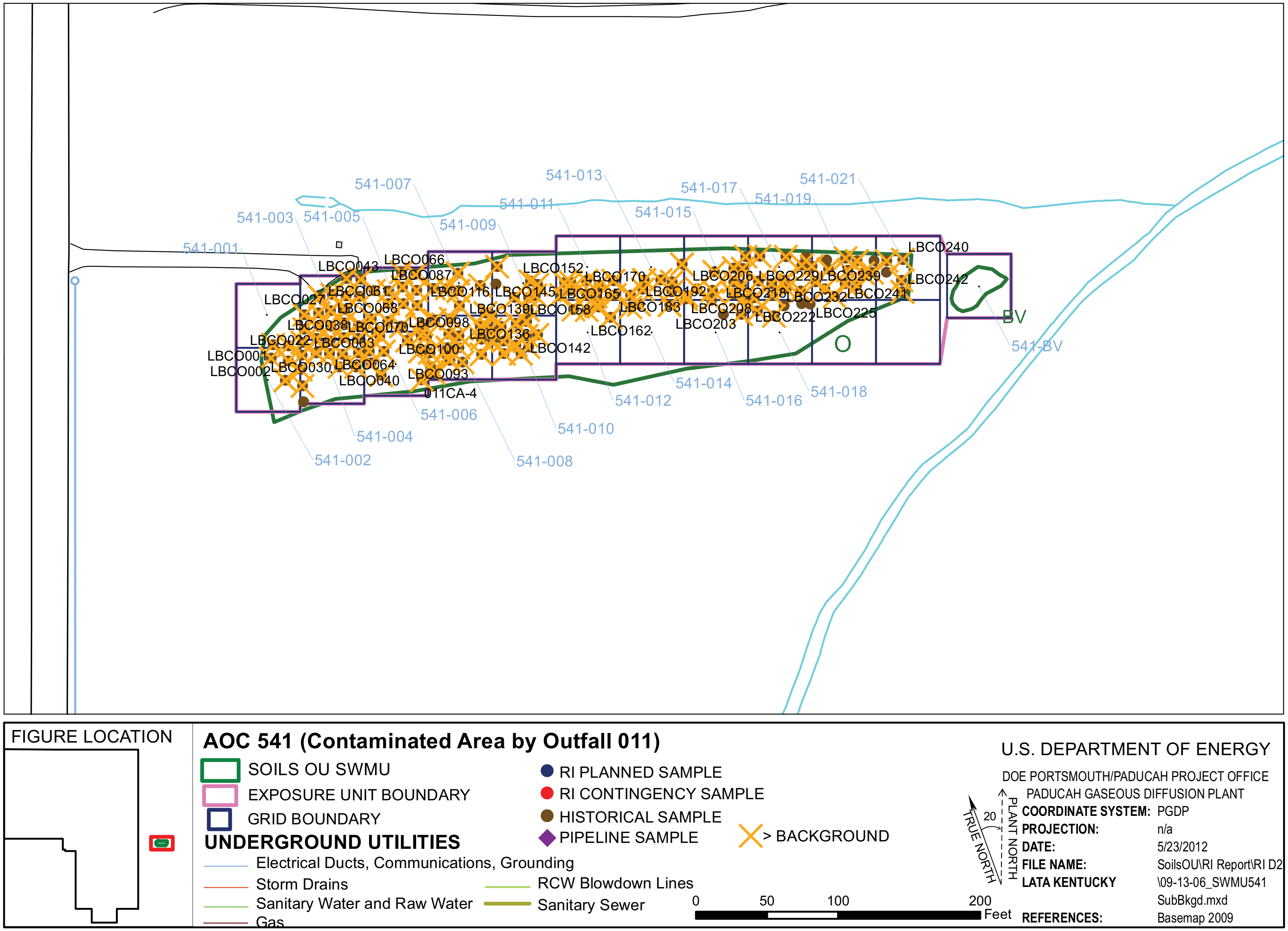


Figure 9.11.6. AOC 541 Background Exceedances - Subsurface Soil

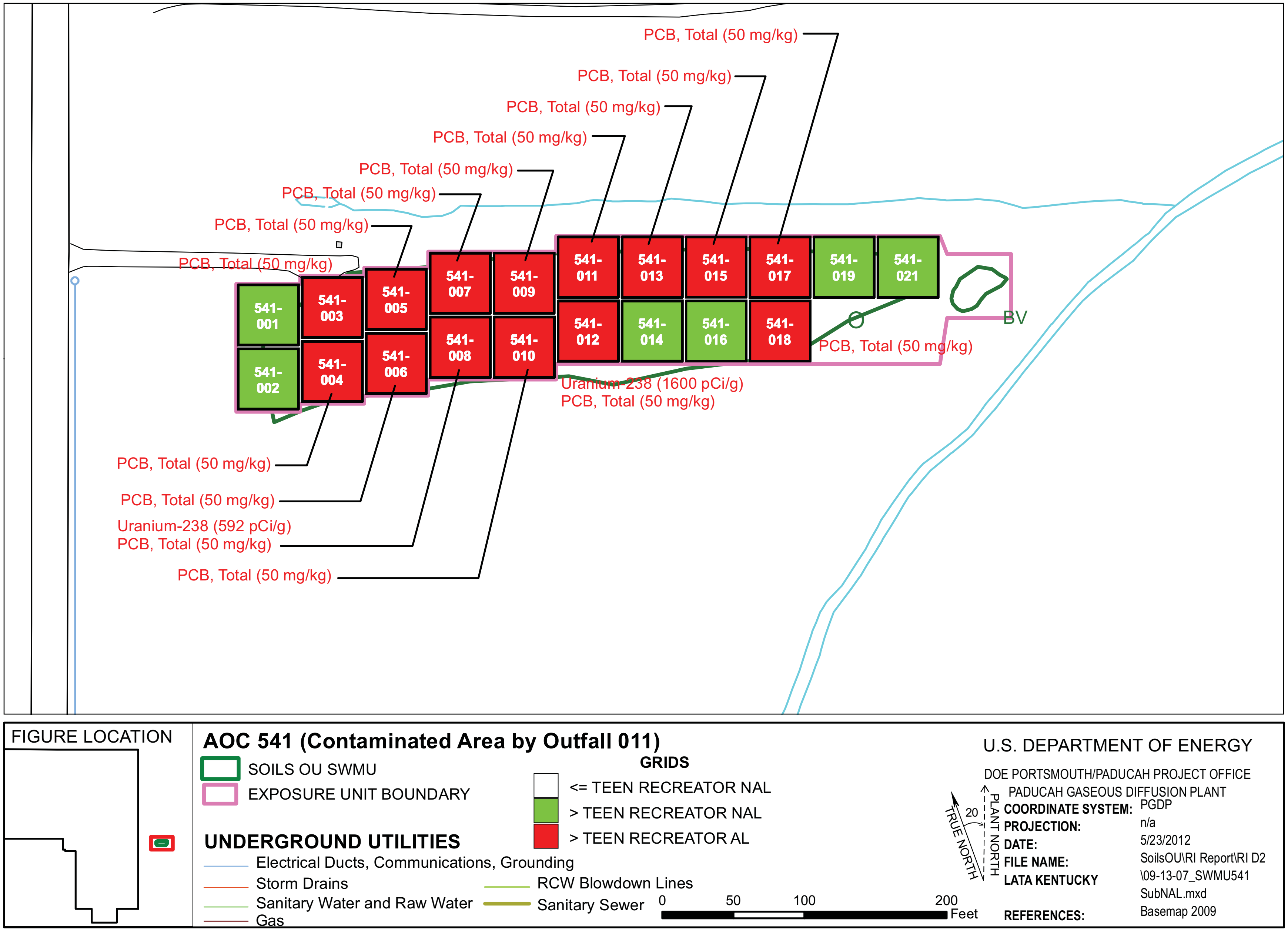


Figure 9.11.7. AOC 541 NAL Exceedances - Subsurface Soil

Metals

Metals were detected above the teen recreator NALs in the AOC 541 subsurface soil. The following are the metals detected at or above both the background screening levels and the teen recreator NALs and the grids in which they were detected.

Metal	Grid
Arsenic	1, 5, 17, 19
Beryllium	5, 6, 8
Chromium	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19
Iron	5
Mercury	6
Uranium	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21
Vanadium	5, 6, 8, 12

* AOC 541 consists of one EU.

All grids are located within the administrative boundary of AOC 541.

The maximum depth at which metals were detected (in samples associated with this RI Report) at or above both the background screening levels and the teen recreator NALs was 4 ft bgs. The end depths of the boreholes taken from all grids ranged from 1 to 4 ft bgs.

No metals were detected above both the background screening levels and the teen recreator ALs in the AOC 541 subsurface soil.

The following are the metals detected in the AOC 541 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Aluminum	2, 3, 5, 6, 7, 8, 10, 11, 12, 19, 21
Arsenic	1, 5, 17, 19
Cadmium	6, 7, 8, 10, 11, 12, 13, 17, 19, 21
Iron	5
Lead	1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 15, 17, 19
Mercury	6
Molybdenum[1]	7
Selenium	6, 8
Uranium	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21
Vanadium	5, 6, 8, 12
Zinc	2, 5, 6, 7, 8, 11, 12, 13, 19

* AOC 541 consists of one EU.
[1] No background value is available.

Arsenic and iron in grid 5, uranium in grids 1–13, 15, 17, and 19, and vanadium in grids 5, 6, 8, and 12 were detected above both the background screening levels and the SSLs for the protection of RGA groundwater in the AOC 541 subsurface soil.

PCBs

Total PCBs were detected above the teen recreator NALs in the subsurface soil of grids 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, and 21.

The maximum depth at which PCBs were detected above the teen recreator NAL was 4 ft bgs.

No PCBs were detected above the teen recreator ALs in the AOC 541 subsurface soil.

Total PCBs in grids 1–15, 17–19, and 21 were detected above the SSLs for the protection of UCRS groundwater and in grids 2–13, 15 and 17–19 above the SSLs for the protection of RGA groundwater in the AOC 541 subsurface soil.

SVOCs

Total PAHs in grids 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 15 were detected to a maximum depth of 4 ft bgs above the teen recreator NAL in the AOC 541 subsurface soil.

No SVOCs were detected above the teen recreator ALs in the AOC 541 subsurface soil.

The following are the SVOCs detected above the SSLs for the protection of UCRS groundwater in the AOC 541 subsurface soil and the grids in which they were detected.

SVOC	Grid
Acenaphthene	5
Fluoranthene	3, 5, 6
Fluorene	5
Naphthalene	3
Pyrene	3, 5, 6, 8
Total PAHs	3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15

* AOC 541 consists of one EU.

Naphthalene in grid 3 and Total PAHs in grids 3, 5–13, and 15 were detected above the SSLs for the protection of RGA groundwater in the AOC 541 subsurface soil.

VOCs

No VOCs were detected above the teen recreator NALs or ALs in the AOC 541 surface soil.

Methylene chloride in grids 6 and 8 was detected above the SSL for the protection of UCRS groundwater in the AOC 541 surface soil. No VOCs were detected above the SSLs for the protection of RGA groundwater.

Radionuclides

Radionuclides were detected above the teen recreator NALs in the AOC 541 subsurface soil. The following are the radionuclides detected at or above both the background screening levels and the teen recreator NALs and the grids in which they were detected.

Radionuclide	Grid
Cesium-137	5, 7
Uranium-234	8, 12
Uranium-235	2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 19
Uranium-238	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 17, 19, 21

* AOC 541 consists of one EU.

All grids are located within the administrative boundary of AOC 541.

The maximum depth at which radionuclides were detected at or above both the background screening levels and the teen recreator NALs was 4 ft bgs.

Uranium-238 was detected above both the background screening level and the teen recreator AL in the AOC 541 subsurface soil.

The following are the radionuclides detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Radionuclide	Grid
Americium-241[1]	6, 8
Neptunium-237[1]	4, 5, 6, 8
Technetium-99	4, 6, 8
Uranium-238	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 17, 19, 21

* AOC 541 consists of one EU.
[1] No background value is available.

Uranium-238 in grids 5, 8, and 12 was detected above both the background screening level and the SSL for the protection of RGA groundwater in the AOC 541 subsurface soil.

9.11.5 Fate and Transport

Total PCBs was selected for further evaluation using modeling to estimate the potential for transport at a rate that could cause an MCL (or risk-based level if MCL is unavailable) exceedance in the RGA at the SWMU/AOC boundary. SESOIL and AT123D simulation modeling results are summarized in Appendix C. Total PCBs was selected for modeling because the average concentration at the AOC exceeded both the subsurface background concentration and the RG SSL (see Appendix C).

The results presented in Appendix C show that migration of Total PCBs at AOC 541 is retarded above the RGA; therefore, Total PCBs, do not reach the RGA in the 1,000-year simulation period.

There is potential for runoff because this AOC is near the confluence of KPDES Outfall 011 and Little Bayou Creek; however, AOC 541 is grass-covered or otherwise stabilized and the contaminants are not likely to be transported attached to suspended soil particles. Based on results from the Site Evaluation Report for Soil Pile I (SWMU 561), potential contaminants are not migrating away from the soil piles. Soil piles are believed to have similar origin. Little Bayou Creek is scheduled to be investigated as part of the SWOU. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs/AOCs to surrounding ditches.

9.11.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for AOC 541were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for one or more EUs at AOC 541 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this AOC will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.11.4 for the outdoor worker (exposed to surface soils), the excavation worker, the hypothetical resident, and the teen recreational user. Table 9.11.4 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this AOC under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for AOC 541 include metals, radionuclides, PCBs, and SVOCs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 9.11.5.

9.11.7 AOC 541 Summary

The following text summarizes the results for AOC 541 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Plant processes that could have contributed to contamination here include dredging the Little Bayou Creek and SWMU 67, the C-375-E4 Effluent Ditch, to keep it clear for PGDP discharges.

COPCs for surface and subsurface soils from AOC 541 are shown on Tables 9.11.1–9.11.3 as those analytes with green boxes under the “Teen Recreator/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. The COPCs identified for AOC 541 in surface and subsurface soil are metals, VOCs, PCBs, SVOCs, and radionuclides. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at AOC 541 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at AOC 541. The CSM can be found in Appendix D.

Table 9.11.4. RGOs for AOC 541

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Outdoor Worker (exposed to surface soil)											
1	Cesium-137	9.58E-01	pCi/g	8.3E-06	1.15E-01	1.15E+00	1.15E+01	n/a	n/a	n/a	n/a
	Chromium	8.24E+02	mg/kg	2.0E-05	4.08E+01	4.08E+02	4.08E+03	< 0.1	n/a	n/a	n/a
	PCB, Total	6.06E+01	mg/kg	3.7E-04	1.62E-01	1.62E+00	1.62E+01	< 0.1	n/a	n/a	n/a
	Total PAH	2.33E+00	mg/kg	4.8E-05	4.85E-02	4.85E-01	4.85E+00	< 0.1	n/a	n/a	n/a
	Uranium	6.38E+03	mg/kg	< 1E-06	n/a	n/a	n/a	7.4	8.61E+01	8.61E+02	2.58E+03
	Uranium-234	1.43E+02	pCi/g	5.0E-05	2.83E+00	2.83E+01	2.83E+02	n/a	n/a	n/a	n/a
	Uranium-235	1.76E+01	pCi/g	3.9E-05	4.55E-01	4.55E+00	4.55E+01	n/a	n/a	n/a	n/a
	Uranium-238	1.00E+03	pCi/g	8.5E-04	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.4E-03**				**7.4**			
Excavation Worker											
1	PCB, Total	6.18E+01	mg/kg	4.8E-06	1.30E+01	1.30E+02	1.30E+03	< 0.1	n/a	n/a	n/a
	Uranium	7.39E+03	mg/kg	< 1E-06	n/a	n/a	n/a	2.7	2.75E+02	2.75E+03	8.25E+03
	Uranium-238	1.11E+03	pCi/g	1.2E-05	9.38E+01	9.38E+02	9.38E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.7E-05**				**2.7**			
Hypothetical Resident[5]											
1	Aluminum	1.43E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	7.27E+03	7.27E+04	2.18E+05
	Cesium-137	9.58E-01	pCi/g	5.6E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Chromium	8.24E+02	mg/kg	5.3E-05	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Iron	1.60E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	5.48E+03	5.48E+04	1.64E+05
	PCB, Total	6.06E+01	mg/kg	9.5E-04	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Total PAH	2.33E+00	mg/kg	1.2E-04	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	6.38E+03	mg/kg	< 1E-06	n/a	n/a	n/a	27.3	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	1.43E+02	pCi/g	3.0E-05	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	1.76E+01	pCi/g	2.2E-04	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	1.00E+03	pCi/g	2.9E-03	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**4.2E-03**				**27.8**			

Table 9.11.4. RGOs for AOC 541 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3] 1 x 10^{-6}	RGOs for ELCR[3] 1 x 10^{-5}	RGOs for ELCR[3] 1 x 10^{-4}	HI[4]	RGOs for HI[3] 0.1	RGOs for HI[3] 1	RGOs for HI[3] 3
Teen Recreational User											
1	Cesium-137	9.58E-01	pCi/g	2.3E-06	4.10E-01	4.10E+00	4.10E+01	n/a	n/a	n/a	n/a
	Chromium	8.24E+02	mg/kg	5.0E-06	1.65E+02	1.65E+03	1.65E+04	< 1	n/a	n/a	n/a
	PCB, Total	6.06E+01	mg/kg	2.0E-04	2.99E-01	2.99E+00	2.99E+01	< 1	n/a	n/a	n/a
	Total PAH	2.33E+00	mg/kg	2.6E-05	8.99E-02	8.99E-01	8.99E+00	< 1	n/a	n/a	n/a
	Uranium-235	1.76E+01	pCi/g	9.2E-06	1.90E+00	1.90E+01	1.90E+02	n/a	n/a	n/a	n/a
	Uranium-238	1.00E+03	pCi/g	1.2E-04	8.56E+00	8.56E+01	8.56E+02	n/a	n/a	n/a	n/a
	Cumulative			**3.6E-04**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.70, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.70, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 9.11.5 Ecological Screening for AOC 541

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Soil/grass mix with trees	Yes	8945	Chromium	1.60E+01	3.35E+03	2.60E+01	129
			HMW PAHs	n/a	1.10E+01	1.10E+00	10
			PCB, Total	n/a	9.40E+01	2.00E-02	4700
			Uranium	4.90E+00	2.02E+04	5.00E+00	4040
			Zinc	6.50E+01	1.09E+03	4.60E+01	24

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010)b
HMW PAHs = high molecular weight PAHs [benz(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; chrysene; benzo(ghi)perylene; dibenz(a,h)anthracene; and indeno(1,2,3-cd)pyrene]
n/a = not applicable

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soil), excavation worker, hypothetical residential, and teen recreational user scenarios. COCs for these scenarios for AOC 541 are as listed below. Priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) are marked with an asterisk.

- Outdoor worker (exposed to surface soil)
  - Americium-241
  - Cesium-137
  - Chromium
  - Total PAHs
  - Total PCBs*
  - Uranium*
  - Uranium-234
  - Uranium-235
  - Uranium-238*

- Excavation worker
  - Total PCBs
  - Uranium*
  - Uranium-238

- Hypothetical Resident (hazards evaluated against the child resident)
  - Aluminum
  - Americium-241
  - Cesium-137
  - Chromium
  - Iron
  - Neptunium-237
  - Total PCBs*
  - Total PAHs*
  - Uranium*
  - Uranium-234
  - Uranium-235*
  - Uranium-238*

- Teen Recreational User
  - Cesium-137
  - Chromium
  - Total PAHs
  - Total PCBs*
  - Uranium
  - Uranium-235
  - Uranium-238*

*Indicates a priority COC

Priority COCs for other scenarios are described in Appendix D. Figure 9.11.8 also shows the COCs exceeding RGOs for the teen recreator.

For AOC 541, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Chromium
- High molecular weight PAHs
- Total PCBs
- Uranium
- Zinc

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for AOC 541 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. AOC 541 is near the confluence of Little Bayou Creek and SWMU 67, C-375-E4 Effluent Ditch (C-340 Ditch), which is part of the SWOU. SWMU 67 was the subject of a CERCLA removal action in 2010. The Addendum 1B SER (DOE 2009d) stated that PGDP monitoring data indicates that little to no migration has taken place to date from these piles. Because of this, a response action at these piles would have no effect on the surface water integrator OU.

9.11.8 AOC 541 Conclusion

The RI adequately defined the nature and extent of contamination in soils at AOC 541; an FS is appropriate for the AOC due to risk exceeding the decision rule benchmark for scenarios including outdoor worker (exposed to surface soil), excavation worker, hypothetical resident, and teen recreational user (DOE 2010a). The reasonably anticipated future land use of the AOC is recreational as shown in the SMP (DOE 2012a). The AOC is outside the limited area, and away from the PGDP area, but on the banks of Little Bayou Creek, which receives PGDP discharges throughout the year.

9.12 SWMU 561, SOIL PILE I

9.12.1 Background

This SWMU was identified on November 2, 2006, as noted in the SWMU notification letter dated February 16, 2007. This SWMU is located east of the PGDP fence and is adjacent to Little Bayou Creek between McCaw Road and Outfall Ditch 002. The area of this SWMU is approximately 7 acres. The footprint of the soil piles within the 7 acre area is approximately 30-ft wide x 700-ft long by an average of 8-ft tall along Outfall Ditch 002 and 30-ft wide x 700-ft long by an average of 8-ft tall along Little Bayou Creek for an estimated total volume of ~12,000 yd^3.

There appears to be no function for the soil piles within the SWMU; however, the piles most likely were made from dredged material produced as a result of maintenance activities performed within or along the ditch and creek.

A key potential source of contaminants in the surface water drainage system on the east side of PGDP is the C-340 Metals Reduction Plant (C-340). Historical leaks and spills at C-340 likely resulted in releases that traveled from floor drains through the storm sewer system, into Outfall 011, and discharged to Little

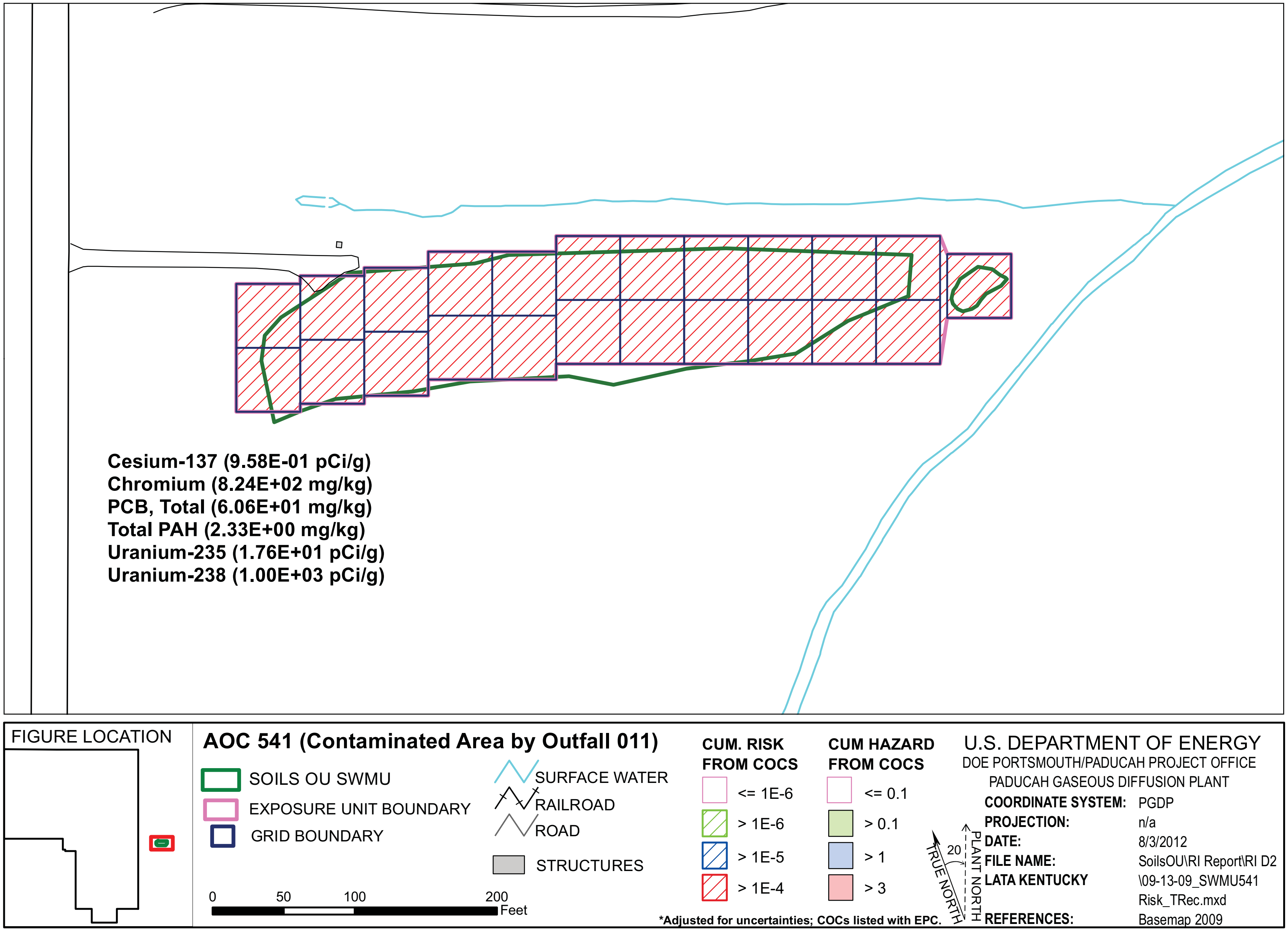


Figure 9.11.8. Summary of COCs Contributing to Risk to the Teen Recreator at AOC 541

Bayou Creek. C-340 is a known source of PCBs. Primary processes in the C-340 Metals Reduction Facility were the reduction of UF_6 to uranium tetrafluoride (UF_4) and the conversion of UF_4 to metallic uranium. The facility became operational in 1956 and continued operating until 1977 when shutdown of primary processes began. After shutdown, C-340 was used as a training school, a valve test facility, a pilot plant for the study of liquid/gas scrubber systems, and a waste pilot plant for the stabilization of uranium chips. A uranium metal remolding project was conducted in the mid-1980s at C-340. The building was closed in 1991.

The following are the primary chemicals employed at C-340 during active operations: $UF_{6,}$ hydrogen, magnesium fluoride, magnesium, TCE, and PCBs that were used in electrical and hydraulic systems.

Outfall 010, just upstream of Outfall 011 on Little Bayou Creek, is another likely primary source of past releases to Little Bayou Creek and may have contributed to observed conditions at Soil Pile I. Its associated ditches drain several PGDP facilities including the following: C-331 Process Building, C-531 Complex, and C-617-B Lagoon. In general, COPCs carried through internal ditches to Outfall 010 mirror those transported throughout the PGDP surface water management system. Key COPCs include radionuclides, VOCs, SVOCs, and heavy metals. The soil piles along Little Bayou Creek contain uranium and PCBs.

On November 2, 2006, radiological control technicians observed and completed a gamma radiological survey on Soil Pile I. Field radioactivity measurements ranged from twice to more than seven times area background.

Similarly in 2006, following the discovery of the soil piles and subsequent completion of a gamma walkover survey, biased surface samples were acquired from Soil Pile I. The samples were collected from the five locations exhibiting the highest field radioactivity measurements. Initial sampling was completed in this way, to provide a "worst-case" picture of conditions at Soil Pile I. This sampling was conducted on a grid basis, but does not necessarily compare to the grid applied for data evaluation used in the Soils OU RI. Conclusions drawn by this RI were made using the 45 ft grids applied for the Soils OU RI.

The results from the SER for Soil Pile I were that distribution of constituents that can be attributed directly to PGDP processes, including the majority of the radionuclides and PCBs, is found along Little Bayou Creek, and potential contaminants are not migrating away from the soil piles (DOE 2008d).

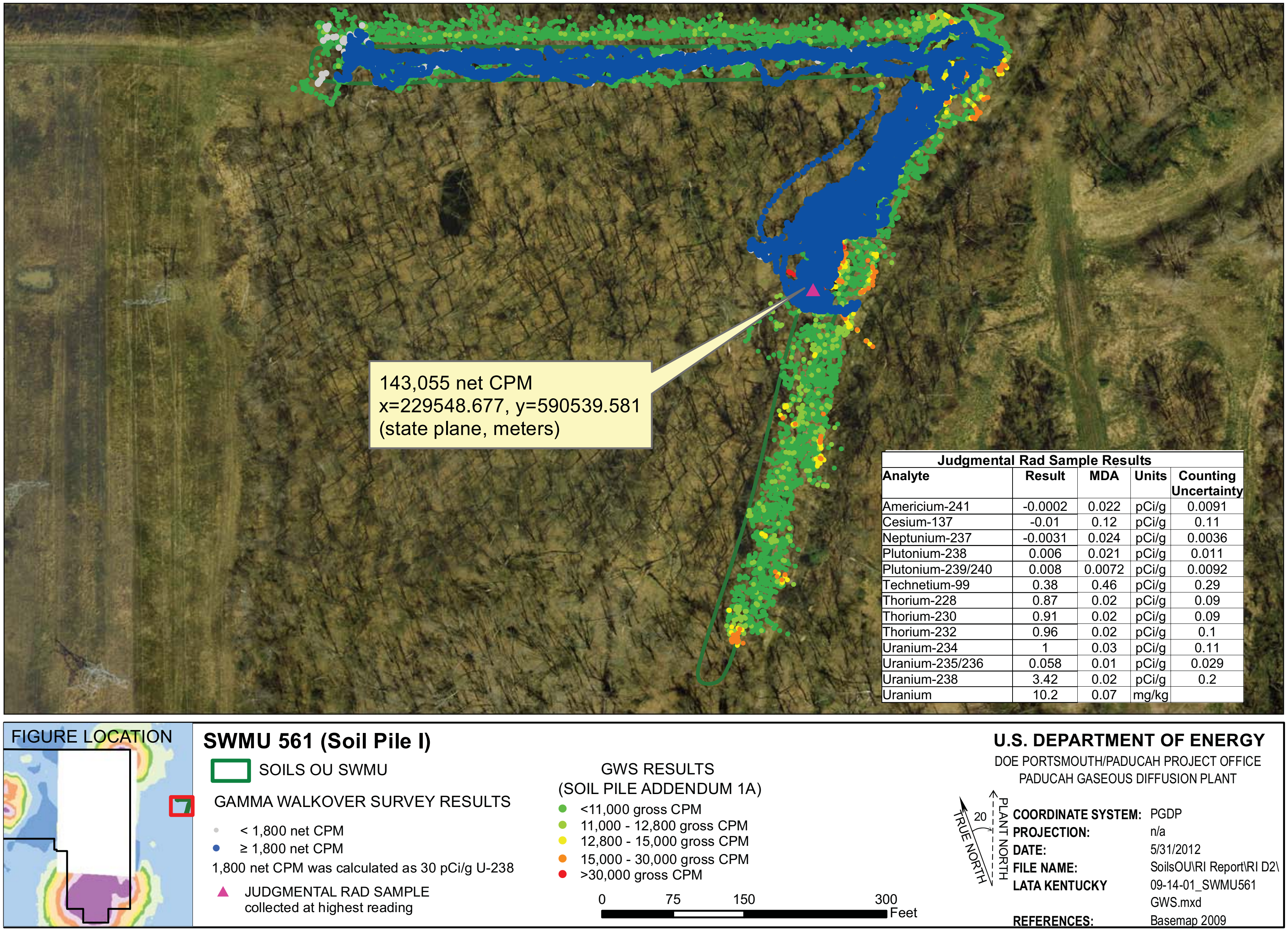
9.12.2 Fieldwork Summary

The historical data are representative of the nature and adequately delineate the extent of the contamination; therefore, no samples were collected from SWMU 561 during the Soils OU RI sampling effort (DOE 2010a).

A gamma radiological walkover survey (Figure 9.12.1) was conducted on this SWMU during the RI using a FIDLER; the 14,052 measurements ranged from 4,023 to 154,055 gross cpm. The ground cover for the area is entirely soil and grass with trees. The survey conducted during this RI was limited due to excessive tree debris remaining from the 2009 ice storm; therefore, the survey did not encompass the entire SWMU boundary. Soil Pile Addendum 1A survey data were added to Figure 9.12.1 to supplement the 2010 data. The two surveys show similar contamination levels throughout the pile; therefore, the historical data fill the data gap of areas not accessible for survey in 2010. The Addendum 1A data were collected using a 2 x 2 NaI probe. A judgmental sample was collected for radiological constituents.

9.12.3 Nature and Extent of Contamination—Surface Soils

For SWMU 561, the representative data set for surface soils is presented in Tables 9.12.1 and 9.12.2 and provides the nature of the contamination in SWMU 561 surface soils. Figures 9.12.2–9.12.4 illustrate the



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	-0.0002	0.022	pCi/g	0.0091
Cesium-137	-0.01	0.12	pCi/g	0.11
Neptunium-237	-0.0031	0.024	pCi/g	0.0036
Plutonium-238	0.006	0.021	pCi/g	0.011
Plutonium-239/240	0.008	0.0072	pCi/g	0.0092
Technetium-99	0.38	0.46	pCi/g	0.29
Thorium-228	0.87	0.02	pCi/g	0.09
Thorium-230	0.91	0.02	pCi/g	0.09
Thorium-232	0.96	0.02	pCi/g	0.1
Uranium-234	1	0.03	pCi/g	0.11
Uranium-235/236	0.058	0.01	pCi/g	0.029
Uranium-238	3.42	0.02	pCi/g	0.2
Uranium	10.2	0.07	mg/kg	

Figure 9.12.1. SWMU 561 Gamma Walkover Survey

Table 9.12.1. Surface Soil Historical Data Summary: SWMU 561 Soil Pile I

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	4.47E+03	1.26E+04	8.11E+03	0/106	106/106	0/106	1.30E+04	0/106	2.77E+04	0/106	8.91E+06	0/106	106/106	5.8 - 46.8
METAL	Antimony	mg/kg	8.40E-02	2.20E+01	5.92E-01	0/106	100/106	35/106	2.10E-01	5/106	1.78E+00	0/106	1.90E+03	1/106	20/106	0.58 - 14
METAL	Arsenic	mg/kg	2.40E+00	3.96E+01	1.01E+01	0/106	102/106	26/106	1.20E+01	102/106	1.02E+00	0/106	1.02E+02	17/106	102/106	1.2 - 20
METAL	Barium	mg/kg	4.28E+01	4.38E+02	9.01E+01	0/106	106/106	2/106	2.00E+02	1/106	4.15E+02	0/106	4.58E+05	0/106	62/106	2.25 - 46.8
METAL	Beryllium	mg/kg	3.10E-01	1.50E+00	5.34E-01	0/106	101/106	12/106	6.70E-01	101/106	1.29E-02	0/106	8.65E+00	0/106	0/106	0.12 - 1.2
METAL	Boron	mg/kg	2.90E+00	7.10E+00	4.54E+00	0/9	5/9	0/9	n/a	0/9	5.66E+03	0/9	2.34E+06	0/9	5/9	23.9 - 46.8
METAL	Cadmium	mg/kg	2.70E-02	1.20E+00	1.02E-01	0/106	97/106	7/106	2.10E-01	0/106	3.14E+00	0/106	3.14E+02	0/106	3/106	0.058 - 2
METAL	Calcium	mg/kg	3.50E+02	2.31E+03	9.12E+02	0/106	106/106	0/106	2.00E+05	0/106	n/a	0/106	n/a	n/a	n/a	58.3 - 1170
METAL	Chromium	mg/kg	1.00E+01	1.37E+03	7.51E+01	0/566	109/566	82/566	1.60E+01	28/566	7.15E+01	0/566	7.15E+03	0/566	0/566	1.2 - 2.49
METAL	Cobalt	mg/kg	3.00E+00	3.10E+01	7.22E+00	0/106	106/106	5/106	1.40E+01	12/106	8.45E+00	0/106	3.29E+03	106/106	106/106	0.23 - 11.7
METAL	Copper	mg/kg	5.20E+00	6.25E+01	1.20E+01	0/106	106/106	9/106	1.90E+01	0/106	1.13E+03	0/106	4.75E+05	0/106	2/106	1.2 - 5.9
METAL	Iron	mg/kg	6.38E+03	4.85E+04	1.40E+04	0/106	106/106	1/106	2.80E+04	8/106	1.98E+04	0/106	8.31E+06	106/106	106/106	5.8 - 23.4
METAL	Lead	mg/kg	8.50E+00	2.25E+02	2.19E+01	0/566	336/566	22/566	3.60E+01	0/566	4.00E+02	0/566	4.00E+02	0/566	310/566	0.35 - 20
METAL	Magnesium	mg/kg	4.92E+02	1.88E+03	1.05E+03	0/106	106/106	0/106	7.70E+03	0/106	n/a	0/106	n/a	n/a	n/a	4.51 - 1170
METAL	Manganese	mg/kg	6.33E+01	5.23E+03	6.35E+02	0/106	106/106	5/106	1.50E+03	1/106	3.47E+03	0/106	2.94E+05	105/106	106/106	0.24 - 3.5
METAL	Mercury	mg/kg	8.60E-03	9.20E-02	3.52E-02	0/106	87/106	0/106	2.00E-01	0/106	6.25E-01	0/106	7.88E+02	0/106	0/106	0.037 - 0.097
METAL	Molybdenum	mg/kg	2.20E-01	2.40E+00	6.78E-01	0/101	93/101	0/101	n/a	0/101	1.42E+02	0/101	5.94E+04	0/101	93/101	0.58 - 9.4
METAL	Nickel	mg/kg	5.70E+00	2.07E+01	8.99E+00	0/106	106/106	0/106	2.10E+01	0/106	2.98E+01	0/106	3.07E+04	0/106	106/106	0.58 - 9.4
METAL	Selenium	mg/kg	1.60E-01	1.10E+00	3.96E-01	0/106	80/106	1/106	8.00E-01	0/106	1.42E+02	0/106	5.93E+04	0/106	66/106	0.58 - 20
METAL	Silver	mg/kg	3.20E-02	1.40E-01	5.30E-02	0/101	92/101	0/101	2.30E+00	0/101	7.45E+00	0/101	8.07E+03	0/101	69/101	0.23 - 2.3
METAL	Sodium	mg/kg	1.45E+01	2.23E+02	2.79E+01	0/106	97/106	0/106	3.20E+02	0/106	n/a	0/106	n/a	n/a	n/a	23.3 - 1170
METAL	Thallium	mg/kg	1.00E-01	1.20E+00	2.52E-01	0/106	96/106	38/106	2.10E-01	0/106	2.27E+00	0/106	9.50E+02	0/106	80/106	0.23 - 20
METAL	Uranium	mg/kg	9.50E-01	6.41E+03	1.69E+02	0/566	193/566	153/566	4.90E+00	50/566	8.49E+01	0/566	3.50E+04	9/566	144/566	0.01 - 117
METAL	Vanadium	mg/kg	1.31E+01	8.69E+01	2.58E+01	0/106	106/106	10/106	3.80E+01	106/106	1.04E-01	1/106	7.61E+01	106/106	106/106	1.2 - 4.7
METAL	Zinc	mg/kg	2.27E+01	1.13E+03	8.50E+01	1/106	106/106	25/106	6.50E+01	0/106	8.50E+03	0/106	3.56E+06	0/106	106/106	2.3 - 20
PPCB	PCB, Total	mg/kg	5.00E-02	7.90E+01	5.44E+00	13/567	39/567	0/567	n/a	23/567	1.83E-01	4/567	1.83E+01	8/567	36/567	0.037 - 1.28
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	0/92	0/92	0.38 - 0.44
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	0/92	0/92	0.38 - 0.44
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/97	0/97	0/97	n/a	0/97	n/a	0/97	n/a	0/97	0/97	0.38 - 0.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/97	0/97	0/97	n/a	0/97	n/a	0/97	n/a	n/a	n/a	0.38 - 0.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/97	0/97	0/97	n/a	0/97	n/a	0/97	n/a	n/a	n/a	0.38 - 0.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/87	0/87	0/87	n/a	0/87	n/a	0/87	n/a	n/a	n/a	1.9 - 2.2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/97	0/97	0/97	n/a	0/97	n/a	0/97	n/a	n/a	n/a	0.38 - 0.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	1.9 - 2.2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/93	0/93	0/93	n/a	0/93	n/a	0/93	n/a	n/a	n/a	0.38 - 0.49
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/97	0/97	0/97	n/a	0/97	n/a	0/97	n/a	n/a	n/a	0.38 - 0.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	3.35E+00	0/92	1.00E+02	0/92	0/92	1.9 - 2.2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	1.9 - 2.2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	1.9 - 2.2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	1.9 - 2.2
SVOA	Acenaphthene	mg/kg	1.10E-01	2.70E+00	1.41E+00	1/94	2/94	0/94	n/a	0/94	5.87E+02	0/94	1.76E+04	0/94	1/94	0.38 - 0.49
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	Anthracene	mg/kg	2.00E-01	4.90E+00	2.55E+00	1/94	2/94	0/94	n/a	0/94	3.25E+03	0/94	9.74E+04	0/94	1/94	0.38 - 0.49
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.12.1. Surface Soil Historical Data Summary: SWMU 561 Soil Pile I (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzo(ghi)perylene	mg/kg	5.80E-02	4.90E+00	9.08E-01	5/94	7/94	0/94	n/a	0/94	n/a	0/94	n/a	n/a	n/a	0.38 - 0.49
SVOA	Benzoic acid	mg/kg	6.40E-01	7.30E-01	6.85E-01	0/94	2/94	0/94	n/a	0/94	n/a	0/94	n/a	n/a	n/a	0.46 - 2.2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	4.30E-02	5.50E-02	5.00E-02	3/92	3/92	0/92	n/a	0/92	n/a	0/92	n/a	0/92	0/92	0.38 - 0.44
SVOA	Butyl benzyl phthalate	mg/kg	5.90E-02	5.90E-02	5.90E-02	1/92	1/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	Carbazole	mg/kg	1.40E+00	1.40E+00	1.40E+00	0/2	1/2	0/2	n/a	0/2	2.61E+01	0/2	2.61E+03	n/a	n/a	0.49 - 0.49
SVOA	Dibenzofuran	mg/kg	5.50E-02	1.10E+00	5.78E-01	1/94	2/94	0/94	n/a	0/94	n/a	0/94	n/a	n/a	n/a	0.38 - 0.49
SVOA	Diethyl phthalate	mg/kg	7.20E-02	7.20E-02	7.20E-02	1/94	1/94	0/94	n/a	0/94	n/a	0/94	n/a	n/a	n/a	0.38 - 0.49
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	Di-n-butyl phthalate	mg/kg	4.40E-02	4.40E-02	4.40E-02	1/94	1/94	0/94	n/a	0/94	n/a	0/94	n/a	n/a	n/a	0.38 - 0.49
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	Fluoranthene	mg/kg	4.60E-02	2.20E+01	2.02E+00	11/96	14/96	0/96	n/a	0/96	4.47E+02	0/96	1.34E+04	0/96	2/96	0.38 - 0.49
SVOA	Fluorene	mg/kg	9.50E-02	2.20E+00	1.15E+00	1/94	2/94	0/94	n/a	0/94	4.19E+02	0/94	1.26E+04	0/94	1/94	0.38 - 0.49
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/97	0/97	0/97	n/a	0/97	1.78E-01	0/97	1.78E+01	0/97	0/97	0.38 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/97	0/97	0/97	n/a	0/97	n/a	0/97	n/a	n/a	n/a	0.38 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	1.9 - 2.2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/97	0/97	0/97	n/a	0/97	n/a	0/97	n/a	n/a	n/a	0.38 - 0.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/97	0/97	0/97	n/a	0/97	n/a	0/97	n/a	n/a	n/a	0.46 - 0.89
SVOA	Naphthalene	mg/kg	5.50E-01	5.50E-01	5.50E-01	0/94	1/94	0/94	n/a	0/94	5.27E+00	0/94	5.27E+02	1/94	1/94	0.38 - 0.49
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/97	0/97	0/97	n/a	0/97	n/a	0/97	n/a	n/a	n/a	0.46 - 2.2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	6.10E-02	0/92	6.10E+00	0/92	0/92	0.38 - 0.44
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/97	0/97	0/97	n/a	0/97	n/a	0/97	n/a	0/97	0/97	0.46 - 2.2
SVOA	Phenanthrene	mg/kg	1.10E-01	2.40E+00	6.23E-01	5/93	7/93	0/93	n/a	0/93	n/a	0/93	n/a	n/a	n/a	0.38 - 0.49
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	0.38 - 0.44
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/92	0/92	0/92	n/a	0/92	n/a	0/92	n/a	n/a	n/a	1.9 - 2.2
SVOA	Pyrene	mg/kg	4.40E-02	2.40E+00	4.29E-01	9/94	11/94	0/94	n/a	0/94	3.35E+02	0/94	1.00E+04	0/94	2/94	0.38 - 0.49
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/97	0/97	0/97	n/a	0/97	n/a	0/97	n/a	n/a	n/a	0.46 - 0.89
SVOA	Total PAH	mg/kg	6.63E-02	9.83E+00	1.61E+00	0/95	8/95	0/95	n/a	8/95	5.57E-02	1/95	5.57E+00	4/95	8/95	-
VOA	1,1,1,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.005 - 0.0059
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.005 - 0.0059
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.005 - 0.0059
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	9.45E-02	0/6	1.29E+01	0/6	0/6	0.005 - 0.0059
VOA	1,2,3-Trichloropropane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	1,2-Dibromoethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.005 - 0.0059
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.50E+02	0/6	2.11E+04	0/6	0/6	0.005 - 0.0059
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.12.1. Surface Soil Historical Data Summary: SWMU 561 Soil Pile I (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.023 - 0.023
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	1.28E+00	0/6	1.91E+02	0/6	0/6	0.005 - 0.0059
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.005 - 0.0059
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	9.30E-01	0/6	1.34E+02	0/6	0/6	0.005 - 0.0059
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0059 - 0.0059
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.38E-01	0/6	5.85E+01	0/6	0/6	0.005 - 0.0059
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	7.03E+00	0/6	4.84E+02	0/6	0/6	0.005 - 0.0059
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0059 - 0.0059
VOA	Dibromomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Dichlorodifluoromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	Ethyl methacrylate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	6.11E+00	0/6	8.90E+02	0/6	0/6	0.005 - 0.0059
VOA	Iodomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	8.66E+01	0/6	2.79E+03	0/6	0/6	0.0059 - 0.01
VOA	Methylene chloride	mg/kg	3.50E-03	3.50E-03	3.50E-03	1/6	1/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	1/6	0.005 - 0.0059
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.0059 - 0.0059
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	3.26E-01	0/6	1.48E+02	0/6	0/6	0.005 - 0.0059
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.005 - 0.0059
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	2.39E+01	0/6	8.87E+02	0/6	0/6	0.005 - 0.0059
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Trans-1,4-Dichloro-2-butene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.012 - 0.012
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	9.91E-02	0/6	1.17E+01	0/6	0/6	0.005 - 0.0059
VOA	Trichlorofluoromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0059 - 0.0059

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.12.1. Surface Soil Historical Data Summary: SWMU 561 Soil Pile I (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	2.39E-01	0/6	1.02E+02	0/6	0/6	0.005 - 0.0059
RADS	Americium-241	pCi/g	-1.51E-02	1.86E-01	-1.90E-03	1/93	93/93	0/93	n/a	0/93	1.28E+01	0/93	1.28E+03	0/93	1/93	0.0098 - 1.04
RADS	Cesium-137	pCi/g	-2.75E-02	1.01E+00	1.37E-01	0/97	97/97	3/97	4.90E-01	21/97	1.98E-01	0/97	1.98E+01	0/97	0/97	0.038 - 0.69
RADS	Cobalt-60	pCi/g	-1.44E-01	2.97E-01	5.28E-03	0/94	94/94	0/94	n/a	3/94	4.06E-02	0/94	4.06E+00	0/94	1/94	0.0478 - 0.653
RADS	Neptunium-237	pCi/g	-9.05E-03	1.90E-01	7.32E-03	2/99	99/99	3/99	1.00E-01	0/99	6.26E-01	0/99	6.26E+01	0/99	18/99	0.011 - 1.41
RADS	Plutonium-238	pCi/g	-3.04E-02	6.30E-01	2.23E-02	1/94	94/94	5/94	7.30E-02	0/94	3.64E+01	0/94	3.64E+03	0/94	4/94	0.00974 - 0.5578
RADS	Plutonium-239/240	pCi/g	-4.83E-03	1.58E-01	9.24E-03	1/102	102/102	12/102	2.50E-02	0/102	3.56E+01	0/102	3.56E+03	0/102	3/102	0.00895 - 0.411
RADS	Technetium-99	pCi/g	-6.45E-01	8.38E+00	6.48E-01	2/98	98/98	1/98	2.50E+00	0/98	1.11E+03	0/98	1.11E+05	0/98	58/98	0.49 - 2.7
RADS	Thorium-228	pCi/g	1.90E-01	1.12E+00	4.01E-01	0/89	89/89	0/89	1.60E+00	0/89	n/a	0/89	n/a	n/a	n/a	0.02 - 0.0678
RADS	Thorium-230	pCi/g	1.47E-01	2.23E+00	3.76E-01	0/94	94/94	1/94	1.50E+00	0/94	4.49E+01	0/94	4.49E+03	0/94	41/94	0.003 - 1.93
RADS	Thorium-232	pCi/g	2.29E-01	1.09E+00	4.15E-01	0/89	89/89	0/89	1.50E+00	0/89	n/a	0/89	n/a	n/a	n/a	0.004 - 0.059
RADS	Uranium-234	pCi/g	1.07E-01	1.36E+02	8.82E+00	2/108	108/108	40/108	1.20E+00	3/108	6.25E+01	0/108	6.25E+03	0/108	0/108	0.01 - 24.8
RADS	Uranium-235	pCi/g	5.34E-03	1.96E+01	1.60E+00	9/102	102/102	58/102	6.00E-02	20/102	9.12E-01	0/102	9.12E+01	0/102	0/102	0.0134 - 35.6
RADS	Uranium-235/236	pCi/g	3.40E-02	6.90E-02	5.78E-02	1/6	6/6	3/6	6.00E-02	0/6	9.12E-01	0/6	9.12E+01	0/6	0/6	0.006 - 0.017
RADS	Uranium-238	pCi/g	1.22E-01	1.34E+03	8.11E+01	2/108	108/108	68/108	1.20E+00	54/108	4.02E+00	7/108	4.02E+02	10/108	54/108	0.004 - 50.8

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.12.2. Surface Soil RI Data Summary: SWMU 561 Soil Pile I

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Uranium	mg/kg	1.02E+01	1.02E+01	1.02E+01	0/1	1/1	1/1	4.90E+00	0/1	8.49E+01	0/1	3.50E+04	0/1	0/1	0.07 - 0.07
RADS	Alpha activity	pCi/g	1.78E+01	1.78E+01	1.78E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	7.3 - 7.3
RADS	Americium-241	pCi/g	-2.00E-04	-2.00E-04	-2.00E-04	0/1	1/1	0/1	n/a	0/1	1.28E+01	0/1	1.28E+03	0/1	0/1	0.022 - 0.022
RADS	Beta activity	pCi/g	2.71E+01	2.71E+01	2.71E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.3 - 3.3
RADS	Cesium-137	pCi/g	-1.00E-02	-1.00E-02	-1.00E-02	0/1	1/1	0/1	4.90E-01	0/1	1.98E-01	0/1	1.98E+01	0/1	0/1	0.12 - 0.12
RADS	Neptunium-237	pCi/g	-3.10E-03	-3.10E-03	-3.10E-03	0/1	1/1	0/1	1.00E-01	0/1	6.26E-01	0/1	6.26E+01	0/1	0/1	0.024 - 0.024
RADS	Plutonium-238	pCi/g	6.00E-03	6.00E-03	6.00E-03	0/1	1/1	0/1	7.30E-02	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.021 - 0.021
RADS	Plutonium-239/240	pCi/g	8.00E-03	8.00E-03	8.00E-03	0/1	1/1	0/1	2.50E-02	0/1	3.56E+01	0/1	3.56E+03	0/1	0/1	0.0072 - 0.0072
RADS	Technetium-99	pCi/g	3.80E-01	3.80E-01	3.80E-01	0/1	1/1	0/1	2.50E+00	0/1	1.11E+03	0/1	1.11E+05	0/1	1/1	0.46 - 0.46
RADS	Thorium-228	pCi/g	8.70E-01	8.70E-01	8.70E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	9.10E-01	9.10E-01	9.10E-01	0/1	1/1	0/1	1.50E+00	0/1	4.49E+01	0/1	4.49E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	9.60E-01	9.60E-01	9.60E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Uranium-234	pCi/g	1.00E+00	1.00E+00	1.00E+00	0/1	1/1	0/1	1.20E+00	0/1	6.25E+01	0/1	6.25E+03	0/1	0/1	0.03 - 0.03
RADS	Uranium-235/236	pCi/g	5.80E-02	5.80E-02	5.80E-02	0/1	1/1	0/1	6.00E-02	0/1	9.12E-01	0/1	9.12E+01	0/1	0/1	0.01 - 0.01
RADS	Uranium-238	pCi/g	3.42E+00	3.42E+00	3.42E+00	0/1	1/1	1/1	1.20E+00	0/1	4.02E+00	0/1	4.02E+02	0/1	0/1	0.02 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

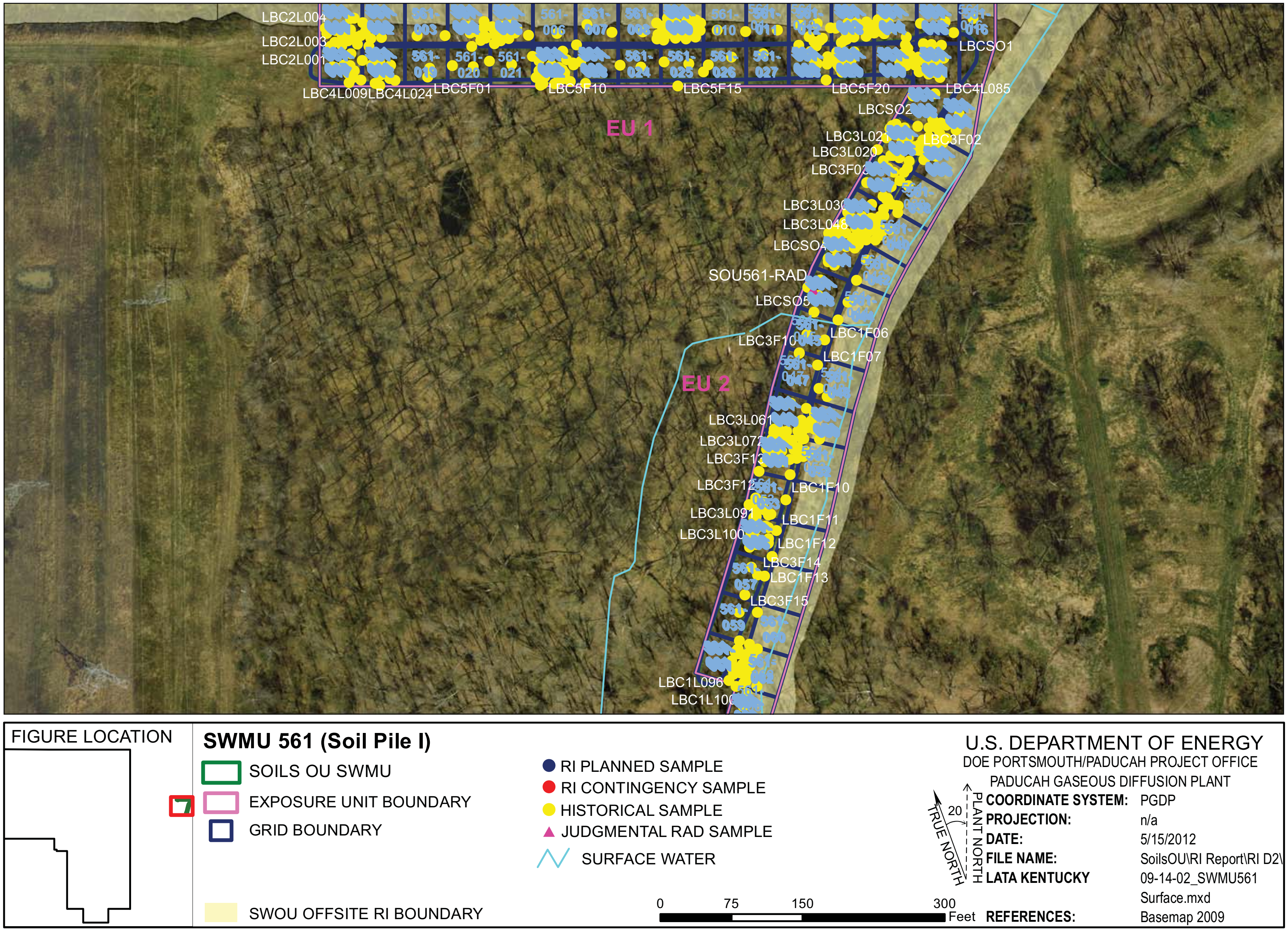


Figure 9.12.2. SWMU 561 Sample Locations - Surface Soil

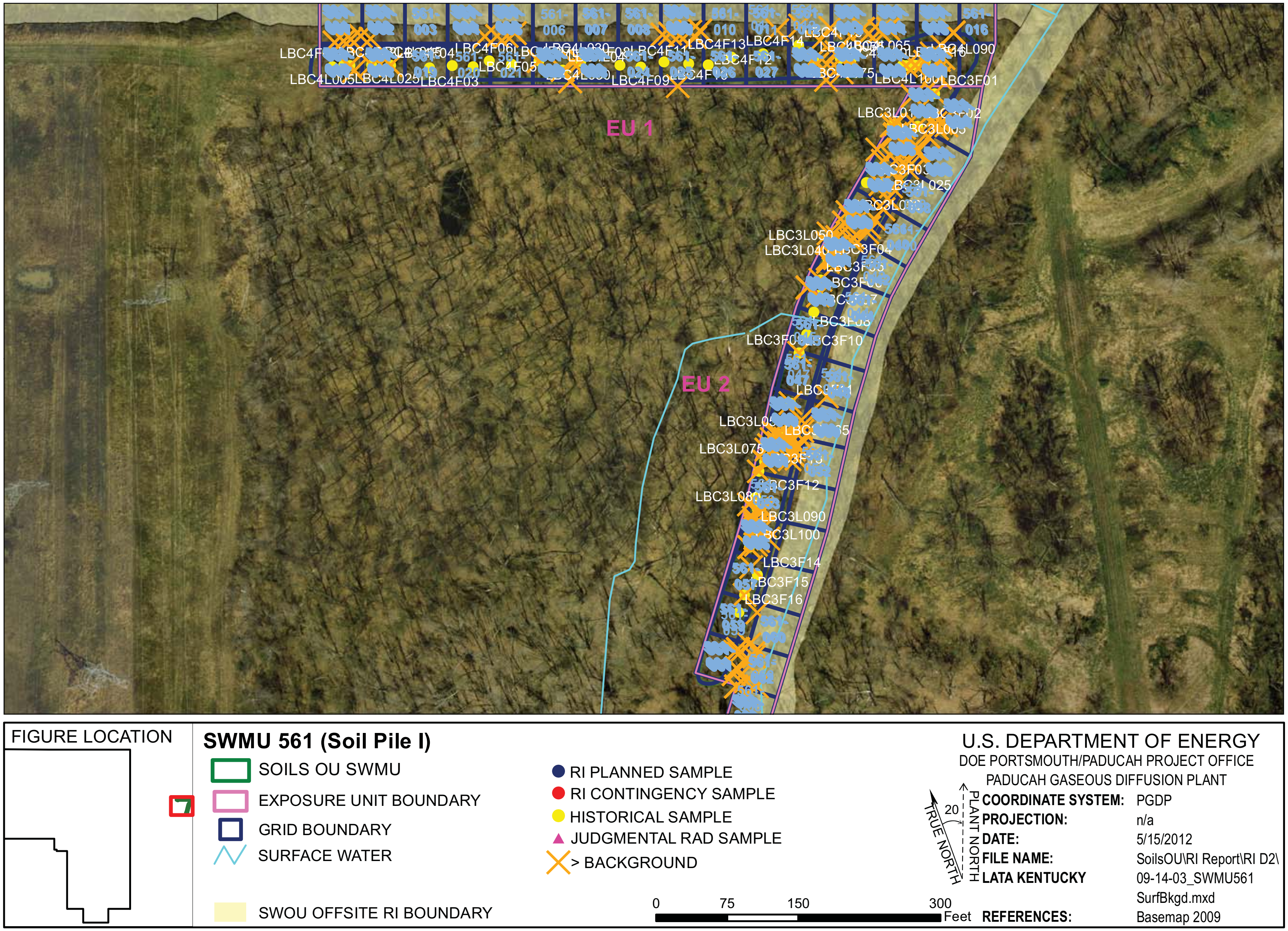


Figure 9.12.3. SWMU 561 Background Exceedances - Surface Soil

Station	Results Exceeding Background
LBC1F14	Uranium (39.15 mg/kg)

Station	Results Exceeding Background
LBC1F16	Uranium (32.5 mg/kg)

Station	Results Exceeding Background
LBC1L001	Uranium (49.48 mg/kg)

Station	Results Exceeding Background
LBC1L002	Uranium (35.74 mg/kg)

Station	Results Exceeding Background
LBC1L005	Chromium (22.8 mg/kg)
	Uranium (39.6 mg/kg)
	Uranium-235 (0.0871 pCi/g)
	Uranium-238 (4.98 pCi/g)

Station	Results Exceeding Background
LBC1L006	Uranium (130.39 mg/kg)

Station	Results Exceeding Background
LBC1L010	Chromium (21.9 mg/kg)
	Uranium (44.05 mg/kg)
	Uranium-234 (1.45 pCi/g)
	Uranium-235 (0.257 pCi/g)
	Uranium-238 (13.7 pCi/g)

Station	Results Exceeding Background
LBC1L015	Thallium (0.22 mg/kg)
	Uranium (17.7 mg/kg)
	Uranium-235 (0.125 pCi/g)
	Uranium-238 (5.85 pCi/g)

Station	Results Exceeding Background
LBC1L020	Chromium (20.4 mg/kg)
	Uranium (22.78 mg/kg)
	Uranium-235 (0.18 pCi/g)
	Uranium-238 (7.22 pCi/g)

Station	Results Exceeding Background
LBC1L025	Chromium (17.7 mg/kg)
	Uranium (10.2 mg/kg)
	Uranium-238 (2.24 pCi/g)

Station	Results Exceeding Background
LBC1L030	Antimony (0.36 mg/kg)
	Arsenic (15 mg/kg)
	Beryllium (0.79 mg/kg)
	Chromium (16.9 mg/kg)
	Cobalt (31 mg/kg)
	Lead (36.4 mg/kg)
	Manganese (2230 mg/kg)
	Thallium (0.23 mg/kg)
	Uranium (11.4 mg/kg)
	Uranium-238 (0.734 pCi/g)

Station	Results Exceeding Background
LBC1L035	Antimony (0.22 mg/kg)
	Uranium (5.5 mg/kg)
	Uranium-238 (1.33 pCi/g)

Station	Results Exceeding Background
LBC1L040	Antimony (0.22 mg/kg)
	Uranium-238 (0.801 pCi/g)

Station	Results Exceeding Background
LBC1L045	Uranium (5.1 mg/kg)
	Uranium-238 (0.794 pCi/g)

Station	Results Exceeding Background
LBC1L050	Uranium-238 (0.666 pCi/g)

Station	Results Exceeding Background
LBC1L053	Uranium (27.13 mg/kg)

Station	Results Exceeding Background
LBC1L055	Uranium (17.6 mg/kg)
	Uranium-235 (0.0896 pCi/g)
	Uranium-238 (3.92 pCi/g)

Station	Results Exceeding Background
LBC1L060	Chromium (16.4 mg/kg)
	Uranium (11.3 mg/kg)
	Uranium-235 (0.0868 pCi/g)
	Uranium-238 (3.82 pCi/g)

Station	Results Exceeding Background
LBC1L065	Chromium (20.5 mg/kg)
	Uranium (42.55 mg/kg)
	Uranium-235 (0.105 pCi/g)
	Uranium-238 (3.95 pCi/g)

Station	Results Exceeding Background
LBC1L066	Uranium (33.2 mg/kg)

Station	Results Exceeding Background
LBC1L070	Chromium (16.7 mg/kg)
	Uranium (19 mg/kg)
	Uranium-238 (2.2 pCi/g)

Station	Results Exceeding Background
LBC1L071	Uranium (32.3 mg/kg)

Station	Results Exceeding Background
LBC1L075	Chromium (17 mg/kg)
	Uranium (19.7 mg/kg)
	Uranium-234 (1.36 pCi/g)
	Uranium-235 (0.165 pCi/g)
	Uranium-238 (10.3 pCi/g)

Station	Results Exceeding Background
LBC1L077	Uranium (42.06 mg/kg)

Station	Results Exceeding Background
LBC1L078	Uranium (23.75 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBC1L080	Antimony (0.45 mg/kg) Arsenic (22.2 mg/kg) Beryllium (0.87 mg/kg) Cadmium (0.23 mg/kg) Chromium (180 mg/kg) Thallium (0.24 mg/kg) Uranium (82.4 mg/kg) Vanadium (40.5 mg/kg) Zinc (140 mg/kg) Uranium-235 (0.146 pCi/g) Uranium-238 (5.2 pCi/g)

Station	Results Exceeding Background
LBC1L081	Uranium (44.5 mg/kg)

Station	Results Exceeding Background
LBC1L083	Uranium (26.33 mg/kg)

Station	Results Exceeding Background
LBC1L085	Chromium (32.9 mg/kg) Uranium (30.5 mg/kg) Uranium-238 (2.48 pCi/g)

Station	Results Exceeding Background
LBC1L088	Uranium (95.89 mg/kg)

Station	Results Exceeding Background
LBC1L090	Chromium (40.8 mg/kg) Uranium (55.8 mg/kg) Uranium-235 (0.124 pCi/g) Uranium-238 (5.67 pCi/g)

Station	Results Exceeding Background
LBC1L094	Uranium (27.73 mg/kg)

Station	Results Exceeding Background
LBC1L095	Chromium (29.1 mg/kg) Thallium (0.26 mg/kg) Uranium (46.7 mg/kg) Uranium-235 (0.106 pCi/g) Uranium-238 (6.08 pCi/g)

Station	Results Exceeding Background
LBC1L098	Uranium (28.38 mg/kg)

Station	Results Exceeding Background
LBC1L099	Uranium (43.6 mg/kg)

Station	Results Exceeding Background
LBC1L100	Chromium (38.7 mg/kg) Thallium (0.26 mg/kg) Uranium (65.7 mg/kg) Cesium-137 (0.56 pCi/g) Uranium-235 (0.063 pCi/g) Uranium-238 (3.85 pCi/g)

Station	Results Exceeding Background
LBC2F11	Lead (225.47 mg/kg)

Station	Results Exceeding Background
LBC2F12	Lead (84.01 mg/kg)

Station	Results Exceeding Background
LBC2F13	Lead (53.21 mg/kg)

Station	Results Exceeding Background
LBC2L005	Antimony (0.24 mg/kg) Uranium-235/236 (0.069 pCi/g) Uranium-238 (1.44 pCi/g)

Station	Results Exceeding Background
LBC2L010	Antimony (0.23 mg/kg) Barium (208 mg/kg) Beryllium (0.68 mg/kg) Lead (37.9 mg/kg) Manganese (1700 mg/kg) Thallium (0.24 mg/kg) Uranium-235/236 (0.065 pCi/g) Uranium-238 (4.7 pCi/g)

Station	Results Exceeding Background
LBC2L015	Antimony (0.59 mg/kg) Arsenic (19 mg/kg) Barium (438 mg/kg) Beryllium (0.83 mg/kg) Chromium (22 mg/kg) Cobalt (16.4 mg/kg) Manganese (5230 mg/kg) Thallium (0.3 mg/kg) Vanadium (50 mg/kg) Uranium-238 (1.25 pCi/g)

Station	Results Exceeding Background
LBC2L020	Antimony (0.22 mg/kg) Chromium (19.7 mg/kg) Thallium (0.23 mg/kg) Uranium-238 (3.9 pCi/g)

Station	Results Exceeding Background
LBC2L025	Uranium-235/236 (0.068 pCi/g) Uranium-238 (1.24 pCi/g)

Station	Results Exceeding Background
LBC2L035	Arsenic (17.2 mg/kg) Thallium (0.51 mg/kg)

Station	Results Exceeding Background
LBC2L040	Antimony (0.28 mg/kg) Arsenic (20.7 mg/kg) Thallium (0.51 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBC2L045	Arsenic (14.3 mg/kg) Thallium (0.49 mg/kg)

Station	Results Exceeding Background
LBC2L050	Antimony (0.25 mg/kg) Arsenic (19.3 mg/kg) Lead (38.9 mg/kg) Thallium (0.48 mg/kg)

Station	Results Exceeding Background
LBC2L055	Antimony (0.23 mg/kg) Arsenic (17.4 mg/kg) Lead (36.7 mg/kg) Thallium (0.52 mg/kg)

Station	Results Exceeding Background
LBC2L060	Antimony (0.23 mg/kg) Arsenic (16.6 mg/kg) Thallium (0.45 mg/kg)

Station	Results Exceeding Background
LBC2L065	Antimony (0.33 mg/kg) Arsenic (30.2 mg/kg) Chromium (16.1 mg/kg) Lead (71.1 mg/kg) Thallium (0.43 mg/kg)

Station	Results Exceeding Background
LBC2L070	Antimony (0.34 mg/kg) Arsenic (25.3 mg/kg) Chromium (17.1 mg/kg) Lead (46.1 mg/kg) Thallium (0.41 mg/kg)

Station	Results Exceeding Background
LBC2L071	Lead (37.41 mg/kg)

Station	Results Exceeding Background
LBC2L075	Antimony (0.37 mg/kg) Arsenic (33.1 mg/kg) Chromium (17.5 mg/kg) Lead (59.2 mg/kg) Thallium (0.48 mg/kg)

Station	Results Exceeding Background
LBC2L080	Antimony (0.24 mg/kg) Arsenic (16.6 mg/kg) Thallium (0.41 mg/kg)

Station	Results Exceeding Background
LBC2L085	Antimony (0.27 mg/kg) Arsenic (15.6 mg/kg) Cobalt (30.9 mg/kg) Lead (54.3 mg/kg) Manganese (2230 mg/kg) Thallium (0.38 mg/kg)

Station	Results Exceeding Background
LBC2L090	Antimony (0.26 mg/kg) Arsenic (15.5 mg/kg) Chromium (16.4 mg/kg) Thallium (0.43 mg/kg)

Station	Results Exceeding Background
LBC2L095	Antimony (0.36 mg/kg) Arsenic (22.2 mg/kg) Chromium (16.7 mg/kg) Thallium (0.42 mg/kg)

Station	Results Exceeding Background
LBC2L100	Antimony (0.24 mg/kg) Arsenic (18 mg/kg) Thallium (0.45 mg/kg)

Station	Results Exceeding Background
LBC3F01	Uranium (27.23 mg/kg)

Station	Results Exceeding Background
LBC3F02	Uranium (473.19 mg/kg)

Station	Results Exceeding Background
LBC3F04	Uranium (312.25 mg/kg)

Station	Results Exceeding Background
LBC3F05	Uranium (108.04 mg/kg)

Station	Results Exceeding Background
LBC3F06	Uranium (27.79 mg/kg)

Station	Results Exceeding Background
LBC3F09	Uranium (263.45 mg/kg)

Station	Results Exceeding Background
LBC3F11	Uranium (26.25 mg/kg)

Station	Results Exceeding Background
LBC3F13	Uranium (40.94 mg/kg)

Station	Results Exceeding Background
LBC3F15	Uranium (81.78 mg/kg)

Station	Results Exceeding Background
LBC3L001	Uranium (25.68 mg/kg)

Station	Results Exceeding Background
LBC3L002	Uranium (38.63 mg/kg)

Station	Results Exceeding Background
LBC3L003	Uranium (98.59 mg/kg)

Station	Results Exceeding Background
LBC3L004	Chromium (199.27 mg/kg) Uranium (91.1 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBC3L005	Beryllium (0.7 mg/kg)
	Chromium (130 mg/kg)
	Uranium (209.01 mg/kg)
	Zinc (127 mg/kg)
	Uranium-234 (2.18 pCi/g)
	Uranium-235 (0.363 pCi/g)
	Uranium-238 (17.9 pCi/g)

Station	Results Exceeding Background
LBC3L008	Chromium (185 mg/kg)
	Uranium (58.11 mg/kg)

Station	Results Exceeding Background
LBC3L009	Uranium (147.99 mg/kg)

Station	Results Exceeding Background
LBC3L010	Chromium (56.4 mg/kg)
	Uranium (48.79 mg/kg)
	Uranium-234 (1.72 pCi/g)
	Uranium-235 (0.205 pCi/g)
	Uranium-238 (14.4 pCi/g)

Station	Results Exceeding Background
LBC3L013	Uranium (115.22 mg/kg)

Station	Results Exceeding Background
LBC3L014	Uranium (172.67 mg/kg)

Station	Results Exceeding Background
LBC3L015	Beryllium (0.69 mg/kg)
	Chromium (189 mg/kg)
	Uranium (266 mg/kg)
	Zinc (111 mg/kg)
	Uranium-234 (1.45 pCi/g)
	Uranium-235 (0.162 pCi/g)
	Uranium-238 (11.8 pCi/g)

Station	Results Exceeding Background
LBC3L017	Uranium (58.53 mg/kg)

Station	Results Exceeding Background
LBC3L019	Uranium (228.35 mg/kg)

Station	Results Exceeding Background
LBC3L020	Beryllium (0.74 mg/kg)
	Chromium (60.3 mg/kg)
	Uranium (373.72 mg/kg)
	Uranium-234 (4.7 pCi/g)
	Uranium-235 (0.701 pCi/g)
	Uranium-238 (48.2 pCi/g)

Station	Results Exceeding Background
LBC3L021	Uranium (122.4 mg/kg)

Station	Results Exceeding Background
LBC3L023	Uranium (70.58 mg/kg)

Station	Results Exceeding Background
LBC3L024	Uranium (42.88 mg/kg)

Station	Results Exceeding Background
LBC3L025	Chromium (40 mg/kg)
	Uranium (71.8 mg/kg)
	Uranium-234 (3.19 pCi/g)
	Uranium-235 (0.385 pCi/g)
	Uranium-238 (26.3 pCi/g)

Station	Results Exceeding Background
LBC3L026	Uranium (44.28 mg/kg)

Station	Results Exceeding Background
LBC3L027	Uranium (285.24 mg/kg)

Station	Results Exceeding Background
LBC3L030	Chromium (25.7 mg/kg)
	Uranium (63.6 mg/kg)
	Uranium-235 (0.14 pCi/g)
	Uranium-238 (7.06 pCi/g)

Station	Results Exceeding Background
LBC3L035	Cadmium (1.2 mg/kg)
	Uranium (11.6 mg/kg)
	Zinc (179 mg/kg)
	Technetium-99 (8.38 pCi/g)
	Uranium-238 (2.8 pCi/g)

Station	Results Exceeding Background
LBC3L040	Uranium (15.6 mg/kg)
	Uranium-235 (0.07 pCi/g)
	Uranium-238 (3.86 pCi/g)

Station	Results Exceeding Background
LBC3L044	Uranium (269.92 mg/kg)

Station	Results Exceeding Background
LBC3L045	Chromium (36.7 mg/kg)
	Uranium (65.85 mg/kg)
	Uranium-234 (1.3 pCi/g)
	Uranium-235 (0.214 pCi/g)
	Uranium-238 (11 pCi/g)

Station	Results Exceeding Background
LBC3L046	Uranium (31.03 mg/kg)

Station	Results Exceeding Background
LBC3L047	Uranium (23.45 mg/kg)

Station	Results Exceeding Background
LBC3L048	Uranium (93.35 mg/kg)

Station	Results Exceeding Background
LBC3L049	Uranium (24.81 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBC3L050	Antimony (1.2 mg/kg) Arsenic (15.4 mg/kg) Beryllium (0.78 mg/kg) Chromium (101 mg/kg) Cobalt (19.8 mg/kg) Lead (40.7 mg/kg) Manganese (1740 mg/kg) Uranium (111 mg/kg) Zinc (100 mg/kg) Uranium-234 (4.53 pCi/g) Uranium-235 (0.551 pCi/g) Uranium-238 (11 pCi/g) Uranium-238 (35.5 pCi/g)

Station	Results Exceeding Background
LBC3L052	Uranium (24.94 mg/kg)

Station	Results Exceeding Background
LBC3L055	Antimony (1.2 mg/kg) Beryllium (0.76 mg/kg) Chromium (89 mg/kg) Uranium (360 mg/kg) Vanadium (49.1 mg/kg) Zinc (104 mg/kg) Uranium-235 (1.93 pCi/g) Uranium-238 (5.82 pCi/g) Uranium-238 (8.74 pCi/g)

Station	Results Exceeding Background
LBC3L056	Uranium (49.52 mg/kg)

Station	Results Exceeding Background
LBC3L058	Uranium (58.95 mg/kg)

Station	Results Exceeding Background
LBC3L060	Chromium (45.6 mg/kg) Uranium (77.7 mg/kg) Uranium-234 (2.42 pCi/g) Uranium-235 (0.482 pCi/g) Uranium-238 (23.8 pCi/g)

Station	Results Exceeding Background
LBC3L061	Uranium (36.47 mg/kg)

Station	Results Exceeding Background
LBC3L062	Uranium (64.57 mg/kg)

Station	Results Exceeding Background
LBC3L063	Uranium (98.63 mg/kg)

Station	Results Exceeding Background
LBC3L065	Chromium (56.7 mg/kg) Uranium (39.8 mg/kg) Uranium-234 (2.09 pCi/g) Uranium-235 (0.33 pCi/g) Uranium-238 (12.4 pCi/g) Uranium-238 (17.6 pCi/g)

Station	Results Exceeding Background
LBC3L066	Chromium (528.44 mg/kg) Uranium (165.35 mg/kg)

Station	Results Exceeding Background
LBC3L068	Uranium (66.65 mg/kg)

Station	Results Exceeding Background
LBC3L070	Chromium (97.2 mg/kg) Uranium (73.6 mg/kg) Zinc (76.2 mg/kg) Uranium-235 (0.102 pCi/g) Uranium-238 (6.39 pCi/g)

Station	Results Exceeding Background
LBC3L075	Antimony (1.4 mg/kg) Chromium (68.3 mg/kg) Uranium (64.7 mg/kg) Zinc (66 mg/kg) Uranium-234 (2.61 pCi/g) Uranium-235 (0.46 pCi/g) Uranium-238 (18.9 pCi/g) Uranium-238 (17.2 pCi/g)

Station	Results Exceeding Background
LBC3L076	Uranium (30.32 mg/kg)

Station	Results Exceeding Background
LBC3L077	Uranium (47.68 mg/kg)

Station	Results Exceeding Background
LBC3L079	Uranium (89.06 mg/kg)

Station	Results Exceeding Background
LBC3L080	Chromium (47.1 mg/kg) Uranium (99.7 mg/kg) Plutonium-239/240 (0.0557 pCi/g) Uranium-234 (4.774 pCi/g) Uranium-235 (0.6048 pCi/g) Uranium-238 (37.2 pCi/g) Uranium-238 (25.3 pCi/g)

Station	Results Exceeding Background
LBC3L082	Uranium (87.01 mg/kg)

Station	Results Exceeding Background
LBC3L085	Chromium (39.9 mg/kg) Uranium (53.9 mg/kg) Uranium-234 (2.53 pCi/g) Uranium-235 (0.375 pCi/g) Uranium-238 (22.6 pCi/g)

Station	Results Exceeding Background
LBC3L087	Uranium (32.86 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBC3L089	Uranium (110.45 mg/kg)

Station	Results Exceeding Background
LBC3L090	Chromium (24.6 mg/kg)
	Uranium (39 mg/kg)
	Plutonium-238 (0.5082 pCi/g)
	Plutonium-239/240 (0.03622 pCi/g)
	Uranium-234 (11.49 pCi/g)
	Uranium-235 (2.554 pCi/g)
	Uranium-238 (108.5 pCi/g)
	Uranium-238 (21.5 pCi/g)

Station	Results Exceeding Background
LBC3L091	Uranium (79.38 mg/kg)

Station	Results Exceeding Background
LBC3L092	Uranium (317.68 mg/kg)

Station	Results Exceeding Background
LBC3L093	Uranium (26.51 mg/kg)

Station	Results Exceeding Background
LBC3L095	Chromium (41.7 mg/kg)
	Uranium (67.3 mg/kg)
	Uranium-234 (1.59 pCi/g)
	Uranium-235 (0.274 pCi/g)
	Uranium-238 (15.1 pCi/g)

Station	Results Exceeding Background
LBC3L096	Uranium (27.98 mg/kg)

Station	Results Exceeding Background
LBC3L097	Uranium (27.58 mg/kg)

Station	Results Exceeding Background
LBC3L100	Cadmium (0.32 mg/kg)
	Chromium (31.4 mg/kg)
	Uranium (51.7 mg/kg)
	Uranium-238 (0.582 pCi/g)

Station	Results Exceeding Background
LBC4L005	Chromium (17.3 mg/kg)
	Thallium (0.28 mg/kg)

Station	Results Exceeding Background
LBC4L010	Thallium (0.3 mg/kg)

Station	Results Exceeding Background
LBC4L015	Thallium (0.29 mg/kg)

Station	Results Exceeding Background
LBC4L020	Chromium (16.9 mg/kg)
	Thallium (0.28 mg/kg)

Station	Results Exceeding Background
LBC4L025	Chromium (24 mg/kg)
	Thallium (0.26 mg/kg)

Station	Results Exceeding Background
LBC4L030	Chromium (16.9 mg/kg)
	Thallium (0.24 mg/kg)

Station	Results Exceeding Background
LBC4L035	Chromium (22.7 mg/kg)
	Thallium (0.23 mg/kg)

Station	Results Exceeding Background
LBC4L040	Chromium (24.3 mg/kg)
	Thallium (0.23 mg/kg)

Station	Results Exceeding Background
LBC4L045	Antimony (0.28 mg/kg)
	Arsenic (17.2 mg/kg)
	Thallium (0.23 mg/kg)

Station	Results Exceeding Background
LBC4L050	Arsenic (12.6 mg/kg)
	Chromium (111 mg/kg)
	Thallium (0.25 mg/kg)
	Uranium (12.1 mg/kg)
	Uranium-238 (0.797 pCi/g)

Station	Results Exceeding Background
LBC4L055	Antimony (0.84 mg/kg)
	Arsenic (23.3 mg/kg)
	Beryllium (1.5 mg/kg)
	Chromium (78.2 mg/kg)
	Iron (48500 mg/kg)
	Vanadium (86.9 mg/kg)
	Uranium-238 (0.969 pCi/g)

Station	Results Exceeding Background
LBC4L058	Lead (51.2 mg/kg)

Station	Results Exceeding Background
LBC4L060	Antimony (0.22 mg/kg)
	Chromium (69.2 mg/kg)
	Zinc (77.7 mg/kg)
	Uranium-238 (0.454 pCi/g)

Station	Results Exceeding Background
LBC4L061	Lead (58.36 mg/kg)

Station	Results Exceeding Background
LBC4L065	Arsenic (12.5 mg/kg)
	Chromium (28 mg/kg)

Station	Results Exceeding Background
LBC4L070	Chromium (86.7 mg/kg)
	Uranium (11.2 mg/kg)
	Zinc (66.5 mg/kg)
	Uranium-238 (0.801 pCi/g)

Station	Results Exceeding Background
LBC4L075	Chromium (25.5 mg/kg)

Station	Results Exceeding Background
LBC4L080	Chromium (32.2 mg/kg)
	Copper (29.1 mg/kg)
	Uranium-238 (0.582 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBC4L085	Chromium (158 mg/kg) Uranium-235 (0.102 pCi/g) Uranium-238 (7.09 pCi/g)

Station	Results Exceeding Background
LBC4L090	Chromium (31.1 mg/kg) Uranium (6.1 mg/kg) Uranium-238 (0.737 pCi/g)

Station	Results Exceeding Background
LBC4L093	Uranium (69.02 mg/kg)

Station	Results Exceeding Background
LBC4L095	Chromium (38.9 mg/kg) Uranium (17.1 mg/kg) Uranium-235 (0.0782 pCi/g) Uranium-238 (4.89 pCi/g)

Station	Results Exceeding Background
LBC4L096	Uranium (55.08 mg/kg)

Station	Results Exceeding Background
LBC4L097	Uranium (321.36 mg/kg)

Station	Results Exceeding Background
LBC4L098	Uranium (95.16 mg/kg)

Station	Results Exceeding Background
LBC4L099	Uranium (35.13 mg/kg)

Station	Results Exceeding Background
LBC4L100	Chromium (67.3 mg/kg) Uranium (411.38 mg/kg) Uranium-235 (0.132 pCi/g) Uranium-238 (9.67 pCi/g)

Station	Results Exceeding Background
LBC5F15	Lead (83.75 mg/kg)

Station	Results Exceeding Background
LBC5F16	Lead (52 mg/kg)

NOTE: maximum detections only shown for location.

Station	Results Exceeding Background
LBC5F20	Lead (37.49 mg/kg)

Station	Results Exceeding Background
LBCSO1	Antimony (3.5 mg/kg) Cadmium (0.35 mg/kg) Chromium (432 mg/kg) Copper (30.2 mg/kg) Uranium (1370 mg/kg) Vanadium (56.4 mg/kg) Zinc (354 mg/kg) Neptunium-237 (0.139 pCi/g) Plutonium-238 (0.6296 pCi/g) Plutonium-239/240 (0.0604 pCi/g) Uranium-234 (37.78 pCi/g) Uranium-235 (6.788 pCi/g) Uranium-238 (412.7 pCi/g) Uranium-238 (303 pCi/g)

Station	Results Exceeding Background
LBCSO2	Antimony (3.1 mg/kg) Chromium (176 mg/kg) Copper (22.3 mg/kg) Thallium (0.65 mg/kg) Uranium (2090 mg/kg) Vanadium (50.2 mg/kg) Zinc (326 mg/kg) Plutonium-238 (0.5558 pCi/g) Plutonium-239/240 (0.139 pCi/g) Uranium-234 (72 pCi/g) Uranium-235 (16.7 pCi/g) Uranium-238 (730 pCi/g) Uranium-238 (511 pCi/g)

Station	Results Exceeding Background
LBCSO3	Antimony (4.4 mg/kg) Chromium (235 mg/kg) Copper (19.2 mg/kg) Thallium (0.24 mg/kg) Uranium (1260 mg/kg) Vanadium (71.6 mg/kg) Zinc (183 mg/kg) Plutonium-238 (0.4589 pCi/g) Plutonium-239/240 (0.04163 pCi/g) Uranium-234 (48.2 pCi/g) Uranium-235 (9.02 pCi/g) Uranium-238 (451 pCi/g) Uranium-238 (458 pCi/g)

Station	Results Exceeding Background
LBCSO4	Antimony (22 mg/kg) Arsenic (39.6 mg/kg) Beryllium (1 mg/kg) Cadmium (0.62 mg/kg) Chromium (1370 mg/kg) Cobalt (18.6 mg/kg) Copper (62.5 mg/kg) Lead (53.5 mg/kg) Selenium (1.1 mg/kg) Thallium (1.2 mg/kg) Uranium (1030 mg/kg) Vanadium (66.8 mg/kg) Zinc (1130 mg/kg) Cesium-137 (1.01 pCi/g) Neptunium-237 (0.19 pCi/g) Plutonium-238 (0.0808 pCi/g) Plutonium-239/240 (0.158 pCi/g) Thorium-230 (2.23 pCi/g) Uranium-234 (24.8 pCi/g) Uranium-235 (4.1 pCi/g) Uranium-238 (187 pCi/g) Uranium-238 (176 pCi/g)

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBCSO5	Antimony (4.2 mg/kg)
	Chromium (205 mg/kg)
	Copper (24.9 mg/kg)
	Thallium (0.73 mg/kg)
	Uranium (6410 mg/kg)
	Zinc (240 mg/kg)
	Plutonium-239/240 (0.0835 pCi/g)
	Uranium-234 (136 pCi/g)
	Uranium-235 (19.6 pCi/g)
	Uranium-238 (1120 pCi/g)
	Uranium-238 (1340 pCi/g)

Station	Results Exceeding Background
SOU561-RAD	Uranium (10.2 mg/kg)
	Uranium-238 (3.42 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBC1F14	Uranium (39.15 mg/kg)
LBC1F16	Uranium (32.5 mg/kg)
LBC1L001	Uranium (49.48 mg/kg)
LBC1L002	Uranium (35.74 mg/kg)
LBC1L005	Chromium (22.8 mg/kg)
	Uranium (39.6 mg/kg)
	Uranium-235 (0.0871 pCi/g)
	Uranium-238 (4.98 pCi/g)
LBC1L006	Uranium (130.39 mg/kg)
LBC1L010	Chromium (21.9 mg/kg)
	Uranium (44.05 mg/kg)
	Uranium-234 (1.45 pCi/g)
	Uranium-235 (0.257 pCi/g)
	Uranium-238 (13.7 pCi/g)
LBC1L015	Thallium (0.22 mg/kg)
	Uranium (17.7 mg/kg)
	Uranium-235 (0.125 pCi/g)
	Uranium-238 (5.85 pCi/g)
LBC1L020	Chromium (20.4 mg/kg)
	Uranium (22.78 mg/kg)
	Uranium-235 (0.18 pCi/g)
	Uranium-238 (7.22 pCi/g)

Station	Results Exceeding Background
LBC1L025	Chromium (17.7 mg/kg)
	Uranium (10.2 mg/kg)
	Uranium-238 (2.24 pCi/g)
LBC1L030	Antimony (0.36 mg/kg)
	Arsenic (15 mg/kg)
	Beryllium (0.79 mg/kg)
	Chromium (16.9 mg/kg)
	Cobalt (31 mg/kg)
	Lead (36.4 mg/kg)
	Manganese (2230 mg/kg)
	Thallium (0.23 mg/kg)
	Uranium (11.4 mg/kg)
	Uranium-238 (0.734 pCi/g)
LBC1L035	Antimony (0.22 mg/kg)
	Uranium (5.5 mg/kg)
	Uranium-238 (1.33 pCi/g)
LBC1L040	Antimony (0.22 mg/kg)
	Uranium-238 (0.801 pCi/g)
LBC1L045	Uranium (5.1 mg/kg)
	Uranium-238 (0.794 pCi/g)
LBC1L050	Uranium-238 (0.666 pCi/g)
LBC1L053	Uranium (27.13 mg/kg)
LBC1L055	Uranium (17.6 mg/kg)
	Uranium-235 (0.0896 pCi/g)
	Uranium-238 (3.92 pCi/g)

Station	Results Exceeding Background
LBC1L060	Chromium (16.4 mg/kg)
	Uranium (11.3 mg/kg)
	Uranium-235 (0.0868 pCi/g)
	Uranium-238 (3.82 pCi/g)
LBC1L065	Chromium (20.5 mg/kg)
	Uranium (42.55 mg/kg)
	Uranium-235 (0.105 pCi/g)
	Uranium-238 (3.95 pCi/g)
LBC1L066	Uranium (33.2 mg/kg)
LBC1L070	Chromium (16.7 mg/kg)
	Uranium (19 mg/kg)
	Uranium-238 (2.2 pCi/g)
LBC1L071	Uranium (32.3 mg/kg)
LBC1L075	Chromium (17 mg/kg)
	Uranium (19.7 mg/kg)
	Uranium-234 (1.36 pCi/g)
	Uranium-235 (0.165 pCi/g)
	Uranium-238 (10.3 pCi/g)
LBC1L077	Uranium (42.06 mg/kg)
LBC1L078	Uranium (23.75 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBC1L080	Antimony (0.45 mg/kg) Arsenic (22.2 mg/kg) Beryllium (0.87 mg/kg) Cadmium (0.23 mg/kg) Chromium (180 mg/kg) Thallium (0.24 mg/kg) Uranium (82.4 mg/kg) Vanadium (40.5 mg/kg) Zinc (140 mg/kg) Uranium-235 (0.146 pCi/g) Uranium-238 (5.2 pCi/g)

Station	Results Exceeding Background
LBC1L081	Uranium (44.5 mg/kg)

Station	Results Exceeding Background
LBC1L083	Uranium (26.33 mg/kg)

Station	Results Exceeding Background
LBC1L085	Chromium (32.9 mg/kg) Uranium (30.5 mg/kg) Uranium-238 (2.48 pCi/g)

Station	Results Exceeding Background
LBC1L088	Uranium (95.89 mg/kg)

Station	Results Exceeding Background
LBC1L090	Chromium (40.8 mg/kg) Uranium (55.8 mg/kg) Uranium-235 (0.124 pCi/g) Uranium-238 (5.67 pCi/g)

Station	Results Exceeding Background
LBC1L094	Uranium (27.73 mg/kg)

Station	Results Exceeding Background
LBC1L095	Chromium (29.1 mg/kg) Thallium (0.26 mg/kg) Uranium (46.7 mg/kg) Uranium-235 (0.106 pCi/g) Uranium-238 (6.08 pCi/g)

Station	Results Exceeding Background
LBC1L098	Uranium (28.38 mg/kg)

Station	Results Exceeding Background
LBC1L099	Uranium (43.6 mg/kg)

Station	Results Exceeding Background
LBC1L100	Chromium (38.7 mg/kg) Thallium (0.26 mg/kg) Uranium (65.7 mg/kg) Cesium-137 (0.56 pCi/g) Uranium-235 (0.063 pCi/g) Uranium-238 (3.85 pCi/g)

Station	Results Exceeding Background
LBC2F11	Lead (225.47 mg/kg)

Station	Results Exceeding Background
LBC2F12	Lead (84.01 mg/kg)

Station	Results Exceeding Background
LBC2F13	Lead (53.21 mg/kg)

Station	Results Exceeding Background
LBC2L005	Antimony (0.24 mg/kg) Uranium-235/236 (0.069 pCi/g) Uranium-238 (1.44 pCi/g)

Station	Results Exceeding Background
LBC2L010	Antimony (0.23 mg/kg) Barium (208 mg/kg) Beryllium (0.68 mg/kg) Lead (37.9 mg/kg) Manganese (1700 mg/kg) Thallium (0.24 mg/kg) Uranium-235/236 (0.065 pCi/g) Uranium-238 (4.7 pCi/g)

Station	Results Exceeding Background
LBC2L015	Antimony (0.59 mg/kg) Arsenic (19 mg/kg) Barium (438 mg/kg) Beryllium (0.83 mg/kg) Chromium (22 mg/kg) Cobalt (16.4 mg/kg) Manganese (5230 mg/kg) Thallium (0.3 mg/kg) Vanadium (50 mg/kg) Uranium-238 (1.25 pCi/g)

Station	Results Exceeding Background
LBC2L020	Antimony (0.22 mg/kg) Chromium (19.7 mg/kg) Thallium (0.23 mg/kg) Uranium-238 (3.9 pCi/g)

Station	Results Exceeding Background
LBC2L025	Uranium-235/236 (0.068 pCi/g) Uranium-238 (1.24 pCi/g)

Station	Results Exceeding Background
LBC2L035	Arsenic (17.2 mg/kg) Thallium (0.51 mg/kg)

Station	Results Exceeding Background
LBC2L040	Antimony (0.28 mg/kg) Arsenic (20.7 mg/kg) Thallium (0.51 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBC2L045	Arsenic (14.3 mg/kg) Thallium (0.49 mg/kg)
LBC2L050	Antimony (0.25 mg/kg) Arsenic (19.3 mg/kg) Lead (38.9 mg/kg) Thallium (0.48 mg/kg)
LBC2L055	Antimony (0.23 mg/kg) Arsenic (17.4 mg/kg) Lead (36.7 mg/kg) Thallium (0.52 mg/kg)
LBC2L060	Antimony (0.23 mg/kg) Arsenic (16.6 mg/kg) Thallium (0.45 mg/kg)
LBC2L065	Antimony (0.33 mg/kg) Arsenic (30.2 mg/kg) Chromium (16.1 mg/kg) Lead (71.1 mg/kg) Thallium (0.43 mg/kg)
LBC2L070	Antimony (0.34 mg/kg) Arsenic (25.3 mg/kg) Chromium (17.1 mg/kg) Lead (46.1 mg/kg) Thallium (0.41 mg/kg)
LBC2L071	Lead (37.41 mg/kg)

Station	Results Exceeding Background
LBC2L075	Antimony (0.37 mg/kg) Arsenic (33.1 mg/kg) Chromium (17.5 mg/kg) Lead (59.2 mg/kg) Thallium (0.48 mg/kg)
LBC2L080	Antimony (0.24 mg/kg) Arsenic (16.6 mg/kg) Thallium (0.41 mg/kg)
LBC2L085	Antimony (0.27 mg/kg) Arsenic (15.6 mg/kg) Cobalt (30.9 mg/kg) Lead (54.3 mg/kg) Manganese (2230 mg/kg) Thallium (0.38 mg/kg)
LBC2L090	Antimony (0.26 mg/kg) Arsenic (15.5 mg/kg) Chromium (16.4 mg/kg) Thallium (0.43 mg/kg)
LBC2L095	Antimony (0.36 mg/kg) Arsenic (22.2 mg/kg) Chromium (16.7 mg/kg) Thallium (0.42 mg/kg)
LBC2L100	Antimony (0.24 mg/kg) Arsenic (18 mg/kg) Thallium (0.45 mg/kg)
LBC3F01	Uranium (27.23 mg/kg)

Station	Results Exceeding Background
LBC3F02	Uranium (473.19 mg/kg)
LBC3F04	Uranium (312.25 mg/kg)
LBC3F05	Uranium (108.04 mg/kg)
LBC3F06	Uranium (27.79 mg/kg)
LBC3F09	Uranium (263.45 mg/kg)
LBC3F11	Uranium (26.25 mg/kg)
LBC3F13	Uranium (40.94 mg/kg)
LBC3F15	Uranium (81.78 mg/kg)
LBC3L001	Uranium (25.68 mg/kg)
LBC3L002	Uranium (38.63 mg/kg)
LBC3L003	Uranium (98.59 mg/kg)
LBC3L004	Chromium (199.27 mg/kg) Uranium (91.1 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBC3L005	Beryllium (0.7 mg/kg) Chromium (130 mg/kg) Uranium (209.01 mg/kg) Zinc (127 mg/kg) Uranium-234 (2.18 pCi/g) Uranium-235 (0.363 pCi/g) Uranium-238 (17.9 pCi/g)

Station	Results Exceeding Background
LBC3L008	Chromium (185 mg/kg) Uranium (58.11 mg/kg)

Station	Results Exceeding Background
LBC3L009	Uranium (147.99 mg/kg)

Station	Results Exceeding Background
LBC3L010	Chromium (56.4 mg/kg) Uranium (48.79 mg/kg) Uranium-234 (1.72 pCi/g) Uranium-235 (0.205 pCi/g) Uranium-238 (14.4 pCi/g)

Station	Results Exceeding Background
LBC3L013	Uranium (115.22 mg/kg)

Station	Results Exceeding Background
LBC3L014	Uranium (172.67 mg/kg)

Station	Results Exceeding Background
LBC3L015	Beryllium (0.69 mg/kg) Chromium (189 mg/kg) Uranium (266 mg/kg) Zinc (111 mg/kg) Uranium-234 (1.45 pCi/g) Uranium-235 (0.162 pCi/g) Uranium-238 (11.8 pCi/g)

Station	Results Exceeding Background
LBC3L017	Uranium (58.53 mg/kg)

Station	Results Exceeding Background
LBC3L019	Uranium (228.35 mg/kg)

Station	Results Exceeding Background
LBC3L020	Beryllium (0.74 mg/kg) Chromium (60.3 mg/kg) Uranium (373.72 mg/kg) Uranium-234 (4.7 pCi/g) Uranium-235 (0.701 pCi/g) Uranium-238 (48.2 pCi/g)

Station	Results Exceeding Background
LBC3L021	Uranium (122.4 mg/kg)

Station	Results Exceeding Background
LBC3L023	Uranium (70.58 mg/kg)

Station	Results Exceeding Background
LBC3L024	Uranium (42.88 mg/kg)

Station	Results Exceeding Background
LBC3L025	Chromium (40 mg/kg) Uranium (71.8 mg/kg) Uranium-234 (3.19 pCi/g) Uranium-235 (0.385 pCi/g) Uranium-238 (26.3 pCi/g)

Station	Results Exceeding Background
LBC3L026	Uranium (44.28 mg/kg)

Station	Results Exceeding Background
LBC3L027	Uranium (285.24 mg/kg)

Station	Results Exceeding Background
LBC3L030	Chromium (25.7 mg/kg) Uranium (63.6 mg/kg) Uranium-235 (0.14 pCi/g) Uranium-238 (7.06 pCi/g)

Station	Results Exceeding Background
LBC3L035	Cadmium (1.2 mg/kg) Uranium (11.6 mg/kg) Zinc (179 mg/kg) Technetium-99 (8.38 pCi/g) Uranium-238 (2.8 pCi/g)

Station	Results Exceeding Background
LBC3L040	Uranium (15.6 mg/kg) Uranium-235 (0.07 pCi/g) Uranium-238 (3.86 pCi/g)

Station	Results Exceeding Background
LBC3L044	Uranium (269.92 mg/kg)

Station	Results Exceeding Background
LBC3L045	Chromium (36.7 mg/kg) Uranium (65.85 mg/kg) Uranium-234 (1.3 pCi/g) Uranium-235 (0.214 pCi/g) Uranium-238 (11 pCi/g)

Station	Results Exceeding Background
LBC3L046	Uranium (31.03 mg/kg)

Station	Results Exceeding Background
LBC3L047	Uranium (23.45 mg/kg)

Station	Results Exceeding Background
LBC3L048	Uranium (93.35 mg/kg)

Station	Results Exceeding Background
LBC3L049	Uranium (24.81 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBC3L050	Antimony (1.2 mg/kg)
	Arsenic (15.4 mg/kg)
	Beryllium (0.78 mg/kg)
	Chromium (101 mg/kg)
	Cobalt (19.8 mg/kg)
	Lead (40.7 mg/kg)
	Manganese (1740 mg/kg)
	Uranium (111 mg/kg)
	Zinc (100 mg/kg)
	Uranium-234 (4.53 pCi/g)
	Uranium-235 (0.551 pCi/g)
	Uranium-238 (11 pCi/g)
	Uranium-238 (35.5 pCi/g)

Station	Results Exceeding Background
LBC3L052	Uranium (24.94 mg/kg)

Station	Results Exceeding Background
LBC3L055	Antimony (1.2 mg/kg)
	Beryllium (0.76 mg/kg)
	Chromium (89 mg/kg)
	Uranium (360 mg/kg)
	Vanadium (49.1 mg/kg)
	Zinc (104 mg/kg)
	Uranium-235 (1.93 pCi/g)
	Uranium-238 (5.82 pCi/g)
	Uranium-238 (8.74 pCi/g)

Station	Results Exceeding Background
LBC3L056	Uranium (49.52 mg/kg)

Station	Results Exceeding Background
LBC3L058	Uranium (58.95 mg/kg)

Station	Results Exceeding Background
LBC3L060	Chromium (45.6 mg/kg)
	Uranium (77.7 mg/kg)
	Uranium-234 (2.42 pCi/g)
	Uranium-235 (0.482 pCi/g)
	Uranium-238 (23.8 pCi/g)

Station	Results Exceeding Background
LBC3L061	Uranium (36.47 mg/kg)

Station	Results Exceeding Background
LBC3L062	Uranium (64.57 mg/kg)

Station	Results Exceeding Background
LBC3L063	Uranium (98.63 mg/kg)

Station	Results Exceeding Background
LBC3L065	Chromium (56.7 mg/kg)
	Uranium (39.8 mg/kg)
	Uranium-234 (2.09 pCi/g)
	Uranium-235 (0.33 pCi/g)
	Uranium-238 (12.4 pCi/g)
	Uranium-238 (17.6 pCi/g)

Station	Results Exceeding Background
LBC3L066	Chromium (528.44 mg/kg)
	Uranium (165.35 mg/kg)

Station	Results Exceeding Background
LBC3L068	Uranium (66.65 mg/kg)

Station	Results Exceeding Background
LBC3L070	Chromium (97.2 mg/kg)
	Uranium (73.6 mg/kg)
	Zinc (76.2 mg/kg)
	Uranium-235 (0.102 pCi/g)
	Uranium-238 (6.39 pCi/g)

Station	Results Exceeding Background
LBC3L075	Antimony (1.4 mg/kg)
	Chromium (68.3 mg/kg)
	Uranium (64.7 mg/kg)
	Zinc (66 mg/kg)
	Uranium-234 (2.61 pCi/g)
	Uranium-235 (0.46 pCi/g)
	Uranium-238 (18.9 pCi/g)
	Uranium-238 (17.2 pCi/g)

Station	Results Exceeding Background
LBC3L076	Uranium (30.32 mg/kg)

Station	Results Exceeding Background
LBC3L077	Uranium (47.68 mg/kg)

Station	Results Exceeding Background
LBC3L079	Uranium (89.06 mg/kg)

Station	Results Exceeding Background
LBC3L080	Chromium (47.1 mg/kg)
	Uranium (99.7 mg/kg)
	Plutonium-239/240 (0.0557 pCi/g)
	Uranium-234 (4.774 pCi/g)
	Uranium-235 (0.6048 pCi/g)
	Uranium-238 (37.2 pCi/g)
	Uranium-238 (25.3 pCi/g)

Station	Results Exceeding Background
LBC3L082	Uranium (87.01 mg/kg)

Station	Results Exceeding Background
LBC3L085	Chromium (39.9 mg/kg)
	Uranium (53.9 mg/kg)
	Uranium-234 (2.53 pCi/g)
	Uranium-235 (0.375 pCi/g)
	Uranium-238 (22.6 pCi/g)

Station	Results Exceeding Background
LBC3L087	Uranium (32.86 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBC3L089	Uranium (110.45 mg/kg)
LBC3L090	Chromium (24.6 mg/kg)
	Uranium (39 mg/kg)
	Plutonium-238 (0.5082 pCi/g)
	Plutonium-239/240 (0.03622 pCi/g)
	Uranium-234 (11.49 pCi/g)
	Uranium-235 (2.554 pCi/g)
	Uranium-238 (108.5 pCi/g)
	Uranium-238 (21.5 pCi/g)
LBC3L091	Uranium (79.38 mg/kg)
LBC3L092	Uranium (317.68 mg/kg)
LBC3L093	Uranium (26.51 mg/kg)
LBC3L095	Chromium (41.7 mg/kg)
	Uranium (67.3 mg/kg)
	Uranium-234 (1.59 pCi/g)
	Uranium-235 (0.274 pCi/g)
	Uranium-238 (15.1 pCi/g)
LBC3L096	Uranium (27.98 mg/kg)
LBC3L097	Uranium (27.58 mg/kg)
LBC3L100	Cadmium (0.32 mg/kg)
	Chromium (31.4 mg/kg)
	Uranium (51.7 mg/kg)
	Uranium-238 (0.582 pCi/g)
LBC4L005	Chromium (17.3 mg/kg)
	Thallium (0.28 mg/kg)
LBC4L010	Thallium (0.3 mg/kg)
LBC4L015	Thallium (0.29 mg/kg)
LBC4L020	Chromium (16.9 mg/kg)
	Thallium (0.28 mg/kg)
LBC4L025	Chromium (24 mg/kg)
	Thallium (0.26 mg/kg)
LBC4L030	Chromium (16.9 mg/kg)
	Thallium (0.24 mg/kg)
LBC4L035	Chromium (22.7 mg/kg)
	Thallium (0.23 mg/kg)
LBC4L040	Chromium (24.3 mg/kg)
	Thallium (0.23 mg/kg)
LBC4L045	Antimony (0.28 mg/kg)
	Arsenic (17.2 mg/kg)
	Thallium (0.23 mg/kg)
LBC4L050	Arsenic (12.6 mg/kg)
	Chromium (111 mg/kg)
	Thallium (0.25 mg/kg)
	Uranium (12.1 mg/kg)
	Uranium-238 (0.797 pCi/g)
LBC4L055	Antimony (0.84 mg/kg)
	Arsenic (23.3 mg/kg)
	Beryllium (1.5 mg/kg)
	Chromium (78.2 mg/kg)
	Iron (48500 mg/kg)
	Vanadium (86.9 mg/kg)
	Uranium-238 (0.969 pCi/g)
LBC4L058	Lead (51.2 mg/kg)
LBC4L060	Antimony (0.22 mg/kg)
	Chromium (69.2 mg/kg)
	Zinc (77.7 mg/kg)
	Uranium-238 (0.454 pCi/g)
LBC4L061	Lead (58.36 mg/kg)
LBC4L065	Arsenic (12.5 mg/kg)
	Chromium (28 mg/kg)
LBC4L070	Chromium (86.7 mg/kg)
	Uranium (11.2 mg/kg)
	Zinc (66.5 mg/kg)
	Uranium-238 (0.801 pCi/g)
LBC4L075	Chromium (25.5 mg/kg)
LBC4L080	Chromium (32.2 mg/kg)
	Copper (29.1 mg/kg)
	Uranium-238 (0.582 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBC4L085	Chromium (158 mg/kg)
	Uranium-235 (0.102 pCi/g)
	Uranium-238 (7.09 pCi/g)

Station	Results Exceeding Background
LBC4L090	Chromium (31.1 mg/kg)
	Uranium (6.1 mg/kg)
	Uranium-238 (0.737 pCi/g)

Station	Results Exceeding Background
LBC4L093	Uranium (69.02 mg/kg)

Station	Results Exceeding Background
LBC4L095	Chromium (38.9 mg/kg)
	Uranium (17.1 mg/kg)
	Uranium-235 (0.0782 pCi/g)
	Uranium-238 (4.89 pCi/g)

Station	Results Exceeding Background
LBC4L096	Uranium (55.08 mg/kg)

Station	Results Exceeding Background
LBC4L097	Uranium (321.36 mg/kg)

Station	Results Exceeding Background
LBC4L098	Uranium (95.16 mg/kg)

Station	Results Exceeding Background
LBC4L099	Uranium (35.13 mg/kg)

Station	Results Exceeding Background
LBC4L100	Chromium (67.3 mg/kg)
	Uranium (411.38 mg/kg)
	Uranium-235 (0.132 pCi/g)
	Uranium-238 (9.67 pCi/g)

Station	Results Exceeding Background
LBC5F15	Lead (83.75 mg/kg)

Station	Results Exceeding Background
LBC5F16	Lead (52 mg/kg)

NOTE: maximum detections only shown for location.

Station	Results Exceeding Background
LBC5F20	Lead (37.49 mg/kg)

Station	Results Exceeding Background
LBCSO1	Antimony (3.5 mg/kg)
	Cadmium (0.35 mg/kg)
	Chromium (432 mg/kg)
	Copper (30.2 mg/kg)
	Uranium (1370 mg/kg)
	Vanadium (56.4 mg/kg)
	Zinc (354 mg/kg)
	Neptunium-237 (0.139 pCi/g)
	Plutonium-238 (0.6296 pCi/g)
	Plutonium-239/240 (0.0604 pCi/g)
	Uranium-234 (37.78 pCi/g)
	Uranium-235 (6.788 pCi/g)
	Uranium-238 (412.7 pCi/g)
	Uranium-238 (303 pCi/g)

Station	Results Exceeding Background
LBCSO2	Antimony (3.1 mg/kg)
	Chromium (176 mg/kg)
	Copper (22.3 mg/kg)
	Thallium (0.65 mg/kg)
	Uranium (2090 mg/kg)
	Vanadium (50.2 mg/kg)
	Zinc (326 mg/kg)
	Plutonium-238 (0.5558 pCi/g)
	Plutonium-239/240 (0.139 pCi/g)
	Uranium-234 (72 pCi/g)
	Uranium-235 (16.7 pCi/g)
	Uranium-238 (730 pCi/g)
	Uranium-238 (511 pCi/g)

Station	Results Exceeding Background
LBCSO3	Antimony (4.4 mg/kg)
	Chromium (235 mg/kg)
	Copper (19.2 mg/kg)
	Thallium (0.24 mg/kg)
	Uranium (1260 mg/kg)
	Vanadium (71.6 mg/kg)
	Zinc (183 mg/kg)
	Plutonium-238 (0.4589 pCi/g)
	Plutonium-239/240 (0.04163 pCi/g)
	Uranium-234 (48.2 pCi/g)
	Uranium-235 (9.02 pCi/g)
	Uranium-238 (451 pCi/g)
	Uranium-238 (458 pCi/g)

Station	Results Exceeding Background
LBCSO4	Antimony (22 mg/kg)
	Arsenic (39.6 mg/kg)
	Beryllium (1 mg/kg)
	Cadmium (0.62 mg/kg)
	Chromium (1370 mg/kg)
	Cobalt (18.6 mg/kg)
	Copper (62.5 mg/kg)
	Lead (53.5 mg/kg)
	Selenium (1.1 mg/kg)
	Thallium (1.2 mg/kg)
	Uranium (1030 mg/kg)
	Vanadium (66.8 mg/kg)
	Zinc (1130 mg/kg)
	Cesium-137 (1.01 pCi/g)
	Neptunium-237 (0.19 pCi/g)
	Plutonium-238 (0.0808 pCi/g)
	Plutonium-239/240 (0.158 pCi/g)
	Thorium-230 (2.23 pCi/g)
	Uranium-234 (24.8 pCi/g)
	Uranium-235 (4.1 pCi/g)
	Uranium-238 (187 pCi/g)
	Uranium-238 (176 pCi/g)

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
LBCSO5	Antimony (4.2 mg/kg)
	Chromium (205 mg/kg)
	Copper (24.9 mg/kg)
	Thallium (0.73 mg/kg)
	Uranium (6410 mg/kg)
	Zinc (240 mg/kg)
	Plutonium-239/240 (0.0835 pCi/g)
	Uranium-234 (136 pCi/g)
	Uranium-235 (19.6 pCi/g)
	Uranium-238 (1120 pCi/g)
	Uranium-238 (1340 pCi/g)

Station	Results Exceeding Background
SOU561-RAD	Uranium (10.2 mg/kg)
	Uranium-238 (3.42 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.12.3. SWMU 561 Background Exceedances – Surface (Continued)

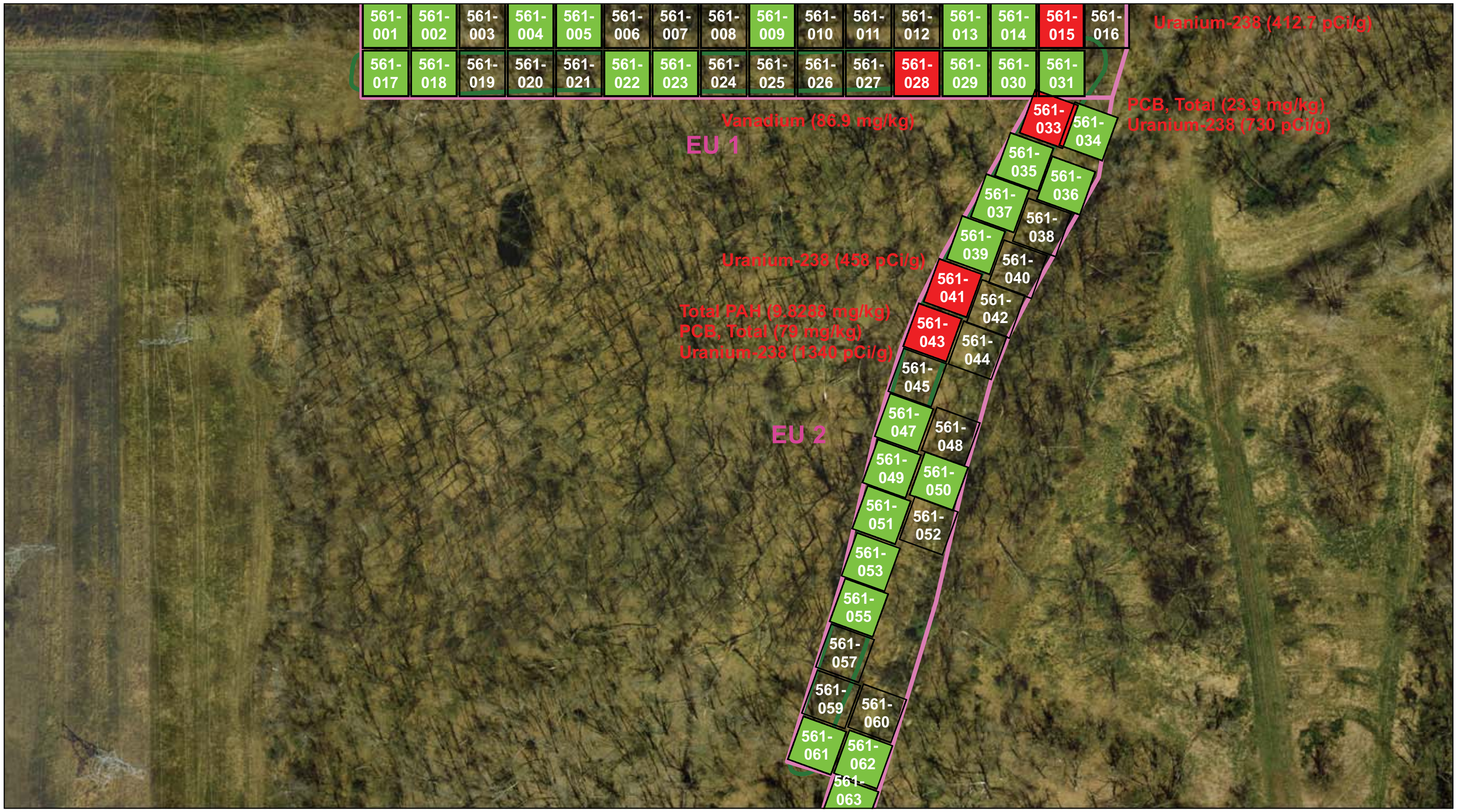
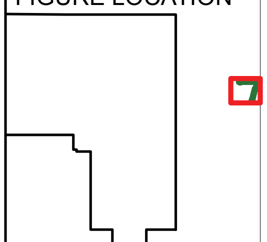


FIGURE LOCATION



SWMU 561 (Soil Pile I)

SOILS OU SWMU

EXPOSURE UNIT BOUNDARY

SWOU ONSITE SI BOUNDARY

SURFACE WATER

SAMPLE LOCATIONS

<= TEEN RECREATIONAL USER NAL

> TEEN RECREATIONAL USER NAL

> TEEN RECREATIONAL USER AL

0 50 100 200 Feet

TRUE NORTH 20 PLANT NORTH

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

COORDINATE SYSTEM:	PGDP
PROJECTION:	n/a
DATE:	5/23/2012
FILE NAME:	SoilsOU\RI Report\RI D2
LATA KENTUCKY	09-14-04_SWMU561 SurfNAL.mxd
REFERENCES:	Basemap 2009

Figure 9.12.4. SWMU 561 NAL Exceedances - Surface Soil

Location	NAL Exceedances
SOU561-001	Arsenic (19 mg/kg) Barium (438 mg/kg) Beryllium (0.83 mg/kg) Cobalt (16.4 mg/kg) Iron (26500 mg/kg) Manganese (5230 mg/kg) Vanadium (50 mg/kg) Cesium-137 (0.38 pCi/g) Uranium-238 (4.7 pCi/g)
SOU561-002	Arsenic (8.8 mg/kg) Beryllium (0.42 mg/kg) Vanadium (23.2 mg/kg) Cesium-137 (0.243 pCi/g)
SOU561-004	Arsenic (17.2 mg/kg) Beryllium (0.57 mg/kg) Vanadium (23.8 mg/kg)
SOU561-005	Arsenic (20.7 mg/kg) Beryllium (0.55 mg/kg) Vanadium (31.6 mg/kg)
SOU561-009	Arsenic (33.1 mg/kg) Beryllium (0.64 mg/kg) Iron (20000 mg/kg) Vanadium (35.9 mg/kg)
SOU561-013	Arsenic (16.6 mg/kg) Beryllium (0.67 mg/kg) Cobalt (30.9 mg/kg) Vanadium (30.9 mg/kg)
SOU561-014	Arsenic (22.2 mg/kg) Beryllium (0.65 mg/kg) Iron (23400 mg/kg) Vanadium (34.9 mg/kg)
SOU561-015	Antimony (3.5 mg/kg) Arsenic (9.2 mg/kg) Beryllium (0.43 mg/kg) Chromium (432 mg/kg) Uranium (1370 mg/kg) Vanadium (56.4 mg/kg) PCB, Total (2.2 mg/kg) Cesium-137 (0.357 pCi/g) Cobalt-60 (0.297 pCi/g) Uranium-235 (6.788 pCi/g) Uranium-238 (412.7 pCi/g) Total PAH (0.16506 mg/kg)
SOU561-017	Arsenic (6.6 mg/kg) Beryllium (0.44 mg/kg) Vanadium (22.9 mg/kg) Cesium-137 (0.371 pCi/g)
SOU561-018	Arsenic (7.6 mg/kg) Beryllium (0.51 mg/kg) Vanadium (26.9 mg/kg) PCB, Total (0.27 mg/kg) Cesium-137 (0.227 pCi/g) Cobalt-60 (0.0419 pCi/g) Total PAH (0.066324 mg/kg)
SOU561-022	Arsenic (17.2 mg/kg) Beryllium (0.65 mg/kg) Vanadium (30.3 mg/kg) Cesium-137 (0.216 pCi/g)
SOU561-023	Arsenic (12.6 mg/kg) Beryllium (0.66 mg/kg) Chromium (111 mg/kg) Vanadium (27.3 mg/kg)
SOU561-028	Arsenic (23.3 mg/kg) Beryllium (1.5 mg/kg) Chromium (78.2 mg/kg) Cobalt (11.3 mg/kg) Iron (48500 mg/kg) Vanadium (86.9 mg/kg) Cesium-137 (0.24 pCi/g)
SOU561-029	Arsenic (12.5 mg/kg) Beryllium (0.55 mg/kg) Chromium (86.7 mg/kg) Vanadium (22.6 mg/kg) Cesium-137 (0.207 pCi/g)
SOU561-030	Arsenic (6.9 mg/kg) Beryllium (0.48 mg/kg) Uranium (411.38 mg/kg) Vanadium (22 mg/kg) PCB, Total (0.49 mg/kg) Uranium-238 (9.67 pCi/g)
SOU561-031	Arsenic (5.9 mg/kg) Beryllium (0.56 mg/kg) Chromium (158 mg/kg) Uranium (321.36 mg/kg) Vanadium (18.6 mg/kg) Uranium-238 (7.09 pCi/g)
SOU561-033	Antimony (3.1 mg/kg) Arsenic (6.4 mg/kg) Beryllium (0.45 mg/kg) Chromium (176 mg/kg) Uranium (2090 mg/kg) Vanadium (50.2 mg/kg) PCB, Total (23.9 mg/kg) Cesium-137 (0.403 pCi/g) Uranium-234 (72 pCi/g) Uranium-235 (16.7 pCi/g) Uranium-238 (730 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.12.4. SWMU 561 NAL Exceedances – Surface (Continued)

SOU561-034	Arsenic (6.3 mg/kg) Beryllium (0.47 mg/kg) Vanadium (18.8 mg/kg) Uranium-238 (5.85 pCi/g)
SOU561-035	Arsenic (12 mg/kg) Beryllium (0.7 mg/kg) Chromium (199.27 mg/kg) Iron (20000 mg/kg) Uranium (266 mg/kg) Vanadium (23.3 mg/kg) Uranium-238 (17.9 pCi/g) Total PAH (0.67184 mg/kg)
SOU561-036	Arsenic (7.3 mg/kg) Beryllium (0.58 mg/kg) Vanadium (20.9 mg/kg) PCB, Total (0.29 mg/kg) Uranium-238 (13.7 pCi/g)
SOU561-037	Arsenic (15 mg/kg) Beryllium (0.79 mg/kg) Cobalt (31 mg/kg) Iron (22000 mg/kg) Uranium (373.72 mg/kg) Vanadium (31 mg/kg) Cesium-137 (0.207 pCi/g) Uranium-238 (48.2 pCi/g)
SOU561-039	Arsenic (10.8 mg/kg) Beryllium (0.6 mg/kg) Uranium (285.24 mg/kg) Vanadium (24.1 mg/kg) Cesium-137 (0.323 pCi/g) Uranium-238 (7.06 pCi/g)
SOU561-041	Antimony (22 mg/kg) Arsenic (39.6 mg/kg) Beryllium (1 mg/kg) Chromium (1370 mg/kg) Cobalt (19.8 mg/kg) Iron (23800 mg/kg) Uranium (1260 mg/kg) Vanadium (71.6 mg/kg) PCB, Total (14 mg/kg) Cesium-137 (1.01 pCi/g) Uranium-235 (9.02 pCi/g) Uranium-238 (458 pCi/g) Total PAH (1.1971 mg/kg)
SOU561-043	Antimony (4.2 mg/kg) Arsenic (5.8 mg/kg) Beryllium (0.56 mg/kg) Chromium (205 mg/kg) Uranium (6410 mg/kg) Vanadium (36.3 mg/kg) PCB, Total (79 mg/kg) Cesium-137 (0.279 pCi/g) Uranium-234 (136 pCi/g) Uranium-235 (19.6 pCi/g) Uranium-238 (1340 pCi/g) Total PAH (9.8288 mg/kg)
SOU561-047	Uranium (263.45 mg/kg)
SOU561-049	Arsenic (4.8 mg/kg) Beryllium (0.32 mg/kg) Vanadium (15.3 mg/kg)
SOU561-050	Arsenic (4.6 mg/kg) Beryllium (0.38 mg/kg) Vanadium (15.9 mg/kg)
SOU561-051	Arsenic (9.4 mg/kg) Beryllium (0.76 mg/kg) Chromium (528.44 mg/kg) Cobalt (9.1 mg/kg) Uranium (360 mg/kg) Vanadium (49.1 mg/kg) PCB, Total (4.22 mg/kg) Uranium-235 (1.93 pCi/g) Uranium-238 (23.8 pCi/g)
SOU561-053	Uranium (98.63 mg/kg)
SOU561-055	Arsenic (5.9 mg/kg) Beryllium (0.45 mg/kg) Uranium (317.68 mg/kg) Vanadium (24.4 mg/kg) Cobalt-60 (0.0438 pCi/g) Uranium-235 (2.554 pCi/g) Uranium-238 (108.5 pCi/g)
SOU561-061	Arsenic (22.2 mg/kg) Beryllium (0.87 mg/kg) Chromium (180 mg/kg) Cobalt (11.7 mg/kg) Iron (26000 mg/kg) Vanadium (40.5 mg/kg) PCB, Total (0.36 mg/kg) Cesium-137 (0.313 pCi/g) Uranium-238 (6.08 pCi/g) Total PAH (0.09889 mg/kg)
SOU561-062	Uranium (95.89 mg/kg)
SOU561-063	Arsenic (5.2 mg/kg) Beryllium (0.37 mg/kg) Vanadium (15.7 mg/kg) Cesium-137 (0.56 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.12.4. SWMU 561 NAL Exceedances – Surface (Continued)

horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits. The horizontal extent of SWMU 561 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 561 consists of two EUs.

Metals

Metals were detected above the teen recreator NALs in the SWMU 561 surface soil. The following are the metals detected at or above both the background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Antimony	15, 33, 41, 43	1, 2
Arsenic	4, 5, 9, 13, 14, 22, 23, 28, 29, 35, 37, 41, 61	1, 2
Barium	1	1
Beryllium	1, 13, 28, 35, 37, 41, 51, 61	1, 2
Chromium	15, 23, 28, 29, 31, 35, 41, 43, 51, 61	1, 2
Cobalt	1, 13, 37, 41	1, 2
Iron	28	1
Manganese	1	1
Uranium	15, 30, 31, 35, 37, 39, 41, 43, 47, 51, 53, 55, 62	1, 2
Vanadium	1, 15, 28, 33, 41, 51, 61	1, 2

Grids 22, 23, 28, 29, 30, 31 (EU 1) and 33, 35, 37, 39, 41, 43, 47, 51, 53, 55, and 61 (EU 2) are located within the administrative boundary of SWMU 561. Grids 1, 4, 5, 9, 13, 14, 15 (EU 1), and 62 (EU 2) are grids, which are outside the administrative boundary of SWMU 561.

Vanadium was detected above both the background screening level and the teen recreator AL in the SWMU 561 surface soil.

The following are the metals detected in the SWMU 561 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Antimony	1, 5, 9, 14, 15, 22, 28, 33, 37, 41, 43, 51, 61	1, 2
Arsenic	1, 4, 5, 9, 13, 14, 22, 23, 29, 37, 41, 61	1, 2
Barium	1	1
Boron	15, 33, 41, 43	1, 2
Cadmium	39, 41	2
Cobalt	1, 13, 37, 41	1, 2
Copper	41	2
Iron	28	1
Lead	1, 5, 9, 11, 12, 13, 25, 28, 29, 37, 41	1, 2
Manganese	1, 13, 37, 41	1, 2
Molybdenum[1]	1, 2, 4, 5, 9, 13, 14, 15, 17, 18, 22, 28, 29, 30, 31, 33, 34, 35, 36, 37, 39, 41, 43, 49, 50, 51, 55, 61, 63	1, 2
Selenium	41	2
Thallium	1, 4, 5, 9, 13, 14, 17, 18, 22, 33, 34, 37, 41, 43, 61, 63	1, 2
Uranium	15, 30, 31, 33, 34, 35, 36, 37, 39, 41, 43, 47, 48, 49, 50, 51, 53, 55, 57, 59, 60, 61, 62, 63	1, 2
Vanadium	1, 15, 28, 33, 41, 51, 61	1, 2
Zinc	15, 28, 29, 33, 35, 39, 41, 43, 51, 61	1, 2

[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Antimony	41	2
Arsenic	1, 4, 5, 9, 14, 2, 28, 41, 61	1, 2
Cobalt	1, 13, 37, 41	1, 2
Iron	28	1
Manganese	1, 13, 37, 41	1, 2
Uranium	15, 33, 41, 43	1, 2
Vanadium	1, 15, 28, 33, 41, 51, 61	1, 2

PCBs

Total PCBs were detected above the teen recreator NAL in the surface soil of grids 15, 18, and 30 in EU 1 and grids 33, 36, 41, 43, 51, and 61 in EU 2.

Total PCBs were detected above the teen recreator AL in grids 33 and 43 in EU 2.

Total PCBs in grids 15, 18, 22, 30, and 31 in EU 1, and grids 33, 35, 36, 37, 39, 41, 43, 51 and 61 in EU 2 were detected above the SSL for the protection of UCRS groundwater.

Total PCBs in grids 33, 41, and 43 in EU 2 were detected above the SSL for the protection of RGA groundwater in the SWMU 561 surface soil.

SVOCs

Total PAHs were detected above the teen recreator NAL in the surface soil of grids 15 and 18 in EU 1 and grids 35, 41, 43 and 61 in EU 2.

Total PAHs were detected above the teen recreator AL in the surface soil of grid 43 in EU 2.

The following are the SVOCs detected above the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

SVOC	Grid	EU
Acenaphthene	43	2
Anthracene	43	2
Fluoranthene	41, 43	2
Fluorene	43	2
Naphthalene	41	2
Pyrene	41	2
Total PAHs	15, 18, 35, 41, 43, 61	1, 2

Naphthalene in grid 41 (EU 2) and Total PAHs in grids 35 and 41 (EU 2) were detected above the SSLs for the protection of RGA groundwater.

VOCs

No VOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of RGA groundwater in the SWMU 561 surface soil.

Methylene chloride in grid 51 (EU 2) was detected above the SSL for the protection of UCRS groundwater in the SWMU 561 surface soil.

Radionuclides

Radionuclides were detected above the teen recreator NALs in the SWMU 561 surface soil. The following are the radionuclides detected at or above both the background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Cesium-137	41, 63	2
Uranium-234	33, 43	2
Uranium-235	15, 33, 41, 43, 51, 55	1, 2
Uranium-238	1, 15, 30, 31, 33, 34, 35, 36, 37, 39, 41, 43, 51, 55, 61	1, 2

Grids 30 and 31(EU 1), 33, 35, 37, 39, 41, 43, 51, 55, 61, and 63 (EU 2) are located within the administrative boundary of SWMU 561. Grid 1 and 15 (EU 1), 34, and 36 (EU 2) are grids, which are outside the administrative boundary of SWMU 561.

Uranium-238 was detected above both the background screening level and the teen recreator AL in the SWMU 561 surface soil.

The following are the radionuclides detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Americium-241[1]	43	2
Cobalt-60[1]	15	1
Neptunium-237	15, 41	1, 2
Plutonium-238	15, 33, 41, 55	1, 2
Plutonium-239/240	33, 41, 43	2
Technetium-99	39	2
Thorium-230	41	2
Uranium-238	1, 15, 30, 31, 33, 34, 35, 36, 37, 39, 41, 43, 51, 55, 61	1, 2

[1] No background value is available.

Uranium-238 in grids 15 (EU 1), 33, 41, and 43 (EU 2) was detected above both the background screening level and the SSL for the protection of RGA groundwater. No background value is available; however, for cobalt-60 reported results for this radionuclide are less than the reported MDA.

9.12.4 Nature and Extent of Contamination—Subsurface Soils

The representative data set presented in Table 9.12.3 provides the nature of the contamination in SWMU 561 subsurface soils. Figures 9.12.5–9.12.7 illustrate the horizontal extent of subsurface soil contamination. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the Figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 561 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 561 consists of two EUs.

Table 9.12.3. Subsurface Soil Historical Data Summary: SWMU 561 Soil Pile I

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	3.50E+03	1.76E+04	9.24E+03	0/56	56/56	8/56	1.20E+04	0/56	2.77E+04	0/56	8.91E+06	0/56	56/56	5.5 - 30.8
METAL	Antimony	mg/kg	8.00E-02	2.30E-01	1.46E-01	0/56	56/56	3/56	2.10E-01	0/56	1.78E+00	0/56	1.90E+03	0/56	0/56	0.55 - 0.62
METAL	Arsenic	mg/kg	2.60E+00	1.76E+01	6.90E+00	0/56	56/56	17/56	7.90E+00	56/56	1.02E+00	0/56	1.02E+02	1/56	56/56	1.1 - 1.3
METAL	Barium	mg/kg	4.47E+01	1.41E+02	9.71E+01	0/56	56/56	0/56	1.70E+02	0/56	4.15E+02	0/56	4.58E+05	0/56	50/56	2.2 - 11.6
METAL	Beryllium	mg/kg	1.20E-01	7.20E-01	4.59E-01	0/56	56/56	1/56	6.90E-01	56/56	1.29E-02	0/56	8.65E+00	0/56	0/56	0.11 - 0.59
METAL	Cadmium	mg/kg	1.50E-02	1.20E-01	5.70E-02	0/56	56/56	0/56	2.10E-01	0/56	3.14E+00	0/56	3.14E+02	0/56	0/56	0.055 - 0.062
METAL	Calcium	mg/kg	3.28E+02	1.26E+03	7.93E+02	0/56	56/56	0/56	6.10E+03	0/56	n/a	0/56	n/a	n/a	n/a	55.3 - 62.4
METAL	Chromium	mg/kg	7.80E+00	2.50E+02	4.18E+01	0/121	56/121	13/121	4.30E+01	7/121	7.15E+01	0/121	7.15E+03	0/121	0/121	1.1 - 5.8
METAL	Cobalt	mg/kg	3.20E+00	1.84E+01	6.16E+00	0/56	56/56	1/56	1.30E+01	3/56	8.45E+00	0/56	3.29E+03	56/56	56/56	0.22 - 0.25
METAL	Copper	mg/kg	4.80E+00	1.92E+01	1.04E+01	0/56	56/56	0/56	2.50E+01	0/56	1.13E+03	0/56	4.75E+05	0/56	0/56	1.1 - 6
METAL	Iron	mg/kg	7.07E+03	1.98E+04	1.32E+04	0/56	56/56	0/56	2.80E+04	0/56	1.98E+04	0/56	8.31E+06	56/56	56/56	5.5 - 29
METAL	Lead	mg/kg	7.30E+00	4.07E+01	1.87E+01	0/121	84/121	18/121	2.30E+01	0/121	4.00E+02	0/121	4.00E+02	0/121	66/121	0.33 - 1.7
METAL	Magnesium	mg/kg	6.84E+02	2.19E+03	1.18E+03	0/56	56/56	2/56	2.10E+03	0/56	n/a	0/56	n/a	n/a	n/a	55.3 - 296
METAL	Manganese	mg/kg	3.35E+01	2.64E+03	5.05E+02	0/56	56/56	5/56	8.20E+02	0/56	3.47E+03	0/56	2.94E+05	55/56	56/56	0.22 - 1.2
METAL	Mercury	mg/kg	7.50E-03	1.39E-01	4.87E-02	0/56	55/56	1/56	1.30E-01	0/56	6.25E-01	0/56	7.88E+02	0/56	5/56	0.0333 - 0.0416
METAL	Molybdenum	mg/kg	2.40E-01	1.10E+00	5.65E-01	0/56	56/56	0/56	n/a	0/56	1.42E+02	0/56	5.94E+04	0/56	56/56	0.55 - 0.62
METAL	Nickel	mg/kg	3.00E+00	2.28E+01	1.13E+01	0/56	56/56	1/56	2.20E+01	0/56	2.98E+01	0/56	3.07E+04	0/56	56/56	0.55 - 3
METAL	Selenium	mg/kg	1.90E-01	4.50E-01	2.73E-01	0/56	29/56	0/56	7.00E-01	0/56	1.42E+02	0/56	5.93E+04	0/56	11/56	0.55 - 0.62
METAL	Silver	mg/kg	3.30E-02	1.10E-01	6.28E-02	0/56	54/56	0/56	2.70E+00	0/56	7.45E+00	0/56	8.07E+03	0/56	53/56	0.22 - 1.2
METAL	Sodium	mg/kg	2.21E+01	2.42E+02	8.85E+01	0/56	50/56	0/56	3.40E+02	0/56	n/a	0/56	n/a	n/a	n/a	22.1 - 118
METAL	Thallium	mg/kg	9.10E-02	3.10E-01	1.69E-01	0/56	53/56	0/56	3.40E-01	0/56	2.27E+00	0/56	9.50E+02	0/56	36/56	0.22 - 1.2
METAL	Uranium	mg/kg	5.00E-01	5.02E+02	6.62E+01	0/121	77/121	46/121	4.60E+00	19/121	8.49E+01	0/121	3.50E+04	0/121	43/121	0.11 - 0.6
METAL	Vanadium	mg/kg	8.60E+00	3.69E+01	2.43E+01	0/56	56/56	0/56	3.70E+01	56/56	1.04E-01	0/56	7.61E+01	56/56	56/56	1.1 - 5.9
METAL	Zinc	mg/kg	9.40E+00	1.23E+02	4.08E+01	0/56	56/56	10/56	6.00E+01	0/56	8.50E+03	0/56	3.56E+06	0/56	53/56	2.2 - 11.8
PPCB	PCB, Total	mg/kg	9.60E-02	5.70E+00	1.08E+00	9/121	27/121	0/121	n/a	19/121	1.83E-01	0/121	1.83E+01	2/121	27/121	0.33 - 0.37
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	0/56	0/56	0.36 - 0.41
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	0/56	0/56	0.36 - 0.41
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/54	0/54	0/54	n/a	0/54	n/a	0/54	n/a	0/54	0/54	0.36 - 0.41
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/54	0/54	0/54	n/a	0/54	n/a	0/54	n/a	n/a	n/a	0.36 - 0.41
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/54	0/54	0/54	n/a	0/54	n/a	0/54	n/a	n/a	n/a	0.36 - 0.41
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/51	0/51	0/51	n/a	0/51	n/a	0/51	n/a	n/a	n/a	1.8 - 2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/53	0/53	0/53	n/a	0/53	n/a	0/53	n/a	n/a	n/a	0.36 - 0.41
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	1.8 - 2
SVOA	2-Methylnaphthalene	mg/kg	6.20E-02	6.20E-02	6.20E-02	1/56	1/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	3.35E+00	0/56	1.00E+02	0/56	0/56	1.8 - 2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	1.8 - 2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	1.8 - 2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	1.8 - 2
SVOA	Acenaphthene	mg/kg	6.10E-01	6.10E-01	6.10E-01	0/56	1/56	0/56	n/a	0/56	5.87E+02	0/56	1.76E+04	0/56	1/56	0.36 - 0.41
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	Anthracene	mg/kg	9.10E-01	9.10E-01	9.10E-01	0/56	1/56	0/56	n/a	0/56	3.25E+03	0/56	9.74E+04	0/56	0/56	0.36 - 0.41
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.12.3. Subsurface Soil Historical Data Summary: SWMU 561 Soil Pile I (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzo(ghi)perylene	mg/kg	5.10E-02	1.20E+00	6.26E-01	1/56	2/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	Benzoic acid	mg/kg	4.70E-01	4.70E-01	4.70E-01	1/56	1/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	1.8 - 2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	7.20E-02	5.10E+00	1.03E+00	4/56	6/56	0/56	n/a	0/56	n/a	0/56	n/a	0/56	1/56	0.36 - 0.41
SVOA	Butyl benzyl phthalate	mg/kg	1.80E-01	1.80E-01	1.80E-01	1/56	1/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	Dibenzofuran	mg/kg	3.20E-01	3.20E-01	3.20E-01	1/56	1/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	Di-n-butyl phthalate	mg/kg	4.40E-02	6.80E-02	5.60E-02	2/56	2/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	Fluoranthene	mg/kg	4.30E-02	5.30E+00	6.81E-01	8/56	9/56	0/56	n/a	0/56	4.47E+02	0/56	1.34E+04	0/56	1/56	0.36 - 0.41
SVOA	Fluorene	mg/kg	5.20E-01	5.20E-01	5.20E-01	0/56	1/56	0/56	n/a	0/56	4.19E+02	0/56	1.26E+04	0/56	1/56	0.36 - 0.41
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/53	0/53	0/53	n/a	0/53	1.78E-01	0/53	1.78E+01	0/53	0/53	0.36 - 0.41
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/54	0/54	0/54	n/a	0/54	n/a	0/54	n/a	n/a	n/a	0.36 - 0.41
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	1.8 - 2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/53	0/53	0/53	n/a	0/53	n/a	0/53	n/a	n/a	n/a	0.36 - 0.41
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.73 - 0.82
SVOA	Naphthalene	mg/kg	1.00E-01	1.00E-01	1.00E-01	1/56	1/56	0/56	n/a	0/56	5.27E+00	0/56	5.27E+02	1/56	1/56	0.36 - 0.41
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/54	0/54	0/54	n/a	0/54	n/a	0/54	n/a	n/a	n/a	1.8 - 2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	6.10E-02	0/56	6.10E+00	0/56	0/56	0.36 - 0.41
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/54	0/54	0/54	n/a	0/54	n/a	0/54	n/a	0/54	0/54	1.8 - 2
SVOA	Phenanthrene	mg/kg	4.40E-02	4.90E+00	9.00E-01	5/56	6/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	0.36 - 0.41
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/56	0/56	0/56	n/a	0/56	n/a	0/56	n/a	n/a	n/a	1.8 - 2
SVOA	Pyrene	mg/kg	4.50E-02	4.70E+00	6.64E-01	7/56	8/56	0/56	n/a	0/56	3.35E+02	0/56	1.00E+04	0/56	1/56	0.36 - 0.41
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/54	0/54	0/54	n/a	0/54	n/a	0/54	n/a	n/a	n/a	0.73 - 0.82
SVOA	Total PAH	mg/kg	3.90E-05	2.63E+00	4.12E-01	0/56	7/56	0/56	n/a	4/56	5.57E-02	0/56	5.57E+00	1/56	4/56	-
VOA	1,1,1,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	0/12	0/12	0.0055 - 0.0062
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	0/12	0/12	0.0055 - 0.0062
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	9.45E-02	0/12	1.29E+01	0/12	0/12	0.0055 - 0.0062
VOA	1,2,3-Trichloropropane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	1,2-Dibromoethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	0/11	0.0055 - 0.0062
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	4.50E+02	0/12	2.11E+04	0/12	0/12	0.0055 - 0.0062
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.022 - 0.025
VOA	2-Chloroethyl vinyl ether	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	n/a	0/9	n/a	n/a	n/a	0.022 - 0.025
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.022 - 0.025

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.12.3. Subsurface Soil Historical Data Summary: SWMU 561 Soil Pile I (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.022 - 0.025
VOA	Acetone	mg/kg	7.80E-03	7.80E-03	7.80E-03	1/12	1/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.022 - 0.025
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	1.28E+00	0/12	1.91E+02	0/12	0/12	0.0055 - 0.0062
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.011 - 0.012
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	9.30E-01	0/12	1.34E+02	0/12	0/12	0.0055 - 0.0062
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	0/11	0/11	0.0055 - 0.0062
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.011 - 0.012
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	5.38E-01	0/12	5.85E+01	0/12	0/12	0.0055 - 0.0062
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.011 - 0.012
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	7.03E+00	0/12	4.84E+02	0/12	0/12	0.0055 - 0.0062
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	0/12	0/12	0.0055 - 0.0062
VOA	Dibromomethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	Dichlorodifluoromethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.011 - 0.012
VOA	Ethyl methacrylate	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	Ethylbenzene	mg/kg	5.70E-04	9.00E-04	7.35E-04	2/12	2/12	0/12	n/a	0/12	6.11E+00	0/12	8.90E+02	0/12	0/12	0.0055 - 0.0062
VOA	Iodomethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	m,p-Xylene	mg/kg	1.20E-03	1.60E-03	1.40E-03	2/12	2/12	0/12	n/a	0/12	8.66E+01	0/12	2.79E+03	0/12	0/12	0.0055 - 0.0062
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	0/12	0/12	0.0055 - 0.0062
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	0/12	0/12	0.0055 - 0.0062
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	3.26E-01	0/11	1.48E+02	0/11	0/11	0.0055 - 0.0062
VOA	Toluene	mg/kg	6.10E-04	6.60E-02	1.86E-02	3/12	6/12	0/12	n/a	0/12	n/a	0/12	n/a	0/12	0/12	0.0055 - 0.0062
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	2.39E+01	0/12	8.87E+02	0/12	0/12	0.0055 - 0.0062
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	Trans-1,4-Dichloro-2-butene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.011 - 0.012
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	9.91E-02	0/12	1.17E+01	0/12	0/12	0.0055 - 0.0062
VOA	Trichlorofluoromethane	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	n/a	0/12	n/a	n/a	n/a	0.0055 - 0.0062

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.12.3. Subsurface Soil Historical Data Summary: SWMU 561 Soil Pile I (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	2.39E-01	0/12	1.02E+02	0/12	0/12	0.0055 - 0.0062
RADS	Americium-241	pCi/g	-1.28E-02	2.85E-03	-6.24E-03	0/58	58/58	0/58	n/a	0/58	1.28E+01	0/58	1.28E+03	0/58	0/58	0.0139 - 0.016
RADS	Cesium-137	pCi/g	-2.73E-02	3.91E-01	8.11E-02	0/59	59/59	1/59	2.80E-01	4/59	1.98E-01	0/59	1.98E+01	0/59	0/59	0.0566 - 0.117
RADS	Cobalt-60	pCi/g	-3.20E-02	4.68E-02	4.04E-03	0/59	59/59	0/59	n/a	1/59	4.06E-02	0/59	4.06E+00	0/59	0/59	0.0431 - 0.095
RADS	Neptunium-237	pCi/g	-1.21E-02	1.47E-02	-6.17E-04	0/59	59/59	0/59	n/a	0/59	6.26E-01	0/59	6.26E+01	0/59	11/59	0.0141 - 0.0476
RADS	Plutonium-238	pCi/g	-4.60E-03	3.84E-03	5.24E-04	0/56	56/56	0/56	n/a	0/56	3.64E+01	0/56	3.64E+03	0/56	0/56	0.0097 - 0.0127
RADS	Plutonium-239/240	pCi/g	-3.94E-03	8.28E-03	7.07E-04	0/59	59/59	0/59	n/a	0/59	3.56E+01	0/59	3.56E+03	0/59	0/59	0.00861 - 0.0111
RADS	Technetium-99	pCi/g	-3.12E-01	1.85E+00	4.69E-01	0/59	59/59	0/59	2.80E+00	0/59	1.11E+03	0/59	1.11E+05	0/59	29/59	0.878 - 0.921
RADS	Thorium-228	pCi/g	2.78E-01	5.84E-01	4.19E-01	0/59	59/59	0/59	1.60E+00	0/59	n/a	0/59	n/a	n/a	n/a	0.0554 - 0.0642
RADS	Thorium-230	pCi/g	1.95E-01	5.70E-01	3.57E-01	0/59	59/59	0/59	1.40E+00	0/59	4.49E+01	0/59	4.49E+03	0/59	40/59	0.0617 - 0.076
RADS	Thorium-232	pCi/g	2.99E-01	6.29E-01	4.41E-01	0/59	59/59	0/59	1.50E+00	0/59	n/a	0/59	n/a	n/a	n/a	0.0304 - 0.0508
RADS	Uranium-234	pCi/g	1.06E-01	1.48E+01	1.78E+00	0/59	59/59	20/59	1.20E+00	0/59	6.25E+01	0/59	6.25E+03	0/59	0/59	0.0626 - 0.204
RADS	Uranium-235	pCi/g	4.35E-03	2.03E+00	2.58E-01	0/59	59/59	24/59	6.00E-02	6/59	9.12E-01	0/59	9.12E+01	0/59	0/59	0.0111 - 0.168
RADS	Uranium-238	pCi/g	1.10E-01	1.32E+02	1.48E+01	0/59	59/59	27/59	1.20E+00	23/59	4.02E+00	0/59	4.02E+02	0/59	23/59	0.0509 - 0.203

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

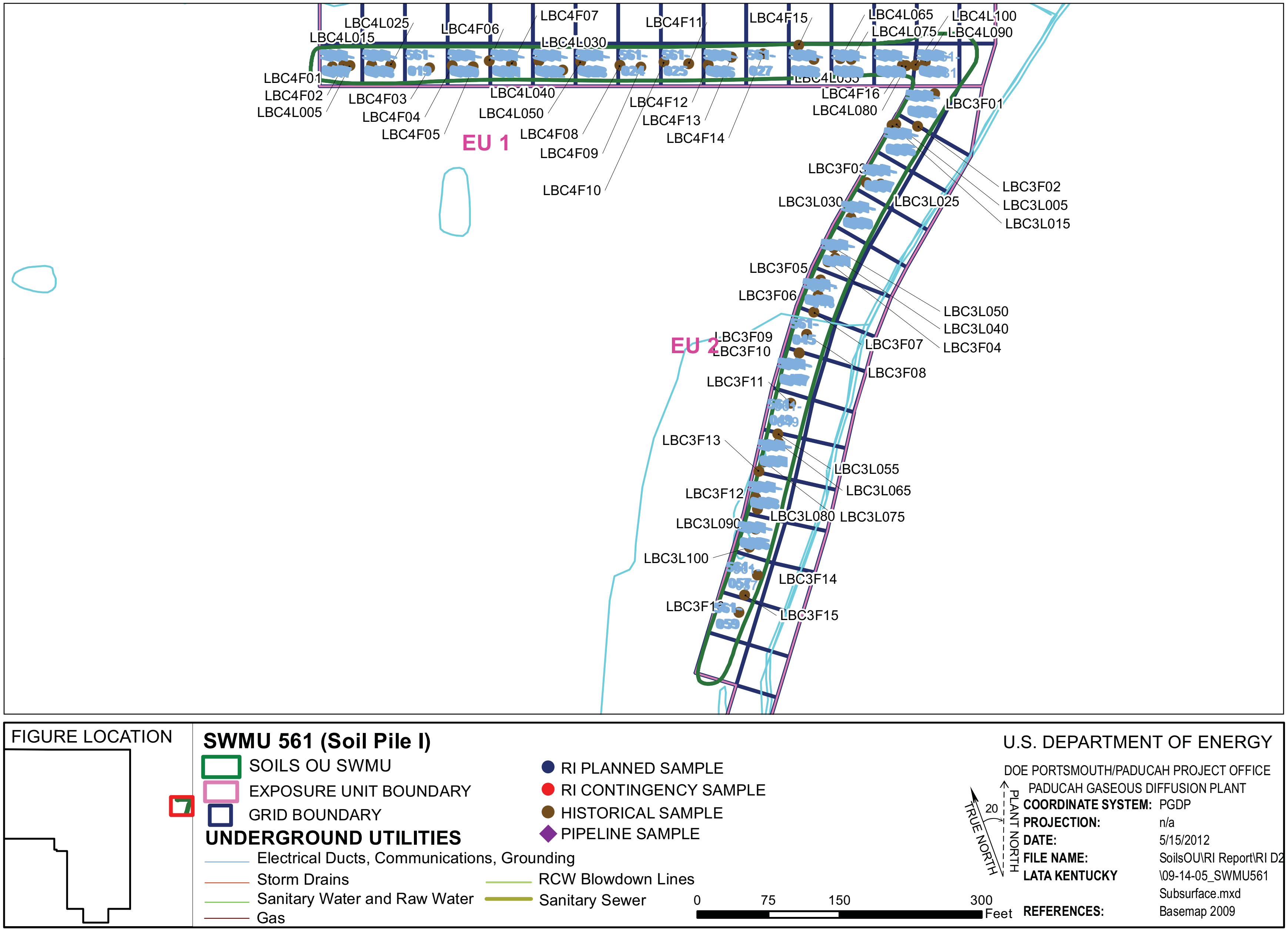


Figure 9.12.5. SWMU 561 Sample Locations - Subsurface Soil

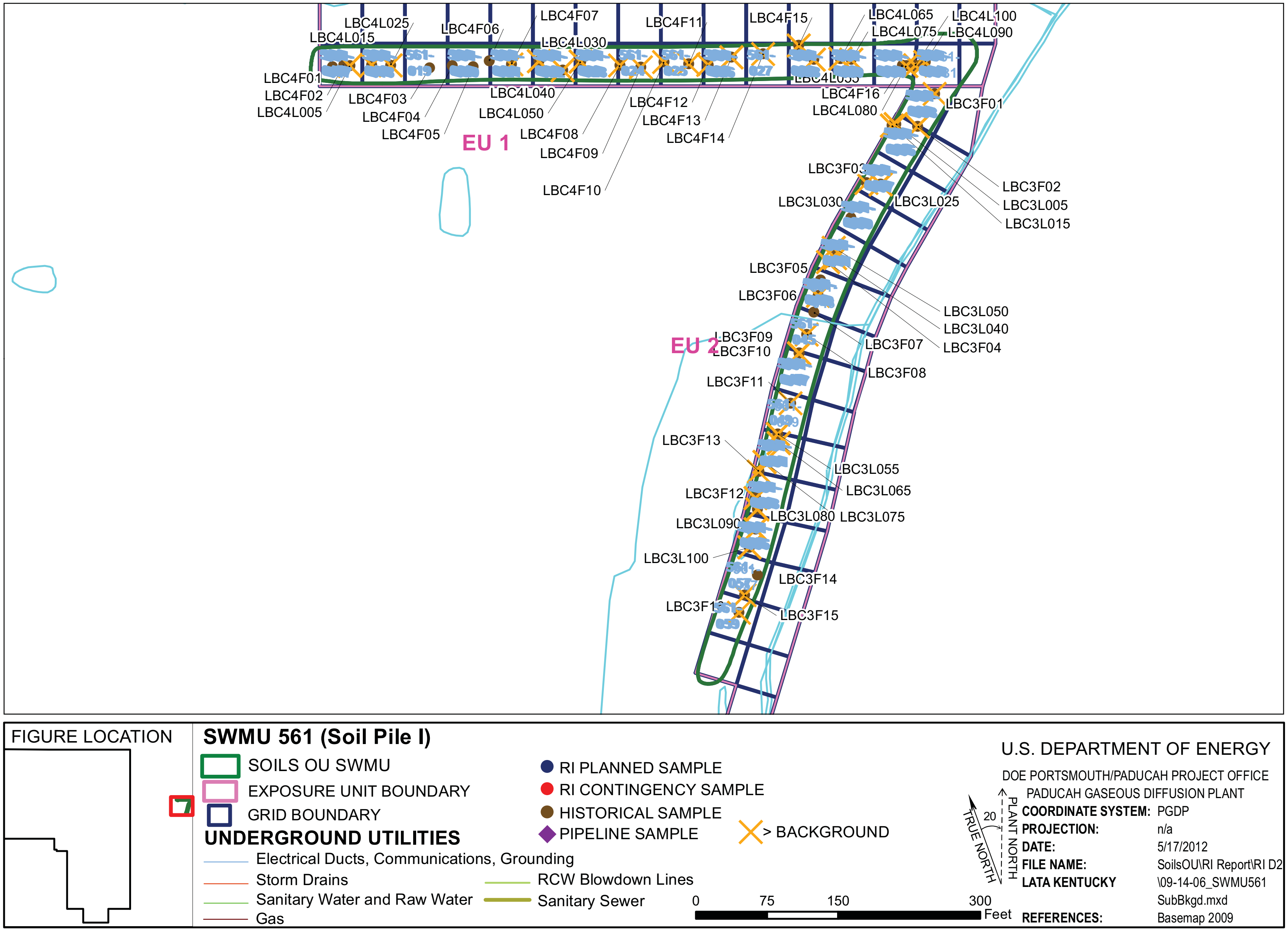


Figure 9.12.6. SWMU 561 Background Exceedances - Subsurface Soil

Station	Results Exceeding Background
LBC3F01	Uranium (59.87 mg/kg)

Station	Results Exceeding Background
LBC3F02	Chromium (104 mg/kg)
	Uranium (283 mg/kg)
	Zinc (65.1 mg/kg)
	Uranium-234 (7.58 pCi/g)
	Uranium-235 (1.01 pCi/g)
	Uranium-238 (63.5 pCi/g)

Station	Results Exceeding Background
LBC3F03	Uranium (35.57 mg/kg)

Station	Results Exceeding Background
LBC3F04	Lead (29.65 mg/kg)
	Uranium (49.01 mg/kg)

Station	Results Exceeding Background
LBC3F06	Arsenic (9.2 mg/kg)
	Chromium (192 mg/kg)
	Uranium (502 mg/kg)
	Zinc (91.7 mg/kg)
	Uranium-234 (10.1 pCi/g)
	Uranium-235 (1.45 pCi/g)
	Uranium-238 (99 pCi/g)

Station	Results Exceeding Background
LBC3F08	Uranium (52.13 mg/kg)

Station	Results Exceeding Background
LBC3F09	Uranium (97.72 mg/kg)

Station	Results Exceeding Background
LBC3F10	Chromium (250 mg/kg)
	Uranium (300 mg/kg)
	Zinc (81.1 mg/kg)
	Uranium-234 (6.62 pCi/g)
	Uranium-235 (1.34 pCi/g)
	Uranium-238 (57.8 pCi/g)

Station	Results Exceeding Background
LBC3F11	Uranium (131.72 mg/kg)

Station	Results Exceeding Background
LBC3F12	Lead (23.24 mg/kg)
	Uranium (37.82 mg/kg)
	Uranium-238 (1.1 pCi/g)

Station	Results Exceeding Background
LBC3F13	Uranium (103.77 mg/kg)

Station	Results Exceeding Background
LBC3F15	Uranium (66.62 mg/kg)

Station	Results Exceeding Background
LBC3F16	Uranium (349.21 mg/kg)

Station	Results Exceeding Background
LBC3L005	Chromium (101 mg/kg)
	Uranium (307 mg/kg)
	Zinc (66.4 mg/kg)
	Uranium-234 (7.61 pCi/g)
	Uranium-235 (0.91 pCi/g)
	Uranium-238 (74.1 pCi/g)

Station	Results Exceeding Background
LBC3L015	Arsenic (8.6 mg/kg)
	Chromium (241 mg/kg)
	Uranium (109 mg/kg)
	Zinc (123 mg/kg)
	Uranium-234 (3.65 pCi/g)
	Uranium-235 (0.429 pCi/g)
	Uranium-238 (27.1 pCi/g)

Station	Results Exceeding Background
LBC3L025	Aluminum (12400 mg/kg)
	Chromium (61.4 mg/kg)
	Uranium (136 mg/kg)
	Zinc (70.8 mg/kg)
	Uranium-234 (3.02 pCi/g)
	Uranium-235 (0.381 pCi/g)
	Uranium-238 (26.6 pCi/g)

Station	Results Exceeding Background
LBC3L040	Aluminum (12500 mg/kg)

Station	Results Exceeding Background
LBC3L050	Uranium (32.8 mg/kg)
	Uranium-235 (0.193 pCi/g)
	Uranium-238 (9.36 pCi/g)

Station	Results Exceeding Background
LBC3L055	Uranium (102.91 mg/kg)
	Uranium-234 (5.8 pCi/g)
	Uranium-235 (0.839 pCi/g)
	Uranium-238 (53.6 pCi/g)

Station	Results Exceeding Background
LBC3L065	Manganese (911 mg/kg)
	Uranium (43.9 mg/kg)
	Uranium-234 (2.07 pCi/g)
	Uranium-235 (0.277 pCi/g)
	Uranium-238 (17.8 pCi/g)

Station	Results Exceeding Background
LBC3L075	Chromium (69.9 mg/kg)
	Uranium (64.3 mg/kg)
	Zinc (60.1 mg/kg)
	Uranium-234 (1.9 pCi/g)
	Uranium-235 (0.24 pCi/g)
	Uranium-238 (14.6 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.12.6. SWMU 561 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
LBC3L080	Chromium (114 mg/kg) Uranium (136 mg/kg) Zinc (73.1 mg/kg) Uranium-234 (1.81 pCi/g) Uranium-235 (0.256 pCi/g) Uranium-238 (16.4 pCi/g)
LBC3L090	Chromium (133 mg/kg) Uranium (469 mg/kg) Zinc (77.7 mg/kg) Uranium-234 (11.1 pCi/g) Uranium-235 (1.7 pCi/g) Uranium-238 (105 pCi/g)
LBC3L100	Uranium (55 mg/kg) Uranium-234 (1.97 pCi/g) Uranium-235 (0.235 pCi/g) Uranium-238 (15 pCi/g)
LBC4F07	Arsenic (10.5 mg/kg)
LBC4F08	Lead (40.65 mg/kg)
LBC4F09	Lead (29 mg/kg)
LBC4F10	Lead (27.24 mg/kg)
LBC4F11	Lead (26.03 mg/kg)
LBC4F12	Lead (28.82 mg/kg)

Station	Results Exceeding Background
LBC4F13	Aluminum (12900 mg/kg) Arsenic (8.3 mg/kg) Lead (29.42 mg/kg) Uranium-238 (0.474 pCi/g)
LBC4F14	Lead (29.83 mg/kg)
LBC4F15	Lead (32.13 mg/kg) Uranium (5.7 mg/kg) Uranium-238 (1.28 pCi/g)
LBC4L005	Antimony (0.23 mg/kg) Arsenic (9.6 mg/kg) Manganese (1300 mg/kg)
LBC4L015	Arsenic (8.6 mg/kg)
LBC4L025	Arsenic (8 mg/kg) Lead (23.31 mg/kg)
LBC4L030	Arsenic (12.5 mg/kg) Lead (33.6 mg/kg) Manganese (1630 mg/kg) Mercury (0.139 mg/kg)
LBC4L040	Arsenic (10.3 mg/kg) Chromium (55.4 mg/kg) Lead (26.17 mg/kg) Uranium-238 (0.423 pCi/g)

Station	Results Exceeding Background
LBC4L050	Antimony (0.23 mg/kg) Arsenic (17.6 mg/kg) Lead (34.3 mg/kg) Nickel (22.8 mg/kg) Uranium-238 (0.445 pCi/g)
LBC4L055	Aluminum (17600 mg/kg) Arsenic (10.1 mg/kg) Lead (33.37 mg/kg) Magnesium (2190 mg/kg)
LBC4L065	Aluminum (16700 mg/kg) Antimony (0.22 mg/kg) Arsenic (15 mg/kg) Beryllium (0.72 mg/kg) Lead (26.85 mg/kg) Cesium-137 (0.391 pCi/g)
LBC4L075	Aluminum (14700 mg/kg) Arsenic (9 mg/kg)
LBC4L080	Cobalt (18.4 mg/kg) Manganese (2640 mg/kg) Uranium (5.3 mg/kg) Uranium-238 (0.451 pCi/g)
LBC4L090	Aluminum (15100 mg/kg) Arsenic (8 mg/kg) Uranium-238 (0.572 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.12.6. SWMU 561 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
LBC4L100	Chromium (65.6 mg/kg)
	Uranium (344 mg/kg)
	Zinc (63.2 mg/kg)
	Uranium-234 (14.8 pCi/g)
	Uranium-235 (2.03 pCi/g)
	Uranium-238 (132 pCi/g)

NOTE: maximum detections only shown for location.

Figure 9.12.6. SWMU 561 Background Exceedances – Subsurface (Continued)

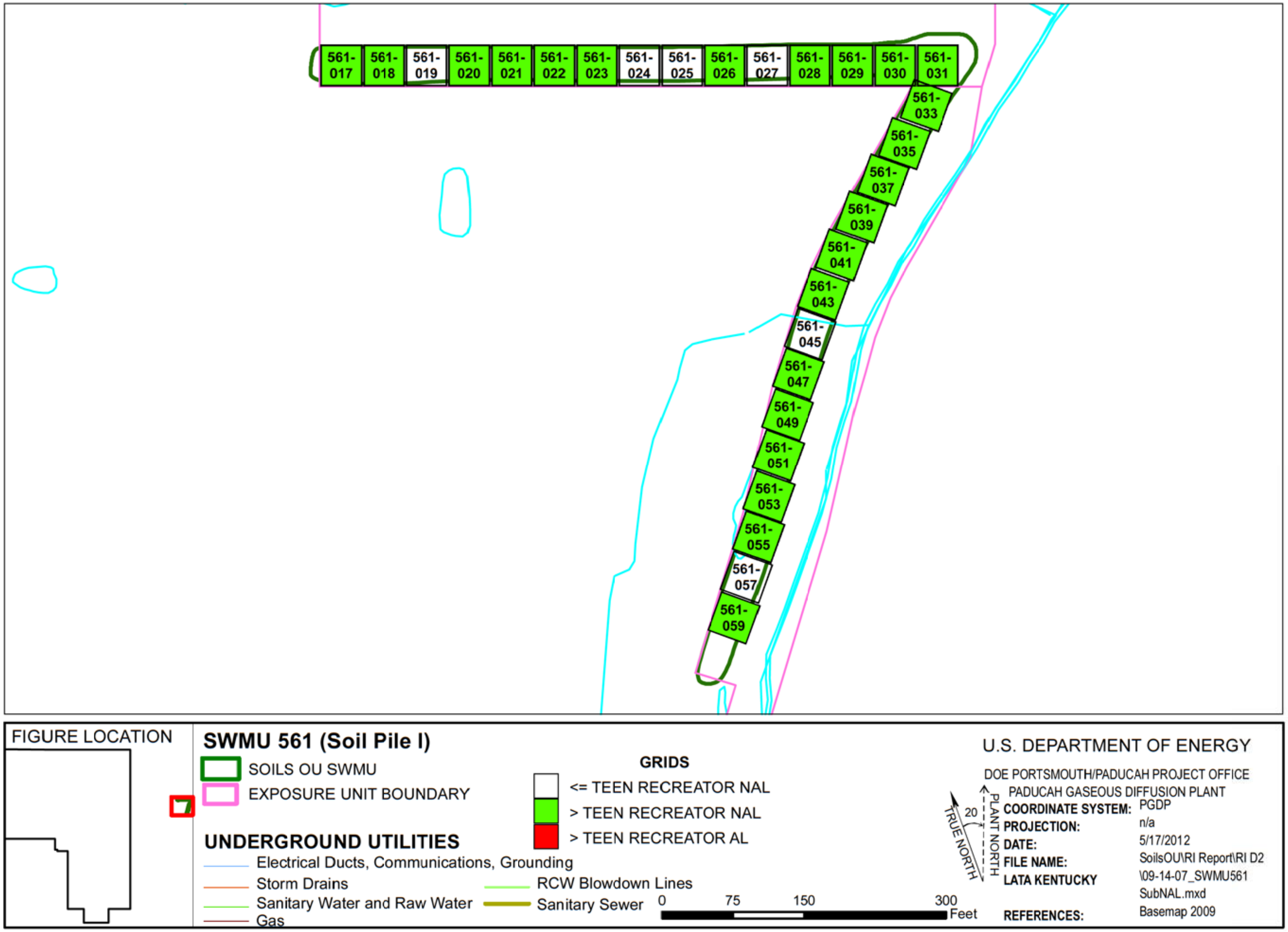


Figure 9.12.7. SWMU 561 NAL Exceedances - Subsurface Soil

Location	NAL Exceedances
SOU561-017	Arsenic (9.6 mg/kg) Beryllium (0.54 mg/kg) Vanadium (29.6 mg/kg)
SOU561-018	Arsenic (8.6 mg/kg) Beryllium (0.48 mg/kg) Vanadium (28.3 mg/kg) PCB, Total (0.47 mg/kg)
SOU561-020	Arsenic (7.5 mg/kg) Beryllium (0.42 mg/kg) Vanadium (25.2 mg/kg)
SOU561-021	Arsenic (10.5 mg/kg) Beryllium (0.45 mg/kg) Vanadium (26.3 mg/kg)
SOU561-022	Arsenic (12.5 mg/kg) Beryllium (0.6 mg/kg) Cobalt (9.4 mg/kg) Vanadium (33.6 mg/kg)
SOU561-023	Arsenic (17.6 mg/kg) Beryllium (0.52 mg/kg) Vanadium (33.5 mg/kg) Total PAH (2.6261 mg/kg)
SOU561-026	Arsenic (8.3 mg/kg) Beryllium (0.48 mg/kg) Vanadium (35.5 mg/kg)
SOU561-028	Arsenic (10.1 mg/kg) Beryllium (0.46 mg/kg) Vanadium (28.6 mg/kg)
SOU561-029	Arsenic (15 mg/kg) Beryllium (0.72 mg/kg) Vanadium (36.9 mg/kg) Cesium-137 (0.391 pCi/g)
SOU561-030	Arsenic (7.7 mg/kg) Beryllium (0.52 mg/kg) Cobalt (18.4 mg/kg) Uranium (344 mg/kg) Vanadium (27.4 mg/kg) PCB, Total (1.2 mg/kg) Cesium-137 (0.204 pCi/g) Uranium-235 (2.03 pCi/g) Uranium-238 (132 pCi/g)
SOU561-031	Arsenic (8 mg/kg) Beryllium (0.55 mg/kg) Vanadium (34.2 mg/kg) PCB, Total (0.37 mg/kg)
SOU561-033	Arsenic (6 mg/kg) Beryllium (0.39 mg/kg) Chromium (104 mg/kg) Uranium (283 mg/kg) Vanadium (17.5 mg/kg) PCB, Total (2.6 mg/kg) Uranium-235 (1.01 pCi/g) Uranium-238 (63.5 pCi/g)
SOU561-035	Arsenic (8.6 mg/kg) Beryllium (0.51 mg/kg) Chromium (241 mg/kg) Uranium (307 mg/kg) Vanadium (22.2 mg/kg) PCB, Total (4.7 mg/kg) Uranium-238 (74.1 pCi/g)
SOU561-037	Arsenic (6.8 mg/kg) Beryllium (0.56 mg/kg) Uranium (136 mg/kg) Vanadium (34 mg/kg) PCB, Total (1.5 mg/kg) Uranium-238 (26.6 pCi/g)
SOU561-039	Arsenic (5.3 mg/kg) Beryllium (0.59 mg/kg) Vanadium (24.1 mg/kg)
SOU561-041	Arsenic (5.1 mg/kg) Beryllium (0.58 mg/kg) Vanadium (35.4 mg/kg) PCB, Total (0.28 mg/kg) Cobalt-60 (0.0468 pCi/g) Uranium-238 (9.36 pCi/g)
SOU561-043	Arsenic (9.2 mg/kg) Beryllium (0.67 mg/kg) Chromium (192 mg/kg) Uranium (502 mg/kg) Vanadium (23.7 mg/kg) PCB, Total (5.7 mg/kg) Uranium-235 (1.45 pCi/g) Uranium-238 (99 pCi/g)
SOU561-047	Arsenic (6.7 mg/kg) Beryllium (0.42 mg/kg) Chromium (250 mg/kg) Uranium (300 mg/kg) Vanadium (14 mg/kg) PCB, Total (2.5 mg/kg) Cesium-137 (0.279 pCi/g) Uranium-235 (1.34 pCi/g) Uranium-238 (57.8 pCi/g) Total PAH (0.074719 mg/kg
SOU561-049	Uranium (131.72 mg/kg)
SOU561-051	Arsenic (5.5 mg/kg) Beryllium (0.55 mg/kg) Uranium (103.77 mg/kg) Vanadium (24.5 mg/kg) PCB, Total (0.86 mg/kg) Uranium-238 (53.6 pCi/g) Total PAH (0.11056 mg/kg)
SOU561-053	Arsenic (6.4 mg/kg) Beryllium (0.4 mg/kg) Vanadium (21.3 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.12.7. SWMU 561 NAL Exceedances – Subsurface (Continued)

SOU561-055	Arsenic (6.1 mg/kg) Beryllium (0.41 mg/kg) Chromium (133 mg/kg) Uranium (469 mg/kg) Vanadium (19.1 mg/kg) PCB, Total (1.9 mg/kg) Uranium-235 (1.7 pCi/g) Uranium-238 (105 pCi/g) Total PAH (0.065588 mg/kg)
SOU561-059	Uranium (349.21 mg/kg)

NOTE: maximum detections only shown for location.

Figure 9.12.7. SWMU 561 NAL Exceedances – Subsurface (Continued)

Metals

Metals were detected above the teen recreator NALs in the SWMU 561 subsurface soil. The following are the metals detected at or above both the background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	17, 18, 21, 22, 23, 26, 28, 29, 31, 35, 43	1, 2
Beryllium	29	1
Chromium	33, 35, 43, 47, 55	2
Cobalt	30	1
Uranium	30, 33, 35, 37, 41, 43, 47, 51, 55	1, 2

Grids 17, 18, 21, 22, 23, 26, 28, 29, 30, 31 (EU 1) and 33, 35, 37, 41, 43, 47, 51, and 55 (EU 2) are located within the administrative boundary of SWMU 561.

The maximum depth at which metals were detected (in samples associated with this RI Report) at or above both the background screening levels and the teen recreator NALs was 10 ft bgs. The end depths of the boreholes taken from grids 17, 18, 21, 22, 23, 26, 28, 29, 30, 31 (EU 1) and 33, 35, 37, 41, 43, 47, 51, and 55 (EU 2) ranged from 1 to 10 ft bgs.

No metals were detected above both the background screening levels and the teen recreator ALs in the SWMU 561 subsurface soil.

The following are the metals detected in the SWMU 561 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Aluminum	26, 28, 29, 31, 37, 41	1, 2
Arsenic	17, 18, 21, 22, 23, 26, 28, 29, 31, 35, 43	1, 2
Cobalt	30	1
Lead	18, 22, 23, 24, 25, 26, 27, 28, 29, 41, 53	1, 2
Manganese	17, 22, 30, 51	1, 2
Mercury	22	1
Molybdenum[1]	17, 18, 20, 21, 22, 23, 26, 28, 29, 30, 31, 33, 35, 37, 39, 41, 43, 47, 51, 53, 55	1, 2
Nickel	23	1
Uranium	30, 33, 35, 37, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59	1, 2
Zinc	30, 33, 35, 37, 43, 47, 51, 55	1, 2

[1] No background value is available.

Arsenic in grid 23 (EU 1); cobalt in grid 30 (EU 1); and manganese in grids 17, 22, 30 (EU 1), and 51 (EU 2) were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the teen recreator NALs in the subsurface soil of grids 18, 30, and 31 to a maximum depth of 10 ft bgs in EU 1 and grids 33, 35, 37, 41, 43, 47, 51, and 55 to a maximum depth of 7 ft bgs in EU 2. PCBs were not detected above the teen recreator ALs in the SWMU 561 subsurface soil.

Total PCBs in grids 18, 23, 28, 30, and 31 in EU 1 and grids 33, 35, 37, 41, 43, 47, 51, and 55 in EU 2 were detected above the SSLs for the protection of UCRS.

Total PCBs in grids 35 and 43 (EU 2) were detected above the SSLs for the protection of RGA groundwater in the SWMU 561 subsurface soil.

SVOCs

Total PAHs were detected above the teen recreator NALs in the subsurface soil of grids 23 (EU 1), 47, 51, and 55 (EU 2) to a maximum depth of 7 ft bgs.

No SVOCs were detected above the teen recreator ALs in the SWMU 561 subsurface soil.

Acenaphthene, fluoranthene, fluorene, naphthalene, pyrene in grid 23 (EU 1); bis(2-ethylhexyl)phthalate in grid 20 (EU 1); and Total PAHs in grids 23 (EU 1), 47, 51 and 55 (EU 2) were detected above the SSLs for the protection of UCRS groundwater.

Naphthalene and Total PAHs in grid 23 (EU 1) were detected above the SSLs for the protection of RGA groundwater.

VOCs

No VOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 561 subsurface soil.

Radionuclides

Radionuclides were detected above the teen recreator NALs in the SWMU 561 subsurface soil. The following are the radionuclides detected at or above both the background screening levels and the teen recreator NALs to a maximum depth of 10 ft bgs and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Cesium-137	29	1
Uranium-235	30, 33, 43, 47, 55	1, 2
Uranium-238	30, 33, 35, 37, 41, 43, 47, 51, 55	1, 2

Grids 29, 30 (EU 1), and 33, 35, 37, 41, 43, 47, 51, and 55 (EU 2) are located within the administrative boundary of SWMU 561.

Neptunium-237 (no background value available) in grids 30 (EU 1), 33, 35, 39, 43, 47, 51, and 55 (EU 2) and uranium-238 in grids 30 (EU 1), 33, 35, 37, 41, 43, 47, 51, and 55 (EU 2) were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater.

No radionuclides were detected above both the background screening levels and the teen recreator ALs or the SSLs for the protection of RGA groundwater.

9.12.5 Fate and Transport

The contaminants at SWMU 561 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMU 561.

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is potential for runoff because this SWMU is at the confluence of KPDES Outfall Ditch 002 and Little Bayou Creek; however, SWMU 561 is grass-covered or otherwise stabilized and the contaminants are not likely to be transported attached to suspended soil particles. Based on results from the Site Evaluation Report for Soil Pile I (SWMU 561), potential contaminants are not migrating away from the soil piles. Soil Piles are believed to have similar origin. Little Bayou Creek is scheduled to be investigated as part of the SWOU. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

9.12.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 561. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for one or more EUs at SWMU 561 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.12.4 for the outdoor worker (exposed to surface soils), the excavation worker, the hypothetical resident, and the teen recreational user. Table 9.12.4 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 561 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 9.12.5.

Table 9.12.4. RGOs for SWMU 561

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	**COC**	**EPC[1]**	**Units**	**ELCR[2]**	**1×10^{-6}**	**1×10^{-5}**	**1×10^{-4}**	**HI[4]**	**0.1**	**1**	**3**
Outdoor Worker (exposed to surface soil)											
1	Arsenic	1.66E+01	mg/kg	4.0E-05	4.15E-01	4.15E+00	4.15E+01	< 1	n/a	n/a	n/a
	Chromium	8.58E+01	mg/kg	2.1E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	PCB, Total	1.04E+00	mg/kg	6.4E-06	1.62E-01	1.62E+00	1.62E+01	< 1	n/a	n/a	n/a
	Total PAH	3.94E-01	mg/kg	8.1E-06	4.85E-02	4.85E-01	4.85E+00	< 1	n/a	n/a	n/a
	Uranium-234	7.84E+00	pCi/g	2.8E-06	2.83E+00	2.83E+01	2.83E+02	n/a	n/a	n/a	n/a
	Uranium-235	1.37E+00	pCi/g	3.0E-06	4.55E-01	4.55E+00	4.55E+01	n/a	n/a	n/a	n/a
	Uranium-238	1.07E+02	pCi/g	9.1E-05	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.5E-04**				**< 1**			
2	Arsenic	1.30E+01	mg/kg	3.1E-05	4.15E-01	4.15E+00	4.15E+01	0.2	6.65E+00	6.65E+01	1.99E+02
	Cesium-137	4.09E-01	pCi/g	3.5E-06	1.15E-01	1.15E+00	1.15E+01	n/a	n/a	n/a	n/a
	Chromium	2.88E+02	mg/kg	7.1E-06	4.08E+01	4.08E+02	4.08E+03	< 0.1	n/a	n/a	n/a
	Cobalt	1.14E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	8.53E+00	8.53E+01	2.56E+02
	PCB, Total	1.64E+01	mg/kg	1.0E-04	1.62E-01	1.62E+00	1.62E+01	< 0.1	n/a	n/a	n/a
	Total PAH	2.43E+00	mg/kg	5.0E-05	4.85E-02	4.85E-01	4.85E+00	< 0.1	n/a	n/a	n/a
	Uranium	1.38E+03	mg/kg	< 1E-06	n/a	n/a	n/a	1.6	8.61E+01	8.61E+02	2.58E+03
	Uranium-234	4.06E+01	pCi/g	1.4E-05	2.83E+00	2.83E+01	2.83E+02	n/a	n/a	n/a	n/a
	Uranium-235	7.09E+00	pCi/g	1.6E-05	4.55E-01	4.55E+00	4.55E+01	n/a	n/a	n/a	n/a
	Uranium-238	4.00E+02	pCi/g	3.4E-04	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**5.6E-04**				**1.9**			
Excavation Worker											
1	Uranium-238	1.12E+02	pCi/g	1.2E-06	9.38E+01	9.38E+02	9.38E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.2E-06**				**< 1**			
2	PCB, Total	1.67E+01	mg/kg	1.3E-06	1.30E+01	1.30E+02	1.30E+03	< 1	n/a	n/a	n/a
	Uranium-238	3.86E+02	pCi/g	4.1E-06	9.38E+01	9.38E+02	9.38E+03	n/a	n/a	n/a	n/a
	Cumulative			**5.4E-06**				**< 1**			

Table 9.12.4. RGOs for SWMU 561 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Hypothetical Resident[5]											
1	Arsenic	1.66E+01	mg/kg	7.0E-05	2.35E-01	2.35E+00	2.35E+01	1.0	1.64E+00	1.64E+01	4.93E+01
	Chromium	8.58E+01	mg/kg	5.5E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Cobalt	1.07E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.5	2.30E+00	2.30E+01	6.91E+01
	Iron	2.05E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.4	5.47E+03	5.48E+04	1.64E+05
	Manganese	1.61E+03	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	5.34E+02	5.34E+03	1.60E+04
	PCB, Total	1.04E+00	mg/kg	1.6E-05	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Total PAH	3.94E-01	mg/kg	2.0E-05	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	2.65E+02	mg/kg	< 1E-06	n/a	n/a	n/a	1.1	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	7.84E+00	pCi/g	1.6E-06	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	1.37E+00	pCi/g	1.7E-05	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	1.07E+02	pCi/g	3.1E-04	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**4.4E-04**				**3.3**			
2	Antimony	5.33E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	3.13E+00	3.13E+01	9.39E+01
	Arsenic	1.30E+01	mg/kg	5.5E-05	2.35E-01	2.35E+00	2.35E+01	0.8	1.64E+00	1.64E+01	4.93E+01
	Cesium-137	4.09E-01	pCi/g	2.4E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Chromium	2.88E+02	mg/kg	1.9E-05	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Cobalt	1.14E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.5	2.30E+00	2.30E+01	6.91E+01
	Manganese	1.12E+03	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	5.34E+02	5.34E+03	1.60E+04
	PCB, Total	1.64E+01	mg/kg	2.6E-04	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Total PAH	2.43E+00	mg/kg	1.3E-04	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	1.38E+03	mg/kg	< 1E-06	n/a	n/a	n/a	5.9	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	4.06E+01	pCi/g	8.4E-06	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	7.09E+00	pCi/g	9.0E-05	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	4.00E+02	pCi/g	1.2E-03	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.8E-03**				**7.6**			

Table 9.12.4. RGOs for SWMU 561 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Teen Recreational User											
1	Arsenic	1.66E+01	mg/kg	9.3E-06	1.77E+00	1.77E+01	1.77E+02	< 1	n/a	n/a	n/a
	PCB, Total	1.04E+00	mg/kg	3.5E-06	2.99E-01	2.99E+00	2.99E+01	< 1	n/a	n/a	n/a
	Total PAH	3.94E-01	mg/kg	4.4E-06	8.99E-02	8.99E-01	8.99E+00	< 1	n/a	n/a	n/a
	Uranium-238	1.07E+02	pCi/g	1.2E-05	8.56E+00	8.56E+01	8.56E+02	n/a	n/a	n/a	n/a
	Cumulative			**3.0E-05**				**< 1**			
2	Arsenic	1.30E+01	mg/kg	7.3E-06	1.77E+00	1.77E+01	1.77E+02	< 1	n/a	n/a	n/a
	Chromium	2.88E+02	mg/kg	1.7E-06	1.65E+02	1.65E+03	1.65E+04	< 1	n/a	n/a	n/a
	PCB, Total	1.64E+01	mg/kg	5.5E-05	2.99E-01	2.99E+00	2.99E+01	< 1	n/a	n/a	n/a
	Total PAH	2.43E+00	mg/kg	2.7E-05	8.99E-02	8.99E-01	8.99E+00	< 1	n/a	n/a	n/a
	Uranium-235	7.09E+00	pCi/g	3.7E-06	1.90E+00	1.90E+01	1.90E+02	n/a	n/a	n/a	n/a
	Uranium-238	4.00E+02	pCi/g	4.7E-05	8.56E+00	8.56E+01	8.56E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.4E-04**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.72, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.72, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1–31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 9.12.5 Ecological Screening for SWMU 561

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Soil/grass mix with trees	Yes	5544	Antimony	2.10E-01	2.20E+01	2.70E-01	81
			Boron	n/a	2.34E+01	5.00E-01	47
			Chromium	1.60E+01	1.37E+03	2.60E+01	53
			Lead	3.60E+01	2.25E+02	1.10E+01	20
			Manganese	1.50E+03	5.23E+03	2.20E+02	24
			PCB, Total	n/a	7.90E+01	2.00E-02	3950
			Selenium	8.00E-01	1.00E+01	5.20E-01	19
			Thallium	2.10E-01	1.00E+01	1.00E+00	10
			Uranium	4.90E+00	6.41E+03	5.00E+00	1282
			Vanadium	3.80E+01	8.69E+01	7.80E+00	11
			Zinc	6.50E+01	1.13E+03	4.60E+01	25

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b) ; n/a = not applicable

9.12.7 SWMU 561 Summary

The following text summarizes the results for SWMU 561 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Plant processes that could have contributed to contamination at SWMU 561 are dredging in SWMU 60 and Little Bayou Creek to keep them clear for PGDP discharges.

COPCs for surface and subsurface soils from SWMU 561 are shown on Tables 9.12.1–9.12.3 as those analytes with green boxes under the "Teen Recreator/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The COPCs identified for SWMU 561 for both EUs are metals, PCBs, SVOCs, and radionuclides for surface and subsurface soils for both EUs. VOCs also were identified for EU 2 surface soils. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 10 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 561 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMU 561. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soil), excavation worker, hypothetical residential, and teen recreational user scenarios. COCs for these scenarios for SWMU 561, as listed below. Priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) are marked with an asterisk.

- Outdoor worker (exposed to surface soil)
    - Arsenic
    - Cesium-137
    - Chromium
    - Cobalt
    - Total PAHs
    - Total PCBs*
    - Uranium*
    - Uranium-234
    - Uranium-235
    - Uranium-238*
- Excavation worker
    - Total PCBs
    - Uranium-238
- Hypothetical Resident (hazards evaluated against the child resident)

- — Antimony
- — Arsenic*
- — Cesium-137
- — Chromium
- — Cobalt
- — Iron
- — Manganese
- — Total PAHs*
- — Total PCBs*
- — Uranium*
- — Uranium-234
- — Uranium-235
- — Uranium-238*

- Teen Recreational User

  - — Arsenic
  - — Chromium
  - — Total PAHs
  - — Total PCBs
  - — Uranium-235
  - — Uranium-238

*Indicates a priority COC

Priority COCs for other scenarios are described in Appendix D. Figure 9.12.8 also shows the COCs exceeding RGOs for the teen recreator.

For SWMU 561, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Antimony
- Boron
- Chromium
- Lead
- Manganese
- Total PCBs
- Selenium
- Thallium
- Uranium
- Vanadium
- Zinc

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 561 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 561 is on the banks of SWMU 60, C-375-E2 Effluent Ditch (KPDES 002). SWMU 60 was evaluated as part of the SWOU (on-site) investigation and it was concluded that there were no unacceptable levels of potential risks and hazards to current and anticipated future receptors; therefore, no action was taken

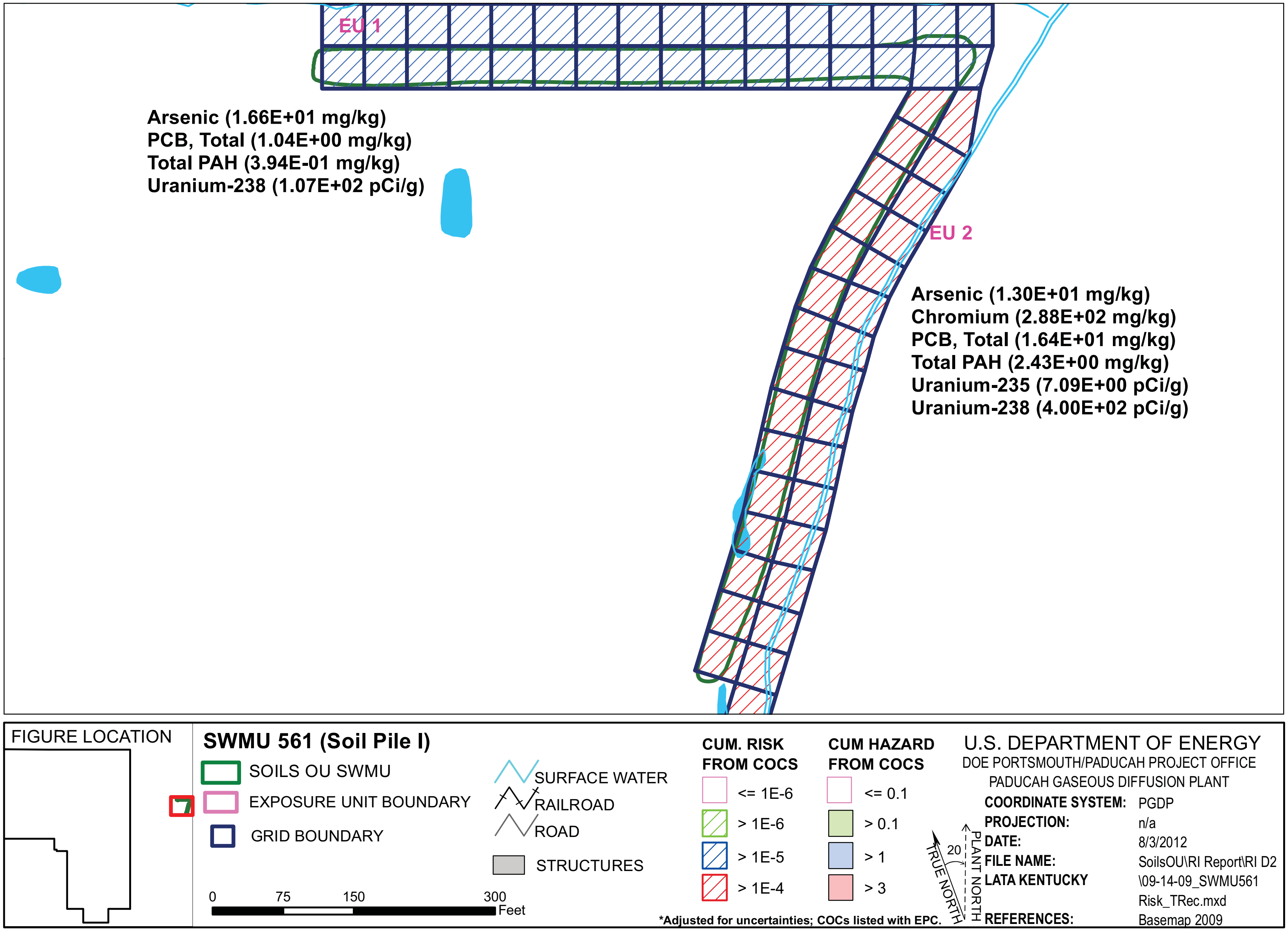


Figure 9.12.8. Summary of COCs Contributing to Risk to the Teen Recreator at SWMU 561

there. Because of the evaluation by the SWOU, a response action at SWMU 561 would not have an impact on the SWOU integrator OU. The Addendum 1B SER (DOE 2009d) stated that PGDP monitoring data indicates that little to no migration has taken place to date from these piles. Because of this, a response action at these piles would have no effect on the surface water integrator OU.

9.12.8 SWMU 561 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 561; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including outdoor worker (exposed to surface soil), excavation worker, hypothetical resident, and teen recreational user (DOE 2010a). The reasonably anticipated future land use for this SWMU is recreational as shown in the SMP (DOE 2012a). The SWMU is outside the limited area, and away from the PGDP area, but on the banks of Little Bayou Creek, which receives PGDP discharges throughout the year.

9.13 AOC 562, SOIL PILES C, D, E, F, G, H, J, K, AND P IN SUBUNIT 1

9.13.1 Background

Sampling, field reconnaissance, and field radioactivity measurements at AOC 562 were completed in December 2006 as part of the Addendum 1B effort (DOE 2009d). An investigation of all soils in Addendum 1B was completed in December 2008, which included AOC 562.

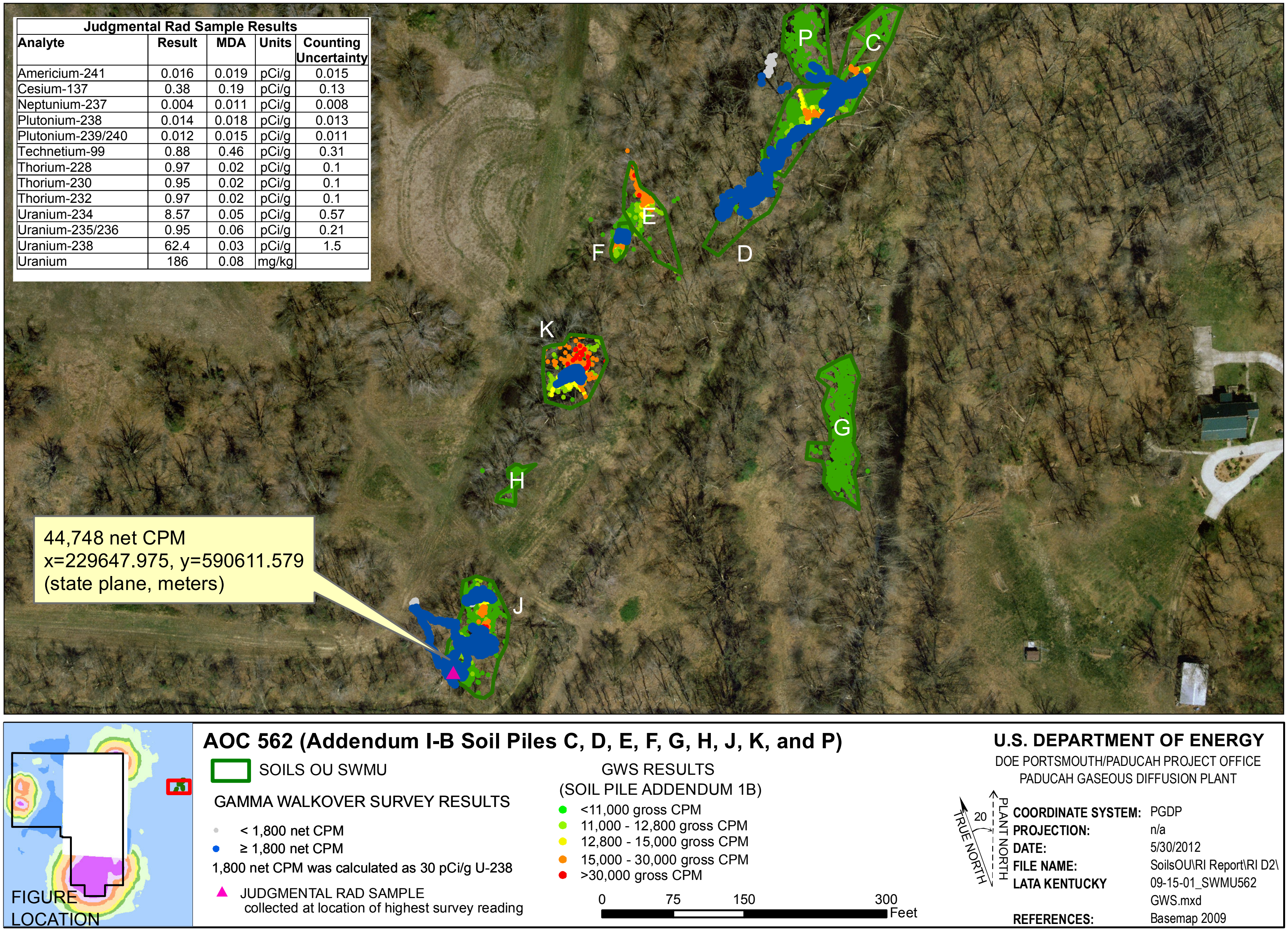
Historical research was performed to attempt to determine the origin of the piles. Origin of the Addendum 1-B Soil Piles remains unknown, although the location and shape indicates that many of the PGDP-related soil piles are likely to have originated from excavations associated with the creation, periodic dredging, and cleanout of the outfalls, ditches, and creeks that comprise the PGDP surface water management system. Management of the surface water system at PGDP no longer allows piling soil along the ditch or creek banks outside the SWMU boundaries. AOC 562 is on the banks of Little Bayou Creek.

This AOC has been characterized and the summary of the findings is presented in the Site Evaluation Report (DOE 2009d). Recommendations from the Site Evaluation included consideration of an early action for Soil Pile E within AOC 562. It was determined that an early action was not warranted.

9.13.2 Fieldwork Summary

The historical data are representative of the nature and adequately delineate the extent of the contamination; therefore, no samples were collected from AOC 562 during the Soils OU RI sampling effort (DOE 2010a).

The AOC underwent a gamma radiological walkover survey (Figure 9.13.1) during the RI using a FIDLER; the 3,049 measurements ranged from 4,996 to 55,748 gross cpm. The area consists entirely of soil and grass with trees. A judgmental sample was collected for radiological constituents. Soil Pile Addendum 1B survey data were added to Figure 9.13.1 to supplement the 2010 data. The two surveys show similar contamination levels throughout the pile; therefore, the historical data fill the data gap of areas not accessible for survey in 2010. The Addendum 1B data were collected using a 2 x 2 NaI probe.



Judgmental Rad Sample Results				
Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.016	0.019	pCi/g	0.015
Cesium-137	0.38	0.19	pCi/g	0.13
Neptunium-237	0.004	0.011	pCi/g	0.008
Plutonium-238	0.014	0.018	pCi/g	0.013
Plutonium-239/240	0.012	0.015	pCi/g	0.011
Technetium-99	0.88	0.46	pCi/g	0.31
Thorium-228	0.97	0.02	pCi/g	0.1
Thorium-230	0.95	0.02	pCi/g	0.1
Thorium-232	0.97	0.02	pCi/g	0.1
Uranium-234	8.57	0.05	pCi/g	0.57
Uranium-235/236	0.95	0.06	pCi/g	0.21
Uranium-238	62.4	0.03	pCi/g	1.5
Uranium	186	0.08	mg/kg	

Figure 9.13.1. AOC 562 Gamma Walkover Survey

9.13.3 Nature and Extent of Contamination—Surface Soils

For AOC 562, the representative data set for surface soils is presented in Tables 9.13.1 and 9.13.2 and provides the nature of the contamination in AOC 562 surface soils. Figures 9.13.2–9.13.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of AOC 562 surface soil contamination is considered adequately defined for supporting the BRA and FS. AOC 562 consists of six EUs.

Metals

Metals were detected above the teen recreator NALs in the AOC 562 surface soil. The following are the metals detected at or above both the background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Chromium	16	5
Uranium	6, 16, 19	1, 5

Grids 6, 16, and 19 are located within the administrative boundary of AOC 562.

No metals were detected above both the background screening levels and the teen recreator ALs in AOC 562 surface soil.

The following are the metals detected in the AOC 562 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Barium	20	6
Cadmium	16	5
Uranium	3, 5, 6, 8, 12, 13, 14, 16, 18, 19	1, 3, 4, 5
Zinc	16	5

No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the teen recreator NALs in the surface soil of grids 9 (EU 2), 12 (EU 3), and 16 (EU 5).

No PCBs were detected above the teen recreator ALs in the AOC 562 surface soil.

Total PCBs in grids 9 (EU 2), 12 (EU 3), and 16 (EU 5) were detected above the SSLs for the protection of UCRS groundwater. No PCBs were detected above the SSLs for the protection of RGA groundwater in the AOC 562 surface soil.

Table 9.13.1. Surface Soil Historical Data Summary: SWMU 562 Addendum 1B Soil Piles D, H, J, C, E, F, G, and P

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.45E+03	7.61E+03	6.49E+03	0/11	11/11	0/11	1.30E+04	0/11	2.77E+04	0/11	8.91E+06	0/11	11/11	17.9 - 19.7
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	2.10E-01	0/11	1.78E+00	0/11	1.90E+03	0/11	0/11	7.31 - 9.53
METAL	Arsenic	mg/kg	2.10E+00	5.77E+00	3.16E+00	0/11	11/11	0/11	1.20E+01	11/11	1.02E+00	0/11	1.02E+02	0/11	11/11	0.893 - 0.986
METAL	Barium	mg/kg	4.76E+01	2.66E+02	9.54E+01	0/11	11/11	1/11	2.00E+02	0/11	4.15E+02	0/11	4.58E+05	0/11	1/11	2.23 - 2.47
METAL	Beryllium	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	6.70E-01	0/11	1.29E-02	0/11	8.65E+00	0/11	0/11	0.446 - 0.493
METAL	Cadmium	mg/kg	4.87E-01	4.87E-01	4.87E-01	0/11	1/11	1/11	2.10E-01	0/11	3.14E+00	0/11	3.14E+02	0/11	1/11	0.446 - 0.493
METAL	Calcium	mg/kg	1.66E+02	1.23E+03	6.12E+02	4/11	11/11	0/11	2.00E+05	0/11	n/a	0/11	n/a	n/a	n/a	89.3 - 98.6
METAL	Chromium	mg/kg	7.41E+00	1.53E+02	4.12E+01	0/25	15/25	8/25	1.60E+01	3/25	7.15E+01	0/25	7.15E+03	0/25	0/25	2.23 - 2.47
METAL	Cobalt	mg/kg	3.20E+00	6.48E+00	4.15E+00	0/11	11/11	0/11	1.40E+01	0/11	8.45E+00	0/11	3.29E+03	11/11	11/11	0.893 - 0.986
METAL	Copper	mg/kg	4.31E+00	1.43E+01	7.35E+00	0/11	11/11	0/11	1.90E+01	0/11	1.13E+03	0/11	4.75E+05	0/11	0/11	2.23 - 2.47
METAL	Iron	mg/kg	6.36E+03	1.02E+04	7.73E+03	0/11	11/11	0/11	2.80E+04	0/11	1.98E+04	0/11	8.31E+06	11/11	11/11	17.9 - 19.7
METAL	Lead	mg/kg	6.41E+00	2.53E+01	1.32E+01	0/25	22/25	0/25	3.60E+01	0/25	4.00E+02	0/25	4.00E+02	0/25	7/25	0.893 - 0.986
METAL	Magnesium	mg/kg	5.25E+02	8.12E+02	6.51E+02	0/11	11/11	0/11	7.70E+03	0/11	n/a	0/11	n/a	n/a	n/a	4.46 - 4.93
METAL	Manganese	mg/kg	1.94E+02	4.71E+02	3.80E+02	0/11	11/11	0/11	1.50E+03	0/11	3.47E+03	0/11	2.94E+05	11/11	11/11	2.23 - 2.47
METAL	Mercury	mg/kg	1.70E-02	3.10E-02	2.38E-02	0/11	8/11	0/11	2.00E-01	0/11	6.25E-01	0/11	7.88E+02	0/11	0/11	0.015 - 0.017
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	1.42E+02	0/11	5.94E+04	0/11	0/11	4.46 - 4.93
METAL	Nickel	mg/kg	4.99E+00	7.01E+00	5.78E+00	0/11	8/11	0/11	2.10E+01	0/11	2.98E+01	0/11	3.07E+04	0/11	8/11	4.46 - 4.93
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	8.00E-01	0/11	1.42E+02	0/11	5.93E+04	0/11	0/11	0.893 - 0.986
METAL	Silver	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	2.30E+00	0/11	7.45E+00	0/11	8.07E+03	0/11	0/11	1.83 - 2.38
METAL	Sodium	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	3.20E+02	0/11	n/a	0/11	n/a	n/a	n/a	179 - 197
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	2.10E-01	0/11	2.27E+00	0/11	9.50E+02	0/11	0/11	1.79 - 1.97
METAL	Uranium	mg/kg	5.66E+00	2.08E+02	4.84E+01	0/25	18/25	18/25	4.90E+00	4/25	8.49E+01	0/25	3.50E+04	0/25	13/25	0.948 - 47.6
METAL	Vanadium	mg/kg	1.06E+01	1.79E+01	1.34E+01	0/11	11/11	0/11	3.80E+01	11/11	1.04E-01	0/11	7.61E+01	11/11	11/11	2.23 - 2.47
METAL	Zinc	mg/kg	2.01E+01	8.36E+01	3.15E+01	0/11	10/11	1/11	6.50E+01	0/11	8.50E+03	0/11	3.56E+06	0/11	10/11	17.9 - 19.7
PPCB	PCB, Total	mg/kg	2.40E-01	1.58E+00	7.63E-01	0/28	5/28	0/28	n/a	5/28	1.83E-01	0/28	1.83E+01	0/28	5/28	0.1 - 0.13
PPCB	PCB, Total	mg/kg	2.40E-01	1.58E+00	7.63E-01	0/28	5/28	0/28	n/a	5/28	1.83E-01	0/28	1.83E+01	0/28	5/28	0.13 - 0.13
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	5.87E+02	0/11	1.76E+04	0/11	0/11	0.48 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.48 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	3.25E+03	0/11	9.74E+04	0/11	0/11	0.48 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.48 - 0.5
SVOA	Fluoranthene	mg/kg	1.10E+00	1.50E+00	1.30E+00	0/11	2/11	0/11	n/a	0/11	4.47E+02	0/11	1.34E+04	0/11	0/11	0.48 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	4.19E+02	0/11	1.26E+04	0/11	0/11	0.48 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/11	0/11	0/11	n/a	0/11	5.27E+00	0/11	5.27E+02	0/11	0/11	0.48 - 0.5
SVOA	Phenanthrene	mg/kg	5.70E-01	1.10E+00	8.35E-01	0/11	2/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	0.48 - 0.5
SVOA	Polycyclic aromatic hydrocarbons (PAH)	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.57E-02	0/1	5.57E+00	n/a	n/a	0.2 - 0.2
SVOA	Pyrene	mg/kg	9.80E-01	1.10E+00	1.04E+00	0/11	2/11	0/11	n/a	0/11	3.35E+02	0/11	1.00E+04	0/11	2/11	0.48 - 0.5
SVOA	Total PAH	mg/kg	7.05E-02	2.20E-01	1.45E-01	0/25	2/25	0/25	n/a	2/25	5.57E-02	0/25	5.57E+00	0/25	2/25	0.2 - 0.2
RADS	Americium-241	pCi/g	-9.73E-03	1.28E+00	1.79E-01	0/19	19/19	0/19	n/a	0/19	1.28E+01	0/19	1.28E+03	0/19	4/19	0.015 - 0.6583
RADS	Cesium-137	pCi/g	-7.73E-03	4.85E-01	1.63E-01	0/19	19/19	0/19	4.90E-01	8/19	1.98E-01	0/19	1.98E+01	0/19	0/19	0.00941 - 0.099
RADS	Neptunium-237	pCi/g	-2.67E-02	6.30E-03	-1.69E-02	0/11	11/11	0/11	1.00E-01	0/11	6.26E-01	0/11	6.26E+01	0/11	1/11	0.0232 - 0.0496
RADS	Neptunium-237/Protactinium-233	pCi/g	-1.84E-02	4.54E-02	6.77E-03	0/6	6/6	0/6	1.00E-01	0/6	n/a	0/6	n/a	n/a	n/a	0.05089 - 0.09734
RADS	Plutonium-238	pCi/g	-4.35E-01	3.73E-01	2.42E-02	0/17	17/17	2/17	7.30E-02	0/17	3.64E+01	0/17	3.64E+03	0/17	2/17	0.0114 - 2.29893707671882

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.13.1. Surface Soil Historical Data Summary: SWMU 562 Addendum 1B Soil Piles D, H, J, C, E, F, G, and P (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
RADS	Plutonium-239/240	pCi/g	-2.90E-01	1.02E-01	-1.81E-02	0/17	17/17	1/17	2.50E-02	0/17	3.56E+01	0/17	3.56E+03	0/17	1/17	1.00605629525785E-02 - 1.74013942067104
RADS	Protactinium-234m	pCi/g	2.74E+00	3.66E+02	2.44E+02	0/6	6/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	3.081 - 5.18
RADS	Technetium-99	pCi/g	-5.40E-01	4.36E+00	9.50E-01	0/19	19/19	3/19	2.50E+00	0/19	1.11E+03	0/19	1.11E+05	0/19	9/19	0.178869893910816 - 2.35
RADS	Thorium-228	pCi/g	1.81E-01	1.06E+00	4.21E-01	0/13	13/13	0/13	1.60E+00	0/13	n/a	0/13	n/a	n/a	n/a	0.117 - 0.162
RADS	Thorium-230	pCi/g	1.00E-01	1.01E+00	3.44E-01	0/13	13/13	0/13	1.50E+00	0/13	4.49E+01	0/13	4.49E+03	0/13	3/13	0.0831 - 0.135
RADS	Thorium-232	pCi/g	2.48E-01	1.07E+00	4.47E-01	0/13	13/13	0/13	1.50E+00	0/13	n/a	0/13	n/a	n/a	n/a	0.0448 - 0.076
RADS	Thorium-234	pCi/g	1.56E+00	2.69E+02	1.84E+02	0/6	6/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.2705 - 1.456
RADS	Uranium	pCi/g	2.18E-01	2.18E-01	2.18E-01	0/1	1/1	0/1	n/a	0/1	4.02E+00	0/1	4.02E+02	0/1	0/1	0.256 - 0.256
RADS	Uranium-234	pCi/g	7.27E-02	5.34E+01	1.52E+01	0/19	19/19	9/19	1.20E+00	0/19	6.25E+01	0/19	6.25E+03	0/19	0/19	3.98E-02 - 1.34
RADS	Uranium-235	wt %	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	-
RADS	Uranium-235	pCi/g	7.21E-04	8.96E+00	2.57E+00	2/19	19/19	10/19	6.00E-02	7/19	9.12E-01	0/19	9.12E+01	0/19	0/19	0.0121 - 1.65
RADS	Uranium-238	pCi/g	4.78E-02	5.81E+02	1.41E+02	0/19	19/19	16/19	1.20E+00	10/19	4.02E+00	2/19	4.02E+02	6/19	10/19	3.96E-02 - 2.75

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.13.2. Surface Soil RI Data Summary: SWMU 562 Addendum 1B Soil Piles D, H, J, C, E, F, G, and P

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Uranium	mg/kg	1.86E+02	1.86E+02	1.86E+02	0/1	1/1	1/1	4.90E+00	1/1	8.49E+01	0/1	3.50E+04	0/1	1/1	0.08 - 0.08
RADS	Alpha activity	pCi/g	1.31E+02	1.31E+02	1.31E+02	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5 - 5
RADS	Americium-241	pCi/g	1.60E-02	1.60E-02	1.60E-02	0/1	1/1	0/1	n/a	0/1	1.28E+01	0/1	1.28E+03	0/1	0/1	0.019 - 0.019
RADS	Beta activity	pCi/g	1.54E+02	1.54E+02	1.54E+02	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	4 - 4
RADS	Cesium-137	pCi/g	3.80E-01	3.80E-01	3.80E-01	0/1	1/1	0/1	4.90E-01	1/1	1.98E-01	0/1	1.98E+01	0/1	0/1	0.19 - 0.19
RADS	Neptunium-237	pCi/g	4.00E-03	4.00E-03	4.00E-03	0/1	1/1	0/1	1.00E-01	0/1	6.26E-01	0/1	6.26E+01	0/1	0/1	0.011 - 0.011
RADS	Plutonium-238	pCi/g	1.40E-02	1.40E-02	1.40E-02	0/1	1/1	0/1	7.30E-02	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.018 - 0.018
RADS	Plutonium-239/240	pCi/g	1.20E-02	1.20E-02	1.20E-02	0/1	1/1	0/1	2.50E-02	0/1	3.56E+01	0/1	3.56E+03	0/1	0/1	0.015 - 0.015
RADS	Technetium-99	pCi/g	8.80E-01	8.80E-01	8.80E-01	0/1	1/1	0/1	2.50E+00	0/1	1.11E+03	0/1	1.11E+05	0/1	1/1	0.46 - 0.46
RADS	Thorium-228	pCi/g	9.70E-01	9.70E-01	9.70E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	9.50E-01	9.50E-01	9.50E-01	0/1	1/1	0/1	1.50E+00	0/1	4.49E+01	0/1	4.49E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	9.70E-01	9.70E-01	9.70E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Uranium-234	pCi/g	8.57E+00	8.57E+00	8.57E+00	0/1	1/1	1/1	1.20E+00	0/1	6.25E+01	0/1	6.25E+03	0/1	0/1	0.05 - 0.05
RADS	Uranium-235/236	pCi/g	9.50E-01	9.50E-01	9.50E-01	0/1	1/1	1/1	6.00E-02	1/1	9.12E-01	0/1	9.12E+01	0/1	0/1	0.06 - 0.06
RADS	Uranium-238	pCi/g	6.24E+01	6.24E+01	6.24E+01	0/1	1/1	1/1	1.20E+00	1/1	4.02E+00	0/1	4.02E+02	0/1	1/1	0.03 - 0.03

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.

[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.

Thallium metal results are compared to thallium chloride action levels/no action levels.

Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).

Field replicates, or separate samples are counted independently.

The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

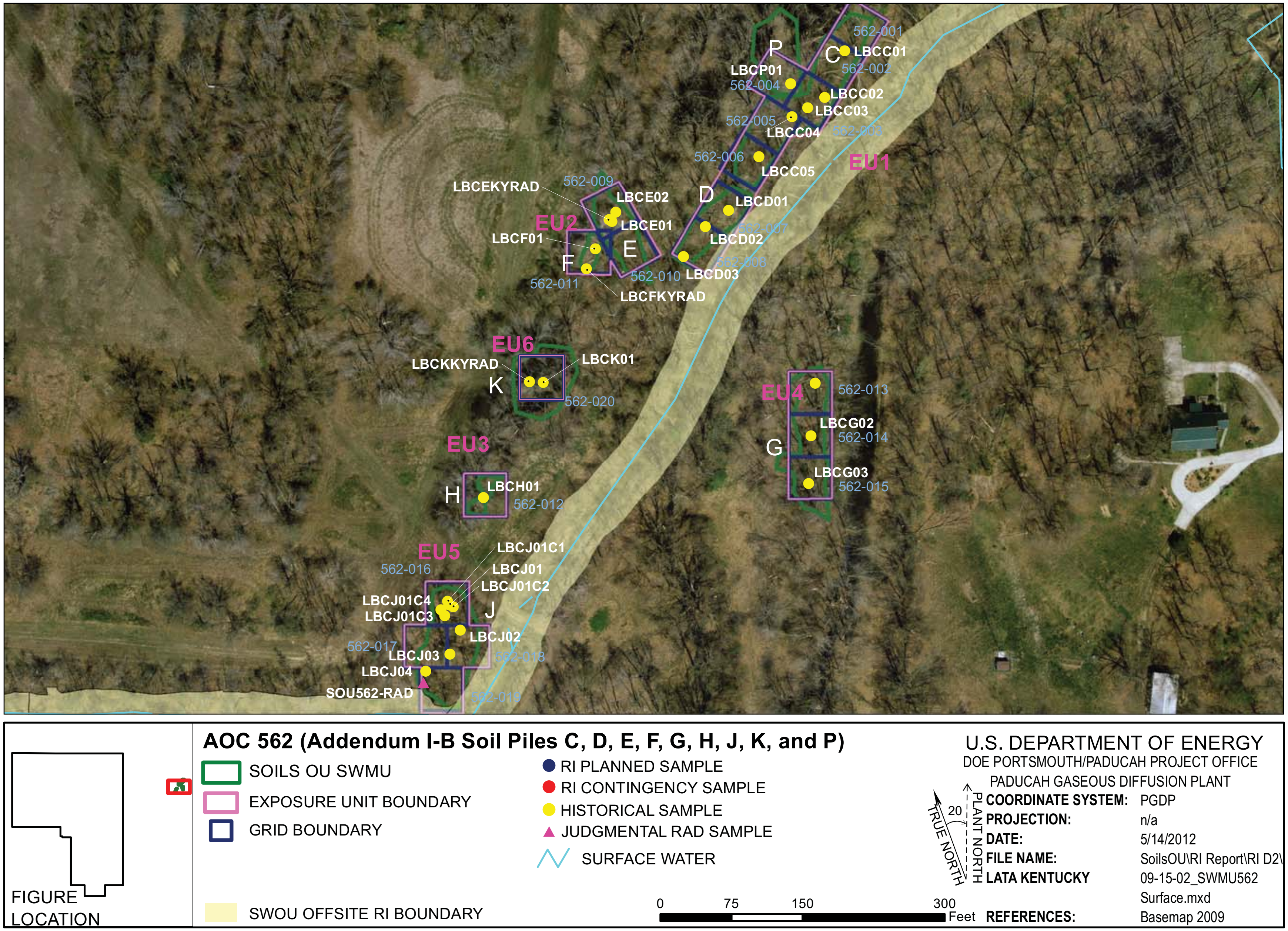


Figure 9.13.2. AOC 562 Sample Locations - Surface Soil

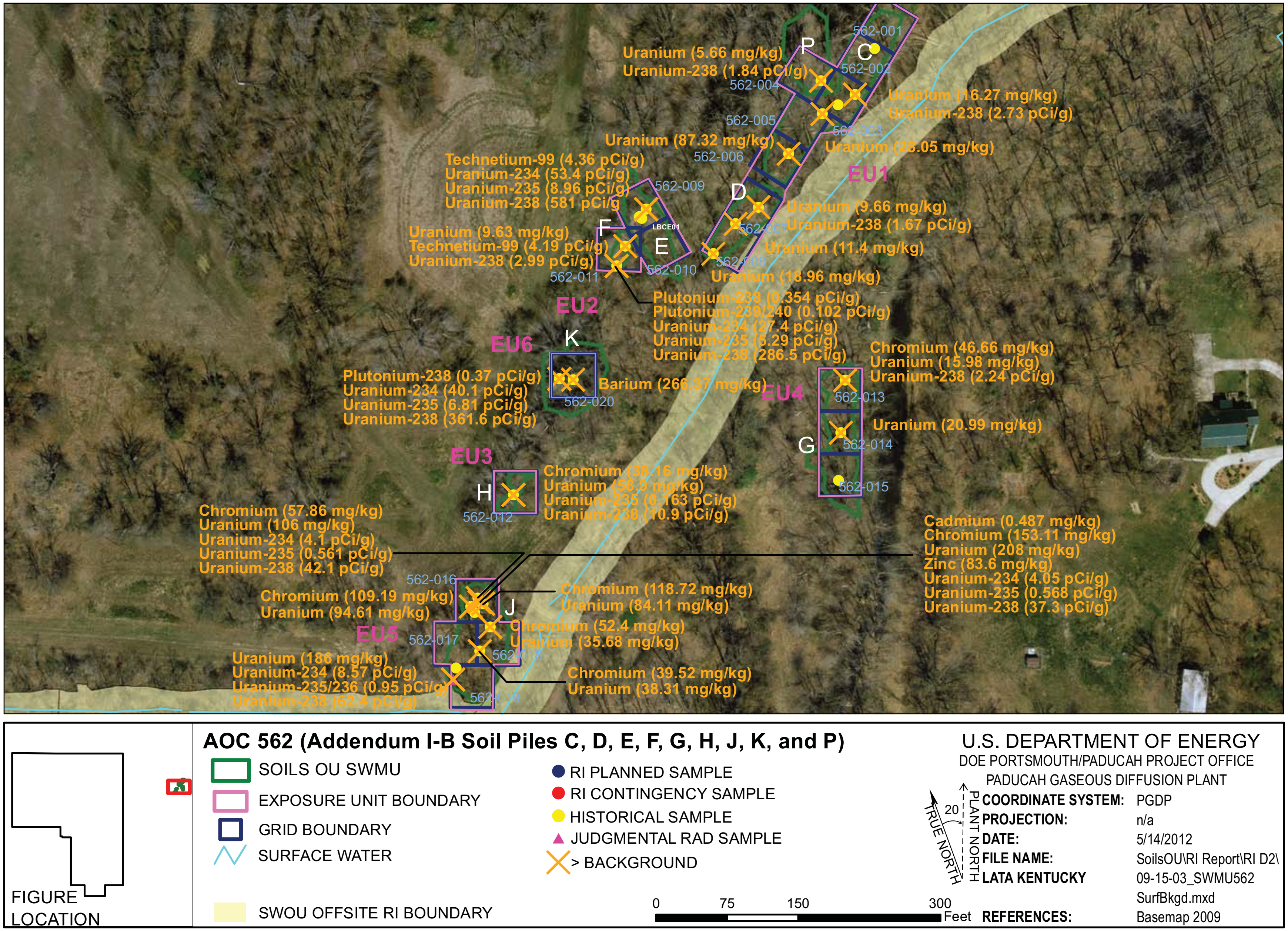


Figure 9.13.3. AOC 562 Background Exceedances - Surface Soil

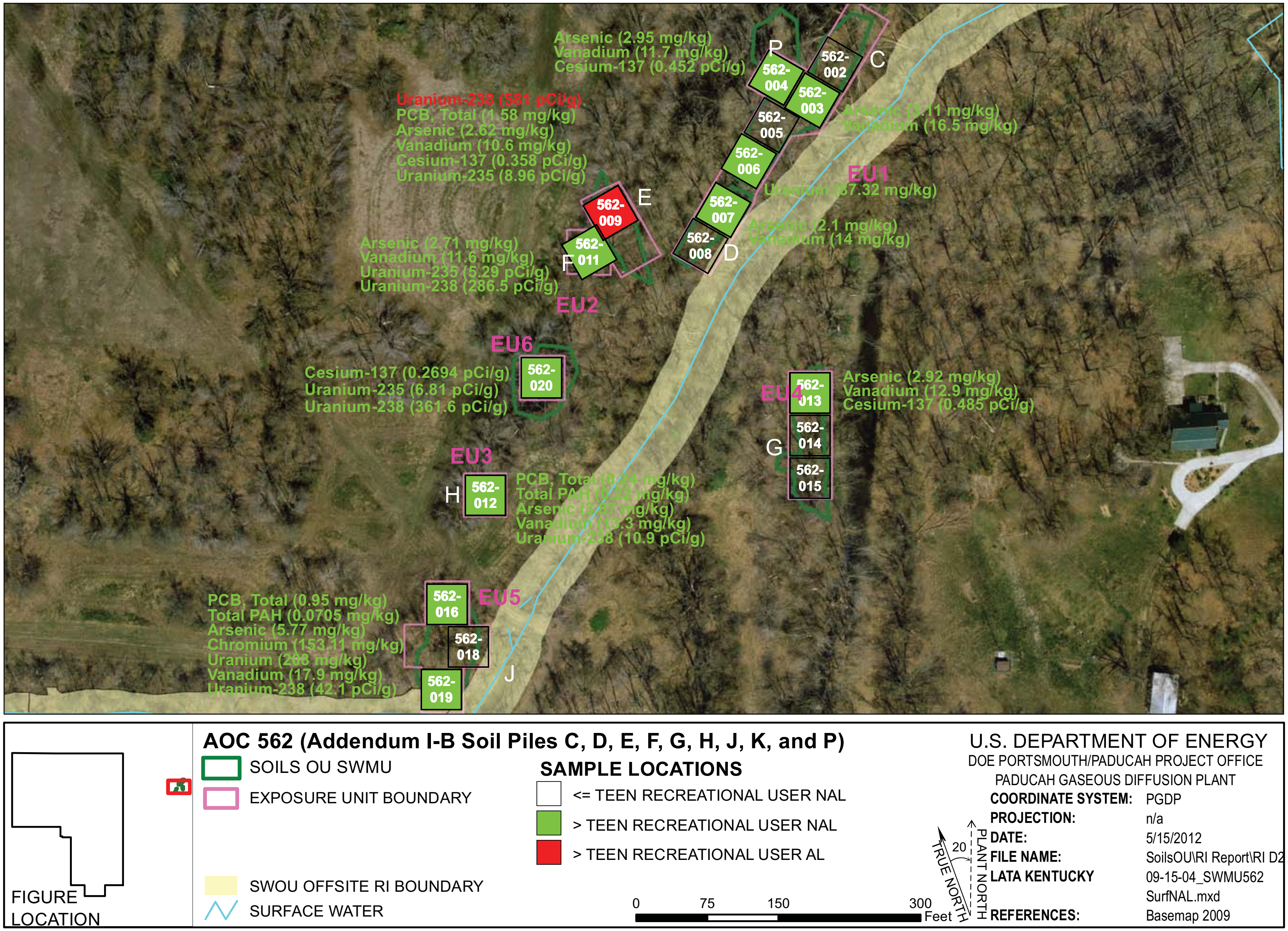


Figure 9.13.4. AOC 562 NAL Exceedances - Surface Soil

SVOCs

Total PAHs were detected above the teen recreator NALs in the AOC 562 surface soil in grids 12 (EU 3) and 16 (EU 5).

No SVOCs were detected above the teen recreator ALs in the AOC 562 surface soil.

Pyrene and Total PAHs in grids 12 (EU 3) and 15 (EU 5) were detected above the SSLs for the protection of UCRS groundwater. No VOCs were detected above the SSLs for the protection of RGA groundwater in the AOC 562 surface soil.

VOCs

No surface soil samples from AOC 562 were analyzed for VOCs.

Radionuclides

Radionuclides were detected above the teen recreator NALs in the AOC 562 surface soil. The following are the radionuclides detected at or above both the background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Uranium-235	9, 11, 20	2, 6
Uranium-235/236	19	5
Uranium-238	9, 11, 12, 16, 19, 20	2, 3, 5, 6

Grids 9 and 11 (EU 2), 12 (EU 3), 16 and 19 (EU 5), and 20 (EU 6) are located within the administrative boundary of AOC 562.

Uranium-238 in grid 9 (EU 2) was detected above both the background screening level and the teen recreator AL in the AOC 562 surface soil.

The following are the radionuclides detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Americium-241[1]	11, 20	2, 6
Plutonium-238	11, 20	2, 6
Plutonium-239/240	11	2
Technetium-99	9, 11	2
Uranium-238	9, 11, 12, 16, 20	2, 3, 5, 6

[1] No background value is available.

Uranium-238 in grids 9, 11 (EU 2), and 20 (EU 6) was detected above both the background screening level and the SSL for the protection of RGA groundwater in AOC 562 surface soils.

9.13.4 Nature and Extent of Contamination—Subsurface Soils

The representative data set presented in Table 9.13.3 provides the nature of the contamination in AOC 562 subsurface soils. Figures 9.13.5–9.13.7 illustrate the horizontal extent of subsurface soil contamination. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU/AOC#–grid#, with zeros filling the appropriate spaces to make three digits.

Table 9.13.3. Subsurface Soil Historical Data Summary: SWMU 562 Addendum 1B Soil Piles D, H, J, C, E, F, G, and P

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	4.46E+03	9.34E+03	6.72E+03	0/18	18/18	0/18	1.20E+04	0/18	2.77E+04	0/18	8.91E+06	0/18	18/18	18.3 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	2.10E-01	0/18	1.78E+00	0/18	1.90E+03	0/18	0/18	6.86 - 9.89
METAL	Arsenic	mg/kg	1.75E+00	1.18E+01	3.90E+00	0/18	18/18	1/18	7.90E+00	18/18	1.02E+00	0/18	1.02E+02	0/18	18/18	0.916 - 0.998
METAL	Barium	mg/kg	4.30E+01	2.83E+02	9.03E+01	0/18	18/18	1/18	1.70E+02	0/18	4.15E+02	0/18	4.58E+05	0/18	3/18	2.29 - 2.5
METAL	Beryllium	mg/kg	6.81E-01	6.81E-01	6.81E-01	0/18	1/18	0/18	6.90E-01	1/18	1.29E-02	0/18	8.65E+00	0/18	0/18	0.458 - 0.499
METAL	Cadmium	mg/kg	5.17E-01	6.23E-01	5.66E-01	0/18	3/18	3/18	2.10E-01	0/18	3.14E+00	0/18	3.14E+02	0/18	3/18	0.458 - 0.499
METAL	Calcium	mg/kg	1.58E+02	1.32E+03	6.86E+02	10/18	18/18	0/18	6.10E+03	0/18	n/a	0/18	n/a	n/a	n/a	91.6 - 99.8
METAL	Chromium	mg/kg	7.45E+00	3.15E+02	5.87E+01	0/57	45/57	22/57	4.30E+01	12/57	7.15E+01	0/57	7.15E+03	0/57	0/57	2.29 - 2.5
METAL	Cobalt	mg/kg	2.95E+00	9.29E+00	5.06E+00	0/18	18/18	0/18	1.30E+01	2/18	8.45E+00	0/18	3.29E+03	18/18	18/18	0.916 - 0.998
METAL	Copper	mg/kg	4.09E+00	1.13E+01	7.32E+00	0/18	18/18	0/18	2.50E+01	0/18	1.13E+03	0/18	4.75E+05	0/18	0/18	2.29 - 2.5
METAL	Iron	mg/kg	6.66E+03	1.98E+04	9.01E+03	0/18	18/18	0/18	2.80E+04	0/18	1.98E+04	0/18	8.31E+06	18/18	18/18	18.3 - 20
METAL	Lead	mg/kg	7.16E+00	3.57E+01	1.37E+01	0/57	52/57	1/57	2.30E+01	0/57	4.00E+02	0/57	4.00E+02	0/57	23/57	0.916 - 0.998
METAL	Magnesium	mg/kg	4.66E+02	8.72E+02	6.62E+02	0/18	18/18	0/18	2.10E+03	0/18	n/a	0/18	n/a	n/a	n/a	4.58 - 4.99
METAL	Manganese	mg/kg	2.26E+02	5.49E+02	3.91E+02	0/18	18/18	0/18	8.20E+02	0/18	3.47E+03	0/18	2.94E+05	18/18	18/18	2.29 - 2.5
METAL	Mercury	mg/kg	1.60E-02	3.00E-02	2.03E-02	0/18	10/18	0/18	1.30E-01	0/18	6.25E-01	0/18	7.88E+02	0/18	0/18	0.014 - 0.017
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	1.42E+02	0/18	5.94E+04	0/18	0/18	4.58 - 4.99
METAL	Nickel	mg/kg	4.73E+00	8.77E+00	6.22E+00	0/18	12/18	0/18	2.20E+01	0/18	2.98E+01	0/18	3.07E+04	0/18	12/18	4.58 - 4.99
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	7.00E-01	0/18	1.42E+02	0/18	5.93E+04	0/18	0/18	0.916 - 0.998
METAL	Silver	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	2.70E+00	0/18	7.45E+00	0/18	8.07E+03	0/18	0/18	1.72 - 2.47
METAL	Sodium	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	3.40E+02	0/18	n/a	0/18	n/a	n/a	n/a	183 - 200
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	3.40E-01	0/18	2.27E+00	0/18	9.50E+02	0/18	0/18	1.83 - 2
METAL	Uranium	mg/kg	4.62E+00	2.27E+02	5.05E+01	0/57	43/57	43/57	4.60E+00	6/57	8.49E+01	0/57	3.50E+04	0/57	37/57	0.954 - 47.5
METAL	Vanadium	mg/kg	1.02E+01	2.80E+01	1.54E+01	0/18	18/18	0/18	3.70E+01	18/18	1.04E-01	0/18	7.61E+01	18/18	18/18	2.29 - 2.5
METAL	Zinc	mg/kg	1.94E+01	7.96E+01	3.41E+01	0/18	16/18	2/18	6.00E+01	0/18	8.50E+03	0/18	3.56E+06	0/18	15/18	18.3 - 20
PPCB	PCB, Total	mg/kg	1.30E-01	2.01E+00	7.04E-01	0/58	9/58	0/58	n/a	8/58	1.83E-01	0/58	1.83E+01	0/58	9/58	0.13 - 0.13
PPCB	PCB, Total	mg/kg	1.30E-01	2.01E+00	7.04E-01	0/58	9/58	0/58	n/a	8/58	1.83E-01	0/58	1.83E+01	0/58	9/58	0.13 - 0.13
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	5.87E+02	0/18	1.76E+04	0/18	0/18	0.47 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.47 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	3.25E+03	0/18	9.74E+04	0/18	0/18	0.47 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.47 - 0.5
SVOA	Fluoranthene	mg/kg	6.20E-01	6.20E-01	6.20E-01	0/18	1/18	0/18	n/a	0/18	4.47E+02	0/18	1.34E+04	0/18	0/18	0.47 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	4.19E+02	0/18	1.26E+04	0/18	0/18	0.47 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	5.27E+00	0/18	5.27E+02	0/18	0/18	0.47 - 0.5
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	n/a	0/18	n/a	n/a	n/a	0.47 - 0.5
SVOA	Polycyclic aromatic hydrocarbons (PAH)	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.57E-02	0/1	5.57E+00	n/a	n/a	0.2 - 0.2
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/18	0/18	0/18	n/a	0/18	3.35E+02	0/18	1.00E+04	0/18	0/18	0.47 - 0.5
SVOA	Total PAH	mg/kg	9.00E-05	9.00E-05	9.00E-05	0/57	1/57	0/57	n/a	0/57	5.57E-02	0/57	5.57E+00	0/57	0/57	0.2 - 0.2
RADS	Americium-241	pCi/g	-1.11E-02	1.01E-03	-5.33E-03	0/17	17/17	0/17	n/a	0/17	1.28E+01	0/17	1.28E+03	0/17	0/17	0.0155 - 0.0244
RADS	Cesium-137	pCi/g	-2.27E-02	4.91E-01	6.96E-02	0/18	18/18	2/18	2.80E-01	2/18	1.98E-01	0/18	1.98E+01	0/18	0/18	0.00922 - 0.101
RADS	Neptunium-237	pCi/g	-2.59E-02	-3.85E-03	-1.67E-02	0/16	16/16	0/16	n/a	0/16	6.26E-01	0/16	6.26E+01	0/16	0/16	0.0462 - 0.0532
RADS	Plutonium-238	pCi/g	-3.07E-02	-1.84E-03	-1.02E-02	0/14	14/14	0/14	n/a	0/14	3.64E+01	0/14	3.64E+03	0/14	0/14	0.0109 - 0.0603
RADS	Plutonium-239/240	pCi/g	-4.97E-03	5.67E-03	-8.82E-04	0/17	17/17	0/17	n/a	0/17	3.56E+01	0/17	3.56E+03	0/17	0/17	0.0115 - 0.0158
RADS	Technetium-99	pCi/g	-5.00E-01	7.61E-01	7.39E-02	0/18	18/18	0/18	2.80E+00	0/18	1.11E+03	0/18	1.11E+05	0/18	4/18	0.617 - 0.774
RADS	Thorium-228	pCi/g	2.01E-01	3.92E-01	2.93E-01	0/18	18/18	0/18	1.60E+00	0/18	n/a	0/18	n/a	n/a	n/a	0.117 - 0.119

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.13.3. Subsurface Soil Historical Data Summary: SWMU 562 Addendum 1B Soil Piles D, H, J, C, E, F, G, and P (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
RADS	Thorium-230	pCi/g	1.40E-01	3.30E-01	2.14E-01	0/18	18/18	0/18	1.40E+00	0/18	4.49E+01	0/18	4.49E+03	0/18	1/18	0.0835 - 0.134
RADS	Thorium-232	pCi/g	2.57E-01	4.47E-01	3.30E-01	0/18	18/18	0/18	1.50E+00	0/18	n/a	0/18	n/a	n/a	n/a	0.0455 - 0.0816
RADS	Uranium	pCi/g	3.24E-01	3.24E-01	3.24E-01	0/1	1/1	0/1	n/a	0/1	4.02E+00	0/1	4.02E+02	0/1	0/1	0.25 - 0.25
RADS	Uranium-234	pCi/g	8.64E-02	4.68E+00	1.07E+00	0/18	18/18	5/18	1.20E+00	0/18	6.25E+01	0/18	6.25E+03	0/18	0/18	0.0706 - 0.121
RADS	Uranium-235	pCi/g	-3.41E-03	5.91E-01	1.51E-01	0/18	18/18	9/18	6.00E-02	0/18	9.12E-01	0/18	9.12E+01	0/18	0/18	0.0116 - 0.0214
RADS	Uranium-235	wt %	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	-
RADS	Uranium-238	pCi/g	4.29E-02	4.42E+01	8.94E+00	0/18	18/18	16/18	1.20E+00	9/18	4.02E+00	0/18	4.02E+02	0/18	9/18	0.099 - 1.31

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

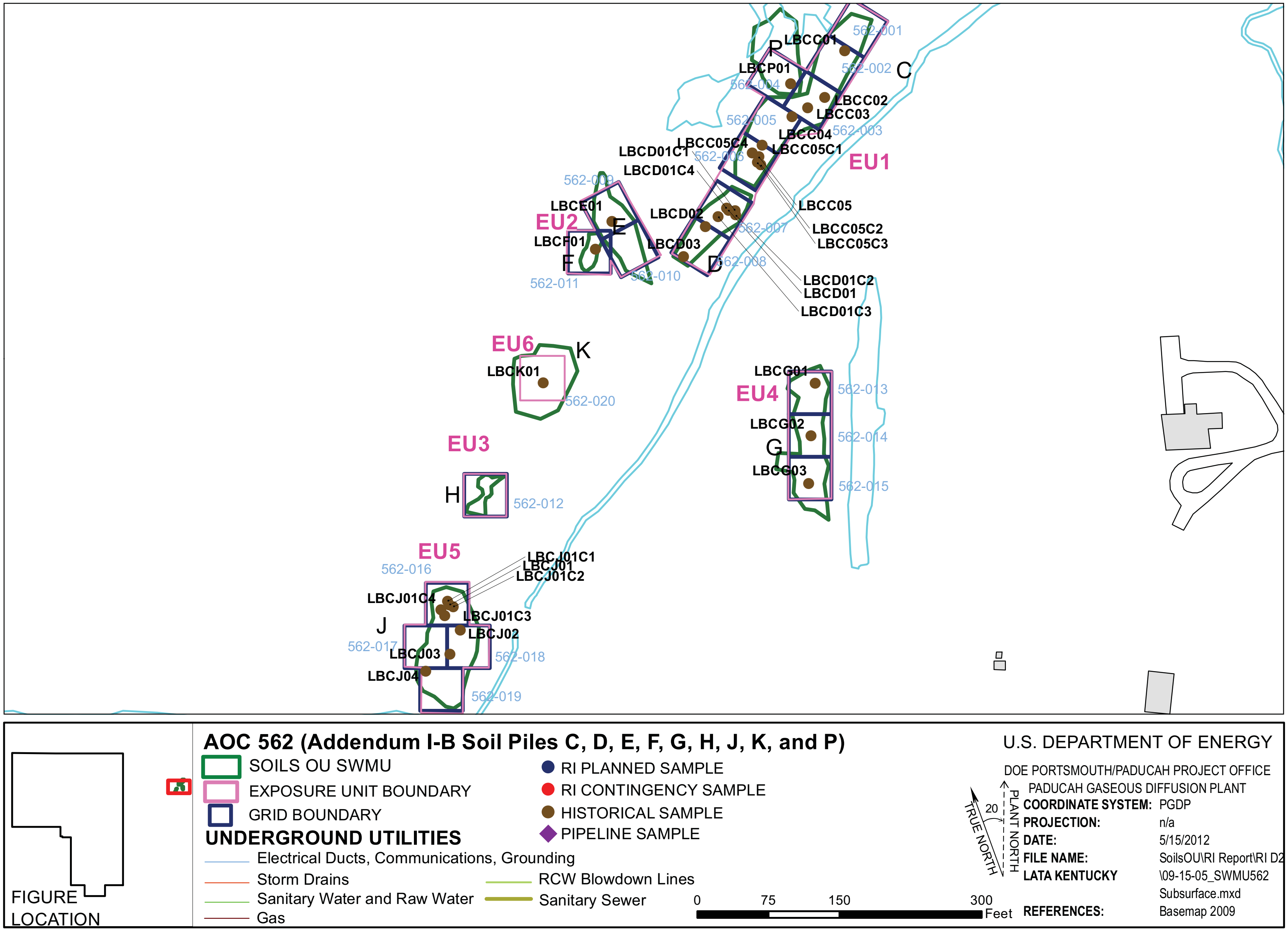


Figure 9.13.5. AOC 562 Sample Locations - Subsurface Soil

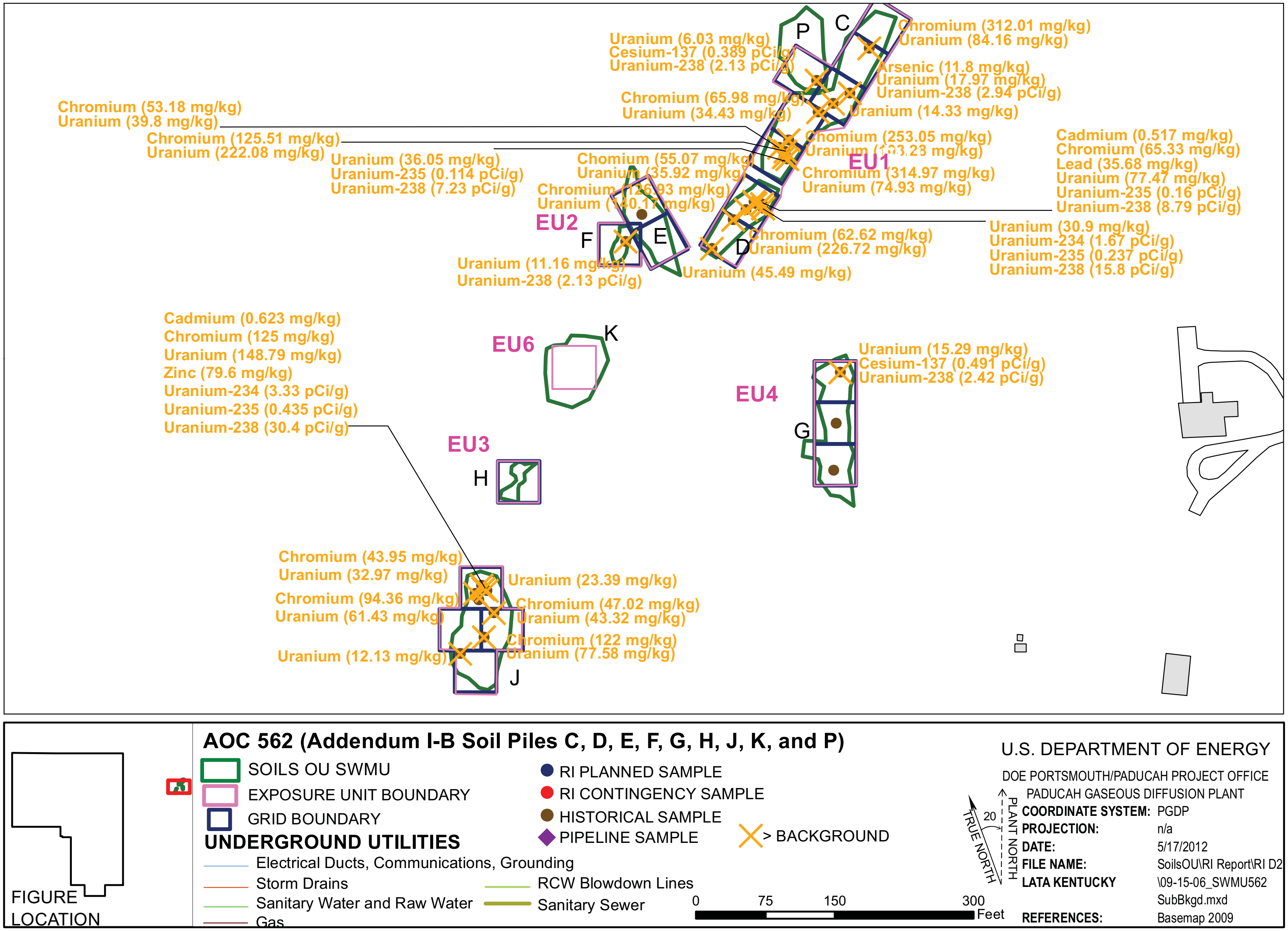


Figure 9.13.6. AOC 562 Background Exceedances - Subsurface Soil

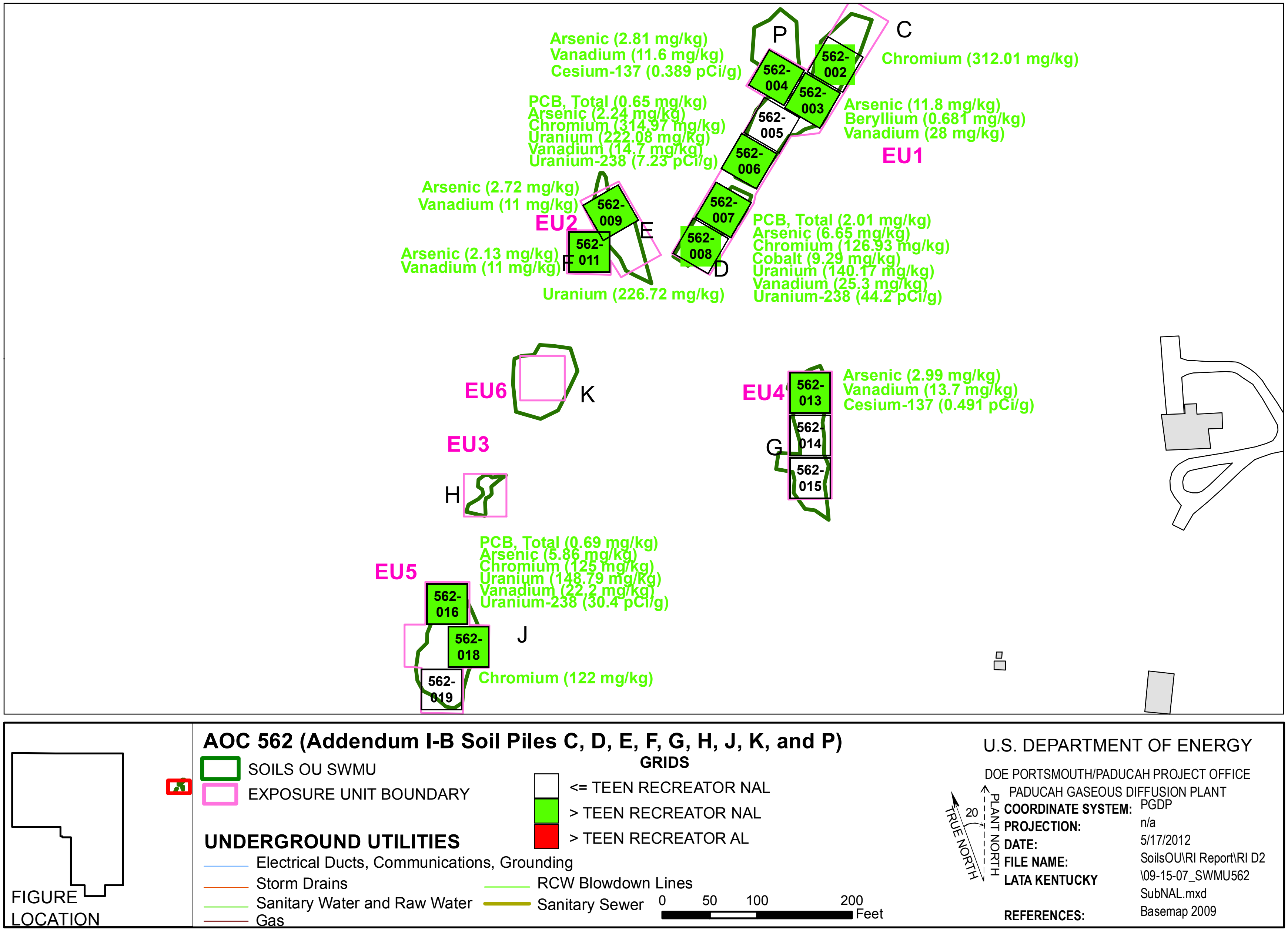


Figure 9.13.7. AOC 562 NAL Exceedances - Subsurface Soil

The horizontal and vertical extent of AOC 562 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. AOC 562 consists of six EUs.

Metals

Metals were detected above the teen recreator NALs in the AOC 562 subsurface soil. The following are the metals detected at or above both the background screening levels and the teen recreator NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	3	1
Chromium	2, 6, 7, 16, 18	1, 5
Uranium	6, 7, 8, 16	1, 5

Grids 2, 3, 6, 7, and 8 (EU 1), and 16 and 18 (EU 5) are located within the administrative boundary of AOC 562.

The maximum depth at which metals were detected (in samples associated with this RI Report) at or above both the background screening levels and the teen recreator NALs was 10 ft bgs. The end depths of the boreholes taken from grids 2, 3, 6, 7, 8, 16, and 18 ranged from 1 to 12 ft bgs.

No metals were detected above both the background screening levels and the teen recreator ALs in the AOC 562 subsurface soil.

The following are the metals detected in the AOC 562 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	3	1
Barium	20	6
Cadmium	7, 16	1, 5
Lead	7	1
Uranium	2, 3, 5, 6, 7, 8, 13, 16, 18	1, 4, 5
Zinc	16	5

No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the teen recreator NALs in the subsurface soil of grids 6, 7, and 16 (EUs 1 and 5).

The maximum depth at which PCBs were detected above the teen recreator NAL was 12 ft bgs.

Total PCBs in grids 6, 7 (EU 1) and 16 (EU 5) were detected above the SSLs for the protection of UCRS groundwater in the AOC 562 subsurface soil.

PCBs were not detected above the teen recreator ALs or the SSLs for the protection of RGA groundwater.

SVOCs

No SVOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the AOC 562 subsurface soil.

VOCs

No subsurface soil samples from AOC 562 were analyzed for VOCs.

Radionuclides

Radionuclides were detected above the teen recreator NALs in the AOC 562 subsurface soil. The following are the radionuclides detected at or above both the background screening levels and the teen recreator NALs and the grid numbers in which they were detected.

Radionuclide	Grid	EU
Cesium-137	4, 13	1, 4
Uranium-238	6, 7, 16	1, 5

Grids 4, 6, 7 (EU 1), 13 (EU 4), and 16 (EU 5) are located within the administrative boundary of AOC 562.

The maximum depth at which radionuclides were detected at or above both the background screening levels and the teen recreator NALs was 12 ft bgs.

No radionuclides were detected above both the background screening levels and the teen recreator ALs in the AOC 562 subsurface soil.

Uranium-238 in grids 6, 7 (EU 1), and 16 (EU 5) were detected above both the background screening level and the SSL for the protection of UCRS groundwater. No radionuclides were detected both the background screening levels and the SSLs for the protection of RGA groundwater.

9.13.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is potential for runoff because these soil piles are on the banks of Little Bayou Creek; however, AOC 562 is grass-covered or otherwise stabilized and the contaminants are not likely to be transported attached to suspended soil particles. Based on results from the Site Evaluation Report for Soil Pile I (SWMU 561), potential contaminants are not migrating away from the soil piles (DOE 2008d). Soil piles are believed to have similar origin. Little Bayou Creek is scheduled to be investigated as part of the SWOU. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs/AOCs to surrounding ditches.

9.13.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for AOC 562. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for one or more EUs at AOC 562 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this AOC will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.13.4 for the outdoor worker (exposed to surface soils), the excavation worker, the hypothetical resident, and the teen recreational user. Table 9.13.4 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this AOC under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for AOC 562 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 9.13.5.

9.13.7 AOC 562 Summary

The following text summarizes the results for AOC 562 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

A plant process that could have contributed to contamination at this site is dredging Little Bayou Creek to keep it free-flowing for PGDP discharges.

COPCs for surface and subsurface soils from AOC 562 are shown on Tables 9.13.1–9.13.3 as those analytes with green boxes under the “Teen Recreator/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 12 ft bgs. A complete list of sampling results is provided in Appendix G. The COPCs identified for each EU at AOC 562 are as follows:

- EU 1
  - Surface—metals, radionuclides
  - Subsurface—metals, PCBs, radionuclides
- EU 2
  - Surface—PCB, radionuclides
  - Subsurface—metals, radionuclides

Table 9.13.4. RGOs for AOC 562

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Outdoor Worker (exposed to surface soil)											
1	Uranium-238	2.73E+00	pCi/g	2.3E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**2.3E-06**				**< 1**			
2	PCB, Total	1.58E+00	mg/kg	9.7E-06	1.62E-01	1.62E+00	1.62E+01	< 1	n/a	n/a	n/a
	Uranium-234	5.34E+01	pCi/g	1.9E-05	2.83E+00	2.83E+01	2.83E+02	n/a	n/a	n/a	n/a
	Uranium-235	8.96E+00	pCi/g	2.0E-05	4.55E-01	4.55E+00	4.55E+01	n/a	n/a	n/a	n/a
	Uranium-238	5.81E+02	pCi/g	5.0E-04	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**5.4E-04**				**< 1**			
3	PCB, Total	2.40E-01	mg/kg	1.5E-06	1.62E-01	1.62E+00	1.62E+01	< 1	n/a	n/a	n/a
	Total PAH	2.20E-01	mg/kg	4.5E-06	4.85E-02	4.85E-01	4.85E+00	< 1	n/a	n/a	n/a
	Uranium-238	1.09E+01	pCi/g	9.3E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.5E-05**				**< 1**			
4	Chromium	4.67E+01	mg/kg	1.1E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	Uranium-238	2.24E+00	pCi/g	1.9E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**3.0E-06**				**< 1**			
5	Chromium	1.53E+02	mg/kg	3.8E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	PCB, Total	9.50E-01	mg/kg	5.9E-06	1.62E-01	1.62E+00	1.62E+01	< 1	n/a	n/a	n/a
	Total PAH	7.05E-02	mg/kg	1.5E-06	4.85E-02	4.85E-01	4.85E+00	< 1	n/a	n/a	n/a
	Uranium-234	8.57E+00	pCi/g	3.0E-06	2.83E+00	2.83E+01	2.83E+02	n/a	n/a	n/a	n/a
	Uranium-235	9.50E-01	pCi/g	2.1E-06	4.55E-01	4.55E+00	4.55E+01	n/a	n/a	n/a	n/a
	Uranium-238	6.24E+01	pCi/g	5.3E-05	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.9E-05**				**< 1**			
6	Uranium-234	4.01E+01	pCi/g	1.4E-05	2.83E+00	2.83E+01	2.83E+02	n/a	n/a	n/a	n/a
	Uranium-235	6.81E+00	pCi/g	1.5E-05	4.55E-01	4.55E+00	4.55E+01	n/a	n/a	n/a	n/a
	Uranium-238	3.62E+02	pCi/g	3.1E-04	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**3.4E-04**				**< 1**			
Excavation Worker											
2	Uranium-238	5.81E+02	pCi/g	6.2E-06	9.38E+01	9.38E+02	9.38E+03	n/a	n/a	n/a	n/a
	Cumulative			**6.2E-06**				**< 1**			
6	Uranium-238	3.62E+02	pCi/g	3.9E-06	9.38E+01	9.38E+02	9.38E+03	n/a	n/a	n/a	n/a
	Cumulative			**3.9E-06**				**< 1**			

Table 9.13.4. RGOs for AOC 562 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Hypothetical Resident[5]											
1	Uranium-238	2.73E+00	pCi/g	7.9E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**7.9E-06**				**< 1**			
2	PCB, Total	1.58E+00	mg/kg	2.5E-05	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Uranium-234	5.34E+01	pCi/g	1.1E-05	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	8.96E+00	pCi/g	1.1E-04	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	5.81E+02	pCi/g	1.7E-03	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.8E-03**				**< 1**			
3	Chromium	3.82E+01	mg/kg	2.5E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	PCB, Total	2.40E-01	mg/kg	3.8E-06	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Total PAH	2.20E-01	mg/kg	1.1E-05	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-235	1.63E-01	pCi/g	2.1E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	1.09E+01	pCi/g	3.2E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**5.1E-05**				**< 1**			
4	Chromium	4.67E+01	mg/kg	3.0E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Uranium-238	2.24E+00	pCi/g	6.5E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**9.5E-06**				**< 1**			
5	Chromium	1.53E+02	mg/kg	9.8E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	PCB, Total	9.50E-01	mg/kg	1.5E-05	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Total PAH	7.05E-02	mg/kg	3.6E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-234	8.57E+00	pCi/g	1.8E-06	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	9.50E-01	pCi/g	1.2E-05	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	6.24E+01	pCi/g	1.8E-04	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**2.2E-04**				**< 1**			
6	Uranium-234	4.01E+01	pCi/g	8.3E-06	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	6.81E+00	pCi/g	8.7E-05	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	3.62E+02	pCi/g	1.0E-03	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.1E-03**				**< 1**			

Table 9.13.4. RGOs for AOC 562 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Teen Recreational User											
2	PCB, Total	1.58E+00	mg/kg	5.3E-06	2.99E-01	2.99E+00	2.99E+01	< 1	n/a	n/a	n/a
	Uranium-235	8.96E+00	pCi/g	4.7E-06	1.90E+00	1.90E+01	1.90E+02	n/a	n/a	n/a	n/a
	Uranium-238	5.81E+02	pCi/g	6.8E-05	8.56E+00	8.56E+01	8.56E+02	n/a	n/a	n/a	n/a
	Cumulative			**7.8E-05**				**< 1**			
3	Total PAH	2.20E-01	mg/kg	2.4E-06	8.99E-02	8.99E-01	8.99E+00	< 1	n/a	n/a	n/a
	Uranium-238	1.09E+01	pCi/g	1.3E-06	8.56E+00	8.56E+01	8.56E+02	n/a	n/a	n/a	n/a
	Cumulative			**9.1E-06**				**< 1**			
5	PCB, Total	9.50E-01	mg/kg	3.2E-06	2.99E-01	2.99E+00	2.99E+01	< 1	n/a	n/a	n/a
	Uranium-238	6.24E+01	pCi/g	7.3E-06	8.56E+00	8.56E+01	8.56E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.0E-05**				**< 1**			
6	Uranium-235	6.81E+00	pCi/g	3.6E-06	1.90E+00	1.90E+01	1.90E+02	n/a	n/a	n/a	n/a
	Uranium-238	3.62E+02	pCi/g	4.2E-05	8.56E+00	8.56E+01	8.56E+02	n/a	n/a	n/a	n/a
	Cumulative			**4.6E-05**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.74, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.74, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 9.13.5. Ecological Screening for AOC 562

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Soil/grass mix with trees	Yes	182	PCB, Total	n/a	2.50E+00	2.00E-02	125
			Uranium	4.90E+00	2.08E+02	5.00E+00	42

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

- EU 3
  - Surface—metals, PCBs, PAHs, radionuclides
  - Subsurface—PCBs, PAHs, radionuclides
- EU 4
  - Surface—metals, radionuclides
  - Subsurface—metals, radionuclides
- EU 5
  - Surface—metals, PCBs, PAHs, radionuclides
  - Subsurface—metals, PCBs, PAHs, radionuclides

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at AOC 562 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at AOC 562. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soil), excavation worker, hypothetical residential, and teen recreational user scenarios. COCs for these scenarios for AOC 562 are as follows:

- Outdoor worker (exposed to surface soil)
  - Chromium
  - Total PAHs
  - Total PCBs
  - Uranium-234
  - Uranium-235
  - Uranium-238
- Excavation worker
  - Uranium-238
- Hypothetical Resident (hazards evaluated against the child resident)
  - Chromium
  - Total PAHs
  - Total PCBs
  - Uranium-234
  - Uranium-235
  - Uranium-238
- Teen Recreational User

- Total PAHs
- Total PCBs
- Uranium-235
- Uranium-238

Of the above, uranium-238 for the outdoor worker (exposed to surface soil) and the uranium-235 and uranium-238 for the hypothetical resident are priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04). Priority COCs for other scenarios are described in Appendix D. Figure 9.13.8 also shows the COCs exceeding RGOs for the teen recreator.

For AOC 562, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Total PCBs
- Uranium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for AOC 562 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. AOC 562 is on the banks of Little Bayou Creek. The Addendum 1B SER (DOE 2009d) stated that PGDP monitoring data indicates that little to no migration has taken place to date from these piles. Because of this, a response action at these piles would have no effect on the surface water integrator OU.

9.13.8 AOC 562 Conclusion

The RI adequately defined the nature and extent of contamination in soils at AOC 562; an FS is appropriate for the AOC due to risk exceeding the decision rule benchmark for scenarios including outdoor worker (exposed to surface soil), excavation worker, hypothetical resident, and teen recreational user (DOE 2010a). The reasonably anticipated future land use of this AOC is recreational as shown in the SMP (DOE 2012a). This area is outside the limited area, away from the plant site, but on the bank of Little Bayou Creek, which receives PGDP discharges. Periodic maintenance of the channel will be required by PGDP workers.

9.14 AOC 563, SOIL PILES 20, CC, AND BW IN SUBUNIT 4

9.14.1 Background

Sampling, field reconnaissance, and field radioactivity measurements at AOC 563 were completed in December 2006 as part of the Addendum 1B effort. An investigation of all soils in Addendum 1B was completed in December 2008, which included AOC 563. Soil Pile 20 consists of one conical-shaped small pile approximately 25 ft by 25 ft by 6 ft high. Soil Pile BW consists of one rectangular-shaped pile approximately 150 ft by 25 ft generally uniform in height, approximately 5 ft, with an irregular surface. Soil Pile CC is a large soil pile approximately 75 ft by 25 ft by 3 ft high.

Historical research was performed to attempt to determine the origin of the piles. Origin of the Addendum 1-B Soil Piles remains unknown, although the location and shape indicates that many of the PGDP-related soil piles are likely to have originated from excavations associated with the creation, periodic dredging, and cleanout of the outfalls, ditches, and creeks that comprise the PGDP surface water management system. AOC 563 is along the banks of Little Bayou Creek KPDES Outfall Ditch 002.

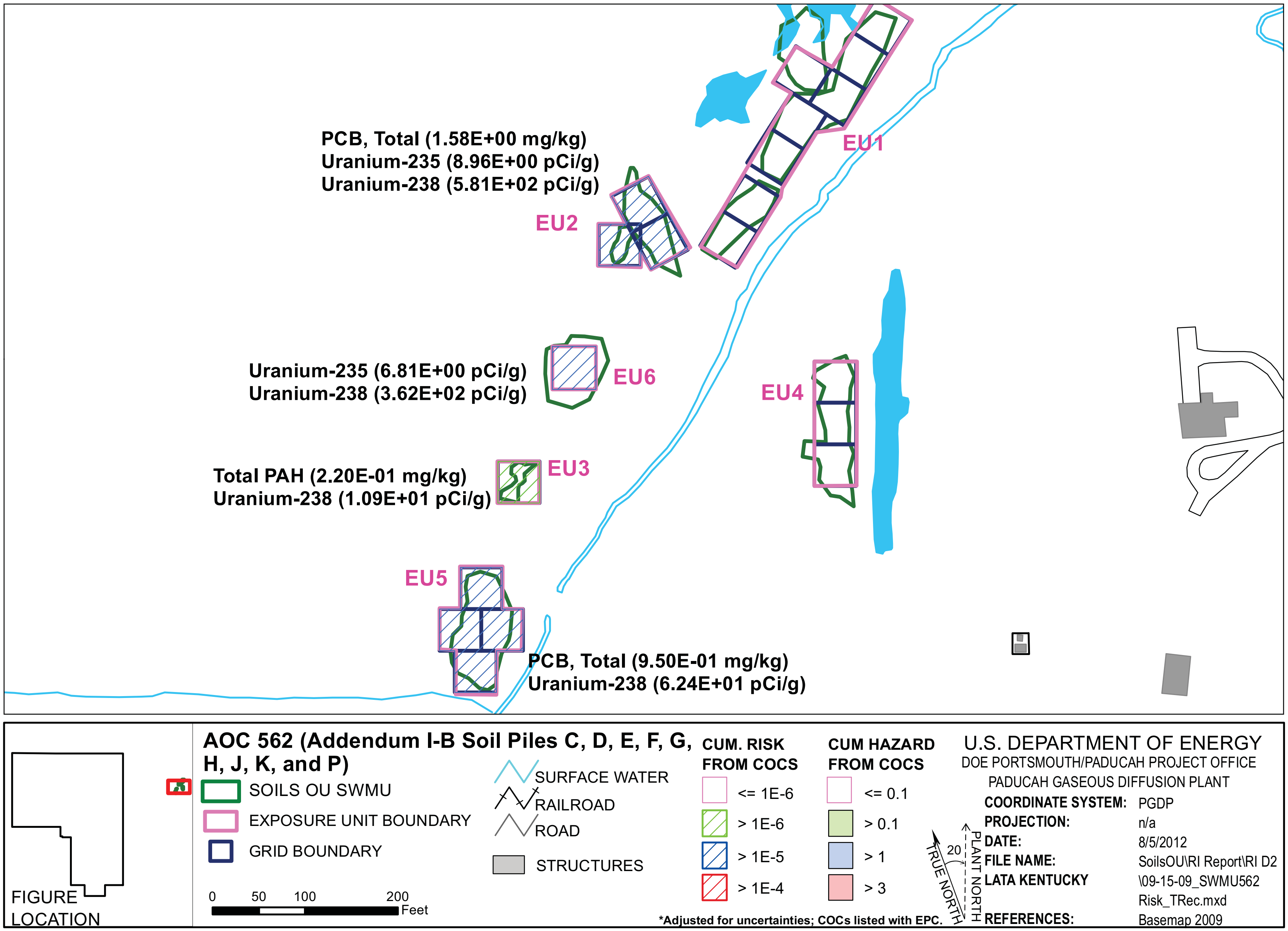


Figure 9.13.8. Summary of COCs Contributing to Risk to the Teen Recreator at AOC 562

Management of the surface water system at PGDP no longer allows piling soil along the ditch or creek banks outside the SWMU boundaries.

At AOC 563, chromium was found in soil pile 20, PCBs were found at soil pile BW, and uranium-238 was found in soil pile CC.

9.14.2 Fieldwork Summary

The historical data are representative of the nature and adequately delineate the extent of the contamination; therefore, no samples were collected from AOC 563 during the Soils OU RI sampling effort (DOE 2010a).

A gamma radiological walkover survey (Figure 9.14.1) was conducted on this AOC during the RI using a FIDLER; the 1,356 measurements ranged from 5,715 to 16,731 gross cpm. Soil Pile Addendum 1B survey data have been added to Figure 9.14.1 to supplement the 2010 data. The two surveys show similar contamination levels throughout the pile; therefore, the historical data fill the data gap of areas not accessible for survey in 2010. The Addendum 1B data were collected using a 2 x 2 NaI probe. The area consists entirely of soil and grass with trees. A judgmental sample was collected for radiological constituents.

9.14.3 Nature and Extent of Contamination—Surface Soils

For AOC 563, the representative data set for surface soils is presented in Tables 9.14.1 and 9.14.2 and provides the nature of the contamination in AOC 563 surface soils. Figures 9.14.2–9.14.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU/AOC#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of AOC 563 surface soil contamination is considered adequately defined for supporting the BRA and FS. AOC 563 consists of two EUs.

Metals

Chromium was detected above both the background screening level and the teen recreator NAL in grids 1, 2, and 4 (EU 1) in the AOC 563 surface soil.

Grids 1, 2, and 4 are located within the administrative boundary of AOC 563.

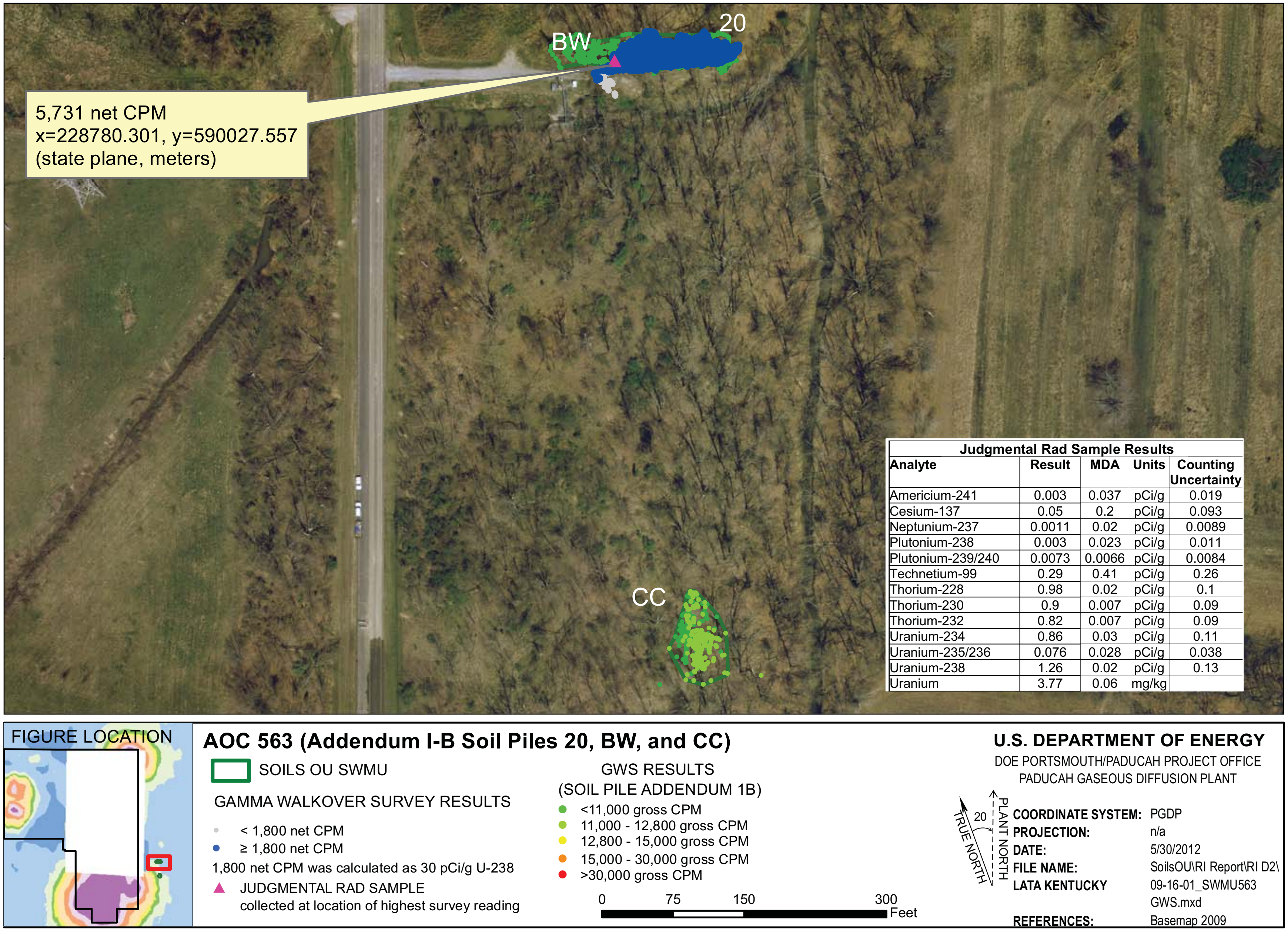
No metals were detected above both the background screening levels and the teen recreator ALs in the AOC 563 surface soil.

The following metals were detected in the AOC 563 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater: cadmium in grids 1 and 2 (EU 1), uranium in grid 4 (EU 1), and zinc in grids 1 and 2 (EU 1).

No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater in the AOC 563 surface soil.

PCBs

Total PCBs were detected above the teen recreator NAL in the surface soil of grids 1 and 2 (EU 1).



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.003	0.037	pCi/g	0.019
Cesium-137	0.05	0.2	pCi/g	0.093
Neptunium-237	0.0011	0.02	pCi/g	0.0089
Plutonium-238	0.003	0.023	pCi/g	0.011
Plutonium-239/240	0.0073	0.0066	pCi/g	0.0084
Technetium-99	0.29	0.41	pCi/g	0.26
Thorium-228	0.98	0.02	pCi/g	0.1
Thorium-230	0.9	0.007	pCi/g	0.09
Thorium-232	0.82	0.007	pCi/g	0.09
Uranium-234	0.86	0.03	pCi/g	0.11
Uranium-235/236	0.076	0.028	pCi/g	0.038
Uranium-238	1.26	0.02	pCi/g	0.13
Uranium	3.77	0.06	mg/kg	

Figure 9.14.1. AOC 563 Gamma Walkover Survey

Table 9.14.1. Surface Soil Historical Data Summary: SWMU 563 Addendum 1B Soil Piles 20, BW, and CC

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	7.30E+03	9.50E+03	8.41E+03	0/3	3/3	0/3	1.30E+04	0/3	2.77E+04	0/3	8.91E+06	0/3	3/3	18.4 - 39.2
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.10E-01	0/3	1.78E+00	0/3	1.90E+03	0/3	0/3	7.05 - 8.26
METAL	Arsenic	mg/kg	4.69E+00	7.40E+00	5.73E+00	0/3	3/3	0/3	1.20E+01	3/3	1.02E+00	0/3	1.02E+02	0/3	3/3	0.92 - 0.979
METAL	Barium	mg/kg	8.56E+01	9.56E+01	8.94E+01	0/3	3/3	0/3	2.00E+02	0/3	4.15E+02	0/3	4.58E+05	0/3	3/3	2.3 - 2.45
METAL	Beryllium	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	6.70E-01	0/3	1.29E-02	0/3	8.65E+00	0/3	0/3	0.46 - 0.49
METAL	Cadmium	mg/kg	6.41E-01	8.96E-01	7.69E-01	0/3	2/3	2/3	2.10E-01	0/3	3.14E+00	0/3	3.14E+02	0/3	2/3	0.46 - 0.49
METAL	Calcium	mg/kg	1.38E+03	3.68E+03	2.55E+03	2/3	3/3	0/3	2.00E+05	0/3	n/a	0/3	n/a	n/a	n/a	92 - 97.9
METAL	Chromium	mg/kg	1.20E+01	2.85E+02	1.47E+02	0/6	4/6	3/6	1.60E+01	3/6	7.15E+01	0/6	7.15E+03	0/6	0/6	2.3 - 2.45
METAL	Cobalt	mg/kg	5.08E+00	8.91E+00	7.40E+00	0/3	3/3	0/3	1.40E+01	1/3	8.45E+00	0/3	3.29E+03	3/3	3/3	0.92 - 0.979
METAL	Copper	mg/kg	1.06E+01	1.58E+01	1.26E+01	0/3	3/3	0/3	1.90E+01	0/3	1.13E+03	0/3	4.75E+05	0/3	0/3	2.3 - 2.45
METAL	Iron	mg/kg	1.04E+04	1.35E+04	1.21E+04	0/3	3/3	0/3	2.80E+04	0/3	1.98E+04	0/3	8.31E+06	3/3	3/3	18.4 - 19.6
METAL	Lead	mg/kg	9.99E+00	2.12E+01	1.47E+01	0/6	6/6	0/6	3.60E+01	0/6	4.00E+02	0/6	4.00E+02	0/6	3/6	0.92 - 4.9
METAL	Magnesium	mg/kg	1.01E+03	1.28E+03	1.11E+03	0/3	3/3	0/3	7.70E+03	0/3	n/a	0/3	n/a	n/a	n/a	4.6 - 4.9
METAL	Manganese	mg/kg	2.81E+02	5.28E+02	4.42E+02	0/3	3/3	0/3	1.50E+03	0/3	3.47E+03	0/3	2.94E+05	3/3	3/3	2.3 - 2.45
METAL	Mercury	mg/kg	1.80E-02	3.10E-02	2.27E-02	0/3	3/3	0/3	2.00E-01	0/3	6.25E-01	0/3	7.88E+02	0/3	0/3	0.016 - 0.017
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.42E+02	0/3	5.94E+04	0/3	0/3	4.6 - 4.9
METAL	Nickel	mg/kg	6.63E+00	9.05E+00	8.18E+00	0/3	3/3	0/3	2.10E+01	0/3	2.98E+01	0/3	3.07E+04	0/3	3/3	4.6 - 4.9
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	8.00E-01	0/3	1.42E+02	0/3	5.93E+04	0/3	0/3	0.92 - 0.979
METAL	Silver	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.30E+00	0/3	7.45E+00	0/3	8.07E+03	0/3	0/3	1.76 - 2.06
METAL	Sodium	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	3.20E+02	0/3	n/a	0/3	n/a	n/a	n/a	184 - 196
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.10E-01	0/3	2.27E+00	0/3	9.50E+02	0/3	0/3	1.84 - 1.96
METAL	Uranium	mg/kg	1.10E+00	1.51E+01	6.47E+00	0/6	4/6	3/6	4.90E+00	0/6	8.49E+01	0/6	3.50E+04	0/6	1/6	0.92 - 0.979
METAL	Vanadium	mg/kg	1.54E+01	2.53E+01	1.91E+01	0/3	3/3	0/3	3.80E+01	3/3	1.04E-01	0/3	7.61E+01	3/3	3/3	2.3 - 2.45
METAL	Zinc	mg/kg	3.15E+01	1.98E+02	1.04E+02	0/3	3/3	2/3	6.50E+01	0/3	8.50E+03	0/3	3.56E+06	0/3	3/3	18.4 - 19.6
PPCB	PCB, Total	mg/kg	5.90E-01	7.40E-01	6.65E-01	0/7	2/7	0/7	n/a	2/7	1.83E-01	0/7	1.83E+01	0/7	2/7	0.1 - 0.13
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.87E+02	0/3	1.76E+04	0/3	0/3	0.49 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.49 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	3.25E+03	0/3	9.74E+04	0/3	0/3	0.49 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.49 - 0.5
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.47E+02	0/3	1.34E+04	0/3	0/3	0.49 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.19E+02	0/3	1.26E+04	0/3	0/3	0.49 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.27E+00	0/3	5.27E+02	0/3	0/3	0.49 - 0.5
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.49 - 0.5
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	3.35E+02	0/3	1.00E+04	0/3	0/3	0.49 - 0.5
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.57E-02	0/6	5.57E+00	0/6	0/6	0.2 - 0.2
RADS	Americium-241	pCi/g	-4.66E-03	-5.61E-04	-1.85E-03	0/4	4/4	0/4	n/a	0/4	1.28E+01	0/4	1.28E+03	0/4	0/4	0.0192 - 0.0228
RADS	Cesium-137	pCi/g	5.77E-02	6.47E-01	2.77E-01	0/4	4/4	1/4	4.90E-01	3/4	1.98E-01	0/4	1.98E+01	0/4	0/4	0.0332 - 0.0929
RADS	Neptunium-237	pCi/g	-2.60E-02	5.94E-02	7.65E-03	0/4	4/4	0/4	1.00E-01	0/4	6.26E-01	0/4	6.26E+01	0/4	1/4	0.0385 - 0.0514
RADS	Plutonium-238	pCi/g	-6.36E-03	-8.21E-04	-3.84E-03	0/3	3/3	0/3	7.30E-02	0/3	3.64E+01	0/3	3.64E+03	0/3	0/3	0.0111 - 0.0127
RADS	Plutonium-239/240	pCi/g	2.23E-03	1.11E-02	6.78E-03	0/4	4/4	0/4	2.50E-02	0/4	3.56E+01	0/4	3.56E+03	0/4	0/4	0.0111 - 0.0124
RADS	Technetium-99	pCi/g	-8.34E-02	2.94E+00	9.96E-01	0/4	4/4	1/4	2.50E+00	0/4	1.11E+03	0/4	1.11E+05	0/4	2/4	0.537 - 2.35
RADS	Thorium-228	pCi/g	3.30E-01	9.03E-01	4.97E-01	0/4	4/4	0/4	1.60E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.0994 - 0.158
RADS	Thorium-230	pCi/g	2.56E-01	1.06E+00	4.94E-01	0/4	4/4	0/4	1.50E+00	0/4	4.49E+01	0/4	4.49E+03	0/4	3/4	0.105 - 0.133
RADS	Thorium-232	pCi/g	3.49E-01	7.85E-01	4.75E-01	0/4	4/4	0/4	1.50E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.0663 - 0.0727
RADS	Uranium-234	pCi/g	1.21E-01	8.77E-01	5.43E-01	0/4	4/4	0/4	1.20E+00	0/4	6.25E+01	0/4	6.25E+03	0/4	0/4	0.0999 - 0.121
RADS	Uranium-235	pCi/g	-1.54E-04	6.76E-02	4.03E-02	0/4	4/4	1/4	6.00E-02	0/4	9.12E-01	0/4	9.12E+01	0/4	0/4	0.0135 - 0.0214

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.14.1. Surface Soil Historical Data Summary: SWMU 563 Addendum 1B Soil Piles 20, BW, and CC (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
RADS	Uranium-238	pCi/g	1.84E-01	2.76E+00	1.45E+00	0/4	4/4	3/4	1.20E+00	0/4	4.02E+00	0/4	4.02E+02	0/4	0/4	0.105 - 0.115

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.14.2. Surface Soil RI Data Summary: SWMU 563 Addendum 1B Soil Piles 20, BW, and CC

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Uranium	mg/kg	3.77E+00	3.77E+00	3.77E+00	0/1	1/1	0/1	4.90E+00	0/1	8.49E+01	0/1	3.50E+04	0/1	0/1	0.06 - 0.06
RADS	Alpha activity	pCi/g	4.80E+01	4.80E+01	4.80E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	6 - 6
RADS	Americium-241	pCi/g	3.00E-03	3.00E-03	3.00E-03	0/1	1/1	0/1	n/a	0/1	1.28E+01	0/1	1.28E+03	0/1	0/1	0.037 - 0.037
RADS	Beta activity	pCi/g	3.55E+01	3.55E+01	3.55E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.9 - 2.9
RADS	Cesium-137	pCi/g	5.00E-02	5.00E-02	5.00E-02	0/1	1/1	0/1	4.90E-01	0/1	1.98E-01	0/1	1.98E+01	0/1	0/1	0.2 - 0.2
RADS	Neptunium-237	pCi/g	1.10E-03	1.10E-03	1.10E-03	0/1	1/1	0/1	1.00E-01	0/1	6.26E-01	0/1	6.26E+01	0/1	0/1	0.02 - 0.02
RADS	Plutonium-238	pCi/g	3.00E-03	3.00E-03	3.00E-03	0/1	1/1	0/1	7.30E-02	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.023 - 0.023
RADS	Plutonium-239/240	pCi/g	7.30E-03	7.30E-03	7.30E-03	0/1	1/1	0/1	2.50E-02	0/1	3.56E+01	0/1	3.56E+03	0/1	0/1	0.0066 - 0.0066
RADS	Technetium-99	pCi/g	2.90E-01	2.90E-01	2.90E-01	0/1	1/1	0/1	2.50E+00	0/1	1.11E+03	0/1	1.11E+05	0/1	0/1	0.41 - 0.41
RADS	Thorium-228	pCi/g	9.80E-01	9.80E-01	9.80E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	9.00E-01	9.00E-01	9.00E-01	0/1	1/1	0/1	1.50E+00	0/1	4.49E+01	0/1	4.49E+03	0/1	1/1	0.007 - 0.007
RADS	Thorium-232	pCi/g	8.20E-01	8.20E-01	8.20E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.007 - 0.007
RADS	Uranium-234	pCi/g	8.60E-01	8.60E-01	8.60E-01	0/1	1/1	0/1	1.20E+00	0/1	6.25E+01	0/1	6.25E+03	0/1	0/1	0.03 - 0.03
RADS	Uranium-235/236	pCi/g	7.60E-02	7.60E-02	7.60E-02	0/1	1/1	1/1	6.00E-02	0/1	9.12E-01	0/1	9.12E+01	0/1	0/1	0.028 - 0.028
RADS	Uranium-238	pCi/g	1.26E+00	1.26E+00	1.26E+00	0/1	1/1	1/1	1.20E+00	0/1	4.02E+00	0/1	4.02E+02	0/1	0/1	0.02 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

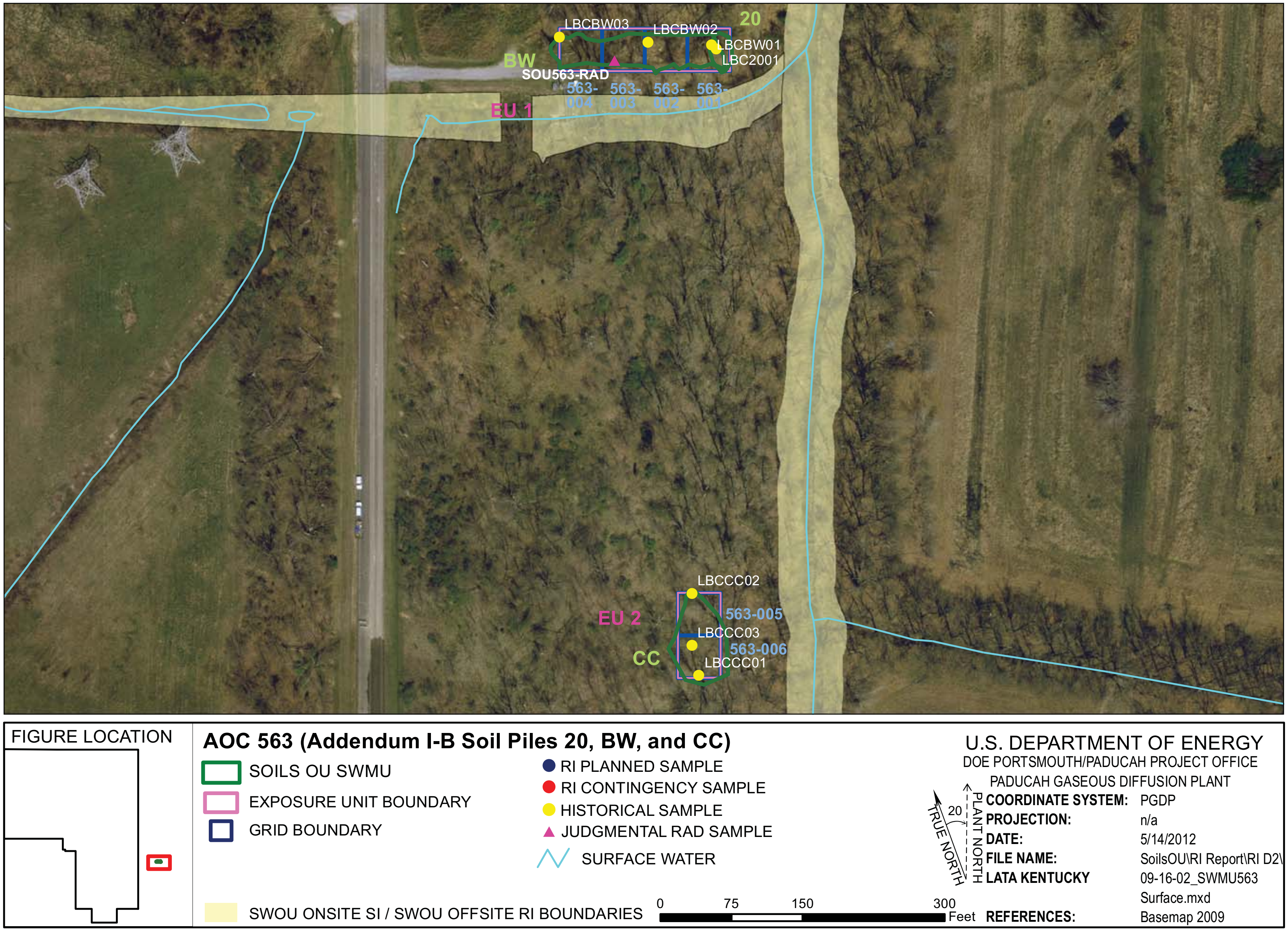


Figure 9.14.2. AOC 563 Sample Locations - Surface Soil

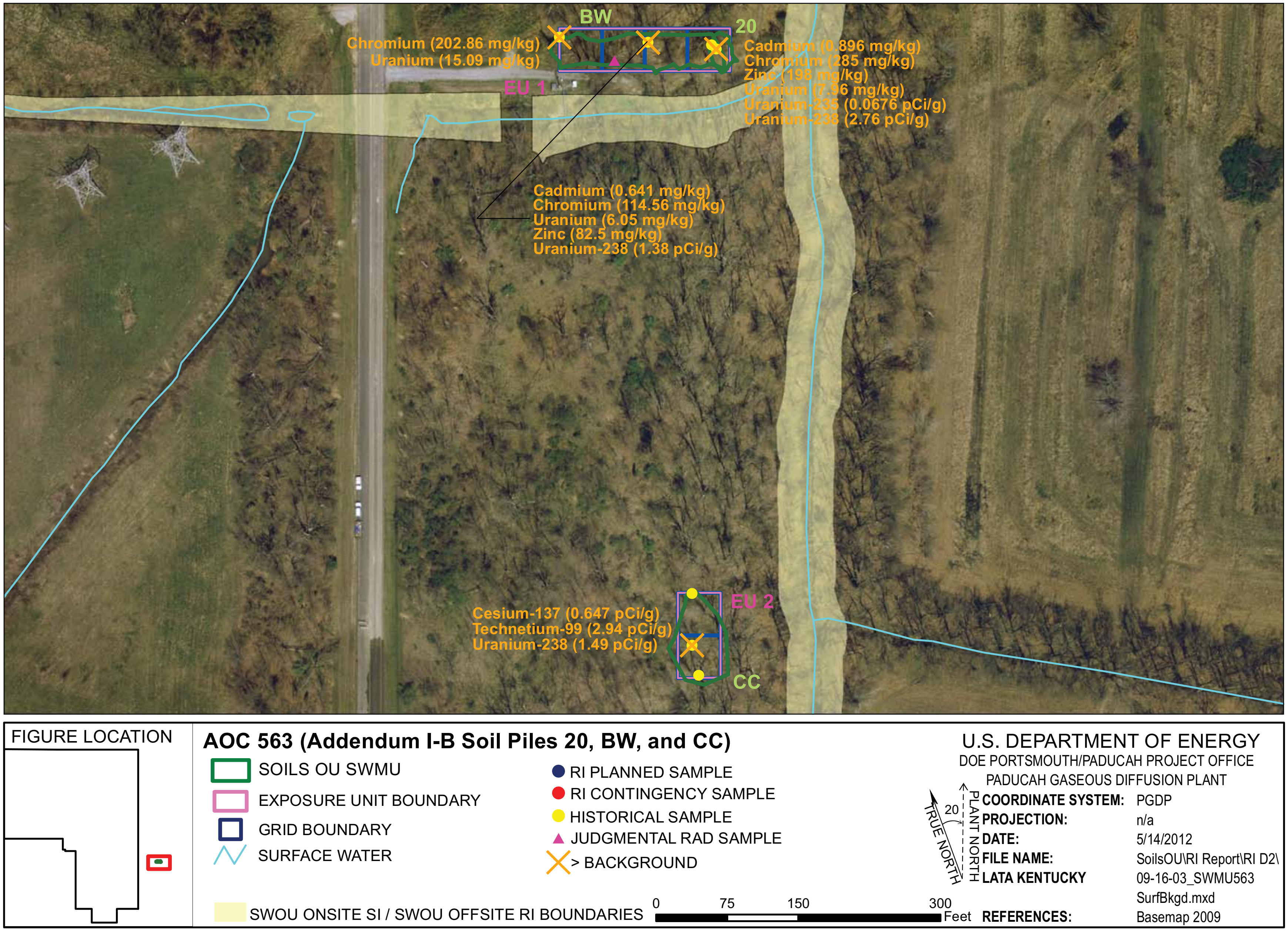


Figure 9.14.3. AOC 563 Background Exceedances - Surface Soil

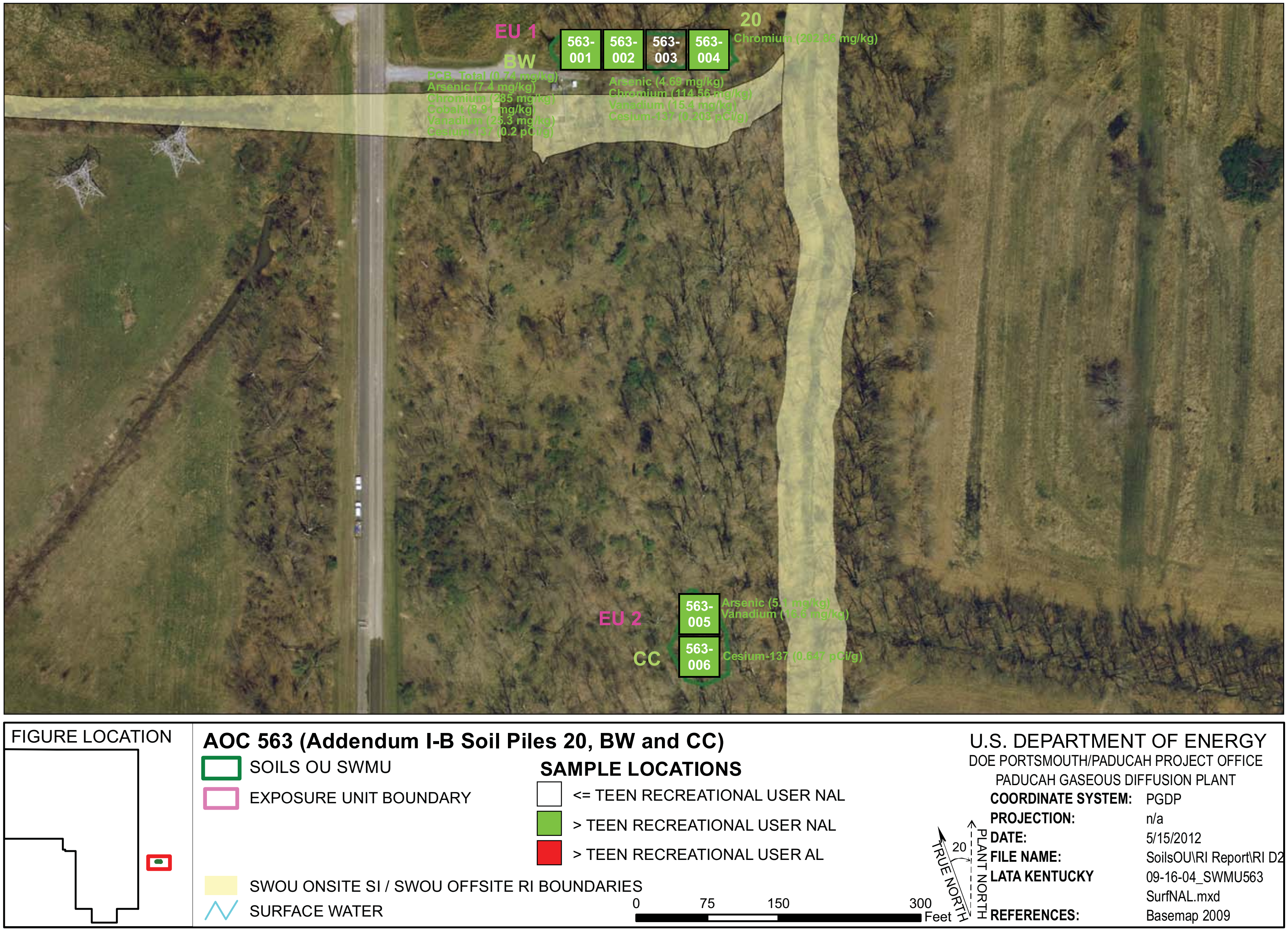


Figure 9.14.4. SWMU 563 NAL Exceedances - Surface Soil

PCBs were not detected above the teen recreator ALs in the AOC 563 surface soil.

Total PCBs in grid 1 and 2 (EU 1) were detected above the SSL for the protection of UCRS groundwater. PCBs were not detected above the SSLs for the protection of RGA groundwater.

SVOCs

No SVOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the AOC 563 surface soil.

VOCs

No surface soil samples from AOC 563 were analyzed for VOCs.

Radionuclides

Cesium-137 was detected above both the background screening level and the teen recreator NAL in the surface soil of grid 6 (EU 2).

No radionuclides were detected above both the background screening levels and the teen recreator ALs in the AOC 563 surface soil.

Technetium-99 in grid 6 (EU 2) was detected above both the background screening level and the SSL for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

9.14.4 Nature and Extent of Contamination—Subsurface Soils

For AOC 563 the representative data set for subsurface soils is presented in Table 9.14.3 and provides the nature of the contamination in AOC 563 subsurface soils. Figures 9.14.5–9.14.7 illustrate the horizontal extent. A complete list of detailed sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU/AOC#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of AOC 563 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. AOC 563 consists of two EUs.

Metals

Chromium was detected above both the background screening level and the teen recreator NAL in grids 1 and 2 (EU 1).

Grids 1 and 2 are located within the administrative boundary of AOC 563.

The maximum depth at which metals were detected at or above both the background screening level and the teen recreator NAL was 4 ft bgs.

No metals were detected above both the background screening levels and the teen recreator ALs in the AOC 563 subsurface soil.

Table 9.14.3. Subsurface Soil Historical Data Summary: SWMU 563 Addendum 1B Soil Piles 20, BW, and CC

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	7.11E+03	9.06E+03	7.97E+03	0/5	5/5	0/5	1.20E+04	0/5	2.77E+04	0/5	8.91E+06	0/5	5/5	18 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	2.10E-01	0/5	1.78E+00	0/5	1.90E+03	0/5	0/5	6.09 - 8.27
METAL	Arsenic	mg/kg	3.42E+00	7.36E+00	5.86E+00	0/5	5/5	0/5	7.90E+00	5/5	1.02E+00	0/5	1.02E+02	0/5	5/5	0.899 - 0.998
METAL	Barium	mg/kg	7.60E+01	8.87E+01	8.31E+01	0/5	5/5	0/5	1.70E+02	0/5	4.15E+02	0/5	4.58E+05	0/5	3/5	2.25 - 2.5
METAL	Beryllium	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	6.90E-01	0/5	1.29E-02	0/5	8.65E+00	0/5	0/5	0.45 - 0.499
METAL	Cadmium	mg/kg	6.17E-01	8.08E-01	7.25E-01	0/5	4/5	4/5	2.10E-01	0/5	3.14E+00	0/5	3.14E+02	0/5	4/5	0.45 - 0.499
METAL	Calcium	mg/kg	1.26E+03	3.78E+03	2.30E+03	2/5	5/5	0/5	6.10E+03	0/5	n/a	0/5	n/a	n/a	n/a	89.9 - 99.8
METAL	Chromium	mg/kg	1.18E+01	3.34E+02	1.51E+02	0/8	6/8	5/8	4.30E+01	3/8	7.15E+01	0/8	7.15E+03	0/8	0/8	2.25 - 2.5
METAL	Cobalt	mg/kg	4.18E+00	8.61E+00	6.32E+00	0/5	5/5	0/5	1.30E+01	1/5	8.45E+00	0/5	3.29E+03	5/5	5/5	0.899 - 0.998
METAL	Copper	mg/kg	7.94E+00	1.90E+01	1.26E+01	0/5	5/5	0/5	2.50E+01	0/5	1.13E+03	0/5	4.75E+05	0/5	0/5	2.25 - 2.5
METAL	Iron	mg/kg	9.01E+03	1.30E+04	1.17E+04	0/5	5/5	0/5	2.80E+04	0/5	1.98E+04	0/5	8.31E+06	5/5	5/5	18 - 20
METAL	Lead	mg/kg	8.71E+00	2.48E+01	1.62E+01	0/8	8/8	1/8	2.30E+01	0/8	4.00E+02	0/8	4.00E+02	0/8	4/8	0.899 - 0.998
METAL	Magnesium	mg/kg	8.56E+02	1.16E+03	9.59E+02	0/5	5/5	0/5	2.10E+03	0/5	n/a	0/5	n/a	n/a	n/a	4.5 - 4.99
METAL	Manganese	mg/kg	1.91E+02	5.80E+02	3.74E+02	0/5	5/5	0/5	8.20E+02	0/5	3.47E+03	0/5	2.94E+05	5/5	5/5	2.25 - 2.5
METAL	Mercury	mg/kg	1.70E-02	3.50E-02	2.77E-02	0/5	3/5	0/5	1.30E-01	0/5	6.25E-01	0/5	7.88E+02	0/5	0/5	0.016 - 0.016
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	1.42E+02	0/5	5.94E+04	0/5	0/5	4.5 - 4.99
METAL	Nickel	mg/kg	5.31E+00	8.65E+00	7.54E+00	0/5	5/5	0/5	2.20E+01	0/5	2.98E+01	0/5	3.07E+04	0/5	5/5	4.5 - 4.99
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	7.00E-01	0/5	1.42E+02	0/5	5.93E+04	0/5	0/5	0.899 - 0.998
METAL	Silver	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	2.70E+00	0/5	7.45E+00	0/5	8.07E+03	0/5	0/5	1.52 - 2.07
METAL	Sodium	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	3.40E+02	0/5	n/a	0/5	n/a	n/a	n/a	180 - 200
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	3.40E-01	0/5	2.27E+00	0/5	9.50E+02	0/5	0/5	1.8 - 2
METAL	Uranium	mg/kg	3.03E+00	1.24E+01	7.61E+00	0/8	4/8	2/8	4.60E+00	0/8	8.49E+01	0/8	3.50E+04	0/8	0/8	0.899 - 0.998
METAL	Vanadium	mg/kg	1.60E+01	2.48E+01	1.99E+01	0/5	5/5	0/5	3.70E+01	5/5	1.04E-01	0/5	7.61E+01	5/5	5/5	2.25 - 2.5
METAL	Zinc	mg/kg	2.92E+01	2.37E+02	1.14E+02	0/5	5/5	2/5	6.00E+01	0/5	8.50E+03	0/5	3.56E+06	0/5	5/5	18 - 20
PPCB	PCB, Total	mg/kg	3.20E-01	3.54E+00	1.91E+00	0/8	4/8	0/8	n/a	4/8	1.83E-01	0/8	1.83E+01	0/8	4/8	0.13 - 0.13
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	5.87E+02	0/5	1.76E+04	0/5	0/5	0.49 - 0.49
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.49 - 0.49
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	3.25E+03	0/5	9.74E+04	0/5	0/5	0.49 - 0.49
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.49 - 0.49
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	4.47E+02	0/5	1.34E+04	0/5	0/5	0.49 - 0.49
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	4.19E+02	0/5	1.26E+04	0/5	0/5	0.49 - 0.49
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	5.27E+00	0/5	5.27E+02	0/5	0/5	0.49 - 0.49
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.49 - 0.49
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	3.35E+02	0/5	1.00E+04	0/5	0/5	0.49 - 0.49
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	5.57E-02	0/8	5.57E+00	0/8	0/8	0.2 - 0.2
RADS	Americium-241	pCi/g	-4.98E-03	-1.54E-03	-3.15E-03	0/5	5/5	0/5	n/a	0/5	1.28E+01	0/5	1.28E+03	0/5	0/5	0.0225 - 0.0229
RADS	Cesium-137	pCi/g	5.82E-02	2.88E-01	1.66E-01	0/5	5/5	2/5	2.80E-01	2/5	1.98E-01	0/5	1.98E+01	0/5	0/5	0.0717 - 0.0848
RADS	Neptunium-237	pCi/g	-2.36E-02	1.20E-01	3.20E-02	0/5	5/5	0/5	n/a	0/5	6.26E-01	0/5	6.26E+01	0/5	2/5	0.0472 - 0.0503
RADS	Plutonium-238	pCi/g	-7.96E-03	-2.10E-03	-5.33E-03	0/5	5/5	0/5	n/a	0/5	3.64E+01	0/5	3.64E+03	0/5	0/5	0.0112 - 0.0116
RADS	Plutonium-239/240	pCi/g	-2.15E-03	3.07E-02	9.68E-03	0/5	5/5	0/5	n/a	0/5	3.56E+01	0/5	3.56E+03	0/5	0/5	0.0121 - 0.013
RADS	Technetium-99	pCi/g	-5.51E-01	3.13E+00	8.66E-01	0/5	5/5	1/5	2.80E+00	0/5	1.11E+03	0/5	1.11E+05	0/5	2/5	0.537 - 0.707
RADS	Thorium-228	pCi/g	3.48E-01	4.45E-01	3.97E-01	0/5	5/5	0/5	1.60E+00	0/5	n/a	0/5	n/a	n/a	n/a	0.0995 - 0.117
RADS	Thorium-230	pCi/g	2.45E-01	3.46E-01	2.99E-01	0/5	5/5	0/5	1.40E+00	0/5	4.49E+01	0/5	4.49E+03	0/5	2/5	0.106 - 0.131
RADS	Thorium-232	pCi/g	3.19E-01	4.37E-01	4.02E-01	0/5	5/5	0/5	1.50E+00	0/5	n/a	0/5	n/a	n/a	n/a	0.0667 - 0.0746

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.14.3. Subsurface Soil Historical Data Summary: SWMU 563 Addendum 1B Soil Piles 20, BW, and CC (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
RADS	Uranium-234	pCi/g	1.20E-01	1.03E+00	6.23E-01	0/5	5/5	0/5	1.20E+00	0/5	6.25E+01	0/5	6.25E+03	0/5	0/5	0.116 - 0.124
RADS	Uranium-235	pCi/g	3.35E-03	7.87E-02	4.41E-02	0/5	5/5	2/5	6.00E-02	0/5	9.12E-01	0/5	9.12E+01	0/5	0/5	0.0136 - 0.0146
RADS	Uranium-238	pCi/g	1.65E-01	2.96E+00	1.59E+00	0/5	5/5	2/5	1.20E+00	0/5	4.02E+00	0/5	4.02E+02	0/5	0/5	0.105 - 0.113

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

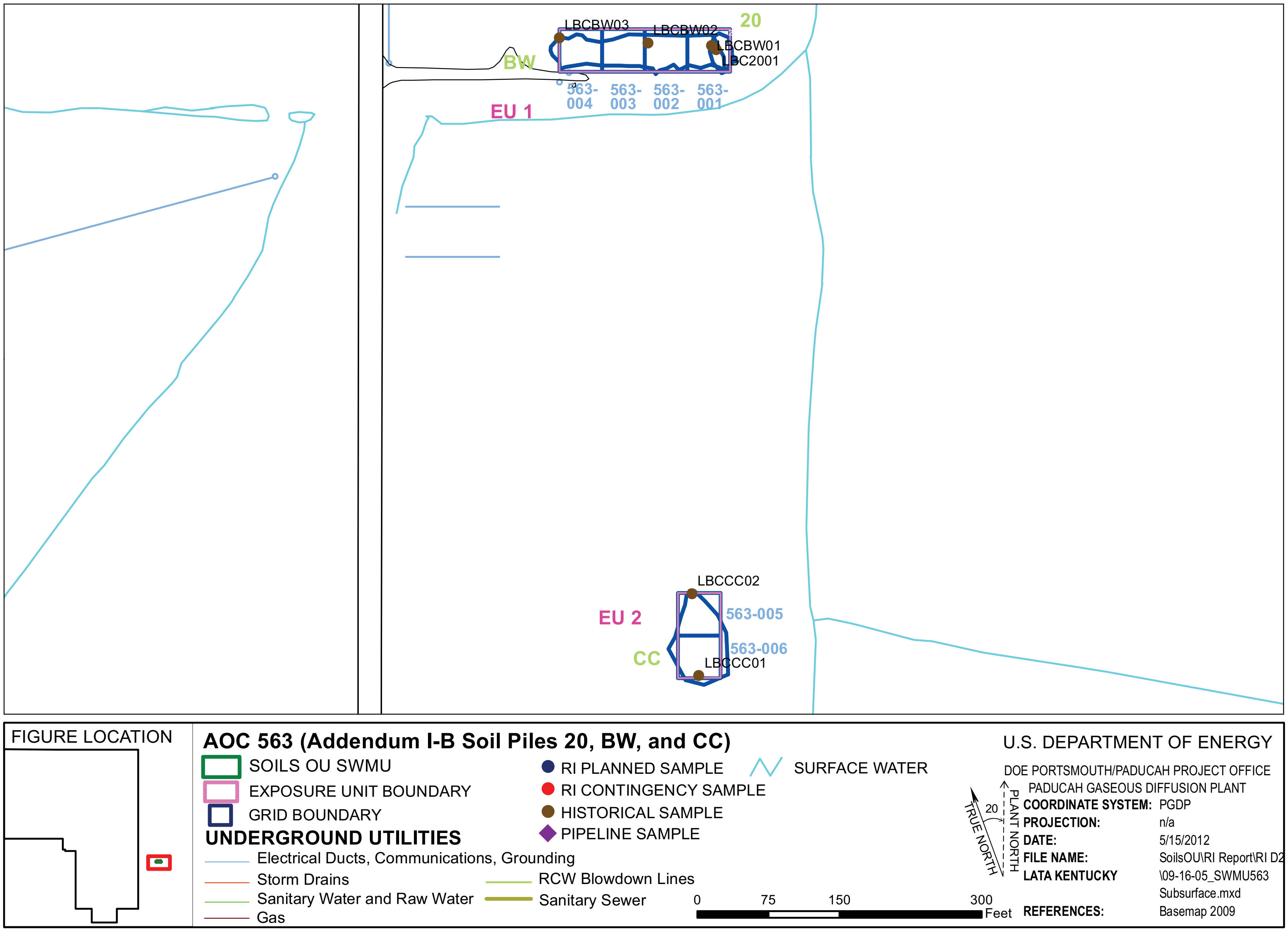


Figure 9.14.5. AOC 563 Sample Locations - Subsurface Soil

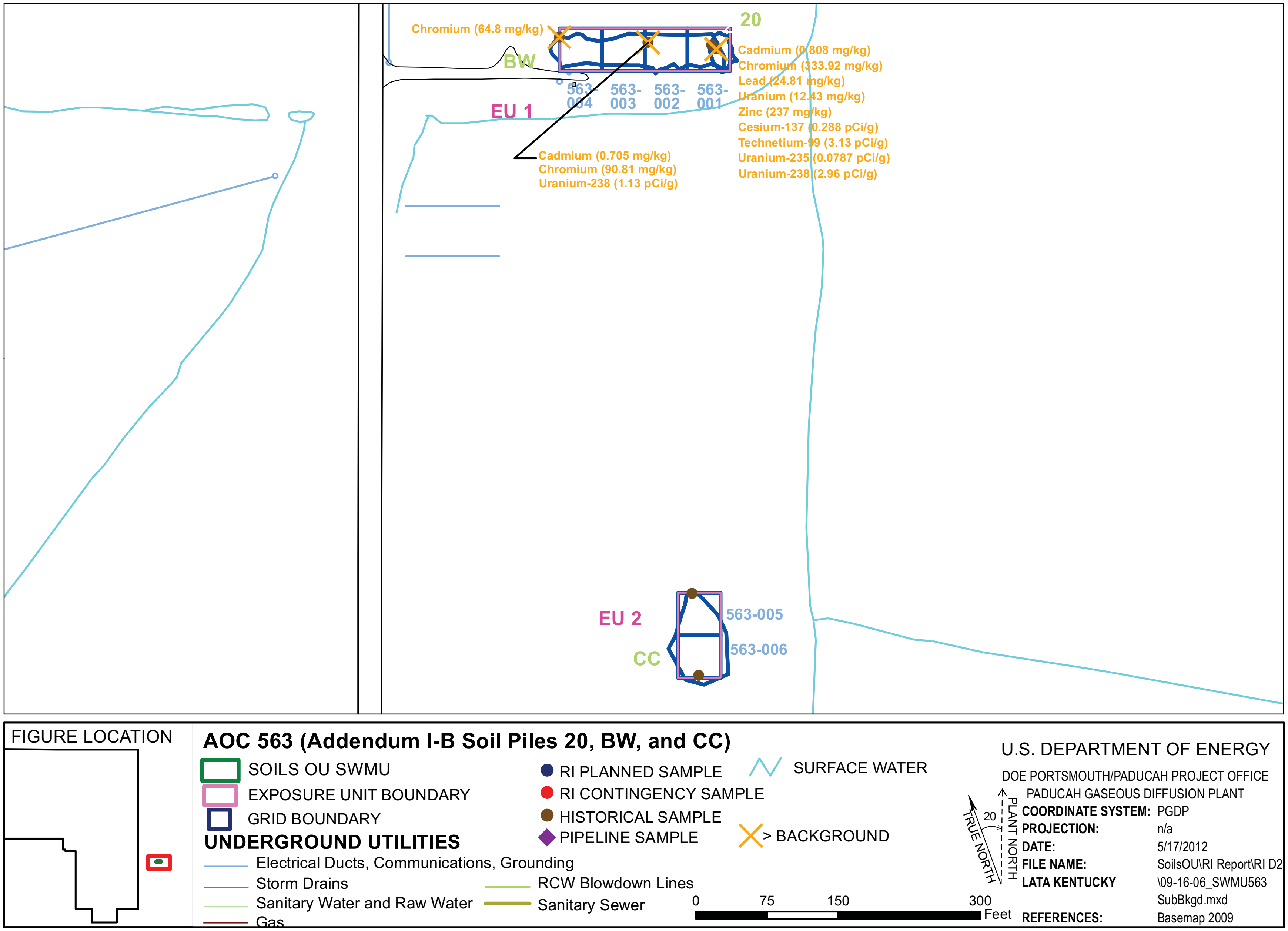


Figure 9.14.6. AOC 563 Background Exceedances - Subsurface Soil

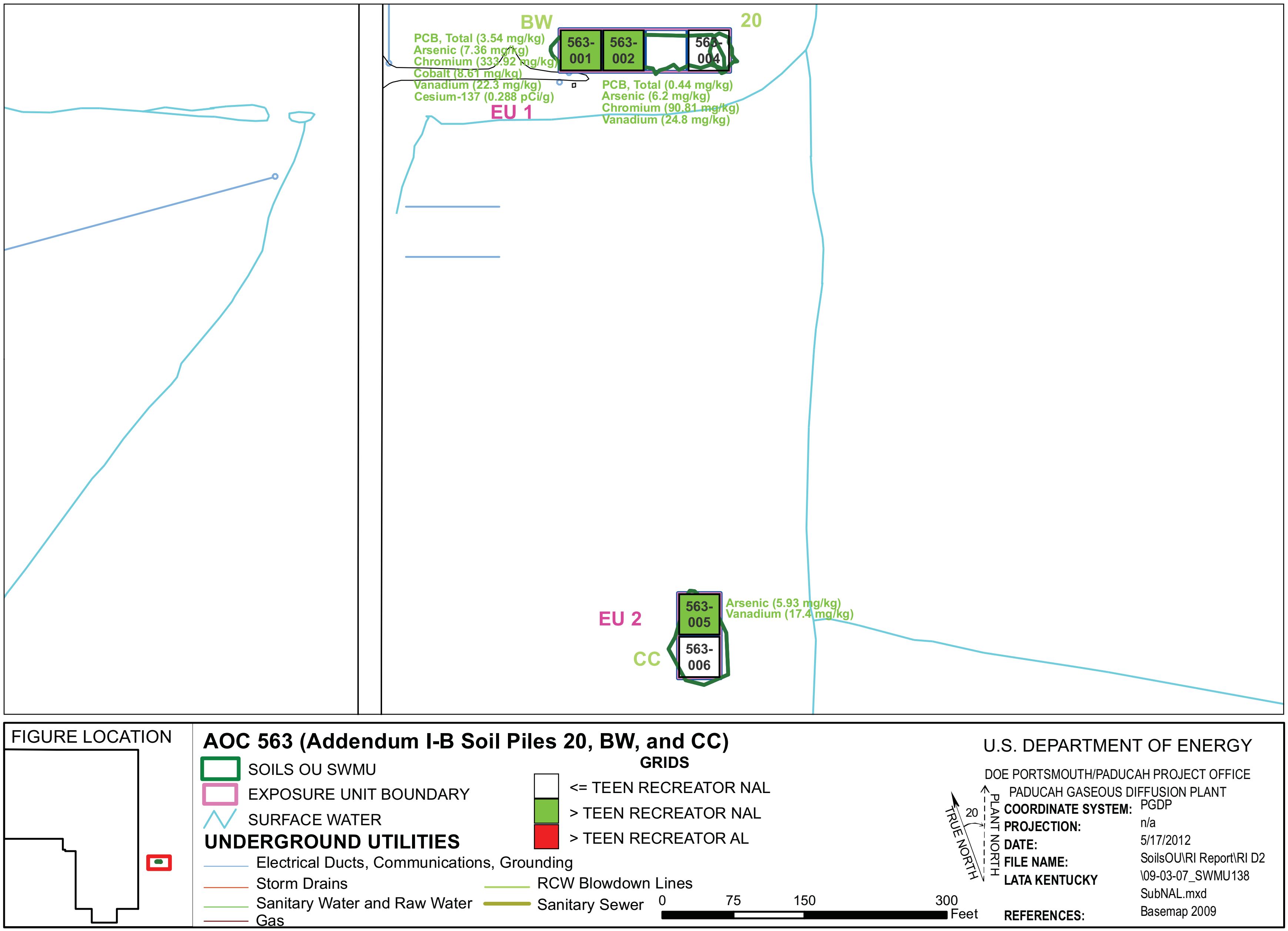


Figure 9.14.7. AOC 563 NAL Exceedances - Subsurface Soil

The following metals were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater: cadmium in grids 1 and 2 (EU 1), lead in grid 1 (EU 1), and zinc in grid 1 (EU 1). No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

<u>PCBs</u>

Total PCBs were detected above the teen recreator NAL in the subsurface soil of grids 1 and 2 (EU 1) at 4 ft bgs.

PCBs were not detected above the teen recreator ALs in the AOC 563 subsurface soil.

Total PCBs in grids 1 and 2 (EU 1) were detected above the SSLs for the protection of UCRS groundwater. PCBs were not detected above the SSL for the protection of RGA groundwater.

<u>SVOCs</u>

No SVOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the AOC 563 subsurface soil.

<u>VOCs</u>

No subsurface soil samples from AOC 563 were analyzed for VOCs.

<u>Radionuclides</u>

Cesium-137 was detected above both the background screening level and the teen recreator NAL in grid 1 at a maximum depth of 4 ft bgs.

No radionuclides were detected above both the background screening levels and the teen recreator ALs in the AOC 563 subsurface soil.

Neptunium-237 (no background value available) and technetium-99 in grid 1 (EU 1) were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

9.14.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is potential for runoff because this AOC is on the banks of KPDES Outfall Ditch 012 and Little Bayou Creek; however, AOC 563 is grass-covered or otherwise stabilized and the contaminants are not likely to be transported attached to suspended soil particles. Soil piles are believed to have similar origin and the findings from the SWMU 561 soil pile evaluation determined that contaminants are not migrating away from the piles (DOE 2008b). Little Bayou Creek is scheduled to be investigated as part of the SWOU. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs/AOCs to surrounding ditches.

9.14.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for AOC 563. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for one or more EUs at AOC 563 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this AOC will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.14.4 for the outdoor worker (exposed to surface soils), the hypothetical resident, and the teen recreational user. The excavation worker did not have any identified COCs. Table 9.14.4 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this AOC under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for AOC 563 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 9.14.5.

9.14.7 AOC 563 Summary

The following text summarizes the results for AOC 563 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

A plant process that could have contributed to contamination at the AOC is dredging Little Bayou Creek to keep it free-flowing for PGDP discharges.

COPCs for surface and subsurface soils from AOC 563 are shown on Tables 9.14.1–9.14.3 as those analytes with green boxes under the "Teen Recreator/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G.

- EU 1
  - Surface—metals, PCBs
  - Subsurface—metals, PCBs, radionuclides
- EU 2
  - Surface—radionuclides
  - Subsurface—none

Table 9.14.4. RGOs for AOC 563

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Outdoor Worker (exposed to surface soil)											
1	Chromium	2.85E+02	mg/kg	7.0E-06	4.08E+01	4.08E+02	4.08E+03	< 1	n/a	n/a	n/a
	PCB, Total	7.40E-01	mg/kg	4.6E-06	1.62E-01	1.62E+00	1.62E+01	< 1	n/a	n/a	n/a
	Uranium-238	2.76E+00	pCi/g	2.4E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.4E-05**				**< 1**			
2	Cesium-137	6.47E-01	pCi/g	5.6E-06	1.15E-01	1.15E+00	1.15E+01	n/a	n/a	n/a	n/a
	Uranium-238	1.49E+00	pCi/g	1.3E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.9E-06**				**< 1**			
Hypothetical Resident[5]											
1	Chromium	2.85E+02	mg/kg	1.8E-05	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	PCB, Total	7.40E-01	mg/kg	1.2E-05	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Uranium-238	2.76E+00	pCi/g	8.0E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**3.8E-05**				**< 1**			
2	Cesium-137	6.47E-01	pCi/g	3.8E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Uranium-238	1.49E+00	pCi/g	4.3E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**4.2E-05**				**< 1**			
Teen Recreational User											
1	Chromium	2.85E+02	mg/kg	1.7E-06	1.65E+02	1.65E+03	1.65E+04	< 1	n/a	n/a	n/a
	PCB, Total	7.40E-01	mg/kg	2.5E-06	2.99E-01	2.99E+00	2.99E+01	< 1	n/a	n/a	n/a
	Cumulative			**4.2E-06**				**< 1**			
2	Cesium-137	6.47E-01	pCi/g	1.6E-06	4.10E-01	4.10E+00	4.10E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.6E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.76, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.76, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 9.14.5 Ecological Screening for AOC 563

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Soil/grass mix with trees	Yes	65	Chromium	1.60E+01	2.85E+02	2.60E+01	11
			PCB, Total	n/a	7.40E-01	2.00E-02	37

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b); n/a = not applicable

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at AOC 563 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at AOC 563. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soil), hypothetical residential, and teen recreational user scenarios. COCs for these scenarios for AOC 563 are as follows:

- Outdoor worker (exposed to surface soil)
    - Cesium-137
    - Chromium
    - Total PCBs
    - Uranium-238
- Excavation worker
    - None
- Hypothetical Resident (hazards evaluated against the child resident)
    - Cesium-137
    - Chromium
    - Total PCBs
    - Uranium-238
- Teen Recreational User
    - Cesium-137
    - Chromium
    - Total PCBs

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for AOC 563.

For AOC 563, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Chromium
- Total PCBs

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for AOC 563 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. AOC 563 is on the banks of Little Bayou Creek. The Addendum 1B SER (DOE 2009d) stated that PGDP monitoring data indicates that little to no migration has taken place to date from these piles. Because of this, a response action at these piles would have no effect on the surface water integrator OU.

9.14.8 AOC 563 Conclusion

The RI adequately defined the nature and extent of contamination in soils at AOC 563; an FS is appropriate for the AOC due to risk exceeding the decision rule benchmark (DOE 2010a) for scenarios including outdoor worker (exposed to surface soil), hypothetical resident, and teen recreational user (DOE 2010a). The reasonably anticipated future land use for this AOC is recreational as shown in the SMP (DOE 2012a). This area is outside the limited area, away from the plant site, so it has easy access by recreational users, but on the bank of Little Bayou Creek, which receives PGDP discharges. Periodic maintenance of the channel will be required by PGDP workers.

9.15 AOC 564, SOIL PILE “AT” IN SUBUNIT 5

9.15.1 Background

Sampling, field reconnaissance, and field radioactivity measurements at AOC 564 were completed in December 2006 as part of the Addendum 1B effort (DOE 2009c). This AOC has been characterized and the summary of the findings is presented in the Site Evaluation Report (DOE 2009d).

Historical research was performed to attempt to determine the origin of the piles. Origin of the Addendum 1-B Soil Piles remains unknown, although the location and shape indicate that many of the PGDP-related soil piles are likely to have originated from excavations associated with the creation, periodic dredging, and cleanout of the outfalls, ditches, and creeks that comprise the PGDP surface water management system. AOC 564 is near Little Bayou Creek. Management of the surface water system at PGDP no longer allows piling soil along the ditch or creek banks outside the SWMU boundaries.

Sampling at AOC 564 revealed metals, radionuclides, and PCBs.

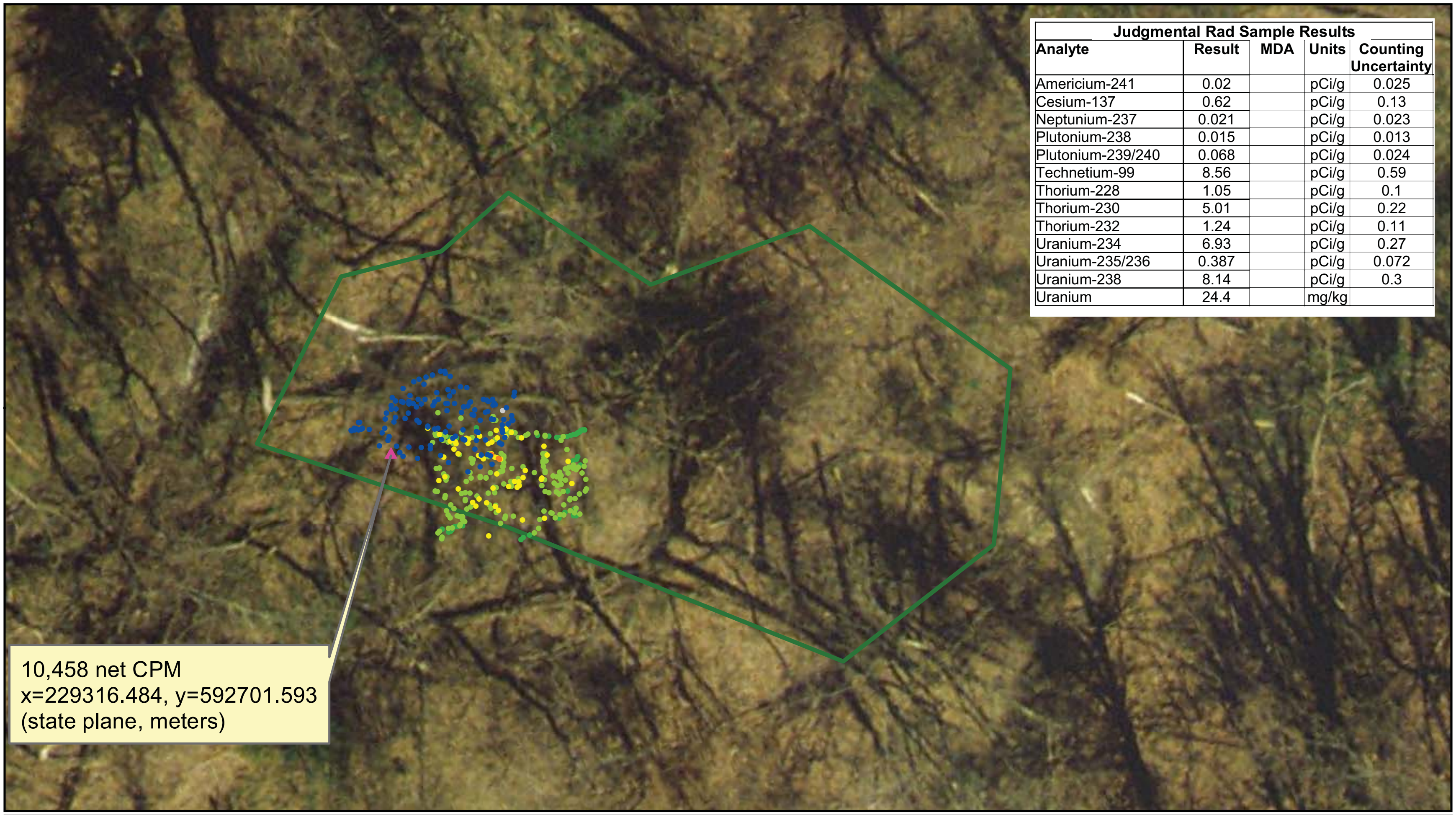
9.15.2 Fieldwork Summary

The historical data are representative of the nature and adequately delineate the extent of the contamination; therefore, no samples were collected from AOC 564 during the Soils OU RI sampling effort (DOE 2010a).

A gamma radiological walkover survey was conducted on this AOC during the RI using a FIDLER as shown in Figure 9.15.1; the 134 measurements ranged from 17,571 to 21,458 gross cpm. Soil Pile Addendum 1B survey data have been added to Figure 9.15.1 to supplement the 2010 data. The two surveys show similar contamination levels throughout the pile; therefore, the historical data fill the data gap of areas not accessible for survey in 2010. The Addendum 1B data were collected using a 2 x 2 NaI probe. The area consists entirely of soils and grass with trees. A judgmental sample was collected for radiological constituents.

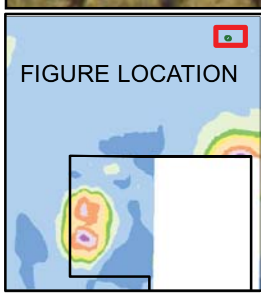
9.15.3 Nature and Extent of Contamination—Surface Soils

For AOC 564, the representative data set for surface is presented in Tables 9.15.1 and 9.15.2 and provides the nature of the contamination in AOC 564 surface soils. Figures 9.15.2–9.15.4 illustrate the horizontal extent. A complete list of the sampling results is provided in Appendix G. Grid numbers shown below are



Judgmental Rad Sample Results				
Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.02		pCi/g	0.025
Cesium-137	0.62		pCi/g	0.13
Neptunium-237	0.021		pCi/g	0.023
Plutonium-238	0.015		pCi/g	0.013
Plutonium-239/240	0.068		pCi/g	0.024
Technetium-99	8.56		pCi/g	0.59
Thorium-228	1.05		pCi/g	0.1
Thorium-230	5.01		pCi/g	0.22
Thorium-232	1.24		pCi/g	0.11
Uranium-234	6.93		pCi/g	0.27
Uranium-235/236	0.387		pCi/g	0.072
Uranium-238	8.14		pCi/g	0.3
Uranium	24.4		mg/kg	

FIGURE LOCATION



AOC 564 (Addendum I-B Soil Pile AT)

SOILS OU SWMU

GAMMA WALKOVER SURVEY RESULTS

< 1,800 net CPM
≥ 1,800 net CPM
1,800 net CPM was calculated as 30 pCi/g U-238

JUDGMENTAL RAD SAMPLE
collected at highest reading

GWS RESULTS
(SOIL PILE ADDENDUM 1B)

<11,000 gross CPM
11,000 - 12,800 gross CPM
12,800 - 15,000 gross CPM
15,000 - 30,000 gross CPM
>30,000 gross CPM

0 10 20 40 Feet

TRUE NORTH 20 PLANT NORTH

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

COORDINATE SYSTEM: PGDP
PROJECTION: n/a
DATE: 5/30/2012
FILE NAME: SoilsOU\RI Report\RI D2\09-17-01_SWMU564 GWS.mxd
LATA KENTUCKY
REFERENCES: Basemap 2009

Figure 9.15.1. AOC 564 Gamma Walkover Survey

Table 9.15.1. Surface Soil Historical Data Summary: AOC 564 Addendum 1B Soil Pile AT

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	7.12E+03	1.27E+04	1.03E+04	0/3	3/3	0/3	1.30E+04	0/3	2.77E+04	0/3	8.91E+06	0/3	3/3	16.7 - 194
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.10E-01	0/3	1.78E+00	0/3	1.90E+03	0/3	0/3	1.7 - 8.83
METAL	Arsenic	mg/kg	1.83E+01	4.30E+01	2.75E+01	0/3	3/3	3/3	1.20E+01	3/3	1.02E+00	0/3	1.02E+02	3/3	3/3	0.975 - 9.7
METAL	Barium	mg/kg	6.27E+01	1.15E+02	9.11E+01	0/3	3/3	0/3	2.00E+02	0/3	4.15E+02	0/3	4.58E+05	0/3	2/3	0.42 - 2.44
METAL	Beryllium	mg/kg	1.71E+00	2.12E+00	1.98E+00	0/3	3/3	3/3	6.70E-01	3/3	1.29E-02	0/3	8.65E+00	0/3	0/3	0.17 - 0.488
METAL	Cadmium	mg/kg	1.40E+00	1.96E+00	1.59E+00	0/3	3/3	3/3	2.10E-01	0/3	3.14E+00	0/3	3.14E+02	0/3	3/3	0.485 - 0.5
METAL	Calcium	mg/kg	1.03E+03	1.95E+03	1.57E+03	0/3	3/3	0/3	2.00E+05	0/3	n/a	0/3	n/a	n/a	n/a	83.5 - 97.5
METAL	Chromium	mg/kg	2.80E+01	7.49E+01	5.21E+01	0/6	6/6	6/6	1.60E+01	1/6	7.15E+01	0/6	7.15E+03	0/6	0/6	0.42 - 2.44
METAL	Cobalt	mg/kg	4.33E+00	6.60E+00	5.49E+00	0/3	3/3	0/3	1.40E+01	0/3	8.45E+00	0/3	3.29E+03	3/3	3/3	0.42 - 0.975
METAL	Copper	mg/kg	1.81E+01	4.63E+01	2.90E+01	0/3	3/3	2/3	1.90E+01	0/3	1.13E+03	0/3	4.75E+05	0/3	1/3	0.42 - 24.3
METAL	Iron	mg/kg	1.79E+04	3.66E+04	2.61E+04	0/3	3/3	1/3	2.80E+04	2/3	1.98E+04	0/3	8.31E+06	3/3	3/3	12.5 - 19.5
METAL	Lead	mg/kg	1.65E+01	4.09E+01	2.93E+01	0/6	6/6	1/6	3.60E+01	0/6	4.00E+02	0/6	4.00E+02	0/6	6/6	0.83 - 9.7
METAL	Magnesium	mg/kg	4.10E+02	9.12E+02	6.89E+02	0/3	3/3	0/3	7.70E+03	0/3	n/a	0/3	n/a	n/a	n/a	4.85 - 20.9
METAL	Manganese	mg/kg	2.58E+02	4.87E+02	3.65E+02	0/3	3/3	0/3	1.50E+03	0/3	3.47E+03	0/3	2.94E+05	3/3	3/3	0.42 - 2.44
METAL	Mercury	mg/kg	2.00E-01	2.30E-01	2.13E-01	0/3	3/3	2/3	2.00E-01	0/3	6.25E-01	0/3	7.88E+02	0/3	3/3	0.016 - 0.035
METAL	Molybdenum	mg/kg	6.51E+00	7.84E+00	7.18E+00	0/2	2/2	0/2	n/a	0/2	1.42E+02	0/2	5.94E+04	2/2	2/2	4.85 - 4.88
METAL	Nickel	mg/kg	1.40E+01	2.24E+01	1.81E+01	0/3	3/3	1/3	2.10E+01	0/3	2.98E+01	0/3	3.07E+04	0/3	3/3	0.83 - 4.88
METAL	Selenium	mg/kg	2.18E+00	2.82E+00	2.47E+00	0/3	3/3	3/3	8.00E-01	0/3	1.42E+02	0/3	5.93E+04	0/3	3/3	0.97 - 1.7
METAL	Silver	mg/kg	2.00E-01	2.00E-01	2.00E-01	1/3	1/3	0/3	2.30E+00	0/3	7.45E+00	0/3	8.07E+03	0/3	1/3	0.42 - 2.21
METAL	Sodium	mg/kg	9.57E+01	9.57E+01	9.57E+01	1/3	1/3	0/3	3.20E+02	0/3	n/a	0/3	n/a	n/a	n/a	194 - 209
METAL	Thallium	mg/kg	2.30E+00	2.36E+00	2.33E+00	1/3	2/3	2/3	2.10E-01	2/3	2.27E+00	0/3	9.50E+02	0/3	2/3	1.94 - 2.5
METAL	Uranium	mg/kg	2.33E+01	5.83E+01	3.83E+01	0/5	5/5	5/5	4.90E+00	0/5	8.49E+01	0/5	3.50E+04	0/5	5/5	0.975 - 9.7
METAL	Vanadium	mg/kg	5.62E+01	8.06E+01	7.03E+01	0/3	3/3	3/3	3.80E+01	3/3	1.04E-01	1/3	7.61E+01	3/3	3/3	0.83 - 2.44
METAL	Zinc	mg/kg	7.58E+01	1.06E+02	9.59E+01	0/3	3/3	3/3	6.50E+01	0/3	8.50E+03	0/3	3.56E+06	0/3	3/3	1.7 - 19.5
PPCB	PCB, Total	mg/kg	1.90E-01	1.93E+00	1.11E+00	0/7	4/7	0/7	n/a	4/7	1.83E-01	0/7	1.83E+01	0/7	4/7	0.019 - 0.13
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.87E+02	0/2	1.76E+04	0/2	0/2	0.48 - 0.49
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.48 - 0.49
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.25E+03	0/2	9.74E+04	0/2	0/2	0.48 - 0.49
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.48 - 0.49
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.47E+02	0/2	1.34E+04	0/2	0/2	0.48 - 0.49
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.19E+02	0/2	1.26E+04	0/2	0/2	0.48 - 0.49
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.27E+00	0/2	5.27E+02	0/2	0/2	0.48 - 0.49
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.48 - 0.49
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.35E+02	0/2	1.00E+04	0/2	0/2	0.48 - 0.49
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	5.57E-02	0/5	5.57E+00	0/5	0/5	0.2 - 0.2
RADS	Americium-241	pCi/g	-8.09E-03	9.00E-03	4.55E-04	0/2	2/2	0/2	n/a	0/2	1.28E+01	0/2	1.28E+03	0/2	0/2	0.0162 - 0.0224
RADS	Cesium-137	pCi/g	2.92E-01	3.14E-01	3.03E-01	0/2	2/2	0/2	4.90E-01	2/2	1.98E-01	0/2	1.98E+01	0/2	0/2	0.0908 - 0.118
RADS	Neptunium-237	pCi/g	-1.75E-03	3.47E-04	-7.02E-04	0/2	2/2	0/2	1.00E-01	0/2	6.26E-01	0/2	6.26E+01	0/2	0/2	0.0473 - 0.0485
RADS	Plutonium-238	pCi/g	-2.64E-03	-2.64E-03	-2.64E-03	0/1	1/1	0/1	7.30E-02	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.0112 - 0.0112
RADS	Plutonium-239/240	pCi/g	2.09E-02	2.17E-02	2.13E-02	0/2	2/2	0/2	2.50E-02	0/2	3.56E+01	0/2	3.56E+03	0/2	0/2	0.0128 - 0.0143
RADS	Technetium-99	pCi/g	2.97E-01	9.21E+00	4.75E+00	0/2	2/2	1/2	2.50E+00	0/2	1.11E+03	0/2	1.11E+05	0/2	1/2	0.662 - 0.774
RADS	Thorium-228	pCi/g	3.13E-01	3.53E-01	3.33E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.0849 - 0.118
RADS	Thorium-230	pCi/g	1.69E+00	1.87E+00	1.78E+00	0/2	2/2	2/2	1.50E+00	0/2	4.49E+01	0/2	4.49E+03	0/2	2/2	0.0555 - 0.085
RADS	Thorium-232	pCi/g	3.22E-01	3.26E-01	3.24E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.0346 - 0.0459
RADS	Uranium-234	pCi/g	4.18E+00	6.58E+00	5.38E+00	0/2	2/2	2/2	1.20E+00	0/2	6.25E+01	0/2	6.25E+03	0/2	0/2	0.0709 - 0.114

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.15.1. Surface Soil Historical Data Summary: SWMU 564 Addendum 1B Soil Pile AT (Continued)

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Teen Recreator FOE	Teen Recreator NAL	Teen Recreator FOE	Teen Recreator AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
RADS	Uranium-235	pCi/g	2.43E-01	3.37E-01	2.90E-01	0/2	2/2	2/2	6.00E-02	0/2	9.12E-01	0/2	9.12E+01	0/2	0/2	0.0148 - 0.0167
RADS	Uranium-238	pCi/g	5.27E+00	8.33E+00	6.80E+00	0/2	2/2	2/2	1.20E+00	2/2	4.02E+00	0/2	4.02E+02	0/2	2/2	0.0992 - 0.1

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.15.2. Surface Soil RI Data Summary: SWMU 564 Addendum 1B Soil Pile AT

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Uranium	mg/kg	2.44E+01	2.44E+01	2.44E+01	0/1	1/1	1/1	4.90E+00	0/1	8.49E+01	0/1	3.50E+04	0/1	1/1	0.04 - 0.04
RADS	Alpha activity	pCi/g	7.10E+01	7.10E+01	7.10E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	7 - 7
RADS	Americium-241	pCi/g	2.00E-02	2.00E-02	2.00E-02	0/1	1/1	0/1	n/a	0/1	1.28E+01	0/1	1.28E+03	0/1	0/1	0.041 - 0.041
RADS	Beta activity	pCi/g	5.08E+01	5.08E+01	5.08E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.4 - 2.4
RADS	Cesium-137	pCi/g	6.20E-01	6.20E-01	6.20E-01	0/1	1/1	1/1	4.90E-01	1/1	1.98E-01	0/1	1.98E+01	0/1	0/1	0.1 - 0.1
RADS	Neptunium-237	pCi/g	2.10E-02	2.10E-02	2.10E-02	0/1	1/1	0/1	1.00E-01	0/1	6.26E-01	0/1	6.26E+01	0/1	1/1	0.033 - 0.033
RADS	Plutonium-238	pCi/g	1.50E-02	1.50E-02	1.50E-02	0/1	1/1	0/1	7.30E-02	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.018 - 0.018
RADS	Plutonium-239/240	pCi/g	6.80E-02	6.80E-02	6.80E-02	0/1	1/1	1/1	2.50E-02	0/1	3.56E+01	0/1	3.56E+03	0/1	0/1	0.011 - 0.011
RADS	Technetium-99	pCi/g	8.56E+00	8.56E+00	8.56E+00	0/1	1/1	1/1	2.50E+00	0/1	1.11E+03	0/1	1.11E+05	0/1	1/1	0.47 - 0.47
RADS	Thorium-228	pCi/g	1.05E+00	1.05E+00	1.05E+00	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.03 - 0.03
RADS	Thorium-230	pCi/g	5.01E+00	5.01E+00	5.01E+00	0/1	1/1	1/1	1.50E+00	0/1	4.49E+01	0/1	4.49E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	1.24E+00	1.24E+00	1.24E+00	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Uranium-234	pCi/g	6.93E+00	6.93E+00	6.93E+00	0/1	1/1	1/1	1.20E+00	0/1	6.25E+01	0/1	6.25E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	3.87E-01	3.87E-01	3.87E-01	0/1	1/1	1/1	6.00E-02	0/1	9.12E-01	0/1	9.12E+01	0/1	0/1	0.009 - 0.009
RADS	Uranium-238	pCi/g	8.14E+00	8.14E+00	8.14E+00	0/1	1/1	1/1	1.20E+00	1/1	4.02E+00	0/1	4.02E+02	0/1	1/1	0.01 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

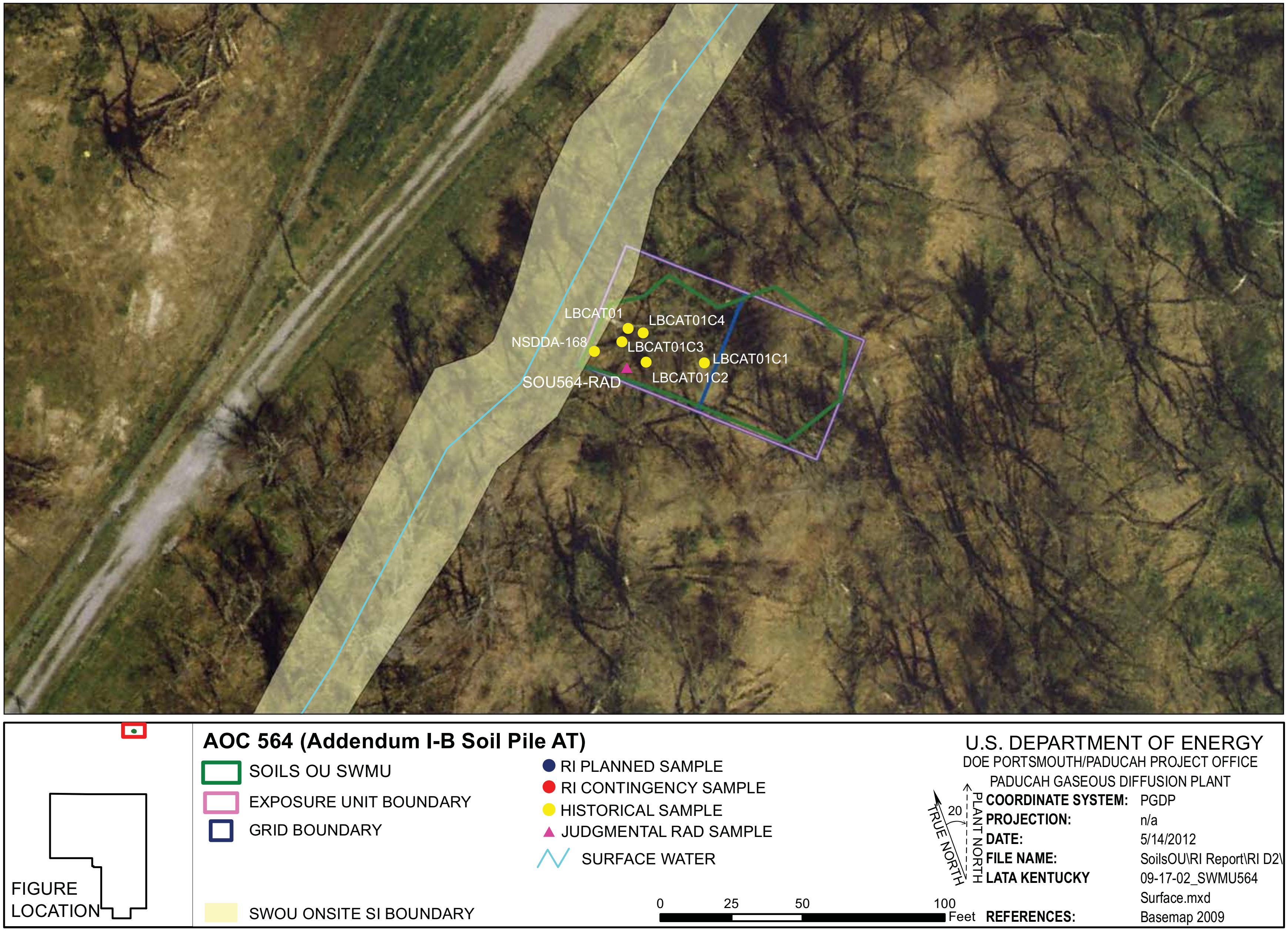


Figure 9.15.2. AOC 564 Sample Locations - Surface Soil

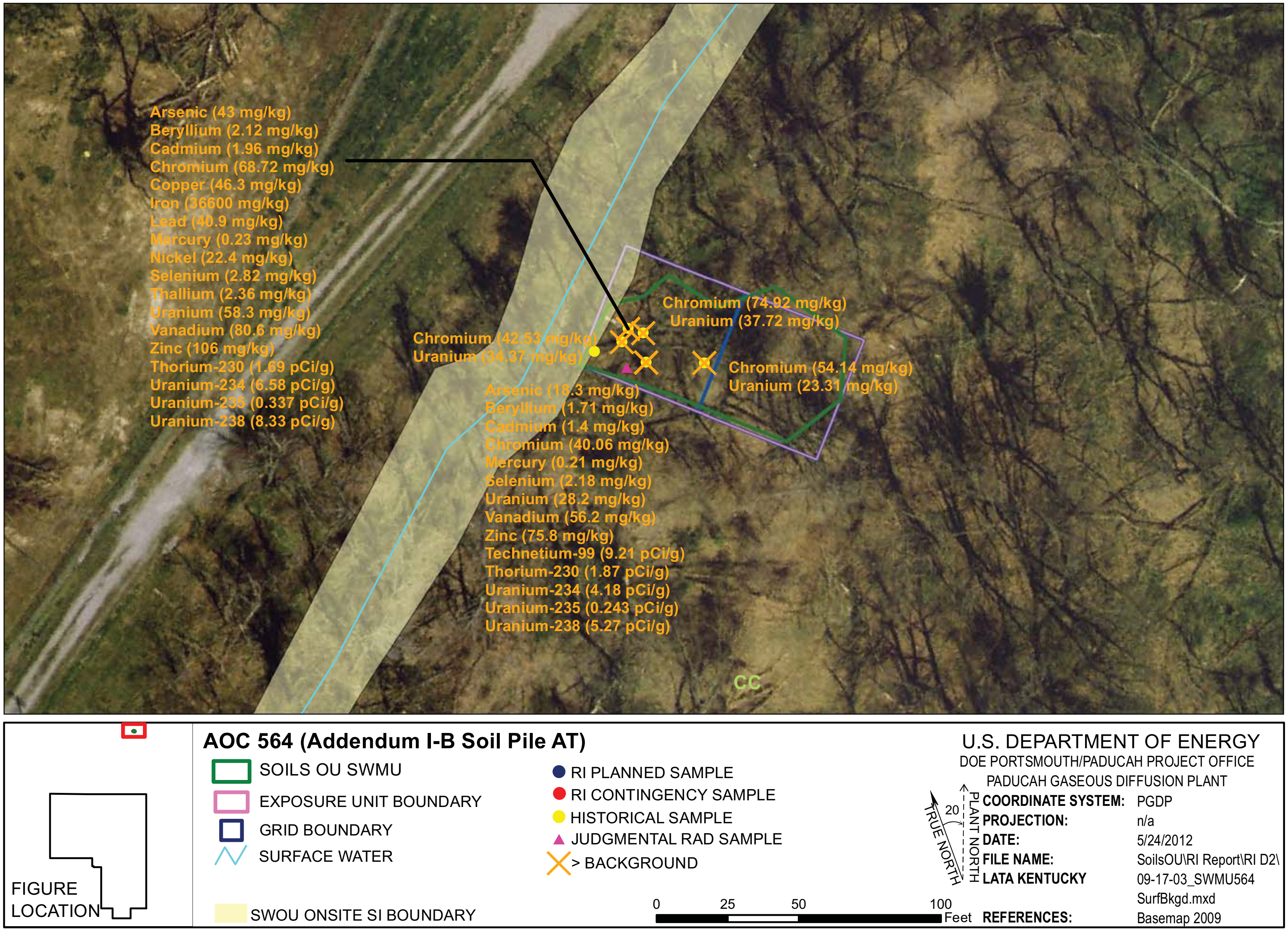


Figure 9.15.3. AOC 564 Background Exceedances - Surface Soil

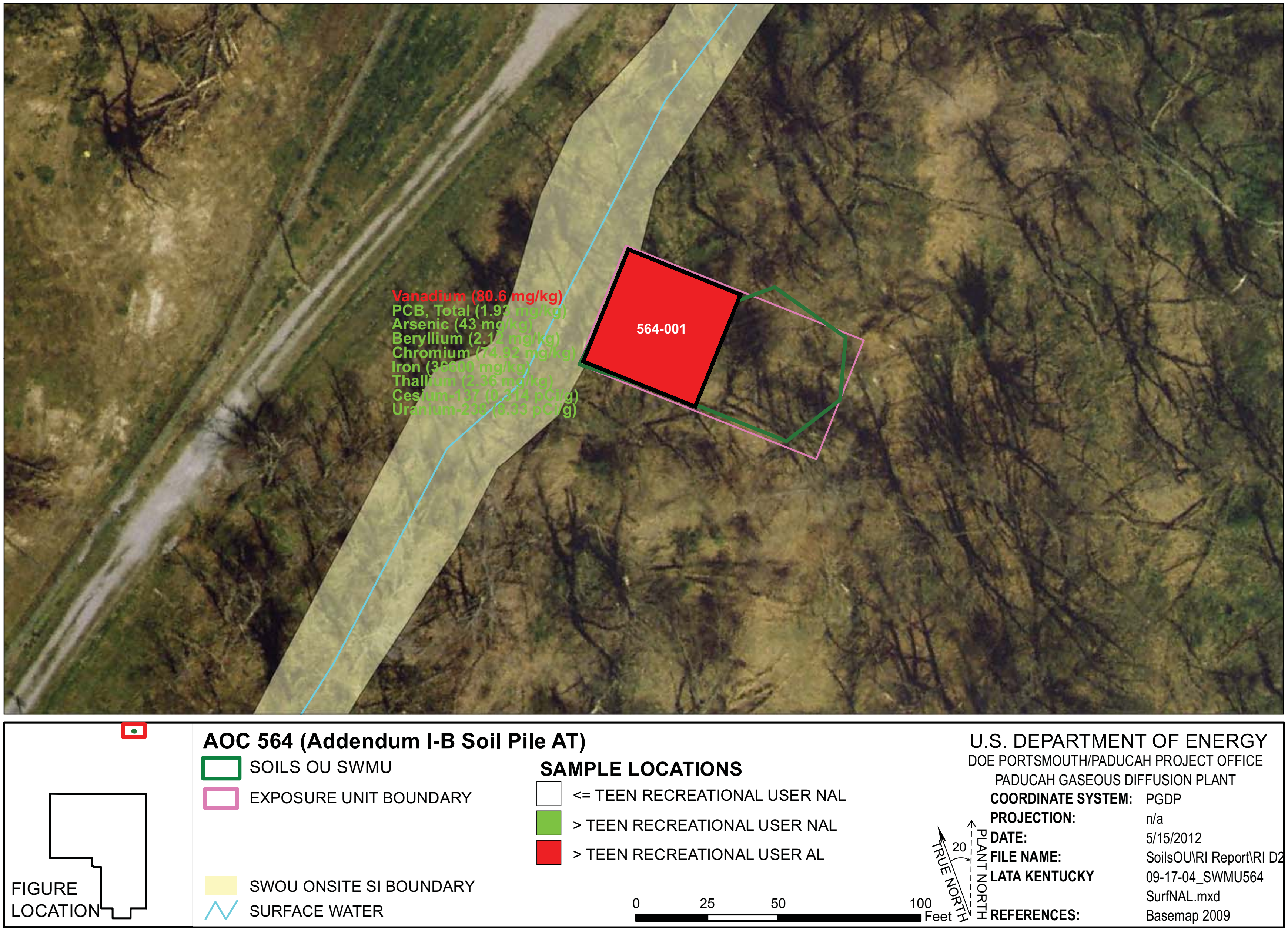


Figure 9.15.4. AOC 564 NAL Exceedances - Surface Soil

truncated from the figures. Figures contain the SWMU/AOC#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of AOC 564 surface soil contamination is considered adequately defined for supporting the BRA and FS. AOC 564 consists of one grid and one EU.

Metals

Metals were detected above the teen recreator NALs in the AOC 564 surface soil. Metals detected at or above both the background screening levels and the teen recreator NALs in the single grid include arsenic, beryllium, chromium, iron, thallium, and vanadium.

Vanadium was detected above both the background screening level and the teen recreator ALs in the AOC 564 surface soil.

The following metals were detected in the AOC 564 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater: arsenic, cadmium, copper, iron, lead, mercury, molybdenum (no background value available), nickel, selenium, thallium, uranium, vanadium, and zinc.

Arsenic, iron, molybdenum (no background value available), and vanadium were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the teen recreator NAL and the SSL for the protection of UCRS groundwater in the AOC 564 surface soil. PCBs were not detected above the teen recreator ALs or the SSLs for the protection of RGA groundwater.

SVOCs

No SVOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the AOC 564 surface soil.

VOC

No surface soil samples from AOC 564 were analyzed for VOCs.

Radionuclides

Cesium-137 and uranium-238 were detected above both the background screening levels and the teen recreator NALs in the AOC 564 surface soil.

No radionuclides were detected above both the background screening levels and the teen recreator ALs in the AOC 564 surface soil.

Technetium-99, thorium-230, and uranium-238 were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

9.15.4 Nature and Extent of Contamination—Subsurface Soils

For AOC 564, the representative data set for subsurface soils is presented in Table 9.15.3 and provides the nature of the contamination in AOC 564 subsurface soils. Figures 9.15.5–9.15.7 illustrate the horizontal extent. A complete list of the sampling results, including the sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU/AOC#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of AOC 564 surface soil contamination is considered adequately defined for supporting the BRA and FS. AOC 564 consists on one grid and one EU.

Metals

Metals were detected above the teen recreator NALs in the AOC 564 subsurface soil. Metals detected at or above both the background screening levels and the teen recreator NALs in the single grid include arsenic, beryllium, chromium and vanadium.

The maximum depth at which metals were detected at or above both the background screening levels and the teen recreator NALs was 3 ft bgs, which also was the end depth of the borehole.

No metals were detected above both the background screening levels and the teen recreator ALs in the AOC 564 subsurface soil.

The following metals were detected in the AOC 564 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater: arsenic, cadmium, lead, mercury, molybdenum (no background value available), selenium, uranium, vanadium, and zinc.

Arsenic, molybdenum (no background value available), and vanadium were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected to a maximum depth of 3 ft bgs above the teen recreator NAL in the AOC 564 subsurface soil. Total PCBs were detected above the SSLs for the protection of UCRS groundwater, but were not detected above the SSLs for the protection of RGA groundwater.

SVOCs

No SVOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the AOC 564 subsurface soil.

VOCs

No subsurface soil samples from AOC 564 were analyzed for VOCs.

Table 9.15.3. Subsurface Soil Historical Data Summary: SWMU 564 Addendum 1B Soil Pile AT

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	1.08E+04	1.08E+04	1.08E+04	0/1	1/1	0/1	1.20E+04	0/1	2.77E+04	0/1	8.91E+06	0/1	1/1	194 - 194
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	1.78E+00	0/1	1.90E+03	0/1	0/1	7.48 - 7.48
METAL	Arsenic	mg/kg	1.91E+01	1.91E+01	1.91E+01	0/1	1/1	1/1	7.90E+00	1/1	1.02E+00	0/1	1.02E+02	1/1	1/1	0.968 - 0.968
METAL	Barium	mg/kg	9.23E+01	9.23E+01	9.23E+01	0/1	1/1	0/1	1.70E+02	0/1	4.15E+02	0/1	4.58E+05	0/1	1/1	2.42 - 2.42
METAL	Beryllium	mg/kg	1.78E+00	1.78E+00	1.78E+00	0/1	1/1	1/1	6.90E-01	1/1	1.29E-02	0/1	8.65E+00	0/1	0/1	0.484 - 0.484
METAL	Cadmium	mg/kg	1.66E+00	1.66E+00	1.66E+00	0/1	1/1	1/1	2.10E-01	0/1	3.14E+00	0/1	3.14E+02	0/1	1/1	0.484 - 0.484
METAL	Calcium	mg/kg	1.68E+03	1.68E+03	1.68E+03	0/1	1/1	0/1	6.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	96.8 - 96.8
METAL	Chromium	mg/kg	3.95E+01	8.32E+01	6.60E+01	0/5	3/5	2/5	4.30E+01	1/5	7.15E+01	0/5	7.15E+03	0/5	0/5	2.42 - 2.42
METAL	Cobalt	mg/kg	5.84E+00	5.84E+00	5.84E+00	0/1	1/1	0/1	1.30E+01	0/1	8.45E+00	0/1	3.29E+03	1/1	1/1	0.968 - 0.968
METAL	Copper	mg/kg	4.42E+01	4.42E+01	4.42E+01	0/1	1/1	1/1	2.50E+01	0/1	1.13E+03	0/1	4.75E+05	0/1	0/1	24.2 - 24.2
METAL	Iron	mg/kg	2.51E+04	2.51E+04	2.51E+04	0/1	1/1	0/1	2.80E+04	1/1	1.98E+04	0/1	8.31E+06	1/1	1/1	19.4 - 19.4
METAL	Lead	mg/kg	1.19E+01	4.01E+01	2.48E+01	0/5	5/5	1/5	2.30E+01	0/5	4.00E+02	0/5	4.00E+02	0/5	4/5	9.68 - 9.68
METAL	Magnesium	mg/kg	7.51E+02	7.51E+02	7.51E+02	0/1	1/1	0/1	2.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	4.84 - 4.84
METAL	Manganese	mg/kg	4.10E+02	4.10E+02	4.10E+02	0/1	1/1	0/1	8.20E+02	0/1	3.47E+03	0/1	2.94E+05	1/1	1/1	2.42 - 2.42
METAL	Mercury	mg/kg	1.70E-01	1.70E-01	1.70E-01	0/1	1/1	1/1	1.30E-01	0/1	6.25E-01	0/1	7.88E+02	0/1	1/1	0.016 - 0.016
METAL	Molybdenum	mg/kg	6.29E+00	6.29E+00	6.29E+00	0/1	1/1	0/1	n/a	0/1	1.42E+02	0/1	5.94E+04	1/1	1/1	4.84 - 4.84
METAL	Nickel	mg/kg	1.74E+01	1.74E+01	1.74E+01	0/1	1/1	0/1	2.20E+01	0/1	2.98E+01	0/1	3.07E+04	0/1	1/1	4.84 - 4.84
METAL	Selenium	mg/kg	2.74E+00	2.74E+00	2.74E+00	0/1	1/1	1/1	7.00E-01	0/1	1.42E+02	0/1	5.93E+04	0/1	1/1	0.968 - 0.968
METAL	Silver	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.70E+00	0/1	7.45E+00	0/1	8.07E+03	0/1	0/1	1.87 - 1.87
METAL	Sodium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	3.40E+02	0/1	n/a	0/1	n/a	n/a	n/a	194 - 194
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	3.40E-01	0/1	2.27E+00	0/1	9.50E+02	0/1	0/1	1.94 - 1.94
METAL	Uranium	mg/kg	1.57E+01	5.45E+01	3.40E+01	0/5	4/5	4/5	4.60E+00	0/5	8.49E+01	0/5	3.50E+04	0/5	4/5	9.68 - 9.68
METAL	Vanadium	mg/kg	6.39E+01	6.39E+01	6.39E+01	0/1	1/1	1/1	3.70E+01	1/1	1.04E-01	0/1	7.61E+01	1/1	1/1	2.42 - 2.42
METAL	Zinc	mg/kg	9.70E+01	9.70E+01	9.70E+01	0/1	1/1	1/1	6.00E+01	0/1	8.50E+03	0/1	3.56E+06	0/1	1/1	19.4 - 19.4
PPCB	PCB, Total	mg/kg	7.40E-01	7.40E-01	7.40E-01	0/5	1/5	0/5	n/a	1/5	1.83E-01	0/5	1.83E+01	0/5	1/5	0.13 - 0.13
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.87E+02	0/1	1.76E+04	0/1	0/1	0.49 - 0.49
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.49 - 0.49
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.25E+03	0/1	9.74E+04	0/1	0/1	0.49 - 0.49
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.49 - 0.49
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.47E+02	0/1	1.34E+04	0/1	0/1	0.49 - 0.49
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.19E+02	0/1	1.26E+04	0/1	0/1	0.49 - 0.49
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.27E+00	0/1	5.27E+02	0/1	0/1	0.49 - 0.49
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.49 - 0.49
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.35E+02	0/1	1.00E+04	0/1	0/1	0.49 - 0.49
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	5.57E-02	0/5	5.57E+00	0/5	0/5	0.2 - 0.2
RADS	Americium-241	pCi/g	4.47E-03	4.47E-03	4.47E-03	0/1	1/1	0/1	n/a	0/1	1.28E+01	0/1	1.28E+03	0/1	0/1	0.0217 - 0.0217
RADS	Cesium-137	pCi/g	4.75E-01	4.75E-01	4.75E-01	0/1	1/1	1/1	2.80E-01	1/1	1.98E-01	0/1	1.98E+01	0/1	0/1	0.138 - 0.138
RADS	Neptunium-237	pCi/g	-2.58E-03	-2.58E-03	-2.58E-03	0/1	1/1	0/1	n/a	0/1	6.26E-01	0/1	6.26E+01	0/1	0/1	0.0475 - 0.0475
RADS	Plutonium-238	pCi/g	-1.07E-03	-1.07E-03	-1.07E-03	0/1	1/1	0/1	n/a	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.0115 - 0.0115
RADS	Plutonium-239/240	pCi/g	2.06E-02	2.06E-02	2.06E-02	0/1	1/1	0/1	n/a	0/1	3.56E+01	0/1	3.56E+03	0/1	0/1	0.0129 - 0.0129
RADS	Technetium-99	pCi/g	3.15E-01	3.15E-01	3.15E-01	0/1	1/1	0/1	2.80E+00	0/1	1.11E+03	0/1	1.11E+05	0/1	0/1	0.662 - 0.662
RADS	Thorium-228	pCi/g	3.39E-01	3.39E-01	3.39E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.0854 - 0.0854
RADS	Thorium-230	pCi/g	1.39E+00	1.39E+00	1.39E+00	0/1	1/1	0/1	1.40E+00	0/1	4.49E+01	0/1	4.49E+03	0/1	1/1	0.0593 - 0.0593

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.15.3. Subsurface Soil Historical Data Summary: AOC 564 Addendum 1B Soil Pile AT (Continued)

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	**Analysis**	**Unit**	**Min**	**Max**	**Avg**	**FOD**	**FOD**	**FOE**	**Bkgd**	**FOE**	**NAL**	**FOE**	**AL**	**RGA**	**UCRS**	**DL Range**
RADS	Thorium-232	pCi/g	3.63E-01	3.63E-01	3.63E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.0372 - 0.0372
RADS	Uranium-234	pCi/g	6.70E+00	6.70E+00	6.70E+00	0/1	1/1	1/1	1.20E+00	0/1	6.25E+01	0/1	6.25E+03	0/1	0/1	0.114 - 0.114
RADS	Uranium-235	pCi/g	3.48E-01	3.48E-01	3.48E-01	0/1	1/1	1/1	6.00E-02	0/1	9.12E-01	0/1	9.12E+01	0/1	0/1	0.0157 - 0.0157
RADS	Uranium-238	pCi/g	8.54E+00	8.54E+00	8.54E+00	0/1	1/1	1/1	1.20E+00	1/1	4.02E+00	0/1	4.02E+02	0/1	1/1	0.0999 - 0.0999

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

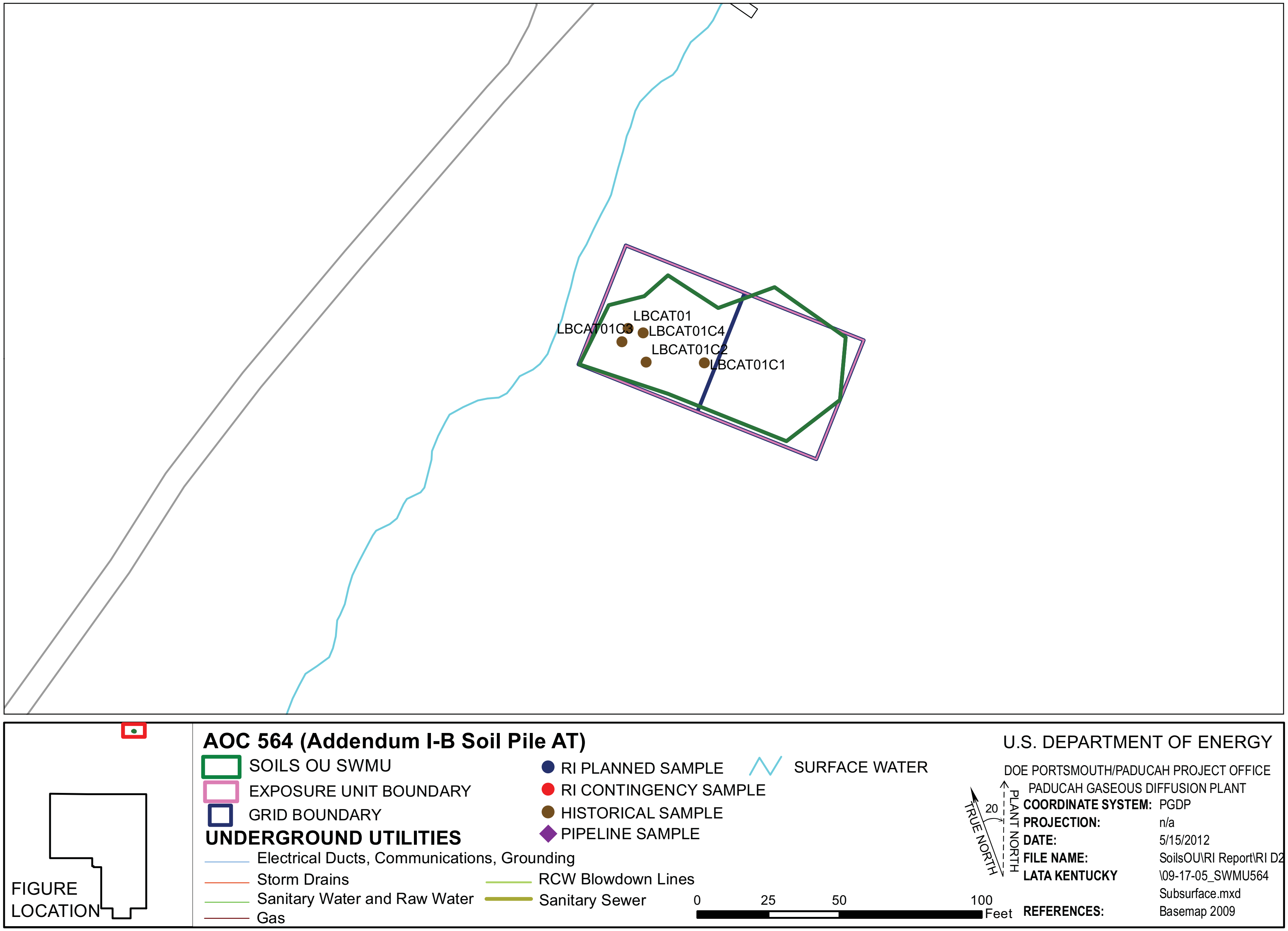


Figure 9.15.5. AOC 564 Sample Locations - Subsurface Soil

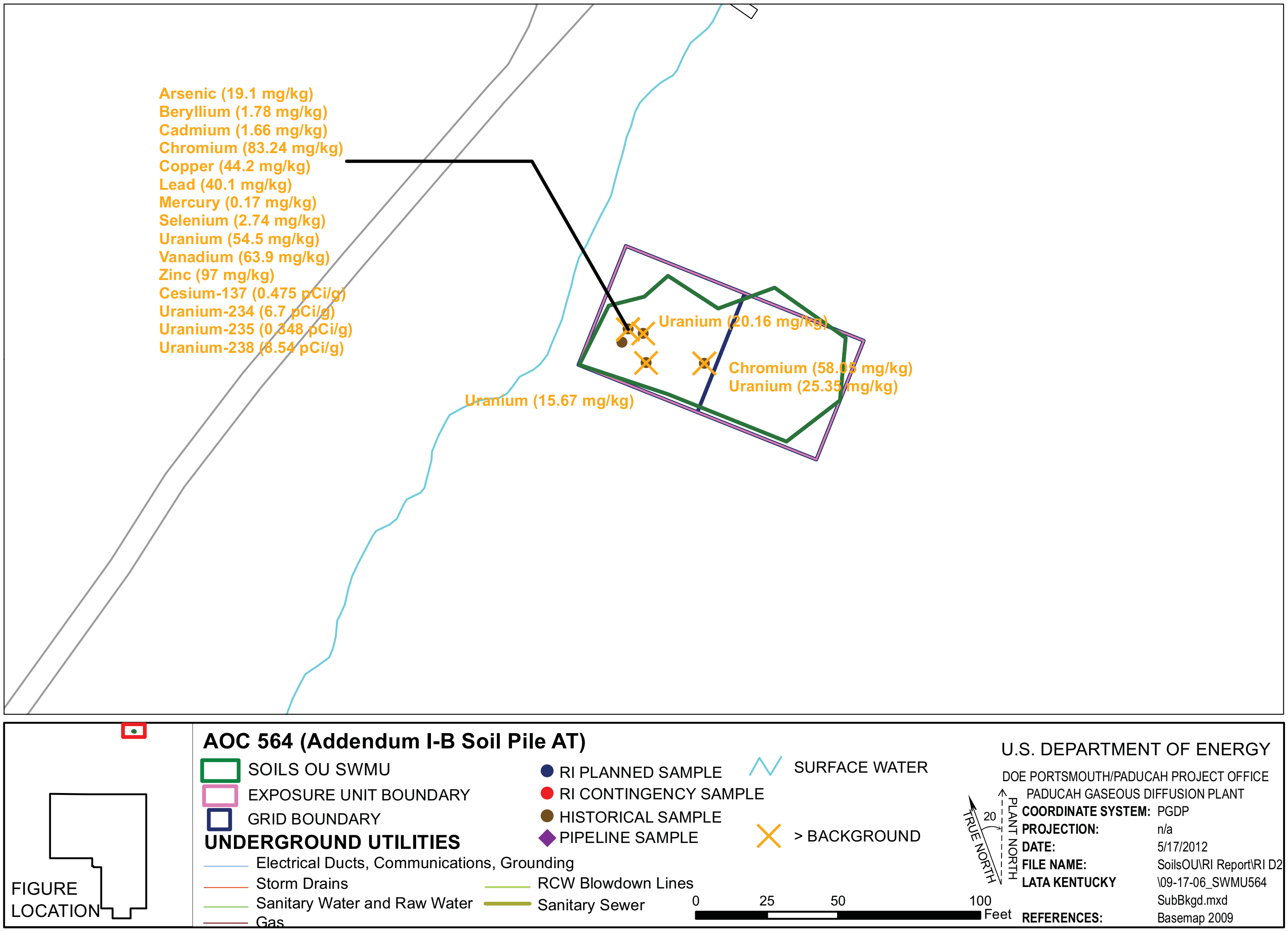


Figure 9.15.6. AOC 564 Background Exceedances - Subsurface Soil

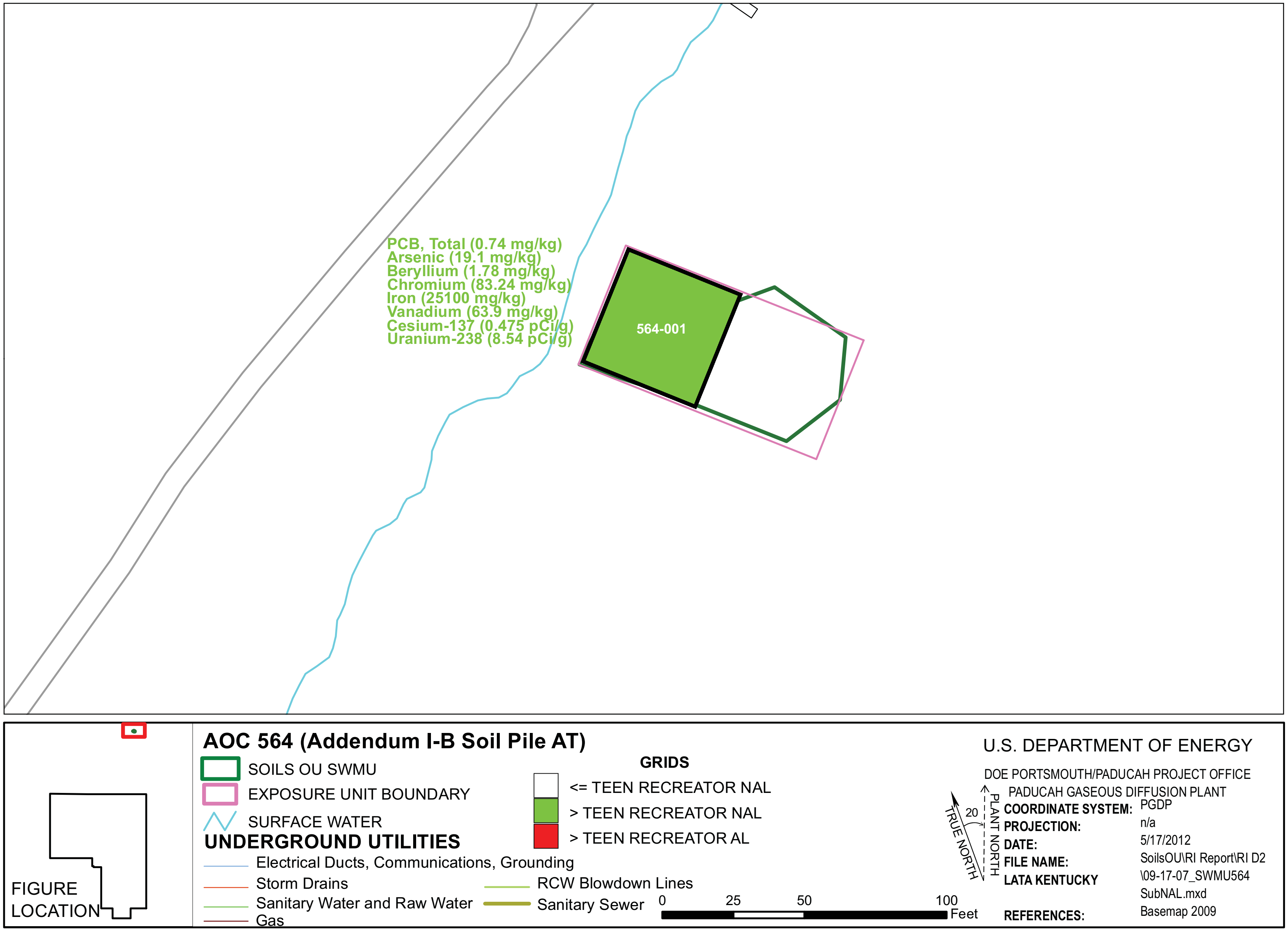


Figure 9.15.7. AOC 564 NAL Exceedances - Subsurface Soil

Radionuclides

Cesium-137 and uranium-238 were detected above both the background screening levels and the teen recreator NALs at 3 ft bgs. No radionuclides were detected above both the background screening levels and the teen recreator ALs.

Uranium-238 was detected above both the background screening level and the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

9.15.5 Fate and Transport

SESOIL and AT123D groundwater and transport modeling was conducted to determine maximum potential RGA groundwater concentrations at the AOC 564 boundary, the DOE property boundary and the surface water discharge location that result from arsenic soil constituents. Screening of the soil contaminant data (Appendix C) showed that arsenic at AOC 564 exceeded the screening criteria. Details regarding the SESOIL and AT123D modeling can be found in Appendix C. Arsenic, the soil constituent of concern for AOC 564 (Chapter 4), was found not to reach the RGA in the 1,000-year SESOIL modeling period.

There is potential for runoff because this AOC is near Little Bayou Creek; however, AOC 564 is grass-covered or otherwise stabilized and the contaminants are not likely to be transported attached to suspended soil particles. Soil piles are believed to have similar origin and the findings from the SWMU 561 soil pile evaluation determined that contaminants are not migrating away from the piles (DOE 2008b). Little Bayou Creek is scheduled to be investigated as part of the SWOU. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs/AOCs to surrounding ditches.

9.15.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for AOC 564. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for AOC 564 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this AOC will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.15.4 for the outdoor worker (exposed to surface soils), the excavation worker, the hypothetical resident, and the teen recreational user. Table 9.15.4 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this AOC under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Table 9.15.4. RGOs for AOC 564

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Outdoor Worker (exposed to surface soil)											
1	Arsenic	4.30E+01	mg/kg	1.0E-04	4.15E-01	4.15E+00	4.15E+01	0.6	6.65E+00	6.65E+01	1.99E+02
	Cesium-137	6.20E-01	pCi/g	5.4E-06	1.15E-01	1.15E+00	1.15E+01	n/a	n/a	n/a	n/a
	Chromium	7.49E+01	mg/kg	1.8E-06	4.08E+01	4.08E+02	4.08E+03	< 0.1	n/a	n/a	n/a
	Iron	3.66E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	2.01E+04	2.01E+05	6.04E+05
	PCB, Total	1.93E+00	mg/kg	1.2E-05	1.62E-01	1.62E+00	1.62E+01	< 0.1	n/a	n/a	n/a
	Thallium	2.36E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	2.30E+00	2.30E+01	6.91E+01
	Thorium-230	5.01E+00	pCi/g	2.3E-06	2.20E+00	2.20E+01	2.20E+02	n/a	n/a	n/a	n/a
	Uranium-234	6.93E+00	pCi/g	2.4E-06	2.83E+00	2.83E+01	2.83E+02	n/a	n/a	n/a	n/a
	Uranium-238	8.33E+00	pCi/g	7.1E-06	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.3E-04**				**0.9**			
Excavation Worker											
1	Arsenic	4.30E+01	mg/kg	1.3E-06	3.32E+01	3.32E+02	3.32E+03	< 1	n/a	n/a	n/a
	Cumulative			**1.3E-06**				**< 1**			
Hypothetical Resident[5]											
1	Arsenic	4.30E+01	mg/kg	1.8E-04	2.35E-01	2.35E+00	2.35E+01	2.6	1.64E+00	1.64E+01	4.93E+01
	Cesium-137	6.20E-01	pCi/g	3.6E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Chromium	7.49E+01	mg/kg	4.8E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Iron	3.66E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.7	5.47E+03	5.48E+04	1.64E+05
	PCB, Total	1.93E+00	mg/kg	3.0E-05	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Thallium	2.36E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.4	6.26E-01	6.26E+00	1.88E+01
	Thorium-230	5.01E+00	pCi/g	1.4E-06	3.57E+00	3.57E+01	3.57E+02	n/a	n/a	n/a	n/a
	Uranium	5.83E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	6.93E+00	pCi/g	1.4E-06	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	3.87E-01	pCi/g	4.9E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	8.33E+00	pCi/g	2.4E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Vanadium	8.06E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	3.91E+01	3.91E+02	1.17E+03
	Cumulative			**2.9E-04**				**4.1**			

Table 9.15.4. RGOs for AOC 564 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Teen Recreational User											
1	Arsenic	4.30E+01	mg/kg	2.4E-05	1.77E+00	1.77E+01	1.77E+02	< 1	n/a	n/a	n/a
	Cesium-137	6.20E-01	pCi/g	1.5E-06	4.10E-01	4.10E+00	4.10E+01	n/a	n/a	n/a	n/a
	PCB, Total	1.93E+00	mg/kg	6.5E-06	2.99E-01	2.99E+00	2.99E+01	< 1	n/a	n/a	n/a
	Cumulative			**3.2E-05**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.78, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.78, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Ecological Screening. COPECs for AOC 564 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 9.15.5.

Table 9.15.5 Ecological Screening for AOC 564

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Soil/grass mix with trees	Yes	153	PCB, Total	n/a	1.93E+00	2.00E-02	97
			Uranium	4.90E+00	5.83E+01	5.00E+00	12
			Vanadium	3.80E+01	8.06E+01	7.80E+00	10

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

9.15.7 AOC 564 Summary

The following text summarizes the results for AOC 564 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

A plant process that could have contributed to contamination at the AOC is dredging Little Bayou Creek to keep it free-flowing for PGDP discharges.

COPCs for surface and subsurface soils from AOC 564 are shown on Tables 9.15.1–9.15.3 as those analytes with green boxes under the "Teen Recreator/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The COPCs identified for this AOC are metals, PCBs, and radionuclides in surface and subsurface soil. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 3 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at AOC 564 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at AOC 564. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the outdoor worker (exposed to surface soil), excavation worker, hypothetical residential, and teen recreational user scenarios. COCs for these scenarios for AOC 564 are as follows:

- Outdoor worker (exposed to surface soil)
  - Arsenic
  - Cesium-137
  - Chromium
  - Iron

- Total PCBs
- Thallium
- Thorium-230
- Uranium-234
- Uranium-238

- Excavation worker

  - Arsenic

- Hypothetical Resident (hazards evaluated against the child resident)

  - Arsenic
  - Cesium-137
  - Chromium
  - Iron
  - Total PCBs
  - Thallium
  - Thorium-230
  - Uranium
  - Uranium-234
  - Uranium-235
  - Uranium-238
  - Vanadium

- Teen Recreational User

  - Arsenic
  - Cesium-137
  - Total PCBs

Of the above, arsenic for the outdoor worker (exposed to surface soil) and the hypothetical resident is a priority COC (i.e., HQ > 1 or chemical-specific ELCR > 1E-04). Priority COCs for other scenarios are described in Appendix D.

For AOC 564, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Total PCBs
- Uranium
- Vanadium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for AOC 564 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. The Addendum 1B SER (DOE 2009d) stated that PGDP monitoring data indicates that little to no migration has taken place to date from these piles. Because of this, a response action at these piles would have no effect on the surface water integrator OU.

9.15.8 AOC 564 Conclusion

The RI adequately defined the nature and extent of contamination in soils at AOC 564; an FS is appropriate for the AOC due to risk exceeding the decision rule benchmark (DOE 2010a) for scenarios including outdoor worker (exposed to surface soil), excavation worker, hypothetical resident, and teen recreational user (DOE 2010a). The reasonably anticipated future land use for this AOC is recreational as shown in the SMP (DOE 2012a). It is very distant from PGDP in the WKWMA, and access by recreational users is easy.

9.16 AOC 567, CONTAMINATED SOIL AREA K013

9.16.1 Background

This AOC encompasses five individual soil piles located near Outfall 013. The soil piles vary in size and are approximately 3-ft high.

This area was discovered in June 2008 during work to implement a sampling and analysis plan (SAP) for other soil piles in the area. The area contained soil piles that likely were generated as a result of past construction activities at PGDP. This area was characterized with the other soil piles in the area in October 2008 during the Soil Pile Addendum 1-B Site Evaluation. The K013 soil piles are not in close proximity to other piles.

As a result of the December 2008 sampling event, risk screening determined uranium-238 to be a COPC in the soil piles (DOE 2009e).

9.16.2 Fieldwork Summary

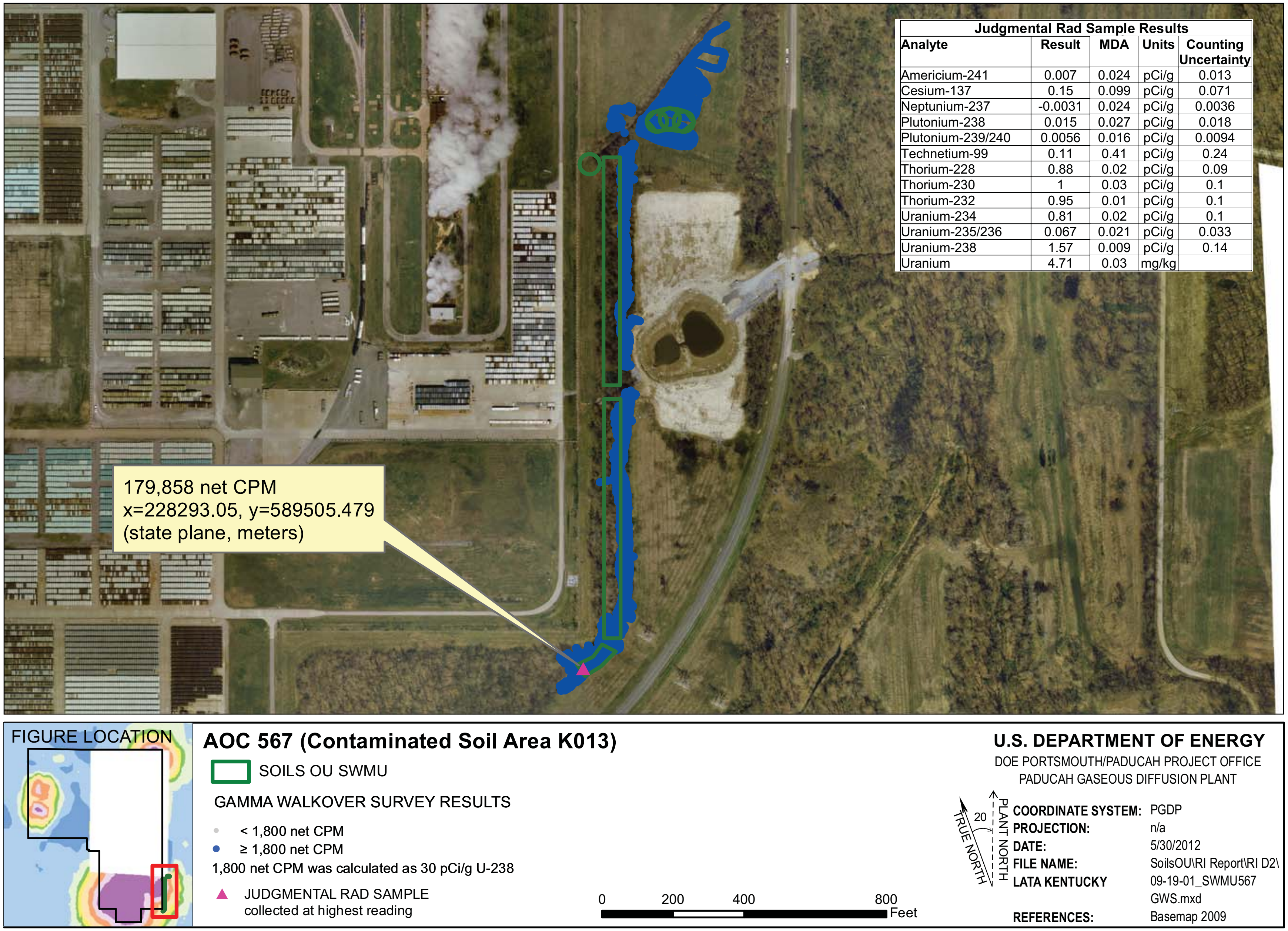
The historical data are representative of the nature and adequately delineate the extent of the contamination; therefore, no samples were collected from AOC 567 during the Soils OU RI sampling effort (DOE 2010a).

A gamma radiological walkover survey (Figure 9.16.1) was conducted on this AOC using a FIDLER; the 13,094 measurements ranged from 4,352 to 190,858 gross cpm. The area consists entirely of soils and grass. The count rates are elevated due to contribution from cylinder yards west of this AOC. A judgmental sample was collected for radiological constituents. Cylinder yard shine prevents the accurate measurement of surficial soil contamination levels and identification of their locations. Per the Work Plan, the judgmental sample was collected at the location with the highest measurement (DOE 2010a).

9.16.3 Nature and Extent of Contamination—Surface Soils

For AOC 567, the representative data set for surface soils is presented in Tables 9.16.1 and 9.16.2 and provides the nature of the contamination in AOC 567 surface soils. Figures 9.16.2–9.16.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU/AOC#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of AOC 567 surface soil contamination is considered adequately defined for supporting the BRA and FS. AOC 567 consists of four EUs.



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.007	0.024	pCi/g	0.013
Cesium-137	0.15	0.099	pCi/g	0.071
Neptunium-237	-0.0031	0.024	pCi/g	0.0036
Plutonium-238	0.015	0.027	pCi/g	0.018
Plutonium-239/240	0.0056	0.016	pCi/g	0.0094
Technetium-99	0.11	0.41	pCi/g	0.24
Thorium-228	0.88	0.02	pCi/g	0.09
Thorium-230	1	0.03	pCi/g	0.1
Thorium-232	0.95	0.01	pCi/g	0.1
Uranium-234	0.81	0.02	pCi/g	0.1
Uranium-235/236	0.067	0.021	pCi/g	0.033
Uranium-238	1.57	0.009	pCi/g	0.14
Uranium	4.71	0.03	mg/kg	

Figure 9.16.1. AOC 567 Gamma Walkover Survey

Table 9.16.1. Surface Soil Historical Data Summary: SWMU 567 Addendum 1B Soil Pile at K013

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Teen Recreator FOE	Teen Recreator NAL	Teen Recreator FOE	Teen Recreator AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
METAL	Aluminum	mg/kg	6.97E+03	1.34E+04	9.46E+03	0/6	6/6	1/6	1.30E+04	0/6	2.77E+04	0/6	8.91E+06	0/6	6/6	17.8 - 199
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	2.10E-01	0/6	1.78E+00	0/6	1.90E+03	0/6	0/6	6.82 - 8.18
METAL	Arsenic	mg/kg	4.80E+00	6.35E+00	5.53E+00	0/6	5/6	0/6	1.20E+01	5/6	1.02E+00	0/6	1.02E+02	0/6	5/6	4.44 - 4.96
METAL	Barium	mg/kg	6.86E+01	1.20E+02	8.97E+01	0/6	6/6	0/6	2.00E+02	0/6	4.15E+02	0/6	4.58E+05	0/6	3/6	2.22 - 2.48
METAL	Beryllium	mg/kg	4.55E-01	4.81E-01	4.68E-01	0/6	2/6	0/6	6.70E-01	2/6	1.29E-02	0/6	8.65E+00	0/6	0/6	0.444 - 0.496
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	2.10E-01	0/6	3.14E+00	0/6	3.14E+02	0/6	0/6	2.22 - 2.48
METAL	Calcium	mg/kg	3.98E+02	2.62E+04	7.21E+03	0/6	6/6	0/6	2.00E+05	0/6	n/a	0/6	n/a	n/a	n/a	88.8 - 99.3
METAL	Chromium	mg/kg	1.00E+01	3.79E+01	1.75E+01	0/6	6/6	2/6	1.60E+01	0/6	7.15E+01	0/6	7.15E+03	0/6	0/6	2.22 - 2.48
METAL	Cobalt	mg/kg	5.68E+00	7.43E+00	6.26E+00	0/6	6/6	0/6	1.40E+01	0/6	8.45E+00	0/6	3.29E+03	6/6	6/6	4.44 - 4.96
METAL	Copper	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	1.90E+01	0/6	1.13E+03	0/6	4.75E+05	0/6	0/6	11.1 - 12.4
METAL	Iron	mg/kg	8.30E+03	1.80E+04	1.22E+04	0/6	6/6	0/6	2.80E+04	0/6	1.98E+04	0/6	8.31E+06	6/6	6/6	17.8 - 19.9
METAL	Lead	mg/kg	9.01E+00	1.42E+01	1.18E+01	0/6	6/6	0/6	3.60E+01	0/6	4.00E+02	0/6	4.00E+02	0/6	1/6	4.44 - 4.96
METAL	Magnesium	mg/kg	9.99E+02	1.31E+03	1.18E+03	0/6	6/6	0/6	7.70E+03	0/6	n/a	0/6	n/a	n/a	n/a	4.44 - 4.96
METAL	Manganese	mg/kg	3.39E+02	1.32E+03	5.96E+02	0/6	6/6	0/6	1.50E+03	0/6	3.47E+03	0/6	2.94E+05	6/6	6/6	2.22 - 2.48
METAL	Mercury	mg/kg	1.70E-02	3.00E-02	2.23E-02	0/6	6/6	0/6	2.00E-01	0/6	6.25E-01	0/6	7.88E+02	0/6	0/6	0.016 - 0.016
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	1.42E+02	0/6	5.94E+04	0/6	0/6	4.44 - 4.96
METAL	Nickel	mg/kg	6.30E+00	9.26E+00	7.18E+00	0/6	6/6	0/6	2.10E+01	0/6	2.98E+01	0/6	3.07E+04	0/6	6/6	4.44 - 4.96
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	8.00E-01	0/6	1.42E+02	0/6	5.93E+04	0/6	0/6	4.44 - 4.96
METAL	Silver	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	2.30E+00	0/6	7.45E+00	0/6	8.07E+03	0/6	0/6	1.7 - 2.05
METAL	Sodium	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	3.20E+02	0/6	n/a	0/6	n/a	n/a	n/a	178 - 199
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	2.10E-01	0/6	2.27E+00	0/6	9.50E+02	0/6	0/6	8.88 - 9.93
METAL	Uranium	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	4.90E+00	0/6	8.49E+01	0/6	3.50E+04	0/6	0/6	4.44 - 4.96
METAL	Vanadium	mg/kg	1.54E+01	2.89E+01	2.05E+01	0/6	6/6	0/6	3.80E+01	6/6	1.04E-01	0/6	7.61E+01	6/6	6/6	2.22 - 2.48
METAL	Zinc	mg/kg	2.39E+01	3.62E+01	2.78E+01	0/6	6/6	0/6	6.50E+01	0/6	8.50E+03	0/6	3.56E+06	0/6	6/6	17.8 - 19.9
PPCB	PCB, Total	mg/kg	4.60E-02	4.60E-02	4.60E-02	0/7	1/7	0/7	n/a	0/7	1.83E-01	0/7	1.83E+01	0/7	0/7	0.13 - 0.13
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.87E+02	0/6	1.76E+04	0/6	0/6	0.49 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.49 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	3.25E+03	0/6	9.74E+04	0/6	0/6	0.49 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.49 - 0.5
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.47E+02	0/6	1.34E+04	0/6	0/6	0.49 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.19E+02	0/6	1.26E+04	0/6	0/6	0.49 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.27E+00	0/6	5.27E+02	0/6	0/6	0.49 - 0.5
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.49 - 0.5
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	3.35E+02	0/6	1.00E+04	0/6	0/6	0.49 - 0.5
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.57E-02	0/6	5.57E+00	0/6	0/6	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	-
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	9.45E-02	0/1	1.29E+01	0/1	0/1	-
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.26E-01	0/1	1.48E+02	0/1	0/1	-
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	9.91E-02	0/1	1.17E+01	0/1	0/1	-
RADS	Americium-241	pCi/g	-1.07E-02	-1.21E-03	-5.13E-03	0/6	6/6	0/6	n/a	0/6	1.28E+01	0/6	1.28E+03	0/6	0/6	0.0156 - 0.0274
RADS	Cesium-137	pCi/g	-2.21E-02	2.14E-01	7.32E-02	0/6	6/6	0/6	4.90E-01	1/6	1.98E-01	0/6	1.98E+01	0/6	0/6	0.046 - 0.0543
RADS	Neptunium-237	pCi/g	-1.04E-02	2.71E-03	-6.05E-03	0/6	6/6	0/6	1.00E-01	0/6	6.26E-01	0/6	6.26E+01	0/6	0/6	0.0467 - 0.0483
RADS	Plutonium-238	pCi/g	-4.32E-03	-1.93E-03	-3.31E-03	0/6	6/6	0/6	7.30E-02	0/6	3.64E+01	0/6	3.64E+03	0/6	0/6	0.0094 - 0.0106
RADS	Plutonium-239/240	pCi/g	5.89E-04	6.11E-03	2.92E-03	0/5	5/5	0/5	2.50E-02	0/5	3.56E+01	0/5	3.56E+03	0/5	0/5	0.0125 - 0.0132
RADS	Technetium-99	pCi/g	3.81E-01	7.45E-01	5.30E-01	0/6	6/6	0/6	2.50E+00	0/6	1.11E+03	0/6	1.11E+05	0/6	6/6	0.536 - 0.656
RADS	Thorium-228	pCi/g	3.69E-01	4.88E-01	4.21E-01	0/6	6/6	0/6	1.60E+00	0/6	n/a	0/6	n/a	n/a	n/a	0.0584 - 0.0622
RADS	Thorium-230	pCi/g	2.64E-01	3.60E-01	3.25E-01	0/6	6/6	0/6	1.50E+00	0/6	4.49E+01	0/6	4.49E+03	0/6	5/6	0.0608 - 0.0625

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.16.1. Surface Soil Historical Data Summary: SWMU 567 Addendum 1B Soil Pile at K013 (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
RADS	Thorium-232	pCi/g	3.27E-01	4.95E-01	4.07E-01	0/6	6/6	0/6	1.50E+00	0/6	n/a	0/6	n/a	n/a	n/a	0.0386 - 0.0399
RADS	Uranium-234	pCi/g	5.67E-03	4.31E-01	1.91E-01	0/6	6/6	0/6	1.20E+00	0/6	6.25E+01	0/6	6.25E+03	0/6	0/6	0.115 - 0.25
RADS	Uranium-238	pCi/g	1.08E-01	9.89E-01	3.90E-01	0/6	6/6	0/6	1.20E+00	0/6	4.02E+00	0/6	4.02E+02	0/6	0/6	0.107 - 0.171

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.

[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.

Thallium metal results are compared to thallium chloride action levels/no action levels.

Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).

Field replicates, or separate samples are counted independently.

The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 9.16.2. Surface Soil Historical Data Summary: AOC 567 Addendum 1B Soil Pile at K013

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Uranium	mg/kg	4.71E+00	4.71E+00	4.71E+00	0/1	1/1	0/1	4.90E+00	0/1	8.49E+01	0/1	3.50E+04	0/1	0/1	0.03 - 0.03
RADS	Alpha activity	pCi/g	2.38E+01	2.38E+01	2.38E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	6.2 - 6.2
RADS	Americium-241	pCi/g	7.00E-03	7.00E-03	7.00E-03	0/1	1/1	0/1	n/a	0/1	1.28E+01	0/1	1.28E+03	0/1	0/1	0.024 - 0.024
RADS	Beta activity	pCi/g	2.88E+01	2.88E+01	2.88E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.6 - 3.6
RADS	Cesium-137	pCi/g	1.50E-01	1.50E-01	1.50E-01	0/1	1/1	0/1	4.90E-01	0/1	1.98E-01	0/1	1.98E+01	0/1	0/1	0.099 - 0.099
RADS	Neptunium-237	pCi/g	-3.10E-03	-3.10E-03	-3.10E-03	0/1	1/1	0/1	1.00E-01	0/1	6.26E-01	0/1	6.26E+01	0/1	0/1	0.024 - 0.024
RADS	Plutonium-238	pCi/g	1.50E-02	1.50E-02	1.50E-02	0/1	1/1	0/1	7.30E-02	0/1	3.64E+01	0/1	3.64E+03	0/1	0/1	0.027 - 0.027
RADS	Plutonium-239/240	pCi/g	5.60E-03	5.60E-03	5.60E-03	0/1	1/1	0/1	2.50E-02	0/1	3.56E+01	0/1	3.56E+03	0/1	0/1	0.016 - 0.016
RADS	Technetium-99	pCi/g	1.10E-01	1.10E-01	1.10E-01	0/1	1/1	0/1	2.50E+00	0/1	1.11E+03	0/1	1.11E+05	0/1	0/1	0.41 - 0.41
RADS	Thorium-228	pCi/g	8.80E-01	8.80E-01	8.80E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	1.00E+00	1.00E+00	1.00E+00	0/1	1/1	0/1	1.50E+00	0/1	4.49E+01	0/1	4.49E+03	0/1	1/1	0.03 - 0.03
RADS	Thorium-232	pCi/g	9.50E-01	9.50E-01	9.50E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
RADS	Uranium-234	pCi/g	8.10E-01	8.10E-01	8.10E-01	0/1	1/1	0/1	1.20E+00	0/1	6.25E+01	0/1	6.25E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	6.70E-02	6.70E-02	6.70E-02	0/1	1/1	1/1	6.00E-02	0/1	9.12E-01	0/1	9.12E+01	0/1	0/1	0.021 - 0.021
RADS	Uranium-238	pCi/g	1.57E+00	1.57E+00	1.57E+00	0/1	1/1	1/1	1.20E+00	0/1	4.02E+00	0/1	4.02E+02	0/1	0/1	0.009 - 0.009

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

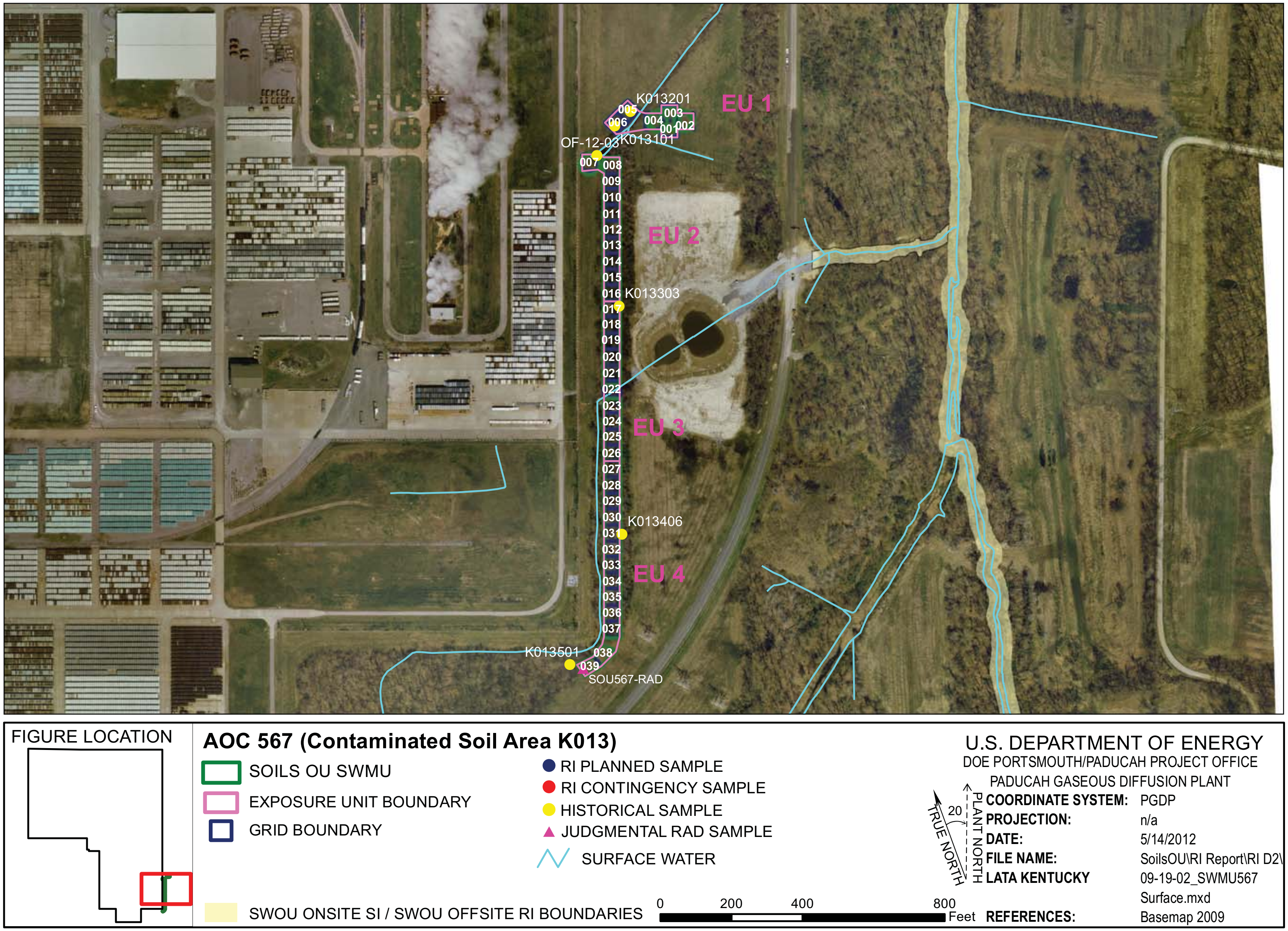


Figure 9.16.2. AOC 567 Sample Locations - Surface Soil

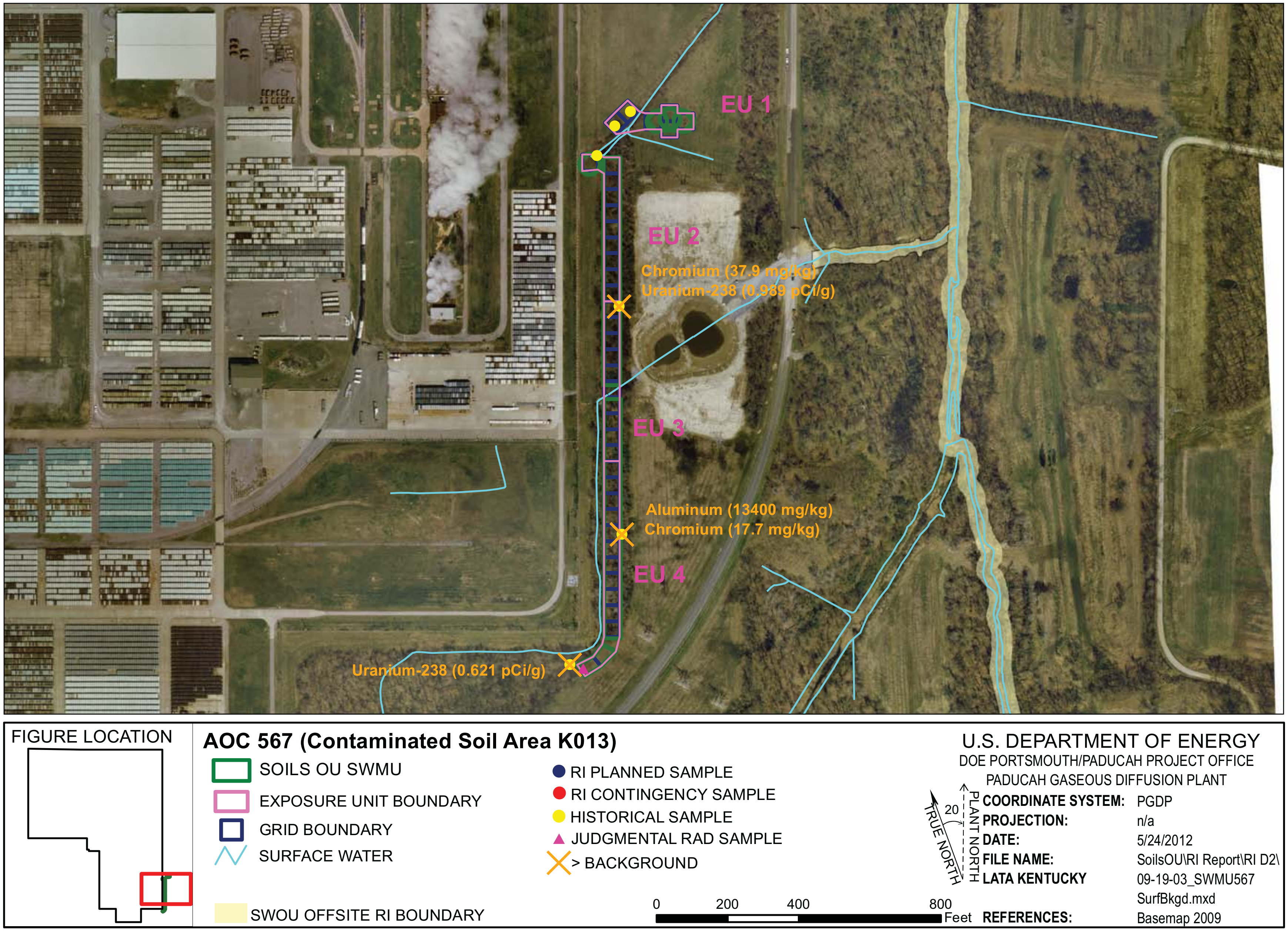


Figure 9.16.3. AOC 567 Background Exceedances - Surface Soil

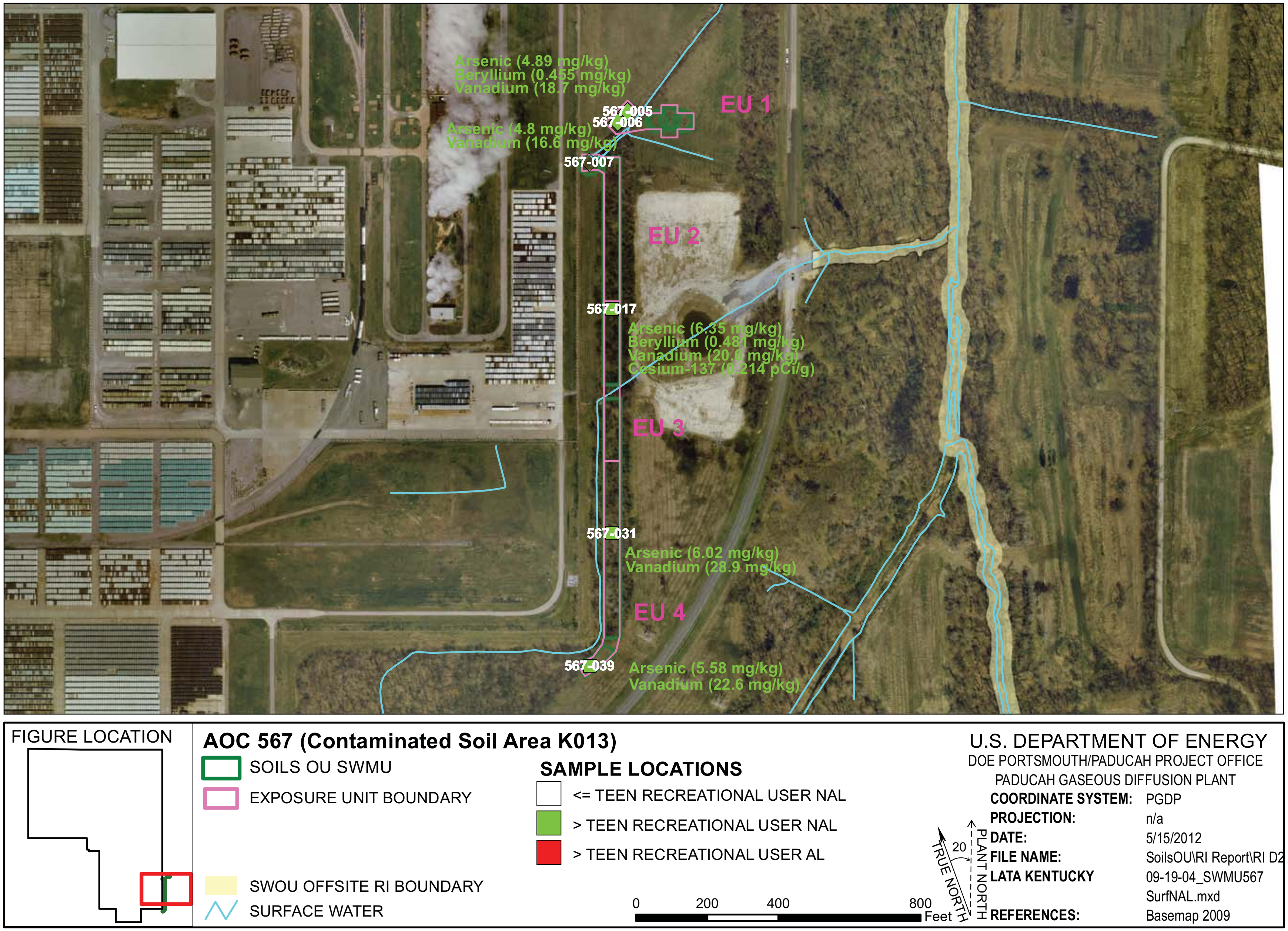


Figure 9.16.4. AOC 567 NAL Exceedances - Surface Soil

Metals

No metals were detected in the AOC 567 surface soil above both the background screening levels and the teen recreator NALs or ALs in the AOC 567 surface soil.

Aluminum in grid 31 (EU 4) was detected in the AOC 567 surface soil above both the background screening level and the SSLs for the protection of UCRS groundwater. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

No PCBs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the AOC 567 surface soil.

SVOCs

No SVOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the AOC 567 surface soil.

VOCs

No VOCs were detected above the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the AOC 567 surface soil.

Radionuclides

No radionuclides were detected above both the background screening levels and the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the AOC 567 surface soil.

9.16.4 Nature and Extent of Contamination—Subsurface Soils

For AOC 567, the representative data set for subsurface soils is presented in Table 9.16.3 and provides the nature of the contamination in AOC 567 subsurface soils. Figures 9.16.5–9.16.7 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU/AOC#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of AOC 567 surface soil contamination is considered adequately defined for supporting the BRA and FS. AOC 567 consists of four EUs.

Metals

Arsenic was detected above both the background screening level and the teen recreator NAL in the subsurface soil of grid 39 (EU 4). The detection was at 3 ft bgs, which was also the end depth of the borehole. Grid 39 is located on the AOC 567 border.

No metals were detected above both the background screening levels and the teen recreator ALs in the AOC 567 subsurface soil.

Table 9.16.3. Subsurface Soil Historical Data Summary: AOC 567 Addendum 1B Soil Pile at K013

			Detected Results*			J-qualified		Provisional Background		Teen Recreator		Teen Recreator		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	7.36E+03	1.29E+04	1.05E+04	0/5	5/5	3/5	1.20E+04	0/5	2.77E+04	0/5	8.91E+06	0/5	5/5	19.3 - 191
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	2.10E-01	0/5	1.78E+00	0/5	1.90E+03	0/5	0/5	7.17 - 8.32
METAL	Arsenic	mg/kg	5.23E+00	1.36E+01	7.78E+00	0/5	5/5	1/5	7.90E+00	5/5	1.02E+00	0/5	1.02E+02	0/5	5/5	4.42 - 4.9
METAL	Barium	mg/kg	8.59E+01	1.03E+02	9.25E+01	0/5	5/5	0/5	1.70E+02	0/5	4.15E+02	0/5	4.58E+05	0/5	5/5	2.21 - 2.45
METAL	Beryllium	mg/kg	4.68E-01	5.59E-01	5.07E-01	0/5	3/5	0/5	6.90E-01	3/5	1.29E-02	0/5	8.65E+00	0/5	0/5	0.442 - 0.49
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	2.10E-01	0/5	3.14E+00	0/5	3.14E+02	0/5	0/5	2.21 - 2.45
METAL	Calcium	mg/kg	4.27E+02	1.83E+04	6.78E+03	0/5	5/5	2/5	6.10E+03	0/5	n/a	0/5	n/a	n/a	n/a	88.3 - 98
METAL	Chromium	mg/kg	1.40E+01	5.21E+01	2.29E+01	0/5	5/5	1/5	4.30E+01	0/5	7.15E+01	0/5	7.15E+03	0/5	0/5	2.21 - 2.45
METAL	Cobalt	mg/kg	5.80E+00	1.13E+01	7.42E+00	0/5	5/5	0/5	1.30E+01	1/5	8.45E+00	0/5	3.29E+03	5/5	5/5	4.42 - 4.9
METAL	Copper	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	2.50E+01	0/5	1.13E+03	0/5	4.75E+05	0/5	0/5	11 - 12.3
METAL	Iron	mg/kg	1.15E+04	1.80E+04	1.38E+04	0/5	5/5	0/5	2.80E+04	0/5	1.98E+04	0/5	8.31E+06	5/5	5/5	17.7 - 19.6
METAL	Lead	mg/kg	9.40E+00	1.64E+01	1.37E+01	0/5	5/5	0/5	2.30E+01	0/5	4.00E+02	0/5	4.00E+02	0/5	3/5	4.42 - 4.9
METAL	Magnesium	mg/kg	8.38E+02	1.58E+03	1.23E+03	0/5	5/5	0/5	2.10E+03	0/5	n/a	0/5	n/a	n/a	n/a	4.42 - 4.9
METAL	Manganese	mg/kg	3.31E+02	7.39E+02	5.67E+02	0/5	5/5	0/5	8.20E+02	0/5	3.47E+03	0/5	2.94E+05	5/5	5/5	2.21 - 2.45
METAL	Mercury	mg/kg	1.90E-02	2.70E-02	2.40E-02	0/5	5/5	0/5	1.30E-01	0/5	6.25E-01	0/5	7.88E+02	0/5	0/5	0.015 - 0.016
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	1.42E+02	0/5	5.94E+04	0/5	0/5	4.42 - 4.9
METAL	Nickel	mg/kg	6.15E+00	9.21E+00	7.98E+00	0/5	5/5	0/5	2.20E+01	0/5	2.98E+01	0/5	3.07E+04	0/5	5/5	4.42 - 4.9
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	7.00E-01	0/5	1.42E+02	0/5	5.93E+04	0/5	0/5	4.42 - 4.9
METAL	Silver	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	2.70E+00	0/5	7.45E+00	0/5	8.07E+03	0/5	0/5	1.79 - 2.08
METAL	Sodium	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	3.40E+02	0/5	n/a	0/5	n/a	n/a	n/a	177 - 196
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	3.40E-01	0/5	2.27E+00	0/5	9.50E+02	0/5	0/5	8.83 - 9.8
METAL	Uranium	mg/kg	5.42E+00	5.42E+00	5.42E+00	0/5	1/5	1/5	4.60E+00	0/5	8.49E+01	0/5	3.50E+04	0/5	0/5	4.42 - 4.9
METAL	Vanadium	mg/kg	2.27E+01	3.05E+01	2.54E+01	0/5	5/5	0/5	3.70E+01	5/5	1.04E-01	0/5	7.61E+01	5/5	5/5	2.21 - 2.45
METAL	Zinc	mg/kg	2.78E+01	4.00E+01	3.13E+01	0/5	5/5	0/5	6.00E+01	0/5	8.50E+03	0/5	3.56E+06	0/5	5/5	17.7 - 19.6
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	1.83E-01	0/5	1.83E+01	0/5	0/5	0.12 - 0.13
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	5.87E+02	0/5	1.76E+04	0/5	0/5	0.49 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.49 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	3.25E+03	0/5	9.74E+04	0/5	0/5	0.49 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.49 - 0.5
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	4.47E+02	0/5	1.34E+04	0/5	0/5	0.49 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	4.19E+02	0/5	1.26E+04	0/5	0/5	0.49 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	5.27E+00	0/5	5.27E+02	0/5	0/5	0.49 - 0.5
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.49 - 0.5
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	3.35E+02	0/5	1.00E+04	0/5	0/5	0.49 - 0.5
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	5.57E-02	0/5	5.57E+00	0/5	0/5	-
RADS	Americium-241	pCi/g	-7.98E-03	-3.39E-03	-5.15E-03	0/5	5/5	0/5	n/a	0/5	1.28E+01	0/5	1.28E+03	0/5	0/5	0.0149 - 0.0171
RADS	Cesium-137	pCi/g	-9.10E-03	1.92E-01	9.17E-02	0/5	5/5	0/5	2.80E-01	0/5	1.98E-01	0/5	1.98E+01	0/5	0/5	0.0452 - 0.0603
RADS	Neptunium-237	pCi/g	-1.17E-02	-3.42E-03	-8.21E-03	0/5	5/5	0/5	n/a	0/5	6.26E-01	0/5	6.26E+01	0/5	0/5	0.0469 - 0.0477
RADS	Plutonium-238	pCi/g	-4.58E-03	-3.99E-04	-2.65E-03	0/5	5/5	0/5	n/a	0/5	3.64E+01	0/5	3.64E+03	0/5	0/5	0.00917 - 0.0105
RADS	Plutonium-239/240	pCi/g	5.89E-04	6.11E-03	4.02E-03	0/4	4/4	0/4	n/a	0/4	3.56E+01	0/4	3.56E+03	0/4	0/4	0.0125 - 0.0127
RADS	Technetium-99	pCi/g	6.47E-02	8.01E-01	4.71E-01	0/5	5/5	0/5	2.80E+00	0/5	1.11E+03	0/5	1.11E+05	0/5	4/5	0.536 - 0.656
RADS	Thorium-228	pCi/g	4.05E-01	5.61E-01	4.54E-01	0/5	5/5	0/5	1.60E+00	0/5	n/a	0/5	n/a	n/a	n/a	0.0591 - 0.0627
RADS	Thorium-230	pCi/g	2.56E-01	5.17E-01	4.09E-01	0/5	5/5	0/5	1.40E+00	0/5	4.49E+01	0/5	4.49E+03	0/5	4/5	0.061 - 0.0642
RADS	Thorium-232	pCi/g	3.52E-01	5.31E-01	4.33E-01	0/5	5/5	0/5	1.50E+00	0/5	n/a	0/5	n/a	n/a	n/a	0.0376 - 0.0397
RADS	Uranium-234	pCi/g	6.40E-02	5.05E-01	2.63E-01	0/5	5/5	0/5	1.20E+00	0/5	6.25E+01	0/5	6.25E+03	0/5	0/5	0.117 - 0.151
RADS	Uranium-238	pCi/g	1.60E-01	1.72E+00	6.12E-01	0/5	5/5	1/5	1.20E+00	0/5	4.02E+00	0/5	4.02E+02	0/5	0/5	0.109 - 0.125

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

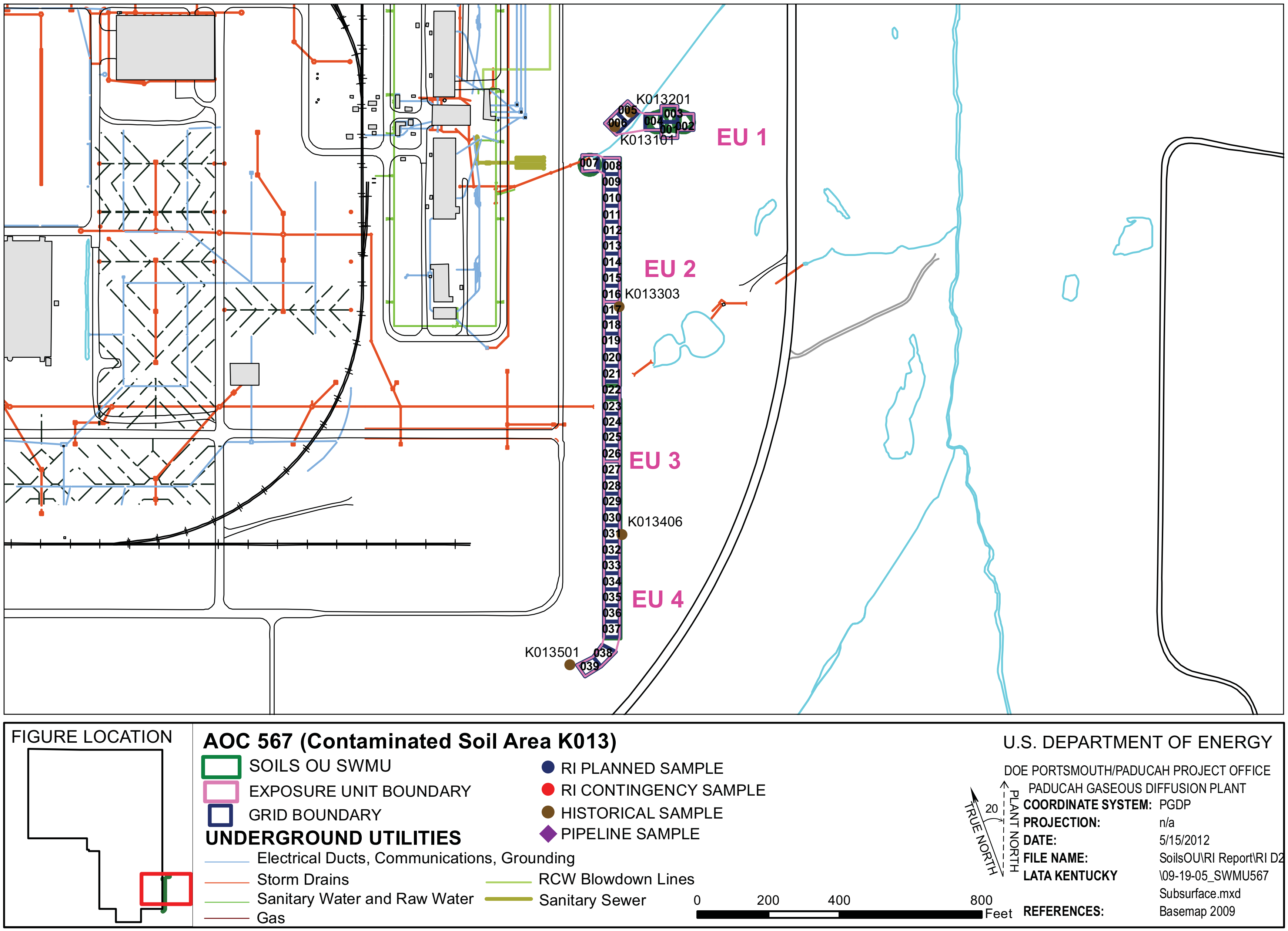


Figure 9.16.5. AOC 567 Sample Locations - Subsurface Soil

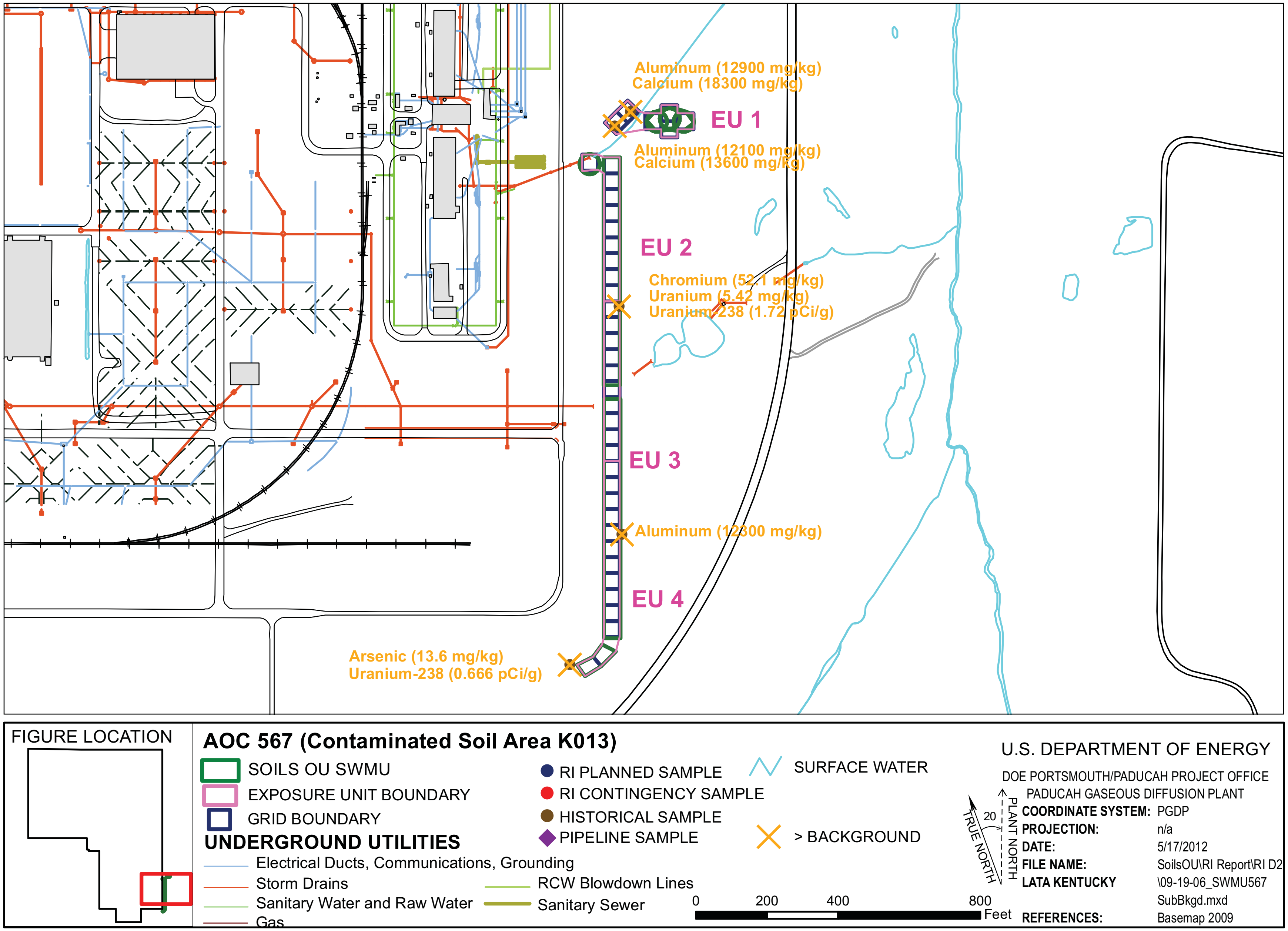


Figure 9.16.6. AOC 567 Background Exceedances - Subsurface Soil

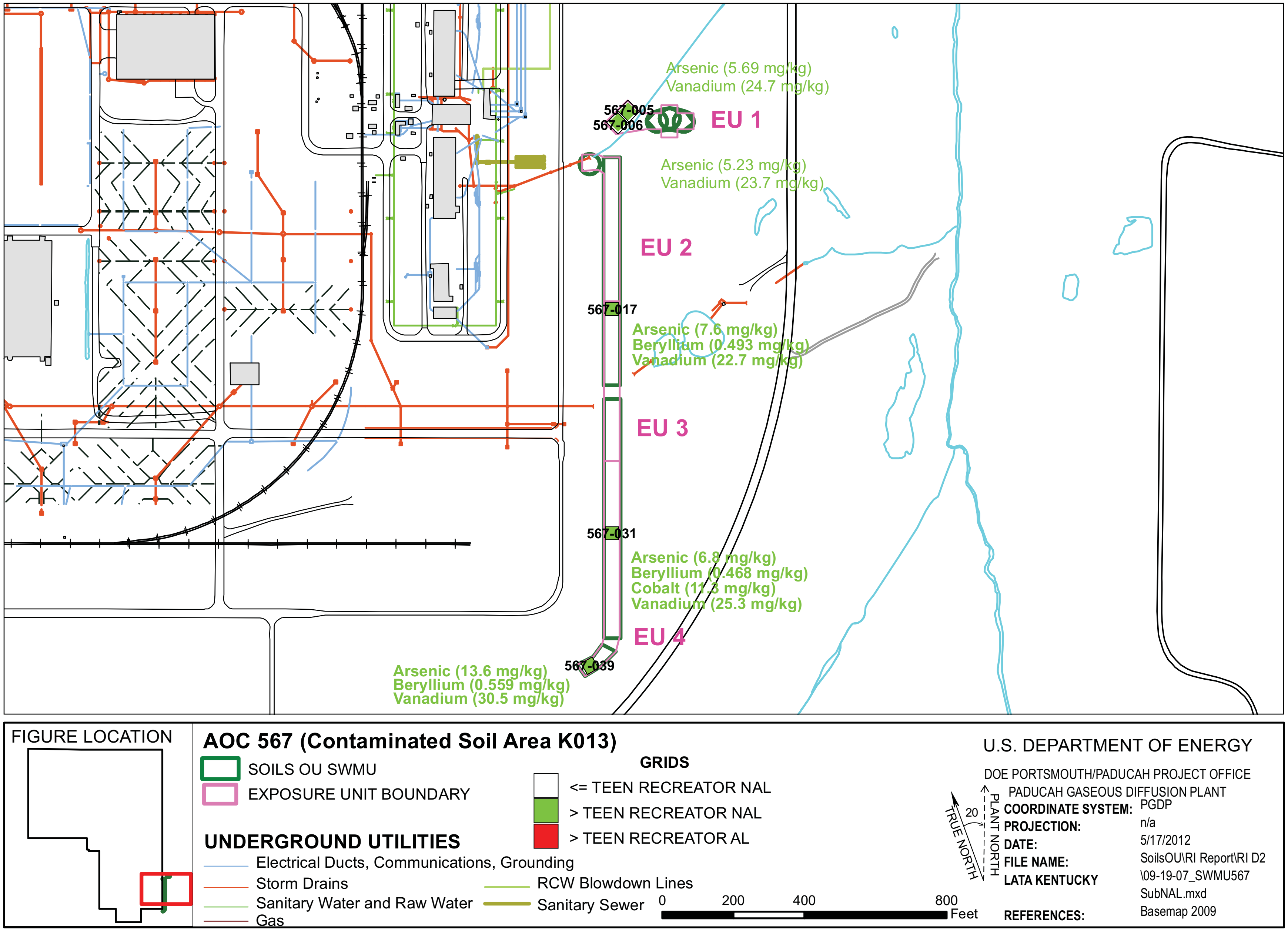


Figure 9.16.7. AOC 567 NAL Exceedances - Subsurface Soil

The following metals were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater: aluminum in grids 5, 6 (EU 1) and 31 (EU 4) and arsenic in grid 39 (EU 4). No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

No PCBs were detected in the AOC 567 subsurface soil.

SVOCs

No SVOCs were detected in the AOC 567 subsurface soil.

VOCs

No subsurface soil samples from AOC 567 were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the teen recreator NALs, teen recreator ALs, or the SSLs for the protection of UCRS and RGA groundwater in the AOC 567 subsurface soil.

9.16.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is a potential for runoff because this AOC is near Outfall 013; however, AOC 567 is grass-covered or otherwise stabilized, and the contaminants are not likely to be transported attached to suspended soil particles. Soil piles are believed to have similar origin and the findings from the SWMU 561 soil pile evaluation determined that contaminants are not migrating away from the piles (DOE 2008b). In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs/AOCs to surrounding ditches.

9.16.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for AOC 567 are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for one or more EUs at AOC 567 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Soils OU Work Plan, Decision Rule D1a (DOE 2010a), this AOC will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 9.16.4 for the hypothetical resident. The outdoor

Table 9.16.4. RGOs for AOC 567

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Hypothetical Resident[5]											
3	Chromium	3.79E+01	mg/kg	2.4E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Cumulative			**2.4E-06**				**< 1**			
4	Chromium	1.63E+01	mg/kg	1.0E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Uranium-238	1.05E+00	pCi/g	3.0E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**4.0E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI, but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.80, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.80, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

worker (exposed to surface soils), excavation worker, and the teen recreational user did not have any identified COCs. Table 9.16.4 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COCs for this AOC under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for AOC 567 include metals and PCBs; however, none had a maximum HQ ≥ 10. Potential hazards for ecological receptors and COPECs are listed in Appendix E.

9.16.7 AOC 567 Summary

The following text summarizes the results for AOC 567 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

A plant process that may have resulted in contamination at the locations of these soil piles is placing soil generated from construction projects at PGDP.

COPCs for surface and subsurface soils from AOC 567 are shown on Tables 9.16.1–9.16.3 as those analytes with green boxes under the "Teen Recreator/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. Contaminants were detected greater than background and greater than teen recreator NALs to a maximum depth of 3 ft bgs. A complete list of sampling results is provided in Appendix G. The COPCs identified for each EU of AOC 567 are as follows:

- EU 1
  - Surface—none
  - Subsurface—metals
- EU 2
  - Surface—none
  - Subsurface—none
- EU 3
  - Surface—none
  - Subsurface— none
- EU 4
  - Surface—metals
  - Subsurface—metals

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at AOC 567 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at AOC 567. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils Operable Unit

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-06 and 1, respectively, for the hypothetical resident scenario. COCs for this scenario for AOC 567 are as follows:

- Outdoor worker (exposed to surface soil)
  - None
- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Chromium
  - Uranium-238
- Teen Recreational User
  - None

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for AOC 567.

For AOC 567, COPECs exceed ESVs, but there are no priority COPECs (i.e., maximum HQ ≥ 10).

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for AOC 567 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. The Addendum 1B SER (DOE 2009d) stated that PGDP monitoring data indicates that little to no migration has taken place to date from these piles. Because of this, a response action at these piles would have no effect on the surface water integrator OU.

9.16.8 AOC 567 Conclusion

The RI adequately defined the nature and extent of contamination in soils at AOC 567; an FS is appropriate for the AOC due to risk exceeding the decision rule benchmark for the scenario including hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this AOC is recreational as shown in the SMP (DOE 2012a). The AOC is next to the limited area security fence. Such close proximity to PGDP would be limited for the recreational users.

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10. GROUP 3, SCRAP YARDS

This chapter includes a discussion of the Scrap Yards SWMUs, which includes the following three SWMUs:

- SWMU 14, C-746-E Contaminated Scrap Yard, sampled during RI
- SWMU 518, C-746-P1 Field South of C-746-P1 Clean Scrap Yard, adequate historical data
- SWMU 520, C-746-A Scrap Material West of C-746-A, sampled during RI

The SWMU-specific discussions highlight the current understanding of each SWMU's impacts. Chapter 4 describes the overall evaluation approach that was used for each SWMU. Figures display the 45 ft grids that were used for the composite sampling and historical sample assignments. There are approximately 10 grids for each EU for SWMUs that are larger than 0.5 acres. If a SWMU is smaller than 0.5 acres, it is considered one EU. If contingency "step-out" grids were deemed necessary by field laboratory results to define extent, the step-out grids are displayed on the figures.

All of these sites are located within the industrial area of the facility, as shown in Figure 10.1, and fieldwork was conducted in accordance with the Work Plan (DOE 2010a).

The nature and extent is divided into surface and subsurface sections that summarize the representative data set and describe the future industrial worker scenario for SWMUs located inside the limited area and teen recreator scenario for SWMUs located outside the limited area. The evaluation of the XRF data with fixed-base laboratory data indicates the use of XRF results for copper, iron, lead, nickel, uranium, and zinc has good correlation and, therefore, is reliable for use in determining nature and extent and hot spots. Molybdenum, mercury, selenium, and silver XRF results are generally below the reporting limits and will not lead to incorrect decisions in the risk assessment; however, these results may not provide much useful information for nature and extent determination. Use of XRF results for arsenic, chromium, and manganese has uncertainties; however, higher values in the complete data set indicate overall patterns of these constituents present in the soils at the SWMUs/AOCs. Uncertainties associated with arsenic will be managed in the FS because detections at high concentrations from the fixed-base laboratory were detected at lower concentrations by the XRF and may lead to underestimating risk For vanadium, comparison with the fixed-base laboratory data indicates XRF data are much higher; therefore, risks may be overestimated when using the XRF data. See Appendix B for additional information.

For the fate and transport section, the process for evaluating surface water run-off and groundwater modeling is described in Chapter 4 and Appendix C, and only the conclusions are provided in the SWMU/AOC specific sections.

As discussed in the fate and transport discussion, only one of these sites (SWMU 14) was identified for groundwater modeling which indicates the SWMU has potential for ongoing impacts to groundwater. The following SWMU/AOC-specific discussions highlight current understanding of the site impacts.

The human health risk assessment narrative discusses the future industrial worker, the excavation worker, and the hypothetical future resident. Each SWMU/AOC was evaluated for receptors listed below. Additional discussion of scenarios is presented in Appendix D.

- Current on-site industrial worker (This assumes exposure to surface soils only.)

- Future on-site industrial worker (This assumes exposure to surface soils only.)

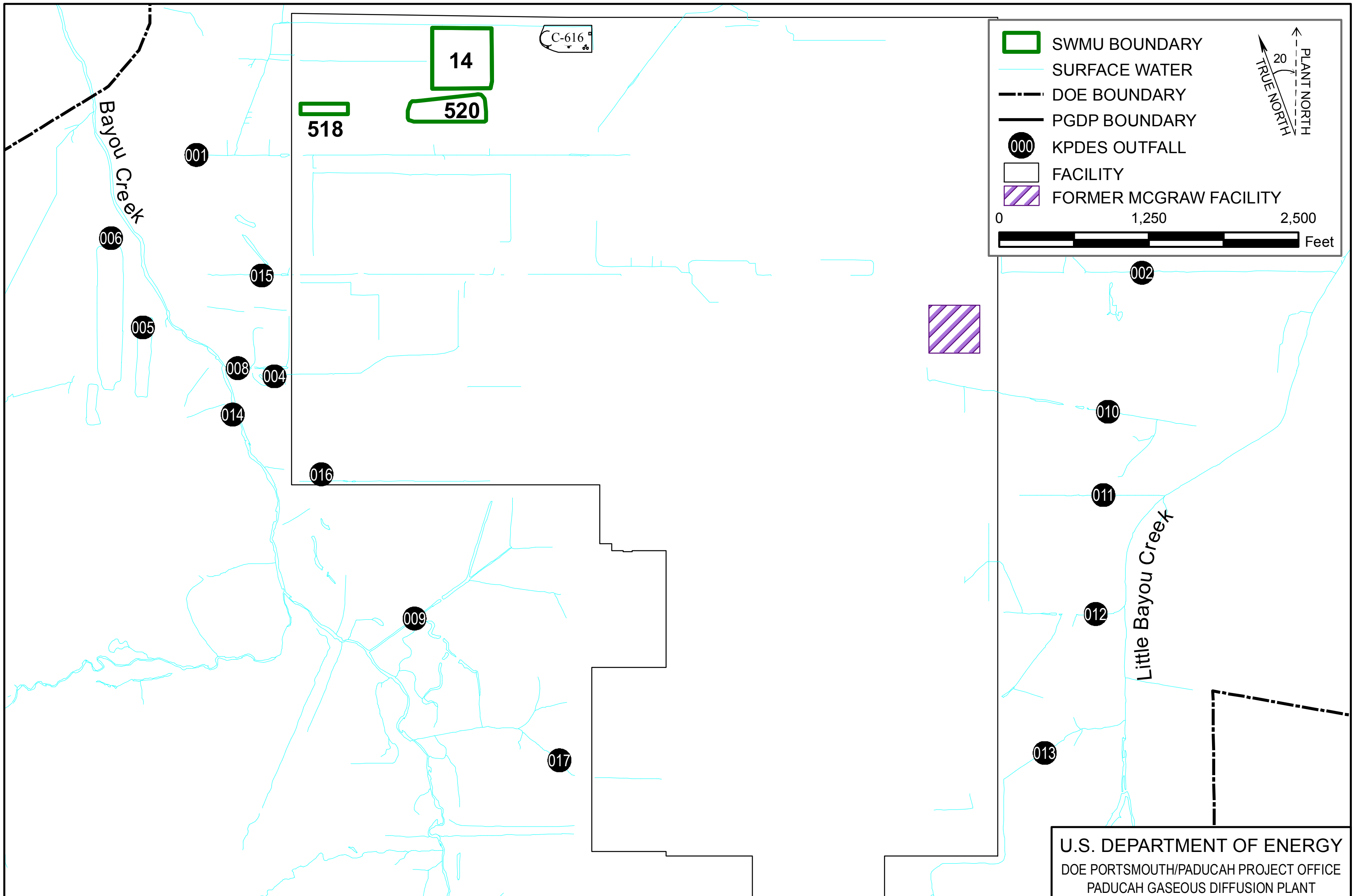

Figure 10.1. SWMU Locations and Features for Scrap Yards

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- Outdoor worker (surface and subsurface soils: 0–16 ft bgs) [This assumes exposure to surface (0–1 ft bgs) and a mixture of the surface (0–1 ft bgs) and subsurface soils (1–16 ft bgs), as appropriate, following a future construction activity. As a subset of the outdoor worker exposed to surface and subsurface soils, the potential risks and hazards for shorter-term exposure for workers during excavation also are provided.]

- Hypothetical future adult and child residents (This assumes exposure to surface soils only.)

- Future teen recreational users (This assumes exposure to surface soils only.)

The following are the uncertainties in the human health risk assessment that may affect SWMUs/AOCs in Chapter 10.

- The range of background was not considered beyond the initial screening against site-specific background.

- Overly conservative dermal toxicity factors potentially lead to an overestimation of risk.

- Arithmetic average lead concentration is compared to the NAL to determine if additional risk analysis is needed (specifically SWMU 14).

- Concentration of total cancerous PAHs were used to estimate risk and the minimum detection limit of the PAHs with toxicity equivalency factors were used when PAHs were not detected.

- Some detection limits for XRF data are above background concentrations and NALs; the COPCs identified using these data are expected to overstate the presence of these metals.

- For those constituents that never were detected within an EU, even if the detection limit is greater than the NAL, the constituent was not considered a COPC.

- UCL concentrations were used as EPCs if there were a sufficient number of samples and distinct results to calculate a UCL. This likely will lead to an overestimation of actual exposure because receptors are assumed to be exposed to the UCL concentration for the entire exposure duration.

- Conservative (i.e., health protective) exposure factors are used when information available is limited in the form of using RME assumptions, per the Risk Methods Document (DOE 2011a). This may result in an overestimation of potential risk.

- Many of the SWMUs/AOCs evaluated in this assessment are very small, and the assumptions used for the levels of exposures (duration, frequency) overstate potential chronic exposures in these units.

- The risk assessment does not consider that concentrations of some COCs may be lower or higher in the future because of processes such as degradation and attenuation.

- While the modeling estimated contaminant transport though groundwater based on contaminant concentrations in the surrounding soil, uncertainty still exists in the POE at which exposure may occur in the future and the contaminant mass that is present in the source areas contributing to the future groundwater concentrations of contaminants.

- Additivity of multiple chemicals is assumed. Whether assuming additivity can lead to an underestimation or overestimation of risk is unknown.

- Most of the assumptions about exposure and toxicity used in this BHHRA are representative of statistical upper-bounds or even maximums for each parameter. The result of combining several such upper-bound assumptions is that the final estimate of potential exposure or potential risk is conservative.

Additional information can be found in Appendix D.

For the ecological screening, the priority chemicals that exceeded their respective screening values are shown in tables within each subsection (maximum HQ $\geq$ 10) as well as the overall HI for the constituents detected. This allows for comparison of the HIs, SWMU sizes, and other factors such as proximity to a surface water body. Additional information is contained in Appendix E.

10.1 SWMU 14, C-746-E CONTAMINATED SCRAP YARD

10.1.1 Background

The C-746-E Contaminated Scrap Yard (SWMU 14) is located in the northwest corner of the plant site. SWMU 14 is approximately 265,000 ft^2.

C-746-E was used for the storage of uranium-contaminated scrap metal, including ferrous alloys, copper and copper alloys, nickel-plated steel, Monel®, and aluminum from the 1950s through 2005. In addition, Burial Pit E is located under the northeastern section of C-746-E. Burial Pit E was investigated under the BGOU in conjunction with SWMU 7.

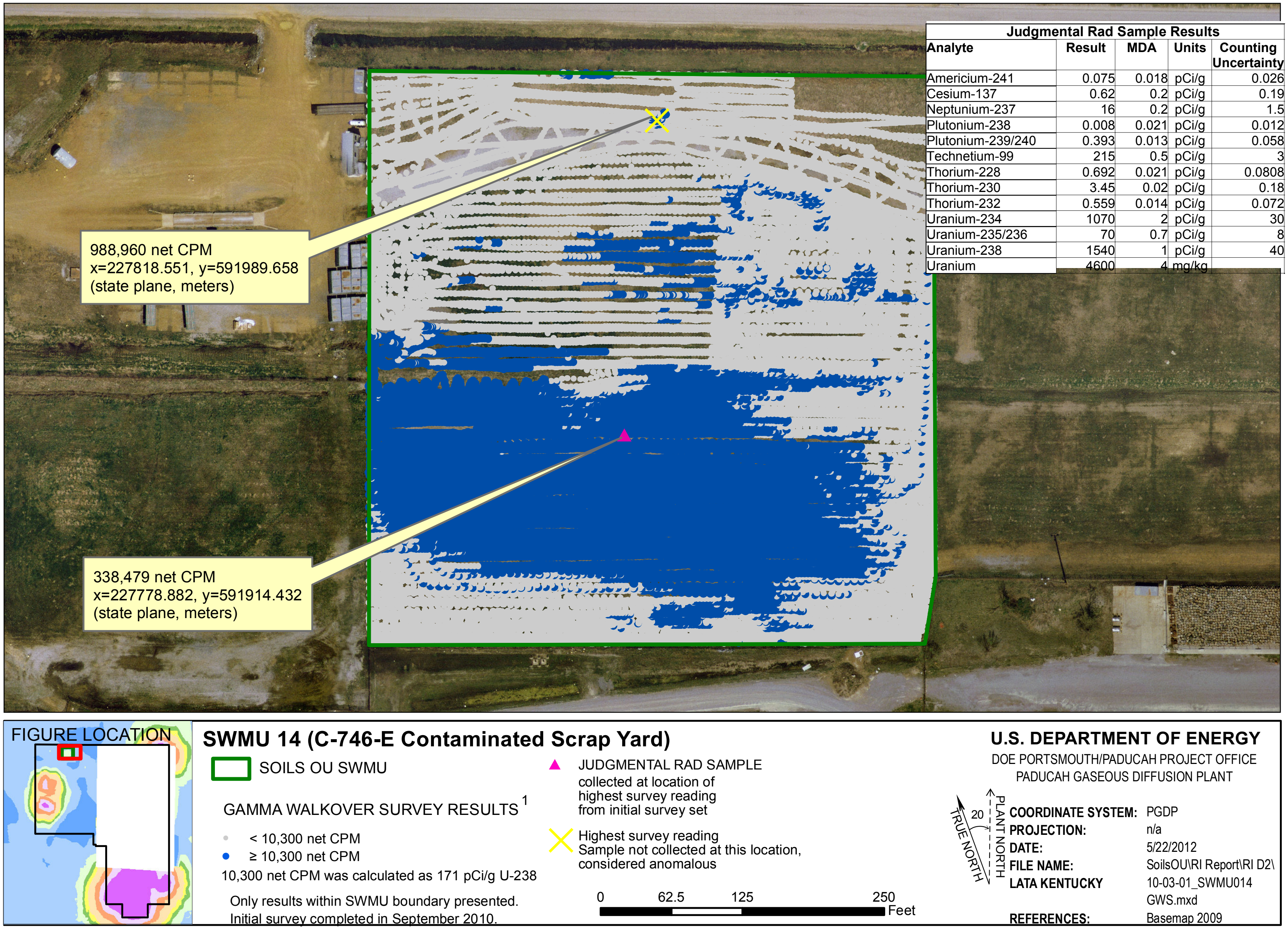
The storage yard was emptied as specified by the Action Memorandum for Scrap Metal (DOE 2001a) and documented in the Removal Action Report for Scrap Metal (DOE 2008e).

The Phase II SI (CH2M HILL 1992) sampled surface and shallow soils in the area. Contaminants of concern include metals and radionuclides.

10.1.2 Fieldwork Summary

Two hundred thirty-nine grid samples were collected out of 242 planned for the unit. Field laboratory results indicated that contingency samples were needed to determine the lateral and vertical extent of contamination because of elevated concentrations of arsenic, PCBs, copper, iron, manganese, mercury, nickel, selenium, uranium, and zinc. Of the 32 contingency samples, 31 were collected. The samples that were not collected were because of shallow refusal and no recovery. Figure A.17 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 10.1.1) using a FIDLER; the 40,103 measurement ranged from 4,528 to 999,960 gross cpm. This area consists mostly of gravel with a soil and grass mix. Roadways and a former rail spur are still in place. There is one count rate that exceeds the maximum recordable by the FIDLER with Ludlum Model 2221 digital rate meter/scalar. A judgmental grab sample was collected for radiological constituents at a point showing 338,479 ncpm. A higher count rate was found to the north, but this was due to a radioactive object being discovered at that point. The object was subsequently removed. Uncertainties with the gamma walkover survey will be managed in the FS.



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.075	0.018	pCi/g	0.026
Cesium-137	0.62	0.2	pCi/g	0.19
Neptunium-237	16	0.2	pCi/g	1.5
Plutonium-238	0.008	0.021	pCi/g	0.012
Plutonium-239/240	0.393	0.013	pCi/g	0.058
Technetium-99	215	0.5	pCi/g	3
Thorium-228	0.692	0.021	pCi/g	0.0808
Thorium-230	3.45	0.02	pCi/g	0.18
Thorium-232	0.559	0.014	pCi/g	0.072
Uranium-234	1070	2	pCi/g	30
Uranium-235/236	70	0.7	pCi/g	8
Uranium-238	1540	1	pCi/g	40
Uranium	4600	4	mg/kg	

Figure 10.1.1. SWMU 14 Gamma Walkover Survey

10.1.3 Nature and Extent of Contamination—Surface Soils

For SWMU 14, the representative data set for surface soils is presented in Tables 10.1.1 and 10.1.2 and provides the nature of the contamination in SWMU 14 surface soils. Figures 10.1.2–10.1.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 14 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 14 consists of ten EUs.

<u>Metals</u>

Metals were detected above the industrial worker NALs in the SWMU 14 surface soil. The following are the metals detected above both the background screening levels and industrial worker NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Antimony	17, 36, 79	2, 4, 6
Arsenic	24, 39, 40, 8, 10, 30, 36, 50, 41, 43, 55, 85, 112, 82, 94, 116, 120	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Beryllium	17	2
Cadmium	53	5
Chromium	3, 12, 23, 24, 25, 5, 6, 7, 16, 17, 27, 28, 39, 40, 8, 9, 11, 22, 30, 35, 36, 37, 47, 49, 50, 51, 60, 61, 43, 53, 65, 66, 79, 80, 72, 76, 85, 87, 90, 92, 102, 111, 82, 84, 95, 115, 116, 96, 97, 98, 108, 109, 118	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Iron	25, 6, 7, 16, 17, 28, 38, 39, 40, 8, 9, 30, 31, 34, 35, 36, 37, 48, 49, 50, 51, 41, 42, 53, 54, 55108, 109, 120	1, 2,3, 4, 5, 10
Manganese	40	2
Mercury	33, 43, 75, 89, 105, 96, 118, 121	3, 5, 7, 8, 9, 10
Nickel	2, 3, 4, 13, 15, 24, 25, 26, 5, 6, 7, 16, 17, 18, 27, 28, 38, 39, 40, 8, 9, 10, 11, 19, 20, 21, 22, 30, 31, 32, 34, 35, 36, 37, 45, 46, 47, 48, 49, 50, 51, 60, 61, 41, 42, 43, 44, 53, 54, 55, 63, 64, 65, 56, 57, 58, 59, 67, 68, 69, 70, 78, 79, 80, 81, 62, 71, 72, 73, 74, 75, 76, 77, 85, 86, 87, 88, 89, 90, 91, 92, 100, 101, 102, 103, 111, 112, 113, 114, 82, 83, 84, 93, 94, 95, 104, 105, 106, 115, 116, 117, 96, 97, 98, 99, 107, 108, 109, 110, 118, 121	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Silver	14, 51, 55, 78, 79	1, 4, 5, 6
Uranium	25, 7, 17, 27, 28, 38, 39, 40, 30, 31, 32, 34, 35, 36, 37, 45, 46, 47, 48, 49, 50, 51, 61, 41, 42, 43, 53, 54, 55, 65, 56, 57, 58, 59, 67, 68, 69, 70, 78, 79, 80 , 81, 62, 71, 72, 73, 74, 85, 89, 91, 92, 102, 103, 82, 83, 84, 93, 94, 95, 104, 105, 106, 96, 97, 98, 107, 108, 109, 118	1, 2, 3, 4, 5, 6, 7, 8, 9, 10

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 14 surface soil.

The following are the metals detected in the SWMU 14 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Table 10.1.1. Surface Soil Historical Data Summary: SWMU 14 C-746-E/E1 Scrap Yard

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
PPCB	PCB, Total	mg/kg	5.00E-01	5.00E-01	5.00E-01	0/1	1/1	0/1	n/a	1/1	1.88E-01	0/1	1.88E+01	0/1	1/1	0.1 - 0.1
RADS	Americium-241	pCi/g	1.65E+00	1.65E+00	1.65E+00	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	1/1	0.558 - 0.558
RADS	Cesium-137	pCi/g	9.70E-02	9.70E-02	9.70E-02	0/1	1/1	0/1	4.90E-01	1/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.0445 - 0.0445
RADS	Neptunium-237	pCi/g	2.73E-01	2.73E-01	2.73E-01	0/1	1/1	1/1	1.00E-01	1/1	2.71E-01	0/1	2.71E+01	1/1	1/1	0.0792 - 0.0792
RADS	Plutonium-239/240	pCi/g	2.83E-01	2.83E-01	2.83E-01	0/1	1/1	1/1	2.50E-02	0/1	1.07E+01	0/1	1.07E+03	0/1	1/1	0.00984 - 0.00984
RADS	Technetium-99	pCi/g	4.06E+02	4.06E+02	4.06E+02	0/1	1/1	1/1	2.50E+00	1/1	3.61E+02	0/1	3.61E+04	1/1	1/1	0.233 - 0.233
RADS	Thorium-230	pCi/g	3.17E+00	3.17E+00	3.17E+00	0/1	1/1	1/1	1.50E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.0264 - 0.0264

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

Table 10.1.2. Surface Soil RI Data Summary: SWMU 14 C-746-E Scrap Yard

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	3.88E+03	1.13E+04	6.51E+03	0/10	10/10	0/10	1.30E+04	0/10	3.32E+04	0/10	3.97E+06	0/10	10/10	5.2 - 12.2
METAL	Antimony	mg/kg	1.80E-01	4.30E+00	1.94E+00	0/10	9/10	8/10	2.10E-01	3/10	2.53E+00	0/10	1.51E+03	0/10	8/10	0.52 - 0.61
METAL	Arsenic	mg/kg	4.10E+00	2.58E+01	1.06E+01	0/124	51/124	17/124	1.20E+01	51/124	9.97E-01	0/124	9.97E+01	4/124	51/124	1 - 11
METAL	Barium	mg/kg	2.69E+01	1.26E+02	8.78E+01	0/10	10/10	0/10	2.00E+02	0/10	5.92E+02	0/10	3.78E+05	0/10	6/10	2.1 - 4.9
METAL	Beryllium	mg/kg	3.20E-01	7.10E-01	4.78E-01	0/10	10/10	1/10	6.70E-01	10/10	1.40E-02	0/10	9.22E+00	0/10	0/10	0.1 - 0.24
METAL	Cadmium	mg/kg	2.30E-02	3.90E+00	1.07E+00	0/10	10/10	8/10	2.10E-01	1/10	3.16E+00	0/10	3.16E+02	0/10	7/10	0.052 - 0.12
METAL	Calcium	mg/kg	3.42E+03	1.82E+05	7.24E+04	0/10	10/10	0/10	2.00E+05	0/10	n/a	0/10	n/a	n/a	n/a	51.8 - 608
METAL	Chromium	mg/kg	1.27E+01	8.98E+02	6.69E+01	0/124	59/124	58/124	1.60E+01	54/124	3.02E+01	0/124	3.02E+03	0/124	0/124	1 - 85
METAL	Cobalt	mg/kg	5.90E+00	1.40E+01	9.26E+00	0/10	10/10	0/10	1.40E+01	4/10	1.05E+01	0/10	1.52E+03	10/10	10/10	0.21 - 0.49
METAL	Copper	mg/kg	3.50E+00	1.10E+03	1.06E+02	0/124	99/124	97/124	1.90E+01	0/124	1.43E+03	0/124	2.24E+05	0/124	76/124	1 - 35
METAL	Iron	mg/kg	8.73E+02	6.66E+04	2.29E+04	0/124	124/124	29/124	2.80E+04	41/124	2.51E+04	0/124	3.92E+06	123/124	124/124	5.2 - 100
METAL	Lead	mg/kg	4.30E+00	1.49E+02	3.93E+01	0/124	120/124	49/124	3.60E+01	0/124	4.00E+02	0/124	4.00E+02	0/124	112/124	0.31 - 13
METAL	Magnesium	mg/kg	7.10E+02	1.82E+04	4.90E+03	0/10	10/10	1/10	7.70E+03	0/10	n/a	0/10	n/a	n/a	n/a	51.7 - 122
METAL	Manganese	mg/kg	1.05E+02	2.67E+03	6.22E+02	0/124	123/124	4/124	1.50E+03	1/124	2.58E+03	0/124	1.16E+05	123/124	123/124	0.21 - 85
METAL	Mercury	mg/kg	1.83E-02	4.37E+01	4.06E+00	0/124	15/124	12/124	2.00E-01	8/124	9.00E-01	0/124	7.85E+02	6/124	13/124	0.0345 - 10
METAL	Molybdenum	mg/kg	4.40E-01	2.87E+01	5.18E+00	0/124	17/124	0/124	n/a	0/124	1.79E+02	0/124	2.80E+04	7/124	17/124	0.52 - 15
METAL	Nickel	mg/kg	1.82E+01	2.67E+03	4.93E+02	0/124	115/124	114/124	2.10E+01	114/124	4.28E+01	0/124	3.18E+04	111/124	115/124	0.52 - 65
METAL	Selenium	mg/kg	5.40E-01	4.75E+00	1.41E+00	0/124	12/124	10/124	8.00E-01	0/124	1.79E+02	0/124	2.80E+04	0/124	12/124	0.52 - 20
METAL	Silver	mg/kg	1.50E-02	1.67E+01	4.29E+00	0/124	16/124	7/124	2.30E+00	5/124	1.08E+01	0/124	9.15E+03	7/124	14/124	0.21 - 10
METAL	Sodium	mg/kg	3.27E+01	1.76E+02	9.03E+01	0/10	10/10	0/10	3.20E+02	0/10	n/a	0/10	n/a	n/a	n/a	20.7 - 48.7
METAL	Thallium	mg/kg	6.60E-02	4.10E-01	1.62E-01	0/10	10/10	3/10	2.10E-01	0/10	2.87E+00	0/10	4.48E+02	0/10	3/10	0.21 - 0.49
METAL	Uranium	mg/kg	5.05E+00	4.60E+03	2.39E+02	0/125	119/125	119/125	4.90E+00	70/125	1.07E+02	0/125	1.65E+04	4/125	113/125	0.09 - 20
METAL	Vanadium	mg/kg	1.76E+01	3.46E+01	2.37E+01	0/10	10/10	0/10	3.80E+01	10/10	1.51E-01	0/10	9.30E+01	10/10	10/10	1 - 2.4
METAL	Zinc	mg/kg	1.60E+01	7.37E+02	1.72E+02	0/124	123/124	102/124	6.50E+01	0/124	1.08E+04	0/124	1.68E+06	0/124	122/124	2.1 - 25
PPCB	PCB, Total	mg/kg	6.50E-02	1.00E+01	4.49E+00	2/124	25/124	0/124	n/a	23/124	1.88E-01	0/124	1.88E+01	17/124	24/124	0.31 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.34 - 0.4
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.34 - 0.4
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.34 - 0.4
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 1.9
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 1.9
SVOA	2-Methylnaphthalene	mg/kg	1.80E-01	1.80E-01	1.80E-01	1/10	1/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	1.30E+00	0/10	3.91E+01	0/10	0/10	1.7 - 1.9
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 1.9
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 1.9
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 1.9
SVOA	Acenaphthene	mg/kg	3.90E-02	3.90E-02	3.90E-02	1/10	1/10	0/10	n/a	0/10	6.02E+02	0/10	1.81E+04	0/10	0/10	0.34 - 0.4
SVOA	Acenaphthylene	mg/kg	4.20E-02	4.20E-02	4.20E-02	1/10	1/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Anthracene	mg/kg	4.00E-02	8.10E-02	6.63E-02	3/10	3/10	0/10	n/a	0/10	4.05E+03	0/10	1.22E+05	0/10	0/10	0.34 - 0.4
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Benzo(ghi)perylene	mg/kg	4.80E-02	2.30E-01	1.18E-01	5/10	5/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.1.2. Surface Soil RI Data Summary: SWMU 14 C-746-E Scrap Yard (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 1.9
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.0068 - 0.008
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	1.70E-01	3.50E-01	2.60E-01	4/10	4/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.34 - 0.4
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Di-n-butyl phthalate	mg/kg	4.30E-02	5.40E-02	4.85E-02	2/10	2/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Fluoranthene	mg/kg	6.80E-02	4.60E-01	2.20E-01	5/10	7/10	0/10	n/a	0/10	6.01E+02	0/10	1.80E+04	0/10	0/10	0.34 - 0.4
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	4.87E+02	0/10	1.46E+04	0/10	0/10	0.34 - 0.4
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	1.17E-01	0/10	1.17E+01	0/10	0/10	0.34 - 0.4
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 1.9
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.68 - 0.8
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	2.24E+00	0/10	2.24E+02	0/10	0/10	0.34 - 0.4
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 1.9
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	5.22E-02	0/10	5.22E+00	0/10	0/10	0.0068 - 0.008
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	1.7 - 1.9
SVOA	Phenanthrene	mg/kg	4.50E-02	3.10E-01	1.32E-01	4/10	4/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.34 - 0.4
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 1.9
SVOA	Pyrene	mg/kg	6.90E-02	4.80E-01	2.25E-01	5/10	7/10	0/10	n/a	0/10	4.49E+02	0/10	1.35E+04	0/10	0/10	0.34 - 0.4
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.68 - 0.8
SVOA	Total PAH	mg/kg	1.50E-02	4.87E-01	2.01E-01	0/10	8/10	0/10	n/a	7/10	5.92E-02	0/10	5.92E+00	3/10	8/10	-
RADS	Alpha activity	pCi/g	1.58E+01	4.64E+03	5.38E+02	0/11	11/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	3.6 - 6
RADS	Americium-241	pCi/g	-2.50E-03	1.95E-01	6.99E-02	0/11	11/11	0/11	n/a	0/11	5.01E+00	0/11	5.01E+02	0/11	2/11	0.012 - 0.023
RADS	Beta activity	pCi/g	1.98E+01	4.20E+03	5.90E+02	0/11	11/11	0/11	n/a	0/11	n/a	0/11	n/a	n/a	n/a	3 - 6
RADS	Cesium-137	pCi/g	-8.00E-03	6.20E-01	1.37E-01	0/11	11/11	1/11	4.90E-01	5/11	8.61E-02	0/11	8.61E+00	0/11	0/11	0.017 - 0.2
RADS	Neptunium-237	pCi/g	1.30E-02	1.60E+01	2.90E+00	0/11	11/11	9/11	1.00E-01	9/11	2.71E-01	0/11	2.71E+01	9/11	11/11	0.01 - 0.2
RADS	Plutonium-238	pCi/g	2.00E-04	5.90E-02	2.03E-02	0/11	11/11	0/11	7.30E-02	0/11	1.09E+01	0/11	1.09E+03	0/11	0/11	0.013 - 0.035
RADS	Plutonium-239/240	pCi/g	1.08E-02	1.12E+00	3.44E-01	0/11	11/11	10/11	2.50E-02	0/11	1.07E+01	0/11	1.07E+03	0/11	8/11	0.0027 - 0.03
RADS	Technetium-99	pCi/g	7.50E-01	2.15E+02	6.67E+01	0/11	11/11	9/11	2.50E+00	0/11	3.61E+02	0/11	3.61E+04	8/11	11/11	0.4 - 0.5
RADS	Thorium-228	pCi/g	2.59E-01	9.30E-01	6.64E-01	0/11	11/11	0/11	1.60E+00	0/11	n/a	0/11	n/a	n/a	n/a	0.013 - 0.04
RADS	Thorium-230	pCi/g	5.44E-01	1.39E+01	3.61E+00	0/11	11/11	6/11	1.50E+00	1/11	1.38E+01	0/11	1.38E+03	0/11	11/11	0.007 - 0.03
RADS	Thorium-232	pCi/g	3.07E-01	9.70E-01	6.57E-01	0/11	11/11	0/11	1.50E+00	0/11	n/a	0/11	n/a	n/a	n/a	0.007 - 0.03
RADS	Uranium-234	pCi/g	1.00E+00	1.07E+03	1.26E+02	0/11	11/11	9/11	1.20E+00	7/11	1.89E+01	0/11	1.89E+03	0/11	0/11	0.03 - 2
RADS	Uranium-235/236	pCi/g	5.20E-02	7.00E+01	8.36E+00	0/11	11/11	10/11	6.00E-02	8/11	3.95E-01	1/11	3.95E+01	0/11	1/11	0.017 - 0.7
RADS	Uranium-238	pCi/g	1.50E+00	1.54E+03	1.87E+02	0/11	11/11	11/11	1.20E+00	9/11	1.70E+00	1/11	1.70E+02	1/11	9/11	0.03 - 1

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

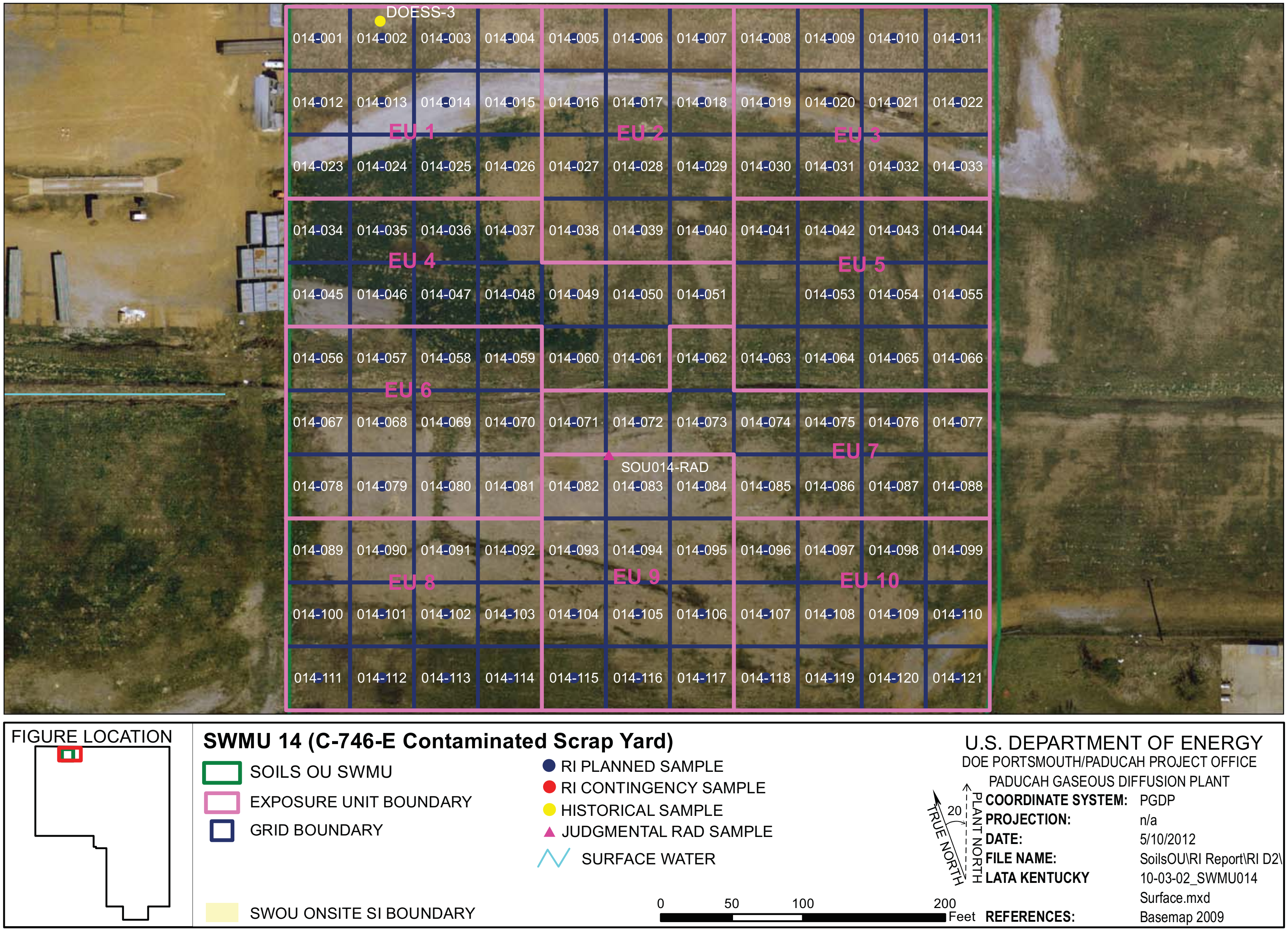


Figure 10.1.2. SWMU 14 Sample Locations - Surface Soil

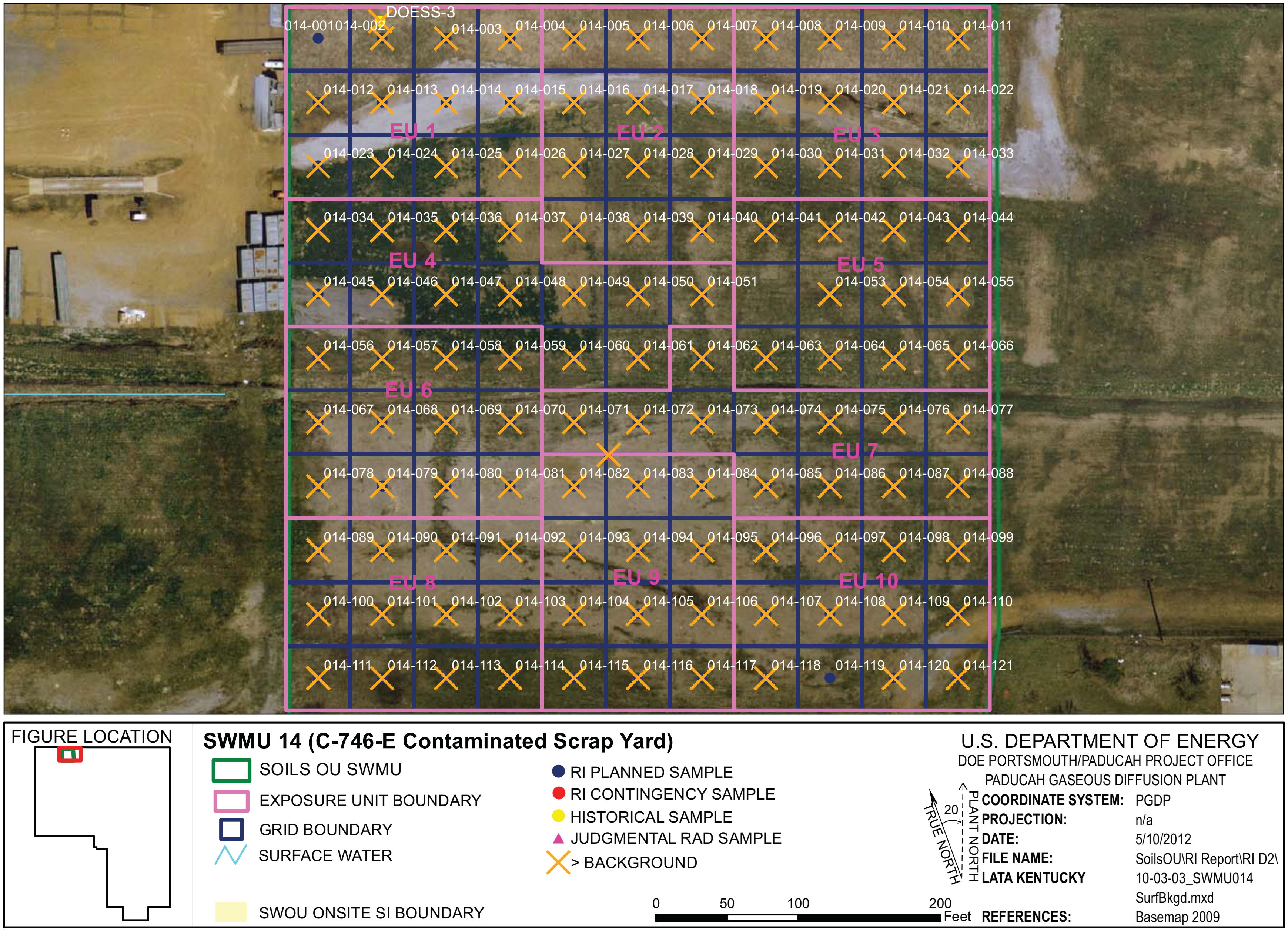


Figure 10.1.3. SWMU 14 Background Exceedances - Surface Soil

Station	Results Exceeding Background
DOESS-3	Neptunium-237 0.273 (pCi/g)
	Plutonium-239/240 0.283 (pCi/g)
	Technetium-99 406 (pCi/g)
	Thorium-230 3.17 (pCi/g)

Station	Results Exceeding Background
SOU014-002	Copper 29.4 (mg/kg)
	Nickel 94.17 (mg/kg)
	Uranium 8.28 (mg/kg)

Station	Results Exceeding Background
SOU014-003	Chromium 43.91 (mg/kg)
	Nickel 133.3 (mg/kg)
	Uranium 12.17 (mg/kg)
	Zinc 84.14 (mg/kg)

Station	Results Exceeding Background
SOU014-004	Nickel 97.67 (mg/kg)
	Uranium 17.39 (mg/kg)

Station	Results Exceeding Background
SOU014-005	Chromium 47.19 (mg/kg)
	Copper 43.68 (mg/kg)
	Nickel 260.63 (mg/kg)
	Uranium 40.41 (mg/kg)
	Zinc 232.1 (mg/kg)

Station	Results Exceeding Background
SOU014-006	Chromium 54.78 (mg/kg)
	Copper 144.85 (mg/kg)
	Iron 29597.96 (mg/kg)
	Lead 58.25 (mg/kg)
	Nickel 1380.97 (mg/kg)
	Uranium 58.7 (mg/kg)
	Zinc 294.3 (mg/kg)

NOTE: maximum detections only shown for location.

Station	Results Exceeding Background
SOU014-007	Chromium 66.54 (mg/kg)
	Copper 258.32 (mg/kg)
	Iron 38049.81 (mg/kg)
	Lead 128.15 (mg/kg)
	Nickel 379.16 (mg/kg)
	Uranium 110.65 (mg/kg)
	Zinc 737.29 (mg/kg)

Station	Results Exceeding Background
SOU014-008	Arsenic 15.96 (mg/kg)
	Chromium 60.92 (mg/kg)
	Copper 147.98 (mg/kg)
	Iron 39049.79 (mg/kg)
	Lead 92.5 (mg/kg)
	Nickel 373.54 (mg/kg)
	Uranium 37.15 (mg/kg)
	Zinc 628.73 (mg/kg)

Station	Results Exceeding Background
SOU014-009	Chromium 70.13 (mg/kg)
	Copper 141.85 (mg/kg)
	Iron 33732.88 (mg/kg)
	Lead 135.03 (mg/kg)
	Nickel 531.58 (mg/kg)
	Uranium 42.84 (mg/kg)
	Zinc 621.96 (mg/kg)

Station	Results Exceeding Background
SOU014-010	Arsenic 12.84 (mg/kg)
	Copper 81.69 (mg/kg)
	Lead 70.41 (mg/kg)
	Nickel 218.39 (mg/kg)
	Uranium 30.77 (mg/kg)
	Zinc 365.4 (mg/kg)

Station	Results Exceeding Background
SOU014-011	Chromium 46.91 (mg/kg)
	Copper 89.09 (mg/kg)
	Lead 141.5 (mg/kg)
	Nickel 184.93 (mg/kg)
	Uranium 23.38 (mg/kg)
	Zinc 407.18 (mg/kg)

Station	Results Exceeding Background
SOU014-012	Chromium 44.41 (mg/kg)

Station	Results Exceeding Background
SOU014-013	Nickel 81 (mg/kg)
	Uranium 5.05 (mg/kg)
	Uranium-235/236 0.061 (pCi/g)
	Uranium-238 1.69 (pCi/g)

Station	Results Exceeding Background
SOU014-014	Silver 16.69 (mg/kg)
	Zinc 158.66 (mg/kg)

Station	Results Exceeding Background
SOU014-015	Copper 33.75 (mg/kg)
	Nickel 80.31 (mg/kg)
	Uranium 18.48 (mg/kg)
	Zinc 90.86 (mg/kg)

Station	Results Exceeding Background
SOU014-016	Chromium 36.91 (mg/kg)
	Copper 24.29 (mg/kg)
	Iron 31645.02 (mg/kg)
	Nickel 273.96 (mg/kg)
	Uranium 21.54 (mg/kg)
	Zinc 111.66 (mg/kg)

Figure 10.1.3. SWMU 14 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU014-017	Antimony 3.7 (mg/kg)
	Beryllium 0.71 (mg/kg)
	Cadmium 0.73 (mg/kg)
	Chromium 57.78 (mg/kg)
	Copper 124.77 (mg/kg)
	Iron 40500 (mg/kg)
	Lead 76.77 (mg/kg)
	Mercury 0.267 (mg/kg)
	Nickel 524.64 (mg/kg)
	Selenium 0.9 (mg/kg)
	Uranium 207.66 (mg/kg)
	Zinc 297.74 (mg/kg)
	Neptunium-237 0.77 (pCi/g)
	Plutonium-239/240 0.698 (pCi/g)
	Technetium-99 48.8 (pCi/g)
	Thorium-230 5.98 (pCi/g)
	Uranium-234 32.4 (pCi/g)
	Uranium-235/236 2 (pCi/g)
	Uranium-238 56.1 (pCi/g)

Station	Results Exceeding Background
SOU014-018	Nickel 72.87 (mg/kg)
	Uranium 27.94 (mg/kg)
	Zinc 91.32 (mg/kg)

Station	Results Exceeding Background
SOU014-019	Copper 19.92 (mg/kg)
	Nickel 76.15 (mg/kg)
	Uranium 17.91 (mg/kg)

Station	Results Exceeding Background
SOU014-020	Nickel 64.57 (mg/kg)
	Uranium 7.85 (mg/kg)

Station	Results Exceeding Background
SOU014-021	Copper 86.43 (mg/kg)
	Lead 94.63 (mg/kg)
	Nickel 198.25 (mg/kg)
	Uranium 27.87 (mg/kg)
	Zinc 371.89 (mg/kg)

Station	Results Exceeding Background
SOU014-022	Chromium 66.69 (mg/kg)
	Copper 97.95 (mg/kg)
	Lead 127.52 (mg/kg)
	Nickel 278.36 (mg/kg)
	Uranium 13.69 (mg/kg)
	Zinc 641.9 (mg/kg)

Station	Results Exceeding Background
SOU014-023	Chromium 57.1 (mg/kg)

Station	Results Exceeding Background
SOU014-024	Arsenic 12.07 (mg/kg)
	Chromium 42.2 (mg/kg)
	Copper 46.89 (mg/kg)
	Nickel 126.39 (mg/kg)
	Uranium 78.34 (mg/kg)
	Zinc 100.63 (mg/kg)

Station	Results Exceeding Background
SOU014-025	Chromium 63.58 (mg/kg)
	Copper 95.55 (mg/kg)
	Iron 29680.63 (mg/kg)
	Lead 37.89 (mg/kg)
	Nickel 303.96 (mg/kg)
	Uranium 174.93 (mg/kg)
	Zinc 187.29 (mg/kg)

Station	Results Exceeding Background
SOU014-026	Nickel 84.46 (mg/kg)
	Uranium 25.66 (mg/kg)
	Zinc 68.6 (mg/kg)

Station	Results Exceeding Background
SOU014-027	Chromium 38.74 (mg/kg)
	Copper 119.07 (mg/kg)
	Lead 42.38 (mg/kg)
	Nickel 382.38 (mg/kg)
	Uranium 321.04 (mg/kg)
	Zinc 195.66 (mg/kg)

Station	Results Exceeding Background
SOU014-028	Chromium 54.24 (mg/kg)
	Copper 115.92 (mg/kg)
	Iron 29504.78 (mg/kg)
	Lead 60.5 (mg/kg)
	Nickel 433.15 (mg/kg)
	Uranium 261.39 (mg/kg)
	Zinc 295.64 (mg/kg)

Station	Results Exceeding Background
SOU014-029	Uranium 17.91 (mg/kg)

Station	Results Exceeding Background
SOU014-030	Arsenic 16.84 (mg/kg)
	Chromium 65.48 (mg/kg)
	Copper 195.57 (mg/kg)
	Iron 54899.16 (mg/kg)
	Lead 48.85 (mg/kg)
	Manganese 1547.92 (mg/kg)
	Nickel 757.6 (mg/kg)
	Uranium 349.16 (mg/kg)
	Zinc 287.38 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.3. SWMU 14 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU014-031	Copper 95.87 (mg/kg)
	Iron 36596.58 (mg/kg)
	Lead 54.71 (mg/kg)
	Nickel 1198.49 (mg/kg)
	Uranium 210.5 (mg/kg)
	Zinc 380.95 (mg/kg)

Station	Results Exceeding Background
SOU014-032	Copper 179.93 (mg/kg)
	Lead 61.75 (mg/kg)
	Nickel 778.4 (mg/kg)
	Uranium 190.19 (mg/kg)
	Zinc 184.72 (mg/kg)

Station	Results Exceeding Background
SOU014-033	Chromium 25 (mg/kg)
	Mercury 7.48 (mg/kg)
	Uranium 5.5 (mg/kg)
	Plutonium-239/240 0.047 (pCi/g)
	Uranium-238 1.5 (pCi/g)

Station	Results Exceeding Background
SOU014-034	Copper 62.57 (mg/kg)
	Iron 29321.44 (mg/kg)
	Nickel 269.83 (mg/kg)
	Uranium 220.62 (mg/kg)
	Zinc 262.04 (mg/kg)

Station	Results Exceeding Background
SOU014-035	Chromium 51.32 (mg/kg)
	Copper 157.64 (mg/kg)
	Iron 34524.76 (mg/kg)
	Lead 44.52 (mg/kg)
	Nickel 805.25 (mg/kg)
	Uranium 329.9 (mg/kg)
	Zinc 239.88 (mg/kg)

Station	Results Exceeding Background
SOU014-036	Antimony 4.3 (mg/kg)
	Arsenic 14.76 (mg/kg)
	Cadmium 0.45 (mg/kg)
	Chromium 37.28 (mg/kg)
	Copper 315.34 (mg/kg)
	Iron 32463.09 (mg/kg)
	Mercury 0.487 (mg/kg)
	Nickel 580.71 (mg/kg)
	Selenium 1.7 (mg/kg)
	Uranium 506 (mg/kg)
	Zinc 267.88 (mg/kg)
	Neptunium-237 2.68 (pCi/g)
	Plutonium-239/240 0.69 (pCi/g)
	Technetium-99 13 (pCi/g)
	Thorium-230 8.33 (pCi/g)
	Uranium-234 113 (pCi/g)
	Uranium-235/236 8 (pCi/g)
	Uranium-238 169 (pCi/g)

Station	Results Exceeding Background
SOU014-037	Chromium 48.55 (mg/kg)
	Copper 252.11 (mg/kg)
	Iron 50951.19 (mg/kg)
	Lead 102.45 (mg/kg)
	Nickel 869.46 (mg/kg)
	Uranium 663.16 (mg/kg)
	Zinc 343.13 (mg/kg)

Station	Results Exceeding Background
SOU014-038	Copper 237.58 (mg/kg)
	Iron 35263.37 (mg/kg)
	Lead 36.63 (mg/kg)
	Nickel 313.29 (mg/kg)
	Uranium 372.4 (mg/kg)
	Zinc 187.25 (mg/kg)

Station	Results Exceeding Background
SOU014-039	Arsenic 17.18 (mg/kg)
	Chromium 44.56 (mg/kg)
	Copper 197.19 (mg/kg)
	Iron 37409.5 (mg/kg)
	Lead 51.17 (mg/kg)
	Manganese 2380.62 (mg/kg)
	Nickel 877.83 (mg/kg)
	Uranium 435.61 (mg/kg)
	Zinc 376.79 (mg/kg)

Station	Results Exceeding Background
SOU014-040	Arsenic 25.82 (mg/kg)
	Chromium 41.72 (mg/kg)
	Copper 242.55 (mg/kg)
	Iron 52657.51 (mg/kg)
	Lead 148.86 (mg/kg)
	Manganese 2667.77 (mg/kg)
	Nickel 822.76 (mg/kg)
	Uranium 524.16 (mg/kg)
	Zinc 324.25 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.3. SWMU 14 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU014-041	Arsenic 16.35 (mg/kg)
	Copper 218.15 (mg/kg)
	Iron 66572.84 (mg/kg)
	Lead 63.7 (mg/kg)
	Nickel 697.12 (mg/kg)
	Uranium 312.37 (mg/kg)
	Zinc 321.32 (mg/kg)

Station	Results Exceeding Background
SOU014-042	Copper 106.14 (mg/kg)
	Iron 38978.48 (mg/kg)
	Lead 46.4 (mg/kg)
	Manganese 1545.17 (mg/kg)
	Nickel 668.6 (mg/kg)
	Uranium 445 (mg/kg)
	Zinc 215.96 (mg/kg)

Station	Results Exceeding Background
SOU014-043	Arsenic 12.86 (mg/kg)
	Chromium 46.97 (mg/kg)
	Copper 82.26 (mg/kg)
	Lead 40.14 (mg/kg)
	Mercury 10.94 (mg/kg)
	Nickel 315.77 (mg/kg)
	Uranium 171.32 (mg/kg)
	Zinc 170.98 (mg/kg)

Station	Results Exceeding Background
SOU014-044	Copper 47.29 (mg/kg)
	Nickel 228.61 (mg/kg)
	Uranium 83.02 (mg/kg)
	Zinc 115.75 (mg/kg)

Station	Results Exceeding Background
SOU014-045	Copper 69.14 (mg/kg)
	Lead 46.38 (mg/kg)
	Nickel 296.12 (mg/kg)
	Uranium 140.7 (mg/kg)
	Zinc 159.23 (mg/kg)

Station	Results Exceeding Background
SOU014-046	Copper 29.72 (mg/kg)
	Nickel 246.11 (mg/kg)
	Uranium 177.1 (mg/kg)
	Zinc 142.7 (mg/kg)

Station	Results Exceeding Background
SOU014-047	Chromium 41.59 (mg/kg)
	Copper 115.03 (mg/kg)
	Lead 40.79 (mg/kg)
	Nickel 383.04 (mg/kg)
	Uranium 187.17 (mg/kg)
	Zinc 203.83 (mg/kg)

Station	Results Exceeding Background
SOU014-048	Copper 149.07 (mg/kg)
	Iron 33558.36 (mg/kg)
	Lead 115.82 (mg/kg)
	Nickel 454.39 (mg/kg)
	Uranium 179.41 (mg/kg)
	Zinc 256.86 (mg/kg)

Station	Results Exceeding Background
SOU014-049	Chromium 54.54 (mg/kg)
	Copper 208.3 (mg/kg)
	Iron 39823.23 (mg/kg)
	Lead 84.22 (mg/kg)
	Nickel 499.31 (mg/kg)
	Uranium 309.72 (mg/kg)
	Zinc 356.23 (mg/kg)

Station	Results Exceeding Background
SOU014-050	Arsenic 20.75 (mg/kg)
	Chromium 77.28 (mg/kg)
	Copper 1098.8 (mg/kg)
	Iron 62967.76 (mg/kg)
	Lead 92.78 (mg/kg)
	Nickel 1590.5 (mg/kg)
	Uranium 442.12 (mg/kg)
	Zinc 722.91 (mg/kg)

Station	Results Exceeding Background
SOU014-051	Chromium 39 (mg/kg)
	Copper 82.79 (mg/kg)
	Iron 34424.37 (mg/kg)
	Nickel 211.13 (mg/kg)
	Silver 11.7 (mg/kg)
	Uranium 140.04 (mg/kg)
	Zinc 137.61 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.3. SWMU 14 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU014-053	Antimony 2.3 (mg/kg)
	Cadmium 3.9 (mg/kg)
	Chromium 44.7 (mg/kg)
	Copper 198 (mg/kg)
	Iron 54600 (mg/kg)
	Lead 146 (mg/kg)
	Nickel 531 (mg/kg)
	Selenium 1.2 (mg/kg)
	Thallium 0.41 (mg/kg)
	Uranium 392 (mg/kg)
	Zinc 364 (mg/kg)
	Neptunium-237 1.74 (pCi/g)
	Plutonium-239/240 1.12 (pCi/g)
	Technetium-99 101 (pCi/g)
	Thorium-230 13.9 (pCi/g)
	Uranium-234 52.2 (pCi/g)
	Uranium-235/236 3.33 (pCi/g)
	Uranium-238 94.2 (pCi/g)

Station	Results Exceeding Background
SOU014-054	Copper 76.18 (mg/kg)
	Iron 31471.75 (mg/kg)
	Nickel 392.14 (mg/kg)
	Uranium 260.79 (mg/kg)
	Zinc 174.58 (mg/kg)

Station	Results Exceeding Background
SOU014-055	Arsenic 16.15 (mg/kg)
	Copper 96.33 (mg/kg)
	Iron 35380.25 (mg/kg)
	Lead 40 (mg/kg)
	Nickel 248.77 (mg/kg)
	Silver 12.87 (mg/kg)
	Uranium 121.94 (mg/kg)
	Zinc 124.65 (mg/kg)

Station	Results Exceeding Background
SOU014-056	Copper 57.24 (mg/kg)
	Nickel 344.76 (mg/kg)
	Uranium 680.29 (mg/kg)

Station	Results Exceeding Background
SOU014-057	Copper 58.25 (mg/kg)
	Nickel 175.84 (mg/kg)
	Uranium 289.71 (mg/kg)
	Zinc 122.15 (mg/kg)

Station	Results Exceeding Background
SOU014-058	Copper 93.83 (mg/kg)
	Lead 36.13 (mg/kg)
	Nickel 897.81 (mg/kg)
	Uranium 845.88 (mg/kg)
	Zinc 129.5 (mg/kg)

Station	Results Exceeding Background
SOU014-059	Copper 146.57 (mg/kg)
	Lead 39.53 (mg/kg)
	Nickel 283.63 (mg/kg)
	Uranium 147.98 (mg/kg)
	Zinc 176.16 (mg/kg)

Station	Results Exceeding Background
SOU014-060	Chromium 59.55 (mg/kg)
	Copper 44.03 (mg/kg)
	Lead 43.93 (mg/kg)
	Nickel 207.13 (mg/kg)
	Uranium 93 (mg/kg)
	Zinc 120.63 (mg/kg)

Station	Results Exceeding Background
SOU014-061	Chromium 36.37 (mg/kg)
	Copper 68.68 (mg/kg)
	Lead 36.99 (mg/kg)
	Nickel 151.18 (mg/kg)
	Uranium 121.77 (mg/kg)
	Zinc 162.51 (mg/kg)

Station	Results Exceeding Background
SOU014-062	Copper 42.57 (mg/kg)
	Nickel 157.52 (mg/kg)
	Uranium 109.29 (mg/kg)

Station	Results Exceeding Background
SOU014-063	Copper 28.24 (mg/kg)
	Nickel 137.41 (mg/kg)
	Silver 9.69 (mg/kg)
	Uranium 70.4 (mg/kg)
	Zinc 91.65 (mg/kg)

Station	Results Exceeding Background
SOU014-064	Copper 39.81 (mg/kg)
	Nickel 342.3 (mg/kg)
	Uranium 98.84 (mg/kg)
	Zinc 106.46 (mg/kg)

Station	Results Exceeding Background
SOU014-065	Chromium 41.55 (mg/kg)
	Copper 104.36 (mg/kg)
	Lead 46.66 (mg/kg)
	Nickel 349.59 (mg/kg)
	Uranium 148.39 (mg/kg)
	Zinc 240.66 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.3. SWMU 14 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU014-066	Chromium 35.55 (mg/kg)

Station	Results Exceeding Background
SOU014-067	Copper 87.8 (mg/kg)
	Lead 38.33 (mg/kg)
	Nickel 1622.96 (mg/kg)
	Uranium 864.68 (mg/kg)
	Zinc 177.81 (mg/kg)

Station	Results Exceeding Background
SOU014-068	Copper 21.45 (mg/kg)
	Nickel 546.1 (mg/kg)
	Uranium 518.48 (mg/kg)

Station	Results Exceeding Background
SOU014-069	Nickel 283.94 (mg/kg)
	Uranium 380.1 (mg/kg)

Station	Results Exceeding Background
SOU014-070	Copper 207.36 (mg/kg)
	Nickel 761.45 (mg/kg)
	Uranium 350.24 (mg/kg)
	Zinc 138.53 (mg/kg)

Station	Results Exceeding Background
SOU014-071	Nickel 1879.18 (mg/kg)
	Uranium 269.35 (mg/kg)
	Zinc 162.43 (mg/kg)

Station	Results Exceeding Background
SOU014-072	Chromium 34.64 (mg/kg)
	Copper 67.44 (mg/kg)
	Nickel 2668.41 (mg/kg)
	Uranium 762.94 (mg/kg)
	Zinc 209.98 (mg/kg)

Station	Results Exceeding Background
SOU014-073	Nickel 665.54 (mg/kg)
	Uranium 186.15 (mg/kg)
	Zinc 103.18 (mg/kg)

Station	Results Exceeding Background
SOU014-074	Antimony 0.75 (mg/kg)
	Cadmium 2.7 (mg/kg)
	Chromium 18.1 (mg/kg)
	Copper 71.79 (mg/kg)
	Magnesium 18200 (mg/kg)
	Mercury 0.422 (mg/kg)
	Nickel 840.39 (mg/kg)
	Selenium 1.3 (mg/kg)
	Thallium 0.27 (mg/kg)
	Uranium 110 (mg/kg)
	Zinc 142.05 (mg/kg)
	Neptunium-237 1.49 (pCi/g)
	Plutonium-239/240 0.037 (pCi/g)
	Technetium-99 25.1 (pCi/g)
	Uranium-234 12.8 (pCi/g)
	Uranium-235/236 0.96 (pCi/g)
	Uranium-238 21.3 (pCi/g)

Station	Results Exceeding Background
SOU014-075	Copper 27.96 (mg/kg)
	Mercury 7.82 (mg/kg)
	Nickel 121.55 (mg/kg)
	Uranium 48.47 (mg/kg)

Station	Results Exceeding Background
SOU014-076	Chromium 36.86 (mg/kg)
	Copper 80.5 (mg/kg)
	Nickel 258.94 (mg/kg)
	Uranium 57.15 (mg/kg)
	Zinc 126.55 (mg/kg)

Station	Results Exceeding Background
SOU014-077	Copper 124.51 (mg/kg)
	Lead 46.89 (mg/kg)
	Nickel 378.46 (mg/kg)
	Uranium 102.1 (mg/kg)
	Zinc 264.5 (mg/kg)

Station	Results Exceeding Background
SOU014-078	Copper 70.13 (mg/kg)
	Nickel 1059.09 (mg/kg)
	Silver 16.63 (mg/kg)
	Uranium 146.4 (mg/kg)
	Zinc 240.58 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.3. SWMU 14 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU014-079	Antimony 2.7 (mg/kg)
	Cadmium 0.84 (mg/kg)
	Chromium 897.61 (mg/kg)
	Copper 54.36 (mg/kg)
	Mercury 0.347 (mg/kg)
	Nickel 1227.64 (mg/kg)
	Selenium 1.1 (mg/kg)
	Silver 13.19 (mg/kg)
	Uranium 249.89 (mg/kg)
	Zinc 105.13 (mg/kg)
	Neptunium-237 2.65 (pCi/g)
	Plutonium-239/240 0.117 (pCi/g)
	Technetium-99 76 (pCi/g)
	Thorium-230 1.67 (pCi/g)
	Uranium-234 34.1 (pCi/g)
	Uranium-235/236 2.27 (pCi/g)
	Uranium-238 50.8 (pCi/g)

Station	Results Exceeding Background
SOU014-080	Chromium 32.91 (mg/kg)
	Copper 179.08 (mg/kg)
	Nickel 1047.65 (mg/kg)
	Uranium 208.27 (mg/kg)
	Zinc 150.13 (mg/kg)

Station	Results Exceeding Background
SOU014-081	Copper 98.51 (mg/kg)
	Nickel 516.72 (mg/kg)
	Uranium 210.67 (mg/kg)
	Zinc 73.47 (mg/kg)

Station	Results Exceeding Background
SOU014-082	Arsenic 23.57 (mg/kg)
	Chromium 46.44 (mg/kg)
	Copper 68.11 (mg/kg)
	Lead 70.88 (mg/kg)
	Nickel 1724.92 (mg/kg)
	Selenium 4.75 (mg/kg)
	Uranium 882.94 (mg/kg)
	Zinc 120.45 (mg/kg)

Station	Results Exceeding Background
SOU014-083	Nickel 174.91 (mg/kg)
	Uranium 104.5 (mg/kg)

Station	Results Exceeding Background
SOU014-084	Chromium 37.8 (mg/kg)
	Copper 52 (mg/kg)
	Nickel 585.04 (mg/kg)
	Uranium 339.91 (mg/kg)
	Zinc 110.55 (mg/kg)

Station	Results Exceeding Background
SOU014-085	Arsenic 12.99 (mg/kg)
	Chromium 64.56 (mg/kg)
	Copper 176.65 (mg/kg)
	Lead 62.69 (mg/kg)
	Nickel 495.4 (mg/kg)
	Uranium 316.27 (mg/kg)
	Zinc 337.01 (mg/kg)

Station	Results Exceeding Background
SOU014-086	Chromium 28.16 (mg/kg)
	Nickel 84.54 (mg/kg)
	Uranium 65.11 (mg/kg)

Station	Results Exceeding Background
SOU014-087	Chromium 34.44 (mg/kg)
	Copper 52.36 (mg/kg)
	Nickel 221.24 (mg/kg)
	Uranium 92.82 (mg/kg)
	Zinc 98.97 (mg/kg)

Station	Results Exceeding Background
SOU014-088	Copper 85.36 (mg/kg)
	Nickel 272.78 (mg/kg)
	Uranium 90.63 (mg/kg)
	Zinc 245.67 (mg/kg)

Station	Results Exceeding Background
SOU014-089	Copper 98.13 (mg/kg)
	Lead 37.59 (mg/kg)
	Mercury 7.9 (mg/kg)
	Nickel 531.79 (mg/kg)
	Uranium 148.84 (mg/kg)
	Zinc 153.51 (mg/kg)

Station	Results Exceeding Background
SOU014-090	Chromium 38.47 (mg/kg)
	Copper 72.79 (mg/kg)
	Nickel 343.76 (mg/kg)
	Silver 9.63 (mg/kg)
	Uranium 73.56 (mg/kg)
	Zinc 91.8 (mg/kg)

Station	Results Exceeding Background
SOU014-091	Copper 71.68 (mg/kg)
	Nickel 660.44 (mg/kg)
	Uranium 387.84 (mg/kg)
	Zinc 110.52 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.3. SWMU 14 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU014-092	Chromium 32.42 (mg/kg)
	Copper 129.47 (mg/kg)
	Lead 36.02 (mg/kg)
	Nickel 892.12 (mg/kg)
	Uranium 638.11 (mg/kg)
	Zinc 135.38 (mg/kg)

Station	Results Exceeding Background
SOU014-093	Copper 48.5 (mg/kg)
	Nickel 672.65 (mg/kg)
	Uranium 363.33 (mg/kg)
	Zinc 88.34 (mg/kg)

Station	Results Exceeding Background
SOU014-094	Arsenic 14.57 (mg/kg)
	Copper 180.26 (mg/kg)
	Lead 41.35 (mg/kg)
	Nickel 1340.98 (mg/kg)
	Uranium 712.98 (mg/kg)
	Zinc 195.15 (mg/kg)

Station	Results Exceeding Background
SOU014-095	Chromium 32.35 (mg/kg)
	Copper 46.84 (mg/kg)
	Nickel 333.28 (mg/kg)
	Uranium 210.29 (mg/kg)
	Zinc 72.12 (mg/kg)

Station	Results Exceeding Background
SOU014-096	Chromium 35.53 (mg/kg)
	Copper 97.6 (mg/kg)
	Lead 49.39 (mg/kg)
	Mercury 43.71 (mg/kg)
	Nickel 797.95 (mg/kg)
	Uranium 230.72 (mg/kg)
	Zinc 182.73 (mg/kg)

Station	Results Exceeding Background
SOU014-097	Chromium 34.83 (mg/kg)
	Copper 107.56 (mg/kg)
	Lead 47.54 (mg/kg)
	Nickel 495.05 (mg/kg)
	Uranium 377.26 (mg/kg)
	Zinc 187.2 (mg/kg)

Station	Results Exceeding Background
SOU014-098	Chromium 32.24 (mg/kg)
	Copper 133.3 (mg/kg)
	Lead 45.4 (mg/kg)
	Nickel 456.88 (mg/kg)
	Uranium 191.48 (mg/kg)
	Zinc 159.7 (mg/kg)

Station	Results Exceeding Background
SOU014-099	Copper 71.74 (mg/kg)
	Nickel 131.88 (mg/kg)
	Uranium 57.43 (mg/kg)
	Zinc 106.99 (mg/kg)

Station	Results Exceeding Background
SOU014-100	Lead 44.95 (mg/kg)
	Nickel 112.45 (mg/kg)
	Uranium 8.8 (mg/kg)
	Zinc 79.04 (mg/kg)

Station	Results Exceeding Background
SOU014-101	Nickel 255.25 (mg/kg)
	Uranium 45.29 (mg/kg)

Station	Results Exceeding Background
SOU014-102	Chromium 46.03 (mg/kg)
	Copper 33.92 (mg/kg)
	Nickel 1299.73 (mg/kg)
	Uranium 381.29 (mg/kg)
	Zinc 83.02 (mg/kg)

Station	Results Exceeding Background
SOU014-103	Copper 45.03 (mg/kg)
	Nickel 378.08 (mg/kg)
	Uranium 184.44 (mg/kg)
	Zinc 88.69 (mg/kg)

Station	Results Exceeding Background
SOU014-104	Copper 36.1 (mg/kg)
	Nickel 232.08 (mg/kg)
	Uranium 144.72 (mg/kg)
	Zinc 72.35 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.3. SWMU 14 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU014-105	Antimony 2 (mg/kg)
	Cadmium 0.94 (mg/kg)
	Chromium 26.3 (mg/kg)
	Copper 81.9 (mg/kg)
	Lead 39.4 (mg/kg)
	Mercury 1.13 (mg/kg)
	Nickel 338.09 (mg/kg)
	Selenium 1.1 (mg/kg)
	Thallium 0.29 (mg/kg)
	Uranium 367 (mg/kg)
	Zinc 108 (mg/kg)
	Neptunium-237 2.99 (pCi/g)
	Plutonium-239/240 0.343 (pCi/g)
	Technetium-99 166 (pCi/g)
	Thorium-230 2.16 (pCi/g)
	Uranium-234 43.2 (pCi/g)
	Uranium-235/236 3.32 (pCi/g)
	Uranium-238 73.5 (pCi/g)

Station	Results Exceeding Background
SOU014-106	Copper 29.68 (mg/kg)
	Nickel 275.6 (mg/kg)
	Uranium 172.12 (mg/kg)
	Zinc 86.87 (mg/kg)

Station	Results Exceeding Background
SOU014-107	Copper 65.03 (mg/kg)
	Nickel 447.82 (mg/kg)
	Uranium 219.4 (mg/kg)
	Zinc 94.43 (mg/kg)

Station	Results Exceeding Background
SOU014-108	Chromium 41.85 (mg/kg)
	Copper 163.23 (mg/kg)
	Iron 28821.17 (mg/kg)
	Lead 48.65 (mg/kg)
	Nickel 873.58 (mg/kg)
	Uranium 366.06 (mg/kg)
	Zinc 209.24 (mg/kg)

Station	Results Exceeding Background
SOU014-109	Chromium 34.88 (mg/kg)
	Copper 275.71 (mg/kg)
	Iron 37476.24 (mg/kg)
	Lead 48.4 (mg/kg)
	Nickel 950.81 (mg/kg)
	Uranium 541.96 (mg/kg)
	Zinc 278.18 (mg/kg)

Station	Results Exceeding Background
SOU014-110	Nickel 125.67 (mg/kg)
	Uranium 21.67 (mg/kg)
	Zinc 65.8 (mg/kg)

Station	Results Exceeding Background
SOU014-111	Antimony 0.61 (mg/kg)
	Cadmium 0.33 (mg/kg)
	Chromium 36.59 (mg/kg)
	Copper 39.1 (mg/kg)
	Nickel 529.85 (mg/kg)
	Selenium 1.1 (mg/kg)
	Uranium 25.87 (mg/kg)
	Zinc 163.71 (mg/kg)
	Neptunium-237 0.88 (pCi/g)
	Plutonium-239/240 0.088 (pCi/g)
	Technetium-99 30.9 (pCi/g)
	Uranium-234 3.81 (pCi/g)
	Uranium-235/236 0.238 (pCi/g)
	Uranium-238 5.92 (pCi/g)

Station	Results Exceeding Background
SOU014-112	Arsenic 14.02 (mg/kg)
	Copper 39.85 (mg/kg)
	Nickel 480.96 (mg/kg)
	Uranium 40.77 (mg/kg)
	Zinc 91.63 (mg/kg)

Station	Results Exceeding Background
SOU014-113	Nickel 212.7 (mg/kg)
	Uranium 22.41 (mg/kg)
	Zinc 70.16 (mg/kg)

Station	Results Exceeding Background
SOU014-114	Copper 25.48 (mg/kg)
	Nickel 334.32 (mg/kg)
	Uranium 35.22 (mg/kg)
	Zinc 120.4 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.3. SWMU 14 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU014-115	Chromium 36.71 (mg/kg)
	Nickel 147.32 (mg/kg)
	Uranium 21.77 (mg/kg)

Station	Results Exceeding Background
SOU014-116	Arsenic 14.35 (mg/kg)
	Chromium 32.69 (mg/kg)
	Copper 62.42 (mg/kg)
	Nickel 322.15 (mg/kg)
	Selenium 4.74 (mg/kg)
	Uranium 63.69 (mg/kg)
	Zinc 125.03 (mg/kg)

Station	Results Exceeding Background
SOU014-117	Copper 46.64 (mg/kg)
	Nickel 310.2 (mg/kg)
	Uranium 101.18 (mg/kg)
	Zinc 70.41 (mg/kg)

Station	Results Exceeding Background
SOU014-118	Antimony 0.94 (mg/kg)
	Cadmium 0.57 (mg/kg)
	Chromium 39.23 (mg/kg)
	Copper 57.33 (mg/kg)
	Mercury 0.92 (mg/kg)
	Nickel 406.3 (mg/kg)
	Selenium 1.2 (mg/kg)
	Uranium 197 (mg/kg)
	Zinc 139.65 (mg/kg)
	Neptunium-237 2.64 (pCi/g)
	Plutonium-239/240 0.24 (pCi/g)
	Technetium-99 56.3 (pCi/g)
	Uranium-234 24.2 (pCi/g)
	Uranium-235/236 1.76 (pCi/g)
	Uranium-238 40.9 (pCi/g)

Station	Results Exceeding Background
SOU014-120	Arsenic 13.37 (mg/kg)
	Iron 39014.89 (mg/kg)
	Uranium 14.07 (mg/kg)
	Zinc 65.24 (mg/kg)

Station	Results Exceeding Background
SOU014-121	Mercury 8.51 (mg/kg)
	Nickel 115.82 (mg/kg)
	Uranium 18.86 (mg/kg)
	Zinc 104.51 (mg/kg)

Station	Results Exceeding Background
SOU014-RAD	Uranium 4600 (mg/kg)
	Cesium-137 0.62 (pCi/g)
	Neptunium-237 16 (pCi/g)
	Plutonium-239/240 0.393 (pCi/g)
	Technetium-99 215 (pCi/g)
	Thorium-230 3.45 (pCi/g)
	Uranium-234 1070 (pCi/g)
	Uranium-235/236 70 (pCi/g)
	Uranium-238 1540 (pCi/g)

NOTE: maximum detections only shown for location.

Figure 10.1.3. SWMU 14 Background Exceedances – Surface (Continued)

Figure 10.1.4. SWMU 14 NAL Exceedances - Surface Soil

Grid	Results Exceeding NAL
014-002	Nickel 94.17 (mg/kg)
	PCB, Total 0.5 (mg/kg)
	Cesium-137 0.097 (pCi/g)
	Neptunium-237 0.273 (pCi/g)
	Technetium-99 406 (pCi/g)

Grid	Results Exceeding NAL
014-003	Chromium 43.91 (mg/kg)
	Nickel 133.3 (mg/kg)

Grid	Results Exceeding NAL
014-004	Arsenic 6.29 (mg/kg)
	Nickel 97.67 (mg/kg)

Grid	Results Exceeding NAL
014-005	Chromium 47.19 (mg/kg)
	Iron 26966.6 (mg/kg)
	Nickel 260.63 (mg/kg)

Grid	Results Exceeding NAL
014-006	Arsenic 11.58 (mg/kg)
	Chromium 54.78 (mg/kg)
	Iron 29597.96 (mg/kg)
	Nickel 1380.97 (mg/kg)

Grid	Results Exceeding NAL
014-007	Chromium 66.54 (mg/kg)
	Iron 38049.81 (mg/kg)
	Nickel 379.16 (mg/kg)
	Uranium 110.65 (mg/kg)

Grid	Results Exceeding NAL
014-008	Arsenic 15.96 (mg/kg)
	Chromium 60.92 (mg/kg)
	Iron 39049.79 (mg/kg)
	Nickel 373.54 (mg/kg)

Grid	Results Exceeding NAL
014-009	Chromium 70.13 (mg/kg)
	Iron 33732.88 (mg/kg)
	Nickel 531.58 (mg/kg)

Grid	Results Exceeding NAL
014-010	Arsenic 12.84 (mg/kg)
	Nickel 218.39 (mg/kg)

Grid	Results Exceeding NAL
014-011	Chromium 46.91 (mg/kg)
	Iron 25775.24 (mg/kg)
	Nickel 184.93 (mg/kg)

Grid	Results Exceeding NAL
014-012	Chromium 44.41 (mg/kg)

Grid	Results Exceeding NAL
014-013	Arsenic 4.1 (mg/kg)
	Beryllium 0.35 (mg/kg)
	Cobalt 10.9 (mg/kg)
	Nickel 81 (mg/kg)
	Vanadium 20.6 (mg/kg)

Grid	Results Exceeding NAL
014-014	Silver 16.69 (mg/kg)

Grid	Results Exceeding NAL
014-015	Nickel 80.31 (mg/kg)

Grid	Results Exceeding NAL
014-016	Arsenic 8.28 (mg/kg)
	Chromium 36.91 (mg/kg)
	Iron 31645.02 (mg/kg)
	Nickel 273.96 (mg/kg)

Grid	Results Exceeding NAL
014-017	Antimony 3.7 (mg/kg)
	Arsenic 6.2 (mg/kg)
	Beryllium 0.71 (mg/kg)
	Chromium 57.78 (mg/kg)
	Iron 40500 (mg/kg)
	Nickel 524.64 (mg/kg)
	Uranium 207.66 (mg/kg)
	Vanadium 32.8 (mg/kg)
	PCB, Total 0.39 (mg/kg)
	Neptunium-237 0.77 (pCi/g)
	Uranium-234 32.4 (pCi/g)
	Uranium-235/236 2 (pCi/g)
	Uranium-238 56.1 (pCi/g)
	Total PAH 0.33814 (mg/kg)

Grid	Results Exceeding NAL
014-018	Arsenic 6.95 (mg/kg)
	Nickel 72.87 (mg/kg)

Grid	Results Exceeding NAL
014-019	Nickel 76.15 (mg/kg)

Grid	Results Exceeding NAL
014-020	Arsenic 9.72 (mg/kg)
	Iron 25845.75 (mg/kg)
	Nickel 64.57 (mg/kg)

Grid	Results Exceeding NAL
014-021	Nickel 198.25 (mg/kg)
	PCB, Total 10 (mg/kg)

Grid	Results Exceeding NAL
014-022	Chromium 66.69 (mg/kg)
	Iron 27469.97 (mg/kg)
	Nickel 278.36 (mg/kg)
	PCB, Total 10 (mg/kg)

Grid	Results Exceeding NAL
014-023	Chromium 57.1 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.4. SWMU 14 NAL Exceedances – Surface (Continued)

Grid	Results Exceeding NAL
014-024	Arsenic 12.07 (mg/kg) Chromium 42.2 (mg/kg) Nickel 126.39 (mg/kg)

Grid	Results Exceeding NAL
014-025	Arsenic 9.5 (mg/kg) Chromium 63.58 (mg/kg) Iron 29680.63 (mg/kg) Nickel 303.96 (mg/kg) Uranium 174.93 (mg/kg)

Grid	Results Exceeding NAL
014-026	Arsenic 7.75 (mg/kg) Nickel 84.46 (mg/kg)

Grid	Results Exceeding NAL
014-027	Chromium 38.74 (mg/kg) Iron 27241.33 (mg/kg) Nickel 382.38 (mg/kg) Uranium 321.04 (mg/kg)

Grid	Results Exceeding NAL
014-028	Chromium 54.24 (mg/kg) Iron 29504.78 (mg/kg) Nickel 433.15 (mg/kg) Uranium 261.39 (mg/kg)

Grid	Results Exceeding NAL
014-030	Arsenic 16.84 (mg/kg) Chromium 65.48 (mg/kg) Iron 54899.16 (mg/kg) Nickel 757.6 (mg/kg) Uranium 349.16 (mg/kg)

Grid	Results Exceeding NAL
014-031	Iron 36596.58 (mg/kg) Nickel 1198.49 (mg/kg) Uranium 210.5 (mg/kg)

Grid	Results Exceeding NAL
014-032	Nickel 778.4 (mg/kg) Uranium 190.19 (mg/kg)

Grid	Results Exceeding NAL
014-033	Arsenic 7.2 (mg/kg) Beryllium 0.62 (mg/kg) Cobalt 11.5 (mg/kg) Iron 26800 (mg/kg) Mercury 7.48 (mg/kg) Vanadium 23.9 (mg/kg)

Grid	Results Exceeding NAL
014-034	Arsenic 11.33 (mg/kg) Iron 29321.44 (mg/kg) Nickel 269.83 (mg/kg) Uranium 220.62 (mg/kg)

Grid	Results Exceeding NAL
014-035	Arsenic 8.8 (mg/kg) Chromium 51.32 (mg/kg) Iron 34524.76 (mg/kg) Nickel 805.25 (mg/kg) Uranium 329.9 (mg/kg) PCB, Total 5 (mg/kg)

Grid	Results Exceeding NAL
014-036	Antimony 4.3 (mg/kg) Arsenic 14.76 (mg/kg) Beryllium 0.64 (mg/kg) Chromium 37.28 (mg/kg) Cobalt 13.9 (mg/kg) Iron 32463.09 (mg/kg) Nickel 580.71 (mg/kg) Uranium 506 (mg/kg) Vanadium 34.6 (mg/kg) PCB, Total 2.6 (mg/kg) Neptunium-237 2.68 (pCi/g) Uranium-234 113 (pCi/g) Uranium-235/236 8 (pCi/g) Uranium-238 169 (pCi/g) Total PAH 0.25077 (mg/kg)

Grid	Results Exceeding NAL
014-037	Chromium 48.55 (mg/kg) Iron 50951.19 (mg/kg) Nickel 869.46 (mg/kg) Uranium 663.16 (mg/kg)

Grid	Results Exceeding NAL
014-038	Iron 35263.37 (mg/kg) Nickel 313.29 (mg/kg) Uranium 372.4 (mg/kg)

Grid	Results Exceeding NAL
014-039	Arsenic 17.18 (mg/kg) Chromium 44.56 (mg/kg) Iron 37409.5 (mg/kg) Nickel 877.83 (mg/kg) Uranium 435.61 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.4. SWMU 14 NAL Exceedances – Surface (Continued)

Grid	Results Exceeding NAL
014-040	Arsenic 25.82 (mg/kg) Chromium 41.72 (mg/kg) Iron 52657.51 (mg/kg) Manganese 2667.77 (mg/kg) Nickel 822.76 (mg/kg) Uranium 524.16 (mg/kg)

Grid	Results Exceeding NAL
014-041	Arsenic 16.35 (mg/kg) Iron 66572.84 (mg/kg) Nickel 697.12 (mg/kg) Uranium 312.37 (mg/kg)

Grid	Results Exceeding NAL
014-042	Iron 38978.48 (mg/kg) Nickel 668.6 (mg/kg) Uranium 445 (mg/kg)

Grid	Results Exceeding NAL
014-043	Arsenic 12.86 (mg/kg) Chromium 46.97 (mg/kg) Mercury 10.94 (mg/kg) Nickel 315.77 (mg/kg) Uranium 171.32 (mg/kg)

Grid	Results Exceeding NAL
014-044	Nickel 228.61 (mg/kg)

Grid	Results Exceeding NAL
014-045	Nickel 296.12 (mg/kg) Uranium 140.7 (mg/kg)

Grid	Results Exceeding NAL
014-046	Nickel 246.11 (mg/kg) Uranium 177.1 (mg/kg)

Grid	Results Exceeding NAL
014-047	Chromium 41.59 (mg/kg) Iron 26780.29 (mg/kg) Nickel 383.04 (mg/kg) Uranium 187.17 (mg/kg) PCB, Total 10 (mg/kg)

Grid	Results Exceeding NAL
014-048	Iron 33558.36 (mg/kg) Nickel 454.39 (mg/kg) Uranium 179.41 (mg/kg)

Grid	Results Exceeding NAL
014-049	Chromium 54.54 (mg/kg) Iron 39823.23 (mg/kg) Nickel 499.31 (mg/kg) Uranium 309.72 (mg/kg)

Grid	Results Exceeding NAL
014-050	Arsenic 20.75 (mg/kg) Chromium 77.28 (mg/kg) Iron 62967.76 (mg/kg) Nickel 1590.5 (mg/kg) Uranium 442.12 (mg/kg) PCB, Total 5 (mg/kg)

Grid	Results Exceeding NAL
014-051	Arsenic 9.8 (mg/kg) Chromium 39 (mg/kg) Iron 34424.37 (mg/kg) Nickel 211.13 (mg/kg) Silver 11.7 (mg/kg) Uranium 140.04 (mg/kg)

Grid	Results Exceeding NAL
014-053	Arsenic 9.7 (mg/kg) Beryllium 0.54 (mg/kg) Cadmium 3.9 (mg/kg) Chromium 44.7 (mg/kg) Cobalt 14 (mg/kg) Iron 54600 (mg/kg) Nickel 531 (mg/kg) Uranium 392 (mg/kg) Vanadium 28.4 (mg/kg) PCB, Total 1 (mg/kg) Cesium-137 0.172 (pCi/g) Neptunium-237 1.74 (pCi/g) Thorium-230 13.9 (pCi/g) Uranium-234 52.2 (pCi/g) Uranium-235/236 3.33 (pCi/g) Uranium-238 94.2 (pCi/g) Total PAH 0.120962 (mg/kg)

Grid	Results Exceeding NAL
014-054	Arsenic 10.64 (mg/kg) Iron 31471.75 (mg/kg) Nickel 392.14 (mg/kg) Uranium 260.79 (mg/kg)

Grid	Results Exceeding NAL
014-055	Arsenic 16.15 (mg/kg) Iron 35380.25 (mg/kg) Nickel 248.77 (mg/kg) Silver 12.87 (mg/kg) Uranium 121.94 (mg/kg)

Grid	Results Exceeding NAL
014-056	Nickel 344.76 (mg/kg) Uranium 680.29 (mg/kg)

Grid	Results Exceeding NAL
014-057	Nickel 175.84 (mg/kg) Uranium 289.71 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.4. SWMU 14 NAL Exceedances – Surface (Continued)

Grid	Results Exceeding NAL
014-058	Nickel 897.81 (mg/kg) Uranium 845.88 (mg/kg)
014-059	Nickel 283.63 (mg/kg) Uranium 147.98 (mg/kg)
014-060	Chromium 59.55 (mg/kg) Nickel 207.13 (mg/kg) PCB, Total 10 (mg/kg)
014-061	Chromium 36.37 (mg/kg) Nickel 151.18 (mg/kg) Uranium 121.77 (mg/kg)
014-062	Nickel 157.52 (mg/kg) Uranium 109.29 (mg/kg)
014-063	Nickel 137.41 (mg/kg)
014-064	Nickel 342.3 (mg/kg)
014-065	Chromium 41.55 (mg/kg) Nickel 349.59 (mg/kg) Uranium 148.39 (mg/kg)
014-066	Chromium 35.55 (mg/kg)
014-067	Nickel 1622.96 (mg/kg) Uranium 864.68 (mg/kg)
014-068	Nickel 546.1 (mg/kg) Uranium 518.48 (mg/kg)
014-069	Nickel 283.94 (mg/kg) Uranium 380.1 (mg/kg)
014-070	Nickel 761.45 (mg/kg) Uranium 350.24 (mg/kg)
014-071	Nickel 1879.18 (mg/kg) Uranium 269.35 (mg/kg)
014-072	Chromium 34.64 (mg/kg) Nickel 2668.41 (mg/kg) Uranium 762.94 (mg/kg)
014-073	Nickel 665.54 (mg/kg) Uranium 186.15 (mg/kg)
014-074	Arsenic 10 (mg/kg) Beryllium 0.41 (mg/kg) Nickel 840.39 (mg/kg) Uranium 110 (mg/kg) Vanadium 18.8 (mg/kg) PCB, Total 0.44 (mg/kg) Cesium-137 0.103 (pCi/g) Neptunium-237 1.49 (pCi/g) Uranium-235/236 0.96 (pCi/g) Uranium-238 21.3 (pCi/g) Total PAH 0.06314 (mg/kg)
014-075	Mercury 7.82 (mg/kg) Nickel 121.55 (mg/kg)
014-076	Chromium 36.86 (mg/kg) Nickel 258.94 (mg/kg)
014-077	Arsenic 9.63 (mg/kg) Nickel 378.46 (mg/kg)
014-078	Nickel 1059.09 (mg/kg) Silver 16.63 (mg/kg) Uranium 146.4 (mg/kg) PCB, Total 5 (mg/kg)
014-079	Antimony 2.7 (mg/kg) Arsenic 4.3 (mg/kg) Beryllium 0.32 (mg/kg) Chromium 897.61 (mg/kg) Nickel 1227.64 (mg/kg) Silver 13.19 (mg/kg) Uranium 249.89 (mg/kg) Vanadium 17.6 (mg/kg) PCB, Total 0.67 (mg/kg) Neptunium-237 2.65 (pCi/g) Uranium-234 34.1 (pCi/g) Uranium-235/236 2.27 (pCi/g) Uranium-238 50.8 (pCi/g)
014-080	Arsenic 10.74 (mg/kg) Chromium 32.91 (mg/kg) Nickel 1047.65 (mg/kg) Uranium 208.27 (mg/kg)
014-081	Nickel 516.72 (mg/kg) Uranium 210.67 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.4. SWMU 14 NAL Exceedances – Surface (Continued)

Grid	Results Exceeding NAL
014-082	Arsenic 23.57 (mg/kg) Chromium 46.44 (mg/kg) Nickel 1724.92 (mg/kg) Uranium 882.94 (mg/kg)
014-083	Nickel 174.91 (mg/kg) Uranium 4600 (mg/kg) Cesium-137 0.62 (pCi/g) Neptunium-237 16 (pCi/g) Uranium-234 1070 (pCi/g) Uranium-235/236 70 (pCi/g) Uranium-238 1540 (pCi/g)
014-084	Chromium 37.8 (mg/kg) Nickel 585.04 (mg/kg) Uranium 339.91 (mg/kg)
014-085	Arsenic 12.99 (mg/kg) Chromium 64.56 (mg/kg) Iron 25208.37 (mg/kg) Nickel 495.4 (mg/kg) Uranium 316.27 (mg/kg) PCB, Total 10 (mg/kg)
014-086	Nickel 84.54 (mg/kg)
014-087	Chromium 34.44 (mg/kg) Nickel 221.24 (mg/kg)
014-088	Arsenic 9.28 (mg/kg) Nickel 272.78 (mg/kg)
014-089	Arsenic 9.55 (mg/kg) Mercury 7.9 (mg/kg) Nickel 531.79 (mg/kg) Uranium 148.84 (mg/kg)
014-090	Chromium 38.47 (mg/kg) Nickel 343.76 (mg/kg)
014-091	Nickel 660.44 (mg/kg) Uranium 387.84 (mg/kg)
014-092	Chromium 32.42 (mg/kg) Nickel 892.12 (mg/kg) Uranium 638.11 (mg/kg)
014-093	Arsenic 8.22 (mg/kg) Nickel 672.65 (mg/kg) Uranium 363.33 (mg/kg)
014-094	Arsenic 14.57 (mg/kg) Iron 27773.15 (mg/kg) Nickel 1340.98 (mg/kg) Uranium 712.98 (mg/kg)
014-095	Chromium 32.35 (mg/kg) Nickel 333.28 (mg/kg) Uranium 210.29 (mg/kg) PCB, Total 5 (mg/kg)
014-096	Arsenic 10.64 (mg/kg) Chromium 35.53 (mg/kg) Mercury 43.71 (mg/kg) Nickel 797.95 (mg/kg) Uranium 230.72 (mg/kg) PCB, Total 10 (mg/kg)
014-097	Chromium 34.83 (mg/kg) Nickel 495.05 (mg/kg) Uranium 377.26 (mg/kg) PCB, Total 5 (mg/kg)
014-098	Chromium 32.24 (mg/kg) Nickel 456.88 (mg/kg) Uranium 191.48 (mg/kg)
014-099	Arsenic 7.63 (mg/kg) Nickel 131.88 (mg/kg)
014-100	Nickel 112.45 (mg/kg)
014-101	Nickel 255.25 (mg/kg)
014-102	Chromium 46.03 (mg/kg) Nickel 1299.73 (mg/kg) Uranium 381.29 (mg/kg)
014-103	Arsenic 8.05 (mg/kg) Nickel 378.08 (mg/kg) Uranium 184.44 (mg/kg) PCB, Total 5 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.4. SWMU 14 NAL Exceedances – Surface (Continued)

Grid	Results Exceeding NAL
014-104	Nickel 232.08 (mg/kg) Uranium 144.72 (mg/kg) PCB, Total 10 (mg/kg)

Grid	Results Exceeding NAL
014-105	Arsenic 8.6 (mg/kg) Beryllium 0.41 (mg/kg) Iron 27200 (mg/kg) Mercury 1.13 (mg/kg) Nickel 338.09 (mg/kg) Uranium 367 (mg/kg) Vanadium 21.8 (mg/kg) PCB, Total 5 (mg/kg) Cesium-137 0.19 (pCi/g) Neptunium-237 2.99 (pCi/g) Uranium-234 43.2 (pCi/g) Uranium-235/236 3.32 (pCi/g) Uranium-238 73.5 (pCi/g) Total PAH 0.48746 (mg/kg)

Grid	Results Exceeding NAL
014-106	Arsenic 5.85 (mg/kg) Nickel 275.6 (mg/kg) Uranium 172.12 (mg/kg) PCB, Total 10 (mg/kg)

Grid	Results Exceeding NAL
014-107	Nickel 447.82 (mg/kg) Uranium 219.4 (mg/kg) PCB, Total 10 (mg/kg)

Grid	Results Exceeding NAL
014-108	Arsenic 11.53 (mg/kg) Chromium 41.85 (mg/kg) Iron 28821.17 (mg/kg) Nickel 873.58 (mg/kg) Uranium 366.06 (mg/kg) PCB, Total 10 (mg/kg)

Grid	Results Exceeding NAL
014-109	Arsenic 10.08 (mg/kg) Chromium 34.88 (mg/kg) Iron 37476.24 (mg/kg) Nickel 950.81 (mg/kg) Uranium 541.96 (mg/kg)

Grid	Results Exceeding NAL
014-110	Nickel 125.67 (mg/kg)

Grid	Results Exceeding NAL
014-111	Arsenic 9 (mg/kg) Beryllium 0.37 (mg/kg) Chromium 36.59 (mg/kg) Nickel 529.85 (mg/kg) Vanadium 17.8 (mg/kg) Cesium-137 0.207 (pCi/g) Neptunium-237 0.88 (pCi/g) Uranium-238 5.92 (pCi/g) Total PAH 0.062758 (mg/kg)

Grid	Results Exceeding NAL
014-112	Arsenic 14.02 (mg/kg) Nickel 480.96 (mg/kg)

Grid	Results Exceeding NAL
014-113	Arsenic 9.9 (mg/kg) Nickel 212.7 (mg/kg)

Grid	Results Exceeding NAL
014-114	Nickel 334.32 (mg/kg)

Grid	Results Exceeding NAL
014-115	Arsenic 7.75 (mg/kg) Chromium 36.71 (mg/kg) Nickel 147.32 (mg/kg)

Grid	Results Exceeding NAL
014-116	Arsenic 14.35 (mg/kg) Chromium 32.69 (mg/kg) Nickel 322.15 (mg/kg)

Grid	Results Exceeding NAL
014-117	Nickel 310.2 (mg/kg)

Grid	Results Exceeding NAL
014-118	Arsenic 6.2 (mg/kg) Beryllium 0.41 (mg/kg) Chromium 39.23 (mg/kg) Mercury 0.92 (mg/kg) Nickel 406.3 (mg/kg) Uranium 197 (mg/kg) Vanadium 20.9 (mg/kg) PCB, Total 1.1 (mg/kg) Neptunium-237 2.64 (pCi/g) Uranium-234 24.2 (pCi/g) Uranium-235/236 1.76 (pCi/g) Uranium-238 40.9 (pCi/g) Total PAH 0.27151 (mg/kg)

Grid	Results Exceeding NAL
014-120	Arsenic 13.37 (mg/kg) Iron 39014.89 (mg/kg)

Grid	Results Exceeding NAL
014-121	Arsenic 9.68 (mg/kg) Iron 26400.56 (mg/kg) Mercury 8.51 (mg/kg) Nickel 115.82 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.4. SWMU 14 NAL Exceedances – Surface (Continued)

Metal	Grid	EU
Antimony	17, 36, 53, 78, 74, 105, 111, 118,	2, 4, 5, 6, 7, 8, 9, 10
Arsenic	8, 10, 24, 30, 36, 39, 40, 41, 43, 50, 55, 82, 85, 94, 112, 116, 120	1, 2, 3, 4, 5, 7, 8, 9, 10
Cadmium	17, 36, 53, 79, 74, 105, 118	2, 4, 5, 6, 7, 9
Copper	6, 7, 8, 9, 10, 11, 17, 21, 22, 24, 25, 27, 28, 30, 31, 32, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 47, 48, 49, 50, 51, 53, 54, 55, 56, 57, 58, 59, 61, 65, 67, 70, 72, 74, 76, 77, 78, 79, 80, 81, 82, 84, 85, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 105, 107, 108, 109, 116, 117, 118	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Iron	6, 7, 8, 9, 16, 17, 25, 28, 30, 31, 34, 35, 36, 37, 38, 39, 40, 41, 42, 48, 49, 50, 51, 53, 54, 55, 108, 109, 120	1, 2, 3, 4, 5, 10
Lead	6, 7, 8, 9, 10, 11, 17, 21, 22, 25, 27, 28, 30, 31, 32, 35, 37, 38, 39, 40, 41, 42, 43, 45, 47, 48, 49, 50, 53, 55, 58, 59, 60, 61, 65, 67, 77, 82, 85, 89, 92, 94, 96, 97, 98, 100, 105, 108, 109	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Manganese	30, 39, 40, 42	2, 3, 5
Mercury	17, 33, 36, 43, 79, 74, 75, 89, 96, 105, 118, 121	2, 3, 4, 5, 6, 7, 8, 9, 10
Molybdenum[1]	9, 13, 17, 33, 36, 37, 50, 53, 56, 57, 67, 74, 79, 82, 105, 111, 118	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Nickel	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 30, 31, 32, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 121	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Selenium	17, 36, 53, 74, 79, 111, 118	2, 4, 5, 6, 7, 8, 9, 10
Silver	14, 51, 55, 63, 78, 79, 90	1, 4, 5, 6, 8
Thallium	53, 74, 105	5, 7, 9
Uranium	4, 5, 6, 7, 8, 9, 10, 11, 15, 16, 17, 18, 19, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 101, 102, 103, 104, 105, 106, 107, 108, 110, 111, 112, 113, 114, 115, 116, 117, 118, 120, 121	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Zinc	3, 5. 6. 7. 8, 9, 10, 11, 14, 15, 16, 17, 18, 21, 22, 24, 25, 26, 27, 28, 30, 31, 32, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 53, 54, 55, 57, 58, 59, 60, 61, 63, 64, 65, 67, 70, 71, 72, 73, 74, 76, 77, 78, 79, 80, 81, 82, 84, 85, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 116, 117, 118, 120, 121	1, 2, 3, 4, 5, 6, 7, 8, 9, 10

[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	39, 40, 50, 82	2, 4, 9
Iron	6, 7, 8, 9, 16, 17, 25, 28, 30, 31, 34, 35, 36, 37, 38, 39, 40, 41, 42, 48, 49, 50, 51, 53, 54, 55, 108, 109, 120	1, 2, 3, 4, 5, 10
Manganese	30, 39, 40, 42	2, 3, 5
Mercury	33, 43, 75, 89, 96, 121	3, 5, 7, 8, 10

Metal	Grid	EU
Molybdenum[1]	9, 37, 50, 56, 57, 67, 82	3, 4, 6, 9
Nickel	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 16, 17, 21, 22, 24, 25, 26, 27, 28, 30, 31, 32, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 121	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Silver	14, 51, 55, 63, 78, 79, 90	1, 4, 5, 6, 8
Uranium	58, 67, 82, 83	6, 9

[1] No background value is available.

PCBs

Total PCBs in the following grids and EUs were detected above the industrial worker NAL in the SWMU 14 surface soil.

PCB	Grid	EU
Total PCBs	2, 17, 21, 22, 35, 36, 47, 50, 53, 60, 74, 78, 79, 85, 95, 96, 97, 103, 104, 105, 106, 107, 108, 118	1, 2, 3, 4, 5, 6, 7, 8, 9, 10

PCBs were not detected above the industrial worker AL in the SWMU 14 surface soil.

Total PCBs in the following grids and EUs were detected above the SSL for the protection of UCRS groundwater in the SWMU 14 surface soil.

PCB	Grid	EU
Total PCBs	2, 17, 21, 22, 35, 36, 47, 50, 53, 60, 74, 78, 79, 85, 95, 96, 97, 103, 104, 105, 106, 107, 108, 111, 118	1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Total PCBs in the following grids and EUs were detected above the SSL for the protection of RGA groundwater in the SWMU 14 surface soil.

PCB	Grid	EU
Total PCBs	21, 22, 35, 47, 50, 60, 78, 85, 95, 96, 97, 103, 104, 105, 106, 107, 111	3, 4, 6, 7, 8, 9, 10

SVOCs

The following are the SVOCs detected above the industrial worker NALs in the surface soil and the grids and EUs in which they were detected.

SVOC	Grid	EU
Total PAHs	17, 36, 53, 74, 105, 111, 118	2, 4, 5, 7, 8, 9, 10

No SVOCs were detected in the SWMU 14 surface soil above the industrial worker ALs.

The following are the SVOCs detected above the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

SVOC	Grid	EU
Total PAHs	17, 36, 53, 74, 79, 105, 111, 118	2, 4, 5, 6, 7, 8, 9, 10

The following are the SVOCs detected above the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

SVOC	Grid	EU
Total PAHs	17, 105, 118	2, 9, 10

VOCs

No surface soil samples from SWMU 14 were analyzed for VOCs.

Radionuclides

Radionuclides were detected above the industrial worker NALs in the SWMU 14 surface soil. The following are the radionuclides detected above both the background screening levels and the industrial worker NALs and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Cesium-137	83	9
Neptunium-237	2, 17, 36, 53, 74, 79, 83, 105, 111, 118	1, 2, 4, 5, 6, 7, 8, 9, 10
Technetium-99	2	1
Thorium-230	53	5
Uranium-234	17, 36, 53, 79, 83, 105, 118	2, 4, 5, 6, 9, 10
Uranium-235/236	17, 36, 53, 74, 79, 83, 105 ,118	2, 4, 5, 6, 7, 9 ,10
Uranium-238	17, 36, 53, 74, 79, 83, 105, 111, 118	2, 4, 5, 6, 7, 8, 9, 10

Uranium-235/236 and uranium-238 were detected above both the background screening levels and the industrial worker ALs in the surface soil of grid 83 (EU 9).

The following are the radionuclides detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Americium-241[1]	2, 17, 53	1, 2, 5
Neptunium-237	2, 17, 36, 53, 74, 79, 83, 105, 111, 118	1, 2, 4, 5, 6, 7, 8, 9, 10
Plutonium-239/240	2, 17, 36, 53, 79, 83, 105, 111, 118	1, 2, 4, 5, 6, 7, 8, 9, 10
Technetium-99	2, 17, 36, 53, 74, 79, 83, 105, 111, 118	1, 2, 4, 5, 6, 7, 8, 9, 10
Thorium-230	2, 17, 36, 53, 79, 83, 105	1, 2, 4, 5, 6, 9
Uranium-235/236	83	9
Uranium-238	17, 36, 53, 74, 79, 83, 105, 111, 118	2, 4, 5, 6, 7, 8, 9, 10

[1] No background value is available.

The following are the radionuclides detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Neptunium-237	2, 17, 36, 53, 74, 79, 83, 105, 111, 118	1, 2, 4, 5, 6, 7, 8, 9, 10
Technetium-99	2, 17, 53, 74, 79, 83, 105, 111, 118	1, 2, 5, 6, 7, 8, 9, 10
Uranium-238	83	9

10.1.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 14, the representative data set for subsurface soils is presented in Tables 10.1.3 and 10.1.4 and provides the nature of the contamination in SWMU 14 subsurface soils. Figures 10.1.5–10.1.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 14 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 14 consists of ten EUs.

Metals

Metals were detected above the industrial worker NALs in the SWMU 14 subsurface soil. The following are the metals detected above both background screening levels and the industrial worker NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Antimony	27	2
Arsenic	1, 2, 3, 6, 7, 10, 14, 15, 17, 19, 20, 22, 24, 27, 29, 31, 32, 43, 45, 49, 51, 55, 70, 73, 79, 82, 90, 91, 103, 104, 107, 111, 114, 121	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Beryllium	15, 19, 55	1, 3, 5
Chromium	1, 3, 5, 6, 7, 8, 11, 15, 17, 23, 24, 26, 31, 39, 55, 59, 63, 64, 76, 78, 80, 88, 100, 111, 119	1, 2, 3, 4, 5, 6, 7, 8, 10
Cobalt	19, 46	3, 4
Iron	1, 3, 14, 15, 17, 19, 24, 25, 26, 27, 29, 39, 55	1, 2, 3, 5
Lead	85	7
Mercury	39, 55, 60, 97, 111, 114	2, 4, 5, 8, 10
Nickel	1, 2, 3, 4, 5, 7, 13, 15, 17, 18, 22,24, 25, 26, 27, 29, 30, 31, 33, 34, 37, 39, 41, 45, 48, 51, 55, 58, 59, 64, 65, 66, 67, 68, 72,78, 80, 83, 84, 88, 90, 91, 93, 94, 97, 100, 102, 103, 111, 114, 119, 121	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Silver	3, 13, 31, 34, 46, 79, 85, 86, 91	1, 3, 4, 6, 7, 8
Uranium	17, 24, 25, 26, 27, 29, 39, 56, 59, 45, 65, 68, 70, 78, 97, 103	1, 2, 4, 5, 6, 8, 10
Vanadium	15, 19, 55	1, 3, 5

The maximum depth at which metals were detected above both background screening levels and the industrial worker NALs was 10 ft bgs. The end depths of the boreholes taken from the grids listed above ranged from 1 to 15 ft bgs.

Lead was detected above the industrial worker AL in the subsurface soil of grid 85 (EU 7).

Table 10.1.3. Subsurface Soil Historical Data Summary: SWMU 14 C-746-E/E1 Scrap Yard

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	7.32E+03	7.46E+03	7.39E+03	0/2	2/2	0/2	1.20E+04	0/2	3.32E+04	0/2	3.97E+06	0/2	2/2	18.2 - 18.7
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	0/2	9.73 - 9.77
METAL	Arsenic	mg/kg	3.80E+00	3.80E+00	3.80E+00	0/2	1/2	0/2	7.90E+00	1/2	9.97E-01	0/2	9.97E+01	0/2	1/2	0.911 - 0.935
METAL	Barium	mg/kg	7.77E+01	1.50E+02	1.14E+02	0/2	2/2	0/2	1.70E+02	0/2	5.92E+02	0/2	3.78E+05	0/2	1/2	2.28 - 2.34
METAL	Beryllium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	6.90E-01	0/2	1.40E-02	0/2	9.22E+00	0/2	0/2	0.455 - 0.467
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	3.16E+00	0/2	3.16E+02	0/2	0/2	1.82 - 1.87
METAL	Calcium	mg/kg	1.08E+03	1.59E+03	1.34E+03	0/2	2/2	0/2	6.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	91.1 - 93.5
METAL	Chromium	mg/kg	1.05E+01	1.31E+01	1.18E+01	0/2	2/2	0/2	4.30E+01	0/2	3.02E+01	0/2	3.02E+03	0/2	0/2	2.28 - 2.34
METAL	Cobalt	mg/kg	7.85E+00	7.85E+00	7.85E+00	0/2	1/2	0/2	1.30E+01	0/2	1.05E+01	0/2	1.52E+03	1/2	1/2	2.28 - 2.34
METAL	Copper	mg/kg	5.71E+00	1.14E+01	8.56E+00	0/2	2/2	0/2	2.50E+01	0/2	1.43E+03	0/2	2.24E+05	0/2	0/2	2.28 - 2.34
METAL	Iron	mg/kg	5.36E+03	9.13E+03	7.25E+03	0/2	2/2	0/2	2.80E+04	0/2	2.51E+04	0/2	3.92E+06	2/2	2/2	18.2 - 18.7
METAL	Lead	mg/kg	6.69E+00	8.26E+00	7.48E+00	0/2	2/2	0/2	2.30E+01	0/2	4.00E+02	0/2	4.00E+02	0/2	0/2	0.911 - 0.935
METAL	Magnesium	mg/kg	8.83E+02	1.59E+03	1.24E+03	0/2	2/2	0/2	2.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	4.55 - 4.67
METAL	Manganese	mg/kg	6.69E+01	2.77E+02	1.72E+02	0/2	2/2	0/2	8.20E+02	0/2	2.58E+03	0/2	1.16E+05	1/2	2/2	2.28 - 2.34
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	1.30E-01	0/2	9.00E-01	0/2	7.85E+02	0/2	0/2	0.018 - 0.019
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.79E+02	0/2	2.80E+04	0/2	0/2	2.28 - 2.34
METAL	Nickel	mg/kg	7.79E+00	1.61E+01	1.19E+01	0/2	2/2	0/2	2.20E+01	0/2	4.28E+01	0/2	3.18E+04	0/2	2/2	4.55 - 4.67
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	7.00E-01	0/2	1.79E+02	0/2	2.80E+04	0/2	0/2	0.911 - 0.935
METAL	Silver	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.70E+00	0/2	1.08E+01	0/2	9.15E+03	0/2	0/2	2.28 - 2.34
METAL	Sodium	mg/kg	1.46E+02	1.53E+02	1.50E+02	0/2	2/2	0/2	3.40E+02	0/2	n/a	0/2	n/a	n/a	n/a	91.1 - 93.5
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	3.40E-01	0/2	2.87E+00	0/2	4.48E+02	0/2	0/2	1.82 - 1.87
METAL	Uranium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	4.60E+00	0/2	1.07E+02	0/2	1.65E+04	0/2	0/2	0.911 - 0.935
METAL	Vanadium	mg/kg	6.75E+00	6.75E+00	6.75E+00	0/2	1/2	0/2	3.70E+01	1/2	1.51E-01	0/2	9.30E+01	1/2	1/2	2.28 - 2.34
METAL	Zinc	mg/kg	3.35E+01	3.35E+01	3.35E+01	0/2	1/2	0/2	6.00E+01	0/2	1.08E+04	0/2	1.68E+06	0/2	1/2	18.2 - 18.7
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.88E-01	0/2	1.88E+01	0/2	0/2	0.1 - 0.1
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.46 - 0.5
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.46 - 0.5
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.46 - 0.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.30E+00	0/2	3.91E+01	0/2	0/2	0.46 - 0.5
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.02E+02	0/2	1.81E+04	0/2	0/2	0.46 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.1.3. Subsurface Soil Historical Data Summary: SWMU 14 C-746-E/E1 Scrap Yard (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.05E+03	0/2	1.22E+05	0/2	0/2	0.46 - 0.5
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.46 - 0.5
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.01E+02	0/2	1.80E+04	0/2	0/2	0.46 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.87E+02	0/2	1.46E+04	0/2	0/2	0.46 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.17E-01	0/2	1.17E+01	0/2	0/2	0.46 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.24E+00	0/2	2.24E+02	0/2	0/2	0.46 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.22E-02	0/2	5.22E+00	0/2	0/2	0.46 - 0.5
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.46 - 0.5
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.49E+02	0/2	1.35E+04	0/2	0/2	0.46 - 0.5
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.5
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.92E-02	0/2	5.92E+00	0/2	0/2	-
VOA	1,1,1,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.00497 - 0.00502
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.00497 - 0.00502
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.89E-02	0/2	5.53E+00	0/2	0/2	0.00497 - 0.00502
VOA	1,2,3-Trichloropropane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	1,2-Dibromoethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.00497 - 0.00502
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.38E+02	0/2	8.21E+03	0/2	0/2	0.00497 - 0.00502
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.1.3. Subsurface Soil Historical Data Summary: SWMU 14 C-746-E/E1 Scrap Yard (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	2-Chloroethyl vinyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Acrolein	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Acrylonitrile	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.70E-01	0/2	2.67E+01	n/a	n/a	0.00497 - 0.00502
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.98E-01	0/2	8.22E+01	0/2	0/2	0.00497 - 0.00502
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.97E-01	0/2	5.76E+01	0/2	0/2	0.00497 - 0.00502
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.00497 - 0.00502
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.42E-01	0/2	2.49E+01	0/2	0/2	0.00497 - 0.00502
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.74E+00	0/2	1.93E+02	0/2	0/2	0.00497 - 0.00502
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.00497 - 0.00502
VOA	Dibromomethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Dichlorodifluoromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Ethyl methacrylate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.29E+00	0/2	3.84E+02	0/2	0/2	0.00497 - 0.00502
VOA	Iodomethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.50E+01	0/2	1.07E+03	0/2	0/2	0.00994 - 0.01
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.00497 - 0.00502
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.00497 - 0.00502
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.82E-01	0/2	7.08E+01	0/2	0/2	0.00497 - 0.00502
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.00497 - 0.00502
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.07E+01	0/2	3.42E+02	0/2	0/2	0.00497 - 0.00502
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.1.3. Subsurface Soil Historical Data Summary: SWMU 14 C-746-E/E1 Scrap Yard (Continued)

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Industrial Worker FOE	Industrial Worker NAL	Industrial Worker FOE	Industrial Worker AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
VOA	Trans-1,4-Dichloro-2-butene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.69E-02	0/2	4.98E+00	0/2	0/2	0.00497 - 0.00502
VOA	Trichlorofluoromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.00497 - 0.00502
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.04E-01	0/2	4.83E+01	0/2	0/2	0.00497 - 0.00502
RADS	Americium-241	pCi/g	-5.21E-03	-3.93E-03	-4.57E-03	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.0196 - 0.0209
RADS	Cesium-137	pCi/g	-2.65E-02	-1.07E-02	-1.86E-02	0/2	2/2	0/2	2.80E-01	0/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.0422 - 0.0573
RADS	Cobalt-60	pCi/g	1.69E-02	2.42E-02	2.06E-02	0/2	2/2	0/2	n/a	1/2	1.77E-02	0/2	1.77E+00	0/2	0/2	0.0436 - 0.0666
RADS	Neptunium-237	pCi/g	-1.64E-03	9.81E-04	-3.30E-04	0/2	2/2	0/2	n/a	0/2	2.71E-01	0/2	2.71E+01	0/2	0/2	0.0445 - 0.0446
RADS	Plutonium-238	pCi/g	-3.40E-03	5.40E-05	-1.67E-03	0/2	2/2	0/2	n/a	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.0169 - 0.0172
RADS	Plutonium-239/240	pCi/g	-5.43E-03	9.95E-04	-2.22E-03	0/2	2/2	0/2	n/a	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.0185 - 0.0194
RADS	Technetium-99	pCi/g	9.75E-01	1.68E+00	1.33E+00	0/2	2/2	0/2	2.80E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	2/2	1.38 - 1.38
RADS	Thorium-228	pCi/g	3.57E-01	5.06E-01	4.32E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.0857 - 0.0859
RADS	Thorium-230	pCi/g	3.69E-01	4.46E-01	4.08E-01	0/2	2/2	0/2	1.40E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.241 - 0.241
RADS	Thorium-232	pCi/g	4.73E-01	5.35E-01	5.04E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.167 - 0.167
RADS	Uranium-234	pCi/g	8.38E-02	1.42E-01	1.13E-01	0/2	2/2	0/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.134 - 0.135
RADS	Uranium-235	pCi/g	7.91E-03	1.13E-02	9.61E-03	0/2	2/2	0/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.0391 - 0.0392
RADS	Uranium-238	pCi/g	7.92E-02	1.21E-01	1.00E-01	0/2	2/2	0/2	1.20E+00	0/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.128 - 0.129

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.1.4. Subsurface Soil RI Data Summary: SWMU 14 C-746-E Scrap Yard

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	4.75E+03	1.31E+04	8.33E+03	0/13	13/13	2/13	1.20E+04	0/13	3.32E+04	0/13	3.97E+06	0/13	13/13	5.4 - 6.3
METAL	Antimony	mg/kg	2.10E-01	3.20E+00	7.05E-01	0/13	13/13	12/13	2.10E-01	1/13	2.53E+00	0/13	1.51E+03	0/13	11/13	0.54 - 0.63
METAL	Arsenic	mg/kg	4.30E+00	4.48E+01	9.17E+00	0/158	88/158	38/158	7.90E+00	88/158	9.97E-01	0/158	9.97E+01	2/158	88/158	1.1 - 11
METAL	Barium	mg/kg	3.55E+01	1.72E+02	1.16E+02	0/13	13/13	1/13	1.70E+02	0/13	5.92E+02	0/13	3.78E+05	0/13	10/13	2.2 - 2.5
METAL	Beryllium	mg/kg	3.50E-01	3.00E+00	7.98E-01	0/13	13/13	3/13	6.90E-01	13/13	1.40E-02	0/13	9.22E+00	0/13	0/13	0.11 - 0.13
METAL	Cadmium	mg/kg	3.30E-02	2.40E+00	3.11E-01	0/13	13/13	3/13	2.10E-01	0/13	3.16E+00	0/13	3.16E+02	0/13	2/13	0.054 - 0.063
METAL	Calcium	mg/kg	1.01E+03	9.15E+04	1.69E+04	0/13	13/13	5/13	6.10E+03	0/13	n/a	0/13	n/a	n/a	n/a	54.3 - 287
METAL	Chromium	mg/kg	9.90E+00	9.89E+01	3.99E+01	0/158	65/158	30/158	4.30E+01	58/158	3.02E+01	0/158	3.02E+03	0/158	0/158	1.1 - 85
METAL	Cobalt	mg/kg	4.80E+00	1.93E+01	8.96E+00	0/13	13/13	2/13	1.30E+01	3/13	1.05E+01	0/13	1.52E+03	13/13	13/13	0.22 - 0.25
METAL	Copper	mg/kg	6.60E+00	2.77E+02	5.53E+01	0/158	43/158	31/158	2.50E+01	0/158	1.43E+03	0/158	2.24E+05	0/158	16/158	1.1 - 35
METAL	Iron	mg/kg	8.25E+02	9.27E+04	1.64E+04	0/158	158/158	13/158	2.80E+04	15/158	2.51E+04	0/158	3.92E+06	157/158	158/158	5.4 - 100
METAL	Lead	mg/kg	6.83E+00	9.44E+02	2.87E+01	0/158	153/158	22/158	2.30E+01	1/158	4.00E+02	1/158	4.00E+02	1/158	71/158	0.33 - 13
METAL	Magnesium	mg/kg	4.83E+02	4.10E+03	1.48E+03	0/13	13/13	2/13	2.10E+03	0/13	n/a	0/13	n/a	n/a	n/a	54.3 - 63.2
METAL	Manganese	mg/kg	7.02E+01	1.85E+03	4.04E+02	0/158	156/158	10/158	8.20E+02	0/158	2.58E+03	0/158	1.16E+05	154/158	156/158	0.22 - 85
METAL	Mercury	mg/kg	1.14E-02	9.22E+00	1.85E+00	0/158	19/158	9/158	1.30E-01	7/158	9.00E-01	0/158	7.85E+02	6/158	9/158	0.0362 - 10
METAL	Molybdenum	mg/kg	1.90E-01	7.99E+00	1.45E+00	0/158	15/158	0/158	n/a	0/158	1.79E+02	0/158	2.80E+04	2/158	15/158	0.54 - 15
METAL	Nickel	mg/kg	1.11E+01	1.29E+03	1.65E+02	0/158	68/158	60/158	2.20E+01	59/158	4.28E+01	0/158	3.18E+04	42/158	68/158	0.54 - 65
METAL	Selenium	mg/kg	7.10E-01	3.07E+01	2.61E+00	0/158	14/158	14/158	7.00E-01	0/158	1.79E+02	0/158	2.80E+04	1/158	14/158	0.54 - 20
METAL	Silver	mg/kg	3.10E-02	2.22E+01	5.32E+00	0/158	25/158	14/158	2.70E+00	9/158	1.08E+01	0/158	9.15E+03	14/158	19/158	0.22 - 10
METAL	Sodium	mg/kg	4.13E+01	1.47E+02	8.76E+01	0/13	13/13	0/13	3.40E+02	0/13	n/a	0/13	n/a	n/a	n/a	21.7 - 25.3
METAL	Thallium	mg/kg	1.00E-01	4.20E-01	1.92E-01	0/13	13/13	1/13	3.40E-01	0/13	2.87E+00	0/13	4.48E+02	0/13	6/13	0.22 - 0.25
METAL	Uranium	mg/kg	1.20E+00	5.23E+02	6.84E+01	0/158	101/158	99/158	4.60E+00	18/158	1.07E+02	0/158	1.65E+04	0/158	64/158	0.04 - 20
METAL	Vanadium	mg/kg	1.85E+01	8.62E+01	3.38E+01	0/13	13/13	3/13	3.70E+01	13/13	1.51E-01	0/13	9.30E+01	13/13	13/13	1.1 - 1.3
METAL	Zinc	mg/kg	9.87E+00	4.73E+02	5.17E+01	0/158	157/158	24/158	6.00E+01	0/158	1.08E+04	0/158	1.68E+06	0/158	149/158	2.2 - 25
PPCB	PCB, Total	mg/kg	1.70E-01	1.00E+01	3.11E+00	3/158	8/158	0/158	n/a	6/158	1.88E-01	0/158	1.88E+01	5/158	8/158	0.33 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.36 - 0.42
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.36 - 0.42
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.36 - 0.42
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	1.30E+00	0/10	3.91E+01	0/10	0/10	1.7 - 2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	6.02E+02	0/10	1.81E+04	0/10	0/10	0.36 - 0.42
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	4.05E+03	0/10	1.22E+05	0/10	0/10	0.36 - 0.42
SVOA	Benzenemethanol	mg/kg	4.70E-02	4.70E-02	4.70E-02	1/10	1/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.1.4. Subsurface Soil RI Data Summary: SWMU 14 C-746-E Scrap Yard (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	6.40E-01	6.40E-01	6.40E-01	1/10	1/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.0072 - 0.0083
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	1.10E-01	2.40E-01	1.75E-01	2/10	2/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	0.36 - 0.42
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Fluoranthene	mg/kg	5.00E-02	8.00E-02	6.50E-02	2/10	2/10	0/10	n/a	0/10	6.01E+02	0/10	1.80E+04	0/10	0/10	0.36 - 0.42
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	4.87E+02	0/10	1.46E+04	0/10	0/10	0.36 - 0.42
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	1.17E-01	0/10	1.17E+01	0/10	0/10	0.36 - 0.42
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.72 - 0.83
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	2.24E+00	0/10	2.24E+02	0/10	0/10	0.36 - 0.42
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	5.22E-02	0/10	5.22E+00	0/10	0/10	0.0072 - 0.0083
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	0/10	0/10	1.7 - 2
SVOA	Phenanthrene	mg/kg	4.70E-02	4.70E-02	4.70E-02	1/10	1/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.36 - 0.42
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	1.7 - 2
SVOA	Pyrene	mg/kg	5.80E-02	8.50E-02	7.15E-02	2/10	2/10	0/10	n/a	0/10	4.49E+02	0/10	1.35E+04	0/10	0/10	0.36 - 0.42
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/10	0/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	0.72 - 0.83
SVOA	Total PAH	mg/kg	5.10E-03	6.39E-02	3.31E-02	0/10	5/10	0/10	n/a	1/10	5.92E-02	0/10	5.92E+00	0/10	5/10	-
RADS	Alpha activity	pCi/g	2.22E+01	2.06E+02	5.69E+01	0/10	10/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	3.9 - 6.2
RADS	Americium-241	pCi/g	-1.10E-03	2.49E-01	3.15E-02	0/10	10/10	0/10	n/a	0/10	5.01E+00	0/10	5.01E+02	0/10	1/10	0.011 - 0.023
RADS	Beta activity	pCi/g	2.38E+01	3.29E+02	7.77E+01	0/10	10/10	0/10	n/a	0/10	n/a	0/10	n/a	n/a	n/a	3.3 - 5.7
RADS	Cesium-137	pCi/g	-3.00E-02	2.07E-01	2.24E-02	0/10	10/10	0/10	2.80E-01	1/10	8.61E-02	0/10	8.61E+00	0/10	0/10	0.046 - 0.16
RADS	Neptunium-237	pCi/g	3.40E-03	2.29E+00	3.06E-01	0/10	10/10	0/10	n/a	1/10	2.71E-01	0/10	2.71E+01	2/10	9/10	0.015 - 0.11
RADS	Plutonium-238	pCi/g	4.00E-03	4.00E-02	2.16E-02	0/10	10/10	0/10	n/a	0/10	1.09E+01	0/10	1.09E+03	0/10	0/10	0.016 - 0.036
RADS	Plutonium-239/240	pCi/g	1.80E-03	8.70E-01	1.03E-01	0/10	10/10	0/10	n/a	0/10	1.07E+01	0/10	1.07E+03	0/10	1/10	0.006 - 0.02
RADS	Technetium-99	pCi/g	9.60E-01	9.35E+01	1.62E+01	0/10	10/10	7/10	2.80E+00	0/10	3.61E+02	0/10	3.61E+04	2/10	10/10	0.39 - 0.5
RADS	Thorium-228	pCi/g	6.55E-01	1.14E+00	9.12E-01	0/10	10/10	0/10	1.60E+00	0/10	n/a	0/10	n/a	n/a	n/a	0.02 - 0.04
RADS	Thorium-230	pCi/g	8.20E-01	8.80E+00	1.81E+00	0/10	10/10	1/10	1.40E+00	0/10	1.38E+01	0/10	1.38E+03	0/10	10/10	0.007 - 0.03
RADS	Thorium-232	pCi/g	6.52E-01	1.25E+00	9.36E-01	0/10	10/10	0/10	1.50E+00	0/10	n/a	0/10	n/a	n/a	n/a	0.007 - 0.02
RADS	Uranium-234	pCi/g	7.60E-01	5.81E+01	9.99E+00	0/10	10/10	7/10	1.20E+00	1/10	1.89E+01	0/10	1.89E+03	0/10	0/10	0.02 - 0.3
RADS	Uranium-235/236	pCi/g	4.00E-02	4.31E+00	7.24E-01	0/10	10/10	8/10	6.00E-02	3/10	3.95E-01	0/10	3.95E+01	0/10	0/10	0.011 - 0.2
RADS	Uranium-238	pCi/g	9.10E-01	1.11E+02	1.85E+01	0/10	10/10	8/10	1.20E+00	7/10	1.70E+00	0/10	1.70E+02	0/10	7/10	0.01 - 0.2

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

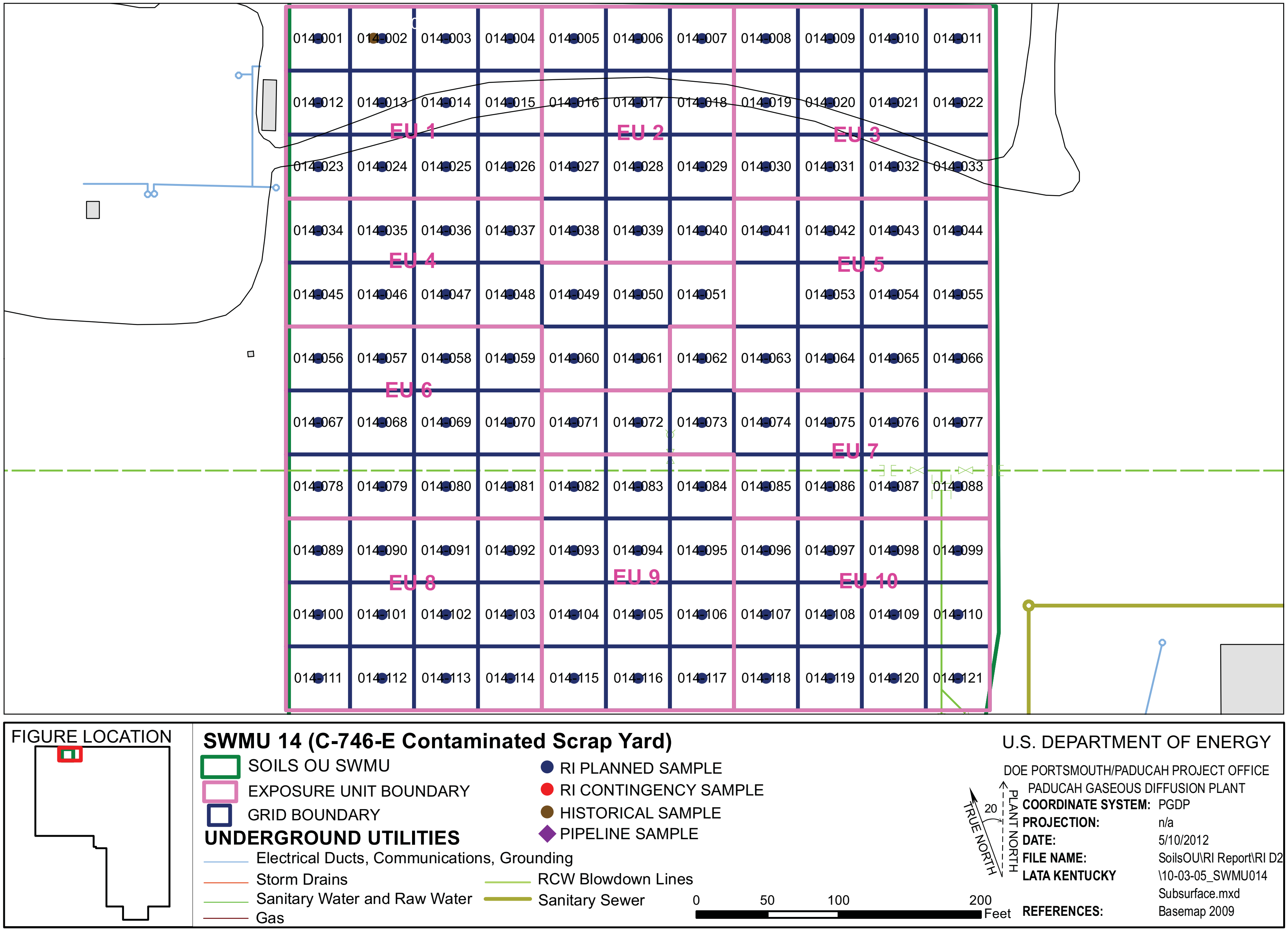


Figure 10.1.5. SWMU 14 Sample Locations - Subsurface Soil

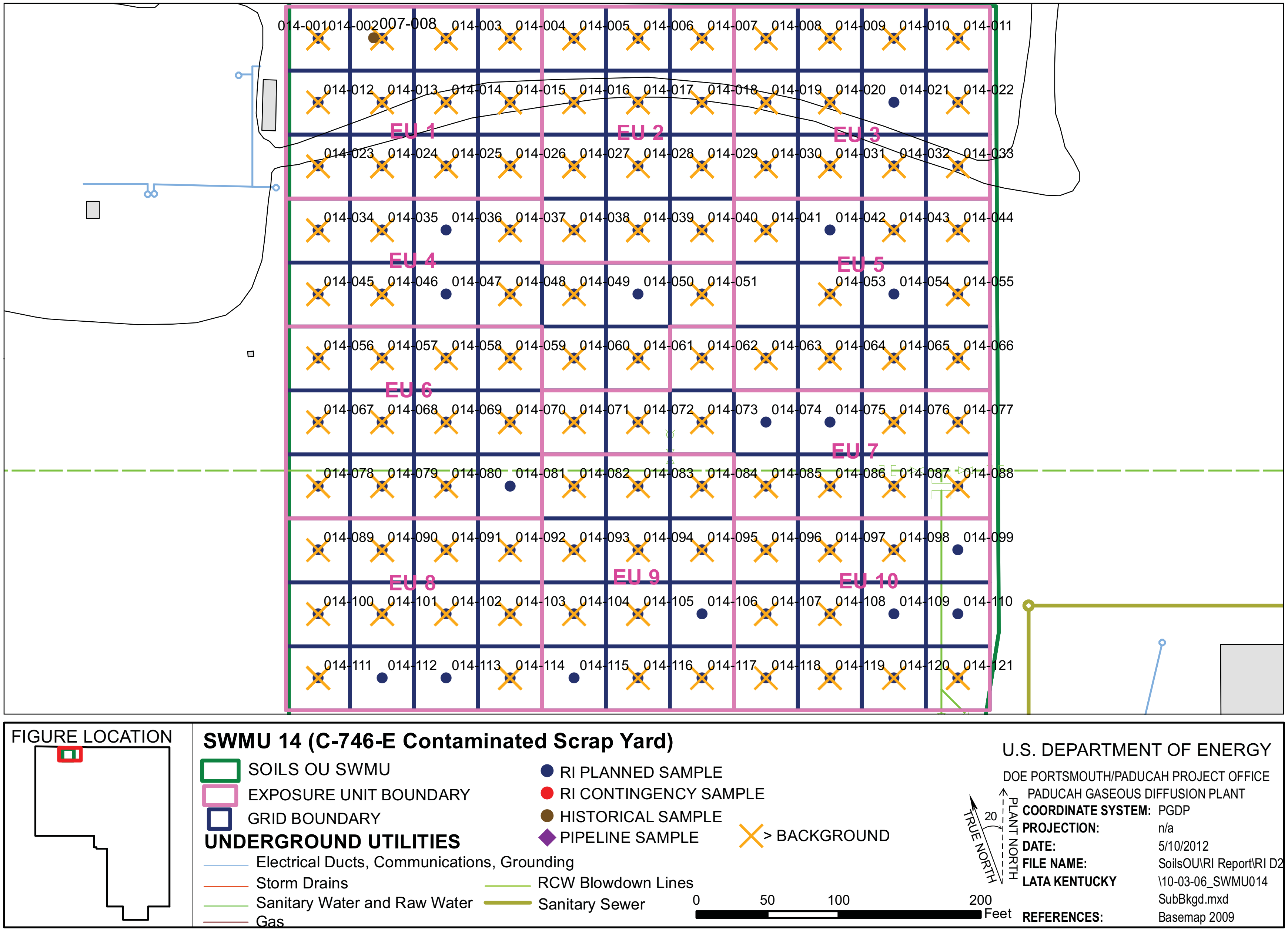


Figure 10.1.6. SWMU 14 Background Exceedances - Subsurface Soil

Station	Results Exceeding Background
SOU014-001	Antimony 0.32 (mg/kg)
	Arsenic 15.2 (mg/kg)
	Chromium 45.84 (mg/kg)
	Copper 27.16 (mg/kg)
	Iron 80721.84 (mg/kg)
	Lead 27.62 (mg/kg)
	Nickel 118.58 (mg/kg)
	Selenium 1.3 (mg/kg)
	Uranium 24.19 (mg/kg)
	Zinc 60.84 (mg/kg)

Station	Results Exceeding Background
SOU014-002	Arsenic 9.4 (mg/kg)
	Lead 29.42 (mg/kg)
	Nickel 64.53 (mg/kg)
	Uranium 10.3 (mg/kg)

Station	Results Exceeding Background
SOU014-003	Arsenic 11.33 (mg/kg)
	Chromium 58.35 (mg/kg)
	Copper 25.4 (mg/kg)
	Iron 32291.55 (mg/kg)
	Nickel 87.94 (mg/kg)
	Silver 12.37 (mg/kg)
	Uranium 44.27 (mg/kg)

Station	Results Exceeding Background
SOU014-004	Nickel 84.56 (mg/kg)
	Zinc 64.65 (mg/kg)

Station	Results Exceeding Background
SOU014-005	Chromium 48.97 (mg/kg)
	Nickel 89.12 (mg/kg)
	Uranium 91.95 (mg/kg)

Station	Results Exceeding Background
SOU014-006	Arsenic 8.7 (mg/kg)
	Chromium 98.88 (mg/kg)
	Copper 44.13 (mg/kg)

Station	Results Exceeding Background
SOU014-007	Arsenic 8.24 (mg/kg)
	Chromium 52.06 (mg/kg)
	Lead 27.35 (mg/kg)
	Manganese 1030.81 (mg/kg)
	Nickel 74.89 (mg/kg)
	Uranium 8.46 (mg/kg)
	Zinc 67.51 (mg/kg)

Station	Results Exceeding Background
SOU014-008	Chromium 48.36 (mg/kg)

Station	Results Exceeding Background
SOU014-009	Uranium 8.79 (mg/kg)
	Zinc 65.9 (mg/kg)

Station	Results Exceeding Background
SOU014-010	Arsenic 9.29 (mg/kg)
	Uranium 9.51 (mg/kg)

Station	Results Exceeding Background
SOU014-011	Chromium 44.89 (mg/kg)

Station	Results Exceeding Background
SOU014-012	Uranium 9.47 (mg/kg)

Station	Results Exceeding Background
SOU014-013	Nickel 93.37 (mg/kg)
	Silver 11.46 (mg/kg)
	Uranium 6.86 (mg/kg)

Station	Results Exceeding Background
SOU014-014	Arsenic 10.85 (mg/kg)
	Iron 40799.64 (mg/kg)

Station	Results Exceeding Background
SOU014-015	Antimony 0.63 (mg/kg)
	Arsenic 8.55 (mg/kg)
	Beryllium 1.1 (mg/kg)
	Chromium 72.7 (mg/kg)
	Iron 31900 (mg/kg)
	Nickel 62.79 (mg/kg)
	Selenium 0.71 (mg/kg)
	Uranium 27.3 (mg/kg)
	Vanadium 50.2 (mg/kg)
	Technetium-99 6.18 (pCi/g)
	Uranium-234 4.73 (pCi/g)
	Uranium-235/236 0.287 (pCi/g)
	Uranium-238 9.14 (pCi/g)

Station	Results Exceeding Background
SOU014-016	Uranium 13.65 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.6. SWMU 14 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU014-017	Arsenic 16.19 (mg/kg)
	Chromium 66.08 (mg/kg)
	Copper 182.39 (mg/kg)
	Iron 61312.21 (mg/kg)
	Lead 76.27 (mg/kg)
	Manganese 1174.13 (mg/kg)
	Nickel 875.68 (mg/kg)
	Selenium 30.65 (mg/kg)
	Uranium 398.65 (mg/kg)
	Zinc 472.72 (mg/kg)

Station	Results Exceeding Background
SOU014-018	Copper 27.48 (mg/kg)
	Nickel 315.3 (mg/kg)
	Uranium 94.38 (mg/kg)
	Zinc 67.96 (mg/kg)

Station	Results Exceeding Background
SOU014-019	Antimony 0.31 (mg/kg)
	Arsenic 44.8 (mg/kg)
	Beryllium 3 (mg/kg)
	Cobalt 19.3 (mg/kg)
	Iron 92700 (mg/kg)
	Lead 54.3 (mg/kg)
	Selenium 3.54 (mg/kg)
	Uranium 40.6 (mg/kg)
	Vanadium 86.2 (mg/kg)
	Technetium-99 9.03 (pCi/g)
	Uranium-234 6.61 (pCi/g)
	Uranium-235/236 0.37 (pCi/g)
	Uranium-238 13.6 (pCi/g)

Station	Results Exceeding Background
SOU014-020	Arsenic 7.95 (mg/kg)
	Uranium 26.25 (mg/kg)
	Zinc 106.88 (mg/kg)

Station	Results Exceeding Background
SOU014-022	Arsenic 8.19 (mg/kg)
	Nickel 97.21 (mg/kg)

Station	Results Exceeding Background
SOU014-023	Chromium 55.12 (mg/kg)
	Copper 30.14 (mg/kg)
	Uranium 9.59 (mg/kg)

Station	Results Exceeding Background
SOU014-024	Arsenic 10.87 (mg/kg)
	Chromium 51.83 (mg/kg)
	Copper 157.02 (mg/kg)
	Iron 30590.89 (mg/kg)
	Lead 52.58 (mg/kg)
	Manganese 1092.86 (mg/kg)
	Nickel 540.71 (mg/kg)
	Uranium 231.12 (mg/kg)
	Zinc 271.62 (mg/kg)

Station	Results Exceeding Background
SOU014-025	Copper 176.69 (mg/kg)
	Iron 36098.83 (mg/kg)
	Lead 62.4 (mg/kg)
	Manganese 1123.15 (mg/kg)
	Nickel 602.31 (mg/kg)
	Uranium 328.05 (mg/kg)
	Zinc 332.77 (mg/kg)

Station	Results Exceeding Background
SOU014-026	Chromium 47.25 (mg/kg)
	Copper 142.49 (mg/kg)
	Iron 42641.3 (mg/kg)
	Lead 54.74 (mg/kg)
	Manganese 1229.39 (mg/kg)
	Nickel 1293.64 (mg/kg)
	Uranium 352.31 (mg/kg)
	Zinc 281.86 (mg/kg)

Station	Results Exceeding Background
SOU014-027	Aluminum 13100 (mg/kg)
	Antimony 3.2 (mg/kg)
	Arsenic 10.4 (mg/kg)
	Cadmium 2.4 (mg/kg)
	Calcium 12300 (mg/kg)
	Copper 160 (mg/kg)
	Iron 41800 (mg/kg)
	Lead 58.2 (mg/kg)
	Magnesium 2300 (mg/kg)
	Manganese 1540 (mg/kg)
	Mercury 0.447 (mg/kg)
	Nickel 358 (mg/kg)
	Selenium 1.5 (mg/kg)
	Uranium 382 (mg/kg)
	Zinc 226 (mg/kg)
	Technetium-99 93.5 (pCi/g)
	Thorium-230 8.8 (pCi/g)
	Uranium-234 58.1 (pCi/g)
	Uranium-235/236 4.31 (pCi/g)
	Uranium-238 111 (pCi/g)

Station	Results Exceeding Background
SOU014-028	Uranium 29.32 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.6. SWMU 14 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU014-029	Arsenic 11.94 (mg/kg)
	Copper 158.47 (mg/kg)
	Iron 47731.12 (mg/kg)
	Lead 80.24 (mg/kg)
	Manganese 1346.74 (mg/kg)
	Nickel 969.77 (mg/kg)
	Uranium 479.54 (mg/kg)
	Zinc 392.5 (mg/kg)

Station	Results Exceeding Background
SOU014-030	Nickel 125.7 (mg/kg)
	Uranium 43.36 (mg/kg)

Station	Results Exceeding Background
SOU014-031	Arsenic 14.67 (mg/kg)
	Chromium 58.15 (mg/kg)
	Copper 53.43 (mg/kg)
	Nickel 300.2 (mg/kg)
	Silver 13.41 (mg/kg)
	Uranium 49.64 (mg/kg)
	Zinc 78.56 (mg/kg)

Station	Results Exceeding Background
SOU014-032	Arsenic 9.94 (mg/kg)
	Uranium 9.93 (mg/kg)

Station	Results Exceeding Background
SOU014-033	Copper 25.82 (mg/kg)
	Manganese 1854.15 (mg/kg)
	Nickel 79.62 (mg/kg)

Station	Results Exceeding Background
SOU014-034	Copper 155.23 (mg/kg)
	Lead 37.76 (mg/kg)
	Nickel 234.65 (mg/kg)
	Silver 10.81 (mg/kg)
	Uranium 60.46 (mg/kg)
	Zinc 196.02 (mg/kg)

Station	Results Exceeding Background
SOU014-035	Uranium 8.14 (mg/kg)

Station	Results Exceeding Background
SOU014-037	Copper 45.71 (mg/kg)
	Lead 28 (mg/kg)
	Nickel 122.14 (mg/kg)
	Uranium 22.68 (mg/kg)

Station	Results Exceeding Background
SOU014-038	Uranium 37.94 (mg/kg)

Station	Results Exceeding Background
SOU014-039	Chromium 75.34 (mg/kg)
	Copper 150.34 (mg/kg)
	Iron 33820.75 (mg/kg)
	Lead 66.4 (mg/kg)
	Mercury 8.88 (mg/kg)
	Nickel 418.94 (mg/kg)
	Silver 9.58 (mg/kg)
	Uranium 274.33 (mg/kg)
	Zinc 225.32 (mg/kg)

Station	Results Exceeding Background
SOU014-040	Uranium 7.91 (mg/kg)

Station	Results Exceeding Background
SOU014-041	Nickel 78.18 (mg/kg)
	Uranium 7.88 (mg/kg)

Station	Results Exceeding Background
SOU014-043	Arsenic 7.98 (mg/kg)

Station	Results Exceeding Background
SOU014-044	Antimony 0.37 (mg/kg)
	Selenium 1.6 (mg/kg)
	Thallium 0.42 (mg/kg)
	Uranium 6.1 (mg/kg)

Station	Results Exceeding Background
SOU014-045	Arsenic 8.23 (mg/kg)
	Copper 26.13 (mg/kg)
	Nickel 92.48 (mg/kg)
	Uranium 122.74 (mg/kg)

Station	Results Exceeding Background
SOU014-046	Aluminum 12100 (mg/kg)
	Antimony 0.3 (mg/kg)
	Cobalt 15.1 (mg/kg)
	Selenium 1.7 (mg/kg)
	Silver 10.85 (mg/kg)
	Uranium 41.28 (mg/kg)
	Technetium-99 23.9 (pCi/g)
	Uranium-234 6.76 (pCi/g)
	Uranium-235/236 0.507 (pCi/g)
	Uranium-238 9.21 (pCi/g)

NOTE: maximum detections only shown for location.

Figure 10.1.6. SWMU 14 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU014-048	Copper 25.24 (mg/kg)
	Lead 28.02 (mg/kg)
	Nickel 94.07 (mg/kg)
	Uranium 28.99 (mg/kg)

Station	Results Exceeding Background
SOU014-049	Arsenic 8.28 (mg/kg)

Station	Results Exceeding Background
SOU014-051	Arsenic 9.71 (mg/kg)
	Nickel 67.29 (mg/kg)

Station	Results Exceeding Background
SOU014-053	Silver 9.92 (mg/kg)

Station	Results Exceeding Background
SOU014-055	Antimony 1.5 (mg/kg)
	Arsenic 17.3 (mg/kg)
	Beryllium 1.1 (mg/kg)
	Cadmium 0.35 (mg/kg)
	Calcium 20000 (mg/kg)
	Chromium 46.75 (mg/kg)
	Copper 27.9 (mg/kg)
	Iron 36600 (mg/kg)
	Lead 24.3 (mg/kg)
	Manganese 1758.31 (mg/kg)
	Mercury 7.06 (mg/kg)
	Nickel 138.51 (mg/kg)
	Selenium 1.2 (mg/kg)
	Silver 10.14 (mg/kg)
	Uranium 55.8 (mg/kg)
	Vanadium 46.5 (mg/kg)
	Zinc 67.72 (mg/kg)

Station	Results Exceeding Background
SOU014-056	Uranium 254.14 (mg/kg)

Station	Results Exceeding Background
SOU014-057	Copper 28.38 (mg/kg)
	Silver 9.66 (mg/kg)
	Uranium 22.48 (mg/kg)

Station	Results Exceeding Background
SOU014-058	Nickel 69.99 (mg/kg)
	Uranium 9.18 (mg/kg)

Station	Results Exceeding Background
SOU014-059	Chromium 62.95 (mg/kg)
	Nickel 94.5 (mg/kg)
	Uranium 192.44 (mg/kg)

Station	Results Exceeding Background
SOU014-060	Mercury 8 (mg/kg)
	Uranium 10.23 (mg/kg)

Station	Results Exceeding Background
SOU014-061	Uranium 87.26 (mg/kg)

Station	Results Exceeding Background
SOU014-062	Uranium 20.9 (mg/kg)

Station	Results Exceeding Background
SOU014-063	Chromium 43.02 (mg/kg)
	Uranium 7.77 (mg/kg)

Station	Results Exceeding Background
SOU014-064	Chromium 45.84 (mg/kg)
	Nickel 68.14 (mg/kg)
	Uranium 45.5 (mg/kg)
	Zinc 68.42 (mg/kg)

Station	Results Exceeding Background
SOU014-065	Copper 73.39 (mg/kg)
	Lead 39.77 (mg/kg)
	Nickel 258.99 (mg/kg)
	Uranium 118.12 (mg/kg)
	Zinc 182.21 (mg/kg)

Station	Results Exceeding Background
SOU014-066	Nickel 123.42 (mg/kg)
	Uranium 24.32 (mg/kg)

Station	Results Exceeding Background
SOU014-067	Nickel 75.66 (mg/kg)
	Uranium 38.46 (mg/kg)

Station	Results Exceeding Background
SOU014-068	Nickel 122.63 (mg/kg)
	Uranium 207.97 (mg/kg)

Station	Results Exceeding Background
SOU014-069	Uranium 57.5 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.6. SWMU 14 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU014-070	Antimony 0.23 (mg/kg)
	Arsenic 8 (mg/kg)
	Selenium 1.5 (mg/kg)
	Uranium 119 (mg/kg)
	Technetium-99 5.92 (pCi/g)
	Uranium-234 13.1 (pCi/g)
	Uranium-235/236 1.03 (pCi/g)
	Uranium-238 25.9 (pCi/g)

Station	Results Exceeding Background
SOU014-071	Uranium 56.2 (mg/kg)

Station	Results Exceeding Background
SOU014-072	Nickel 76.63 (mg/kg)
	Uranium 11.29 (mg/kg)

Station	Results Exceeding Background
SOU014-073	Arsenic 12.37 (mg/kg)
	Uranium 9.46 (mg/kg)

Station	Results Exceeding Background
SOU014-076	Chromium 49.22 (mg/kg)
	Uranium 8.21 (mg/kg)

Station	Results Exceeding Background
SOU014-077	Uranium 21.09 (mg/kg)

Station	Results Exceeding Background
SOU014-078	Chromium 53.47 (mg/kg)
	Nickel 344.5 (mg/kg)
	Uranium 110.86 (mg/kg)
	Zinc 71.6 (mg/kg)

Station	Results Exceeding Background
SOU014-079	Arsenic 11.31 (mg/kg)
	Silver 11.27 (mg/kg)

Station	Results Exceeding Background
SOU014-080	Chromium 61.92 (mg/kg)
	Nickel 134.52 (mg/kg)
	Uranium 8.68 (mg/kg)
	Zinc 141.4 (mg/kg)

Station	Results Exceeding Background
SOU014-082	Arsenic 12.28 (mg/kg)
	Uranium 16.28 (mg/kg)

Station	Results Exceeding Background
SOU014-083	Nickel 62.74 (mg/kg)
	Uranium 11.14 (mg/kg)

Station	Results Exceeding Background
SOU014-084	Nickel 68.26 (mg/kg)
	Uranium 9.44 (mg/kg)

Station	Results Exceeding Background
SOU014-085	Antimony 0.37 (mg/kg)
	Copper 51 (mg/kg)
	Lead 944 (mg/kg)
	Nickel 28.7 (mg/kg)
	Selenium 1.7 (mg/kg)
	Silver 22.2 (mg/kg)
	Uranium 66 (mg/kg)
	Technetium-99 7.09 (pCi/g)
	Uranium-234 5.26 (pCi/g)
	Uranium-235/236 0.366 (pCi/g)
	Uranium-238 7.8 (pCi/g)

Station	Results Exceeding Background
SOU014-086	Silver 11.33 (mg/kg)

Station	Results Exceeding Background
SOU014-087	Uranium 9.75 (mg/kg)

Station	Results Exceeding Background
SOU014-088	Chromium 43.05 (mg/kg)
	Nickel 85.72 (mg/kg)
	Uranium 41.35 (mg/kg)

Station	Results Exceeding Background
SOU014-089	Uranium 29.03 (mg/kg)

Station	Results Exceeding Background
SOU014-090	Arsenic 10.79 (mg/kg)
	Copper 58.42 (mg/kg)
	Nickel 156.42 (mg/kg)
	Uranium 84.19 (mg/kg)

Station	Results Exceeding Background
SOU014-091	Arsenic 10.8 (mg/kg)
	Nickel 62.71 (mg/kg)
	Silver 11.8 (mg/kg)
	Uranium 22.48 (mg/kg)

Station	Results Exceeding Background
SOU014-092	Uranium 12.65 (mg/kg)

Station	Results Exceeding Background
SOU014-093	Nickel 115.22 (mg/kg)
	Uranium 54.6 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.6. SWMU 14 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU014-094	Nickel 59.71 (mg/kg)
	Uranium 67.65 (mg/kg)
SOU014-095	Uranium 32.23 (mg/kg)
SOU014-096	Barium 172 (mg/kg)
	Mercury 0.3 (mg/kg)
	Selenium 1.4 (mg/kg)
	Uranium 14.3 (mg/kg)
	Technetium-99 12.2 (pCi/g)
	Uranium-234 2.63 (pCi/g)
	Uranium-235/236 0.196 (pCi/g)
	Uranium-238 4.79 (pCi/g)
SOU014-097	Antimony 1.1 (mg/kg)
	Cadmium 0.56 (mg/kg)
	Calcium 66000 (mg/kg)
	Copper 88.51 (mg/kg)
	Lead 35.77 (mg/kg)
	Magnesium 4100 (mg/kg)
	Mercury 9.22 (mg/kg)
	Nickel 437.11 (mg/kg)
	Selenium 1.2 (mg/kg)
	Uranium 216.68 (mg/kg)
	Zinc 110.29 (mg/kg)
SOU014-098	Uranium 14.58 (mg/kg)

Station	Results Exceeding Background
SOU014-100	Chromium 51.41 (mg/kg)
	Nickel 58.88 (mg/kg)
SOU014-101	Antimony 0.33 (mg/kg)
	Calcium 12900 (mg/kg)
	Selenium 1.4 (mg/kg)
SOU014-102	Copper 35.59 (mg/kg)
	Nickel 167.13 (mg/kg)
	Uranium 71.58 (mg/kg)
SOU014-103	Arsenic 16.62 (mg/kg)
	Copper 276.79 (mg/kg)
	Lead 73.78 (mg/kg)
	Nickel 67.33 (mg/kg)
	Uranium 522.52 (mg/kg)
SOU014-104	Arsenic 8.88 (mg/kg)
	Uranium 17.7 (mg/kg)
SOU014-105	Antimony 0.29 (mg/kg)
	Calcium 91500 (mg/kg)
	Selenium 1.1 (mg/kg)
	Uranium 9.62 (mg/kg)
	Uranium-235/236 0.076 (pCi/g)
	Uranium-238 1.69 (pCi/g)

Station	Results Exceeding Background
SOU014-107	Arsenic 8.16 (mg/kg)
	Copper 27.34 (mg/kg)
	Uranium 7.25 (mg/kg)
SOU014-108	Uranium 9.91 (mg/kg)
SOU014-111	Arsenic 13.31 (mg/kg)
	Chromium 48.3 (mg/kg)
	Copper 27 (mg/kg)
	Lead 23.82 (mg/kg)
	Mercury 8.56 (mg/kg)
	Nickel 490.81 (mg/kg)
	Uranium 25.96 (mg/kg)
	Zinc 110.1 (mg/kg)
SOU014-114	Arsenic 10.56 (mg/kg)
	Mercury 8.7 (mg/kg)
	Nickel 115.35 (mg/kg)
	Uranium 23.74 (mg/kg)
SOU014-116	Uranium 7.54 (mg/kg)
SOU014-117	Uranium 12.55 (mg/kg)
SOU014-118	Uranium 14.49 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.6. SWMU 14 Background Exceedances – Subsurface (Continued)

Station	Results Exceeding Background
SOU014-119	Chromium 44.72 (mg/kg)
	Copper 42.1 (mg/kg)
	Nickel 91.37 (mg/kg)
	Uranium 68.58 (mg/kg)

Station	Results Exceeding Background
SOU014-120	Uranium 7.42 (mg/kg)

Station	Results Exceeding Background
SOU014-121	Arsenic 14.57 (mg/kg)
	Lead 27.69 (mg/kg)
	Nickel 62.98 (mg/kg)
	Silver 10.71 (mg/kg)
	Uranium 7.67 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.6. SWMU 14 Background Exceedances – Subsurface (Continued)

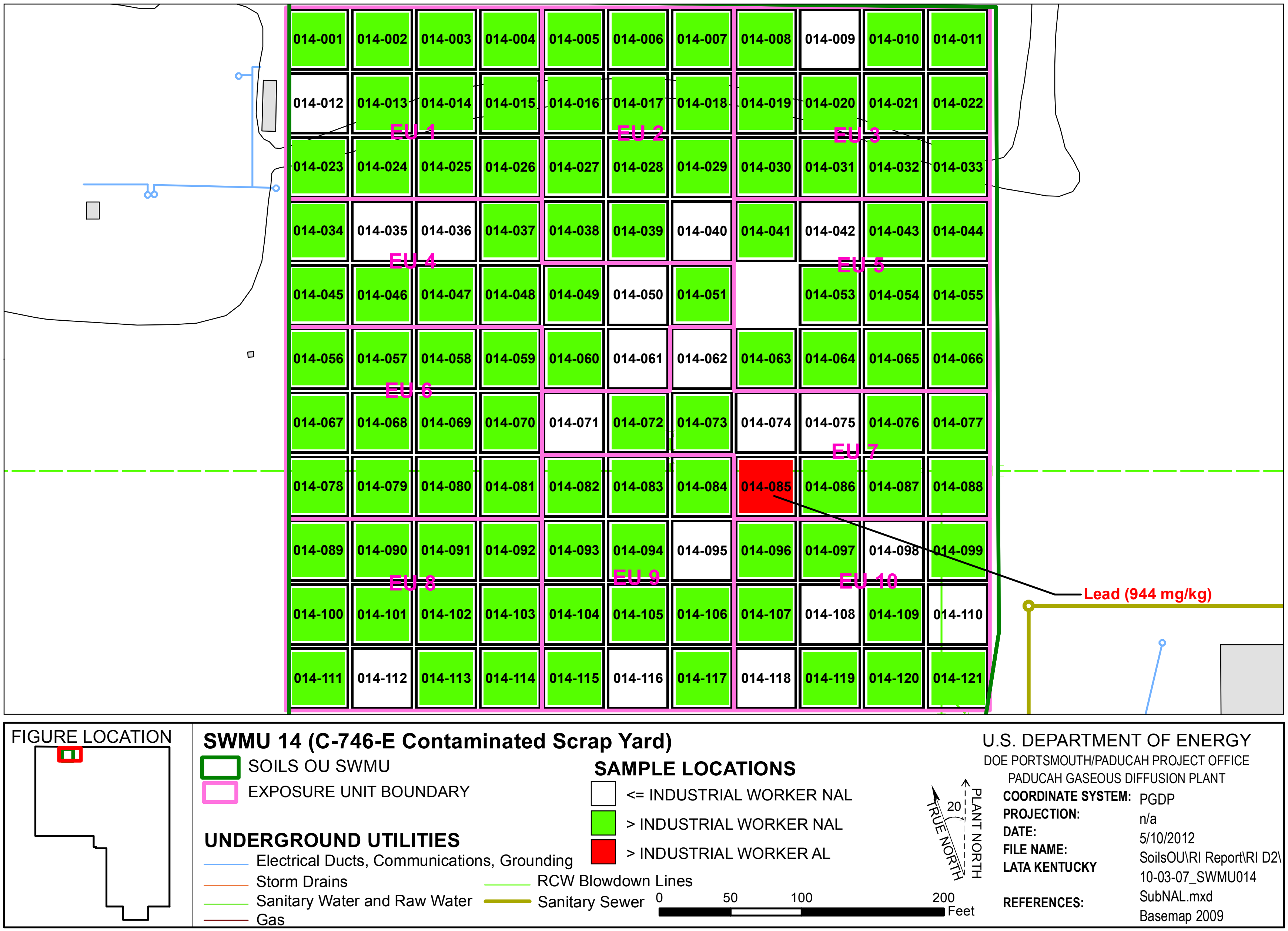


Figure 10.1.7. SWMU 14 NAL Exceedances - Subsurface Soil

Grid	Results Exceeding NAL
014-001	Arsenic 15.2 (mg/kg) Beryllium 0.46 (mg/kg) Chromium 45.84 (mg/kg) Iron 80721.84 (mg/kg) Nickel 118.58 (mg/kg) Vanadium 22.5 (mg/kg)

Grid	Results Exceeding NAL
014-002	Arsenic 9.4 (mg/kg) Chromium 36.74 (mg/kg) Nickel 64.53 (mg/kg) Vanadium 6.75 (mg/kg) Cobalt-60 0.0242 (pCi/g)

Grid	Results Exceeding NAL
014-003	Arsenic 11.33 (mg/kg) Chromium 58.35 (mg/kg) Iron 32291.55 (mg/kg) Nickel 87.94 (mg/kg) Silver 12.37 (mg/kg)

Grid	Results Exceeding NAL
014-004	Nickel 84.56 (mg/kg)

Grid	Results Exceeding NAL
014-005	Arsenic 6.38 (mg/kg) Chromium 48.97 (mg/kg) Nickel 89.12 (mg/kg)

Grid	Results Exceeding NAL
014-006	Arsenic 8.7 (mg/kg) Chromium 98.88 (mg/kg)

Grid	Results Exceeding NAL
014-007	Arsenic 8.24 (mg/kg) Chromium 52.06 (mg/kg) Iron 26416.22 (mg/kg) Nickel 74.89 (mg/kg)

Grid	Results Exceeding NAL
014-008	Chromium 48.36 (mg/kg)

Grid	Results Exceeding NAL
014-010	Arsenic 9.29 (mg/kg)

Grid	Results Exceeding NAL
014-011	Arsenic 7.1 (mg/kg) Chromium 44.89 (mg/kg)

Grid	Results Exceeding NAL
014-013	Nickel 93.37 (mg/kg) Silver 11.46 (mg/kg)

Grid	Results Exceeding NAL
014-014	Arsenic 10.85 (mg/kg) Iron 40799.64 (mg/kg)

Grid	Results Exceeding NAL
014-015	Arsenic 8.55 (mg/kg) Beryllium 1.1 (mg/kg) Chromium 72.7 (mg/kg) Iron 31900 (mg/kg) Nickel 62.79 (mg/kg) Vanadium 50.2 (mg/kg) Uranium-238 9.14 (pCi/g)

Grid	Results Exceeding NAL
014-016	Arsenic 6.99 (mg/kg)

Grid	Results Exceeding NAL
014-017	Arsenic 16.19 (mg/kg) Chromium 66.08 (mg/kg) Iron 61312.21 (mg/kg) Nickel 875.68 (mg/kg) Uranium 398.65 (mg/kg)

Grid	Results Exceeding NAL
014-018	Arsenic 7.56 (mg/kg) Nickel 315.3 (mg/kg)

Grid	Results Exceeding NAL
014-019	Arsenic 44.8 (mg/kg) Beryllium 3 (mg/kg) Chromium 31.6 (mg/kg) Cobalt 19.3 (mg/kg) Iron 92700 (mg/kg) Vanadium 86.2 (mg/kg) Uranium-238 13.6 (pCi/g)

Grid	Results Exceeding NAL
014-020	Arsenic 7.95 (mg/kg)

Grid	Results Exceeding NAL
014-021	Arsenic 6.95 (mg/kg)

Grid	Results Exceeding NAL
014-022	Arsenic 8.19 (mg/kg) Nickel 97.21 (mg/kg)

Grid	Results Exceeding NAL
014-023	Chromium 55.12 (mg/kg)

Grid	Results Exceeding NAL
014-024	Arsenic 10.87 (mg/kg) Chromium 51.83 (mg/kg) Iron 30590.89 (mg/kg) Nickel 540.71 (mg/kg) Uranium 231.12 (mg/kg)

Grid	Results Exceeding NAL
014-025	Iron 36098.83 (mg/kg) Nickel 602.31 (mg/kg) Uranium 328.05 (mg/kg)

Grid	Results Exceeding NAL
014-026	Chromium 47.25 (mg/kg) Iron 42641.3 (mg/kg) Nickel 1293.64 (mg/kg) Uranium 352.31 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.7. SWMU 14 NAL Exceedances – Subsurface (Continued)

Grid	Results Exceeding NAL
014-027	Antimony 3.2 (mg/kg) Arsenic 10.4 (mg/kg) Beryllium 0.62 (mg/kg) Chromium 37 (mg/kg) Cobalt 12.7 (mg/kg) Iron 41800 (mg/kg) Nickel 358 (mg/kg) Uranium 382 (mg/kg) Vanadium 33.3 (mg/kg) PCB, Total 4.7 (mg/kg) Cesium-137 0.207 (pCi/g) Neptunium-237 2.29 (pCi/g) Uranium-234 58.1 (pCi/g) Uranium-235/236 4.31 (pCi/g) Uranium-238 111 (pCi/g) Total PAH 0.063948 (mg/kg)

Grid	Results Exceeding NAL
014-028	Arsenic 6.97 (mg/kg)

Grid	Results Exceeding NAL
014-029	Arsenic 11.94 (mg/kg) Chromium 37.96 (mg/kg) Iron 47731.12 (mg/kg) Nickel 969.77 (mg/kg) Uranium 479.54 (mg/kg) PCB, Total 5 (mg/kg)

Grid	Results Exceeding NAL
014-030	Nickel 125.7 (mg/kg)

Grid	Results Exceeding NAL
014-031	Arsenic 14.67 (mg/kg) Chromium 58.15 (mg/kg) Nickel 300.2 (mg/kg) Silver 13.41 (mg/kg)

Grid	Results Exceeding NAL
014-032	Arsenic 9.94 (mg/kg) Chromium 35.22 (mg/kg)

Grid	Results Exceeding NAL
014-033	Nickel 79.62 (mg/kg)

Grid	Results Exceeding NAL
014-034	Chromium 34.11 (mg/kg) Nickel 234.65 (mg/kg) Silver 10.81 (mg/kg)

Grid	Results Exceeding NAL
014-037	Arsenic 7.31 (mg/kg) Nickel 122.14 (mg/kg)

Grid	Results Exceeding NAL
014-038	Arsenic 7.26 (mg/kg)

Grid	Results Exceeding NAL
014-039	Arsenic 7.63 (mg/kg) Chromium 75.34 (mg/kg) Iron 33820.75 (mg/kg) Mercury 8.88 (mg/kg) Nickel 418.94 (mg/kg) Uranium 274.33 (mg/kg)

Grid	Results Exceeding NAL
014-041	Arsenic 6.06 (mg/kg) Nickel 78.18 (mg/kg)

Grid	Results Exceeding NAL
014-043	Arsenic 7.98 (mg/kg)

Grid	Results Exceeding NAL
014-044	Arsenic 5.5 (mg/kg) Beryllium 0.52 (mg/kg) Vanadium 28.6 (mg/kg)

Grid	Results Exceeding NAL
014-045	Arsenic 8.23 (mg/kg) Chromium 34.18 (mg/kg) Nickel 92.48 (mg/kg) Uranium 122.74 (mg/kg)

Grid	Results Exceeding NAL
014-046	Arsenic 5.9 (mg/kg) Beryllium 0.58 (mg/kg) Cobalt 15.1 (mg/kg) Silver 10.85 (mg/kg) Vanadium 24.8 (mg/kg) Uranium-235/236 0.507 (pCi/g) Uranium-238 9.21 (pCi/g)

Grid	Results Exceeding NAL
014-047	Chromium 39.18 (mg/kg)

Grid	Results Exceeding NAL
014-048	Nickel 94.07 (mg/kg)

Grid	Results Exceeding NAL
014-049	Arsenic 8.28 (mg/kg) Chromium 32.13 (mg/kg)

Grid	Results Exceeding NAL
014-051	Arsenic 9.71 (mg/kg) Nickel 67.29 (mg/kg)

Grid	Results Exceeding NAL
014-053	Arsenic 7.01 (mg/kg)

Grid	Results Exceeding NAL
014-054	Arsenic 5.97 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.7. SWMU 14 NAL Exceedances – Subsurface (Continued)

Grid	Results Exceeding NAL
014-055	Arsenic 17.3 (mg/kg) Beryllium 1.1 (mg/kg) Chromium 46.75 (mg/kg) Iron 36600 (mg/kg) Mercury 7.06 (mg/kg) Nickel 138.51 (mg/kg) Vanadium 46.5 (mg/kg)

Grid	Results Exceeding NAL
014-056	Arsenic 7.69 (mg/kg) Uranium 254.14 (mg/kg)

Grid	Results Exceeding NAL
014-057	Arsenic 6.82 (mg/kg)

Grid	Results Exceeding NAL
014-058	Nickel 69.99 (mg/kg)

Grid	Results Exceeding NAL
014-059	Chromium 62.95 (mg/kg) Nickel 94.5 (mg/kg) Uranium 192.44 (mg/kg)

Grid	Results Exceeding NAL
014-060	Arsenic 7.75 (mg/kg) Mercury 8 (mg/kg)

Grid	Results Exceeding NAL
014-063	Arsenic 6.75 (mg/kg) Chromium 43.02 (mg/kg)

Grid	Results Exceeding NAL
014-064	Arsenic 6.83 (mg/kg) Chromium 45.84 (mg/kg) Nickel 68.14 (mg/kg)

Grid	Results Exceeding NAL
014-065	Chromium 36.3 (mg/kg) Nickel 258.99 (mg/kg) Uranium 118.12 (mg/kg) PCB, Total 10 (mg/kg)

Grid	Results Exceeding NAL
014-066	Nickel 123.42 (mg/kg)

Grid	Results Exceeding NAL
014-067	Nickel 75.66 (mg/kg)

Grid	Results Exceeding NAL
014-068	Nickel 122.63 (mg/kg) Uranium 207.97 (mg/kg)

Grid	Results Exceeding NAL
014-069	Arsenic 7.48 (mg/kg)

Grid	Results Exceeding NAL
014-070	Arsenic 8 (mg/kg) Beryllium 0.67 (mg/kg) Uranium 119 (mg/kg) Vanadium 28.5 (mg/kg) Uranium-235/236 1.03 (pCi/g) Uranium-238 25.9 (pCi/g)

Grid	Results Exceeding NAL
014-072	Nickel 76.63 (mg/kg)

Grid	Results Exceeding NAL
014-073	Arsenic 12.37 (mg/kg)

Grid	Results Exceeding NAL
014-076	Arsenic 7.19 (mg/kg) Chromium 49.22 (mg/kg)

Grid	Results Exceeding NAL
014-077	Arsenic 7.56 (mg/kg)

Grid	Results Exceeding NAL
014-078	Arsenic 7.81 (mg/kg) Chromium 53.47 (mg/kg) Nickel 344.5 (mg/kg) Uranium 110.86 (mg/kg)

Grid	Results Exceeding NAL
014-079	Arsenic 11.31 (mg/kg) Chromium 40.5 (mg/kg) Silver 11.27 (mg/kg)

Grid	Results Exceeding NAL
014-080	Chromium 61.92 (mg/kg) Nickel 134.52 (mg/kg)

Grid	Results Exceeding NAL
014-081	Chromium 37.59 (mg/kg)

Grid	Results Exceeding NAL
014-082	Arsenic 12.28 (mg/kg)

Grid	Results Exceeding NAL
014-083	Chromium 33.34 (mg/kg) Nickel 62.74 (mg/kg)

Grid	Results Exceeding NAL
014-084	Nickel 68.26 (mg/kg)

Grid	Results Exceeding NAL
014-085	Arsenic 6.3 (mg/kg) Beryllium 0.51 (mg/kg) Lead 944 (mg/kg) Silver 22.2 (mg/kg) Vanadium 29.8 (mg/kg) PCB, Total 0.19 (mg/kg) Uranium-238 7.8 (pCi/g)

Grid	Results Exceeding NAL
014-086	Silver 11.33 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.7. SWMU 14 NAL Exceedances – Subsurface (Continued)

Grid	Results Exceeding NAL
014-087	Arsenic 7.38 (mg/kg)
014-088	Chromium 43.05 (mg/kg)
	Nickel 85.72 (mg/kg)
014-089	Arsenic 6.32 (mg/kg)
	Chromium 42.41 (mg/kg)
014-090	Arsenic 10.79 (mg/kg)
	Chromium 36.14 (mg/kg)
	Nickel 156.42 (mg/kg)
014-091	Arsenic 10.8 (mg/kg)
	Chromium 42.47 (mg/kg)
	Nickel 62.71 (mg/kg)
	Silver 11.8 (mg/kg)
014-092	Arsenic 7.6 (mg/kg)
	Chromium 35.08 (mg/kg)
014-093	Nickel 115.22 (mg/kg)
014-094	Nickel 59.71 (mg/kg)
014-096	Arsenic 5.3 (mg/kg)
	Beryllium 0.4 (mg/kg)
	Vanadium 22.8 (mg/kg)
	Uranium-238 4.79 (pCi/g)
014-097	Arsenic 7.82 (mg/kg)
	Beryllium 0.58 (mg/kg)
	Chromium 38.27 (mg/kg)
	Mercury 9.22 (mg/kg)
	Nickel 437.11 (mg/kg)
	Uranium 216.68 (mg/kg)
	Vanadium 22.4 (mg/kg)
	PCB, Total 5 (mg/kg)
014-099	Arsenic 6.73 (mg/kg)
014-100	Chromium 51.41 (mg/kg)
	Nickel 58.88 (mg/kg)
014-101	Arsenic 6 (mg/kg)
	Beryllium 0.48 (mg/kg)
	Vanadium 25.2 (mg/kg)
014-102	Arsenic 7.71 (mg/kg)
	Nickel 167.13 (mg/kg)
014-103	Arsenic 16.62 (mg/kg)
	Nickel 67.33 (mg/kg)
	Uranium 522.52 (mg/kg)
014-104	Arsenic 8.88 (mg/kg)
014-105	Arsenic 4.3 (mg/kg)
	Beryllium 0.35 (mg/kg)
	Chromium 33.68 (mg/kg)
	Vanadium 18.5 (mg/kg)
014-106	Arsenic 5.79 (mg/kg)
014-107	Arsenic 8.16 (mg/kg)
014-109	Arsenic 6.08 (mg/kg)
014-111	Arsenic 13.31 (mg/kg)
	Chromium 48.3 (mg/kg)
	Mercury 8.56 (mg/kg)
	Nickel 490.81 (mg/kg)
014-113	Arsenic 6.45 (mg/kg)
014-114	Arsenic 10.56 (mg/kg)
	Chromium 36.91 (mg/kg)
	Mercury 8.7 (mg/kg)
	Nickel 115.35 (mg/kg)
014-115	Chromium 33.18 (mg/kg)
014-117	Chromium 38.54 (mg/kg)
014-119	Chromium 44.72 (mg/kg)
	Nickel 91.37 (mg/kg)
014-120	Arsenic 6.12 (mg/kg)
014-121	Arsenic 14.57 (mg/kg)
	Chromium 41.11 (mg/kg)
	Iron 25440.17 (mg/kg)
	Nickel 62.98 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.1.7. SWMU 14 NAL Exceedances – Subsurface (Continued)

The following are the metals detected in the SWMU 14 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Aluminum	27	2
Antimony	1., 15, 19, 27, 44, 46, 55, 85, 97, 101, 105	1, 2, 3, 4, 5, 7, 8, 9, 10
Arsenic	1, 2, 3, 6, 7, 10, 4, 15, 17, 19, 20, 22, 24, 27, 29, 31, 32, 43, 45, 49, 51, 55, 70, 73, 79, 82, 90, 91, 103, 104, 107, 111, 114, 121	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Barium	96	10
Cadmium	27, 97	2, 10
Cobalt	19, 46	3, 4
Copper	17, 24, 25, 26, 27, 29, 31, 34, 39, 65, 85, 90, 97, 103	1, 2, 3, 4, 5, 7, 8 10
Iron	1, 3, 4, 14, 15, 17, 19, 24, 25, 26, 27, 29, 39, 55	1, 2, 3, 5
Lead	1, 2, 7, 17, 19, 24, 25, 26, 27, 29, 34, 37, 39, 48, 55, 65, 85, 97, 103, 111, 121	1, 2, 3, 4, 5, 7, 8, 10
Manganese	7, 17, 24, 25, 26, 27, 29, 33, 55	1, 2, 3, 5
Mercury	27, 39, 55, 60, 96, 97, 111, 114	2, 4, 5, 8, 10
Molybdenum[1]	1, 15, 19, 24, 26, 27, 44, 46, 55, 70, 85, 96, 97, 101, 105	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Nickel	1, 2, 3, 4, 5, 7, 13, 15, 18, 22, 24, 25, 26, 27, 29, 30, 31, 33, 34, 37, 39, 41, 45, 48, 51, 55, 58, 59, 64, 65, 66, 67, 68, 72, 78, 80, 83, 84, 85, 88, 90, 91, 93, 94, 97, 100, 102, 103, 111, 114, 119, 121	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Selenium	1, 15, 17, 19, 27, 44, 46, 55, 70, 85, 96, 97, 101, 105	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Silver	3, 13, 31, 34, 39, 46, 53, 55, 57, 79, 85, 86, 91, 121	1, 2, 3, 4, 5, 6, 7, 8, 10
Thallium	44	5
Uranium	1, 3, 5, 15, 16, 17, 18, 19, 20, 24, 25, 26, 27, 28, 29, 30, 31, 34, 37, 38, 39, 45, 46, 48, 55, 56, 57, 59, 61, 62, 64, 65, 66, 67, 68, 69, 70, 71, 77, 78, 82, 85, 88, 89, 90, 91, 93, 94, 95, 96, 97, 98, 102, 103, 104, 111, 114, 118, 119	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Vanadium	15, 19, 55	1, 3, 5
Zinc	1, 4, 7, 9, 17, 18, 20, 24, 25, 26, 27, 29, 31, 34, 39, 55, 64, 65, 78, 80, 97, 111	1, 2, 3, 4, 5, 6, 8, 10

[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	19, 55	3, 5
Cobalt	19, 46	3, 4
Iron	1, 3, 14, 15, 17, 19, 24, 25, 26, 27, 29, 39, 55	1, 2, 3, 5, 7
Lead	85	7
Manganese	1, 17, 24, 25, 26, 27, 29, 33, 55	1, 2, 3, 5
Mercury	39, 60, 55, 97, 111, 114	2, 4, 5, 8, 10
Molybdenum[1]	24, 26	1
Nickel	1, 3, 4, 5, 13, 17, 18, 22, 24, 25, 26, 27, 29, 30, 31, 33, 34, 37, 39, 45, 48, 55, 59, 65, 66, 68, 78, 80, 88, 90, 93, 97, 102, 111, 114, 119	1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Metal	Grid	EU
Selenium	17	2
Silver	3, 13, 31, 34, 39, 46, 53, 55, 57, 79, 85, 86, 91, 121	1, 2, 3, 4, 5, 6, 7, 8, 10
Vanadium	19, 55	3, 5

[1] No background value is available.

PCBs

Total PCBs in the following grids and EUs were detected above the industrial worker NAL.

PCB	Grid	EU
Total PCBs	27, 29, 65, 85, 97	2, 5, 7, 10

None of the grids listed above are located on the SWMU 14 border.

The maximum depth at which Total PCBs were detected above the industrial worker NAL was 7 ft bgs. The end depths of the boreholes taken from grids 27, 29, 65, 85, and 97 ranged from 4 to 10 ft bgs.

PCBs were not detected above the industrial worker ALs in the SWMU 14 subsurface soil.

Total PCBs in the following grids and EUs were detected above the SSLs for the protection of UCRS groundwater.

PCB	Grid	EU
Total PCBs	27, 29, 65, 85, 96, 97, 105	2, 5, 7, 10

Total PCBs in the following grids and EUs were detected above the SSLs for the protection of RGA groundwater.

PCB	Grid	EU
Total PCBs	27, 29, 65, 97	2, 5, 10

SVOCs

Of the SVOCs, Total PAHs were detected above the industrial worker NAL in the subsurface soil of grid 27 (EU 2). The detection was at 4 ft bgs, which also was the end depth of the borehole.

No SVOCs were detected in the SWMU 14 subsurface soil above the industrial worker ALs or the SSLs for the protection of RGA groundwater. The following are the SVOCs detected above the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

SVOC	Grid	EU
Total PAHs	15, 27, 46, 85, 105	1, 2, 4, 7, 9

VOCs

No VOCs were detected in the SWMU 14 subsurface soil.

Radionuclides

Radionuclides were detected above the industrial worker NALs in the SWMU 14 subsurface soil. The following are the radionuclides detected above both the background screening levels and the industrial worker NALs and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Cobalt-60[1]	2	1
Neptunium-237[1]	27	2
Uranium-234	27	2
Uranium-235/236	27, 46, 70	2, 4, 6
Uranium-238	15, 19, 27, 46, 70, 85, 96	1, 2, 3, 4, 6, 7, 10

[1] No background value is available.

The maximum depth at which radionuclides were detected (in samples associated with this RI Report) above both the background screening levels and the industrial worker NALs was 10 ft bgs. The end depths of the boreholes taken from the grids listed above ranged from 4 to 15 ft bgs.

No radionuclides were detected above both the background screening levels and the industrial worker ALs in the SWMU 14 subsurface soil. No background value is available for cobalt-60, although reported results for this radionuclide are less than the reported MDA.

The following are the radionuclides detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Americium-241[1]	27	2
Neptunium-237[1]	15, 19, 27, 46, 70, 85, 96, 101, 105	1, 2, 3, 4, 6, 7, 10
Technetium-99	15, 19, 27, 46, 70, 85, 96	1, 2, 3, 4, 6, 7, 10
Thorium-230	27	2
Uranium-238	15, 19, 27, 46, 70, 85, 96	1, 2, 3, 4, 6, 7, 10

[1] No background value is available.

The following are the radionuclides detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Neptunium-237[1]	15, 27	1, 2
Technetium-99	27, 46	2, 4

[1] No background value is available.

10.1.5 Fate and Transport

Technetium-99, nickel, and chromium at SWMU 14 were selected for further evaluation using modeling to estimate the potential for transport at a rate that could cause an MCL (or risk-based level if an MCL is unavailable) exceedance in the RGA at the SWMU boundary. SESOIL and AT123D simulation modeling results are summarized in Appendix C.

The technetium-99 and nickel were selected for modeling because the average concentration at the SWMU exceeded both the subsurface background concentration and the RG SSL (see Appendix C). Chromium at SWMU 14 also was subjected to modeling though its concentration in soils did not exceed the RG SSL and subsurface background because the chromium concentration at SWMU 14 is the highest for any of the SWMUs/AOCs covered by this RI. The modeling was conducted to bound the potential for impacts from the Soils OU on the RGA groundwater because there are some locations where RGA concentrations of chromium pose a potential risk/hazard. The results presented in Appendix C show that migration of nickel and chromium (both trivalent and hexavalent) are highly retarded in the UCRS and these constituents do not reach the RGA in the 1,000-year simulation period.

Based on the modeling results, technetium-99 present in soil at SWMU 14 has the potential to impact the RGA groundwater at the SWMU boundary at concentrations (1,700 pCi/L) that exceed 900 pCi/L [which is the value derived by EPA from the 4 mrem/yr MCL (EPA 2002)]. A review of the RGA monitoring well and extraction well data does not show incremental impacts to the RGA plume from SWMU 14 (see also Appendix C, Attachment C1). The technetium-99 plume is sourced from the vicinity of C-400 without measured change as it passes by SWMU 14.

SWMU 14 is located near the PGDP boundary and just upgradient of the Northwest Plume extraction wells. Technetium-99 concentrations from the extraction wells have not exceeded 900 pCi/L since 1998.

There is potential for runoff because this SWMU is on the banks of one of the KPDES Outfall 001 ditches. This runoff is captured in the C-613 Sedimentation Basin prior to discharge into Outfall 001. The discharge from the C-613 Sedimentation Basin never has had technetium-99 concentrations exceed 900 pCi/L. Thus, there is no indication of significant migration of technetium-99 from SWMU 14 via a surface water pathway. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

10.1.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 14 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for one or more EUs at SWMU 14 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 10.1.5 for the future industrial worker, the excavation worker, and the hypothetical resident. Table 10.1.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COC for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Table 10.1.5. RGOs for SWMU 14

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Future Industrial Worker											
1	Arsenic	1.10E+01	mg/kg	1.1E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Chromium	6.36E+01	mg/kg	2.1E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	PCB, Total	5.00E-01	mg/kg	2.7E-06	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Technetium-99	4.06E+02	pCi/g	1.1E-06	3.61E+02	3.61E+03	3.61E+04	n/a	n/a	n/a	n/a
	Cumulative			**1.7E-05**				**< 1**			
2	Arsenic	1.45E+01	mg/kg	1.5E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Chromium	6.65E+01	mg/kg	2.2E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Neptunium-237	7.70E-01	pCi/g	2.8E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	PCB, Total	3.90E-01	mg/kg	2.1E-06	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	3.38E-01	mg/kg	5.7E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-234	3.24E+01	pCi/g	1.7E-06	1.89E+01	1.89E+02	1.89E+03	n/a	n/a	n/a	n/a
	Uranium-235	2.00E+00	pCi/g	5.1E-06	3.95E-01	3.95E+00	3.95E+01	n/a	n/a	n/a	n/a
	Uranium-238	5.61E+01	pCi/g	3.3E-05	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.7E-05**				**< 1**			
3	Arsenic	1.30E+01	mg/kg	1.3E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Chromium	7.01E+01	mg/kg	2.3E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	PCB, Total	8.65E+00	mg/kg	4.6E-05	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Cumulative			**6.1E-05**				**< 1**			
4	Arsenic	1.33E+01	mg/kg	1.3E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Chromium	7.20E+01	mg/kg	2.4E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Neptunium-237	2.68E+00	pCi/g	9.9E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	PCB, Total	6.61E+00	mg/kg	3.5E-05	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	2.51E-01	mg/kg	4.2E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-234	1.13E+02	pCi/g	6.0E-06	1.89E+01	1.89E+02	1.89E+03	n/a	n/a	n/a	n/a
	Uranium-235	8.00E+00	pCi/g	2.0E-05	3.95E-01	3.95E+00	3.95E+01	n/a	n/a	n/a	n/a
	Uranium-238	1.69E+02	pCi/g	9.9E-05	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.9E-04**				**< 1**			

Table 10.1.5. RGOs for SWMU 14 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
5	Arsenic	1.31E+01	mg/kg	1.3E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Chromium	4.70E+01	mg/kg	1.6E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Neptunium-237	1.74E+00	pCi/g	6.4E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	PCB, Total	1.00E+00	mg/kg	5.3E-06	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Thorium-230	1.39E+01	pCi/g	1.0E-06	1.38E+01	1.38E+02	1.38E+03	n/a	n/a	n/a	n/a
	Total PAH	1.21E-01	mg/kg	2.0E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-234	5.22E+01	pCi/g	2.8E-06	1.89E+01	1.89E+02	1.89E+03	n/a	n/a	n/a	n/a
	Uranium-235	3.33E+00	pCi/g	8.4E-06	3.95E-01	3.95E+00	3.95E+01	n/a	n/a	n/a	n/a
	Uranium-238	9.42E+01	pCi/g	5.5E-05	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**9.6E-05**				**< 1**			
6	Chromium	4.46E+02	mg/kg	1.5E-05	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Neptunium-237	2.65E+00	pCi/g	9.8E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	PCB, Total	5.00E+00	mg/kg	2.7E-05	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Uranium-234	3.41E+01	pCi/g	1.8E-06	1.89E+01	1.89E+02	1.89E+03	n/a	n/a	n/a	n/a
	Uranium-235	2.27E+00	pCi/g	5.7E-06	3.95E-01	3.95E+00	3.95E+01	n/a	n/a	n/a	n/a
	Uranium-238	5.08E+01	pCi/g	3.0E-05	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**8.9E-05**				**< 1**			
7	Arsenic	1.13E+01	mg/kg	1.1E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Chromium	6.46E+01	mg/kg	2.1E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Neptunium-237	1.49E+00	pCi/g	5.5E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	PCB, Total	7.60E+00	mg/kg	4.1E-05	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	6.31E-02	mg/kg	1.1E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-235	9.60E-01	pCi/g	2.4E-06	3.95E-01	3.95E+00	3.95E+01	n/a	n/a	n/a	n/a
	Uranium-238	2.13E+01	pCi/g	1.3E-05	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**7.5E-05**				**< 1**			
8	Arsenic	1.14E+01	mg/kg	1.1E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Chromium	4.60E+01	mg/kg	1.5E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Neptunium-237	8.80E-01	pCi/g	3.2E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	PCB, Total	5.00E+00	mg/kg	2.7E-05	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	6.28E-02	mg/kg	1.1E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-238	5.92E+00	pCi/g	3.5E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**4.7E-05**				**< 1**			

Table 10.1.5. RGOs for SWMU 14 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
9	Arsenic	1.40E+01	mg/kg	1.4E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Cesium-137	4.53E-01	pCi/g	5.3E-06	8.61E-02	8.61E-01	8.61E+00	n/a	n/a	n/a	n/a
	Chromium	4.64E+01	mg/kg	1.5E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Neptunium-237	1.09E+01	pCi/g	4.0E-05	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	PCB, Total	6.84E+00	mg/kg	3.6E-05	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	4.87E-01	mg/kg	8.2E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-234	8.32E+02	pCi/g	4.4E-05	1.89E+01	1.89E+02	1.89E+03	n/a	n/a	n/a	n/a
	Uranium-235	5.46E+01	pCi/g	1.4E-04	3.95E-01	3.95E+00	3.95E+01	n/a	n/a	n/a	n/a
	Uranium-238	1.20E+03	pCi/g	7.1E-04	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**9.9E-04**				**< 1**			
10	Arsenic	1.12E+01	mg/kg	1.1E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Chromium	4.19E+01	mg/kg	1.4E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Neptunium-237	2.64E+00	pCi/g	9.7E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	PCB, Total	9.38E+00	mg/kg	5.0E-05	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	2.72E-01	mg/kg	4.6E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-234	2.42E+01	pCi/g	1.3E-06	1.89E+01	1.89E+02	1.89E+03	n/a	n/a	n/a	n/a
	Uranium-235	1.76E+00	pCi/g	4.5E-06	3.95E-01	3.95E+00	3.95E+01	n/a	n/a	n/a	n/a
	Uranium-238	4.09E+01	pCi/g	2.4E-05	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.1E-04**				**< 1**			
Excavation Worker											
4	Uranium-238	1.29E+02	pCi/g	1.4E-06	9.38E+01	9.38E+02	9.38E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.4E-06**				**<1**			
9	Uranium-234	8.32E+02	pCi/g	3.7E-06	2.26E+02	2.26E+03	2.26E+04	n/a	n/a	n/a	n/a
	Uranium-235	5.46E+01	pCi/g	1.5E-06	3.64E+01	3.64E+02	3.64E+03	n/a	n/a	n/a	n/a
	Uranium-238	1.20E+03	pCi/g	1.3E-05	9.38E+01	9.38E+02	9.38E+03	n/a	n/a	n/a	n/a
	Cumulative			**1.8E-05**				**<1**			

Table 10.1.5. RGOs for SWMU 14 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3] 1 x 10^-6	RGOs for ELCR[3] 1 x 10^-5	RGOs for ELCR[3] 1 x 10^-4	HI[4]	RGOs for HI[3] 0.1	RGOs for HI[3] 1	RGOs for HI[3] 3
Hypothetical Resident[5]											
1	Americium-241	1.27E+00	pCi/g	1.2E-06	1.09E+00	1.09E+01	1.09E+02	n/a	n/a	n/a	n/a
	Arsenic	1.10E+01	mg/kg	4.7E-05	2.35E-01	2.35E+00	2.35E+01	0.7	1.64E+00	1.64E+01	4.93E+01
	Chromium	6.36E+01	mg/kg	4.1E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Iron	1.89E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	5.47E+03	5.48E+04	1.64E+05
	Neptunium-237	2.14E-01	pCi/g	4.0E-06	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	PCB, Total	5.00E-01	mg/kg	7.8E-06	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Technetium-99	4.06E+02	pCi/g	4.7E-06	8.67E+01	8.67E+02	8.67E+03	n/a	n/a	n/a	n/a
	Uranium	7.21E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	2.34E+01	2.34E+02	7.01E+02
	Uranium-238	1.69E+00	pCi/g	4.9E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**7.3E-05**				**1.3**			
2	Antimony	3.70E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	3.13E+00	3.13E+01	9.39E+01
	Arsenic	1.45E+01	mg/kg	6.2E-05	2.35E-01	2.35E+00	2.35E+01	0.9	1.64E+00	1.64E+01	4.93E+01
	Chromium	6.65E+01	mg/kg	4.3E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Iron	3.72E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.7	5.47E+03	5.48E+04	1.64E+05
	Manganese	1.44E+03	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	5.34E+02	5.34E+03	1.60E+04
	Neptunium-237	7.70E-01	pCi/g	1.4E-05	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Nickel	6.78E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.5	1.44E+02	1.44E+03	4.33E+03
	PCB, Total	3.90E-01	mg/kg	6.1E-06	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Thorium-230	5.98E+00	pCi/g	1.7E-06	3.57E+00	3.57E+01	3.57E+02	n/a	n/a	n/a	n/a
	Total PAH	3.38E-01	mg/kg	1.7E-05	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	2.93E+02	mg/kg	< 1E-06	n/a	n/a	n/a	1.3	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	3.24E+01	pCi/g	6.7E-06	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	2.00E+00	pCi/g	2.5E-05	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	5.61E+01	pCi/g	1.6E-04	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**3.0E-04**				**3.7**			

Table 10.1.5. RGOs for SWMU 14 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
3	Arsenic	1.30E+01	mg/kg	5.5E-05	2.35E-01	2.35E+00	2.35E+01	0.8	1.64E+00	1.64E+01	4.93E+01
	Chromium	7.01E+01	mg/kg	4.5E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Iron	3.48E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.6	5.47E+03	5.48E+04	1.64E+05
	Manganese	1.06E+03	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	5.34E+02	5.34E+03	1.60E+04
	Mercury	7.48E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	2.35E+00	2.35E+01	7.04E+01
	Nickel	5.76E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.4	1.44E+02	1.44E+03	4.33E+03
	PCB, Total	8.65E+00	mg/kg	1.4E-04	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Uranium	2.18E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.9	2.34E+01	2.34E+02	7.01E+02
	Uranium-238	1.50E+00	pCi/g	4.3E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**2.0E-04**				**3.3**			
4	Antimony	4.30E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	3.13E+00	3.13E+01	9.39E+01
	Arsenic	1.33E+01	mg/kg	5.6E-05	2.35E-01	2.35E+00	2.35E+01	0.8	1.64E+00	1.64E+01	4.93E+01
	Chromium	7.20E+01	mg/kg	4.6E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Copper	3.54E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	3.13E+02	3.13E+03	9.39E+03
	Iron	3.88E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.7	5.47E+03	5.48E+04	1.64E+05
	Neptunium-237	2.68E+00	pCi/g	5.0E-05	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Nickel	7.31E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.5	1.44E+02	1.44E+03	4.33E+03
	PCB, Total	6.61E+00	mg/kg	1.0E-04	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Thorium-230	8.33E+00	pCi/g	2.3E-06	3.57E+00	3.57E+01	3.57E+02	n/a	n/a	n/a	n/a
	Total PAH	2.51E-01	mg/kg	1.3E-05	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	3.72E+02	mg/kg	< 1E-06	n/a	n/a	n/a	1.6	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	1.13E+02	pCi/g	2.3E-05	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	8.00E+00	pCi/g	1.0E-04	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	1.69E+02	pCi/g	4.9E-04	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**8.4E-04**				**3.9**			

Table 10.1.5. RGOs for SWMU 14 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
5	Arsenic	1.31E+01	mg/kg	5.6E-05	2.35E-01	2.35E+00	2.35E+01	0.8	1.64E+00	1.64E+01	4.93E+01
	Chromium	4.70E+01	mg/kg	3.0E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Cobalt	1.40E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.6	2.30E+00	2.30E+01	6.91E+01
	Iron	3.92E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.7	5.47E+03	5.48E+04	1.64E+05
	Manganese	8.28E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	5.34E+02	5.34E+03	1.60E+04
	Mercury	1.09E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.5	2.35E+00	2.35E+01	7.04E+01
	Neptunium-237	1.74E+00	pCi/g	3.2E-05	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Nickel	4.61E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	1.44E+02	1.44E+03	4.33E+03
	PCB, Total	1.00E+00	mg/kg	1.6E-05	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Technetium-99	1.01E+02	pCi/g	1.2E-06	8.67E+01	8.67E+02	8.67E+03	n/a	n/a	n/a	n/a
	Thorium-230	1.39E+01	pCi/g	3.9E-06	3.57E+00	3.57E+01	3.57E+02	n/a	n/a	n/a	n/a
	Total PAH	1.21E-01	mg/kg	6.2E-06	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	2.62E+02	mg/kg	< 1E-06	n/a	n/a	n/a	1.1	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	5.22E+01	pCi/g	1.1E-05	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	3.33E+00	pCi/g	4.2E-05	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	9.42E+01	pCi/g	2.7E-04	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**4.4E-04**				**4.2**			
6	Chromium	4.46E+02	mg/kg	2.9E-05	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Neptunium-237	2.65E+00	pCi/g	4.9E-05	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Nickel	9.63E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.7	1.44E+02	1.44E+03	4.33E+03
	PCB, Total	5.00E+00	mg/kg	7.8E-05	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Uranium	5.79E+02	mg/kg	< 1E-06	n/a	n/a	n/a	2.5	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	3.41E+01	pCi/g	7.1E-06	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	2.27E+00	pCi/g	2.9E-05	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	5.08E+01	pCi/g	1.5E-04	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**3.4E-04**				**3.1**			

Table 10.1.5. RGOs for SWMU 14 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
7	Arsenic	1.13E+01	mg/kg	4.8E-05	2.35E-01	2.35E+00	2.35E+01	0.7	1.64E+00	1.64E+01	4.93E+01
	Chromium	6.46E+01	mg/kg	4.2E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Mercury	7.82E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	2.35E+00	2.35E+01	7.04E+01
	Neptunium-237	1.49E+00	pCi/g	2.8E-05	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Nickel	1.22E+03	mg/kg	< 1E-06	n/a	n/a	n/a	0.8	1.44E+02	1.44E+03	4.33E+03
	PCB, Total	7.60E+00	mg/kg	1.2E-04	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Total PAH	6.31E-02	mg/kg	3.2E-06	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	3.33E+02	mg/kg	< 1E-06	n/a	n/a	n/a	1.4	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	1.28E+01	pCi/g	2.7E-06	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	9.60E-01	pCi/g	1.2E-05	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	2.13E+01	pCi/g	6.2E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**2.8E-04**				**3.3**			
8	Arsenic	1.14E+01	mg/kg	4.8E-05	2.35E-01	2.35E+00	2.35E+01	0.7	1.64E+00	1.64E+01	4.93E+01
	Chromium	4.60E+01	mg/kg	3.0E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Mercury	7.90E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	2.35E+00	2.35E+01	7.04E+01
	Neptunium-237	8.80E-01	pCi/g	1.6E-05	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Nickel	6.73E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.5	1.44E+02	1.44E+03	4.33E+03
	PCB, Total	5.00E+00	mg/kg	7.8E-05	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Total PAH	6.28E-02	mg/kg	3.2E-06	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	3.35E+02	mg/kg	< 1E-06	n/a	n/a	n/a	1.4	2.34E+01	2.34E+02	7.01E+02
	Uranium-235	2.38E-01	pCi/g	3.0E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	5.92E+00	pCi/g	1.7E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.7E-04**				**2.9**			

Table 10.1.5. RGOs for SWMU 14 (Continued)

					RGOs for ELCR[3]				RGOs for HI[3]		
EU	COC	EPC[1]	Units	ELCR[2]	1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}	HI[4]	0.1	1	3
9	Arsenic	1.40E+01	mg/kg	6.0E-05	2.35E-01	2.35E+00	2.35E+01	0.9	1.64E+00	1.64E+01	4.93E+01
	Cesium-137	4.53E-01	pCi/g	2.7E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Chromium	4.64E+01	mg/kg	3.0E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Neptunium-237	1.09E+01	pCi/g	2.0E-04	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Nickel	9.43E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.7	1.44E+02	1.44E+03	4.33E+03
	PCB, Total	6.84E+00	mg/kg	1.1E-04	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Technetium-99	1.96E+02	pCi/g	2.3E-06	8.67E+01	8.67E+02	8.67E+03	n/a	n/a	n/a	n/a
	Total PAH	4.87E-01	mg/kg	2.5E-05	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	1.46E+03	mg/kg	< 1E-06	n/a	n/a	n/a	6.3	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	8.32E+02	pCi/g	1.7E-04	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	5.46E+01	pCi/g	6.9E-04	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	1.20E+03	pCi/g	3.5E-03	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**4.8E-03**				**7.8**			
10	Arsenic	1.12E+01	mg/kg	4.8E-05	2.35E-01	2.35E+00	2.35E+01	0.7	1.64E+00	1.64E+01	4.93E+01
	Chromium	4.19E+01	mg/kg	2.7E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Iron	2.75E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.5	5.47E+03	5.47E+04	1.64E+05
	Mercury	2.51E+01	mg/kg	< 1E-06	n/a	n/a	n/a	1.1	2.35E+00	2.35E+01	7.04E+01
	Neptunium-237	2.64E+00	pCi/g	4.9E-05	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Nickel	6.00E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.4	1.44E+02	1.44E+03	4.33E+03
	PCB, Total	9.38E+00	mg/kg	1.5E-04	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Total PAH	2.72E-01	mg/kg	1.4E-05	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	2.88E+02	mg/kg	< 1E-06	n/a	n/a	n/a	1.2	2.34E+01	2.34E+02	7.01E+02
	Uranium-234	2.42E+01	pCi/g	5.0E-06	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	n/a
	Uranium-235	1.76E+00	pCi/g	2.2E-05	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	4.09E+01	pCi/g	1.2E-04	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**4.1E-04**				**3.9**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.82, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.82, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Additionally, SWMU 14 was evaluated for risk to the hypothetical resident exposed to RGA groundwater at the SWMU boundary. Technetium-99 was the only COC determined potentially to migrate to the RGA groundwater. The ELCR to the hypothetical resident is is 9.32E-05 from exposure to RGA groundwater contributed by SWMU 14 contaminants.

Ecological Screening. COPECs for SWMU 14 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 10.1.6.

Table 10.1.6 Ecological Screening for SWMU 14

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Gravel with a soil/grass mix	Yes	2123	Antimony	2.10E-01	4.30E+00	2.70E-01	16
			Cadmium	2.10E-01	3.90E+00	3.60E-01	11
			Chromium	1.60E+01	8.98E+02	2.60E+01	35
			Copper	1.90E+01	1.10E+03	2.80E+01	39
			Lead	3.60E+01	1.49E+02	1.10E+01	14
			Manganese	1.50E+03	2.67E+03	2.20E+02	12
			Mercury	2.00E-01	4.37E+01	1.00E-01	437
			Molybdenum	n/a	2.87E+01	2.00E+00	14
			Nickel	2.10E+01	2.67E+03	3.80E+01	70
			PCB, Total	n/a	1.00E+01	2.00E-02	500
			Selenium	8.00E-01	1.00E+01	5.20E-01	19
			Uranium	4.90E+00	4.60E+03	5.00E+00	920
			Zinc	6.50E+01	7.37E+02	4.60E+01	16

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

10.1.7 SWMU 14 Summary

The following text summarizes the results for SWMU 14 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

A plant process that could have contributed to contamination in SWMU 14 is placement of scrap metal in the elements.

COPCs for surface and subsurface soils from SWMU 14 are shown on Tables 10.1.1 through 10.1.4 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 10 ft bgs. A complete list of sampling results is provided in Appendix G. The COPCs identified for each EU in SWMU 14 are as follows:

- EU 1
  - — Surface—metals, PCBs, radionuclides
  - — Subsurface—metals, SVOCs, radionuclides
- EU 2
  - — Surface—metals, PCBs, SVOCs, radionuclides
  - — Subsurface—metals, PCBs, SVOCs, radionuclides
- EU 3
  - — Surface—metals, PCBs, radionuclides
  - — Subsurface—metals, radionuclides
- EU 4
  - — Surface—metals, PCBs, SVOCs, radionuclides
  - — Subsurface—metals, SVOCs, radionuclides
- EU 5
  - — Surface—metals, PCBs, SVOCs, radionuclides
  - — Subsurface—metals, PCBs
- EU 6
  - — Surface—metals, PCBs, SVOCs, radionuclides
  - — Subsurface—metals, radionuclides
- EU 7
  - — Surface—metals, PCBs, SVOCs, radionuclides
  - — Subsurface—metals, PCBs, SVOCs, radionuclides
- EU 8
  - — Surface—metals, PCBs, SVOCs, radionuclides
  - — Subsurface—metals
- EU 9
  - — Surface—metals, PCBs, SVOCs, radionuclides
  - — Subsurface—metals, SVOCs
- EU 10
  - — Surface—metals, PCBs, radionuclides
  - — Subsurface—metals, PCBs, radionuclides

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 14 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There is potential for runoff because this SWMU is on the banks of one of the KPDES Outfall 001 ditches; however, the runoff is captured in the C-613 Sedimentation Basin prior to discharge into Outfall 001. There are no underground pipelines at SWMU 14. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-6 and 1, respectively, for the future industrial worker, the excavation worker, and hypothetical residential scenarios. COCs for these scenarios for SWMU 14 are as follows:

- Future Industrial Worker
    - Arsenic
    - Cesium-137
    - Chromium
    - Neptunium-237
    - Technetium-99
    - Thorium-230
    - Total PAHs
    - Total PCBs
    - Uranium-234
    - Uranium-235
    - Uranium-238

- Excavation worker
    - Uranium-234
    - Uranium-235
    - Uranium-238

- Hypothetical Resident (hazards evaluated against the child resident)
    - Americium-241
    - Antimony
    - Arsenic
    - Cesium-137
    - Chromium
    - Cobalt
    - Copper
    - Iron
    - Manganese
    - Mercury
    - Neptunium-237
    - Nickel
    - Technetium-99
    - Thorium-230

- Total PAHs
- Total PCBs
- Uranium
- Uranium-234
- Uranium-235
- Uranium-238

Of the above, uranium-235 and uranium-238 are priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for the future industrial worker. For the hypothetical resident, mercury, uranium, neptunium-237, Total PCBs, uranium-234, uranium-235, and uranium-238 are priority COCs due to exposure to soil, and there are no priority COCs due to exposure to RGA groundwater. Priority COCs for other scenarios are described in Appendix D. Figure 10.1.8 also shows the COCs exceeding RGOs for the future industrial worker.

For SWMU 14, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Antimony
- Cadmium
- Chromium
- Copper
- Lead
- Manganese
- Mercury
- Molybdenum
- Nickel
- Total PCBs
- Selenium
- Uranium
- Zinc

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 14 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 14 is adjacent to SWMUs 7, 15, and 520. SWMUs 15 and 520 are part of this Soils OU RI. A response action at SWMU 14 would not have an impact on integrator OUs.

10.1.8 SWMU 14 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 14; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker, excavation worker, and hypothetical resident (DOE 2010a). The reasonably anticipated land use for this SWMU is industrial as shown in the SMP (DOE 2012a).

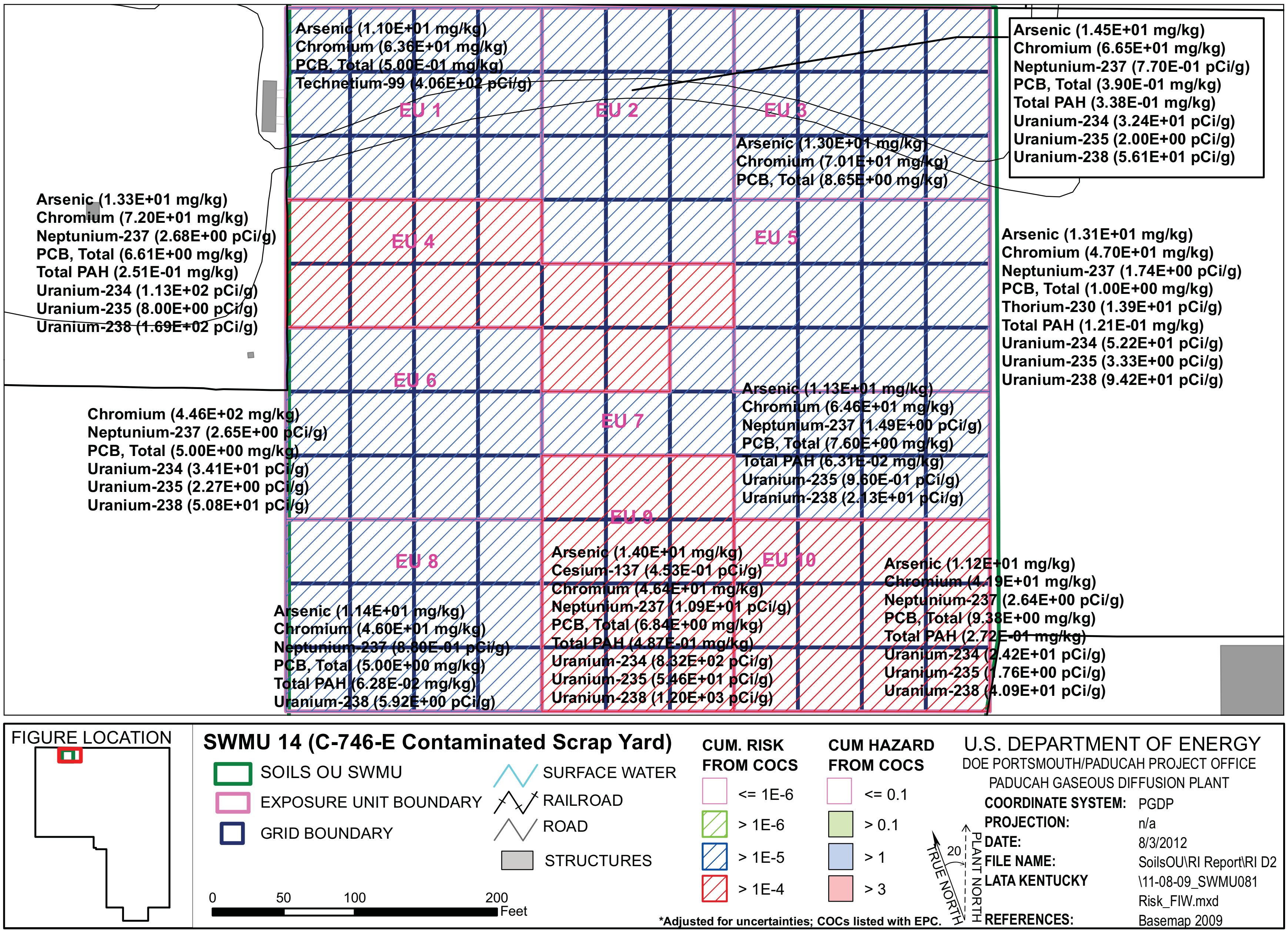


Figure 10.1.8. Summary of COCs Contributing to Risk to the Future Industrial Worker at SWMU 14

10.2 SWMU 518, C-746-P1 FIELD SOUTH OF C-746-P1 CLEAN SCRAP YARD

10.2.1 Background

The field south of the C-746-P1 Clean Scrap Yard (SWMU 518) is in the northwestern portion of the plant. SWMU 518 is approximately 35,000 ft^2. It is believed to have been used as a temporary storage area for heavy equipment.

Analytical results from precharacterization sampling, performed by collecting subsurface composite samples within four grid areas, indicated the presence of PAHs in three of the grids. A second round of sampling was conducted by collecting grab samples within the previously discussed grids. The presence of PAHs was confirmed.

A radiological walkover survey performed in the area indicated results ranging from 15,000 to 35,000 cpm. This area is covered by soils and grass on the western half and by gravel on the eastern half (DOE 2010a).

10.2.2 Fieldwork Summary

The historical data are representative of the nature and adequately delineate the extent of the contamination; therefore, no grid samples were collected from SWMU 518 during the Soils OU RI sampling effort (DOE 2010a).

The SWMU underwent a gamma radiological walkover survey (Figure 10.2.1) using a FIDLER; 9,227 FIDLER measurements range from 4,000 to 13,608 gross cpm and were consistent with background measurements. This area is covered with soil/grass on the western half and gravel on the eastern half. A judgmental sample was not collect as project action limits were not exceeded.

10.2.3 Nature and Extent of Contamination—Surface Soils

For SWMU 518, the representative data set for surface soils is presented in Tables 10.2.1 and 10.2.2 and provides the nature of the contamination in SWMU 518 surface soils. Figures 10.2.2–10.2.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

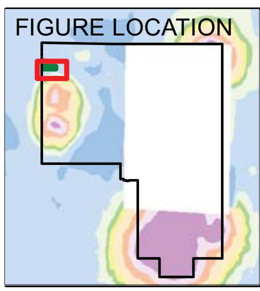
The horizontal extent of SWMU 518 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 518 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 518 surface soil. The following are the metals detected above both background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Cobalt	2
Uranium	18

* SWMU 518 consists of one EU.



SWMU 518 (Field South of C-746-P1 Clean Scrap Yard)

SOILS OU SWMU

GAMMA WALKOVER SURVEY RESULTS [1]

< 10,300 net CPM

≥ 10,300 net CPM

10,300 net CPM was calculated as 171 pCi/g U-238

[1] Only results within SWMU boundary presented.

0 25 50 100 Feet

TRUE NORTH 20 PLANT NORTH

U.S. DEPARTMENT OF ENERGY

DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

COORDINATE SYSTEM:	PGDP
PROJECTION:	n/a
DATE:	5/10/2012
FILE NAME:	SoilsOU\RI Report\RI D2\
LATA KENTUCKY	10-06-01_SWMU518 GWS.mxd
REFERENCES:	Basemap 2009

Figure 10.2.1. SWMU 518 Gamma Walkover Survey

Table 10.2.1. Surface Soil Historical Data Summary: SWMU 518 Field South of P1 Yard

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	3.17E+03	8.72E+03	5.74E+03	0/9	9/9	0/9	1.30E+04	0/9	3.32E+04	0/9	3.97E+06	0/9	9/9	17.7 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	2.10E-01	0/9	2.53E+00	0/9	1.51E+03	0/9	0/9	1.6 - 20
METAL	Arsenic	mg/kg	3.00E+00	8.63E+00	4.91E+00	0/9	3/9	0/9	1.20E+01	3/9	9.97E-01	0/9	9.97E+01	0/9	3/9	4.43 - 5
METAL	Barium	mg/kg	3.33E+01	1.30E+02	7.44E+01	0/9	9/9	0/9	2.00E+02	0/9	5.92E+02	0/9	3.78E+05	0/9	4/9	1 - 5
METAL	Beryllium	mg/kg	3.50E-01	5.50E-01	4.73E-01	0/9	3/9	0/9	6.70E-01	3/9	1.40E-02	0/9	9.22E+00	0/9	0/9	0.44 - 0.5
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	2.10E-01	0/9	3.16E+00	0/9	3.16E+02	0/9	0/9	0.74 - 2
METAL	Calcium	mg/kg	5.03E+03	2.07E+05	9.58E+04	0/9	9/9	1/9	2.00E+05	0/9	n/a	0/9	n/a	n/a	n/a	50 - 2000
METAL	Chromium	mg/kg	5.37E+00	1.28E+01	8.38E+00	0/9	9/9	0/9	1.60E+01	0/9	3.02E+01	0/9	3.02E+03	0/9	0/9	2 - 2.5
METAL	Cobalt	mg/kg	2.50E+00	1.76E+01	5.39E+00	0/9	9/9	1/9	1.40E+01	1/9	1.05E+01	0/9	1.52E+03	9/9	9/9	1 - 2.5
METAL	Copper	mg/kg	2.50E+00	1.08E+01	6.23E+00	0/9	9/9	0/9	1.90E+01	0/9	1.43E+03	0/9	2.24E+05	0/9	0/9	2 - 2.5
METAL	Iron	mg/kg	4.50E+03	1.22E+04	8.48E+03	0/9	9/9	0/9	2.80E+04	0/9	2.51E+04	0/9	3.92E+06	9/9	9/9	5 - 20
METAL	Lead	mg/kg	6.90E+00	3.19E+01	1.69E+01	0/9	3/9	0/9	3.60E+01	0/9	4.00E+02	0/9	4.00E+02	0/9	1/9	17.7 - 200
METAL	Magnesium	mg/kg	6.31E+02	4.78E+03	2.62E+03	0/9	9/9	0/9	7.70E+03	0/9	n/a	0/9	n/a	n/a	n/a	4.43 - 15
METAL	Manganese	mg/kg	2.06E+02	4.93E+02	3.55E+02	0/9	9/9	0/9	1.50E+03	0/9	2.58E+03	0/9	1.16E+05	9/9	9/9	1 - 10
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	2.00E-01	0/9	9.00E-01	0/9	7.85E+02	0/9	0/9	0.08 - 0.2
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.79E+02	0/1	2.80E+04	0/1	0/1	2.21 - 2.21
METAL	Nickel	mg/kg	5.80E+00	2.48E+01	1.07E+01	0/9	9/9	1/9	2.10E+01	0/9	4.28E+01	0/9	3.18E+04	0/9	9/9	4.43 - 5
METAL	Selenium	mg/kg	1.06E+00	1.06E+00	1.06E+00	0/9	1/9	1/9	8.00E-01	0/9	1.79E+02	0/9	2.80E+04	0/9	1/9	0.29 - 17.7
METAL	Silver	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	2.30E+00	0/9	1.08E+01	0/9	9.15E+03	0/9	0/9	0.6 - 4
METAL	Sodium	mg/kg	7.60E+01	2.20E+02	1.51E+02	0/4	3/4	0/4	3.20E+02	0/4	n/a	0/4	n/a	n/a	n/a	88.5 - 200
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	2.10E-01	0/9	2.87E+00	0/9	4.48E+02	0/9	0/9	0.54 - 20
METAL	Uranium	mg/kg	8.09E+00	2.17E+02	7.77E+01	0/6	2/6	2/6	4.90E+00	1/6	1.07E+02	0/6	1.65E+04	0/6	1/6	0.13 - 2000
METAL	Vanadium	mg/kg	6.80E+00	2.08E+01	1.39E+01	0/9	9/9	0/9	3.80E+01	9/9	1.51E-01	0/9	9.30E+01	9/9	9/9	2 - 2.5
METAL	Zinc	mg/kg	3.10E+01	7.61E+01	4.54E+01	0/9	4/9	1/9	6.50E+01	0/9	1.08E+04	0/9	1.68E+06	0/9	4/9	15 - 200
PPCB	PCB, Total	mg/kg	6.80E-02	1.64E+00	9.09E-01	0/15	3/15	0/15	n/a	2/15	1.88E-01	0/15	1.88E+01	0/15	2/15	0.1 - 0.19
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	0/24	0/24	0.39 - 2.4
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	0/24	0/24	0.39 - 2.4
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	0/24	0/24	0.39 - 2.4
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.46 - 2.4
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.46 - 2.4
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.46 - 2.4
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	1.30E+00	0/24	3.91E+01	0/24	0/24	0.46 - 2.4
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.46 - 2.4
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.46 - 2.4
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.46 - 2.4
SVOA	Acenaphthene	mg/kg	5.80E-01	3.10E+01	7.14E+00	1/25	7/25	0/25	n/a	0/25	6.02E+02	0/25	1.81E+04	1/25	7/25	0.39 - 2.4
SVOA	Acenaphthylene	mg/kg	1.20E+00	1.20E+00	1.20E+00	0/25	1/25	0/25	n/a	0/25	n/a	0/25	n/a	n/a	n/a	0.39 - 2.4
SVOA	Anthracene	mg/kg	7.30E-01	4.00E+01	9.04E+00	1/25	8/25	0/25	n/a	0/25	4.05E+03	0/25	1.22E+05	0/25	5/25	0.39 - 2.4
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Benzo(ghi)perylene	mg/kg	6.10E-02	2.80E+01	5.55E+00	2/25	10/25	0/25	n/a	0/25	n/a	0/25	n/a	n/a	n/a	0.39 - 2.4

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.2.1. Surface Soil Historical Data Summary: SWMU 518 Field South of P1 Yard (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	4.40E+00	5.70E+00	4.93E+00	1/24	16/24	0/24	n/a	0/24	n/a	0/24	n/a	0/24	16/24	0.39 - 2.4
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	Carbazole	mg/kg	5.90E-01	3.70E+01	1.13E+01	1/22	5/22	0/22	n/a	1/22	2.75E+01	0/22	2.75E+03	n/a	n/a	0.46 - 2.4
SVOA	Dibenzofuran	mg/kg	1.65E+00	1.65E+00	1.65E+00	1/3	1/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.5
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.5
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	Fluoranthene	mg/kg	1.30E-01	1.21E+01	6.12E+00	1/4	2/4	0/4	n/a	0/4	6.01E+02	0/4	1.80E+04	0/4	1/4	0.39 - 0.5
SVOA	Fluorene	mg/kg	7.40E-01	2.70E+01	7.41E+00	1/25	6/25	0/25	n/a	0/25	4.87E+02	0/25	1.46E+04	1/25	6/25	0.39 - 2.4
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.17E-01	0/3	1.17E+01	0/3	0/3	0.39 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/25	0/25	0/25	n/a	0/25	2.24E+00	0/25	2.24E+02	0/25	0/25	0.39 - 2.4
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	5.22E-02	0/24	5.22E+00	0/24	0/24	0.39 - 2.4
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	0/24	0/24	0.46 - 2.4
SVOA	Phenanthrene	mg/kg	8.50E-02	6.40E+01	1.80E+01	2/25	13/25	0/25	n/a	0/25	n/a	0/25	n/a	n/a	n/a	0.39 - 2.4
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.39 - 2.4
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/24	0/24	0/24	n/a	0/24	n/a	0/24	n/a	n/a	n/a	0.46 - 2.4
SVOA	Pyrene	mg/kg	9.80E-02	1.50E+02	1.88E+01	2/25	17/25	0/25	n/a	0/25	4.49E+02	0/25	1.35E+04	4/25	13/25	0.39 - 2.4
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/21	0/21	0/21	n/a	0/21	n/a	0/21	n/a	n/a	n/a	0.46 - 2.4
SVOA	Total PAH	mg/kg	8.72E-02	1.12E+02	1.81E+01	0/25	13/25	0/25	n/a	13/25	5.92E-02	5/25	5.92E+00	12/25	13/25	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	n/a	0/8	n/a	0/8	0/8	0.005 - 0.01
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.01
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.006 - 0.01
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.01
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	4.89E-02	0/7	5.53E+00	0/7	0/7	0.006 - 0.01
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.006 - 0.01
VOA	1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.48E+00	0/2	1.76E+02	0/2	0/2	0.006 - 0.006
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.01
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	2.38E+02	0/5	8.21E+03	0/5	0/5	0.01 - 0.01
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.01 - 0.012
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.01 - 0.012
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.01 - 0.012
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.01 - 0.012
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	6.98E-01	0/7	8.22E+01	0/7	0/7	0.006 - 0.01
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.01
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.01
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.01 - 0.012
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.01
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	4.97E-01	0/7	5.76E+01	0/7	0/7	0.006 - 0.01
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.006 - 0.01
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.42E-01	0/2	2.49E+01	0/2	0/2	0.006 - 0.006

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.2.1. Surface Soil Historical Data Summary: SWMU 518 Field South of P1 Yard (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	3.29E+00	0/7	3.84E+02	0/7	0/7	0.006 - 0.01
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	3.50E+01	0/5	1.07E+03	0/5	0/5	0.02 - 0.02
VOA	Methylene chloride	mg/kg	5.00E-03	6.00E-03	5.50E-03	1/7	2/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	2/7	0.006 - 0.01
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.006 - 0.01
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	2.82E-01	0/7	7.08E+01	0/7	0/7	0.006 - 0.01
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.006 - 0.01
VOA	Total Xylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.50E+01	0/2	1.07E+03	0/2	0/2	0.006 - 0.006
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	1.07E+01	0/5	3.42E+02	0/5	0/5	0.01 - 0.01
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.01
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	4.69E-02	0/8	4.98E+00	0/8	0/8	0.005 - 0.01
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.012 - 0.012
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.04E-01	0/2	4.83E+01	0/2	0/2	0.012 - 0.012
RADS	Americium-241	pCi/g	-1.01E-02	5.28E-02	2.03E-02	0/6	6/6	0/6	n/a	0/6	5.01E+00	0/6	5.01E+02	0/6	0/6	0.02 - 0.0687
RADS	Cesium-137	pCi/g	3.16E-02	7.41E-02	4.76E-02	0/6	6/6	0/6	4.90E-01	0/6	8.61E-02	0/6	8.61E+00	0/6	0/6	0.0101 - 0.04
RADS	Cobalt-60	pCi/g	-1.06E-02	4.46E-03	-2.43E-03	0/6	6/6	0/6	n/a	0/6	1.77E-02	0/6	1.77E+00	0/6	0/6	0.00978 - 0.04
RADS	Neptunium-237	pCi/g	-4.88E-03	1.51E-02	4.12E-03	0/6	6/6	0/6	1.00E-01	0/6	2.71E-01	0/6	2.71E+01	0/6	3/6	0.0214 - 0.0368
RADS	Plutonium-238	pCi/g	-7.90E-02	-1.17E-02	-5.34E-02	0/6	6/6	0/6	7.30E-02	0/6	1.09E+01	0/6	1.09E+03	0/6	0/6	0.04 - 0.274
RADS	Plutonium-239/240	pCi/g	-7.62E-03	7.62E-03	-1.59E-03	0/6	6/6	0/6	2.50E-02	0/6	1.07E+01	0/6	1.07E+03	0/6	0/6	0.02 - 0.0329
RADS	Technetium-99	pCi/g	8.11E-01	1.73E+01	5.95E+00	0/6	6/6	3/6	2.50E+00	0/6	3.61E+02	0/6	3.61E+04	0/6	6/6	2.72 - 4.11
RADS	Thorium-228	pCi/g	2.28E-01	4.22E-01	3.02E-01	0/6	6/6	0/6	1.60E+00	0/6	n/a	0/6	n/a	n/a	n/a	0.0715 - 0.16
RADS	Thorium-230	pCi/g	2.35E-01	3.89E-01	3.37E-01	0/6	6/6	0/6	1.50E+00	0/6	1.38E+01	0/6	1.38E+03	0/6	5/6	0.126 - 0.21
RADS	Thorium-232	pCi/g	2.62E-01	3.82E-01	3.18E-01	0/6	6/6	0/6	1.50E+00	0/6	n/a	0/6	n/a	n/a	n/a	0.05 - 0.0652
RADS	Uranium-234	pCi/g	3.51E-01	2.06E+00	8.32E-01	0/6	6/6	1/6	1.20E+00	0/6	1.89E+01	0/6	1.89E+03	0/6	0/6	0.09 - 0.43
RADS	Uranium-235	pCi/g	2.40E-02	9.25E-02	4.18E-02	0/6	6/6	1/6	6.00E-02	0/6	3.95E-01	0/6	3.95E+01	0/6	0/6	0.0145 - 0.0272
RADS	Uranium-238	pCi/g	6.47E-01	2.70E+00	1.19E+00	0/6	6/6	1/6	1.20E+00	1/6	1.70E+00	0/6	1.70E+02	0/6	0/6	0.04 - 0.488

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.2.2. Surface Soil RI Data Summary: SWMU 518 Field South of P1 Yard

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	**Analysis**	**Unit**	**Min**	**Max**	**Avg**	**FOD**	**FOD**	**FOE**	**Bkgd**	**FOE**	**NAL**	**FOE**	**AL**	**RGA**	**UCRS**	**DL Range**
METAL	Uranium	mg/kg	9.12E+00	9.12E+00	9.12E+00	0/1	1/1	1/1	4.90E+00	0/1	1.07E+02	0/1	1.65E+04	0/1	0/1	0.06 - 0.06
RADS	Alpha activity	pCi/g	1.81E+01	1.81E+01	1.81E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	6.3 - 6.3
RADS	Americium-241	pCi/g	8.00E-03	8.00E-03	8.00E-03	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.018 - 0.018
RADS	Beta activity	pCi/g	3.31E+01	3.31E+01	3.31E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.4 - 3.4
RADS	Cesium-137	pCi/g	2.20E-02	2.20E-02	2.20E-02	0/1	1/1	0/1	4.90E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.12 - 0.12
RADS	Neptunium-237	pCi/g	1.60E-02	1.60E-02	1.60E-02	0/1	1/1	0/1	1.00E-01	0/1	2.71E-01	0/1	2.71E+01	0/1	1/1	0.011 - 0.011
RADS	Plutonium-238	pCi/g	1.40E-02	1.40E-02	1.40E-02	0/1	1/1	0/1	7.30E-02	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.018 - 0.018
RADS	Plutonium-239/240	pCi/g	1.30E-02	1.30E-02	1.30E-02	0/1	1/1	0/1	2.50E-02	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.016 - 0.016
RADS	Technetium-99	pCi/g	2.09E+00	2.09E+00	2.09E+00	0/1	1/1	0/1	2.50E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	1/1	0.4 - 0.4
RADS	Thorium-228	pCi/g	7.60E-01	7.60E-01	7.60E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	1.11E+00	1.11E+00	1.11E+00	0/1	1/1	0/1	1.50E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	7.30E-01	7.30E-01	7.30E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
RADS	Uranium-234	pCi/g	2.56E+00	2.56E+00	2.56E+00	0/1	1/1	1/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.03 - 0.03
RADS	Uranium-235/236	pCi/g	1.63E-01	1.63E-01	1.63E-01	0/1	1/1	1/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.032 - 0.032
RADS	Uranium-238	pCi/g	3.04E+00	3.04E+00	3.04E+00	0/1	1/1	1/1	1.20E+00	1/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.02 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

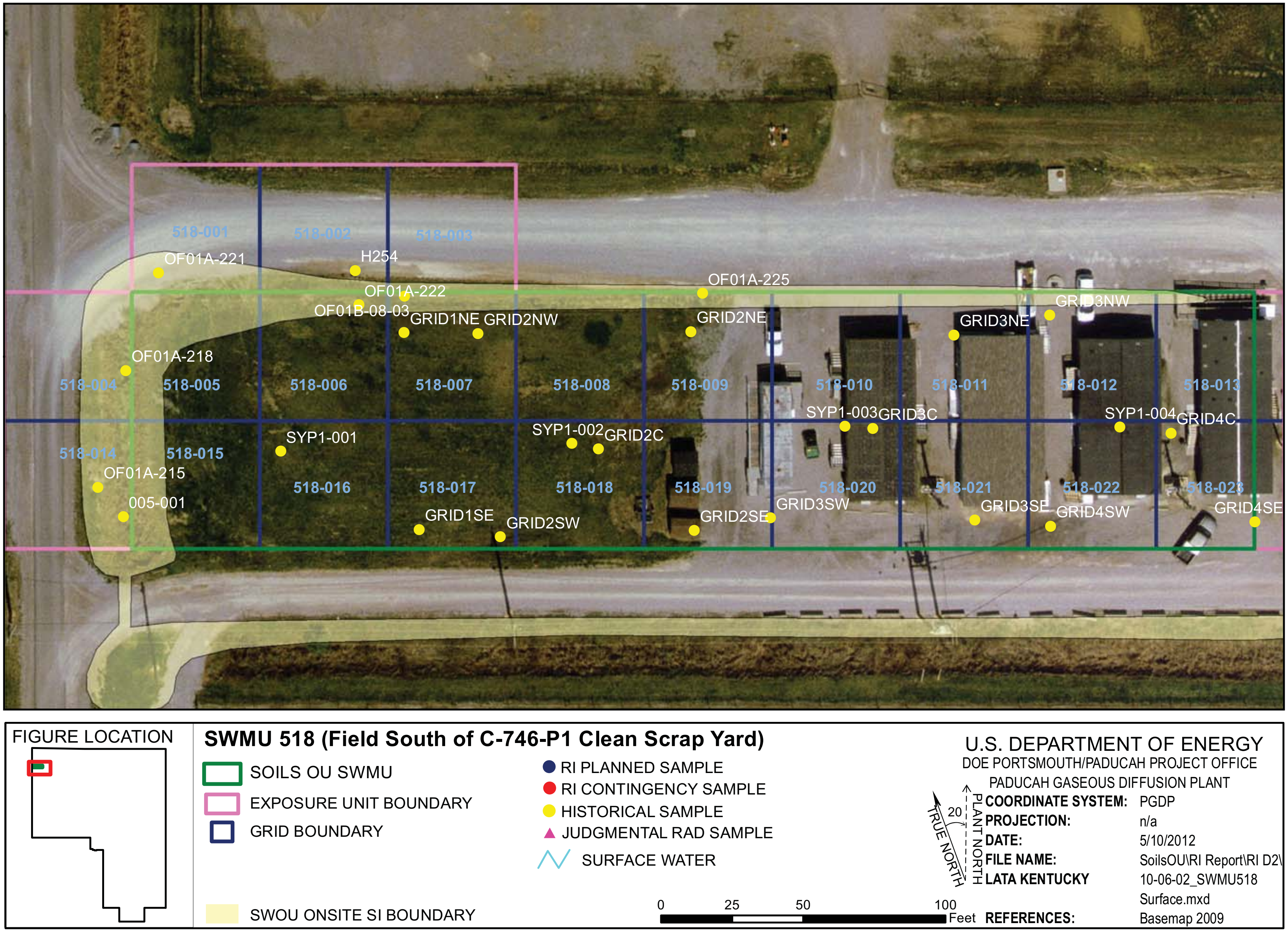


Figure 10.2.2. SWMU 518 Sample Locations - Surface Soil

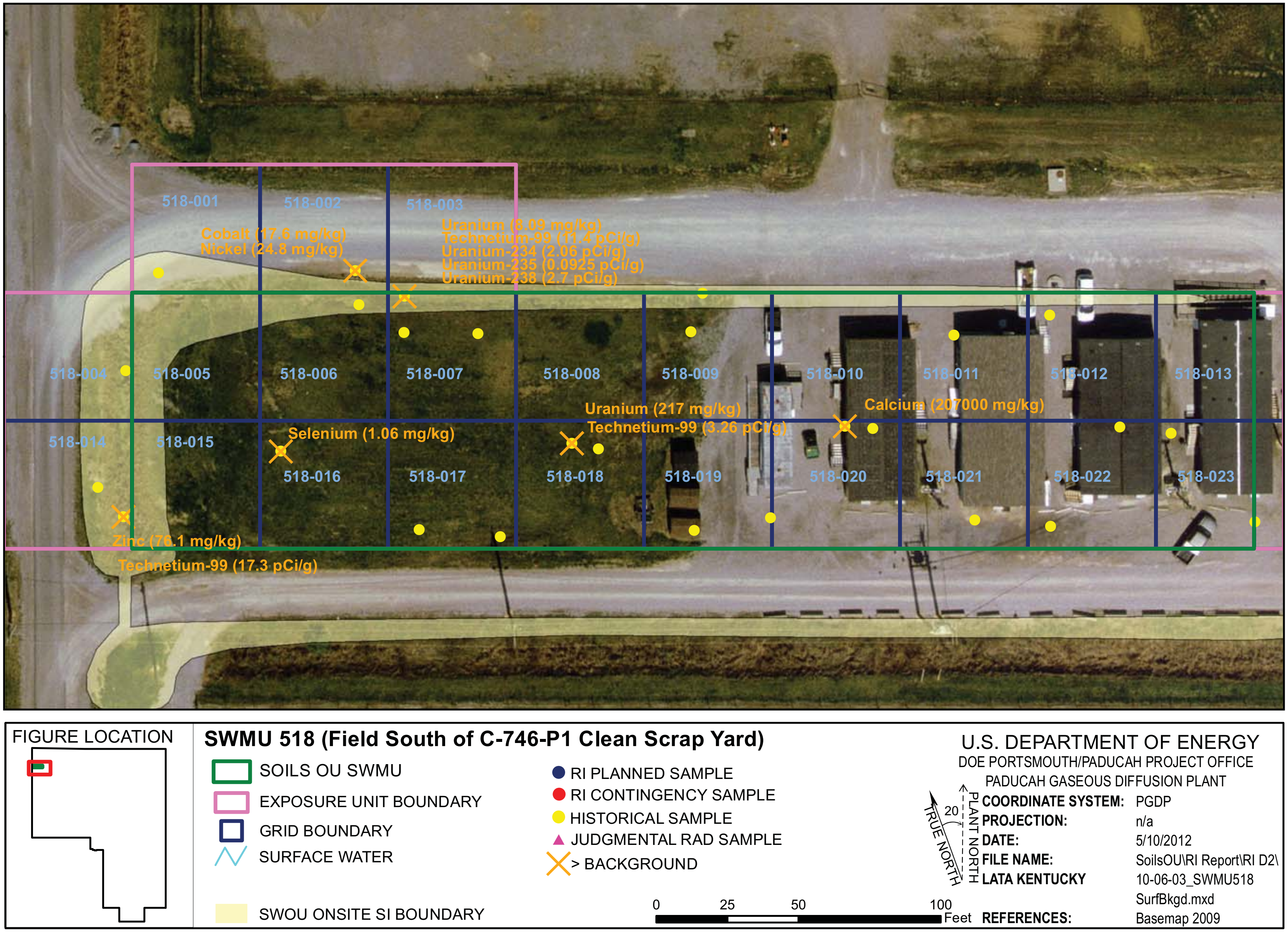


Figure 10.2.3. SWMU 518 Background Exceedances - Surface Soil

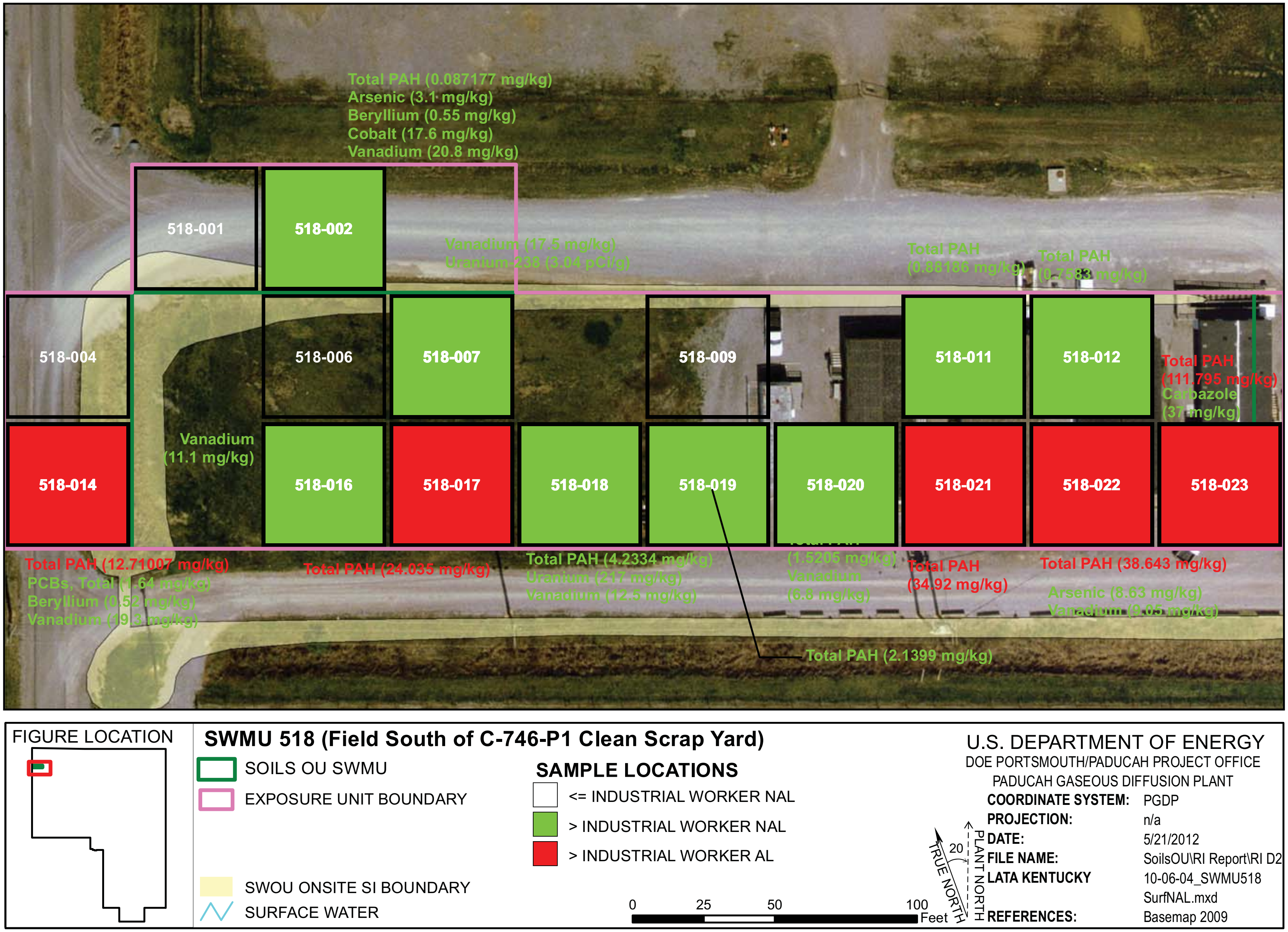


Figure 10.2.4. SWMU 518 NAL Exceedances - Surface Soil

Grid 18 is located inside the administrative boundary of SWMU 518. Grid 2 is outside the administrative boundary of SWMU 518.

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 518 surface soil.

The following are the metals detected in the SWMU 518 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Cobalt	2
Nickel	2
Selenium	16
Uranium	18
Zinc	14

* SWMU 518 consists of one EU.

Cobalt in grid 2 was detected above both the background screening level and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the industrial worker NAL in the surface soil of grid 14, which is on the western border of SWMU 518, next to the SWMU access road and the scrap yards. Grid 14 is located on the border of the area sampled for SWMU 518.

PCBs were not detected in the SWMU 518 surface soil above the industrial worker AL or the SSL for the protection of RGA groundwater. Total PCBs in grid 14 were detected above the SSL for the protection of UCRS groundwater.

SVOCs

The following are the SVOCs detected in the SWMU 518 surface soil above the industrial worker NALs and the grids in which they were detected.

SVOC	Grid
Carbazole	23
Total PAHs	2, 11, 12, 14, 17, 18, 19, 20, 21, 22, 23

* SWMU 518 consists of one EU.

Grids 11, 12, 17, 18, 19, 20, 21, 22, and 23 are located within the administrative boundary of SWMU 518. Grids 2 and 14 are outside the administrative boundary.

Total PAHs were detected above the industrial worker AL in the surface soil of grids 14, 17, 21, 22, and 23.

The unusually high concentration of carbazole (37 mg/kg) is present in the same historical sample as unusually high Total PAHs (calculated at 111.795 mg/kg). It is suspected this sample was collected from a hot spot for PAH contamination.

The following are the SVOCs detected in the SWMU 518 surface soil above the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

SVOC	Grid
Acenaphthene	14, 17, 18, 21, 22, 23
Anthracene	14, 17, 21, 22, 23
Bis(2-Ethylhexyl)Phthalate	7, 9, 11, 12, 17, 18, 19, 20, 21, 22, 23
Fluoranthene	14
Fluorene	14, 17, 21, 22, 23
Pyrene	11, 12, 14, 16, 16, 18, 19, 20, 21, 22, 23
Total PAHs	2, 14

* SWMU 518 consists of one EU.

The following are the SVOCs detected above the SSLs for the protection of RGA groundwater and the grids in which they were detected.

SVOC	Grid
Acenaphthene	23
Fluorene	23
Pyrene	17, 21, 22, 23
Total PAHs	14

* SWMU 518 consists of one EU.

<u>VOCs</u>

No VOCs were detected in the SWMU 518 surface soil above the industrial worker NALs or ALs.

Methylene chloride in grid 2 was detected above the SSLs for the protection of UCRS groundwater. No VOCs were detected above the SSLs for the protection of RGA groundwater.

<u>Radionuclides</u>

Uranium-238 was detected above both the background screening level and the industrial worker NAL in the surface soil of grid 7, which is located within the administrative boundary of SWMU 518.

No radionuclides were detected in the SWMU 518 surface soil above both the background screening level and the industrial worker ALs.

Technetium-99 in grids 7, 14, and 18 was detected above both the background screening level and the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening level and the SSLs for the protection of RGA groundwater.

10.2.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 518, the representative data set for subsurface soils is presented in Table 10.2.3 and provides the nature of the contamination in SWMU 518 subsurface soils. Figures 10.2.5–10.2.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 518 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 518 consists of one EU.

Table 10.2.3. Subsurface Soil Historical Data Summary: SWMU 518 Field South of P1 Yard

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	8.87E+03	1.17E+04	1.03E+04	0/2	2/2	0/2	1.20E+04	0/2	3.32E+04	0/2	3.97E+06	0/2	2/2	-
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	0/2	1.7 - 1.9
METAL	Arsenic	mg/kg	3.50E+00	9.30E+00	6.40E+00	0/2	2/2	1/2	7.90E+00	2/2	9.97E-01	0/2	9.97E+01	0/2	2/2	-
METAL	Barium	mg/kg	8.88E+01	1.32E+02	1.10E+02	0/2	2/2	0/2	1.70E+02	0/2	5.92E+02	0/2	3.78E+05	0/2	2/2	-
METAL	Beryllium	mg/kg	4.90E-01	6.30E-01	5.60E-01	0/2	2/2	0/2	6.90E-01	2/2	1.40E-02	0/2	9.22E+00	0/2	0/2	-
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.10E-01	0/2	3.16E+00	0/2	3.16E+02	0/2	0/2	0.79 - 0.86
METAL	Calcium	mg/kg	6.62E+02	9.88E+02	8.25E+02	0/2	2/2	0/2	6.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	-
METAL	Chromium	mg/kg	1.19E+01	1.40E+01	1.30E+01	0/2	2/2	0/2	4.30E+01	0/2	3.02E+01	0/2	3.02E+03	0/2	0/2	-
METAL	Cobalt	mg/kg	5.10E+00	5.20E+00	5.15E+00	0/2	2/2	0/2	1.30E+01	0/2	1.05E+01	0/2	1.52E+03	2/2	2/2	-
METAL	Copper	mg/kg	4.20E+00	4.30E+00	4.25E+00	0/2	2/2	0/2	2.50E+01	0/2	1.43E+03	0/2	2.24E+05	0/2	0/2	-
METAL	Iron	mg/kg	1.31E+04	1.70E+04	1.51E+04	0/2	2/2	0/2	2.80E+04	0/2	2.51E+04	0/2	3.92E+06	2/2	2/2	-
METAL	Lead	mg/kg	1.36E+01	1.71E+01	1.54E+01	0/2	2/2	0/2	2.30E+01	0/2	4.00E+02	0/2	4.00E+02	0/2	2/2	-
METAL	Magnesium	mg/kg	7.43E+02	1.14E+03	9.42E+02	0/2	2/2	0/2	2.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	-
METAL	Manganese	mg/kg	1.78E+02	3.66E+02	2.72E+02	0/2	2/2	0/2	8.20E+02	0/2	2.58E+03	0/2	1.16E+05	2/2	2/2	-
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	1.30E-01	0/2	9.00E-01	0/2	7.85E+02	0/2	0/2	0.1 - 0.11
METAL	Nickel	mg/kg	6.10E+00	8.60E+00	7.35E+00	0/2	2/2	0/2	2.20E+01	0/2	4.28E+01	0/2	3.18E+04	0/2	2/2	-
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	7.00E-01	0/2	1.79E+02	0/2	2.80E+04	0/2	0/2	0.31 - 0.32
METAL	Silver	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.70E+00	0/2	1.08E+01	0/2	9.15E+03	0/2	0/2	0.66 - 0.74
METAL	Sodium	mg/kg	9.37E+01	1.55E+02	1.24E+02	0/2	2/2	0/2	3.40E+02	0/2	n/a	0/2	n/a	n/a	n/a	-
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	3.40E-01	0/2	2.87E+00	0/2	4.48E+02	0/2	0/2	0.58 - 0.6
METAL	Vanadium	mg/kg	2.49E+01	2.54E+01	2.52E+01	0/2	2/2	0/2	3.70E+01	2/2	1.51E-01	0/2	9.30E+01	2/2	2/2	-
METAL	Zinc	mg/kg	2.31E+01	2.96E+01	2.64E+01	0/2	2/2	0/2	6.00E+01	0/2	1.08E+04	0/2	1.68E+06	0/2	2/2	-
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.88E-01	0/2	1.88E+01	0/2	0/2	0.99 - 1
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.42 - 0.43
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.42 - 0.43
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.42 - 0.43
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.1 - 2.1
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.1 - 2.1
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.1 - 2.1
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.30E+00	0/2	3.91E+01	0/2	0/2	2.1 - 2.1
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.84 - 0.85
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.1 - 2.1
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.1 - 2.1
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.02E+02	0/2	1.81E+04	0/2	0/2	0.42 - 0.43
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.05E+03	0/2	1.22E+05	0/2	0/2	0.42 - 0.43
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.1 - 2.1
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.2.3. Subsurface Soil Historical Data Summary: SWMU 518 Field South of P1 Yard (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.42 - 0.43
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.01E+02	0/2	1.80E+04	0/2	0/2	0.42 - 0.43
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.87E+02	0/2	1.46E+04	0/2	0/2	0.42 - 0.43
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.17E-01	0/2	1.17E+01	0/2	0/2	0.42 - 0.43
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.24E+00	0/2	2.24E+02	0/2	0/2	0.42 - 0.43
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.22E-02	0/2	5.22E+00	0/2	0/2	0.42 - 0.43
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	2.1 - 2.1
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.42 - 0.43
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.1 - 2.1
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.49E+02	0/2	1.35E+04	0/2	0/2	0.42 - 0.43
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.92E-02	0/2	5.92E+00	0/2	0/2	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.89E-02	0/2	5.53E+00	0/2	0/2	0.006 - 0.006
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.48E+00	0/2	1.76E+02	0/2	0/2	0.006 - 0.006
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.013 - 0.013
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.013 - 0.013
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.013 - 0.013
VOA	Acetone	mg/kg	1.30E-01	1.30E-01	1.30E-01	0/2	1/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.013 - 0.013
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.98E-01	0/2	8.22E+01	0/2	0/2	0.006 - 0.006
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.013 - 0.013
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.2.3. Subsurface Soil Historical Data Summary: SWMU 518 Field South of P1 Yard (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.97E-01	0/2	5.76E+01	0/2	0/2	0.006 - 0.006
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.013 - 0.013
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.42E-01	0/2	2.49E+01	0/2	0/2	0.006 - 0.006
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.013 - 0.013
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.29E+00	0/2	3.84E+02	0/2	0/2	0.006 - 0.006
VOA	Methylene chloride	mg/kg	3.00E-03	5.00E-03	4.00E-03	2/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	2/2	0.006 - 0.006
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.82E-01	0/2	7.08E+01	0/2	0/2	0.006 - 0.006
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.006 - 0.006
VOA	Total Xylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.50E+01	0/2	1.07E+03	0/2	0/2	0.006 - 0.006
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.006 - 0.006
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.69E-02	0/2	4.98E+00	0/2	0/2	0.006 - 0.006
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.013 - 0.013
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.04E-01	0/2	4.83E+01	0/2	0/2	0.013 - 0.013

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

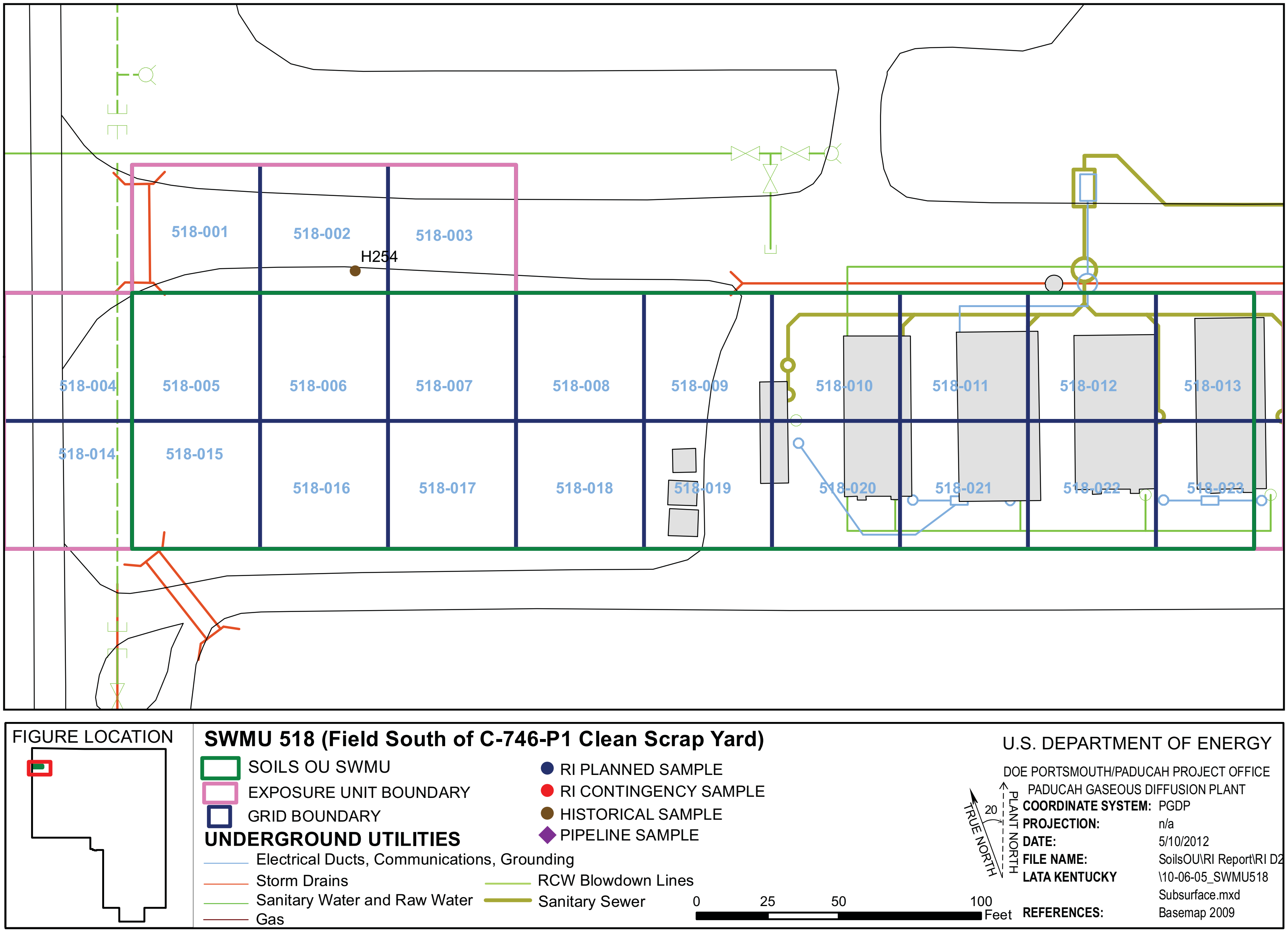


Figure 10.2.5. SWMU 518 Sample Locations - Subsurface Soil

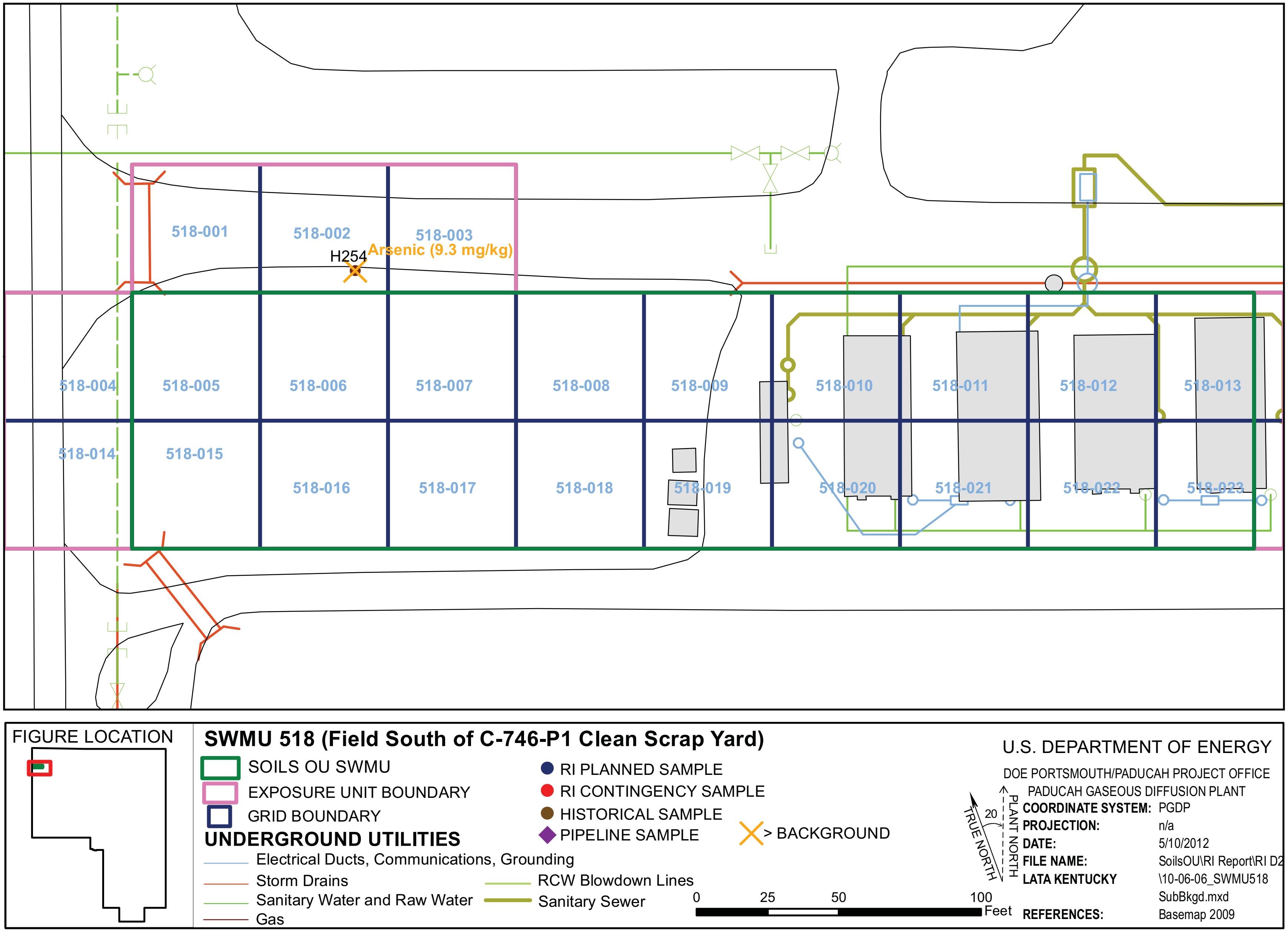


Figure 10.2.6. SWMU 518 Background Exceedances - Subsurface Soil

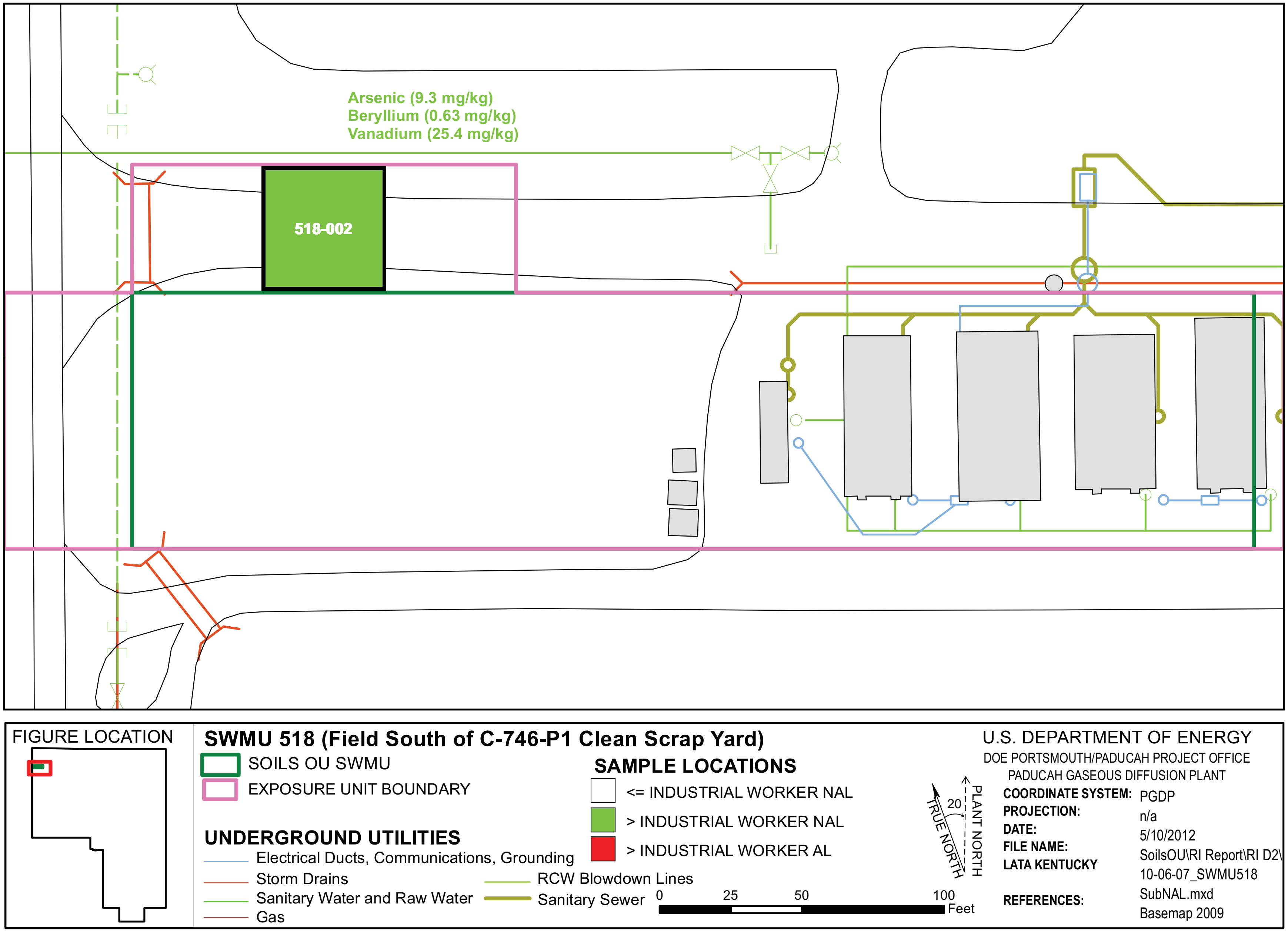


Figure 10.2.7. SWMU 518 NAL Exceedances - Subsurface Soil

Metals

Of the metals, arsenic in grid 2 was detected above both the background screening level and the industrial worker NAL. The detection was at 4 ft bgs. The end depth of the borehole taken from grid 2 was 6 ft bgs.

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 518 subsurface soil.

Arsenic was detected in the SWMU 518 subsurface soil above both the background screening level and the SSLs for the protection of UCRS groundwater in grid 2. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected in the SWMU 518 subsurface soil.

SVOCs

SVOCs were not detected in the SWMU 518 subsurface soil.

VOCs

No VOCs were detected above the industrial worker NALs or ALs in the SWMU 518 subsurface soil. Methylene chloride in grid 2 was detected above the SSLs for the protection of UCRS groundwater. No VOCs were detected above the SSLs for the protection of RGA groundwater.

Radionuclides

No radionuclides were detected above both the background screening levels and the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater.

10.2.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is potential for runoff because this SWMU is on the banks of one of the KPDES Outfall 001 ditches. Runoff is captured in the C-613 Sedimentation Basin prior to discharge at Outfall 001. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

10.2.6 Baseline Risk Assessment

Human Health. Potential risks for current/future human health for SWMU 518 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for SWMU 518 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 10.2.4 for the future industrial worker, the excavation worker, and the hypothetical resident. Table 10.2.4 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COC for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 518 include metals, PCBs and SVOCs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 10.2.5.

10.2.7 SWMU 518 Summary

The following text summarizes the results for SWMU 518 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

A plant process that could have contributed to contamination at SWMU 518 is temporary storage of heavy equipment.

COPCs for surface and subsurface soils from SWMU 518 are shown on Tables 10.2.1–10.2.3 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. The COPCs identified for SWMU 518 are metals, PCBs, SVOCs, VOCs, and radioisotopes for the surface soils and metals and VOCs for the subsurface soils. Contaminants were detected greater than background at a maximum of 4 ft bgs and greater than industrial worker NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 518 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There is potential for runoff because this SWMU is on the banks of one of the KPDES Outfall 001 ditches, which is controlled under interim corrective measures. This runoff is captured in the C-613 Sedimentation Basin prior to discharge into Outfall 001. There are no underground pipelines at SWMU 518. The CSM can be found in Appendix D.

Table 10.2.4. RGOs for SWMU 518

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^-6	1 x 10^-5	1 x 10^-4		0.1	1	3
Future Industrial Worker											
1	PCB, Total	6.30E-01	mg/kg	3.4E-06	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	3.90E+01	mg/kg	6.6E-04	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Cumulative			**6.6E-04**				**< 1**			
Excavation Worker											
1	Total PAH	3.90E+01	mg/kg	1.0E-05	3.88E+00	3.88E+01	3.88E+02	< 1	n/a	n/a	n/a
	Cumulative			**1.0E-05**				**< 1**			
Hypothetical Resident[5]											
1	Carbazole	1.17E+01	mg/kg	1.4E-06	8.66E+00	8.66E+01	8.66E+02	< 0.1	n/a	n/a	n/a
	Cobalt	6.80E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	2.30E+00	2.30E+01	6.91E+01
	PCB, Total	6.30E-01	mg/kg	9.9E-06	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Total PAH	3.90E+01	mg/kg	2.0E-03	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	2.17E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.9	2.34E+01	2.34E+02	7.01E+02
	Uranium-238	1.51E+00	pCi/g	4.4E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**2.0E-03**				**1.2**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.84, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.84, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 10.2.5 Ecological Screening for SWMU 518

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Soil/grass and gravel	No	476	HMW PAHs	n/a	1.70E+02	1.10E+00	155
			PCB, Total	n/a	1.64E+00	2.00E-02	82
			Selenium	8.00E-01	8.85E+00	5.20E-01	17
			Uranium	4.90E+00	1.00E+03	5.00E+00	200

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
HMW PAHs = high molecular weight PAHs [benz(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; chrysene; benzo(ghi)perylene; dibenz(a,h)anthracene; and indeno(1,2,3-cd)pyrene]
n/a = not applicable

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-6 and 1, respectively, for the future industrial worker, the excavation worker, and hypothetical residential scenarios. COCs for these scenarios for SWMU 518 are as follows:

- Future Industrial Worker
  - Total PAHs
  - Total PCBs
- Excavation worker
  - Total PAHs
- Hypothetical Resident (hazards evaluated against the child resident)
  - Carbazole
  - Cobalt
  - Total PAHs
  - Total PCBs
  - Uranium
  - Uranium-238

Of the above, Total PAHs for the future industrial worker and the hypothetical resident is a priority COC (i.e., HQ > 1 or chemical-specific ELCR > 1E-04). Priority COCs for other scenarios are described in Appendix D. Figure 10.2.8 also shows the COCs exceeding RGOs for the future industrial worker.

For SWMU 518, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- High molecular weight PAHs
- Total PCBs
- Selenium
- Uranium

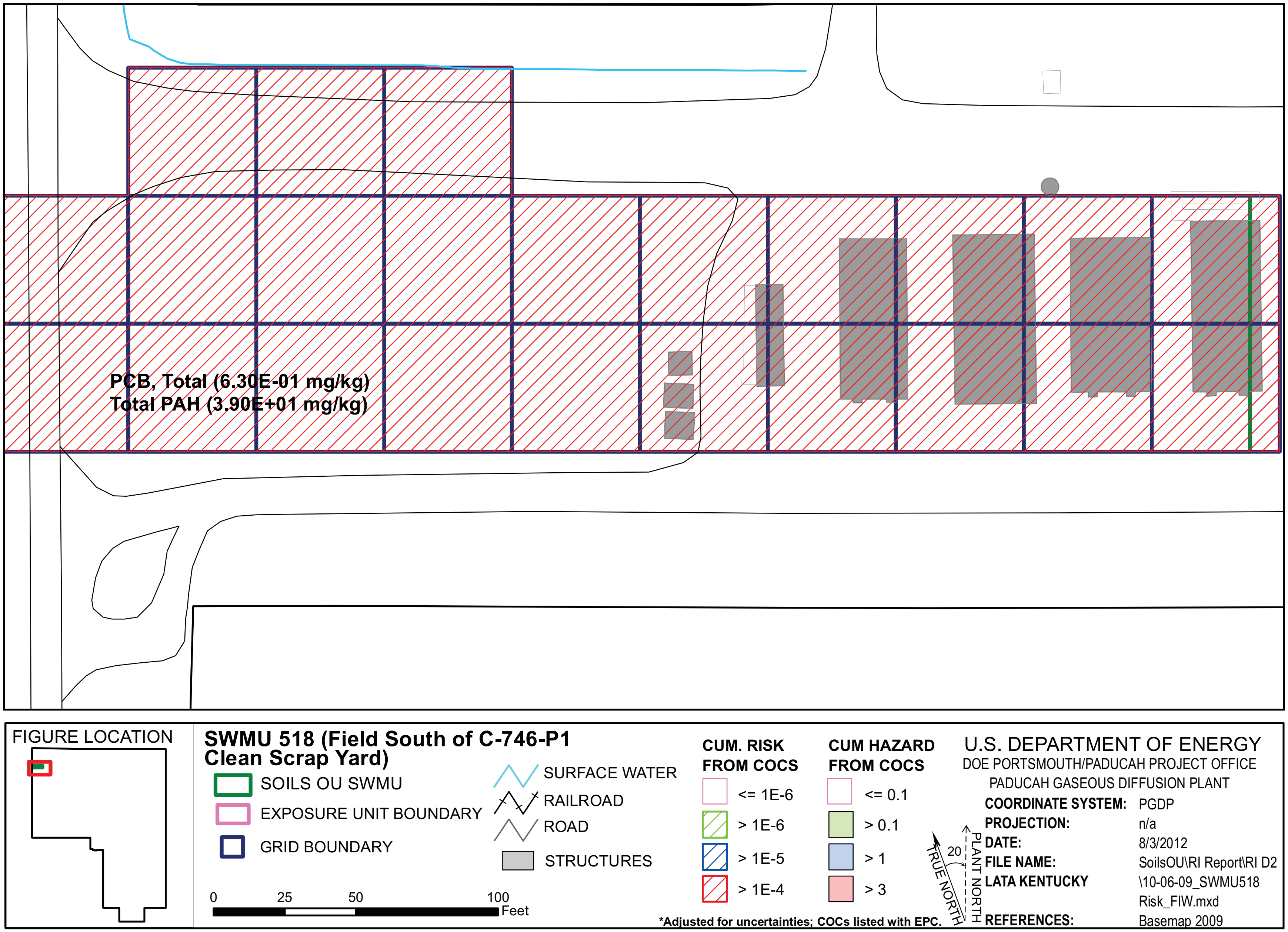


Figure 10.2.8. Summary of COCs Contributing to Risk to the Future Industrial Worker at SWMU 518

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 518 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 518 is next to SWMUs 5, 13, and 229. SWMU 5, the C-746-F Burial Ground, and SWMU 13, the C-746-P Clean Scrap Yard, are part of the BGOU. SWMU 229 DMSA OS-18, is part of this Soils OU and is discussed in the Storage Areas chapter. A response action at SWMU 518 would not have an impact on integrator OUs.

10.2.8 SWMU 518 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 518; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker, excavation worker, and hypothetical resident (DOE 2010a). The reasonably anticipated future land use of this SWMU is industrial as shown in the SMP (DOE 2012a).

10.3 SWMU 520, C-746-A SCRAP MATERIAL WEST OF C-746-A

10.3.1 Background

The scrap material west of C-746-A (SWMU 520) is located in the northwestern portion of PGDP. SWMU 520 is approximately 152,000 ft^2. This SWMU has been used as a storage area for old equipment and materials since the 1970s. Materials stored in this area include old pallets, old equipment (such as tow motors, forklifts, welding rigs and fixtures, vehicles, and vehicle trailers), and wooden saddles from the cylinder yards.

Annual surveys of the perimeter of this area are performed. The area currently is posted as a radioactive materials area, although no known releases have occurred.

10.3.2 Fieldwork Summary

One-hundred forty grid samples were planned and 120 were collected for the unit. Field laboratory results indicated that contingency samples were needed to determine the lateral and vertical extent of contamination because of elevated concentrations of cadmium, copper, manganese, nickel, uranium, and zinc. Six out of six contingency samples were collected. Twenty of the grid samples were not collected because of the presence of utilities, standing water, and rubble. Figure A.18 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 10.3.1) using a FIDLER; the 4,431 measurements ranged from 4,312 to 29,159 gross cpm. This area is covered mostly with gravel, but it has some soil and grass patches. A judgmental grab sample was collected for radiological constituents. Areas inaccessible for survey were due to standing water, railroad debris, and facility operations.

10.3.3 Nature and Extent of Contamination—Surface Soils

For SWMU 520, the representative data set for surface soils is presented in Tables 10.3.1 and 10.3.2 and provides the nature of the contamination in SWMU 520 surface soils. Figures 10.3.2–10.3.4 illustrate the horizontal extent. A complete list of sampling results is presented in Appendix G. Grid numbers shown

Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.339	0.021	pCi/g	0.058
Cesium-137	1.61	0.06	pCi/g	0.13
Neptunium-237	1.1	0.02	pCi/g	0.14
Plutonium-238	0.04	0.023	pCi/g	0.021
Plutonium-239/240	1.23	0.02	pCi/g	0.1
Technetium-99	7.93	0.45	pCi/g	0.55
Thorium-228	0.43	0.2	pCi/g	0.22
Thorium-230	18.7	0.2	pCi/g	1.3
Thorium-232	0.56	0.17	pCi/g	0.24
Uranium 235	0.75		pCi/g	0.39
Uranium-234	3.27	0.02	pCi/g	0.18
Uranium-235/236	0.19	0.022	pCi/g	0.049
Uranium-238	6.14	0.02	pCi/g	0.25
Uranium	18.4	0.05	mg/kg	

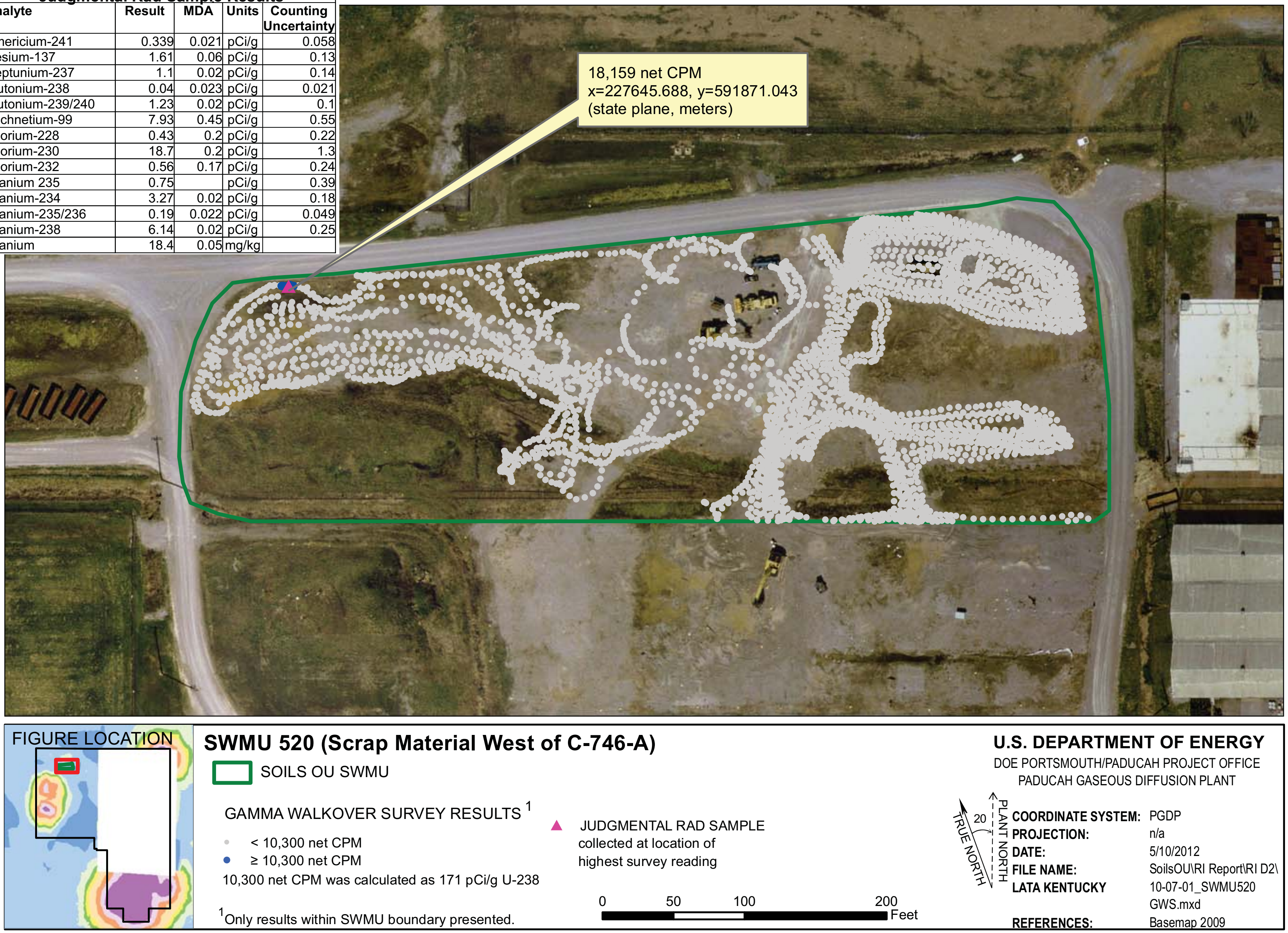


Figure 10.3.1. SWMU 520 Gamma Walkover Survey

Table 10.3.1. Surface Soil Historical Data Summary: SWMU 520 C-746-A Scrap Metal

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	3.75E+03	1.06E+04	7.53E+03	0/8	8/8	0/8	1.30E+04	0/8	3.32E+04	0/8	3.97E+06	0/8	8/8	18.6 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	2.10E-01	0/8	2.53E+00	0/8	1.51E+03	0/8	0/8	9.3 - 20
METAL	Arsenic	mg/kg	3.96E+00	6.38E+00	5.17E+00	0/8	2/8	0/8	1.20E+01	2/8	9.97E-01	0/8	9.97E+01	0/8	2/8	0.93 - 5
METAL	Barium	mg/kg	4.83E+01	9.84E+01	7.51E+01	0/8	8/8	0/8	2.00E+02	0/8	5.92E+02	0/8	3.78E+05	0/8	3/8	1 - 2.5
METAL	Beryllium	mg/kg	5.05E-01	6.70E-01	5.71E-01	0/8	3/8	0/8	6.70E-01	3/8	1.40E-02	0/8	9.22E+00	0/8	0/8	0.46 - 0.5
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	2.10E-01	0/8	3.16E+00	0/8	3.16E+02	0/8	0/8	1.86 - 2
METAL	Calcium	mg/kg	9.32E+02	1.46E+05	3.03E+04	0/8	8/8	0/8	2.00E+05	0/8	n/a	0/8	n/a	n/a	n/a	50 - 2000
METAL	Chromium	mg/kg	4.46E+00	1.44E+01	9.39E+00	0/8	8/8	0/8	1.60E+01	0/8	3.02E+01	0/8	3.02E+03	0/8	0/8	2 - 2.5
METAL	Cobalt	mg/kg	2.63E+00	6.07E+00	4.10E+00	0/8	8/8	0/8	1.40E+01	0/8	1.05E+01	0/8	1.52E+03	8/8	8/8	1 - 2.5
METAL	Copper	mg/kg	5.70E+00	2.13E+01	9.71E+00	0/8	8/8	1/8	1.90E+01	0/8	1.43E+03	0/8	2.24E+05	0/8	0/8	2 - 2.5
METAL	Iron	mg/kg	6.70E+03	1.56E+04	1.04E+04	0/8	8/8	0/8	2.80E+04	0/8	2.51E+04	0/8	3.92E+06	8/8	8/8	5 - 186
METAL	Lead	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	3.60E+01	0/8	4.00E+02	0/8	4.00E+02	0/8	0/8	18.6 - 20
METAL	Lithium	mg/kg	5.53E+00	8.08E+00	6.59E+00	0/6	6/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	5 - 5
METAL	Magnesium	mg/kg	3.89E+02	3.34E+03	1.61E+03	0/8	8/8	0/8	7.70E+03	0/8	n/a	0/8	n/a	n/a	n/a	2.5 - 15
METAL	Manganese	mg/kg	2.33E+02	5.34E+02	3.46E+02	0/8	8/8	0/8	1.50E+03	0/8	2.58E+03	0/8	1.16E+05	8/8	8/8	1 - 2.5
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	2.00E-01	0/8	9.00E-01	0/8	7.85E+02	0/8	0/8	0.06 - 0.2
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.79E+02	0/1	2.80E+04	0/1	0/1	2.33 - 2.33
METAL	Nickel	mg/kg	6.07E+00	4.32E+01	1.14E+01	0/8	8/8	1/8	2.10E+01	1/8	4.28E+01	0/8	3.18E+04	0/8	8/8	4.65 - 5
METAL	Potassium	mg/kg	1.66E+02	5.78E+02	3.72E+02	0/2	2/2	0/2	1.30E+03	0/2	n/a	0/2	n/a	n/a	n/a	93 - 100
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	8.00E-01	0/8	1.79E+02	0/8	2.80E+04	0/8	0/8	1 - 18.6
METAL	Silver	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	2.30E+00	0/8	1.08E+01	0/8	9.15E+03	0/8	0/8	2.33 - 4
METAL	Sodium	mg/kg	2.31E+02	2.31E+02	2.31E+02	0/2	1/2	0/2	3.20E+02	0/2	n/a	0/2	n/a	n/a	n/a	93 - 200
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	2.10E-01	0/8	2.87E+00	0/8	4.48E+02	0/8	0/8	15 - 20
METAL	Tin	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	100 - 1000
METAL	Uranium	mg/kg	1.14E+02	1.14E+02	1.14E+02	0/7	1/7	1/7	4.90E+00	1/7	1.07E+02	0/7	1.65E+04	0/7	1/7	0.13 - 1000
METAL	Vanadium	mg/kg	1.41E+01	2.48E+01	2.06E+01	0/8	8/8	0/8	3.80E+01	8/8	1.51E-01	0/8	9.30E+01	8/8	8/8	2 - 2.5
METAL	Zinc	mg/kg	1.94E+01	1.28E+02	3.94E+01	0/8	7/8	1/8	6.50E+01	0/8	1.08E+04	0/8	1.68E+06	0/8	6/8	10 - 18.6
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	1.88E-01	0/13	1.88E+01	0/13	0/13	0.1 - 0.13
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.46 - 0.5
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.46 - 0.5
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.46 - 0.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.49
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	1.30E+00	0/7	3.91E+01	0/7	0/7	0.46 - 0.5
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Methylphenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.3.1. Surface Soil Historical Data Summary: SWMU 520 C-746-A Scrap Metal (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	6.02E+02	0/8	1.81E+04	0/8	0/8	0.46 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	n/a	0/8	n/a	n/a	n/a	0.46 - 0.5
SVOA	Anthracene	mg/kg	1.56E-01	1.56E-01	1.56E-01	1/8	1/8	0/8	n/a	0/8	4.05E+03	0/8	1.22E+05	0/8	0/8	0.46 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	1.24E-01	1.24E-01	1.24E-01	1/8	1/8	0/8	n/a	0/8	n/a	0/8	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	4.20E-01	4.20E-01	4.20E-01	1/7	1/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.46 - 0.5
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.49
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	2.75E+01	0/7	2.75E+03	n/a	n/a	0.46 - 0.5
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	Fluoranthene	mg/kg	6.36E-01	6.36E-01	6.36E-01	0/2	1/2	0/2	n/a	0/2	6.01E+02	0/2	1.80E+04	0/2	0/2	0.49 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	4.87E+02	0/8	1.46E+04	0/8	0/8	0.46 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.5 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	2.24E+00	0/8	2.24E+02	0/8	0/8	0.46 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	5.22E-02	0/7	5.22E+00	0/7	0/7	0.46 - 0.5
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.46 - 0.5
SVOA	Phenanthrene	mg/kg	4.61E-01	4.61E-01	4.61E-01	1/8	1/8	0/8	n/a	0/8	n/a	0/8	n/a	n/a	n/a	0.46 - 0.5
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pyrene	mg/kg	6.63E-01	6.63E-01	6.63E-01	0/8	1/8	0/8	n/a	0/8	4.49E+02	0/8	1.35E+04	0/8	1/8	0.46 - 0.5
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.49
SVOA	Total PAH	mg/kg	4.97E-01	4.97E-01	4.97E-01	0/8	1/8	0/8	n/a	1/8	5.92E-02	0/8	5.92E+00	1/8	1/8	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.005 - 0.01
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.01 - 0.01
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.89E-02	0/6	5.53E+00	0/6	0/6	0.01 - 0.01
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.01 - 0.01
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.01 - 0.01
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	2.38E+02	0/6	8.21E+03	0/6	0/6	0.01 - 0.01
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.01 - 0.01
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.01 - 0.01
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.01 - 0.01
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.01 - 0.01
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	6.98E-01	0/6	8.22E+01	0/6	0/6	0.01 - 0.01
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.97E-01	0/6	5.76E+01	0/6	0/6	0.01 - 0.01
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.01 - 0.01
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	3.29E+00	0/6	3.84E+02	0/6	0/6	0.01 - 0.01
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	3.50E+01	0/6	1.07E+03	0/6	0/6	0.02 - 0.02

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.3.1. Surface Soil Historical Data Summary: SWMU 520 C-746-A Scrap Metal (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.01 - 0.01
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.01 - 0.01
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	2.82E-01	0/6	7.08E+01	0/6	0/6	0.01 - 0.01
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.01 - 0.01
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	1.07E+01	0/6	3.42E+02	0/6	0/6	0.01 - 0.01
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.01 - 0.01
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	4.69E-02	0/7	4.98E+00	0/7	0/7	0.005 - 0.01
RADS	Americium-241	pCi/g	-2.11E-02	5.94E-02	1.26E-02	3/7	7/7	0/7	n/a	0/7	5.01E+00	0/7	5.01E+02	0/7	0/7	0.02 - 0.128
RADS	Cesium-134	pCi/g	-5.35E-03	3.02E-03	-2.07E-03	3/6	6/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.0139 - 0.0193
RADS	Cesium-137	pCi/g	-6.57E-03	5.23E-02	1.84E-02	3/7	7/7	0/7	4.90E-01	0/7	8.61E-02	0/7	8.61E+00	0/7	0/7	0.0166 - 0.06
RADS	Cobalt-60	pCi/g	-1.53E-02	5.20E-03	-2.30E-03	3/7	7/7	0/7	n/a	0/7	1.77E-02	0/7	1.77E+00	0/7	0/7	0.0141 - 0.05
RADS	Neptunium-237	pCi/g	-1.24E-02	2.50E-02	6.15E-03	3/7	7/7	0/7	1.00E-01	0/7	2.71E-01	0/7	2.71E+01	0/7	4/7	0.02 - 0.0483
RADS	Plutonium-238	pCi/g	-4.59E-02	7.58E-03	-2.04E-02	0/7	7/7	0/7	7.30E-02	0/7	1.09E+01	0/7	1.09E+03	0/7	0/7	0.04 - 0.275
RADS	Plutonium-239/240	pCi/g	-8.22E-03	7.71E-03	-4.65E-04	0/7	7/7	0/7	2.50E-02	0/7	1.07E+01	0/7	1.07E+03	0/7	0/7	0.02 - 0.0724
RADS	Technetium-99	pCi/g	6.59E-01	3.85E+00	2.30E+00	0/8	8/8	4/8	2.50E+00	0/8	3.61E+02	0/8	3.61E+04	0/8	8/8	2.57 - 4.63
RADS	Thorium-228	pCi/g	2.23E-01	4.06E-01	3.27E-01	0/7	7/7	0/7	1.60E+00	0/7	n/a	0/7	n/a	n/a	n/a	0.0698 - 0.16
RADS	Thorium-230	pCi/g	2.01E-01	4.39E-01	3.38E-01	0/7	7/7	0/7	1.50E+00	0/7	1.38E+01	0/7	1.38E+03	0/7	5/7	0.172 - 0.301
RADS	Thorium-232	pCi/g	2.10E-01	4.57E-01	3.51E-01	0/7	7/7	0/7	1.50E+00	0/7	n/a	0/7	n/a	n/a	n/a	0.04 - 0.198
RADS	Uranium-234	pCi/g	1.40E-01	1.35E+00	6.43E-01	6/7	7/7	1/7	1.20E+00	0/7	1.89E+01	0/7	1.89E+03	0/7	0/7	0.08 - 0.92
RADS	Uranium-235	pCi/g	1.41E-03	7.50E-02	3.90E-02	3/7	7/7	1/7	6.00E-02	0/7	3.95E-01	0/7	3.95E+01	0/7	0/7	0.02 - 0.0356
RADS	Uranium-238	pCi/g	1.59E-01	1.38E+00	8.84E-01	6/7	7/7	1/7	1.20E+00	0/7	1.70E+00	0/7	1.70E+02	0/7	0/7	0.04 - 0.634

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.3.2. Surface Soil RI Data Summary: SWMU 520 Scrap Material West of C-746-A

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	2.57E+03	6.24E+03	4.98E+03	0/5	5/5	0/5	1.30E+04	0/5	3.32E+04	0/5	3.97E+06	0/5	5/5	5.1 - 5.5
METAL	Antimony	mg/kg	2.90E-01	9.60E-01	5.00E-01	0/5	5/5	5/5	2.10E-01	0/5	2.53E+00	0/5	1.51E+03	0/5	5/5	0.51 - 0.55
METAL	Arsenic	mg/kg	3.90E+00	1.04E+01	7.26E+00	0/64	14/64	0/64	1.20E+01	14/64	9.97E-01	0/64	9.97E+01	0/64	14/64	1 - 11
METAL	Barium	mg/kg	6.80E+01	9.13E+01	7.68E+01	0/5	5/5	0/5	2.00E+02	0/5	5.92E+02	0/5	3.78E+05	0/5	2/5	2.1 - 2.2
METAL	Beryllium	mg/kg	1.90E-01	4.50E-01	3.06E-01	0/5	5/5	0/5	6.70E-01	5/5	1.40E-02	0/5	9.22E+00	0/5	0/5	0.1 - 0.11
METAL	Cadmium	mg/kg	4.40E-01	6.00E-01	4.92E-01	0/5	5/5	5/5	2.10E-01	0/5	3.16E+00	0/5	3.16E+02	0/5	5/5	0.051 - 0.055
METAL	Calcium	mg/kg	2.20E+05	2.82E+05	2.64E+05	0/5	5/5	5/5	2.00E+05	0/5	n/a	0/5	n/a	n/a	n/a	514 - 1300
METAL	Chromium	mg/kg	1.25E+01	6.67E+01	2.68E+01	0/64	13/64	11/64	1.60E+01	8/64	3.02E+01	0/64	3.02E+03	0/64	0/64	1 - 85
METAL	Cobalt	mg/kg	2.30E+00	5.70E+00	4.12E+00	0/5	5/5	0/5	1.40E+01	0/5	1.05E+01	0/5	1.52E+03	5/5	5/5	0.21 - 0.22
METAL	Copper	mg/kg	6.90E+00	2.43E+02	4.84E+01	0/64	20/64	15/64	1.90E+01	0/64	1.43E+03	0/64	2.24E+05	0/64	6/64	1 - 35
METAL	Iron	mg/kg	2.59E+03	3.26E+04	1.12E+04	0/64	64/64	1/64	2.80E+04	1/64	2.51E+04	0/64	3.92E+06	64/64	64/64	5.1 - 100
METAL	Lead	mg/kg	8.66E+00	2.71E+01	1.59E+01	0/64	58/64	0/64	3.60E+01	0/64	4.00E+02	0/64	4.00E+02	0/64	33/64	0.31 - 13
METAL	Magnesium	mg/kg	5.49E+03	1.93E+04	1.33E+04	0/5	5/5	3/5	7.70E+03	0/5	n/a	0/5	n/a	n/a	n/a	51.3 - 55
METAL	Manganese	mg/kg	7.95E+01	1.76E+03	2.63E+02	0/64	64/64	1/64	1.50E+03	0/64	2.58E+03	0/64	1.16E+05	61/64	64/64	0.21 - 85
METAL	Mercury	mg/kg	2.05E-02	1.19E+01	3.50E+00	0/64	8/64	4/64	2.00E-01	4/64	9.00E-01	0/64	7.85E+02	4/64	4/64	0.0342 - 10
METAL	Molybdenum	mg/kg	7.30E-01	1.30E+00	1.04E+00	0/64	5/64	0/64	n/a	0/64	1.79E+02	0/64	2.80E+04	0/64	5/64	0.51 - 15
METAL	Nickel	mg/kg	1.61E+01	8.10E+02	2.10E+02	0/64	41/64	40/64	2.10E+01	39/64	4.28E+01	0/64	3.18E+04	36/64	41/64	0.51 - 65
METAL	Selenium	mg/kg	8.30E-01	4.55E+00	2.03E+00	0/64	7/64	7/64	8.00E-01	0/64	1.79E+02	0/64	2.80E+04	0/64	7/64	0.51 - 20
METAL	Silver	mg/kg	4.40E-02	1.40E+01	3.67E+00	0/64	9/64	4/64	2.30E+00	4/64	1.08E+01	0/64	9.15E+03	4/64	9/64	0.21 - 10
METAL	Sodium	mg/kg	1.31E+02	2.27E+02	1.84E+02	0/5	5/5	0/5	3.20E+02	0/5	n/a	0/5	n/a	n/a	n/a	20.5 - 22
METAL	Thallium	mg/kg	1.00E-01	3.40E-01	1.76E-01	0/5	5/5	1/5	2.10E-01	0/5	2.87E+00	0/5	4.48E+02	0/5	3/5	0.21 - 0.22
METAL	Uranium	mg/kg	3.22E+00	6.08E+01	1.51E+01	0/65	32/65	31/65	4.90E+00	0/65	1.07E+02	0/65	1.65E+04	0/65	13/65	0.04 - 20
METAL	Vanadium	mg/kg	8.10E+00	2.60E+01	1.63E+01	0/5	5/5	0/5	3.80E+01	5/5	1.51E-01	0/5	9.30E+01	5/5	5/5	1 - 1.1
METAL	Zinc	mg/kg	3.05E+01	3.73E+02	7.73E+01	0/64	64/64	35/64	6.50E+01	0/64	1.08E+04	0/64	1.68E+06	0/64	64/64	2.1 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/63	0/63	0/63	n/a	0/63	1.88E-01	0/63	1.88E+01	0/63	0/63	0.31 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	0/5	0/5	0.34 - 0.36
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	0/5	0/5	0.34 - 0.36
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	0/5	0/5	0.34 - 0.36
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.6 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.6 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	1.30E+00	0/5	3.91E+01	0/5	0/5	1.6 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.6 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.6 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.6 - 1.8
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	6.02E+02	0/5	1.81E+04	0/5	0/5	0.34 - 0.36
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Anthracene	mg/kg	7.30E-02	8.50E-02	7.90E-02	2/5	2/5	0/5	n/a	0/5	4.05E+03	0/5	1.22E+05	0/5	0/5	0.34 - 0.36
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.3.2. Surface Soil RI Data Summary: SWMU 520 Scrap Material West of C-746-A (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzo(ghi)perylene	mg/kg	3.70E-02	2.70E-01	1.34E-01	4/5	4/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.6 - 1.8
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.0068 - 0.0073
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	7.20E-02	1.00E-01	8.60E-02	2/5	2/5	0/5	n/a	0/5	n/a	0/5	n/a	0/5	0/5	0.34 - 0.36
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Fluoranthene	mg/kg	3.90E-02	6.90E-01	3.34E-01	3/5	5/5	0/5	n/a	0/5	6.01E+02	0/5	1.80E+04	0/5	0/5	0.34 - 0.36
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	4.87E+02	0/5	1.46E+04	0/5	0/5	0.34 - 0.36
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	1.17E-01	0/5	1.17E+01	0/5	0/5	0.34 - 0.36
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.6 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.68 - 0.73
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	2.24E+00	0/5	2.24E+02	0/5	0/5	0.34 - 0.36
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.6 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	5.22E-02	0/5	5.22E+00	0/5	0/5	0.0068 - 0.0073
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	0/5	0/5	1.6 - 1.8
SVOA	Phenanthrene	mg/kg	5.90E-02	3.20E-01	2.16E-01	3/5	3/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.34 - 0.36
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	1.6 - 1.8
SVOA	Pyrene	mg/kg	3.80E-02	6.00E-01	2.83E-01	3/5	5/5	0/5	n/a	0/5	4.49E+02	0/5	1.35E+04	0/5	0/5	0.34 - 0.36
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/5	0/5	0/5	n/a	0/5	n/a	0/5	n/a	n/a	n/a	0.68 - 0.73
SVOA	Total PAH	mg/kg	3.18E-02	5.52E-01	2.31E-01	0/5	5/5	0/5	n/a	4/5	5.92E-02	0/5	5.92E+00	2/5	5/5	-
RADS	Alpha activity	pCi/g	1.90E+01	1.01E+02	3.48E+01	0/6	6/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	4.7 - 6
RADS	Americium-241	pCi/g	-3.70E-03	3.39E-01	7.53E-02	0/6	6/6	0/6	n/a	0/6	5.01E+00	0/6	5.01E+02	0/6	1/6	0.012 - 0.022
RADS	Beta activity	pCi/g	1.31E+01	6.43E+01	3.32E+01	0/6	6/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	2.5 - 4
RADS	Cesium-137	pCi/g	7.00E-03	1.61E+00	3.04E-01	0/6	6/6	1/6	4.90E-01	1/6	8.61E-02	0/6	8.61E+00	0/6	0/6	0.051 - 0.094
RADS	Neptunium-237	pCi/g	1.00E-03	1.10E+00	3.53E-01	0/6	6/6	4/6	1.00E-01	2/6	2.71E-01	0/6	2.71E+01	2/6	5/6	0.02 - 0.067
RADS	Plutonium-238	pCi/g	3.00E-03	4.00E-02	1.40E-02	0/6	6/6	0/6	7.30E-02	0/6	1.09E+01	0/6	1.09E+03	0/6	0/6	0.016 - 0.027
RADS	Plutonium-239/240	pCi/g	3.60E-03	1.23E+00	2.87E-01	0/6	6/6	2/6	2.50E-02	0/6	1.07E+01	0/6	1.07E+03	0/6	2/6	0.007 - 0.021
RADS	Technetium-99	pCi/g	2.70E-01	7.93E+00	2.82E+00	0/6	6/6	2/6	2.50E+00	0/6	3.61E+02	0/6	3.61E+04	0/6	5/6	0.34 - 0.48
RADS	Thorium-228	pCi/g	1.48E-01	5.10E-01	3.76E-01	0/6	6/6	0/6	1.60E+00	0/6	n/a	0/6	n/a	n/a	n/a	0.021 - 0.2
RADS	Thorium-230	pCi/g	6.58E-01	1.87E+01	3.79E+00	0/6	6/6	1/6	1.50E+00	1/6	1.38E+01	0/6	1.38E+03	1/6	6/6	0.017 - 0.2
RADS	Thorium-232	pCi/g	1.34E-01	6.00E-01	3.96E-01	0/6	6/6	0/6	1.50E+00	0/6	n/a	0/6	n/a	n/a	n/a	0.012 - 0.17
RADS	Uranium-234	pCi/g	9.20E-01	3.69E+00	1.87E+00	0/6	6/6	3/6	1.20E+00	0/6	1.89E+01	0/6	1.89E+03	0/6	0/6	0.02 - 0.03
RADS	Uranium-235/236	pCi/g	4.30E-02	2.42E-01	1.14E-01	0/6	6/6	4/6	6.00E-02	0/6	3.95E-01	0/6	3.95E+01	0/6	0/6	0.009 - 0.024
RADS	Uranium-238	pCi/g	1.07E+00	6.26E+00	3.09E+00	0/6	6/6	5/6	1.20E+00	3/6	1.70E+00	0/6	1.70E+02	0/6	2/6	0.01 - 0.02

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

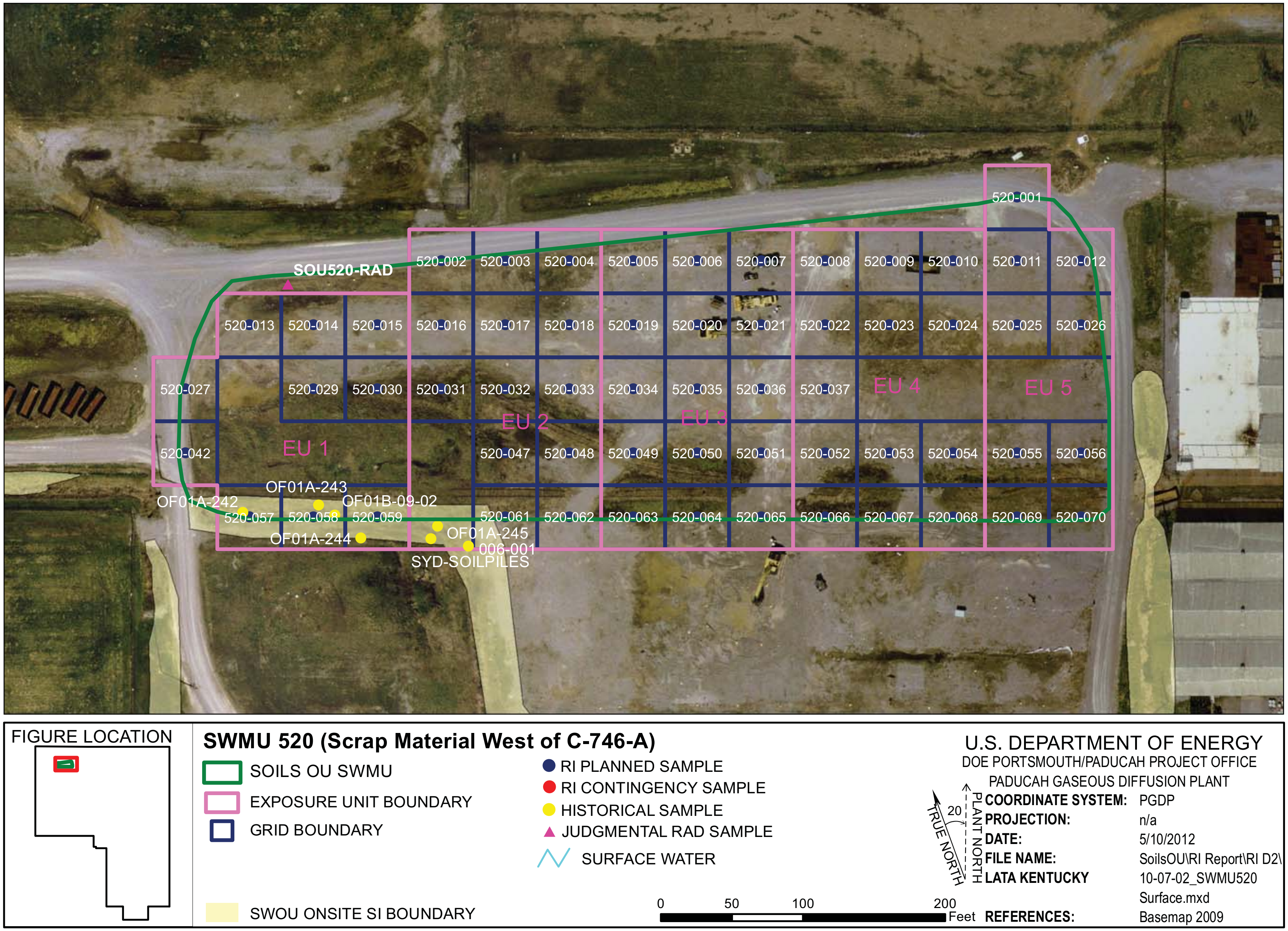


Figure 10.3.2. SWMU 520 Sample Locations - Surface Soil

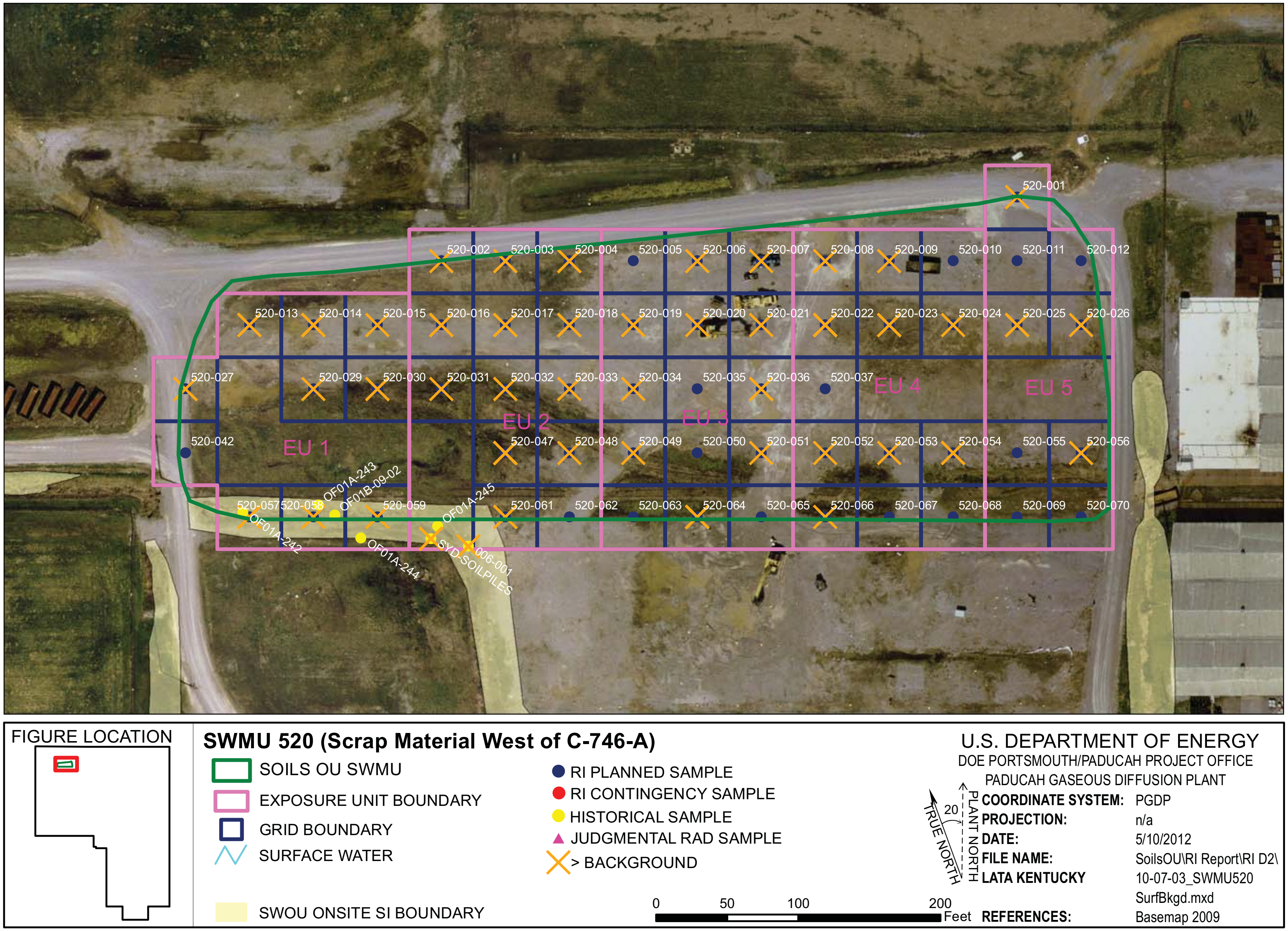


Figure 10.3.3. SWMU 520 Background Exceedances - Surface Soil

Station	Results Exceeding Background
006-001	Copper 21.3 (mg/kg) Nickel 43.2 (mg/kg) Zinc 128 (mg/kg) Technetium-99 2.76 (pCi/g)

Station	Results Exceeding Background
SOU520-001	Nickel 220.42 (mg/kg)

Station	Results Exceeding Background
SOU520-002	Nickel 131.39 (mg/kg) Uranium 8.45 (mg/kg) Zinc 67.06 (mg/kg)

Station	Results Exceeding Background
SOU520-003	Chromium 36.67 (mg/kg) Copper 37.58 (mg/kg) Nickel 240.66 (mg/kg) Zinc 71.65 (mg/kg)

Station	Results Exceeding Background
SOU520-004	Copper 43.04 (mg/kg) Nickel 142.44 (mg/kg) Uranium 13.09 (mg/kg) Zinc 94.97 (mg/kg)

Station	Results Exceeding Background
SOU520-005	Zinc 69.84 (mg/kg)

Station	Results Exceeding Background
SOU520-006	Nickel 180.82 (mg/kg) Uranium 8.77 (mg/kg) Zinc 129.86 (mg/kg)

Station	Results Exceeding Background
SOU520-007	Copper 136.38 (mg/kg) Nickel 325.66 (mg/kg) Uranium 14.44 (mg/kg) Zinc 105.23 (mg/kg)

Station	Results Exceeding Background
SOU520-008	Copper 242.69 (mg/kg) Nickel 587.23 (mg/kg) Uranium 48.82 (mg/kg) Zinc 173.69 (mg/kg)

Station	Results Exceeding Background
SOU520-009	Nickel 72.55 (mg/kg) Zinc 372.55 (mg/kg)

Station	Results Exceeding Background
SOU520-010	Zinc 73.35 (mg/kg)

Station	Results Exceeding Background
SOU520-013	Iron 32605.35 (mg/kg) Nickel 235.68 (mg/kg) Uranium 10.53 (mg/kg) Zinc 77.66 (mg/kg)

Station	Results Exceeding Background
SOU520-014	Nickel 76.65 (mg/kg)

Station	Results Exceeding Background
SOU520-015	Copper 38.01 (mg/kg) Nickel 247.93 (mg/kg) Zinc 69.24 (mg/kg)

Station	Results Exceeding Background
SOU520-016	Copper 54.97 (mg/kg) Manganese 1761.69 (mg/kg) Nickel 344.16 (mg/kg) Uranium 18.8 (mg/kg) Zinc 78.44 (mg/kg)

Station	Results Exceeding Background
SOU520-017	Mercury 11.88 (mg/kg) Nickel 452.47 (mg/kg) Uranium 9.3 (mg/kg) Zinc 98.05 (mg/kg)

Station	Results Exceeding Background
SOU520-018	Chromium 66.65 (mg/kg) Copper 65.54 (mg/kg) Nickel 809.76 (mg/kg) Uranium 28.68 (mg/kg) Zinc 92.24 (mg/kg)

Station	Results Exceeding Background
SOU520-019	Chromium 36.39 (mg/kg) Copper 239.62 (mg/kg) Nickel 630.99 (mg/kg) Uranium 28.18 (mg/kg) Zinc 73.8 (mg/kg)

Station	Results Exceeding Background
SOU520-020	Chromium 39.68 (mg/kg) Zinc 67.97 (mg/kg)

Station	Results Exceeding Background
SOU520-021	Nickel 148.63 (mg/kg) Zinc 146.19 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.3.3. SWMU 520 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU520-022	Antimony 0.44 (mg/kg)
	Cadmium 0.47 (mg/kg)
	Calcium 278000 (mg/kg)
	Magnesium 16200 (mg/kg)
	Nickel 138.9 (mg/kg)
	Selenium 4.55 (mg/kg)
	Silver 12.25 (mg/kg)
	Uranium 18.8 (mg/kg)
	Zinc 144.34 (mg/kg)
	Neptunium-237 0.74 (pCi/g)
	Plutonium-239/240 0.459 (pCi/g)
	Technetium-99 4.85 (pCi/g)
	Uranium-234 3.69 (pCi/g)
	Uranium-235/236 0.242 (pCi/g)
	Uranium-238 6.26 (pCi/g)

Station	Results Exceeding Background
SOU520-023	Chromium 33.53 (mg/kg)
	Mercury 9.69 (mg/kg)
	Nickel 155.17 (mg/kg)
	Uranium 11.83 (mg/kg)
	Zinc 77.03 (mg/kg)

Station	Results Exceeding Background
SOU520-024	Nickel 97.79 (mg/kg)
	Zinc 83.16 (mg/kg)

Station	Results Exceeding Background
SOU520-025	Antimony 0.96 (mg/kg)
	Cadmium 0.48 (mg/kg)
	Calcium 272000 (mg/kg)
	Chromium 21 (mg/kg)
	Selenium 0.88 (mg/kg)
	Thallium 0.34 (mg/kg)
	Uranium 5.1 (mg/kg)
	Zinc 73.64 (mg/kg)
	Neptunium-237 0.155 (pCi/g)
	Uranium-238 1.45 (pCi/g)

Station	Results Exceeding Background
SOU520-026	Nickel 98.2 (mg/kg)
	Uranium 8.68 (mg/kg)

Station	Results Exceeding Background
SOU520-027	Nickel 105.34 (mg/kg)
	Silver 13.95 (mg/kg)

Station	Results Exceeding Background
SOU520-029	Copper 36.22 (mg/kg)
	Nickel 115.18 (mg/kg)
	Zinc 71.44 (mg/kg)

Station	Results Exceeding Background
SOU520-030	Mercury 9.53 (mg/kg)
	Nickel 96.95 (mg/kg)
	Selenium 4.48 (mg/kg)
	Uranium 22.94 (mg/kg)

Station	Results Exceeding Background
SOU520-031	Copper 29.94 (mg/kg)
	Nickel 113.23 (mg/kg)
	Uranium 60.81 (mg/kg)

Station	Results Exceeding Background
SOU520-032	Nickel 54.53 (mg/kg)

Station	Results Exceeding Background
SOU520-033	Copper 36.01 (mg/kg)
	Nickel 172.39 (mg/kg)
	Uranium 9.62 (mg/kg)
	Zinc 65.48 (mg/kg)

Station	Results Exceeding Background
SOU520-034	Nickel 292.26 (mg/kg)
	Uranium 14.03 (mg/kg)
	Zinc 92.58 (mg/kg)

Station	Results Exceeding Background
SOU520-035	Copper 27.62 (mg/kg)
	Zinc 79.5 (mg/kg)

Station	Results Exceeding Background
SOU520-036	Nickel 135.9 (mg/kg)
	Silver 13.32 (mg/kg)
	Uranium 17.11 (mg/kg)
	Zinc 72.63 (mg/kg)

Station	Results Exceeding Background
SOU520-037	Zinc 67.57 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.3.3. SWMU 520 Background Exceedances – Surface (Continued)

Station	Results Exceeding Background
SOU520-047	Antimony 0.29 (mg/kg)
	Cadmium 0.44 (mg/kg)
	Calcium 282000 (mg/kg)
	Chromium 17.3 (mg/kg)
	Nickel 167.51 (mg/kg)
	Selenium 0.83 (mg/kg)
	Uranium 11.07 (mg/kg)
	Zinc 67.83 (mg/kg)
	Neptunium-237 0.11 (pCi/g)
	Uranium-234 1.26 (pCi/g)
	Uranium-235/236 0.097 (pCi/g)
	Uranium-238 2.06 (pCi/g)

Station	Results Exceeding Background
SOU520-049	Uranium 7.89 (mg/kg)

Station	Results Exceeding Background
SOU520-050	Selenium 3.9 (mg/kg)
	Uranium 10.77 (mg/kg)

Station	Results Exceeding Background
SOU520-051	Nickel 90.75 (mg/kg)

Station	Results Exceeding Background
SOU520-052	Copper 29.39 (mg/kg)
	Nickel 143.12 (mg/kg)
	Uranium 8.74 (mg/kg)
	Zinc 113.39 (mg/kg)

Station	Results Exceeding Background
SOU520-053	Copper 47.53 (mg/kg)
	Nickel 136.4 (mg/kg)
	Uranium 11.91 (mg/kg)
	Zinc 73.58 (mg/kg)

NOTE: maximum detections only shown for location.

Station	Results Exceeding Background
SOU520-054	Chromium 38.23 (mg/kg)

Station	Results Exceeding Background
SOU520-055	Uranium 8.76 (mg/kg)

Station	Results Exceeding Background
SOU520-056	Chromium 36.82 (mg/kg)
	Uranium 9.13 (mg/kg)

Station	Results Exceeding Background
SOU520-057	Antimony 0.3 (mg/kg)
	Cadmium 0.6 (mg/kg)
	Calcium 220000 (mg/kg)
	Magnesium 18400 (mg/kg)
	Nickel 648 (mg/kg)
	Selenium 0.87 (mg/kg)

Station	Results Exceeding Background
SOU520-058	Silver 11.25 (mg/kg)
	Zinc 66.35 (mg/kg)

Station	Results Exceeding Background
SOU520-059	Chromium 31.73 (mg/kg)
	Mercury 10.68 (mg/kg)
	Zinc 73.96 (mg/kg)

Station	Results Exceeding Background
SOU520-061	Nickel 82.83 (mg/kg)

Station	Results Exceeding Background
SOU520-064	Antimony 0.51 (mg/kg)
	Cadmium 0.47 (mg/kg)
	Calcium 267000 (mg/kg)
	Chromium 17.6 (mg/kg)
	Magnesium 19300 (mg/kg)
	Nickel 23.1 (mg/kg)
	Selenium 0.87 (mg/kg)
	Uranium 6.4 (mg/kg)
	Uranium-235/236 0.061 (pCi/g)
	Uranium-238 1.57 (pCi/g)

Station	Results Exceeding Background
SOU520-066	Nickel 112.23 (mg/kg)

Station	Results Exceeding Background
SOU520-070	Zinc 66.17 (mg/kg)

Station	Results Exceeding Background
SOU520-RAD	Uranium 18.4 (mg/kg)
	Cesium-137 1.61 (pCi/g)
	Neptunium-237 1.1 (pCi/g)
	Plutonium-239/240 1.23 (pCi/g)
	Technetium-99 7.93 (pCi/g)
	Thorium-230 18.7 (pCi/g)
	Uranium-234 3.27 (pCi/g)
	Uranium-235/236 0.19 (pCi/g)
	Uranium-238 6.14 (pCi/g)

Station	Results Exceeding Background
SYD-SOILPILES	Uranium 114 (mg/kg)
	Technetium-99 3.85 (pCi/g)
	Uranium-234 1.35 (pCi/g)
	Uranium-235 0.075 (pCi/g)
	Uranium-238 1.38 (pCi/g)

Figure 10.3.3. SWMU 520 Background Exceedances – Surface (Continued)

Figure 10.3.4. SWMU 520 NAL Exceedances - Surface Soil

Grid	Results Exceeding NAL
520-001	Nickel 220.42 (mg/kg)
520-002	Nickel 131.39 (mg/kg)
520-003	Chromium 36.67 (mg/kg) Nickel 240.66 (mg/kg)
520-004	Arsenic 9.34 (mg/kg) Nickel 142.44 (mg/kg)
520-006	Nickel 180.82 (mg/kg)
520-007	Nickel 325.66 (mg/kg)
520-008	Nickel 587.23 (mg/kg)
520-009	Nickel 72.55 (mg/kg)
520-013	Arsenic 8.83 (mg/kg) Iron 32605.35 (mg/kg) Nickel 235.68 (mg/kg)
520-014	Nickel 76.65 (mg/kg) Cesium-137 1.61 (pCi/g) Neptunium-237 1.1 (pCi/g) Thorium-230 18.7 (pCi/g) Uranium-238 6.14 (pCi/g)
520-015	Nickel 247.93 (mg/kg)
520-016	Arsenic 8.79 (mg/kg) Nickel 344.16 (mg/kg)
520-017	Mercury 11.88 (mg/kg) Nickel 452.47 (mg/kg)
520-018	Arsenic 8.27 (mg/kg) Chromium 66.65 (mg/kg) Nickel 809.76 (mg/kg)
520-019	Chromium 36.39 (mg/kg) Nickel 630.99 (mg/kg)
520-020	Chromium 39.68 (mg/kg)
520-021	Nickel 148.63 (mg/kg)
520-022	Arsenic 3.9 (mg/kg) Beryllium 0.19 (mg/kg) Nickel 138.9 (mg/kg) Silver 12.25 (mg/kg) Vanadium 8.1 (mg/kg) Neptunium-237 0.74 (pCi/g) Uranium-238 6.26 (pCi/g) Total PAH 0.55242 (mg/kg)
520-023	Chromium 33.53 (mg/kg) Mercury 9.69 (mg/kg) Nickel 155.17 (mg/kg)
520-024	Nickel 97.79 (mg/kg)
520-025	Arsenic 5.4 (mg/kg) Beryllium 0.34 (mg/kg) Vanadium 18.2 (mg/kg) Total PAH 0.38723 (mg/kg)
520-026	Nickel 98.2 (mg/kg)
520-027	Nickel 105.34 (mg/kg) Silver 13.95 (mg/kg)
520-029	Nickel 115.18 (mg/kg)
520-030	Mercury 9.53 (mg/kg) Nickel 96.95 (mg/kg)
520-031	Nickel 113.23 (mg/kg)
520-032	Nickel 54.53 (mg/kg)
520-033	Nickel 172.39 (mg/kg)
520-034	Nickel 292.26 (mg/kg)
520-036	Nickel 135.9 (mg/kg) Silver 13.32 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.3.4. SWMU 520 NAL Exceedances – Surface (Continued)

Grid	Results Exceeding NAL
520-047	Arsenic 10.4 (mg/kg) Beryllium 0.45 (mg/kg) Nickel 167.51 (mg/kg) Vanadium 26 (mg/kg) Uranium-238 2.06 (pCi/g) Total PAH 0.0638 (mg/kg)

Grid	Results Exceeding NAL
520-048	Arsenic 8.06 (mg/kg)

Grid	Results Exceeding NAL
520-049	Arsenic 8.91 (mg/kg)

Grid	Results Exceeding NAL
520-051	Nickel 90.75 (mg/kg)

Grid	Results Exceeding NAL
520-052	Nickel 143.12 (mg/kg)

Grid	Results Exceeding NAL
520-053	Nickel 136.4 (mg/kg)

Grid	Results Exceeding NAL
520-054	Arsenic 6.53 (mg/kg) Chromium 38.23 (mg/kg)

Grid	Results Exceeding NAL
520-056	Chromium 36.82 (mg/kg)

Grid	Results Exceeding NAL
520-057	Arsenic 6.2 (mg/kg) Beryllium 0.27 (mg/kg) Nickel 648 (mg/kg) Vanadium 12.2 (mg/kg)

Grid	Results Exceeding NAL
520-058	Arsenic 8.79 (mg/kg) Silver 11.25 (mg/kg) Vanadium 23.4 (mg/kg)

Grid	Results Exceeding NAL
520-059	Chromium 31.73 (mg/kg) Mercury 10.68 (mg/kg)

Grid	Results Exceeding NAL
520-060	Arsenic 6.38 (mg/kg) Beryllium 0.67 (mg/kg) Nickel 43.2 (mg/kg) Uranium 114 (mg/kg) Vanadium 24.8 (mg/kg) Total PAH 0.496717 (mg/kg)

Grid	Results Exceeding NAL
520-061	Arsenic 8.26 (mg/kg) Nickel 82.83 (mg/kg)

Grid	Results Exceeding NAL
520-064	Arsenic 5.2 (mg/kg) Beryllium 0.28 (mg/kg) Vanadium 17 (mg/kg) Total PAH 0.11809 (mg/kg)

Grid	Results Exceeding NAL
520-066	Nickel 112.23 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.3.4. SWMU 520 NAL Exceedances – Surface (Continued)

below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 520 surface soil contamination is considered adequately defined for supporting the BHHRA and FS. SWMU 520 consists of five EUs.

Metals

Metals were detected above the industrial worker NALs in the SWMU 520 surface soil. The following are the metals detected above both the background screening levels and the industrial worker NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Chromium	3, 18, 19, 20, 23, 54, 56, 59	1, 2, 3, 4, 5
Iron	13	1
Mercury	17, 23, 30, 59	1, 2, 4
Nickel	1, 2, 3, 4, 6, 7, 8, 9, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 27, 26, 29, 30, 31, 32, 33, 34, 36, 47, 51, 52, 53, 57, 60, 61,66	1, 2, 3, 4, 5
Silver	22, 27, 36, 58	1, 3,4
Uranium	60	2

Each of the grids listed above is located within the administrative boundary of SWMU 520.

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 520 surface soil.

The following are the metals detected in the SWMU 520 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Antimony	22, 25, 47, 57, 64	1, 2, 3, 4, 5
Cadmium	22, 25, 47, 57, 64	1, 2, 3, 4, 5
Copper	7, 8, 16, 18, 19, 53	2, 3, 4
Iron	13	1
Manganese	16	2
Mercury	17, 23, 30, 59	1, 2, 4
Molybdenum[1]	22, 25, 47, 57, 64	1,2, 3, 4, 5
Nickel	1, 2, 3, 4, 6, 7, 8, 9, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 26, 27, 29, 30, 31, 32, 33, 34, 36, 47, 51, 52, 53, 57, 60, 61, 64, 66	1, 2, 3, 4, 5
Selenium	22, 25, 30, 47, 57, 64	1, 2, 3, 4, 5
Silver	22, 27, 36, 58	1, 3, 4
Thallium	25	5
Uranium	7, 8, 14, 16, 18, 19, 22, 30, 31, 34, 36, 60,	1, 2, 3, 4
Zinc	2, 3, 4, 5, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 29, 33, 34, 35, 36, 37, 47, 52, 53, 58, 59, 60, 70	1, 2, 3, 4, 5

[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Iron	13	1
Manganese	16	2
Mercury	17, 23, 30, 59	1, 2, 4
Nickel	1, 2, 3, 4, 6, 7, 8, 13, 15, 16, 17, 18, 19, 21, 22, 23, 24, 26, 27, 29, 30, 31, 33, 34, 36, 47, 51, 52, 53, 57, 61, 66	1, 2, 3, 4, 5
Silver	22, 27, 36, 58	1, 3, 4

PCBs

No PCBs were detected in the SWMU 520 surface soil.

SVOCs

The following are the SVOCs detected above the industrial worker NAL and the grids and EUs in which they were detected.

SVOC	Grid	EU
Total PAHs	22, 25, 47, 60, 64	2, 3, 4, 5

No SVOCs were detected in the SWMU 520 surface soil above the industrial worker ALs.

The following are the SVOCs detected above the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

SVOC	Grid	EU
Pyrene	60	2
Total PAHs	22, 25, 47, 57, 60, 64	1, 2, 3, 4, 5

Total PAHs in grids 22 (EU 4), 25 (EU 5), and 60 (EU 2) were detected above the SSL for the protection of RGA groundwater.

VOCs

No VOCs were detected in the SWMU 520 surface soil.

Radionuclides

Radionuclides were detected above the industrial worker NALs in the SWMU 520 surface soil. The following are the radionuclides detected above both background screening levels and the industrial worker NALs and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Cesium-137	14	1
Neptunium-237	14, 22	1, 4
Thorium-230	14	1
Uranium-238	14, 22, 47	1, 2, 4

No radionuclides were detected above both the background screening levels and the industrial worker ALs in the SWMU 520 surface soil.

The following are the radionuclides detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Radionuclide	Grid	EU
Americium-241[1]	14	1
Neptunium-237	14, 22, 25, 47	1, 2, 4, 5
Plutonium-239/240	14, 22	1, 4
Technetium-99	14, 22, 60	1, 2
Thorium-230	14	1
Uranium-238	14, 22	1, 4

[1] No background value is available.

Neptunium-237 in grids 14 (EU 1) and 22 (EU 4) and thorium-230 in grid 14 (EU 1) were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

10.3.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 520, the representative data set for subsurface soils is presented in Tables 10.3.3 and 10.3.4 and provides the nature of the contamination in SWMU 520 subsurface soils. Figures 10.3.5–10.3.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 520 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 520 consists of five EUs.

Metals

Metals were detected above the industrial worker NALs in the SWMU 520 subsurface soil. The following are the metals detected above both the background screening levels and the industrial worker NALs and the grids and EUs in which they were detected.

Metal	Grid	EU
Arsenic	1, 18, 19, 21, 23, 24, 27, 26, 56, 62, 70	1, 2, 3, 4, 5
Beryllium	24, 56, 58	1, 4, 5
Chromium	15, 19, 21, 24, 27, 35, 54, 56, 68	1, 3, 4, 5
Cobalt	59	1
Iron	24, 56	4, 5
Mercury	56, 64	3, 5
Nickel	4, 9, 12, 16, 24, 25, 27, 29, 35, 36, 42, 48, 56, 58, 64, 66, 68	1, 2, 3, 4, 5
Silver	10	4
Vanadium	24, 56	4, 5

The maximum depth at which metals were detected (in samples associated with this RI Report) above both background screening levels and the industrial worker NALs was 16 ft bgs. The end depths of the boreholes taken from the grids listed above ranged from 1 to 16 ft bgs.

Table 10.3.3. Subsurface Soil Historical Data Summary: SWMU 520 C-746-A Scrap Metal

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	2.20E+03	1.21E+04	7.90E+03	0/12	12/12	1/12	1.20E+04	0/12	3.32E+04	0/12	3.97E+06	0/12	12/12	1.3135 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	2.10E-01	0/12	2.53E+00	0/12	1.51E+03	0/12	0/12	0.5215 - 20
METAL	Arsenic	mg/kg	1.26E-01	7.99E+00	4.19E+00	0/12	6/12	1/12	7.90E+00	4/12	9.97E-01	0/12	9.97E+01	0/12	5/12	0.0827 - 5
METAL	Barium	mg/kg	1.51E+01	2.58E+02	8.83E+01	0/12	12/12	1/12	1.70E+02	0/12	5.92E+02	0/12	3.78E+05	0/12	8/12	0.0242 - 1
METAL	Beryllium	mg/kg	1.66E-01	9.65E-01	5.62E-01	0/12	9/12	2/12	6.90E-01	9/12	1.40E-02	0/12	9.22E+00	0/12	0/12	0.0188 - 0.5
METAL	Cadmium	mg/kg	1.48E+00	1.67E+00	1.58E+00	0/12	2/12	2/12	2.10E-01	0/12	3.16E+00	0/12	3.16E+02	0/12	2/12	0.0489 - 2
METAL	Calcium	mg/kg	2.57E+02	1.00E+04	2.22E+03	0/12	12/12	1/12	6.10E+03	0/12	n/a	0/12	n/a	n/a	n/a	0.5097 - 100
METAL	Chromium	mg/kg	9.06E+00	6.60E+01	1.75E+01	0/12	12/12	1/12	4.30E+01	1/12	3.02E+01	0/12	3.02E+03	0/12	0/12	0.1325 - 2
METAL	Cobalt	mg/kg	4.57E-01	1.79E+01	5.28E+00	0/12	12/12	1/12	1.30E+01	1/12	1.05E+01	0/12	1.52E+03	11/12	12/12	0.0847 - 2
METAL	Copper	mg/kg	6.94E-01	1.49E+01	6.79E+00	0/12	12/12	0/12	2.50E+01	0/12	1.43E+03	0/12	2.24E+05	0/12	0/12	0.1067 - 2
METAL	Iron	mg/kg	2.58E+03	3.02E+04	1.21E+04	0/12	12/12	1/12	2.80E+04	1/12	2.51E+04	0/12	3.92E+06	12/12	12/12	0.6677 - 5
METAL	Lead	mg/kg	1.32E+00	1.23E+01	6.26E+00	0/12	4/12	0/12	2.30E+01	0/12	4.00E+02	0/12	4.00E+02	0/12	0/12	0.2401 - 20
METAL	Magnesium	mg/kg	1.16E+02	2.07E+03	1.07E+03	0/12	12/12	0/12	2.10E+03	0/12	n/a	0/12	n/a	n/a	n/a	3.7451 - 15
METAL	Manganese	mg/kg	8.29E+00	1.55E+03	2.97E+02	0/12	12/12	1/12	8.20E+02	0/12	2.58E+03	0/12	1.16E+05	10/12	12/12	0.03 - 10
METAL	Mercury	mg/kg	9.80E-03	3.79E-02	2.45E-02	0/12	4/12	0/12	1.30E-01	0/12	9.00E-01	0/12	7.85E+02	0/12	0/12	0.0078 - 0.2
METAL	Nickel	mg/kg	1.74E+00	3.00E+01	1.06E+01	0/12	10/12	1/12	2.20E+01	0/12	4.28E+01	0/12	3.18E+04	0/12	10/12	0.1277 - 5
METAL	Potassium	mg/kg	1.22E+02	8.10E+02	3.90E+02	0/12	12/12	0/12	9.50E+02	0/12	n/a	0/12	n/a	n/a	n/a	2.0521 - 100
METAL	Selenium	mg/kg	1.90E-01	1.90E-01	1.90E-01	0/12	1/12	0/12	7.00E-01	0/12	1.79E+02	0/12	2.80E+04	0/12	0/12	0.0891 - 1
METAL	Silver	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	2.70E+00	0/12	1.08E+01	0/12	9.15E+03	0/12	0/12	0.1799 - 4
METAL	Sodium	mg/kg	2.18E+02	8.80E+02	3.90E+02	2/12	12/12	6/12	3.40E+02	0/12	n/a	0/12	n/a	n/a	n/a	2.7264 - 200
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	3.40E-01	0/12	2.87E+00	0/12	4.48E+02	0/12	0/12	0.534 - 15
METAL	Vanadium	mg/kg	5.79E+00	6.25E+01	2.31E+01	0/12	12/12	1/12	3.70E+01	12/12	1.51E-01	0/12	9.30E+01	12/12	12/12	0.1449 - 2
METAL	Zinc	mg/kg	5.35E+00	5.63E+01	3.17E+01	0/12	12/12	0/12	6.00E+01	0/12	1.08E+04	0/12	1.68E+06	0/12	9/12	0.0806 - 20
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/8	0/8	0/8	n/a	0/8	1.88E-01	0/8	1.88E+01	0/8	0/8	0.1 - 106
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.46 - 0.5
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.46 - 0.5
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.46 - 0.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	1.30E+00	0/6	3.91E+01	0/6	0/6	0.46 - 0.5
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Methylphenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	6.02E+02	0/6	1.81E+04	0/6	0/6	0.46 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.05E+03	0/6	1.22E+05	0/6	0/6	0.46 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.3.3. Subsurface Soil Historical Data Summary: SWMU 520 C-746-A Scrap Metal (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.46 - 0.5
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.46 - 0.5
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	2.75E+01	0/6	2.75E+03	n/a	n/a	0.46 - 0.5
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	6.01E+02	0/6	1.80E+04	0/6	0/6	0.46 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.87E+02	0/6	1.46E+04	0/6	0/6	0.46 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	1.17E-01	0/6	1.17E+01	0/6	0/6	0.46 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	2.24E+00	0/6	2.24E+02	0/6	0/6	0.46 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.22E-02	0/6	5.22E+00	0/6	0/6	0.46 - 0.5
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	0/6	0/6	0.46 - 0.5
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	n/a	0/6	n/a	n/a	n/a	0.46 - 0.5
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	4.49E+02	0/6	1.35E+04	0/6	0/6	0.46 - 0.5
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.46 - 0.48
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/6	0/6	0/6	n/a	0/6	5.92E-02	0/6	5.92E+00	0/6	0/6	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	4.89E-02	0/13	5.53E+00	0/13	0/13	0.005 - 0.9
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.38E+02	0/2	8.21E+03	0/2	0/2	0.01 - 0.01
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Acetone	mg/kg	1.10E-02	1.10E-02	1.10E-02	1/2	1/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.98E-01	0/2	8.22E+01	0/2	0/2	0.01 - 0.01
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.97E-01	0/2	5.76E+01	0/2	0/2	0.01 - 0.01
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.42E-01	0/2	2.49E+01	0/2	0/2	0.01 - 0.01
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	4.74E+00	0/13	1.93E+02	0/13	0/13	0.01 - 0.9
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.3.3. Subsurface Soil Historical Data Summary: SWMU 520 C-746-A Scrap Metal (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.29E+00	0/2	3.84E+02	0/2	0/2	0.01 - 0.01
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	3.50E+01	0/2	1.07E+03	0/2	0/2	0.02 - 0.02
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.82E-01	0/2	7.08E+01	0/2	0/2	0.01 - 0.01
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.01 - 0.01
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	1.07E+01	0/13	3.42E+02	0/13	0/13	0.01 - 0.9
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	4.69E-02	0/13	4.98E+00	0/13	0/13	0.001 - 0.9
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	2.04E-01	0/13	4.83E+01	0/13	0/13	0.01 - 17
RADS	Americium-241	pCi/g	7.27E-03	4.43E-02	2.58E-02	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.117 - 0.143
RADS	Neptunium-237	pCi/g	-7.94E-03	1.60E-02	4.03E-03	0/2	2/2	0/2	n/a	0/2	2.71E-01	0/2	2.71E+01	0/2	1/2	0.0648 - 0.0698
RADS	Plutonium-239/240	pCi/g	-1.37E-02	-9.26E-03	-1.15E-02	0/2	2/2	0/2	n/a	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.373 - 0.374
RADS	Radium-226	pCi/g	1.49E+00	1.56E+00	1.53E+00	0/2	2/2	1/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.528 - 0.58
RADS	Technetium-99	pCi/g	2.05E+00	2.45E+00	2.25E+00	0/2	2/2	0/2	2.80E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	2/2	4.31 - 4.31
RADS	Thorium-234	pCi/g	1.38E+00	1.42E+00	1.40E+00	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.646 - 0.751

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.3.4. Subsurface Soil RI Data Summary: SWMU 520 Scrap Material West of C-746-A

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	4.81E+03	1.01E+04	7.01E+03	0/5	5/5	0/5	1.20E+04	0/5	3.32E+04	0/5	3.97E+06	0/5	5/5	5.5 - 6.3
METAL	Antimony	mg/kg	1.60E-01	4.00E-01	2.42E-01	0/5	5/5	2/5	2.10E-01	0/5	2.53E+00	0/5	1.51E+03	0/5	1/5	0.55 - 0.63
METAL	Arsenic	mg/kg	4.50E+00	1.11E+01	7.48E+00	0/70	30/70	10/70	7.90E+00	30/70	9.97E-01	0/70	9.97E+01	0/70	30/70	1.1 - 11
METAL	Barium	mg/kg	7.90E+01	1.80E+02	1.14E+02	0/5	5/5	1/5	1.70E+02	0/5	5.92E+02	0/5	3.78E+05	0/5	4/5	2.2 - 2.5
METAL	Beryllium	mg/kg	3.90E-01	9.20E-01	5.34E-01	0/5	5/5	1/5	6.90E-01	5/5	1.40E-02	0/5	9.22E+00	0/5	0/5	0.11 - 0.13
METAL	Cadmium	mg/kg	3.20E-02	9.50E-02	5.94E-02	0/5	5/5	0/5	2.10E-01	0/5	3.16E+00	0/5	3.16E+02	0/5	0/5	0.055 - 0.063
METAL	Calcium	mg/kg	1.48E+03	9.85E+04	2.61E+04	0/5	5/5	3/5	6.10E+03	0/5	n/a	0/5	n/a	n/a	n/a	57.7 - 553
METAL	Chromium	mg/kg	6.80E+00	6.75E+01	3.48E+01	0/70	33/70	11/70	4.30E+01	28/70	3.02E+01	0/70	3.02E+03	0/70	0/70	1.1 - 85
METAL	Cobalt	mg/kg	4.60E+00	8.40E+00	5.78E+00	0/5	5/5	0/5	1.30E+01	0/5	1.05E+01	0/5	1.52E+03	5/5	5/5	0.22 - 0.25
METAL	Copper	mg/kg	6.00E+00	2.05E+01	1.05E+01	0/70	6/70	0/70	2.50E+01	0/70	1.43E+03	0/70	2.24E+05	0/70	0/70	1.1 - 35
METAL	Iron	mg/kg	5.26E+03	2.90E+04	1.10E+04	0/70	70/70	1/70	2.80E+04	2/70	2.51E+04	0/70	3.92E+06	70/70	70/70	5.5 - 100
METAL	Lead	mg/kg	6.54E+00	2.12E+01	1.19E+01	0/70	67/70	0/70	2.30E+01	0/70	4.00E+02	0/70	4.00E+02	0/70	16/70	0.33 - 13
METAL	Magnesium	mg/kg	8.58E+02	3.64E+03	1.74E+03	0/5	5/5	1/5	2.10E+03	0/5	n/a	0/5	n/a	n/a	n/a	55.3 - 62.8
METAL	Manganese	mg/kg	6.54E+01	1.53E+03	3.56E+02	0/70	69/70	3/70	8.20E+02	0/70	2.58E+03	0/70	1.16E+05	67/70	69/70	0.22 - 85
METAL	Mercury	mg/kg	7.10E-03	6.94E+00	1.88E+00	0/70	6/70	2/70	1.30E-01	2/70	9.00E-01	0/70	7.85E+02	2/70	2/70	0.0369 - 10
METAL	Molybdenum	mg/kg	2.80E-01	7.20E-01	4.04E-01	0/70	5/70	0/70	n/a	0/70	1.79E+02	0/70	2.80E+04	0/70	5/70	0.55 - 15
METAL	Nickel	mg/kg	6.30E+00	8.46E+01	5.06E+01	0/70	23/70	19/70	2.20E+01	19/70	4.28E+01	0/70	3.18E+04	2/70	23/70	0.55 - 65
METAL	Selenium	mg/kg	7.70E-01	2.30E+00	1.37E+00	0/70	5/70	5/70	7.00E-01	0/70	1.79E+02	0/70	2.80E+04	0/70	5/70	0.55 - 20
METAL	Silver	mg/kg	3.40E-02	1.10E+01	2.38E+00	0/70	8/70	3/70	2.70E+00	1/70	1.08E+01	0/70	9.15E+03	3/70	4/70	0.22 - 10
METAL	Sodium	mg/kg	6.57E+01	2.37E+02	1.04E+02	0/5	5/5	0/5	3.40E+02	0/5	n/a	0/5	n/a	n/a	n/a	22.1 - 25.1
METAL	Thallium	mg/kg	1.20E-01	3.20E-01	1.82E-01	0/5	5/5	0/5	3.40E-01	0/5	2.87E+00	0/5	4.48E+02	0/5	3/5	0.22 - 0.25
METAL	Uranium	mg/kg	9.10E-01	1.50E+01	5.81E+00	0/70	15/70	10/70	4.60E+00	0/70	1.07E+02	0/70	1.65E+04	0/70	1/70	0.02 - 20
METAL	Vanadium	mg/kg	1.56E+01	3.73E+01	2.28E+01	0/5	5/5	1/5	3.70E+01	5/5	1.51E-01	0/5	9.30E+01	5/5	5/5	1.1 - 1.3
METAL	Zinc	mg/kg	1.34E+01	5.81E+01	2.76E+01	0/70	69/70	0/70	6.00E+01	0/70	1.08E+04	0/70	1.68E+06	0/70	59/70	2.2 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/71	0/71	0/71	n/a	0/71	1.88E-01	0/71	1.88E+01	0/71	0/71	0.33 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.36 - 0.39
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.36 - 0.39
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.36 - 0.39
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.8 - 1.9
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.8 - 1.9
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.30E+00	0/4	3.91E+01	0/4	0/4	1.8 - 1.9
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.8 - 1.9
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.8 - 1.9
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.8 - 1.9
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	6.02E+02	0/4	1.81E+04	0/4	0/4	0.36 - 0.39
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.05E+03	0/4	1.22E+05	0/4	0/4	0.36 - 0.39
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 10.3.4. Subsurface Soil RI Data Summary: SWMU 520 Scrap Material West of C-746-A (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzo(ghi)perylene	mg/kg	1.30E-01	1.30E-01	1.30E-01	1/4	1/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.8 - 1.9
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.0073 - 0.0079
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	0.36 - 0.39
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	6.01E+02	0/4	1.80E+04	0/4	0/4	0.36 - 0.39
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.87E+02	0/4	1.46E+04	0/4	0/4	0.36 - 0.39
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.17E-01	0/4	1.17E+01	0/4	0/4	0.36 - 0.39
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.8 - 1.9
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.73 - 0.79
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	2.24E+00	0/4	2.24E+02	0/4	0/4	0.36 - 0.39
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.8 - 1.9
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	5.22E-02	0/4	5.22E+00	0/4	0/4	0.0073 - 0.0079
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	0/4	0/4	1.8 - 1.9
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.36 - 0.39
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	1.8 - 1.9
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	4.49E+02	0/4	1.35E+04	0/4	0/4	0.36 - 0.39
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	0.73 - 0.79
SVOA	Total PAH	mg/kg	1.20E-02	6.92E-02	4.06E-02	0/4	2/4	0/4	n/a	1/4	5.92E-02	0/4	5.92E+00	0/4	2/4	-
RADS	Alpha activity	pCi/g	2.49E+01	3.45E+01	2.90E+01	0/4	4/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	5.8 - 7.1
RADS	Americium-241	pCi/g	-5.30E-03	8.00E-03	2.95E-03	0/4	4/4	0/4	n/a	0/4	5.01E+00	0/4	5.01E+02	0/4	0/4	0.017 - 0.021
RADS	Beta activity	pCi/g	2.22E+01	3.32E+01	2.92E+01	0/4	4/4	0/4	n/a	0/4	n/a	0/4	n/a	n/a	n/a	2.9 - 3.6
RADS	Cesium-137	pCi/g	-4.00E-03	2.00E-03	-1.50E-03	0/4	4/4	0/4	2.80E-01	0/4	8.61E-02	0/4	8.61E+00	0/4	0/4	0.074 - 0.14
RADS	Neptunium-237	pCi/g	6.00E-03	5.00E-02	2.63E-02	0/4	4/4	0/4	n/a	0/4	2.71E-01	0/4	2.71E+01	0/4	4/4	0.016 - 0.089
RADS	Plutonium-238	pCi/g	4.40E-03	1.40E-02	1.04E-02	0/4	4/4	0/4	n/a	0/4	1.09E+01	0/4	1.09E+03	0/4	0/4	0.012 - 0.017
RADS	Plutonium-239/240	pCi/g	1.70E-03	2.40E-02	9.25E-03	0/4	4/4	0/4	n/a	0/4	1.07E+01	0/4	1.07E+03	0/4	0/4	0.0055 - 0.016
RADS	Technetium-99	pCi/g	4.10E-01	1.86E+00	9.23E-01	0/4	4/4	0/4	2.80E+00	0/4	3.61E+02	0/4	3.61E+04	0/4	4/4	0.33 - 0.45
RADS	Thorium-228	pCi/g	1.04E+00	1.06E+00	1.05E+00	0/4	4/4	0/4	1.60E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	1.03E+00	1.07E+00	1.05E+00	0/4	4/4	0/4	1.40E+00	0/4	1.38E+01	0/4	1.38E+03	0/4	4/4	0.01 - 0.02
RADS	Thorium-232	pCi/g	8.60E-01	1.05E+00	9.90E-01	0/4	4/4	0/4	1.50E+00	0/4	n/a	0/4	n/a	n/a	n/a	0.007 - 0.01
RADS	Uranium-234	pCi/g	8.50E-01	1.08E+00	9.48E-01	0/4	4/4	0/4	1.20E+00	0/4	1.89E+01	0/4	1.89E+03	0/4	0/4	0.007 - 0.02
RADS	Uranium-235/236	pCi/g	4.00E-02	6.30E-02	4.88E-02	0/4	4/4	1/4	6.00E-02	0/4	3.95E-01	0/4	3.95E+01	0/4	0/4	0.008 - 0.018
RADS	Uranium-238	pCi/g	1.01E+00	1.37E+00	1.16E+00	0/4	4/4	2/4	1.20E+00	0/4	1.70E+00	0/4	1.70E+02	0/4	0/4	0.007 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

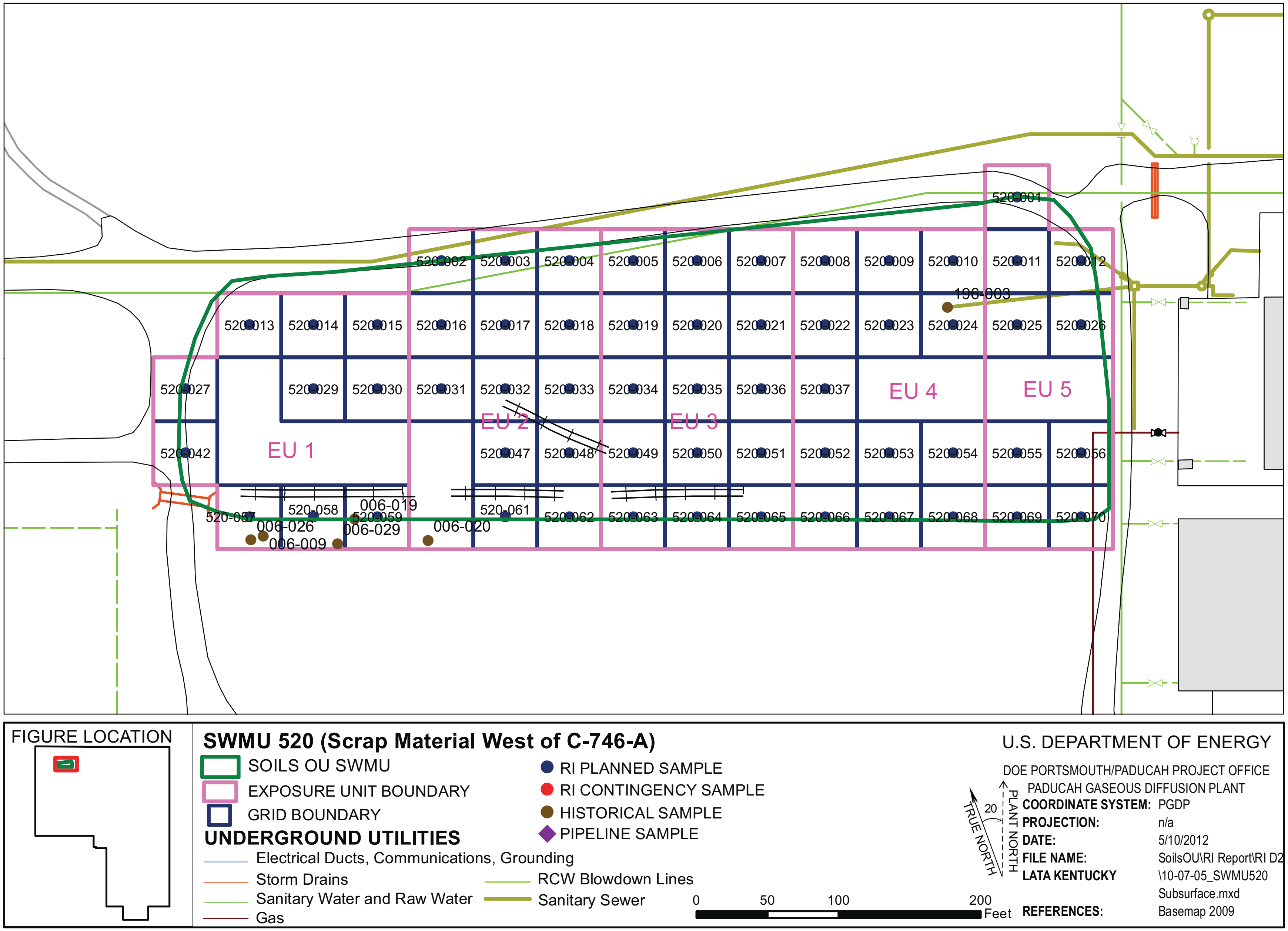


Figure 10.3.5. SWMU 520 Sample Location - Subsurface Soil

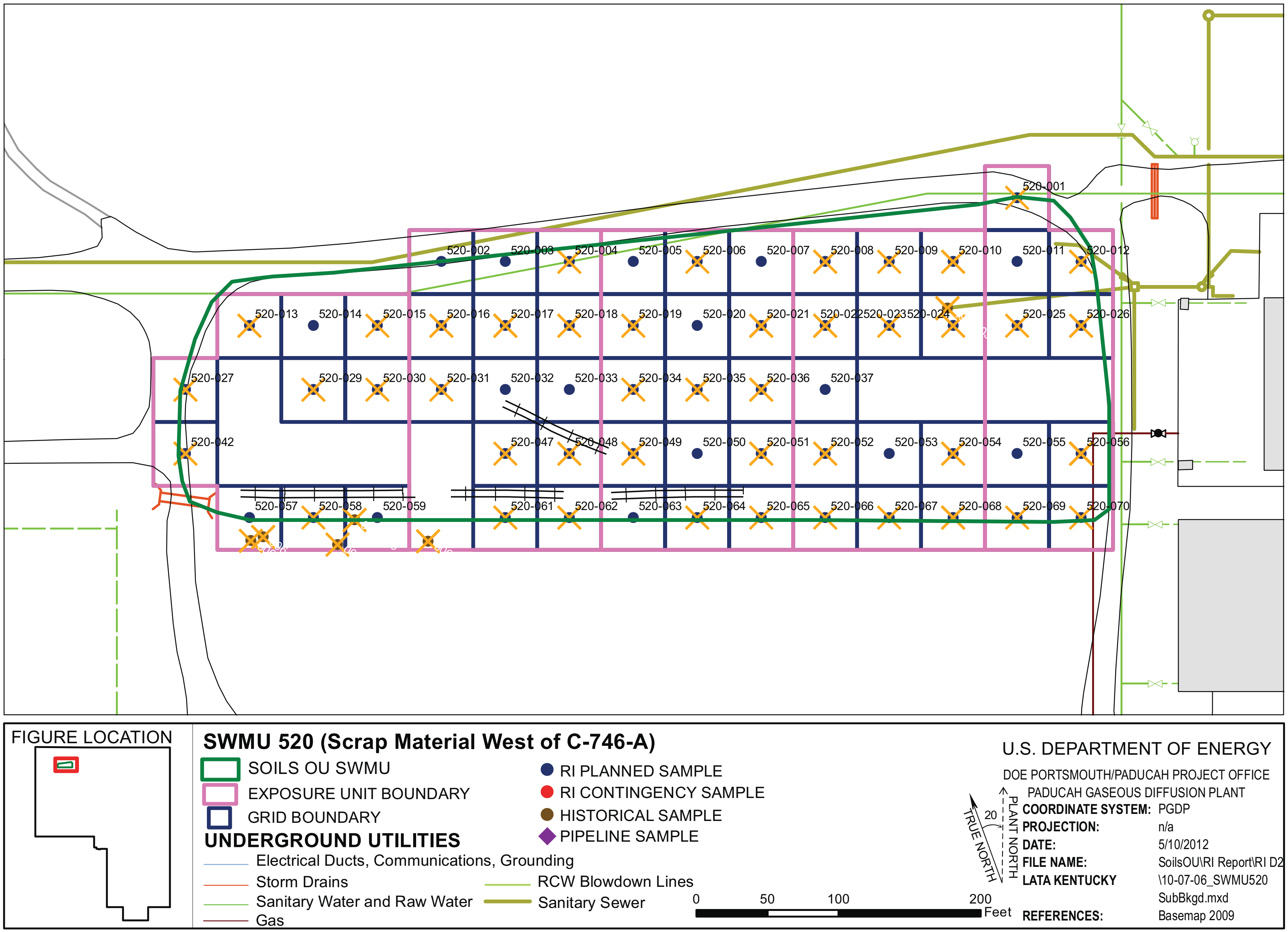


Figure 10.3.6. SWMU 520 Background Exceedances - Subsurface Soil

Station	Results Exceeding Background
006-009	Aluminum 12100 (mg/kg)
	Barium 258 (mg/kg)
	Sodium 452 (mg/kg)
006-019	Cobalt 17.9 (mg/kg)
	Manganese 1550 (mg/kg)
	Sodium 382 (mg/kg)
006-020	Sodium 394 (mg/kg)
	Radium-226 1.56 (pCi/g)
006-026	Nickel 30 (mg/kg)
	Sodium 880 (mg/kg)
006-029	Beryllium 0.7 (mg/kg)
	Sodium 410 (mg/kg)
196-003	Arsenic 7.99 (mg/kg)
	Beryllium 0.965 (mg/kg)
	Cadmium 1.67 (mg/kg)
	Calcium 10000 (mg/kg)
	Chromium 66 (mg/kg)
	Iron 30200 (mg/kg)
	Vanadium 62.5 (mg/kg)
SOU520-001	Arsenic 8.08 (mg/kg)
	Uranium 11.29 (mg/kg)
SOU520-004	Nickel 65.6 (mg/kg)
SOU520-005	Uranium 7.14 (mg/kg)
SOU520-009	Nickel 65.79 (mg/kg)
SOU520-010	Silver 11.03 (mg/kg)
SOU520-011	Uranium 8.49 (mg/kg)
SOU520-012	Nickel 73.67 (mg/kg)
	Uranium 10.16 (mg/kg)
SOU520-013	Antimony 0.4 (mg/kg)
	Calcium 12900 (mg/kg)
	Selenium 1.6 (mg/kg)
	Uranium-235/236 0.063 (pCi/g)
	Uranium-238 1.37 (pCi/g)
SOU520-015	Chromium 45.28 (mg/kg)
SOU520-016	Nickel 83.16 (mg/kg)
SOU520-017	Selenium 1.2 (mg/kg)
SOU520-018	Arsenic 10.29 (mg/kg)
SOU520-019	Arsenic 8.13 (mg/kg)
	Chromium 48.93 (mg/kg)
SOU520-021	Arsenic 11.06 (mg/kg)
	Chromium 64.67 (mg/kg)
SOU520-022	Calcium 98500 (mg/kg)
	Magnesium 3640 (mg/kg)
	Selenium 0.99 (mg/kg)
	Uranium-238 1.25 (pCi/g)
SOU520-023	Arsenic 9.35 (mg/kg)
SOU520-024	Chromium 48.94 (mg/kg)
	Manganese 1528.35 (mg/kg)
	Nickel 77.14 (mg/kg)
	Uranium 7.41 (mg/kg)
SOU520-025	Nickel 66.43 (mg/kg)

Figure 10.3.6. SWMU 520 Background Exceedances - Subsurface Soil (Continued)

Station	Results Exceeding Background
SOU520-027	Arsenic 8.77 (mg/kg)
	Chromium 67.54 (mg/kg)
	Manganese 1021.92 (mg/kg)
	Nickel 60.88 (mg/kg)

Station	Results Exceeding Background
SOU520-029	Nickel 69.11 (mg/kg)
	Uranium 7.22 (mg/kg)

Station	Results Exceeding Background
SOU520-030	Uranium 15 (mg/kg)

Station	Results Exceeding Background
SOU520-031	Uranium 11.84 (mg/kg)

Station	Results Exceeding Background
SOU520-035	Chromium 65.71 (mg/kg)
	Nickel 64.69 (mg/kg)

Station	Results Exceeding Background
SOU520-036	Nickel 61.39 (mg/kg)

Station	Results Exceeding Background
SOU520-037	Uranium 9.96 (mg/kg)

Station	Results Exceeding Background
SOU520-042	Nickel 63.42 (mg/kg)

Station	Results Exceeding Background
SOU520-048	Nickel 68.54 (mg/kg)

Station	Results Exceeding Background
SOU520-049	Antimony 0.27 (mg/kg)
	Calcium 13500 (mg/kg)
	Selenium 0.77 (mg/kg)

Station	Results Exceeding Background
SOU520-051	Silver 9.62 (mg/kg)

Station	Results Exceeding Background
SOU520-054	Chromium 44.14 (mg/kg)

Station	Results Exceeding Background
SOU520-056	Arsenic 10.4 (mg/kg)
	Barium 180 (mg/kg)
	Beryllium 0.92 (mg/kg)
	Chromium 49.39 (mg/kg)
	Iron 29000 (mg/kg)
	Manganese 992.83 (mg/kg)
	Mercury 6.94 (mg/kg)
	Nickel 66.25 (mg/kg)
	Selenium 2.3 (mg/kg)
	Vanadium 37.3 (mg/kg)

Station	Results Exceeding Background
SOU520-058	Nickel 84.64 (mg/kg)

Station	Results Exceeding Background
SOU520-062	Arsenic 8.23 (mg/kg)

Station	Results Exceeding Background
SOU520-064	Mercury 6.65 (mg/kg)
	Nickel 62.09 (mg/kg)
	Silver 9.86 (mg/kg)

Station	Results Exceeding Background
SOU520-066	Nickel 68.59 (mg/kg)

Station	Results Exceeding Background
SOU520-068	Chromium 50.12 (mg/kg)
	Nickel 57.82 (mg/kg)

Station	Results Exceeding Background
SOU520-070	Arsenic 8.5 (mg/kg)

NOTE: maximum detections only shown for location.

Figure 10.3.6. SWMU 520 Background Exceedances – Subsurface (Continued)

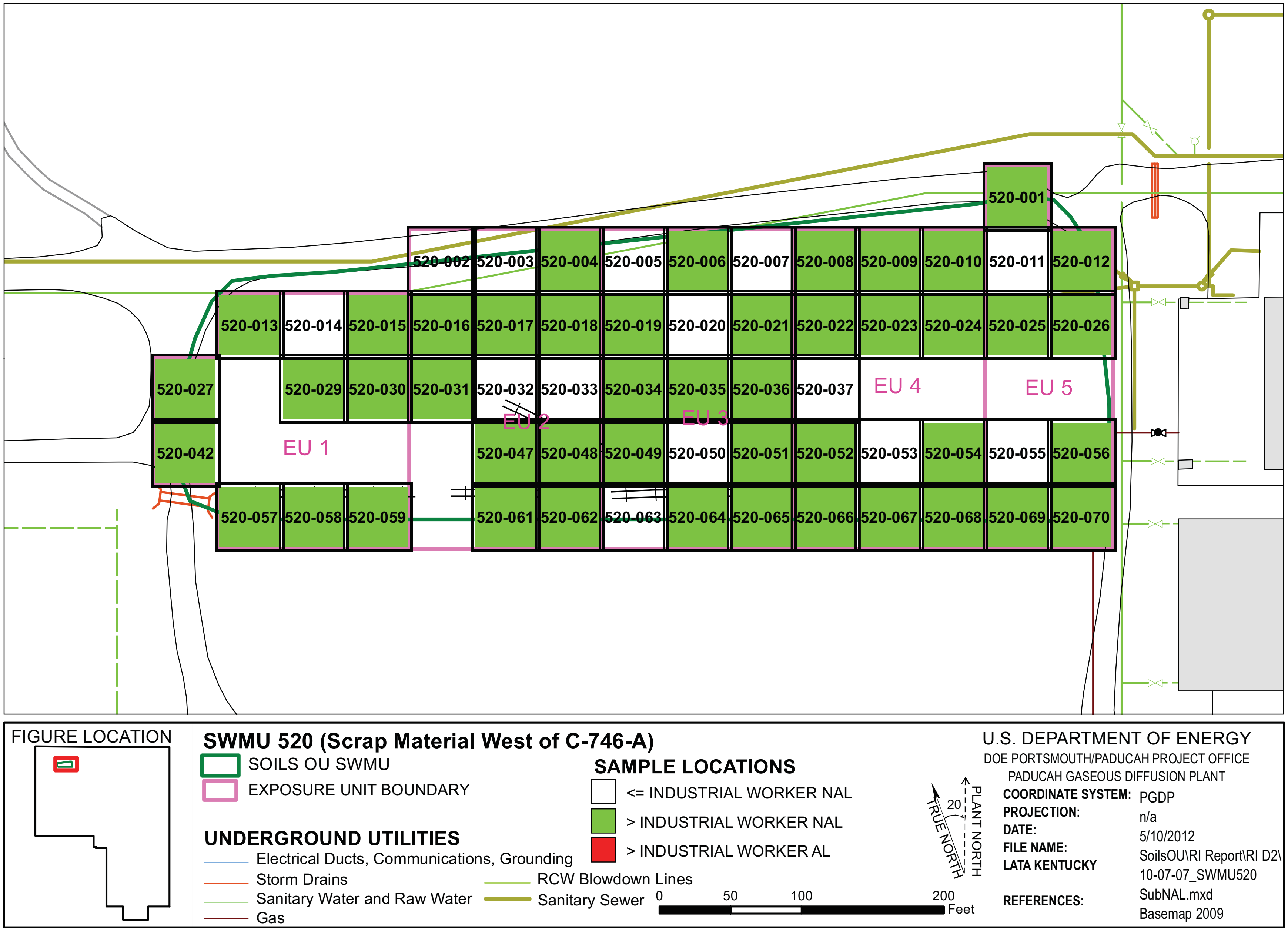


Figure 10.3.7. SWMU 520 NAL Exceedances - Subsurface Soil

Grid	Results Exceeding NAL
520-001	Arsenic 8.08 (mg/kg)
520-004	Chromium 40.33 (mg/kg) Nickel 65.6 (mg/kg)
520-006	Arsenic 6.71 (mg/kg)
520-008	Arsenic 6.96 (mg/kg) Chromium 39.02 (mg/kg)
520-009	Nickel 65.79 (mg/kg)
520-010	Arsenic 7.03 (mg/kg) Silver 11.03 (mg/kg)
520-012	Arsenic 7.2 (mg/kg) Nickel 73.67 (mg/kg)
520-013	Arsenic 7.8 (mg/kg) Beryllium 0.4 (mg/kg) Vanadium 15.6 (mg/kg)
520-015	Chromium 45.28 (mg/kg)
520-016	Chromium 35.48 (mg/kg) Nickel 83.16 (mg/kg)
520-017	Arsenic 7.3 (mg/kg) Beryllium 0.54 (mg/kg) Vanadium 23.2 (mg/kg) Total PAH 0.06918 (mg/kg)
520-018	Arsenic 10.29 (mg/kg) Chromium 35.33 (mg/kg)
520-019	Arsenic 8.13 (mg/kg) Chromium 48.93 (mg/kg)
520-021	Arsenic 11.06 (mg/kg) Chromium 64.67 (mg/kg) Iron 26251.99 (mg/kg)
520-022	Arsenic 4.5 (mg/kg) Beryllium 0.39 (mg/kg) Vanadium 18.5 (mg/kg)
520-023	Arsenic 9.35 (mg/kg)
520-024	Arsenic 7.99 (mg/kg) Beryllium 0.965 (mg/kg) Chromium 66 (mg/kg) Iron 30200 (mg/kg) Nickel 77.14 (mg/kg) Vanadium 62.5 (mg/kg)
520-025	Nickel 66.43 (mg/kg)
520-026	Arsenic 8.35 (mg/kg) Chromium 42.83 (mg/kg)
520-027	Arsenic 8.77 (mg/kg) Chromium 67.54 (mg/kg) Nickel 60.88 (mg/kg)
520-029	Arsenic 6.77 (mg/kg) Nickel 69.11 (mg/kg)
520-030	Chromium 36.97 (mg/kg)
520-031	Arsenic 7.06 (mg/kg)
520-034	Chromium 40.78 (mg/kg)
520-035	Chromium 65.71 (mg/kg) Nickel 64.69 (mg/kg)
520-036	Chromium 36.14 (mg/kg) Nickel 61.39 (mg/kg)
520-042	Arsenic 7.28 (mg/kg) Nickel 63.42 (mg/kg)
520-047	Chromium 33.36 (mg/kg)
520-048	Arsenic 7.4 (mg/kg) Nickel 68.54 (mg/kg)

Figure 10.3.7. SWMU 520 NAL Exceedances - Subsurface Soil (Continued)

Grid	Results Exceeding NAL
520-052	Arsenic 5.74 (mg/kg) Chromium 36.58 (mg/kg)

Grid	Results Exceeding NAL
520-054	Arsenic 6.19 (mg/kg) Chromium 44.14 (mg/kg)

Grid	Results Exceeding NAL
520-056	Arsenic 10.4 (mg/kg) Beryllium 0.92 (mg/kg) Chromium 49.39 (mg/kg) Iron 29000 (mg/kg) Mercury 6.94 (mg/kg) Nickel 66.25 (mg/kg) Vanadium 37.3 (mg/kg)

Grid	Results Exceeding NAL
520-057	Arsenic 6.47 (mg/kg) Beryllium 0.59 (mg/kg) Vanadium 26.5 (mg/kg)

Grid	Results Exceeding NAL
520-058	Arsenic 5.76 (mg/kg) Beryllium 0.7 (mg/kg) Nickel 84.64 (mg/kg) Vanadium 25 (mg/kg)

Grid	Results Exceeding NAL
520-059	Cobalt 17.9 (mg/kg) Vanadium 19.8 (mg/kg)

Grid	Results Exceeding NAL
520-060	Vanadium 22.6 (mg/kg)

Grid	Results Exceeding NAL
520-061	Arsenic 5.78 (mg/kg) Chromium 31.34 (mg/kg)

Grid	Results Exceeding NAL
520-062	Arsenic 8.23 (mg/kg) Chromium 33.74 (mg/kg)

Grid	Results Exceeding NAL
520-064	Mercury 6.65 (mg/kg) Nickel 62.09 (mg/kg)

Grid	Results Exceeding NAL
520-065	Arsenic 6.96 (mg/kg)

Grid	Results Exceeding NAL
520-066	Nickel 68.59 (mg/kg)

Grid	Results Exceeding NAL
520-067	Chromium 36.39 (mg/kg)

Grid	Results Exceeding NAL
520-068	Arsenic 5.69 (mg/kg) Chromium 50.12 (mg/kg) Nickel 57.82 (mg/kg)

Grid	Results Exceeding NAL
520-069	Chromium 31.43 (mg/kg)

NOTE: Maximum detections only shown for location.

Figure 10.3.7. SWMU 520 NAL Exceedances - Subsurface Soil (Continued)

No metals were detected in the SWMU 520 subsurface soil above both the background screening levels and the industrial worker ALs.

The following are the metals detected in the SWMU 520 subsurface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Aluminum	57	1
Antimony	13	1
Arsenic	1, 18, 19, 21, 23, 24, 26, 27, 56, 62, 70	1, 2, 3, 4, 5
Barium	56, 57	1, 5
Cadmium	24	4
Cobalt	59	1
Iron	24, 56	4, 5
Manganese	24, 27, 56, 59	1, 4, 5
Mercury	56, 64	3, 5
Molybdenum*	13, 17, 22, 49, 56	1, 2, 3, 4, 5
Nickel	4, 9, 12, 16, 24, 25, 27, 29, 35, 36, 42, 48, 56, 57, 58, 64, 66, 68	1, 2, 3, 4, 5
Selenium	13, 17, 22, 49, 56	1, 2, 3, 4, 5
Silver	10, 51, 64	3, 4
Uranium	30	1
Vanadium	24, 56	4, 5

* No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids and EUs in which they were detected.

Metal	Grid	EU
Cobalt	59	1
Iron	24, 56	4, 5
Manganese	24, 27, 56, 59	1, 4, 5
Mercury	56, 64	3, 5
Nickel	16, 58	1, 2
Silver	10, 51, 64	3, 4
Vanadium	24, 56	4, 5

PCBs

No PCBs were detected in the SWMU 520 subsurface soil.

SVOCs

Of the SVOCs, Total PAHs were detected above the industrial worker NAL in the subsurface soil of grid 17 (EU 2), which is located within the administrative boundary of SWMU 520. The detection was at 4 ft bgs, which also was the end depth of the borehole.

No SVOCs were detected in the SWMU 520 subsurface soil above the industrial worker ALs or the SSLs for the protection of RGA groundwater. Total PAHs in grids 17 (EU 2) and 49 (EU 3) were detected above the SSLs for the protection of UCRS groundwater.

VOCs

No VOCs were detected in the SWMU 520 subsurface soil above the industrial worker NALs, industrial ALs, or the SSLs for the protection of UCRS and RGA groundwater.

Radionuclides

No radionuclides were detected in the SWMU 520 subsurface soil above both the background screening levels and the industrial worker NALs or ALs.

Neptunium-237 (no background value available) in grids 13 (EU 1), 17 (EU 2), 22 (EU 4), 49 (EU 3), and 60 (EU 2) was detected above the SSL for the protection of UCRS groundwater. No radionuclides were detected above both the background screening level and the SSLs for the protection of RGA groundwater.

10.3.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is potential for runoff because this SWMU is on the banks of one of the KPDES Outfall 001 ditches. Runoff is captured in the C-613 Sedimentation Basin prior to discharge at Outfall 001. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

10.3.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 520 were evaluated for direct contact for all EUs. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for one or more EUs at SWMU 520 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 10.3.5 for the future industrial worker and the hypothetical resident. The excavation worker did not have any identified COCs. Table 10.3.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COC for this SWMU under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 520 include metals. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 10.3.6.

Table 10.3.5. RGOs for SWMU 520

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Future Industrial Worker											
1	Cesium-137	9.62E-01	pCi/g	1.1E-05	8.61E-02	8.61E-01	8.61E+00	n/a	n/a	n/a	n/a
	Chromium	3.17E+01	mg/kg	1.1E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Neptunium-237	6.56E-01	pCi/g	2.4E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	Uranium-238	3.93E+00	pCi/g	2.3E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.7E-05**				**< 1**			
2	Chromium	6.67E+01	mg/kg	2.2E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Total PAH	3.17E-01	mg/kg	5.4E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-238	1.78E+00	pCi/g	1.0E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**8.6E-06**				< 1			
3	Chromium	3.97E+01	mg/kg	1.3E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Total PAH	1.18E-01	mg/kg	2.0E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Cumulative			**3.3E-06**				**< 1**			
4	Chromium	3.82E+01	mg/kg	1.3E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Neptunium-237	7.40E-01	pCi/g	2.7E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	Total PAH	5.52E-01	mg/kg	9.3E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-238	6.26E+00	pCi/g	3.7E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**1.7E-05**				**< 1**			
5	Chromium	3.68E+01	mg/kg	1.2E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Total PAH	3.87E-01	mg/kg	6.5E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Cumulative			**7.8E-06**				**< 1**			
Hypothetical Resident[5]											
1	Cesium-137	9.62E-01	pCi/g	5.6E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	Chromium	3.17E+01	mg/kg	2.0E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Iron	1.56E+04	mg/kg	< 1E-06	n/a	n/a	n/a	0.3	5.47E+03	5.48E+04	1.64E+05
	Mercury	1.07E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.5	2.35E+00	2.35E+01	7.04E+01
	Neptunium-237	6.56E-01	pCi/g	1.2E-05	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Nickel	2.60E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	1.44E+02	1.44E+03	4.33E+03
	Thorium-230	1.13E+01	pCi/g	3.2E-06	3.57E+00	3.57E+01	3.57E+02	n/a	n/a	n/a	n/a
	Total PAH	3.18E-02	mg/kg	1.6E-06	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium-235	1.26E-01	pCi/g	1.6E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	3.93E+00	pCi/g	1.1E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**8.8E-05**				**0.9**			

Table 10.3.5. RGOs for SWMU 520 (Continued)

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	**1 x 10^{-5}**	**1 x 10^{-4}**		**0.1**	**1**	**3**
2	Chromium	6.67E+01	mg/kg	4.3E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Manganese	5.89E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	5.34E+02	5.34E+03	1.60E+04
	Mercury	1.19E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.5	2.35E+00	2.35E+01	7.04E+01
	Neptunium-237	7.48E-02	pCi/g	1.4E-06	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Nickel	3.11E+02	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	1.44E+02	1.44E+03	4.33E+03
	Total PAH	3.17E-01	mg/kg	1.6E-05	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium	3.96E+01	mg/kg	< 1E-06	n/a	n/a	n/a	0.2	2.34E+01	2.34E+02	7.01E+02
	Uranium-238	1.78E+00	pCi/g	5.1E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**2.7E-05**				**1.1**			
3	Chromium	3.97E+01	mg/kg	2.6E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Nickel	2.65E+02	mg/kg	< 1E-06	n/a	n/a	n/a	< 1	n/a	n/a	n/a
	Total PAH	1.18E-01	mg/kg	6.1E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-238	1.57E+00	pCi/g	4.5E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.3E-05**				**< 1**			
4	Chromium	3.82E+01	mg/kg	2.5E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Neptunium-237	7.40E-01	pCi/g	1.4E-05	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Total PAH	5.52E-01	mg/kg	2.8E-05	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-235	2.42E-01	pCi/g	3.1E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	6.26E+00	pCi/g	1.8E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**6.6E-05**				**< 1**			
5	Chromium	3.68E+01	mg/kg	2.4E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Neptunium-237	1.55E-01	pCi/g	2.9E-06	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Total PAH	3.87E-01	mg/kg	2.0E-05	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-238	1.45E+00	pCi/g	4.2E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**2.9E-05**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.86, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.86, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 10.3.6 Ecological Screening for SWMU 520

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
mostly gravel and some soil/grass patches	Yes	340	Antimony	2.10E-01	1.00E+01	2.70E-01	37
			Mercury	2.00E-01	1.19E+01	1.00E-01	119
			Nickel	2.10E+01	8.10E+02	3.80E+01	21
			Selenium	8.00E-01	1.00E+01	5.20E-01	19
			Uranium	4.90E+00	5.00E+02	5.00E+00	100

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

10.3.7 SWMU 520 Summary

The following text summarizes the results for SWMU 520 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

A plant process that could have contributed to contamination at SWMU 520 includes placement of scrap material in the elements.

COPCs for surface and subsurface soils from SWMU 520 are shown on Tables 10.3.1 through 10.3.4 as those analytes with green boxes under the “Industrial Worker/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 16 ft bgs. A complete list of sampling results is provided in Appendix G. The COPCs identified for each EU of SWMU 520 are as follows:

- EU 1

  — Surface—metals, SVOCs, radionuclides
  — Subsurface—metals, radionuclides

- EU 2

  — Surface—metals, SVOCs, radionuclide
  — Subsurface—metals, SVOCs, radionuclides

- EU 3

  — Surface—metals, SVOCs
  — Subsurface—metals, SVOCs, radionuclides

- EU 4

  — Surface—metals, SVOCs, radionuclides
  — Subsurface—metals, radionuclides

- EU 5
  - Surface—metals, SVOCs, radionuclides
  - Subsurface—metals

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 520 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There is potential for runoff because this SWMU is on the banks of one of the KPDES Outfall 001 ditches, which is controlled under interim corrective measures. This runoff is captured in the C-613 Sedimentation Basin prior to discharge into Outfall 001. There are no underground pipelines at SWMU 520. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-6 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. COCs for these scenarios for SWMU 520 are as follows:

- Future Industrial Worker
  - Cesium-137
  - Chromium
  - Neptunium-237
  - Total PAHs
  - Uranium-238

- Excavation worker
  - None

- Hypothetical Resident (hazards evaluated against the child resident)
  - Cesium-137
  - Chromium
  - Iron
  - Manganese
  - Mercury
  - Neptunium-237
  - Nickel
  - Thorium-230
  - Total PAHs
  - Uranium
  - Uranium-235
  - Uranium-238

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 520.

For SWMU 520, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Antimony
- Mercury
- Nickel
- Selenium
- Uranium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 520 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit, as discussed in the Work Plan, are posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. A response action at SWMU 520 would not have an impact on integrator OUs.

10.3.8 SWMU 520 Conclusion

The RI adequately defined the nature and extent of contamination in soils at SWMU 520; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated land use for this SWMU is industrial as shown in the SMP (DOE 2012a).

11. GROUP 3, PCBS

This chapter includes a discussion of the PCB SWMUs, which includes the following eight SWMUs:

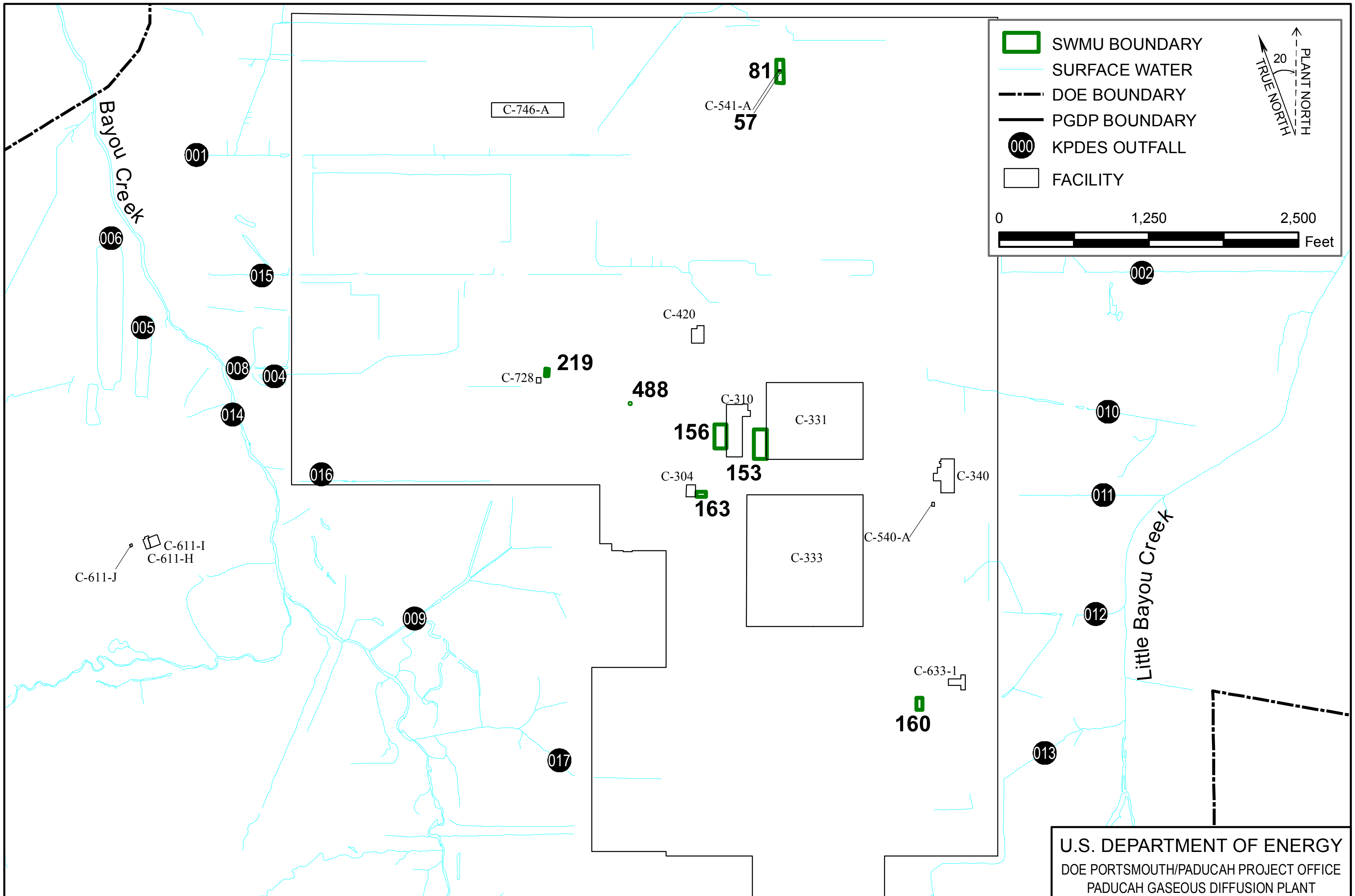
- SWMU 57, C-541-A PCB Waste Staging Area, not sampled during RI (DOE 2010a)
- SWMU 81, C-541 PCB Spill Site, sampled during RI
- SWMU 153, C-331 PCB Soil Contamination (West), sampled during RI
- SWMU 156, C-310 PCB Soil Contamination (West Side), sampled during RI
- SWMU 160, C-745 Cylinder Yard Spoils (PCB Soils), sampled during RI
- SWMU 163, C-304 Building/HVAC Piping System (Soil Backfill), sampled during RI
- SWMU 219, C-728 OS-08, sampled during RI
- SWMU 488, C-410 Trailers PCB Contamination Area by C-410 Trailer Complex, sampled during RI

The SWMU-specific discussions highlight the current understanding of each SWMU's impacts. Chapter 4 describes the overall evaluation approach that was used for each SWMU. Figures display the 45 ft grids that were used for the composite sampling and historical sample assignments. There are approximately 10 grids for each EU for SWMUs that are larger than 0.5 acres. If a SWMU is smaller than 0.5 acres, it is considered one EU. If contingency "step-out" grids were deemed necessary by field laboratory results to define extent, the step-out grids are displayed on the figures.

All of these sites are located within the industrial area of the facility, as shown in Figure 11.1, and fieldwork was conducted in accordance with the Work Plan (DOE 2010a).

SWMU 57 is small in size and is located inside of SWMU 81; therefore, the data sets for SWMUs 57 and 81 have been joined for evaluation.

The nature and extent is divided into surface and subsurface sections that summarize the representative data set and describes the future industrial worker scenario for SWMUs located inside the limited area and teen recreator scenario for SWMUs located outside the limited area. The evaluation of the XRF data with fixed-base laboratory data indicates the use of XRF results for copper, iron, lead, nickel, uranium, and zinc has good correlation and, therefore, is reliable for use in determining nature and extent and hot spots. Molybdenum, mercury, selenium, and silver XRF results are generally below the reporting limits and will not lead to incorrect decisions in the risk assessment; however, these results may not provide much useful information for nature and extent determination. Use of XRF results for arsenic, chromium, and manganese has uncertainties; however, higher values in the complete data set indicate overall patterns of these constituents present in the soils at the SWMUs/AOCs. Uncertainties associated with arsenic will be managed in the FS because detections at high concentrations from the fixed-base laboratory were detected at lower concentrations by the XRF and may lead to underestimating risk. For vanadium, comparison with the fixed-base laboratory data XRF data are much higher; therefore, risks may be overestimated when using the XRF data. See Appendix B for additional information.



U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

LATA Environmental Services of Kentucky, LLC

Figure 11.1. SWMU Locations and Features for PCB Areas

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For the fate and transport section, the process for evaluating surface water run-off and groundwater modeling is described in Chapter 4 and Appendix C, and only the conclusions are provided in the SWMU/AOC-specific sections. As detailed in the fate and transport discussion, one of these sites (SWMU 81) was identified for groundwater modeling.

The human health risk assessment narrative discusses the future industrial worker, the excavation worker, and the hypothetical future resident. Each SWMU/AOC was evaluated for receptors listed below. Additional discussion of scenarios is presented in Appendix D.

- Current on-site industrial worker (This assumes exposure to surface soils only.)

- Future on-site industrial worker (This assumes exposure to surface soils only.)

- Outdoor worker (surface and subsurface soils: 0–16 ft bgs) [This assumes exposure to surface (0–1 ft bgs) and a mixture of the surface (0–1 ft bgs) and subsurface soils (1-16 ft bgs), as appropriate, following a future construction activity. As a subset of the outdoor worker exposed to surface and subsurface soils, the potential risks and hazards for shorter-term exposure for workers during excavation are also provided.]

- Hypothetical future adult and child residents (This assumes exposure to surface soils only.)

- Future teen recreational users (This assumes exposure to surface soils only.)

The following are the uncertainties in the human health risk assessment that may affect SWMUs/AOCs in Chapter 11.

- The range of background was not considered beyond the initial screening against site-specific background.

- Overly conservative dermal toxicity factors potentially lead to an overestimation of risk.

- Concentration of total cancerous PAHs were used to estimate risk and the minimum detection limit of the PAHs with toxicity equivalency factors were used when PAHs were not detected.

- Some detection limits for XRF data are above background concentrations and NALs; the COPCs identified using these data are expected to overstate the presence of these metals.

- For those constituents that never were detected within an EU, even if the detection limit is greater than the NAL, the constituent was not considered a COPC.

- UCL concentrations were used as EPCs if there were a sufficient number of samples and distinct results to calculate a UCL. This likely will lead to an overestimation of actual exposure because receptors are assumed to be exposed to the UCL concentration for the entire exposure duration.

- Conservative (i.e., health protective) exposure factors are used when information available is limited in the form of using RME assumptions, per the Risk Methods Document (DOE 2011a). This may result in an overestimation of potential risk.

- Many of the SWMUs/AOCs (especially SWMUs 219 and 488) evaluated in this assessment are very small, and the assumptions used for the levels of exposures (duration, frequency) overstate potential chronic exposures in these units.

- The risk assessment does not consider that concentrations of some COCs may be lower or higher in the future because of processes such as degradation and attenuation.

- Additivity of multiple chemicals is assumed. Whether assuming additivity can lead to an underestimation or overestimation of risk is unknown.

- Most of the assumptions about exposure and toxicity used in this BHHRA are representative of statistical upper-bounds or even maximums for each parameter. The result of combining several such upper-bound assumptions is that the final estimate of potential exposure or potential risk is conservative.

Additional information can be found in Appendix D.

For the ecological screening, the priority chemicals that exceeded their respective screening values are shown in tables within each subsection (maximum HQ $\geq$ 10) as well as the overall HI for the constituents detected. This allows for comparison of the HIs, SWMU sizes, and other factors, such as proximity to a surface water body. Additional information is contained in Appendix E.

11.1 SWMU 57, C-541-A PCB WASTE STAGING AREA

11.1.1 Background

The C-541-A PCB Waste Staging Area (SWMU 57) is located in the northeast portion of the plant site. SWMU 57 is made up of leaks and spills of oils containing PCBs as a result of past operations that contaminated the soils.

Soil boring samples were obtained during the Phase I and Phase II SIs (CH2M HILL 1991; CH2M HILL 1992) and during the WAG 23 RI (DOE 1994d). Results of these investigations indicate the presence of PCBs.

In 1997, as part of the WAG 23 non-time-critical removal action, 23 yd^3 of soil contaminated with dioxins and 32 yd^3 of soil contaminated with PCBs were excavated for SWMUs 57 and 81 (DOE 1998d).

The entire area of SWMU 57 is inside SWMU 81; therefore, SWMU 57 characterization data will be discussed in the section on SWMU 81.

11.1.2 Fieldwork Summary

N/A

11.1.3 Nature and Extent of Contamination—Surface Soils

N/A

11.1.4 Nature and Extent of Contamination—Subsurface Soils

N/A

11.1.5 Fate and Transport

N/A

11.1.6 Baseline Risk Assessment

N/A

11.1.7 SWMU 57 Summary

SWMU 57 is summarized in the discussion on SWMU 81, Section 11.2.7 of this chapter.

11.1.8 SWMU 57 Conclusions

The conclusions for SWMU 57 are included in the Section 11.2.8 describing SWMU 81.

11.2 SWMU 81, C-541 PCB SPILL SITE

11.2.1 Background

The C-541 PCB Spill Site (SWMU 81) is located in the northeast portion of the plant site. SWMU 81 is 0.26 acres and is not located near a surface water body.

SWMU 81 is made up of leaks and spills of oils containing PCBs as a result of past operations that contaminated the soils.

Soil boring samples were obtained during the Phase I and Phase II SIs (CH2M HILL 1991; CH2M HILL 1992) and during the WAG 23 RI (DOE 1994d). Results of these investigations indicate the presence of PCBs.

In 1997, as part of the WAG 23 non-time-critical removal action, 23 yds^3 of soil contaminated with dioxins and 32 yds^3 of soil contaminated with PCBs were excavated for SWMUs 57 and 81(DOE 1998f).

11.2.2 Fieldwork Summary

Fourteen grid samples were collected of the 16 planned for this unit. Field laboratory results indicated contingency samples were needed for manganese and zinc, and 24 of 46 contingency samples were collected. Samples not collected were because of a building, a road, and concrete. Figure A.19 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 11.2.1) using a FIDLER; the 1,377 measurements ranged from 4,008 to 15,680 gross cpm and were consistent with background. This area consists of gravel, soil, and grass with gravel driveways and concrete pads. A judgmental grab sample was collected for radiological constituents.

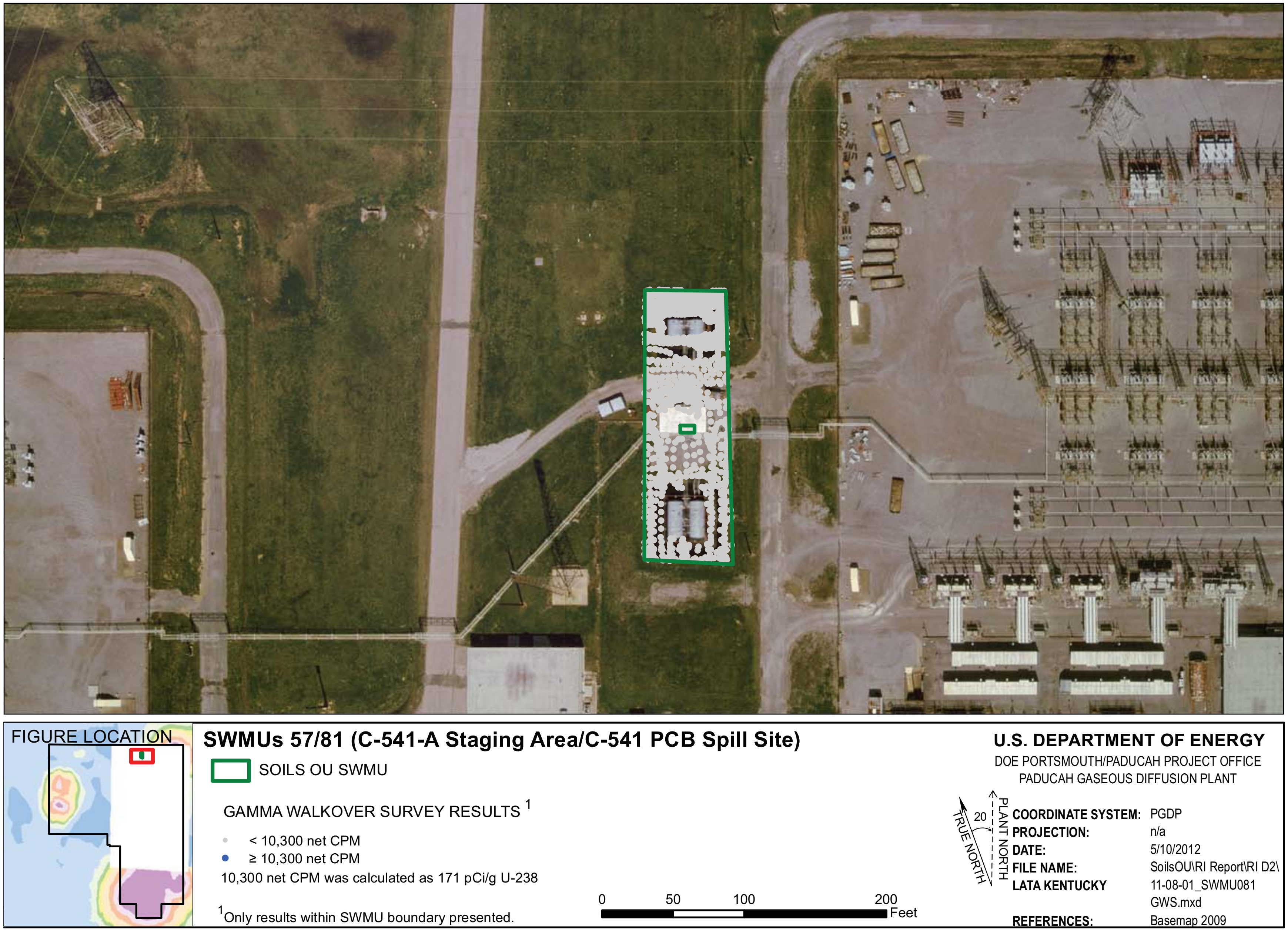


Figure 11.2.1. SWMUs 57/81 Gamma Walkover Survey

11.2.3 Nature and Extent of Contamination—Surface Soils

SWMU 57 is small in size and is located inside of SWMU 81; therefore, the data set for SWMU 57 and 81 have been joined for evaluation.

For SWMUs 57 and 81, the representative data set for surface soils is presented in Tables 11.2.1 and 11.2.2 and provides the nature of the contamination in SWMUs 57 and 81 surface soils. Figures 11.2.2–11.2.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of the surface soil contamination in SWMUs 57 and 81 is considered adequately defined for supporting the BRA and FS. SWMUs 57 and 81 consist of one EU.

Metals

Metals were detected above the industrial worker NALs in the surface soil of SWMUs 57 and 81. The following are the metals detected above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Arsenic	1, 4
Beryllium	4, 5D
Chromium	1, 1C, 1D, 3, 5B, 6, 6C, 6D
Mercury	3
Nickel	1A, 1G, 6C
Uranium	1, 1A, 1B, 1C, 1I, 2, 3, 4, 5, 5B, 5C, 5D, 6, 6A, 6D

* SWMUs 57/81 consist of one EU.

No metals were detected above both the background screening levels and the industrial worker ALs in the surface soil of SWMUs 57 and 81.

The following are the metals detected in the surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	1
Arsenic	1, 4
Mercury	3
Molybdenum[1]	1
Nickel	1A, 1G, 6C
Selenium	1
Silver	4
Uranium	1, 1A, 1B, 1I, 2, 3, 4, 5, 5B, 5c, 5D, 6, 6D
Zinc	4, 5, 5B, 6, 7

* SWMUs 57/81 consist of one EU.
[1] No background value is available.

Table 11.2.1. Surface Soil Historical Data Summary: SWMUs 57/81 C-541-A PCB Staging Area and C-541 PCB Spill Site

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	9.18E+03	1.30E+04	1.12E+04	0/3	3/3	0/3	1.30E+04	0/3	3.32E+04	0/3	3.97E+06	0/3	3/3	-
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.10E-01	0/3	2.53E+00	0/3	1.51E+03	0/3	0/3	12.6 - 13.1
METAL	Arsenic	mg/kg	9.10E+00	1.34E+01	1.08E+01	0/3	3/3	1/3	1.20E+01	3/3	9.97E-01	0/3	9.97E+01	0/3	3/3	-
METAL	Barium	mg/kg	7.88E+01	1.06E+02	9.18E+01	0/3	3/3	0/3	2.00E+02	0/3	5.92E+02	0/3	3.78E+05	0/3	2/3	-
METAL	Beryllium	mg/kg	7.00E-01	1.00E+00	9.00E-01	0/3	3/3	3/3	6.70E-01	3/3	1.40E-02	0/3	9.22E+00	0/3	0/3	0.4 - 0.4
METAL	Calcium	mg/kg	3.40E+03	5.20E+03	4.53E+03	0/3	3/3	0/3	2.00E+05	0/3	n/a	0/3	n/a	n/a	n/a	-
METAL	Chromium	mg/kg	1.20E+01	1.32E+01	1.25E+01	0/3	3/3	0/3	1.60E+01	0/3	3.02E+01	0/3	3.02E+03	0/3	0/3	-
METAL	Cobalt	mg/kg	6.20E+00	1.03E+01	7.60E+00	0/3	3/3	0/3	1.40E+01	0/3	1.05E+01	0/3	1.52E+03	3/3	3/3	1.4 - 1.4
METAL	Copper	mg/kg	1.50E+01	2.12E+01	1.90E+01	0/3	3/3	2/3	1.90E+01	0/3	1.43E+03	0/3	2.24E+05	0/3	0/3	-
METAL	Iron	mg/kg	1.80E+04	2.59E+04	2.30E+04	0/3	3/3	0/3	2.80E+04	1/3	2.51E+04	0/3	3.92E+06	3/3	3/3	-
METAL	Lead	mg/kg	1.72E+01	2.19E+01	1.92E+01	0/3	3/3	0/3	3.60E+01	0/3	4.00E+02	0/3	4.00E+02	0/3	3/3	-
METAL	Magnesium	mg/kg	2.14E+03	2.47E+03	2.31E+03	0/3	2/3	0/3	7.70E+03	0/3	n/a	0/3	n/a	n/a	n/a	1800 - 1800
METAL	Manganese	mg/kg	1.34E+02	1.55E+02	1.45E+02	0/3	2/3	0/3	1.50E+03	0/3	2.58E+03	0/3	1.16E+05	2/3	2/3	714 - 714
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.00E-01	0/3	9.00E-01	0/3	7.85E+02	0/3	0/3	0.1 - 0.1
METAL	Nickel	mg/kg	1.45E+01	1.52E+01	1.48E+01	0/3	3/3	0/3	2.10E+01	0/3	4.28E+01	0/3	3.18E+04	0/3	3/3	6.8 - 6.8
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	8.00E-01	0/3	1.79E+02	0/3	2.80E+04	0/3	0/3	1 - 1
METAL	Silver	mg/kg	2.30E+00	2.70E+00	2.47E+00	0/3	3/3	2/3	2.30E+00	0/3	1.08E+01	0/3	9.15E+03	1/3	3/3	1.8 - 1.8
METAL	Sodium	mg/kg	5.78E+01	6.40E+01	6.09E+01	0/3	2/3	0/3	3.20E+02	0/3	n/a	0/3	n/a	n/a	n/a	111 - 111
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	2.10E-01	0/3	2.87E+00	0/3	4.48E+02	0/3	0/3	0.7 - 0.8
METAL	Uranium	mg/kg	2.60E+03	6.50E+03	4.12E+03	0/18	17/18	17/18	4.90E+00	17/18	1.07E+02	0/18	1.65E+04	17/18	17/18	-
METAL	Vanadium	mg/kg	2.89E+01	2.98E+01	2.94E+01	0/3	2/3	0/3	3.80E+01	2/3	1.51E-01	0/3	9.30E+01	2/3	2/3	27.4 - 27.4
METAL	Zinc	mg/kg	6.68E+01	7.53E+01	7.11E+01	0/3	2/3	2/3	6.50E+01	0/3	1.08E+04	0/3	1.68E+06	0/3	2/3	49.9 - 49.9
PPCB	PCB, Total	mg/kg	1.50E-02	3.70E+02	1.37E+01	0/39	32/39	0/39	n/a	19/39	1.88E-01	1/39	1.88E+01	5/39	23/39	0.2 - 24
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.4 - 0.42
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.4 - 0.42
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.4 - 0.42
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	2 - 2.1
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	2 - 2.1
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	2 - 2.1
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.30E+00	0/3	3.91E+01	0/3	0/3	2 - 2.1
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.8 - 0.84
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	2 - 2.1
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	2 - 2.1
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	6.02E+02	0/3	1.81E+04	0/3	0/3	0.4 - 0.42
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.05E+03	0/3	1.22E+05	0/3	0/3	0.4 - 0.42
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	2 - 2.1

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.2.1. Surface Soil Historical Data Summary: SWMUs 57/81 C-541-A PCB Staging Area and C-541 PCB Spill Site (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	4.50E-01	4.50E-01	4.50E-01	0/3	1/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.53 - 0.59
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	6.01E+02	0/3	1.80E+04	0/3	0/3	0.4 - 0.42
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.87E+02	0/3	1.46E+04	0/3	0/3	0.4 - 0.42
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.17E-01	0/3	1.17E+01	0/3	0/3	0.4 - 0.42
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	2.24E+00	0/3	2.24E+02	0/3	0/3	0.4 - 0.42
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.22E-02	0/3	5.22E+00	0/3	0/3	0.4 - 0.42
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	2 - 2.1
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.4 - 0.42
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	2 - 2.1
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.49E+02	0/3	1.35E+04	0/3	0/3	0.4 - 0.42
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.92E-02	0/3	5.92E+00	0/3	0/3	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.006 - 0.006
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.006 - 0.006
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.006 - 0.006
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.006 - 0.006
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.89E-02	0/3	5.53E+00	0/3	0/3	0.006 - 0.006
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.006 - 0.006
VOA	1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.48E+00	0/3	1.76E+02	0/3	0/3	0.006 - 0.006
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.006 - 0.006
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.012 - 0.013
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.012 - 0.013
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.012 - 0.013
VOA	Acetone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.012 - 0.03
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	6.98E-01	0/3	8.22E+01	0/3	0/3	0.006 - 0.006
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.006 - 0.006
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.006 - 0.006
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.012 - 0.013
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.006 - 0.006
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.97E-01	0/3	5.76E+01	0/3	0/3	0.006 - 0.006
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.006 - 0.006
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.012 - 0.013
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	2.42E-01	0/3	2.49E+01	0/3	0/3	0.006 - 0.006
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.012 - 0.013
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.006 - 0.006
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.006 - 0.006
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	3.29E+00	0/3	3.84E+02	0/3	0/3	0.006 - 0.006
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.006 - 0.029
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.006 - 0.006

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.2.1. Surface Soil Historical Data Summary: SWMUs 57/81 C-541-A PCB Staging Area and C-541 PCB Spill Site (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	2.82E-01	0/3	7.08E+01	0/3	0/3	0.006 - 0.006
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.006 - 0.006
VOA	Total Xylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	3.50E+01	0/3	1.07E+03	0/3	0/3	0.006 - 0.006
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.006 - 0.006
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.69E-02	0/3	4.98E+00	0/3	0/3	0.006 - 0.006
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.012 - 0.013
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	2.04E-01	0/3	4.83E+01	0/3	0/3	0.012 - 0.013

One or more samples exceed AL value
One or more samples exceed NAL value
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not

[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.

Thallium metal results are compared to thallium chloride action

Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two

Field replicates, or separate samples are counted

The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (is

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.2.2 Surface Soil RI Data Summary: SWMUs 57/81 C-541 PCB Spill Site

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Industrial Worker FOE	Industrial Worker NAL	Industrial Worker FOE	Industrial Worker AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
METAL	Aluminum	mg/kg	5.47E+03	5.47E+03	5.47E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.4 - 5.4
METAL	Antimony	mg/kg	4.10E-01	4.10E-01	4.10E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.54 - 0.54
METAL	Arsenic	mg/kg	5.81E+00	1.37E+01	9.10E+00	0/20	14/20	1/20	1.20E+01	14/20	9.97E-01	0/20	9.97E+01	0/20	14/20	1.1 - 11
METAL	Barium	mg/kg	1.01E+02	1.01E+02	1.01E+02	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.1 - 2.1
METAL	Beryllium	mg/kg	5.00E-01	5.00E-01	5.00E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.11 - 0.11
METAL	Cadmium	mg/kg	9.50E-02	9.50E-02	9.50E-02	0/1	1/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.054 - 0.054
METAL	Calcium	mg/kg	1.91E+04	1.91E+04	1.91E+04	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	53.6 - 53.6
METAL	Chromium	mg/kg	3.44E+01	1.08E+02	4.74E+01	0/20	8/20	8/20	1.60E+01	8/20	3.02E+01	0/20	3.02E+03	0/20	0/20	1.1 - 85
METAL	Cobalt	mg/kg	6.60E+00	6.60E+00	6.60E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.21 - 0.21
METAL	Copper	mg/kg	9.80E+00	2.72E+01	1.68E+01	0/20	3/20	2/20	1.90E+01	0/20	1.43E+03	0/20	2.24E+05	0/20	0/20	1.1 - 35
METAL	Iron	mg/kg	9.36E+03	1.81E+04	1.31E+04	0/20	20/20	0/20	2.80E+04	0/20	2.51E+04	0/20	3.92E+06	20/20	20/20	5.4 - 100
METAL	Lead	mg/kg	9.00E+00	2.02E+01	1.50E+01	0/20	19/20	0/20	3.60E+01	0/20	4.00E+02	0/20	4.00E+02	0/20	12/20	0.32 - 13
METAL	Magnesium	mg/kg	1.35E+03	1.35E+03	1.35E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	53.6 - 53.6
METAL	Manganese	mg/kg	1.11E+02	1.38E+03	5.70E+02	0/20	20/20	0/20	1.50E+03	0/20	2.58E+03	0/20	1.16E+05	20/20	20/20	0.21 - 85
METAL	Mercury	mg/kg	3.75E-02	8.33E+00	2.80E+00	0/20	2/20	1/20	2.00E-01	1/20	9.00E-01	0/20	7.85E+02	1/20	1/20	0.0357 - 10
METAL	Molybdenum	mg/kg	9.80E-01	9.80E-01	9.80E-01	0/20	1/20	0/20	n/a	0/20	1.79E+02	0/20	2.80E+04	0/20	1/20	0.54 - 15
METAL	Nickel	mg/kg	9.50E+00	8.19E+01	4.52E+01	0/20	4/20	3/20	2.10E+01	3/20	4.28E+01	0/20	3.18E+04	1/20	4/20	0.54 - 65
METAL	Selenium	mg/kg	1.00E+00	1.00E+00	1.00E+00	0/20	1/20	1/20	8.00E-01	0/20	1.79E+02	0/20	2.80E+04	0/20	1/20	0.54 - 20
METAL	Silver	mg/kg	3.20E-02	3.20E-02	3.20E-02	0/20	1/20	0/20	2.30E+00	0/20	1.08E+01	0/20	9.15E+03	0/20	0/20	0.21 - 10
METAL	Sodium	mg/kg	2.28E+01	2.28E+01	2.28E+01	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	21.4 - 21.4
METAL	Thallium	mg/kg	1.10E-01	1.10E-01	1.10E-01	0/1	1/1	0/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	0/1	0.21 - 0.21
METAL	Uranium	mg/kg	7.70E+00	8.48E+00	7.91E+00	0/21	3/21	3/21	4.90E+00	0/21	1.07E+02	0/21	1.65E+04	0/21	0/21	0.02 - 20
METAL	Vanadium	mg/kg	2.64E+01	2.64E+01	2.64E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	3.77E+01	1.32E+02	5.67E+01	0/20	20/20	4/20	6.50E+01	0/20	1.08E+04	0/20	1.68E+06	0/20	20/20	2.1 - 25
PPCB	PCB, Total	mg/kg	4.20E-01	4.20E-01	4.20E-01	0/7	1/7	0/7	n/a	1/7	1.88E-01	0/7	1.88E+01	0/7	1/7	0.32 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2-Methylnaphthalene	mg/kg	8.20E-02	8.20E-02	8.20E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.7 - 1.7
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Acenaphthene	mg/kg	2.80E-01	2.80E-01	2.80E-01	1/1	1/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	1/1	0.35 - 0.35
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Anthracene	mg/kg	3.60E-01	3.60E-01	3.60E-01	0/1	1/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.35 - 0.35
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Benzo(ghi)perylene	mg/kg	3.60E-01	3.60E-01	3.60E-01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.2.2 Surface Soil RI Data Summary: SWMUs 57/81 C-541 PCB Spill Site (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0071 - 0.0071
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Dibenzofuran	mg/kg	1.40E-01	1.40E-01	1.40E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Fluoranthene	mg/kg	1.50E+00	1.50E+00	1.50E+00	0/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.35 - 0.35
SVOA	Fluorene	mg/kg	2.20E-01	2.20E-01	2.20E-01	1/1	1/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	1/1	0.35 - 0.35
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.35 - 0.35
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.71 - 0.71
SVOA	Naphthalene	mg/kg	3.90E-01	3.90E-01	3.90E-01	0/1	1/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	1/1	1/1	0.35 - 0.35
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0071 - 0.0071
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.7 - 1.7
SVOA	Phenanthrene	mg/kg	1.40E+00	1.40E+00	1.40E+00	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Pyrene	mg/kg	1.20E+00	1.20E+00	1.20E+00	0/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	1/1	0.35 - 0.35
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.71 - 0.71
SVOA	Total PAH	mg/kg	7.79E-01	7.79E-01	7.79E-01	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	1/1	1/1	-
RADS	Alpha activity	pCi/g	2.80E+01	4.53E+01	3.67E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.5 - 5.5
RADS	Americium-241	pCi/g	6.00E-03	1.10E-02	8.50E-03	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.027 - 0.028
RADS	Beta activity	pCi/g	3.30E+01	3.77E+01	3.54E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.7 - 3.1
RADS	Cesium-137	pCi/g	2.90E-02	8.80E-02	5.85E-02	0/2	2/2	0/2	4.90E-01	1/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.078 - 0.13
RADS	Neptunium-237	pCi/g	-4.30E-03	0.00E+00	-2.15E-03	0/2	2/2	0/2	1.00E-01	0/2	2.71E-01	0/2	2.71E+01	0/2	0/2	0.022 - 0.028
RADS	Plutonium-238	pCi/g	7.00E-03	1.80E-02	1.25E-02	0/2	2/2	0/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.015 - 0.02
RADS	Plutonium-239/240	pCi/g	3.70E-03	8.60E-03	6.15E-03	0/2	2/2	0/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.013 - 0.015
RADS	Technetium-99	pCi/g	1.30E-01	5.40E-01	3.35E-01	0/2	2/2	0/2	2.50E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	1/2	0.41 - 0.5
RADS	Thorium-228	pCi/g	1.03E+00	1.22E+00	1.13E+00	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.02 - 0.03
RADS	Thorium-230	pCi/g	1.12E+00	3.10E+00	2.11E+00	0/2	2/2	1/2	1.50E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.02 - 0.02
RADS	Thorium-232	pCi/g	1.01E+00	1.32E+00	1.17E+00	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.02 - 0.02
RADS	Uranium-234	pCi/g	1.57E+00	2.50E+00	2.04E+00	0/2	2/2	2/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	9.20E-02	1.12E-01	1.02E-01	0/2	2/2	2/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.008 - 0.021
RADS	Uranium-238	pCi/g	1.82E+00	2.67E+00	2.25E+00	0/2	2/2	2/2	1.20E+00	2/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.007 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

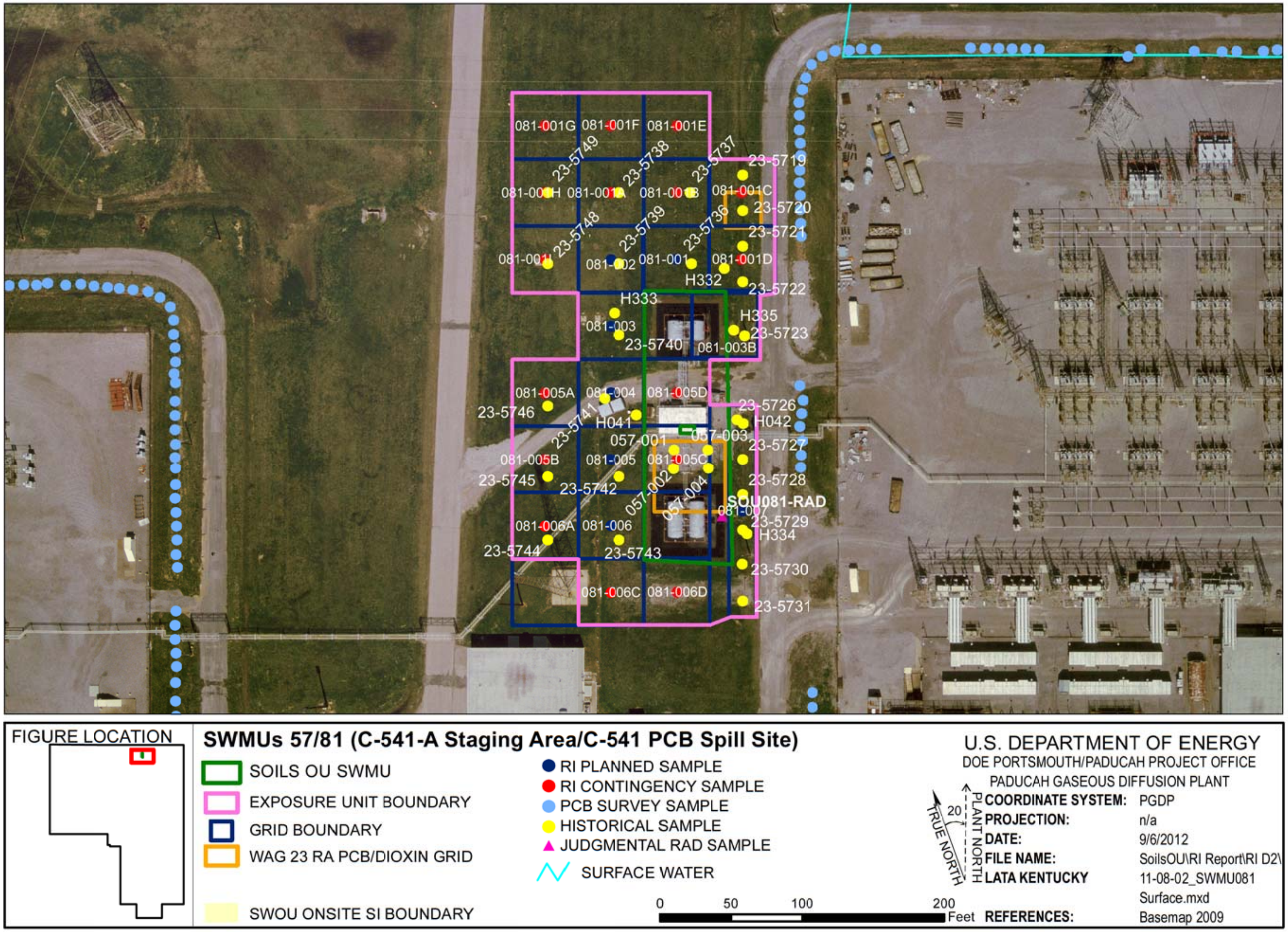


Figure 11.2.2. SWMUs 57/81 Sample Locations - Surface Soil

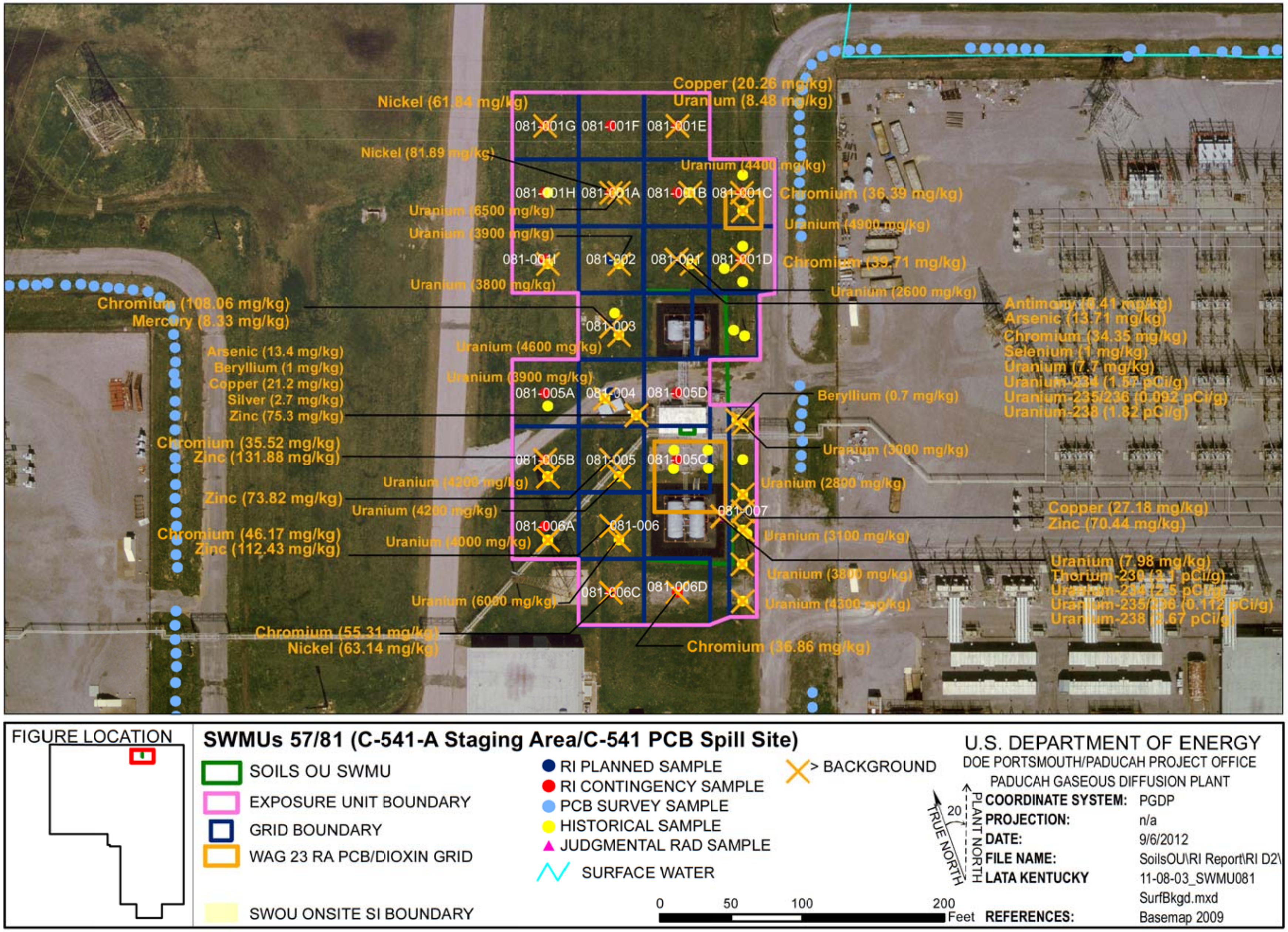


Figure 11.2.3. SWMUs 57/81 Background Exceedances - Surface Soil

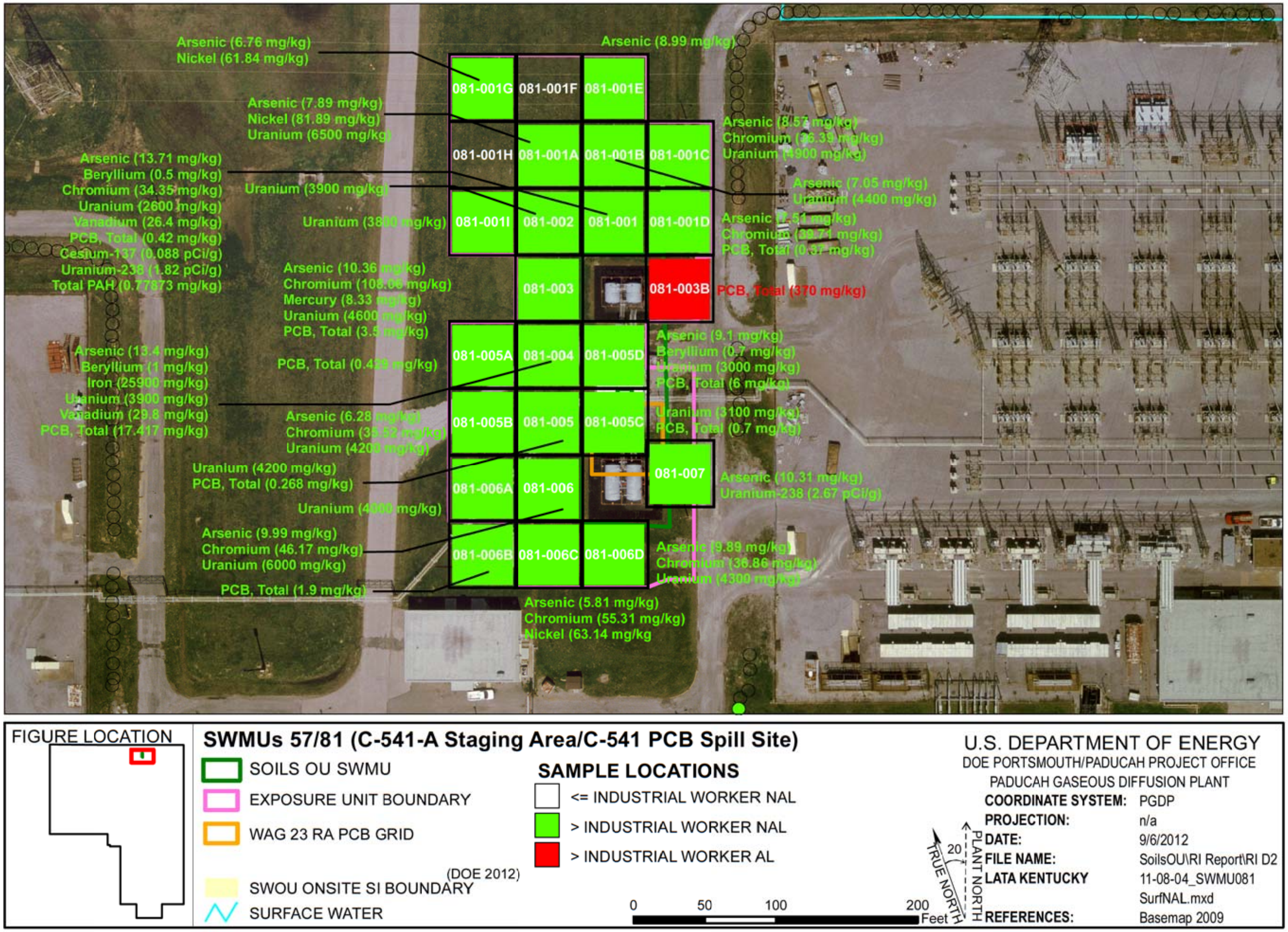


Figure 11.2.4. SWMUs 57/81 NAL Exceedances - Surface Soil

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids in which they were detected.

Metal	Grid
Mercury	3
Nickel	1A
Silver	4
Uranium	1, 1A, 1B, 1C, 1I, 2, 3, 4, 5, 5B, 5C, 5D, 6, 6a, 6D

* SWMUs 57/81 consist of one EU.

An uncertainty exists in using the historical uranium data for SWMU 81. Historical samples were analyzed using a radionuclide method and converted to a concentration for uranium metal. These results appear to show uranium at a higher level than would be expected at this site. The results also are inconsistent with the gamma radiological walkover survey shown in Figure 11.2.1, which indicates results are less than the project action limit for uranium-238. Isotopic uranium results are not available for the historical samples in order to compare to the total uranium result. The historical uranium metal results have been carried forward to fate and transport screening and the BHHRA, but it should be noted that these results may overstate the actual risks at this site.

PCBs

Total PCBs were detected above the industrial worker NAL in the surface soil of grids 1, 1D, 3, 3B, 4, 5, 5A, 5C, 5D, and 6B. Grids 3, 5A, and 6B are located on the western border of SWMU 81, and grids 1D, 3B, 5C, and 5D are located on the eastern border of SWMUs 57 and 81.

Surface soil samples were collected in 2010 as part of a PCB survey effort. Samples were not associated with SWMU 81, but provide bounding information for PCBs at this SWMU. Samples were collected from North Ditch 1, which wraps around the C-535 Electrical Switchyard, and from North Ditch 2, which surrounds the C-537 Electrical Switchyard as shown in Figure 11.2.2. North Ditch 1 is located to the west of SWMU 81, and North Ditch 2 is located to the east of SWMU 81. A total of 367 samples was collected from the two north ditches and these were analyzed for total PCBs using a field laboratory. Ten percent of the samples also were sent to a fixed-based laboratory for PCB analysis with Aroclor segregation. All of the field laboratory results were nondetect for PCBs. The maximum fixed-based laboratory result was 0.18 mg/kg for Aroclor 1260, which is below the industrial worker NAL for total PCBs, thereby bounding the PCB exceedances of SWMUs 57 and 81.

Total PCBs were detected above the industrial worker AL in the surface soil of grid 3B.

Total PCBs were detected above the SSLs for protection of the UCRS groundwater in grids 1, 1D, 1I, 2, 3, 3B, 4, 5, 5A, 5B, 5C, 5C, and 6B. Total PCBs were detected above the SSL for the protection of RGA groundwater in grids 3B, 4 and 5D.

SVOCs

Total PAHs were detected above the industrial worker NAL in the surface soil of grid 1.

No SVOCs were detected above the industrial worker ALs in the surface soil of SWMUs 57 and 81.

Acenaphthene, fluorene, naphthalene, pyrene, and Total PAHs in grid 1 were detected above the SSLs for the protection of UCRS groundwater. Naphthalene and Total PAHs in grid 1 were detected above the SSL for the protection of RGA groundwater.

VOCs

No VOCs were detected in the surface soil of SWMUs 57 and 81.

Radionuclides

Uranium-238 was detected above both the background screening level and the industrial worker NAL.

No radionuclides were detected above the industrial worker ALs in the surface soil of SWMUs 57 and 81.

Thorium-230 in grid 7 was detected above both the background screening levels and the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

11.2.4 Nature and Extent of Contamination—Subsurface Soils

SWMU 57 is small in size and is located inside of SWMU 81; therefore, the data sets for SWMU 57 and 81 have been joined for evaluation.

For SWMUs 57 and 81, the representative data set for subsurface soils is presented in Tables 11.2.3 and 11.2.4 and provides the nature of contamination in SWMUs 57 and 81 subsurface soils. Figures 11.2.5–11.2.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of subsurface soil contamination in SWMUs 57 and 81 is considered adequately defined for supporting the BRA and FS. SWMUs 57 and 81 consist of one EU.

Metals

Metals were detected above the industrial worker NALs in the subsurface soil of SWMUs 57 and 81. The following are the metals detected above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Arsenic	1, 1B, 1D, 1E, 1G, 1H, 4, 5, 5A, 5B, 5C, 6, 6C, 6D
Beryllium	6D
Chromium	5, 5B, 1H, 6C
Cobalt	5A
Manganese	5A
Mercury	1G
Nickel	1G, 6C

* SWMUs 57/81 consist of one EU.

The maximum depth at which metals were detected above both the background screening levels and the industrial worker NALs was 10 ft bgs. The end depths of the boreholes taken from the grids listed above ranged from 4 to 10 ft bgs.

No metals were detected above both the background screening levels and the industrial worker ALs in the subsurface soil of SWMUs 57 and 81.

Table 11.2.3. Subsurface Soil Historical Data Summary: SWMUs 57/81 C-541-A PCB Staging Area and C-541 PCB Spill Site

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
PPCB	PCB, Total	mg/kg	6.80E-01	1.25E+01	5.78E+00	0/26	6/26	0/26	n/a	6/26	1.88E-01	0/26	1.88E+01	3/26	6/26	0.2 - 0.2
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.41 - 0.43
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.41 - 0.43
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.41 - 0.43
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	2.1 - 2.2
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	2.1 - 2.2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	2.1 - 2.2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	1.30E+00	0/7	3.91E+01	0/7	0/7	2.1 - 2.2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.82 - 0.87
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	2.1 - 2.2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	2.1 - 2.2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	6.02E+02	0/7	1.81E+04	0/7	0/7	0.41 - 0.43
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	4.05E+03	0/7	1.22E+05	0/7	0/7	0.41 - 0.43
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	2.1 - 2.2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.41 - 2.9
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	6.01E+02	0/7	1.80E+04	0/7	0/7	0.41 - 0.43
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	4.87E+02	0/7	1.46E+04	0/7	0/7	0.41 - 0.43
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	1.17E-01	0/7	1.17E+01	0/7	0/7	0.41 - 0.43
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	2.24E+00	0/7	2.24E+02	0/7	0/7	0.41 - 0.43
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	5.22E-02	0/7	5.22E+00	0/7	0/7	0.41 - 0.43
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	2.1 - 2.2

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.2.3. Subsurface Soil Historical Data Summary: SWMUs 57/81 C-541-A PCB Staging Area and C-541 PCB Spill Site (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.41 - 0.43
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	2.1 - 2.2
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	4.49E+02	0/7	1.35E+04	0/7	0/7	0.41 - 0.43
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	5.92E-02	0/7	5.92E+00	0/7	0/7	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.006 - 0.031
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.031
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.006 - 0.031
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.031
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	4.89E-02	0/7	5.53E+00	0/7	0/7	0.006 - 0.031
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.006 - 0.031
VOA	1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	5.48E+00	0/7	1.76E+02	0/7	0/7	0.006 - 0.031
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.031
VOA	2-Butanone	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.012 - 0.062
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.012 - 0.062
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.012 - 0.062
VOA	Acetone	mg/kg	1.70E-01	1.70E-01	1.70E-01	0/7	1/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.009 - 0.062
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	6.98E-01	0/7	8.22E+01	0/7	0/7	0.006 - 0.031
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.031
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.031
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.012 - 0.062
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.031
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	4.97E-01	0/7	5.76E+01	0/7	0/7	0.006 - 0.031
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.006 - 0.031
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.012 - 0.062
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	2.42E-01	0/7	2.49E+01	0/7	0/7	0.006 - 0.031
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.012 - 0.062
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.031
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.006 - 0.031
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	3.29E+00	0/7	3.84E+02	0/7	0/7	0.006 - 0.031
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.006 - 0.031
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.006 - 0.031
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	2.82E-01	0/7	7.08E+01	0/7	0/7	0.006 - 0.031
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	0/7	0/7	0.006 - 0.031
VOA	Total Xylene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	3.50E+01	0/7	1.07E+03	0/7	0/7	0.006 - 0.031
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.006 - 0.031
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	4.69E-02	0/7	4.98E+00	0/7	0/7	0.006 - 0.031
VOA	Vinyl acetate	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	n/a	0/7	n/a	n/a	n/a	0.012 - 0.062
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	2.04E-01	0/7	4.83E+01	0/7	0/7	0.012 - 0.062

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.2.4. Subsurface Soil RI Data Summary: SWMUs 57/81 C-541-A PCB Staging Area and C-541 PCB Spill Site

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	6.22E+03	1.10E+04	8.94E+03	0/6	6/6	0/6	1.20E+04	0/6	3.32E+04	0/6	3.97E+06	0/6	6/6	5.5 - 5.9
METAL	Antimony	mg/kg	2.00E-01	4.00E-01	3.45E-01	0/6	6/6	5/6	2.10E-01	0/6	2.53E+00	0/6	1.51E+03	0/6	5/6	0.55 - 0.59
METAL	Arsenic	mg/kg	6.32E+00	1.36E+01	9.55E+00	0/30	23/30	16/30	7.90E+00	23/30	9.97E-01	0/30	9.97E+01	0/30	23/30	1.1 - 11
METAL	Barium	mg/kg	8.86E+01	1.57E+02	1.17E+02	0/6	6/6	0/6	1.70E+02	0/6	5.92E+02	0/6	3.78E+05	0/6	6/6	2.2 - 2.3
METAL	Beryllium	mg/kg	4.50E-01	7.70E-01	5.90E-01	0/6	6/6	1/6	6.90E-01	6/6	1.40E-02	0/6	9.22E+00	0/6	0/6	0.11 - 0.12
METAL	Cadmium	mg/kg	5.30E-02	2.30E-01	1.17E-01	0/6	5/6	1/6	2.10E-01	0/6	3.16E+00	0/6	3.16E+02	0/6	0/6	0.055 - 0.059
METAL	Calcium	mg/kg	7.28E+02	7.62E+04	1.62E+04	0/6	6/6	2/6	6.10E+03	0/6	n/a	0/6	n/a	n/a	n/a	54.6 - 294
METAL	Chromium	mg/kg	1.02E+01	7.61E+01	3.56E+01	0/30	14/30	5/30	4.30E+01	11/30	3.02E+01	0/30	3.02E+03	0/30	0/30	1.1 - 85
METAL	Cobalt	mg/kg	5.10E+00	4.83E+01	1.42E+01	0/6	6/6	1/6	1.30E+01	1/6	1.05E+01	0/6	1.52E+03	6/6	6/6	0.22 - 0.23
METAL	Copper	mg/kg	7.70E+00	2.78E+01	1.43E+01	0/30	10/30	1/30	2.50E+01	0/30	1.43E+03	0/30	2.24E+05	0/30	0/30	1.1 - 35
METAL	Iron	mg/kg	8.22E+03	2.40E+04	1.56E+04	0/30	30/30	0/30	2.80E+04	0/30	2.51E+04	0/30	3.92E+06	30/30	30/30	5.5 - 100
METAL	Lead	mg/kg	6.88E+00	3.94E+01	1.51E+01	0/30	30/30	1/30	2.30E+01	0/30	4.00E+02	0/30	4.00E+02	0/30	15/30	0.33 - 13
METAL	Magnesium	mg/kg	1.14E+03	2.44E+03	1.68E+03	0/6	6/6	1/6	2.10E+03	0/6	n/a	0/6	n/a	n/a	n/a	54.6 - 58.7
METAL	Manganese	mg/kg	1.00E+02	3.65E+03	7.57E+02	0/30	30/30	7/30	8.20E+02	1/30	2.58E+03	0/30	1.16E+05	30/30	30/30	0.22 - 85
METAL	Mercury	mg/kg	7.70E-03	7.40E+00	5.88E-01	0/30	7/30	1/30	1.30E-01	1/30	9.00E-01	0/30	7.85E+02	1/30	1/30	0.0364 - 10
METAL	Molybdenum	mg/kg	4.00E-01	2.20E+00	9.72E-01	0/30	6/30	0/30	n/a	0/30	1.79E+02	0/30	2.80E+04	0/30	6/30	0.55 - 15
METAL	Nickel	mg/kg	7.80E+00	1.14E+02	2.39E+01	0/30	8/30	2/30	2.20E+01	2/30	4.28E+01	0/30	3.18E+04	1/30	8/30	0.55 - 65
METAL	Selenium	mg/kg	9.00E-01	1.40E+00	1.08E+00	0/30	6/30	6/30	7.00E-01	0/30	1.79E+02	0/30	2.80E+04	0/30	6/30	0.55 - 20
METAL	Silver	mg/kg	2.70E-02	3.80E-02	3.28E-02	0/30	6/30	0/30	2.70E+00	0/30	1.08E+01	0/30	9.15E+03	0/30	0/30	0.22 - 10
METAL	Sodium	mg/kg	2.54E+01	1.08E+02	6.56E+01	0/6	6/6	0/6	3.40E+02	0/6	n/a	0/6	n/a	n/a	n/a	21.8 - 23.5
METAL	Thallium	mg/kg	1.70E-01	4.20E-01	2.40E-01	0/6	6/6	1/6	3.40E-01	0/6	2.87E+00	0/6	4.48E+02	0/6	6/6	0.22 - 0.23
METAL	Uranium	mg/kg	7.90E-01	8.55E+00	2.87E+00	0/30	9/30	3/30	4.60E+00	0/30	1.07E+02	0/30	1.65E+04	0/30	0/30	0.05 - 20
METAL	Vanadium	mg/kg	1.99E+01	3.23E+01	2.74E+01	0/6	6/6	0/6	3.70E+01	6/6	1.51E-01	0/6	9.30E+01	6/6	6/6	1.1 - 1.2
METAL	Zinc	mg/kg	2.67E+01	6.23E+01	4.19E+01	0/30	30/30	1/30	6.00E+01	0/30	1.08E+04	0/30	1.68E+06	0/30	30/30	2.2 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/7	0/7	0/7	n/a	0/7	1.88E-01	0/7	1.88E+01	0/7	0/7	0.33 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.8 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.37 - 0.37
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.37 - 0.37
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.2.4. Subsurface Soil RI Data Summary: SWMUs 57/81 C-541-A PCB Staging Area and C-541 PCB Spill Site (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0073 - 0.0073
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.37 - 0.37
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.37 - 0.37
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.37 - 0.37
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.73 - 0.73
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.37 - 0.37
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0073 - 0.0073
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.8 - 1.8
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.37 - 0.37
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.73 - 0.73
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	0/1	-
RADS	Alpha activity	pCi/g	3.06E+01	3.06E+01	3.06E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.1 - 5.1
RADS	Americium-241	pCi/g	0.00E+00	0.00E+00	0.00E+00	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.0064 - 0.0064
RADS	Beta activity	pCi/g	2.59E+01	2.59E+01	2.59E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
RADS	Cesium-137	pCi/g	-2.30E-02	-2.30E-02	-2.30E-02	0/1	1/1	0/1	2.80E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.11 - 0.11
RADS	Neptunium-237	pCi/g	0.00E+00	0.00E+00	0.00E+00	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.023 - 0.023
RADS	Plutonium-238	pCi/g	3.00E-03	3.00E-03	3.00E-03	0/1	1/1	0/1	n/a	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.02 - 0.02
RADS	Plutonium-239/240	pCi/g	-1.10E-03	-1.10E-03	-1.10E-03	0/1	1/1	0/1	n/a	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.014 - 0.014
RADS	Technetium-99	pCi/g	-5.00E-02	-5.00E-02	-5.00E-02	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	0/1	0.48 - 0.48
RADS	Thorium-228	pCi/g	1.07E+00	1.07E+00	1.07E+00	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	1.25E+00	1.25E+00	1.25E+00	0/1	1/1	0/1	1.40E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	1.03E+00	1.03E+00	1.03E+00	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
RADS	Uranium-234	pCi/g	7.30E-01	7.30E-01	7.30E-01	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	3.50E-02	3.50E-02	3.50E-02	0/1	1/1	0/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.01 - 0.01
RADS	Uranium-238	pCi/g	9.00E-01	9.00E-01	9.00E-01	0/1	1/1	0/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.02 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

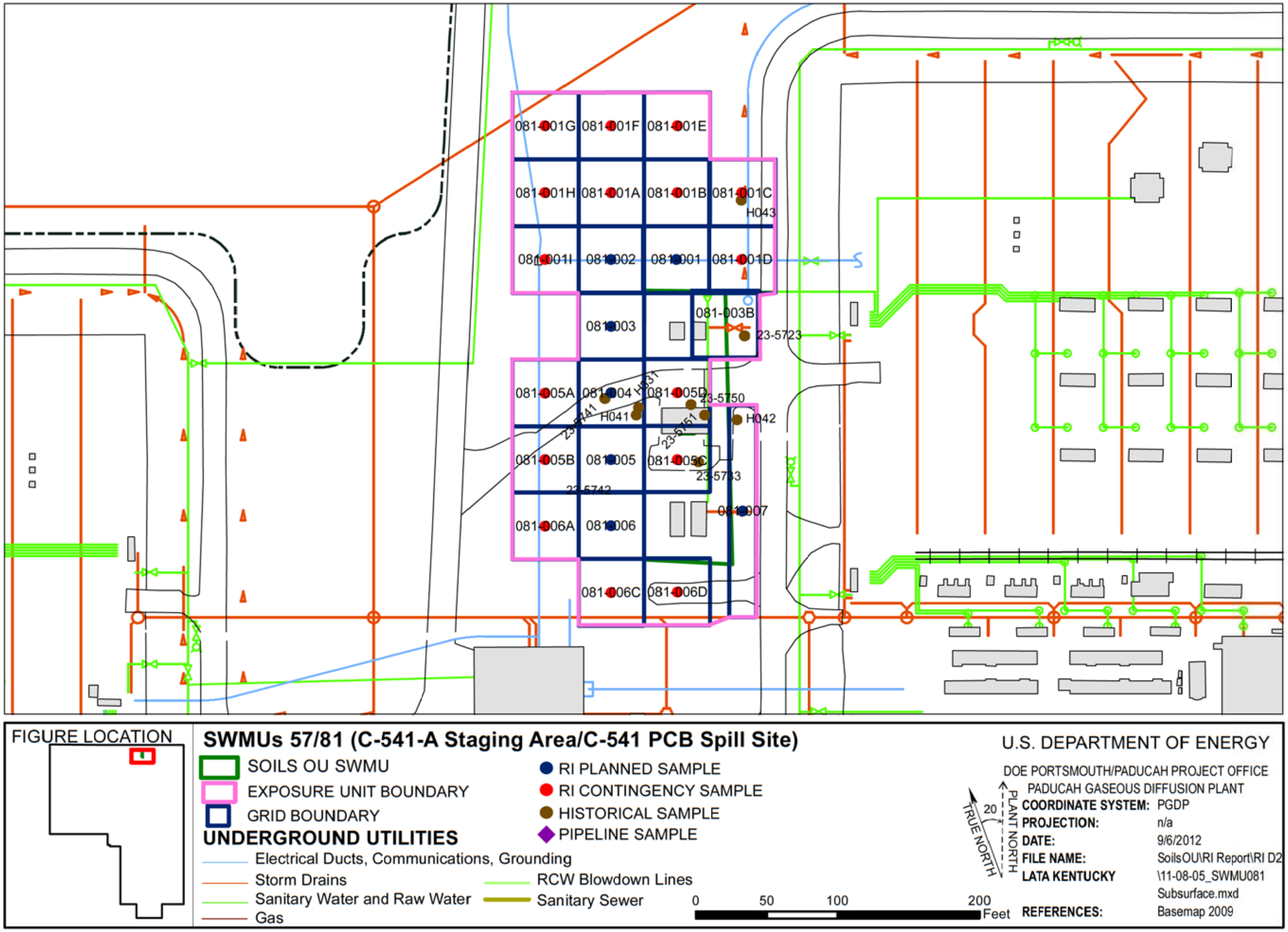


Figure 11.2.5. SWMUs 57/81 Sample Locations - Subsurface Soil

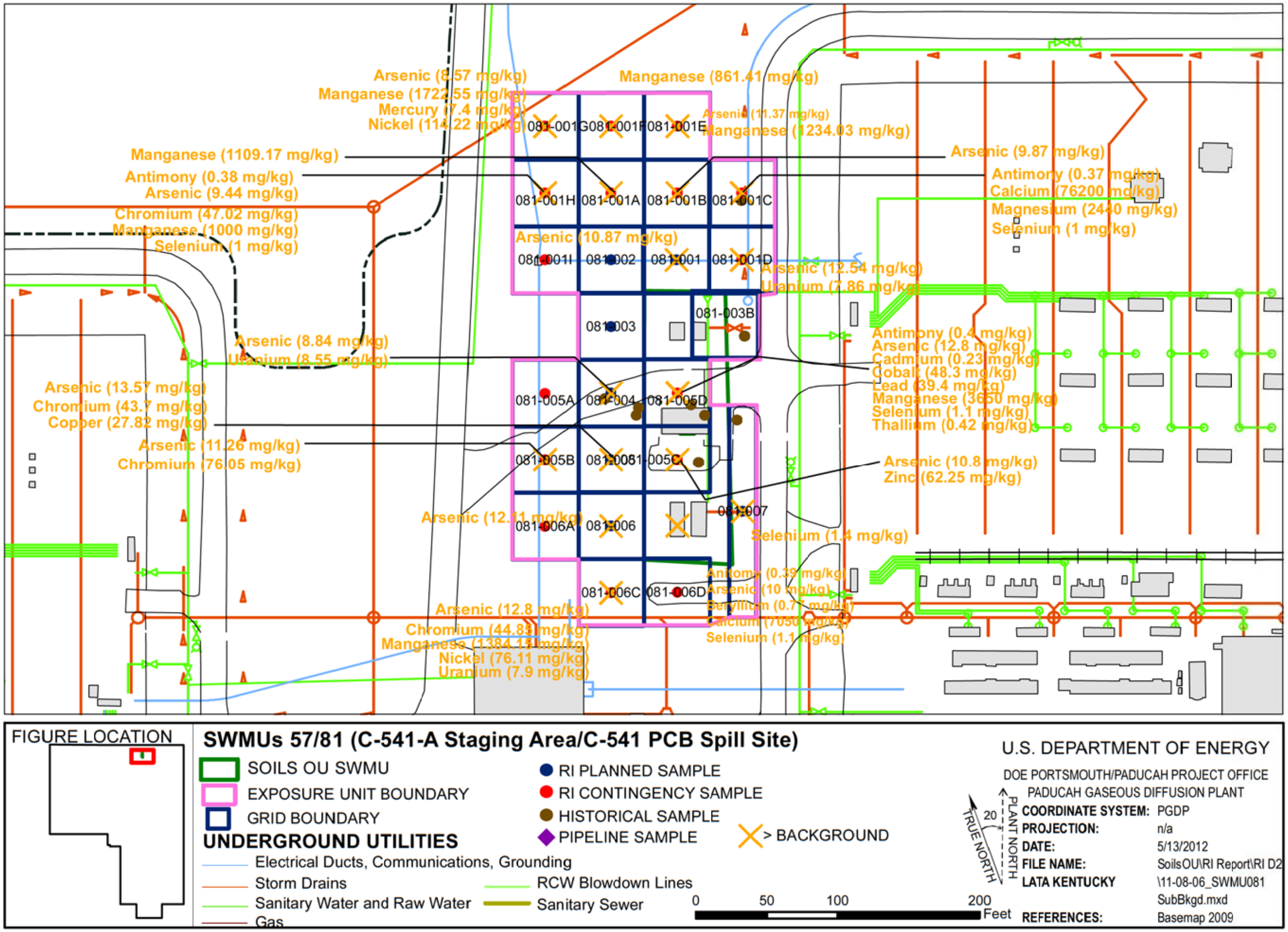


Figure 11.2.6. SWMUs 57/81 Background Exceedances - Subsurface Soil

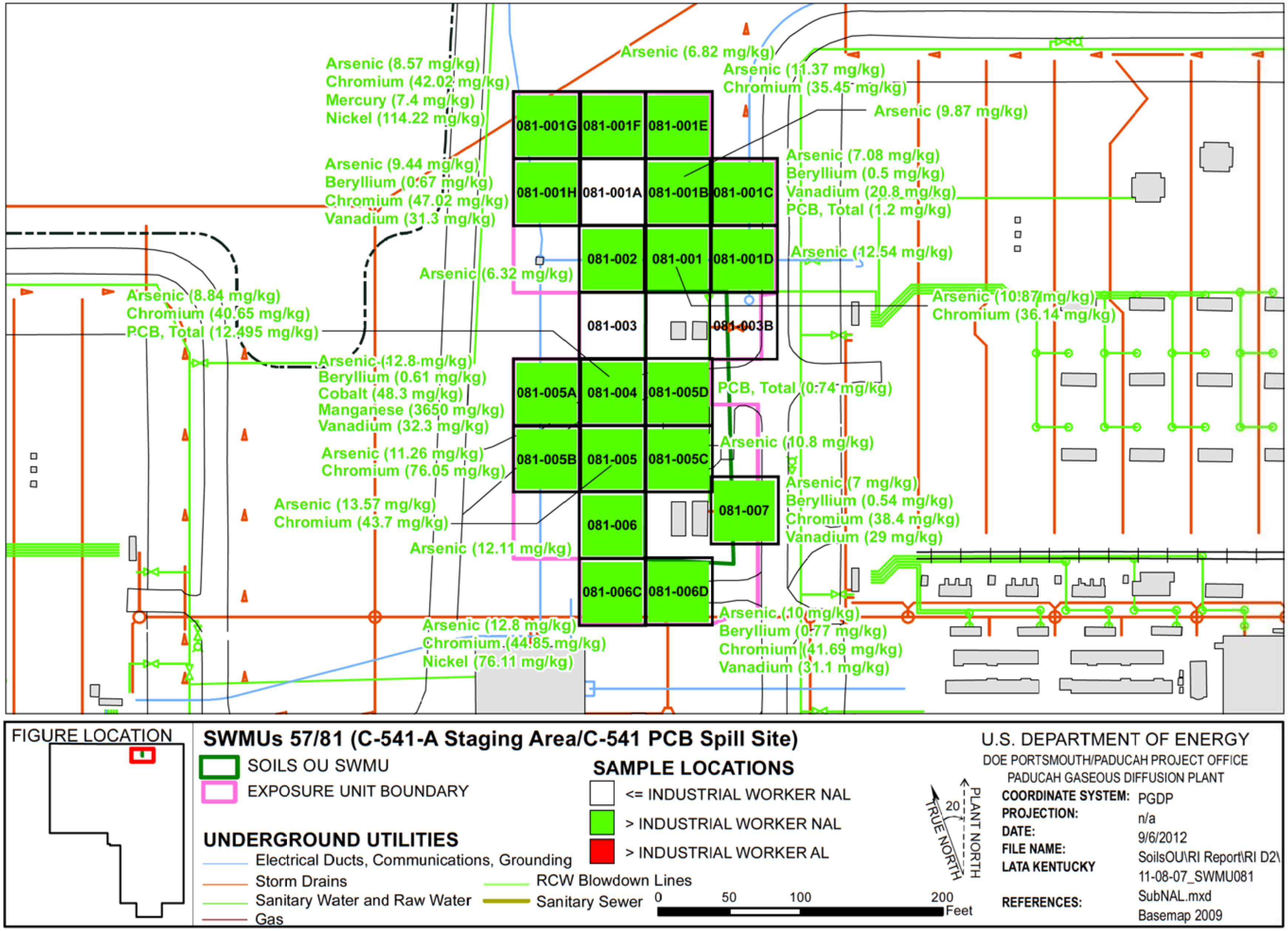


Figure 11.2.7. SWMUs 57/81 NAL Exceedances - Subsurface Soil

The following are the metals detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	1C, 1H, 5A, 6D
Arsenic	1, 1B, 1D, 1E, 1G, 1H, 4, 5, 5A, 5B, 5C, 6, 6C, 6D
Cobalt	5A
Lead	5A
Manganese	1A, 1E, 1F, 1G, 1H, 5a, 6C
Mercury	1G
Molybdenum[1]	1C, 1H, 5A, 6D, 7
Nickel	1G, 6C
Selenium	1C, 1H, 5A, 6D, 7
Thallium	5A
Zinc	5C

* SWMUs 57/81 consist of one EU.
[1] No background value is available.

The following are the metals detected above both the background screening levels and the SSLs for the protection of RGA groundwater and the grids in which they were detected.

Metal	Grid
Cobalt	5A
Manganese	1A, 1E, 1F, 1G, 1H, 5A, 6C
Mercury	1G
Nickel	1G

* SWMUs 57/81 consist of one EU.

PCBs

Total PCBs were detected above the industrial worker NAL in the subsurface soil of grids 1C, 4, and 5D to a maximum depth of 6 ft bgs. Grids 1C and 5D are located on the border of the area sampled for SWMUs 57 and 81.

No PCBs were detected above the industrial worker AL in the subsurface soil of SWMUs 57 and 81.

Total PCBs were detected above the SSLs for the protection of UCRS groundwater in grids 1C, 4 and 5D and above the SSLs for the protection of RGA groundwater in grid 4.

SVOCs

No SVOCs were detected in the subsurface soil of SWMUs 57 and 81.

VOCs

No VOCs were detected in the subsurface soil of SWMUs 57 and 81.

Radionuclides

No radionuclides were detected above both the background screening levels and the industrial worker NALs or ALs in the subsurface soil of SWMUs 57 and 81.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

11.2.5 Fate and Transport

SESOIL and AT123D groundwater and transport modeling was conducted to determine maximum potential RGA groundwater concentrations at the SWMU 81 boundary, the DOE property boundary, and the surface water discharge location that result from residual uranium and Total PCBs soil contamination. Screening of the soil contaminant data (Appendix C) determined that the average concentrations of these constituents exceeded screening levels. Details regarding the SESOIL and AT123D modeling can be found in Appendix C. The results presented in Appendix C show that migration of uranium and Total PCBs is retarded in the UCRS and these constituents do not reach the RGA groundwater in the 1,000 year SESOIL modeling period.

There is no concern for potential significant runoff due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

11.2.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMUs 57 and 81 were evaluated for direct contact. These results are summarized in Appendix D and in the following subsections, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for SWMUs 57 and 81 exceed the benchmark for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), these SWMUs will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 11.2.5 for the future industrial worker, the excavation worker, and the hypothetical resident. Table 11.2.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COC for these SWMUs under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMUs 57 and 81 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 11.2.6.

Table 11.2.5. RGOs for SWMUs 57 and 81

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Future Industrial Worker											
1	Arsenic	1.03E+01	mg/kg	1.0E-05	9.97E-01	9.97E+00	9.97E+01	< 1	n/a	n/a	n/a
	Chromium	8.62E+01	mg/kg	2.9E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	PCB, Total	1.60E+02	mg/kg	8.5E-04	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	5.53E-01	mg/kg	9.3E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium[5]	6.50E+03	mg/kg	< 1E-06	n/a	n/a	n/a	1.1	6.00E+02	6.00E+03	1.80E+04
	Uranium-238	2.29E+00	pCi/g	1.3E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**8.7E-04**				**1.1**			
Excavation Worker											
1	PCB, Total	1.60E+02	mg/kg	1.2E-05	1.30E+01	1.30E+02	1.30E+03	< 0.1	n/a	n/a	n/a
	Uranium[5]	6.50E+03	mg/kg	< 1E-06	n/a	n/a	n/a	2.4	2.75E+02	2.75E+03	8.25E+03
	Cumulative			**1.2E-05**				**2.4**			
Hypothetical Resident[6]											
1	Aluminum	9.57E+03	mg/kg	< 1E-06	n/a	n/a	n/a	0.1	7.27E+03	7.27E+04	2.18E+05
	Arsenic	1.03E+01	mg/kg	4.4E-05	2.35E-01	2.35E+00	2.35E+01	0.6	1.64E+00	1.64E+01	4.93E+01
	Chromium	8.62E+01	mg/kg	5.5E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Mercury	8.33E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.4	2.35E+00	2.35E+01	7.04E+01
	PCB, Total	1.60E+02	mg/kg	2.5E-03	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Total PAH	**5.53E-01**	**mg/kg**	**2.8E-05**	**1.94E-02**	**1.94E-01**	**1.94E+00**	**< 0.1**	**n/a**	**n/a**	**n/a**
	Uranium[5]	6.50E+03	mg/kg	< 1E-06	n/a	n/a	n/a	27.8	2.34E+01	2.34E+02	7.01E+02
	Uranium-238	2.29E+00	pCi/g	6.6E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**2.6E-03**				**28.9**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.

n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI but not ELCR or it was of concern for ELCR by not HI).

[1] See Table D.6 (Appendix D) for EPC values.

[2] See Appendix D, Exhibit D.88, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.

[3] See Table D.41 for RGOs.

[4] See Appendix D, Exhibit D.88, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.

[5] Uranium data was collected from historical samples and are uncertain. See Section 11.4.2 for additional information.

[6] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 11.2.6 Ecological Screening for SWMU 57 and 81

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Gravel/soil/grass with gravel driveways, and concrete pads	No	19,948	Antimony	2.10E-01	6.55E+00	2.70E-01	24
			Mercury	2.00E-01	8.33E+00	1.00E-01	83
			PCB, Total	n/a	3.70E+02	2.00E-02	18,500
			Selenium	8.00E-01	1.00E+01	5.20E-01	19
			Uranium[c]	4.90E+00	6.50E+03	5.00E+00	1,300

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
[c] Uranium data was collected from historical samples and are uncertain. See Section 11.4.2 for additional information.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

11.2.7 SWMU 81 Summary

The following text summarizes the results for SWMUs 57 and 81 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

Plant processes that could have contributed to contamination at this SWMU are releases from the PCB spill that occurred in the past.

COPCs for surface and subsurface soils from SWMUs 57 and 81 are shown on Tables 11.2.1 through 11.2.4 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 10 ft bgs. A complete list of sampling results is provided in Appendix G. COPCs identified for SWMUs 57 and 81 are metals, PCBs, SVOCs, and radionuclides for surface soils and metals, PCBs, and radionuclides subsurface soil.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMUs 57 and 81 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMUs 57 and 81. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-6 and 1, respectively, for the future industrial worker, excavation worker, and hypothetical residential scenarios. COCs for these scenarios for SWMUs 57 and 81 are as follows:

- Future Industrial Worker
  - Arsenic
  - Chromium
  - Total PAHs

- Total PCBs
- Uranium
- Uranium-238

- Excavation worker

  - Total PCBs
  - Uranium

- Hypothetical Resident (hazards evaluated against the child resident)

  - Aluminum
  - Arsenic
  - Chromium
  - Mercury
  - Total PAHs
  - Total PCBs
  - Uranium
  - Uranium-238

Priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMUs 57 and 81 are uranium and Total PCBs for the future industrial worker and the hypothetical resident and uranium for the excavation worker. It should be noted, however, that uranium data were collected from historical samples and are uncertain. See Section 11.4.2 for additional information. Priority COCs for other scenarios are described in Appendix D. Figure 11.2.8 also shows the COCs exceeding RGOs for the future industrial worker.

For SWMUs 57 and 81, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ $\geq$ 10) are the following:

- Antimony
- Mercury
- Total PCBs
- Selenium
- Uranium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMUs 57 and 81 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit are, as discussed in the Work Plan, posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMUs 57 and 81 are next to SWMU 85, the C-537 Electric Switchyard, which is part of the GDP D&D OU. A response action at SWMUs 57 and 81 would not have an impact on SWMU 85. A response action at SWMUs 57 and 81 would not have an impact on integrator OUs.

11.2.8 SWMU 81 Conclusions

The RI adequately defined the nature and extent of contamination in soils at SWMUs 57 and 81; an FS is appropriate for the SWMUs due to risk exceeding the decision rule benchmark for scenarios including future industrial worker, excavation worker, and hypothetical resident (DOE 2010a). The reasonably anticipated land use for SWMUs 57 and 81 is industrial as shown in the SMP (DOE 2012a).

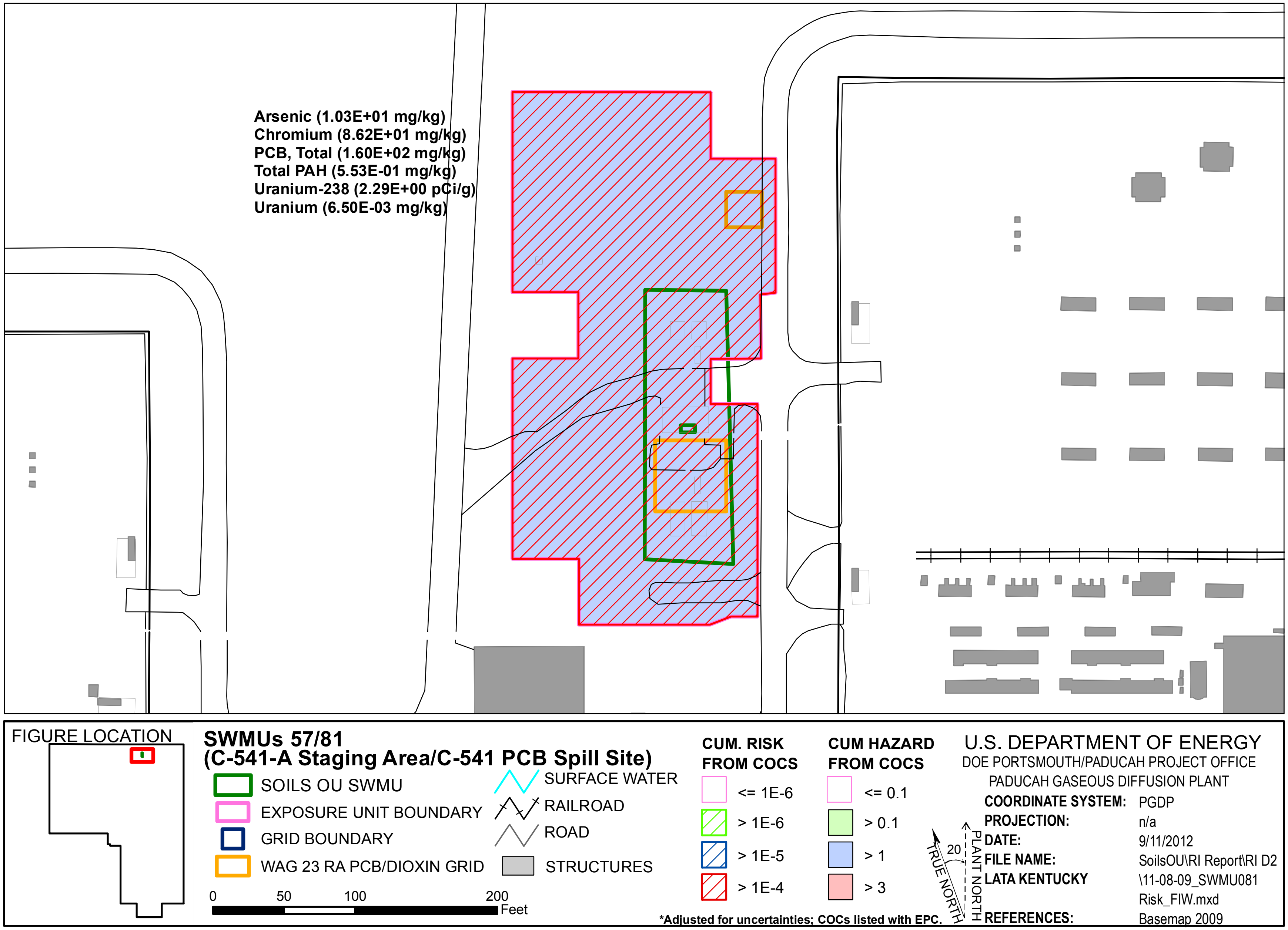


Figure 11.2.8. Summary of COCs Contributing to Risk to the Future Industrial Worker at SWMUs 57/81

11.3 SWMU 153, C-331 PCB SOIL CONTAMINATION (WEST)

11.3.1 Background

The C-331 PCB Soil Contamination (West) (SWMU 153) is located west of the C-331 Building in the west-central portion of the plant site and was a dust palliative area used to reduce the amount of dust taken in by the ventilation system. The area is approximately 100-ft wide by 420-ft long.

SWMU 153 was part of WAGs 16 and 19. Information obtained in the scoping information package for WAGs 16 and 19 projects identified surface sampling that detected PCBs and uranium (DOE 1997f).

11.3.2 Fieldwork Summary

Eleven grid samples were collected of the 20 planned for the unit. Two pipeline samples were planned and collected. Additional samples were needed to determine the lateral and vertical extent of contamination by the field laboratory. Of the 14 contingency samples, none were collected. Samples not collected were due to the surface being a dense chip seal and asphalt with a gravel base. Surface soil samples were not recoverable, except at one location. Figure A.20 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 11.3.1) using a FIDLER; the 6,231 measurements ranged from 5,698 to 219,007 gross cpm. The area consists entirely of chip seal/gravel. A judgmental grab sample was collected for radiological constituents. SWMU 153 is located adjacent to a building; therefore, the GPS coordinates plotted on Figure 11.3.1 may not be entirely accurate due to limited accessibility of satellites.

11.3.3 Nature and Extent of Contamination—Surface Soils

For SWMU 153, the representative data set for surface soils is presented in Tables 11.3.1 and 11.3.2 and provides the nature of the contamination in SWMU 153 surface soils. Figures 11.3.2–11.3.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 153 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 153 consists of one EU.

Metals

No metals were detected above both background screening levels and the industrial worker NALs or ALs in the SWMU 153 surface soil.

The following metals were detected in grid 1 above background and the SSLs for the protection of UCRS groundwater: antimony, molybdenum (no background value available), selenium, and thallium. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the industrial worker NAL and the SSL for the protection of UCRS groundwater in grid 5. Grid 5 is located on the border of SWMU 153, within the administrative boundary.

Figure 11.3.1. SWMU 153 Gamma Walkover Survey

Table 11.3.1. Surface Soil Historical Data Summary: SWMU 153 C-331 PCB Soil Contamination (west)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
PPCB	PCB, Total	mg/kg	6.00E-01	6.00E-01	6.00E-01	0/1	1/1	0/1	n/a	1/1	1.88E-01	0/1	1.88E+01	0/1	1/1	-

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.3.2. Surface Soil RI Data Summary: SWMU 153 C-331 PCB Soil Contamination -West

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	8.68E+03	8.68E+03	8.68E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.8 - 5.8
METAL	Antimony	mg/kg	3.00E-01	3.00E-01	3.00E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.58 - 0.58
METAL	Arsenic	mg/kg	7.40E+00	7.40E+00	7.40E+00	0/1	1/1	0/1	1.20E+01	1/1	9.97E-01	0/1	9.97E+01	0/1	1/1	1.2 - 11
METAL	Barium	mg/kg	9.22E+01	9.22E+01	9.22E+01	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.3 - 2.3
METAL	Beryllium	mg/kg	4.90E-01	4.90E-01	4.90E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.12 - 0.12
METAL	Cadmium	mg/kg	6.60E-02	6.60E-02	6.60E-02	0/1	1/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.058 - 0.058
METAL	Calcium	mg/kg	1.55E+04	1.55E+04	1.55E+04	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	58.1 - 58.1
METAL	Chromium	mg/kg	1.57E+01	1.57E+01	1.57E+01	0/1	1/1	0/1	1.60E+01	0/1	3.02E+01	0/1	3.02E+03	0/1	0/1	1.2 - 85
METAL	Cobalt	mg/kg	7.30E+00	7.30E+00	7.30E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.23 - 0.23
METAL	Copper	mg/kg	1.00E+01	1.00E+01	1.00E+01	0/1	1/1	0/1	1.90E+01	0/1	1.43E+03	0/1	2.24E+05	0/1	0/1	1.2 - 35
METAL	Iron	mg/kg	1.60E+04	1.60E+04	1.60E+04	0/1	1/1	0/1	2.80E+04	0/1	2.51E+04	0/1	3.92E+06	1/1	1/1	5.8 - 100
METAL	Lead	mg/kg	1.20E+01	1.20E+01	1.20E+01	0/1	1/1	0/1	3.60E+01	0/1	4.00E+02	0/1	4.00E+02	0/1	0/1	0.35 - 13
METAL	Magnesium	mg/kg	2.01E+03	2.01E+03	2.01E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	58.1 - 58.1
METAL	Manganese	mg/kg	4.49E+02	4.49E+02	4.49E+02	0/1	1/1	0/1	1.50E+03	0/1	2.58E+03	0/1	1.16E+05	1/1	1/1	0.23 - 85
METAL	Mercury	mg/kg	1.99E-02	1.99E-02	1.99E-02	0/1	1/1	0/1	2.00E-01	0/1	9.00E-01	0/1	7.85E+02	0/1	0/1	0.0387 - 10
METAL	Molybdenum	mg/kg	1.00E+00	1.00E+00	1.00E+00	0/1	1/1	0/1	n/a	0/1	1.79E+02	0/1	2.80E+04	0/1	1/1	0.58 - 15
METAL	Nickel	mg/kg	1.32E+01	1.32E+01	1.32E+01	0/1	1/1	0/1	2.10E+01	0/1	4.28E+01	0/1	3.18E+04	0/1	1/1	0.58 - 65
METAL	Selenium	mg/kg	1.10E+00	1.10E+00	1.10E+00	0/1	1/1	1/1	8.00E-01	0/1	1.79E+02	0/1	2.80E+04	0/1	1/1	0.58 - 20
METAL	Silver	mg/kg	3.40E-02	3.40E-02	3.40E-02	0/1	1/1	0/1	2.30E+00	0/1	1.08E+01	0/1	9.15E+03	0/1	0/1	0.23 - 10
METAL	Sodium	mg/kg	5.90E+01	5.90E+01	5.90E+01	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	23.2 - 23.2
METAL	Thallium	mg/kg	3.30E-01	3.30E-01	3.30E-01	0/1	1/1	1/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.23 - 0.23
METAL	Uranium	mg/kg	3.42E+00	3.42E+00	3.42E+00	0/1	1/1	0/1	4.90E+00	0/1	1.07E+02	0/1	1.65E+04	0/1	0/1	0.04 - 20
METAL	Vanadium	mg/kg	2.92E+01	2.92E+01	2.92E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.2 - 1.2
METAL	Zinc	mg/kg	3.86E+01	3.86E+01	3.86E+01	0/1	1/1	0/1	6.50E+01	0/1	1.08E+04	0/1	1.68E+06	0/1	1/1	2.3 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.88E-01	0/1	1.88E+01	0/1	0/1	0.35 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.9 - 1.9
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.38 - 0.38
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.38 - 0.38
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.3.2. Surface Soil RI Data Summary: SWMU 153 C-331 PCB Soil Contamination -West (Continued)

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0077 - 0.0077
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Fluoranthene	mg/kg	1.30E-01	1.30E-01	1.30E-01	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.38 - 0.38
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.77 - 0.77
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.38 - 0.38
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0077 - 0.0077
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.9 - 1.9
SVOA	Phenanthrene	mg/kg	5.50E-02	5.50E-02	5.50E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Pyrene	mg/kg	9.10E-02	9.10E-02	9.10E-02	1/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.38 - 0.38
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.77 - 0.77
SVOA	Total PAH	mg/kg	8.69E-02	8.69E-02	8.69E-02	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	3.33E+01	3.33E+01	3.33E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	4.8 - 4.8
RADS	Americium-241	pCi/g	5.00E-03	5.00E-03	5.00E-03	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.032 - 0.032
RADS	Beta activity	pCi/g	2.74E+01	2.74E+01	2.74E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.4 - 2.4
RADS	Cesium-137	pCi/g	8.50E-02	8.50E-02	8.50E-02	1/1	1/1	0/1	4.90E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.033 - 0.033
RADS	Neptunium-237	pCi/g	-2.40E-03	-2.40E-03	-2.40E-03	0/1	1/1	0/1	1.00E-01	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.054 - 0.054
RADS	Plutonium-238	pCi/g	1.80E-02	1.80E-02	1.80E-02	1/1	1/1	0/1	7.30E-02	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.013 - 0.013
RADS	Plutonium-239/240	pCi/g	7.00E-03	7.00E-03	7.00E-03	0/1	1/1	0/1	2.50E-02	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.017 - 0.017
RADS	Technetium-99	pCi/g	3.20E-01	3.20E-01	3.20E-01	0/1	1/1	0/1	2.50E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	0/1	0.43 - 0.43
RADS	Thorium-228	pCi/g	7.80E-01	7.80E-01	7.80E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.03 - 0.03
RADS	Thorium-230	pCi/g	1.00E+00	1.00E+00	1.00E+00	0/1	1/1	0/1	1.50E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	9.00E-01	9.00E-01	9.00E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Uranium-234	pCi/g	1.20E+00	1.20E+00	1.20E+00	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.01 - 0.01
RADS	Uranium-235/236	pCi/g	7.60E-02	7.60E-02	7.60E-02	0/1	1/1	1/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.016 - 0.016
RADS	Uranium-238	pCi/g	1.14E+00	1.14E+00	1.14E+00	0/1	1/1	0/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.01 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

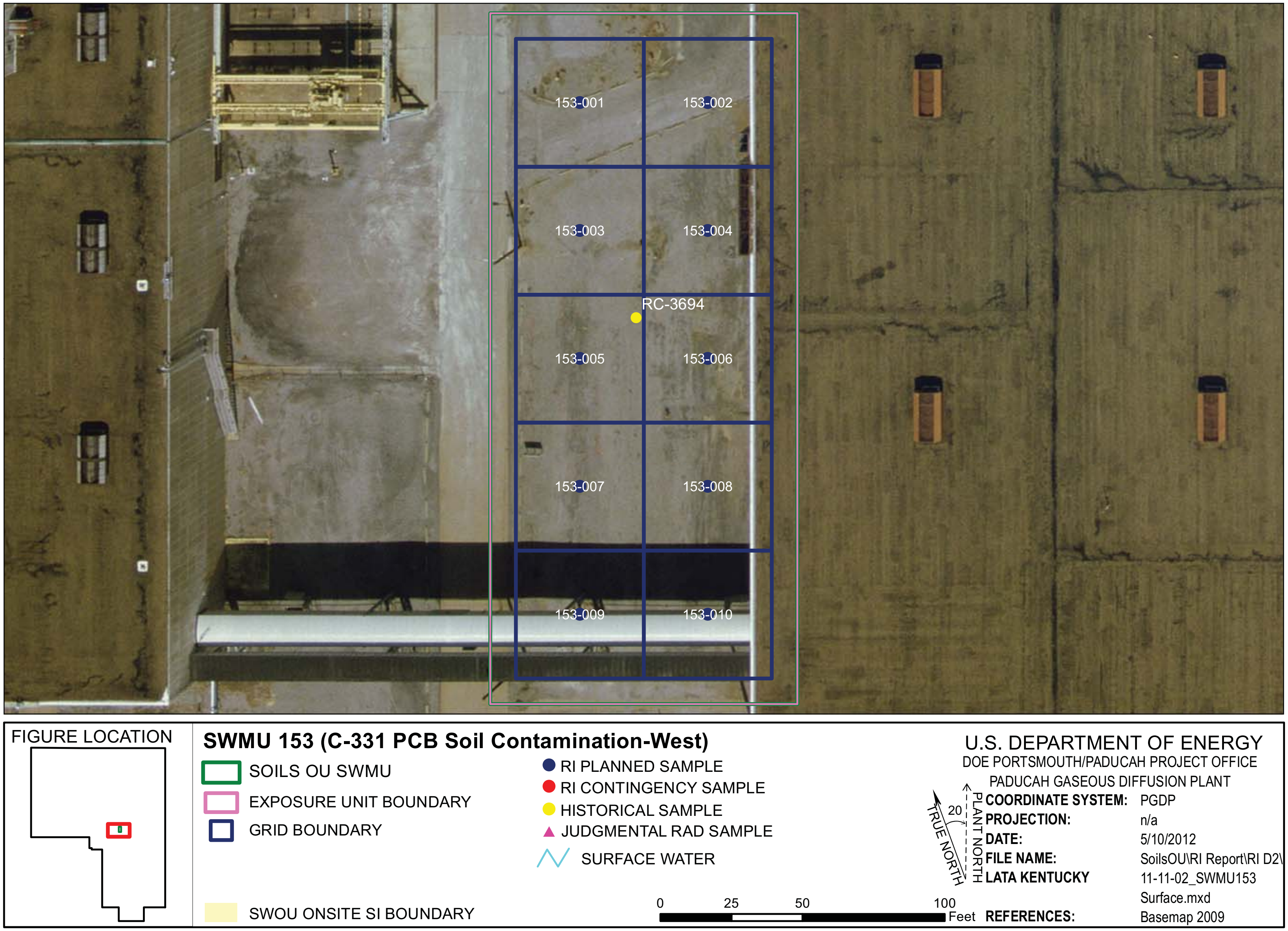


Figure 11.3.2. SWMU 153 Sample Locations - Surface Soil

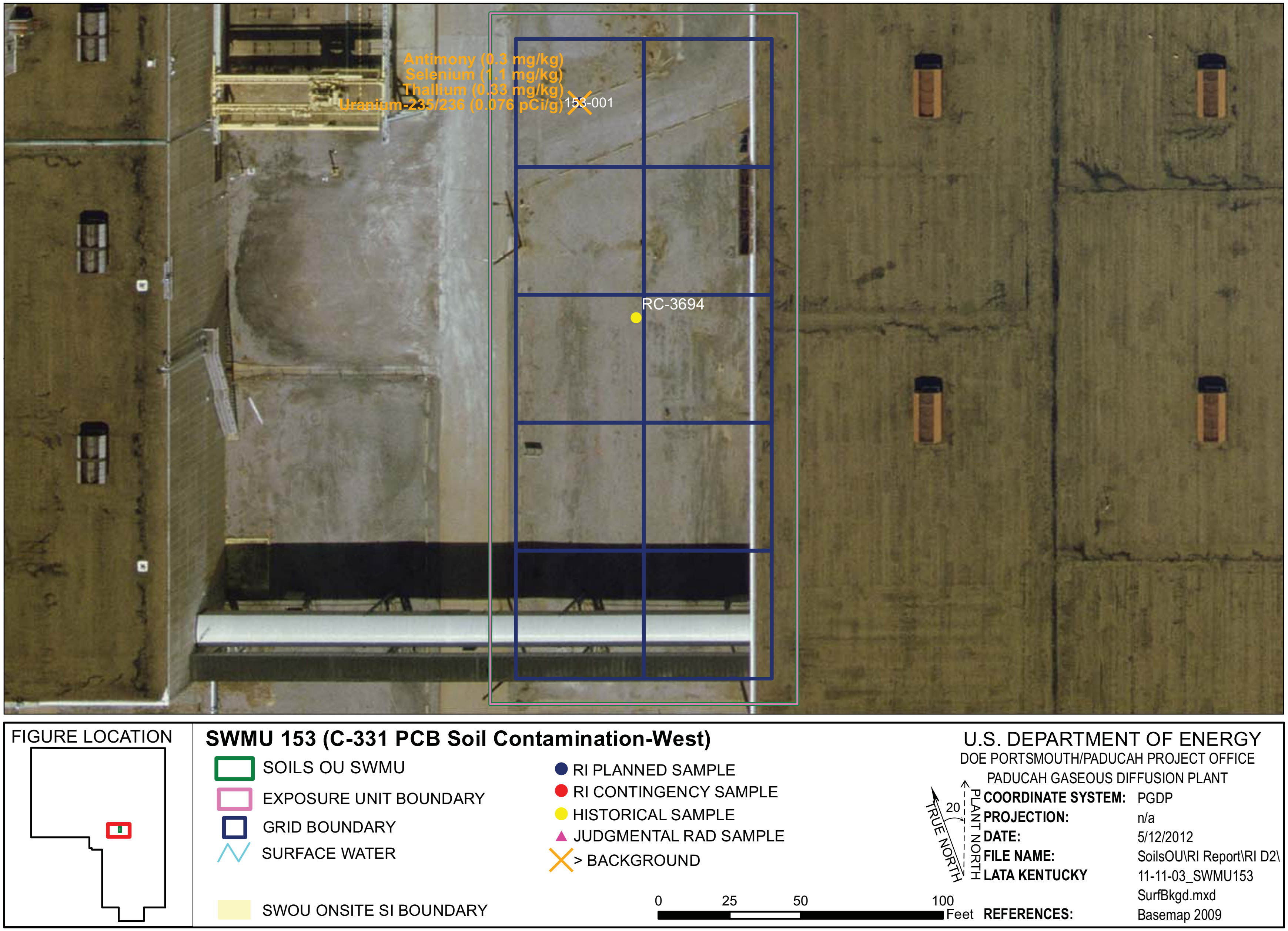


Figure 11.3.3. SWMU 153 Background Exceedances - Surface Soil

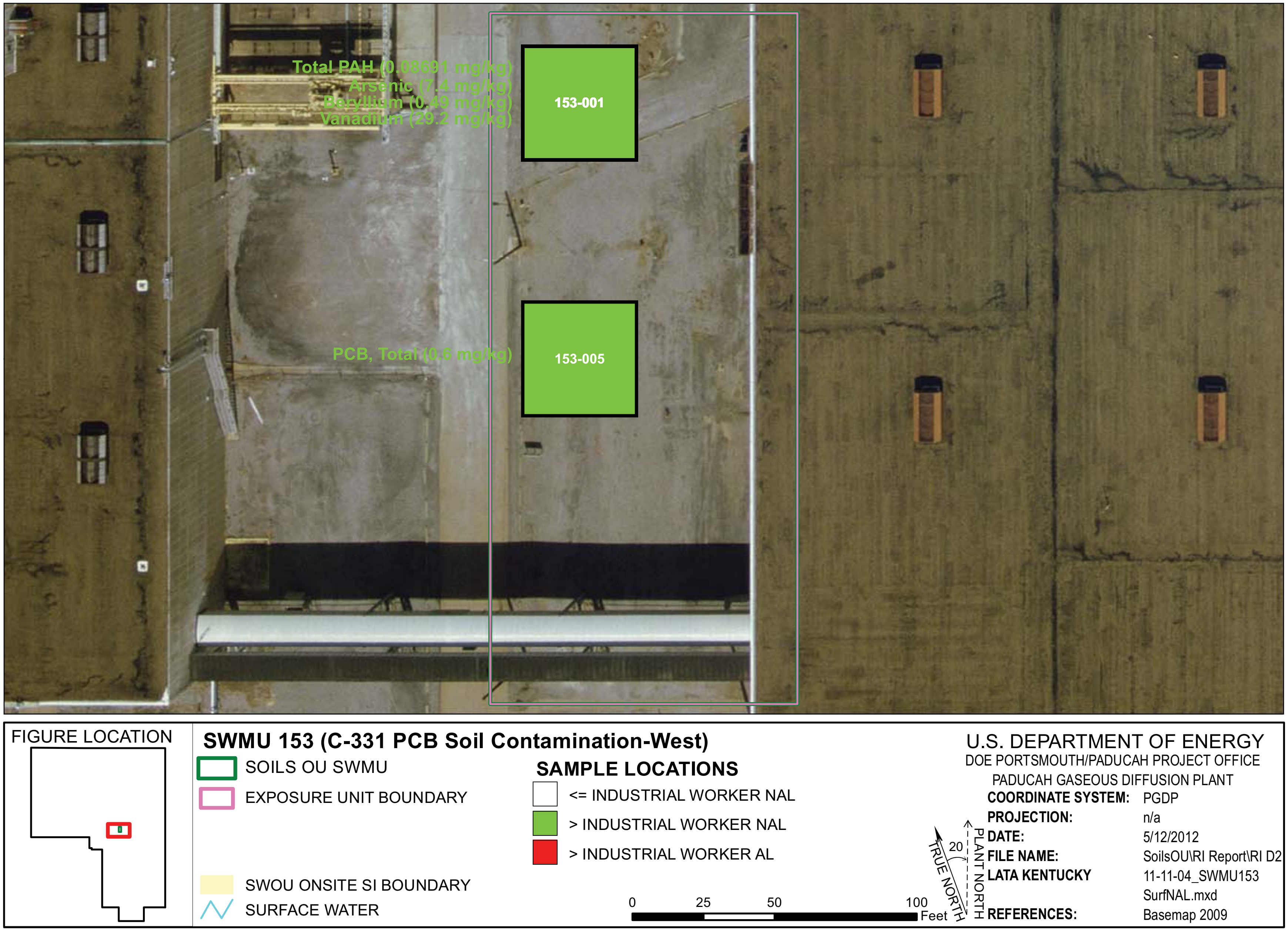


Figure 11.3.4. SWMU 153 NAL Exceedances - Surface Soil

No PCBs were detected above the industrial worker AL or the SSL for the protection of RGA groundwater in the SWMU 153 surface soil.

SVOCs

Total PAHs were detected in grid 1 above the industrial worker NAL. No SVOCs were detected above the industrial worker ALs or the SSLs for the protection of RGA groundwater. Total PAHs in grid 5 were detected above the SSLs for the protection of UCRS groundwater.

VOCs

No SWMU 153 surface soil samples were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the industrial worker NALs or ALs in the SWMU 153 surface soils.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

11.3.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 153, the representative data set for subsurface soils is presented in Tables 11.3.3 and 11.3.4 and provides the nature of contamination in SWMU 153 subsurface soils. Figures 11.3.5–11.3.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 153 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 153 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 153 subsurface soil. The following are the metals detected above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Arsenic	1, 2, 3, 5, 7, 8
Chromium	1, 2, 7, 8
Nickel	2, 3, 10
Silver	5, 6

* SWMU 153 consists of one EU.

All of the SWMU 153 grids are located on the SWMU border, within the administrative boundary.

The maximum depth at which metals were detected above both the background screening levels and the industrial worker NALs was 4 ft bgs, which also was the end depth of each borehole taken from the grids listed above.

Table 11.3.3. Subsurface Soil Historical Data Summary: SWMU 153 C-331 PCB Soil Contamination (west)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range

There is no subsurface historical data.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.3.4. Subsurface Soil RI Data Summary: SWMU 153 C-331 PCB Soil Contamination -West

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	8.55E+03	8.55E+03	8.55E+03	0/1	1/1	0/1	1.20E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	6.3 - 6.3
METAL	Antimony	mg/kg	3.70E-01	3.70E-01	3.70E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.63 - 0.63
METAL	Arsenic	mg/kg	5.82E+00	1.03E+01	8.61E+00	0/12	8/12	6/12	7.90E+00	8/12	9.97E-01	0/12	9.97E+01	0/12	8/12	1.3 - 11
METAL	Barium	mg/kg	1.66E+02	1.66E+02	1.66E+02	0/1	1/1	0/1	1.70E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.5 - 2.5
METAL	Beryllium	mg/kg	6.30E-01	6.30E-01	6.30E-01	0/1	1/1	0/1	6.90E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.13 - 0.13
METAL	Cadmium	mg/kg	5.50E-02	5.50E-02	5.50E-02	0/1	1/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.063 - 0.063
METAL	Calcium	mg/kg	1.26E+04	1.26E+04	1.26E+04	0/1	1/1	1/1	6.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	62.6 - 62.6
METAL	Chromium	mg/kg	4.13E+01	6.59E+01	5.36E+01	0/12	7/12	4/12	4.30E+01	7/12	3.02E+01	0/12	3.02E+03	0/12	0/12	1.3 - 85
METAL	Cobalt	mg/kg	8.10E+00	8.10E+00	8.10E+00	0/1	1/1	0/1	1.30E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.25 - 0.25
METAL	Copper	mg/kg	1.91E+01	2.31E+01	2.04E+01	0/12	2/12	0/12	2.50E+01	0/12	1.43E+03	0/12	2.24E+05	0/12	0/12	1.3 - 35
METAL	Iron	mg/kg	3.67E+03	2.20E+04	1.54E+04	0/12	12/12	0/12	2.80E+04	0/12	2.51E+04	0/12	3.92E+06	12/12	12/12	6.3 - 100
METAL	Lead	mg/kg	6.25E+00	1.27E+01	9.63E+00	0/12	11/12	0/12	2.30E+01	0/12	4.00E+02	0/12	4.00E+02	0/12	0/12	0.38 - 13
METAL	Magnesium	mg/kg	2.81E+03	2.81E+03	2.81E+03	0/1	1/1	1/1	2.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	62.6 - 62.6
METAL	Manganese	mg/kg	6.21E+01	1.02E+03	3.17E+02	0/12	12/12	1/12	8.20E+02	0/12	2.58E+03	0/12	1.16E+05	11/12	12/12	0.25 - 85
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	1.30E-01	0/12	9.00E-01	0/12	7.85E+02	0/12	0/12	0.0417 - 10
METAL	Molybdenum	mg/kg	1.20E+00	1.20E+00	1.20E+00	0/12	1/12	0/12	n/a	0/12	1.79E+02	0/12	2.80E+04	0/12	1/12	0.63 - 15
METAL	Nickel	mg/kg	2.08E+01	9.92E+01	6.20E+01	0/12	4/12	3/12	2.20E+01	3/12	4.28E+01	0/12	3.18E+04	3/12	4/12	0.63 - 65
METAL	Selenium	mg/kg	1.70E+00	1.70E+00	1.70E+00	0/12	1/12	1/12	7.00E-01	0/12	1.79E+02	0/12	2.80E+04	0/12	1/12	0.63 - 20
METAL	Silver	mg/kg	2.10E-02	1.32E+01	6.40E+00	0/12	3/12	2/12	2.70E+00	2/12	1.08E+01	0/12	9.15E+03	2/12	2/12	0.25 - 10
METAL	Sodium	mg/kg	1.02E+02	1.02E+02	1.02E+02	0/1	1/1	0/1	3.40E+02	0/1	n/a	0/1	n/a	n/a	n/a	25 - 25
METAL	Thallium	mg/kg	2.50E-01	2.50E-01	2.50E-01	0/1	1/1	0/1	3.40E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.25 - 0.25
METAL	Uranium	mg/kg	2.09E+00	2.09E+00	2.09E+00	0/12	1/12	0/12	4.60E+00	0/12	1.07E+02	0/12	1.65E+04	0/12	0/12	0.03 - 20
METAL	Vanadium	mg/kg	2.88E+01	2.88E+01	2.88E+01	0/1	1/1	0/1	3.70E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.3 - 1.3
METAL	Zinc	mg/kg	2.79E+01	5.98E+01	4.64E+01	0/12	12/12	0/12	6.00E+01	0/12	1.08E+04	0/12	1.68E+06	0/12	12/12	2.5 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/12	0/12	0/12	n/a	0/12	1.88E-01	0/12	1.88E+01	0/12	0/12	0.38 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	2 - 2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.41 - 0.41
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.41 - 0.41
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.3.4. Subsurface Soil RI Data Summary: SWMU 153 C-331 PCB Soil Contamination -West (Continued)

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0083 - 0.0083
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	2.00E-01	2.00E-01	2.00E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.41 - 0.41
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.41 - 0.41
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.41 - 0.41
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.41 - 0.41
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.83 - 0.83
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.41 - 0.41
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0083 - 0.0083
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	2 - 2
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.41 - 0.41
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2 - 2
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.41 - 0.41
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.83 - 0.83
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	0/1	-
RADS	Alpha activity	pCi/g	2.00E+01	2.00E+01	2.00E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.5 - 5.5
RADS	Americium-241	pCi/g	7.00E-03	7.00E-03	7.00E-03	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.014 - 0.014
RADS	Beta activity	pCi/g	3.26E+01	3.26E+01	3.26E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.7 - 3.7
RADS	Cesium-137	pCi/g	-3.00E-03	-3.00E-03	-3.00E-03	0/1	1/1	0/1	2.80E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.094 - 0.094
RADS	Neptunium-237	pCi/g	-1.90E-03	-1.90E-03	-1.90E-03	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.02 - 0.02
RADS	Plutonium-238	pCi/g	3.30E-02	3.30E-02	3.30E-02	1/1	1/1	0/1	n/a	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.012 - 0.012
RADS	Plutonium-239/240	pCi/g	6.90E-03	6.90E-03	6.90E-03	1/1	1/1	0/1	n/a	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.0062 - 0.0062
RADS	Technetium-99	pCi/g	-1.40E-01	-1.40E-01	-1.40E-01	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	0/1	0.44 - 0.44
RADS	Thorium-228	pCi/g	9.30E-01	9.30E-01	9.30E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.03 - 0.03
RADS	Thorium-230	pCi/g	1.07E+00	1.07E+00	1.07E+00	0/1	1/1	0/1	1.40E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	1.06E+00	1.06E+00	1.06E+00	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Uranium-234	pCi/g	6.66E-01	6.66E-01	6.66E-01	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.011 - 0.011
RADS	Uranium-235/236	pCi/g	4.30E-02	4.30E-02	4.30E-02	1/1	1/1	0/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.007 - 0.007
RADS	Uranium-238	pCi/g	6.97E-01	6.97E-01	6.97E-01	0/1	1/1	0/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.011 - 0.011

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

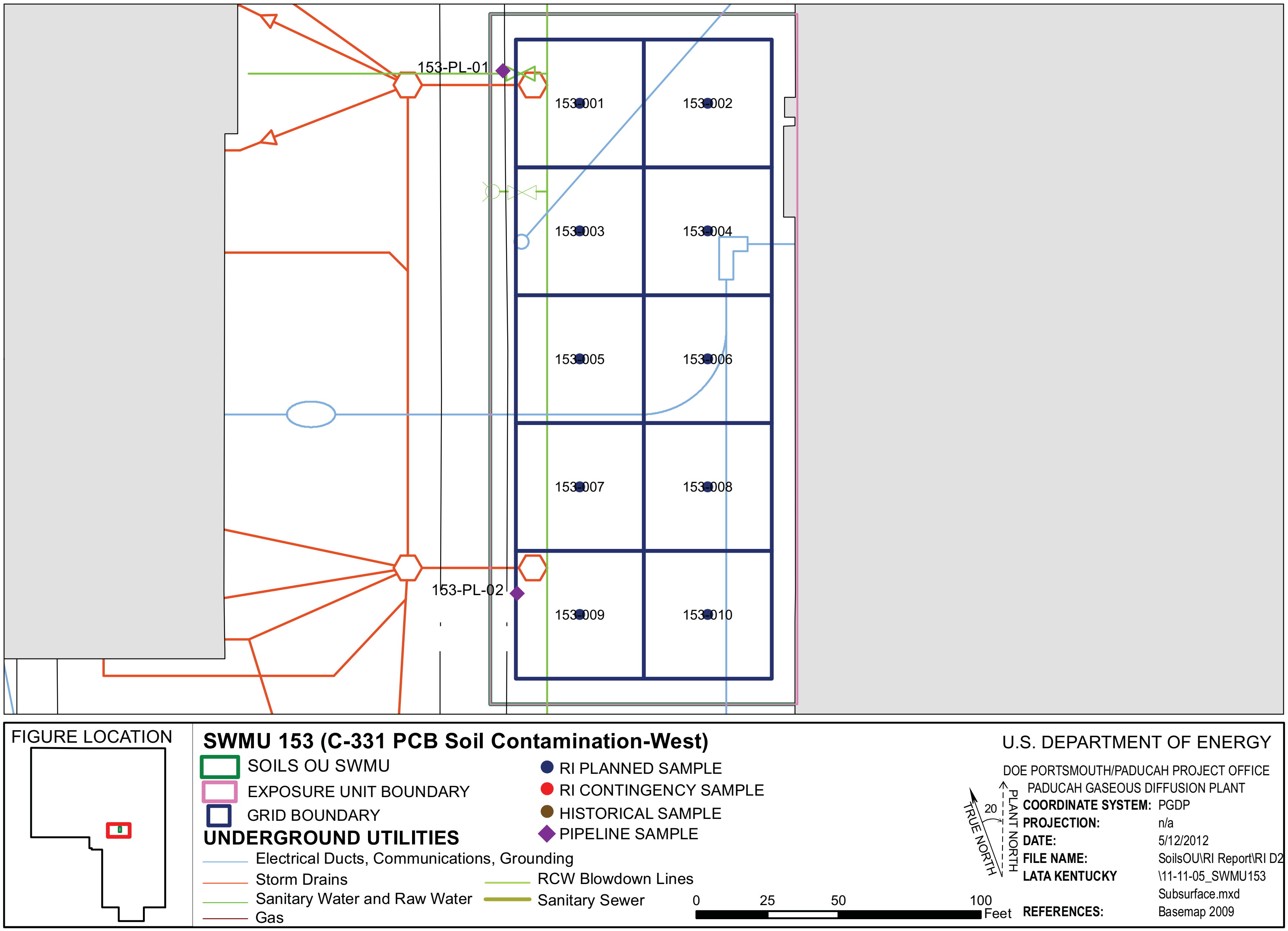


Figure 11.3.5. SWMU 153 Sample Locations - Subsurface Soil

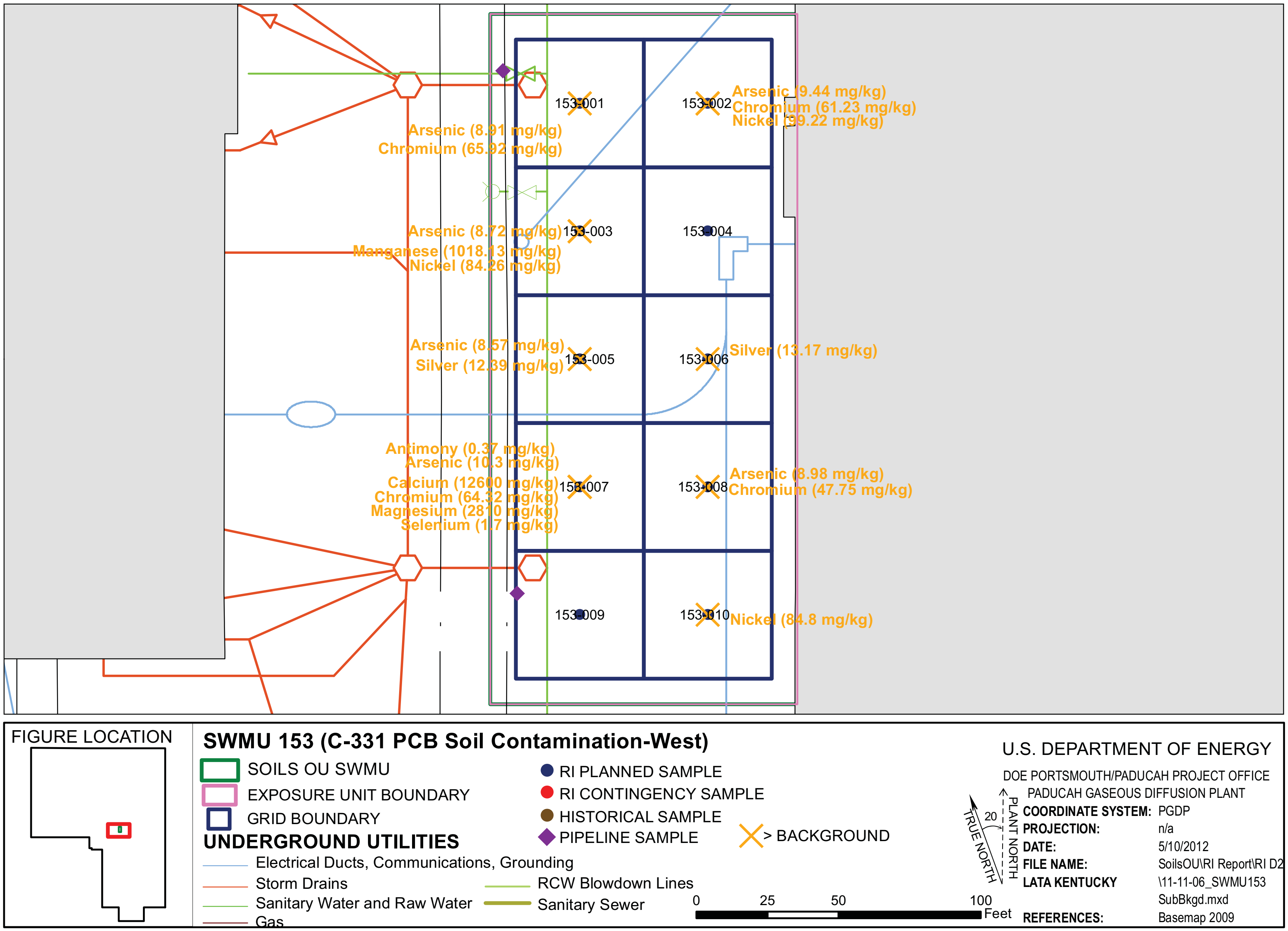


Figure 11.3.6. SWMU 153 Background Exceedances - Subsurface Soil

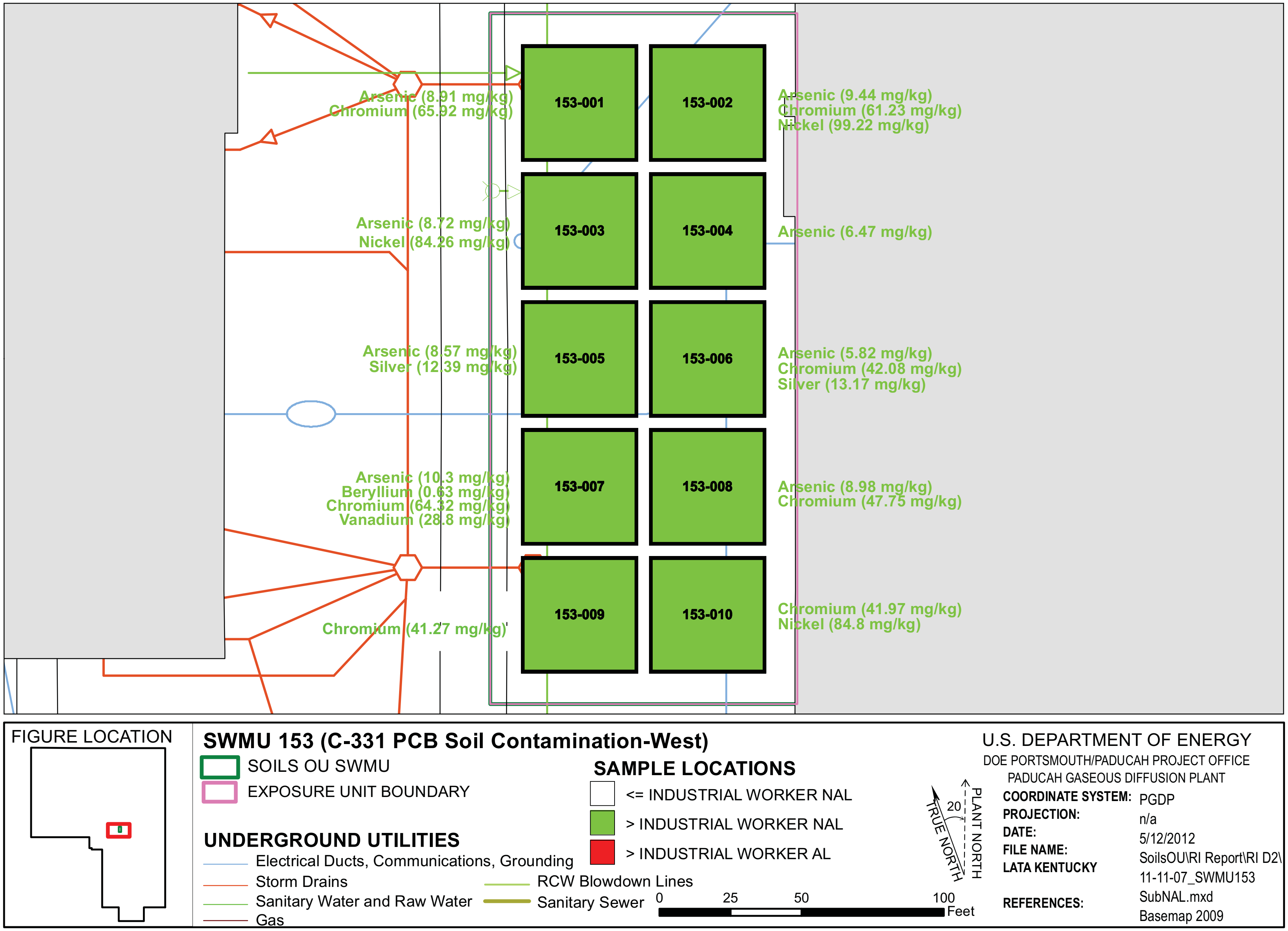


Figure 11.3.7. SWMU 153 NAL Exceedances - Subsurface Soil

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 153 subsurface soil.

The following metals were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Antimony	7
Arsenic	1, 2, 3, 5, 7, 8
Manganese	3
Molybdenum[1]	7
Nickel	2, 3, 10
Selenium	7
Silver	5, 6

* SWMU 153 consists of one EU.
[1] No background value is available.

Manganese in grid 3; nickel in grids 2, 3, and 10; and silver in grids 5 and 6 were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 153 subsurface soil.

SVOCs

No SVOCs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 153 subsurface soil.

VOCs

No SWMU 153 subsurface soil samples were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the industrial worker NALs or ALs in SWMU 153 subsurface soils.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

11.3.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no direct connection to surface water. There is no concern for potential significant runoff due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

11.3.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 153 were evaluated for direct contact. These results are summarized in Appendix D and in the following subsections, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 153 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 11.3.5 for the future industrial worker and the hypothetical resident. The excavation worker did not have any identified COCs. Table 11.3.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COC for these SWMUs under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 153 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 11.3.6.

11.3.7 SWMU 153 Summary

The following text summarizes the results for SWMU 153 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature and Extent of Source Zone

A plant process that could have contributed to contamination at this site is disbursement of PCB-contaminated oils to reduce dust at the intake of the process building ventilation system.

COPCs for surface and subsurface soils from SWMU 153 are shown on Tables 11.3.1–11.3.4 as those analytes with green boxes under the “Industrial Worker/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G. COPCs identified for SWMU 153 are metals, PCBs, and SVOCs in surface soil and metals for subsurface soil.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 153 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMU 153. The CSM can be found in Appendix D.

Table 11.3.5. RGOs for SWMU 153

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Future Industrial Worker											
1	PCB, Total	5.09E-01	mg/kg	2.7E-06	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	8.69E-02	mg/kg	1.5E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Cumulative			**4.2E-06**				**< 1**			
Hypothetical Resident[5]											
1	PCB, Total	5.09E-01	mg/kg	8.0E-06	6.38E-02	6.38E-01	5.09E-01	< 1	n/a	n/a	n/a
	Total PAH	8.69E-02	mg/kg	4.5E-06	1.94E-02	1.94E-01	8.69E-02	< 1	n/a	n/a	n/a
	Cumulative			**1.2E-05**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.90, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.90, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 11.3.6 Ecological Screening for SWMU 153

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Gravel	No	152	PCB, Total	n/a	2.50E+00	2.00E-02	125
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-6 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. COCs for these scenarios for SWMU 153 are as follows:

- Future Industrial Worker
  - Total PAHs
  - Total PCBs
- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Total PAHs
  - Total PCBs

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 153.

For SWMU 153, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Total PCBs
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 153 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit are, as discussed in the Work Plan, posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 153 is not near any other SWMUs, but is adjacent to the C-331 Process Building. A response action at SWMU 153 would not impact either the operations at C-331 or any integrator OUs.

11.3.8 SWMU 153 Conclusions

The RI adequately defined the nature and extent of contamination in soils at SWMU 153; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated land use for this SWMU is industrial, as shown in the SMP (DOE 2012a).

11.4 SWMU 156, C-310 PCB SOIL CONTAMINATION (WEST SIDE)

11.4.1 Background

The C-310 PCB Soil Contamination (west side) (SWMU 156) is located in the central portion of the plant site. The approximate dimension of SWMU 156 is 100-ft wide by 160-ft long. The area historically was used as a dust palliative area to reduce the amount of dust taken in by the C-331 Building ventilation systems.

SWMU 156 was part of WAGs 16 and 19. Information obtained in the scoping information package for WAGs 16 and 19 projects identified surface samples with PCBs and uranium (DOE 1997f).

11.4.2 Fieldwork Summary

Sixteen grid samples were collected of the 20 planned for the unit. Of the 6 planned pipeline samples, 3 were collected. The samples not collected were due to the presence of dense underground utilities. Figure A.21 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 11.4.1) using a FIDLER; the 4,115 measurements ranged from 4,465 to 13,213 gross cpm. The area surveyed consists entirely of gravel. A judgmental grab sample was collected for radiological constituents, although gamma walkover survey results were consistent with background.

11.4.3 Nature and Extent of Contamination—Surface Soils

For SWMU 156, the representative data set for surface soils is presented in Tables 11.4.1 and 11.4.2 and provides the nature of the contamination in SWMU 156 surface soils. Figures 11.4.2–11.4.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 156 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 156 consists of one EU.

<u>Metals</u>

Metals were detected above the industrial worker NALs in the SWMU 156 surface soil. The following metals detected at or above both the background screening levels and the industrial worker NALs and the grid numbers in which they were detected.

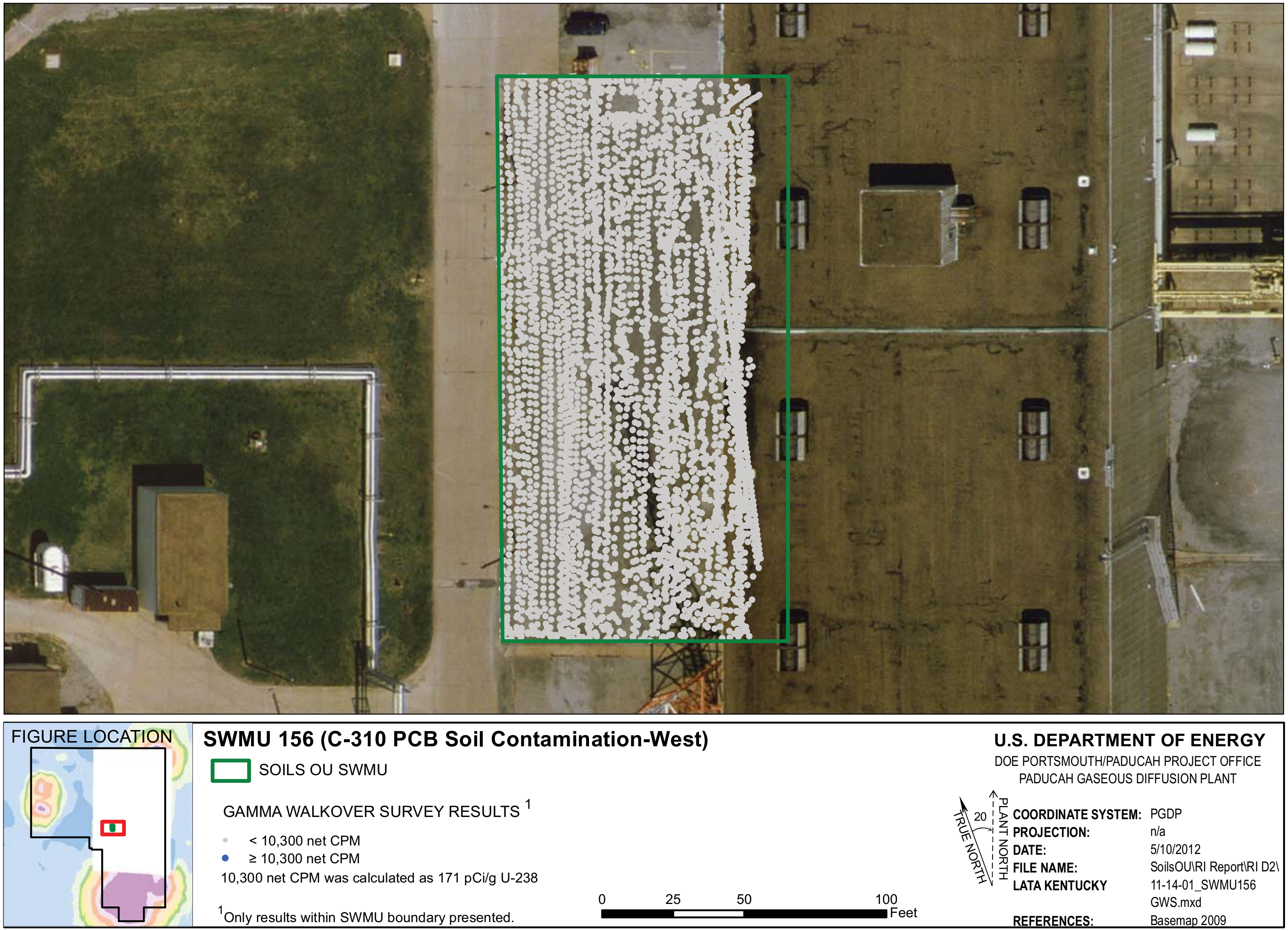


Figure 11.4.1. SWMU 156 Gamma Walkover Survey

Table 11.4.1. Surface Soil Historical Data Summary: SWMU 156 C-310 PCB Soil Contamination (west)

Type	Analysis	Unit	Detected Results*			J-qualified	FOD	Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD		FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
PPCB	PCB, Total	mg/kg	3.00E-01	3.00E-01	3.00E-01	0/2	1/2	0/2	n/a	1/2	1.88E-01	0/2	1.88E+01	0/2	1/2	-

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.4.2. Surface Soil RI Data Summary: SWMU 156 C-310 PCB Soil Contamination-West

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	8.05E+03	8.05E+03	8.05E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.7 - 5.7
METAL	Antimony	mg/kg	4.30E-01	4.30E-01	4.30E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.57 - 0.57
METAL	Arsenic	mg/kg	5.66E+00	1.11E+01	7.20E+00	0/12	7/12	0/12	1.20E+01	7/12	9.97E-01	0/12	9.97E+01	0/12	7/12	1.1 - 11
METAL	Barium	mg/kg	1.04E+02	1.04E+02	1.04E+02	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.3 - 2.3
METAL	Beryllium	mg/kg	5.20E-01	5.20E-01	5.20E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.11 - 0.11
METAL	Cadmium	mg/kg	1.20E-01	1.20E-01	1.20E-01	0/1	1/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.057 - 0.057
METAL	Calcium	mg/kg	7.50E+03	7.50E+03	7.50E+03	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	57.1 - 57.1
METAL	Chromium	mg/kg	1.19E+01	4.90E+01	3.24E+01	0/12	6/12	5/12	1.60E+01	5/12	3.02E+01	0/12	3.02E+03	0/12	0/12	1.1 - 85
METAL	Cobalt	mg/kg	7.60E+00	7.60E+00	7.60E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.23 - 0.23
METAL	Copper	mg/kg	9.60E+00	2.30E+01	1.59E+01	0/12	3/12	2/12	1.90E+01	0/12	1.43E+03	0/12	2.24E+05	0/12	0/12	1.1 - 35
METAL	Iron	mg/kg	8.78E+03	1.51E+04	1.21E+04	0/12	12/12	0/12	2.80E+04	0/12	2.51E+04	0/12	3.92E+06	12/12	12/12	5.7 - 100
METAL	Lead	mg/kg	9.20E+00	4.12E+01	1.67E+01	0/12	12/12	1/12	3.60E+01	0/12	4.00E+02	0/12	4.00E+02	0/12	5/12	0.34 - 13
METAL	Magnesium	mg/kg	1.34E+03	1.34E+03	1.34E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	57.1 - 57.1
METAL	Manganese	mg/kg	1.61E+02	2.83E+03	6.43E+02	0/12	12/12	1/12	1.50E+03	1/12	2.58E+03	0/12	1.16E+05	12/12	12/12	0.23 - 85
METAL	Mercury	mg/kg	2.55E-02	9.87E+00	4.22E+00	0/12	3/12	2/12	2.00E-01	2/12	9.00E-01	0/12	7.85E+02	2/12	2/12	0.0381 - 10
METAL	Molybdenum	mg/kg	6.60E-01	6.60E-01	6.60E-01	0/12	1/12	0/12	n/a	0/12	1.79E+02	0/12	2.80E+04	0/12	1/12	0.57 - 15
METAL	Nickel	mg/kg	1.15E+01	6.16E+01	2.82E+01	0/12	2/12	1/12	2.10E+01	1/12	4.28E+01	0/12	3.18E+04	0/12	2/12	0.57 - 65
METAL	Selenium	mg/kg	1.30E+00	1.30E+00	1.30E+00	0/12	1/12	1/12	8.00E-01	0/12	1.79E+02	0/12	2.80E+04	0/12	1/12	0.57 - 20
METAL	Silver	mg/kg	3.30E-02	3.30E-02	3.30E-02	0/12	1/12	0/12	2.30E+00	0/12	1.08E+01	0/12	9.15E+03	0/12	0/12	0.23 - 10
METAL	Sodium	mg/kg	7.00E+01	7.00E+01	7.00E+01	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	22.8 - 22.8
METAL	Thallium	mg/kg	2.50E-01	2.50E-01	2.50E-01	0/1	1/1	1/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.23 - 0.23
METAL	Uranium	mg/kg	7.81E+00	2.32E+01	1.22E+01	0/12	5/12	5/12	4.90E+00	0/12	1.07E+02	0/12	1.65E+04	0/12	2/12	0.03 - 20
METAL	Vanadium	mg/kg	2.59E+01	2.59E+01	2.59E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	2.81E+01	6.44E+01	4.72E+01	0/12	12/12	0/12	6.50E+01	0/12	1.08E+04	0/12	1.68E+06	0/12	12/12	2.3 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/9	0/9	0/9	n/a	0/9	1.88E-01	0/9	1.88E+01	0/9	0/9	5 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.8 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.38 - 0.38
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.38 - 0.38
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Benzo(ghi)perylene	mg/kg	3.90E-02	3.90E-02	3.90E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.4.2. Surface Soil RI Data Summary: SWMU 156 C-310 PCB Soil Contamination-West (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0075 - 0.0075
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	7.10E-02	7.10E-02	7.10E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.38
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Fluoranthene	mg/kg	1.20E-01	1.20E-01	1.20E-01	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.38 - 0.38
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.38 - 0.38
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.75 - 0.75
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.38 - 0.38
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0075 - 0.0075
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.8 - 1.8
SVOA	Phenanthrene	mg/kg	4.20E-02	4.20E-02	4.20E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Pyrene	mg/kg	9.90E-02	9.90E-02	9.90E-02	1/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.38 - 0.38
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.75 - 0.75
SVOA	Total PAH	mg/kg	8.26E-02	8.26E-02	8.26E-02	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	1.98E+01	1.98E+01	1.98E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.7 - 5.7
RADS	Americium-241	pCi/g	-4.40E-03	-4.40E-03	-4.40E-03	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.025 - 0.025
RADS	Beta activity	pCi/g	3.23E+01	3.23E+01	3.23E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	4.6 - 4.6
RADS	Cesium-137	pCi/g	4.10E-02	4.10E-02	4.10E-02	0/1	1/1	0/1	4.90E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.092 - 0.092
RADS	Neptunium-237	pCi/g	2.80E-03	2.80E-03	2.80E-03	0/1	1/1	0/1	1.00E-01	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.017 - 0.017
RADS	Plutonium-238	pCi/g	2.10E-02	2.10E-02	2.10E-02	0/1	1/1	0/1	7.30E-02	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.03 - 0.03
RADS	Plutonium-239/240	pCi/g	1.30E-02	1.30E-02	1.30E-02	0/1	1/1	0/1	2.50E-02	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.019 - 0.019
RADS	Technetium-99	pCi/g	1.94E+00	1.94E+00	1.94E+00	0/1	1/1	0/1	2.50E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	1/1	0.41 - 0.41
RADS	Thorium-228	pCi/g	1.14E+00	1.14E+00	1.14E+00	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.03 - 0.03
RADS	Thorium-230	pCi/g	1.02E+00	1.02E+00	1.02E+00	0/1	1/1	0/1	1.50E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	1.03E+00	1.03E+00	1.03E+00	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.008 - 0.008
RADS	Uranium-234	pCi/g	2.00E+00	2.00E+00	2.00E+00	0/1	1/1	1/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.03 - 0.03
RADS	Uranium-235/236	pCi/g	1.16E-01	1.16E-01	1.16E-01	0/1	1/1	1/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.019 - 0.019
RADS	Uranium-238	pCi/g	2.19E+00	2.19E+00	2.19E+00	0/1	1/1	1/1	1.20E+00	1/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.01 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

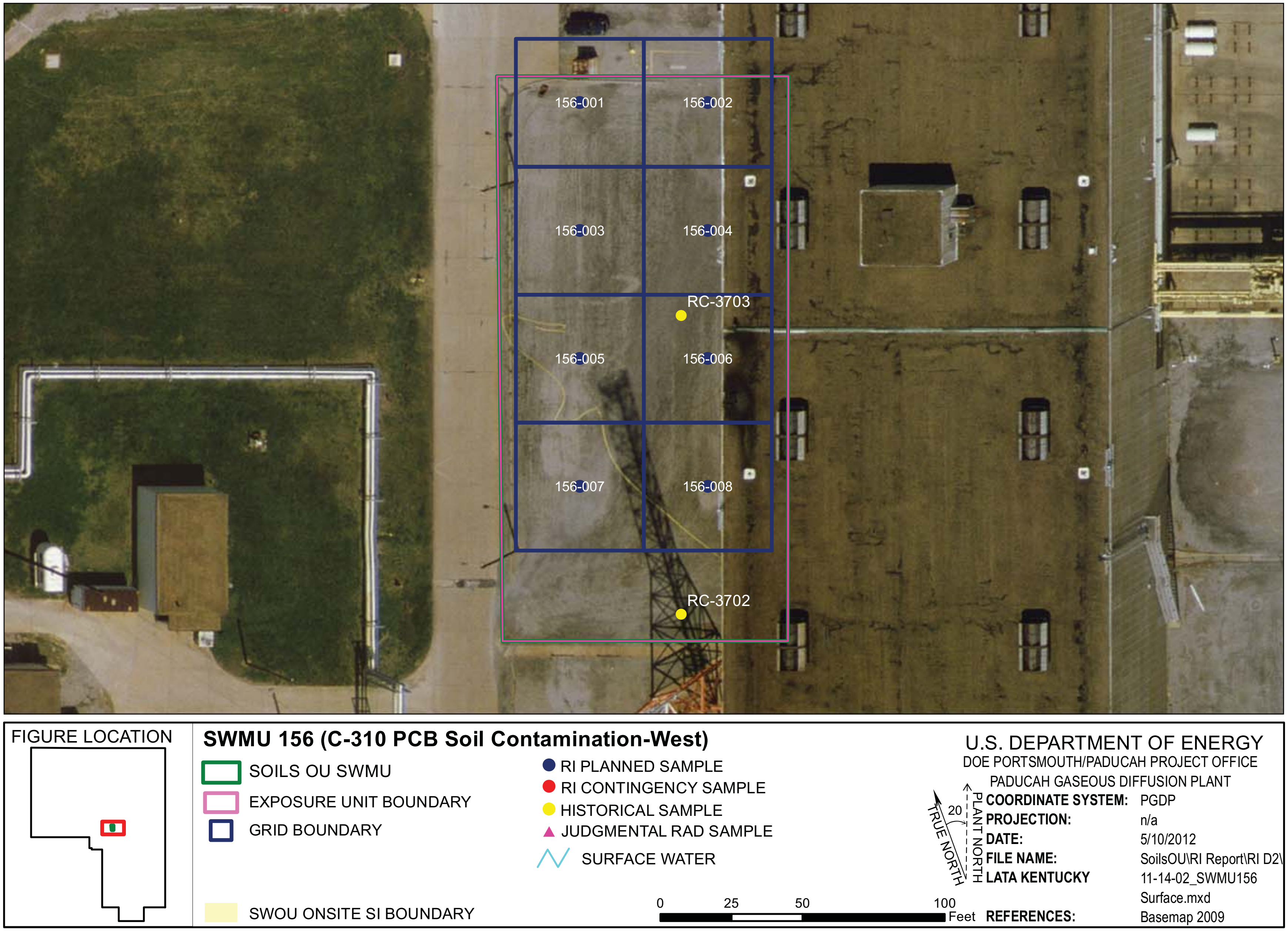


Figure 11.4.2. SWMU 156 Sample Locations - Surface Soil

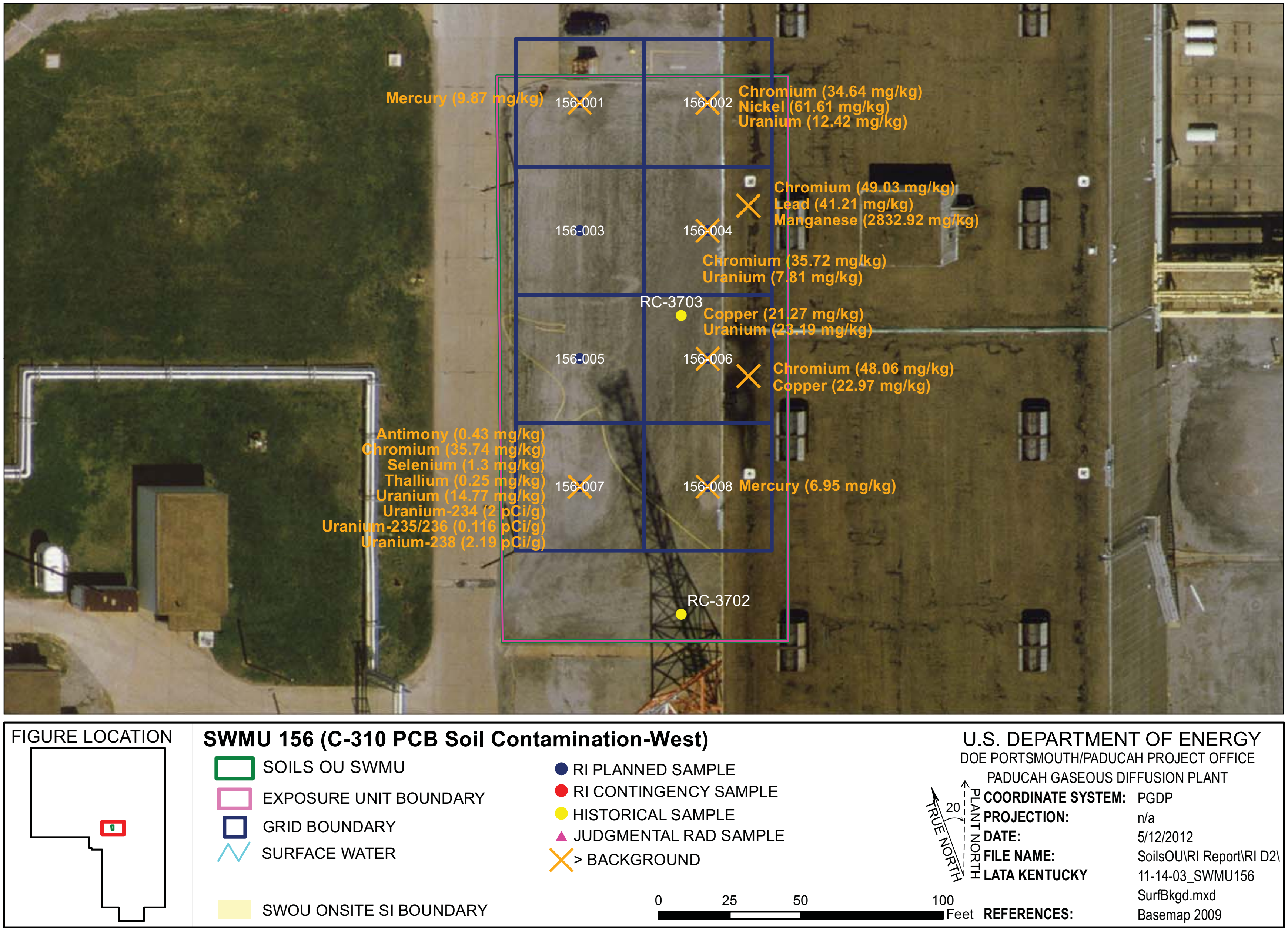


Figure 11.4.3. SWMU 156 Background Exceedances - Surface Soil

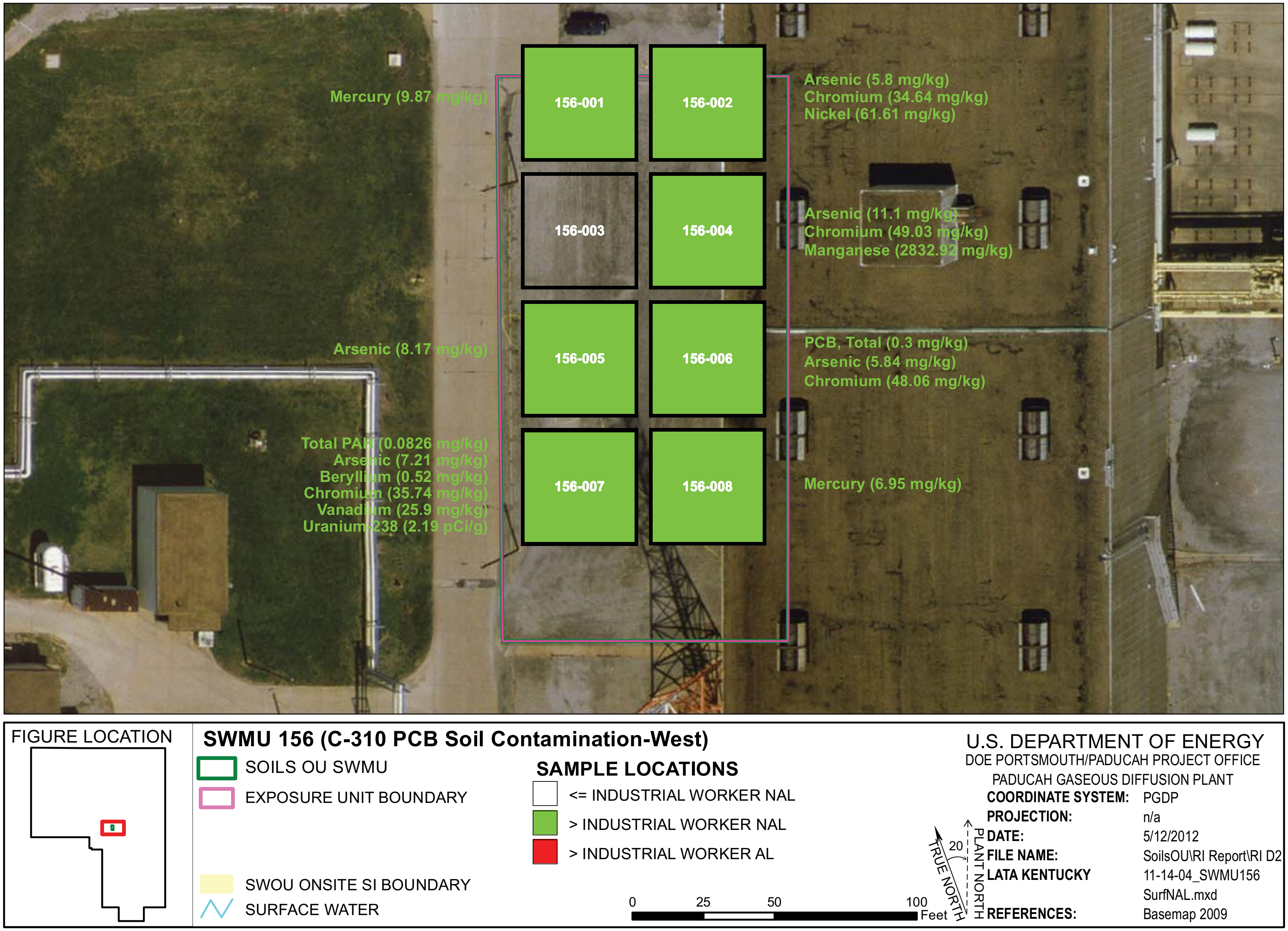


Figure 11.4.4. SWMU 156 NAL Exceedances - Surface Soil

Metal	Grid
Chromium	2, 4, 6, 7
Manganese	4
Mercury	1, 8
Nickel	2

* SWMU 156 consists of one EU.

Grids 1, 2, 4, 6, 7, and 8 are located within the administrative boundary of SWMU 156.

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 156 surface soil.

The following are the metals detected in the SWMU 156 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grid numbers in which they were detected.

Metal	Grid
Antimony	7
Lead	4
Manganese	4
Mercury	1, 8
Molybdenum[1]	7
Nickel	7
Selenium	7
Thallium	7
Uranium	6, 7

* SWMU 156 consists of one EU.
[1] No background value is available.

Manganese in grid 4 and mercury in grids 1 and 8 were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs were detected above the industrial worker NALs in the surface soil of grid 6 at SWMU 156.

PCBs were not detected above the industrial worker ALs in the SWMU 156 surface soil.

Total PCBs in grid 6 were detected above the SSL for the protection of UCRS groundwater, but PCBs were not detected above the SSL for the protection of RGA groundwater.

SVOCs

Total PAHs in grid 7 were detected above the industrial worker NALs in the SWMU 156 surface soil.

SVOCs were not detected above the industrial worker ALs or the SSLs for the protection of RGA groundwater in the SWMU 156 surface soil. Total PAHs in grid 7 were detected above the SSLs for the protection of UCRS groundwater.

VOCs

No surface soil samples from SWMU 156 were analyzed for VOCs.

Radionuclides

Uranium-238 in grid 7 was detected above both the background screening level and the industrial worker NAL.

No radionuclides were detected above both the background screening levels and the industrial worker ALs or the SSLs for the protection of UCRS and RGA groundwater.

11.4.4 Nature and Extent of Contamination—Subsurface Soils

The representative data set for subsurface soils is presented in Tables 11.4.3 and 11.4.4 and provides the nature of contamination in SWMU 156 subsurface soils. Figures 11.4.5–11.4.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 156 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 156 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 156 subsurface soil. The following are the metals detected above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Metal	Grid
Arsenic	4, 6
Beryllium	4, 8
Chromium	3, 5, 6
Cobalt	8
Silver	4

* SWMU 156 consists of one EU.

Grids 3, 4, 5, 6 and 8 are located on the SWMU border within the administrative boundary.

The maximum depth at which metals were detected above both the background screening levels and the industrial worker NALs was 4 ft bgs, which also was the end depth of each borehole taken from the grids listed above.

No metals were detected above the industrial worker ALs in the SWMU 156 subsurface soil.

The following are the metals detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Table 11.4.3. Subsurface Soil Historical Data Summary: SWMU 156 C-310 PCB Soil Contamination (west)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range

There is no subsurface historical data.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.4.4. Subsurface Soil RI Data Summary: SWMU 156 C-310 PCB Soil Contamination-West

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
METAL	Aluminum	mg/kg	5.24E+03	6.43E+03	5.84E+03	0/2	2/2	0/2	1.20E+04	0/2	3.32E+04	0/2	3.97E+06	0/2	2/2	5.7 - 6.4
METAL	Antimony	mg/kg	2.40E-01	2.90E-01	2.65E-01	0/2	2/2	2/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	1/2	0.57 - 0.64
METAL	Arsenic	mg/kg	2.80E+00	9.15E+00	6.48E+00	0/12	8/12	2/12	7.90E+00	8/12	9.97E-01	0/12	9.97E+01	0/12	8/12	1.1 - 11
METAL	Barium	mg/kg	6.83E+01	9.53E+01	8.18E+01	0/2	2/2	0/2	1.70E+02	0/2	5.92E+02	0/2	3.78E+05	0/2	1/2	2.3 - 2.6
METAL	Beryllium	mg/kg	8.30E-01	1.00E+00	9.15E-01	0/2	2/2	2/2	6.90E-01	2/2	1.40E-02	0/2	9.22E+00	0/2	0/2	0.11 - 0.13
METAL	Cadmium	mg/kg	5.30E-02	7.10E-02	6.20E-02	0/2	2/2	0/2	2.10E-01	0/2	3.16E+00	0/2	3.16E+02	0/2	0/2	0.057 - 0.064
METAL	Calcium	mg/kg	2.50E+03	4.08E+03	3.29E+03	0/2	2/2	0/2	6.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	57.4 - 64.4
METAL	Chromium	mg/kg	6.20E+00	6.31E+01	3.59E+01	0/12	8/12	3/12	4.30E+01	7/12	3.02E+01	0/12	3.02E+03	0/12	0/12	1.1 - 85
METAL	Cobalt	mg/kg	2.90E+00	1.72E+01	1.01E+01	0/2	2/2	1/2	1.30E+01	1/2	1.05E+01	0/2	1.52E+03	2/2	2/2	0.23 - 0.26
METAL	Copper	mg/kg	5.40E+00	3.28E+01	1.30E+01	0/12	3/12	1/12	2.50E+01	0/12	1.43E+03	0/12	2.24E+05	0/12	0/12	1.1 - 35
METAL	Iron	mg/kg	8.42E+03	2.71E+04	1.70E+04	0/12	12/12	0/12	2.80E+04	2/12	2.51E+04	0/12	3.92E+06	12/12	12/12	5.7 - 100
METAL	Lead	mg/kg	7.17E+00	2.35E+01	1.25E+01	0/12	11/12	1/12	2.30E+01	0/12	4.00E+02	0/12	4.00E+02	0/12	3/12	0.34 - 13
METAL	Magnesium	mg/kg	1.06E+03	1.55E+03	1.31E+03	0/2	2/2	0/2	2.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	57.4 - 64.4
METAL	Manganese	mg/kg	8.84E+01	7.18E+02	2.67E+02	0/12	12/12	0/12	8.20E+02	0/12	2.58E+03	0/12	1.16E+05	11/12	12/12	0.23 - 85
METAL	Mercury	mg/kg	1.21E-02	1.21E-02	1.21E-02	0/12	1/12	0/12	1.30E-01	0/12	9.00E-01	0/12	7.85E+02	0/12	0/12	0.0383 - 10
METAL	Molybdenum	mg/kg	4.00E-01	7.40E-01	5.70E-01	0/12	2/12	0/12	n/a	0/12	1.79E+02	0/12	2.80E+04	0/12	2/12	0.57 - 15
METAL	Nickel	mg/kg	7.00E+00	1.62E+01	1.16E+01	0/12	2/12	0/12	2.20E+01	0/12	4.28E+01	0/12	3.18E+04	0/12	2/12	0.57 - 65
METAL	Selenium	mg/kg	1.40E+00	1.50E+00	1.45E+00	0/12	2/12	2/12	7.00E-01	0/12	1.79E+02	0/12	2.80E+04	0/12	2/12	0.57 - 20
METAL	Silver	mg/kg	1.50E-02	1.19E+01	5.97E+00	0/12	2/12	1/12	2.70E+00	1/12	1.08E+01	0/12	9.15E+03	1/12	1/12	0.23 - 10
METAL	Sodium	mg/kg	1.29E+02	4.32E+03	2.22E+03	0/2	2/2	1/2	3.40E+02	0/2	n/a	0/2	n/a	n/a	n/a	23 - 25.7
METAL	Thallium	mg/kg	1.80E-01	1.80E-01	1.80E-01	0/2	2/2	0/2	3.40E-01	0/2	2.87E+00	0/2	4.48E+02	0/2	2/2	0.23 - 0.26
METAL	Uranium	mg/kg	3.16E+00	7.66E+00	4.76E+00	0/12	3/12	2/12	4.60E+00	0/12	1.07E+02	0/12	1.65E+04	0/12	0/12	0.04 - 20
METAL	Vanadium	mg/kg	1.18E+01	3.28E+01	2.23E+01	0/2	2/2	0/2	3.70E+01	2/2	1.51E-01	0/2	9.30E+01	2/2	2/2	1.1 - 1.3
METAL	Zinc	mg/kg	1.65E+01	5.99E+01	4.25E+01	0/12	12/12	0/12	6.00E+01	0/12	1.08E+04	0/12	1.68E+06	0/12	11/12	2.3 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/15	0/15	0/15	n/a	0/15	1.88E-01	0/15	1.88E+01	0/15	0/15	0.39 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.38 - 0.42
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.38 - 0.42
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.38 - 0.42
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.30E+00	0/2	3.91E+01	0/2	0/2	1.8 - 2.1
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.02E+02	0/2	1.81E+04	0/2	0/2	0.38 - 0.42
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.05E+03	0/2	1.22E+05	0/2	0/2	0.38 - 0.42
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.4.4. Subsurface Soil RI Data Summary: SWMU 156 C-310 PCB Soil Contamination-West (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.0076 - 0.0085
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	1.90E-01	1.90E-01	1.90E-01	1/2	1/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.38 - 0.42
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Fluoranthene	mg/kg	4.50E-02	5.60E-02	5.05E-02	2/2	2/2	0/2	n/a	0/2	6.01E+02	0/2	1.80E+04	0/2	0/2	0.38 - 0.42
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.87E+02	0/2	1.46E+04	0/2	0/2	0.38 - 0.42
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.17E-01	0/2	1.17E+01	0/2	0/2	0.38 - 0.42
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.76 - 0.85
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.24E+00	0/2	2.24E+02	0/2	0/2	0.38 - 0.42
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.22E-02	0/2	5.22E+00	0/2	0/2	0.0076 - 0.0085
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	1.8 - 2.1
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.38 - 0.42
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.8 - 2.1
SVOA	Pyrene	mg/kg	4.30E-02	4.30E-02	4.30E-02	1/2	1/2	0/2	n/a	0/2	4.49E+02	0/2	1.35E+04	0/2	0/2	0.38 - 0.42
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.76 - 0.85
SVOA	Total PAH	mg/kg	2.50E-02	2.69E-02	2.60E-02	0/2	2/2	0/2	n/a	0/2	5.92E-02	0/2	5.92E+00	0/2	2/2	-
RADS	Alpha activity	pCi/g	2.14E+01	2.14E+01	2.14E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.5 - 5.5
RADS	Americium-241	pCi/g	3.00E-03	3.00E-03	3.00E-03	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.018 - 0.018
RADS	Beta activity	pCi/g	2.98E+01	2.98E+01	2.98E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	3.3 - 3.3
RADS	Cesium-137	pCi/g	1.10E-02	1.10E-02	1.10E-02	0/1	1/1	0/1	2.80E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.076 - 0.076
RADS	Neptunium-237	pCi/g	-2.00E-03	-2.00E-03	-2.00E-03	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.021 - 0.021
RADS	Plutonium-238	pCi/g	1.90E-02	1.90E-02	1.90E-02	0/1	1/1	0/1	n/a	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.027 - 0.027
RADS	Plutonium-239/240	pCi/g	2.70E-03	2.70E-03	2.70E-03	0/1	1/1	0/1	n/a	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.015 - 0.015
RADS	Technetium-99	pCi/g	1.84E+00	1.84E+00	1.84E+00	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	1/1	0.43 - 0.43
RADS	Thorium-228	pCi/g	1.06E+00	1.06E+00	1.06E+00	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	1.03E+00	1.03E+00	1.03E+00	0/1	1/1	0/1	1.40E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	9.60E-01	9.60E-01	9.60E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.008 - 0.008
RADS	Uranium-234	pCi/g	9.50E-01	9.50E-01	9.50E-01	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	6.10E-02	6.10E-02	6.10E-02	0/1	1/1	1/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.007 - 0.007
RADS	Uranium-238	pCi/g	1.05E+00	1.05E+00	1.05E+00	0/1	1/1	0/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.01 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

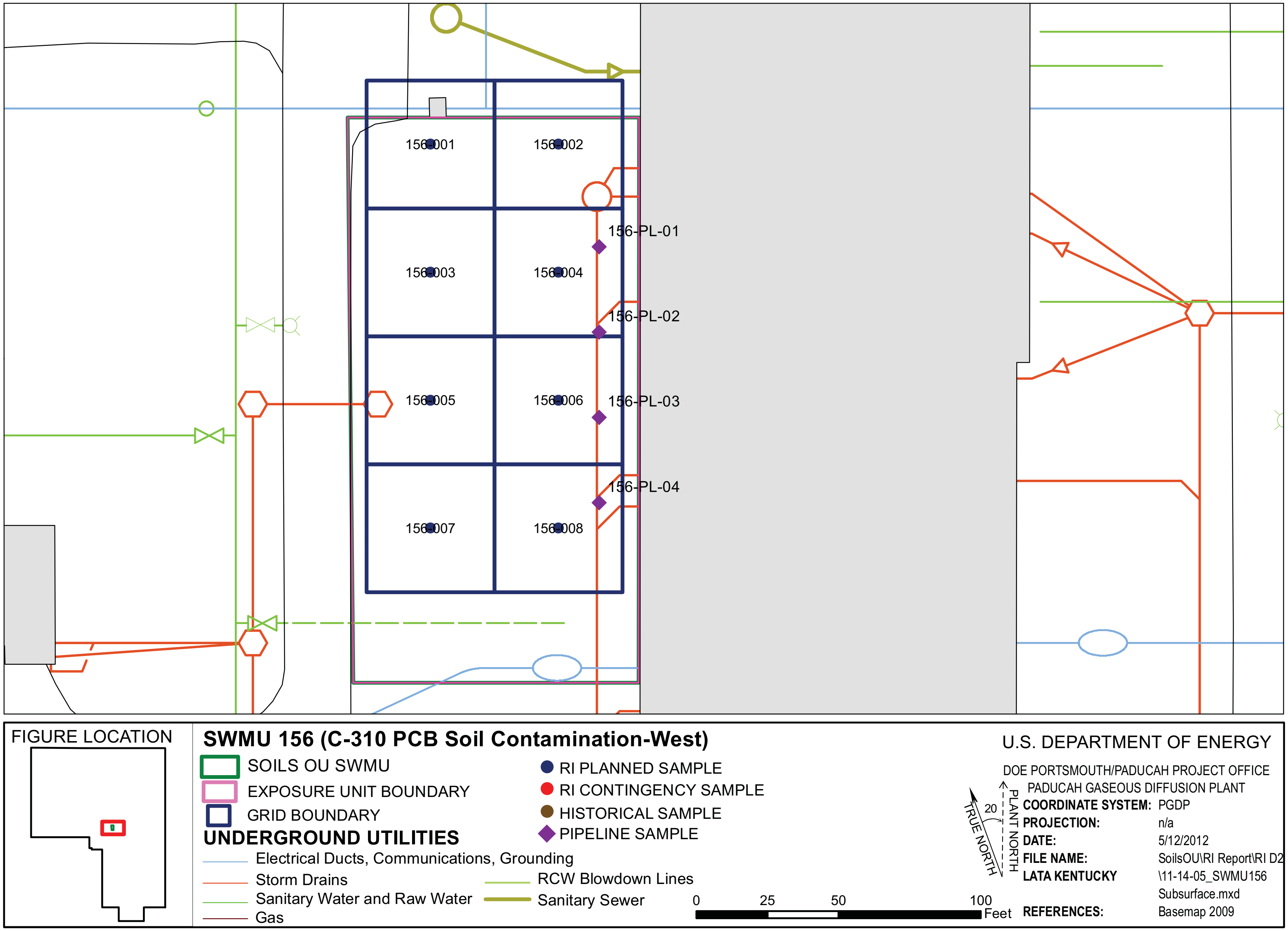


Figure 11.4.5. SWMU 156 Sample Locations - Subsurface Soil

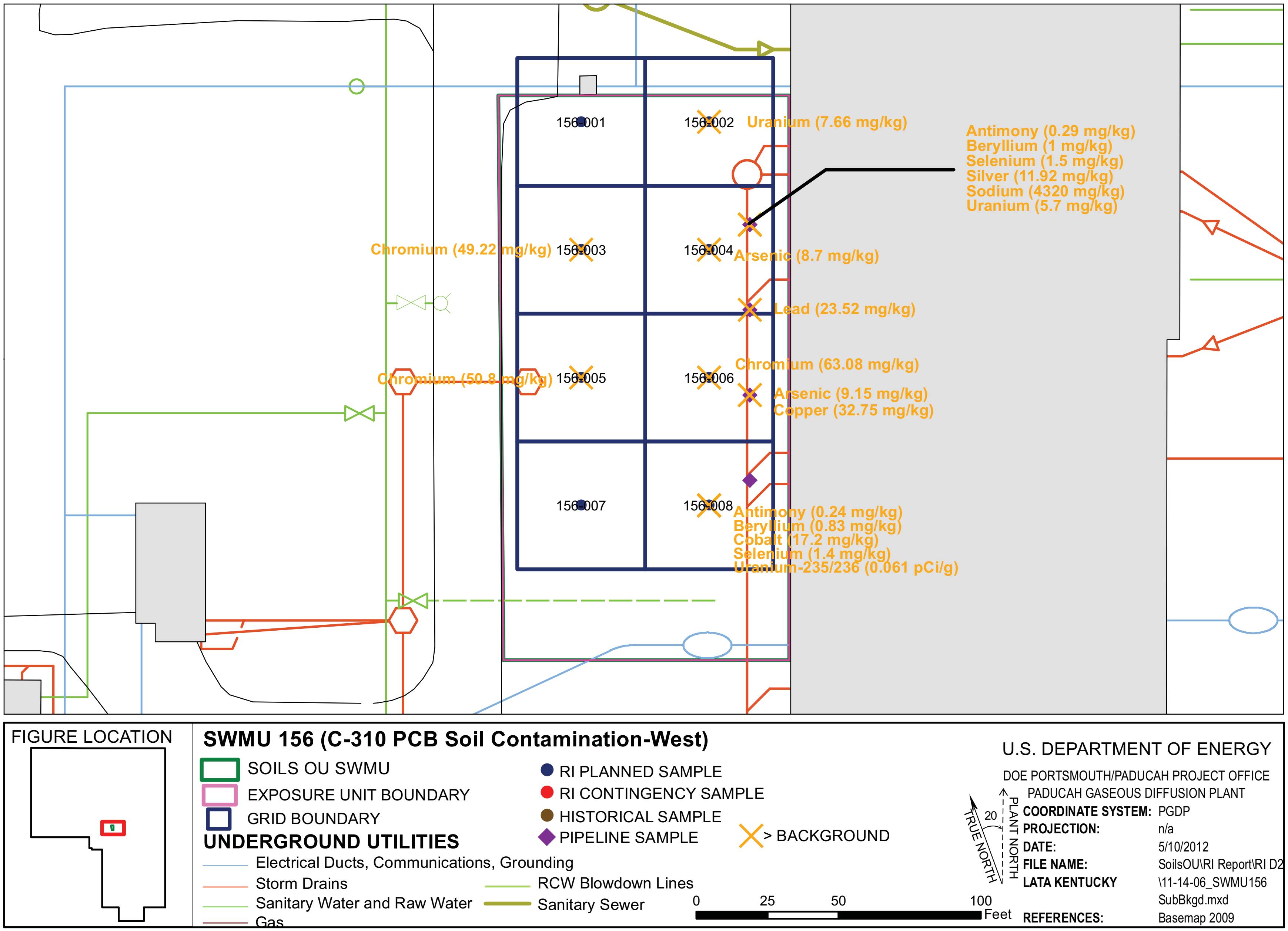


Figure 11.4.6. SWMU 156 Background Exceedances - Subsurface Soil

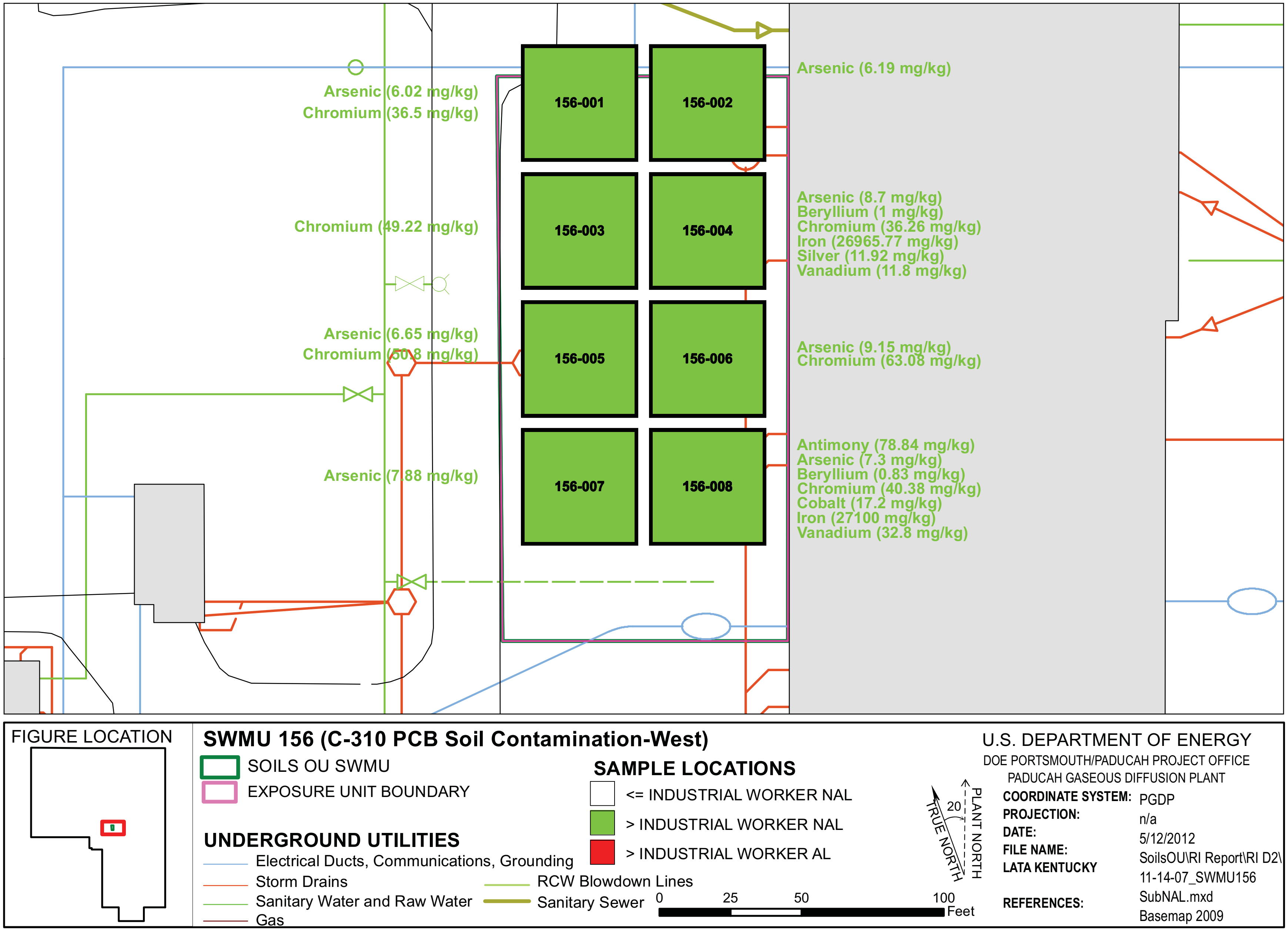


Figure 11.4.7. SWMU 156 NAL Exceedances - Subsurface Soil

Metal	Grid
Antimony	4
Arsenic	4, 6
Cobalt	8
Lead	4
Molybdenum[1]	4, 8
Selenium	4, 8
Silver	4

* SWMU 156 consists of one EU.
[1] No background value is available.

Cobalt in grid 8 and silver in grid 4 were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of UCRS and RGA groundwater in the SWMU 156 subsurface soil.

SVOCs

No SVOCs were detected above the industrial worker NALs, industrial work ALs, or the SSLs for the protection of RGA groundwater in the SWMU 156 subsurface soil. Total PAHs in grids 4 and 8 were detected above the SSLs for the protection of UCRS groundwater.

VOCs

No SWMU 156 surface soil samples were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening level and the industrial worker NALs or ALs in the SWMU 156 subsurface soil.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

11.4.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no direct connection to surface water. There is no concern for potential significant runoff due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

11.4.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 156 were evaluated for direct contact. These results are summarized in Appendix D and in the following subsections, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR and cumulative HI for SWMU 156 exceed the benchmarks for cumulative ELCR of 1E-6 and cumulative HI greater than 1, respectively, for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 11.4.5 for the future industrial worker and the hypothetical resident. The excavation worker did not have any identified COCs. Table 11.4.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COC for these SWMUs under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 156 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 11.4.6.

11.4.7 SWMU 156 Summary

The following text summarizes the results for SWMU 156 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

A plant process that could have contributed to contamination at this site is disbursement of PCB-contaminated soils to reduce dust at the intake of the process building ventilation system.

COPCs for surface and subsurface soils from SWMU 156 are shown on Tables 11.4.1–11.4.4 as those analytes with green boxes under the “Industrial Worker/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G. COPCs identified for this SWMU are metals, PCBs, SVOCs, and radionuclides for surface soils and metals and SVOCs in the subsurface soil.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 156 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. The CSM can be found in Appendix D.

Table 11.4.5. RGOs for SWMU 156

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Future Industrial Worker											
1	Chromium	4.90E+01	mg/kg	1.6E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	PCB, Total	3.00E-01	mg/kg	1.6E-06	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	8.26E-02	mg/kg	1.4E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-238	2.19E+00	pCi/g	1.3E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**5.9E-06**				**< 1**			
Hypothetical Resident[5]											
1	Chromium	4.90E+01	mg/kg	3.2E-06	1.55E+01	1.55E+02	1.55E+03	< 0.1	n/a	n/a	n/a
	Manganese	2.83E+03	mg/kg	< 1E-06	n/a	n/a	n/a	0.5	5.34E+02	5.34E+03	1.60E+04
	Mercury	9.87E+00	mg/kg	< 1E-06	n/a	n/a	n/a	0.4	2.35E+00	2.35E+01	7.04E+01
	PCB, Total	3.00E-01	mg/kg	4.7E-06	6.38E-02	6.38E-01	6.38E+00	< 0.1	n/a	n/a	n/a
	Total PAH	8.26E-02	mg/kg	4.2E-06	1.94E-02	1.94E-01	1.94E+00	< 0.1	n/a	n/a	n/a
	Uranium-238	2.19E+00	pCi/g	6.3E-06	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**1.8E-05**				**0.9**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.92, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.92, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 11.4.6 Ecological Screening for SWMU 156

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Gravel	No	274	Manganese	1.50E+03	2.83E+03	2.20E+02	13
			Mercury	2.00E-01	9.87E+00	1.00E-01	99
			PCB, Total	n/a	2.50E+00	2.00E-02	125
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-6 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. COCs for these scenarios for SWMU 156 are as follows:

- Future Industrial Worker
  - Chromium
  - Total PAHs
  - Total PCBs
  - Uranium-238
- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Chromium
  - Manganese
  - Mercury
  - Total PAHs
  - Total PCBs
  - Uranium-238

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 156.

For SWMU 156, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Manganese
- Mercury
- Total PCBs
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 156 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit are, as discussed in the Work Plan, posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 156 is not near any other SWMUs, but is adjacent to the C-331 Process Building. A response action at SWMU 156 would not impact either the operations at C-331 or any integrator OUs.

11.4.8 SWMU 156 Conclusions

The RI adequately defined the nature and extent of contamination in soils at SWMU 156; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial as shown in the SMP (DOE 2012a).

11.5 SWMU 160, C-745 CYLINDER YARD SPOILS (PCB SOILS)

11.5.1 Background

The C-745 Cylinder Yard Spoils (PCB soils) (SWMU 160) is located in the southeast portion of the plant site. SWMU 160 is approximately 300-ft wide by 500-ft long. Historically, this area was used as storage of excavated soils and soils for fill from other projects at PGDP.

Surface samples detected PCBs, uranium, arsenic, chromium, lead, selenium, thallium, and nickel (DOE 1997f).

11.5.2 Fieldwork Summary

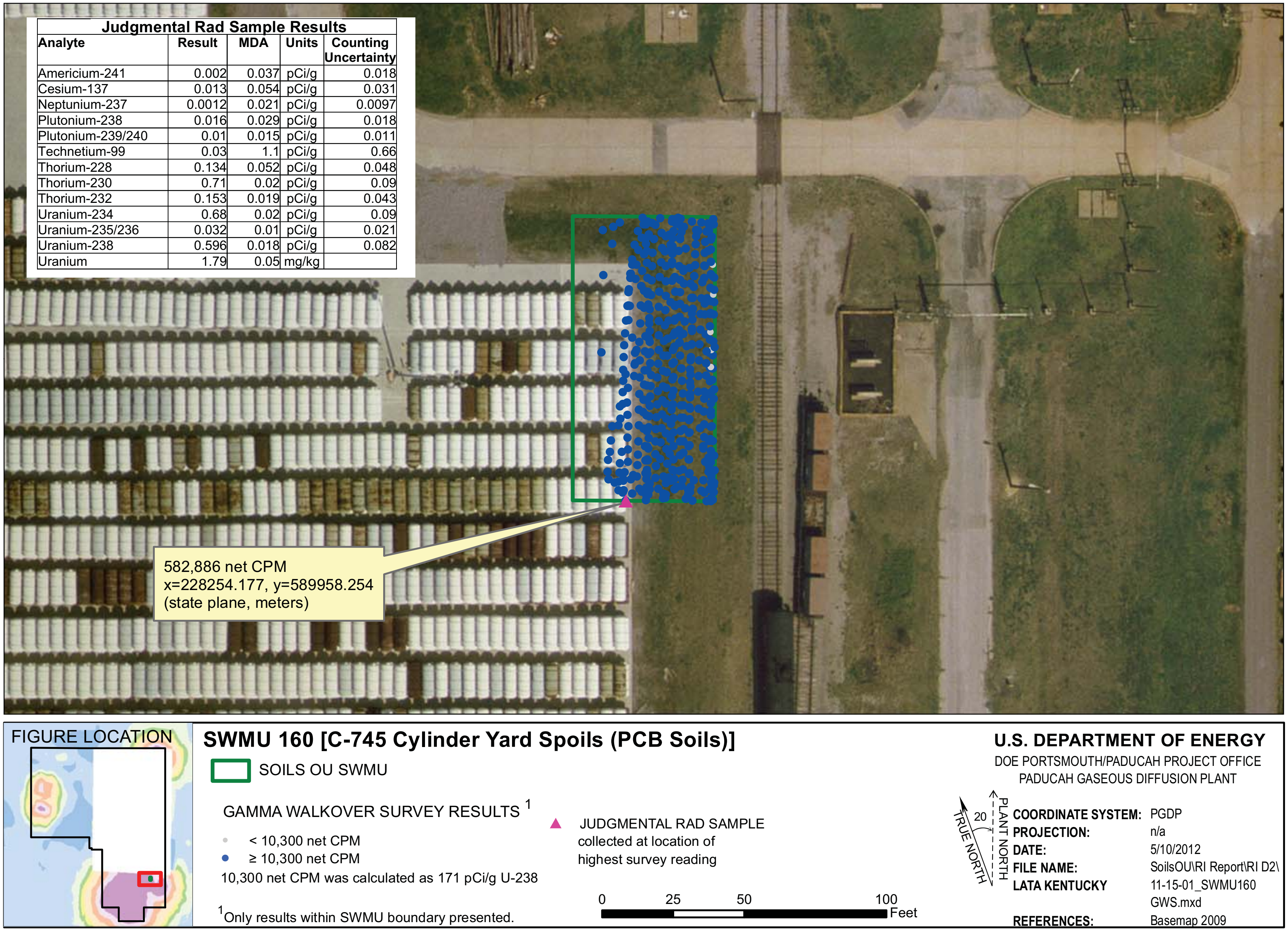
Four grid samples were collected of the four planned for the unit.

The SWMU underwent a gamma radiological walkover survey (Figure 11.5.1) using a FIDLER; the 466 measurements ranged from 14,318 to 593,886 gross cpm. Part of this SWMU is contained within and adjacent to the C-745 depleted uranium cylinder storage yards. The influence of background radiation from nearby cylinders does not allow a reliable determination for areas of contamination at the project action limit. A judgmental grab sample was collected for radiological constituents.

11.5.3 Nature and Extent of Contamination—Surface Soils

For SWMU 160, the representative data set for surface soils is presented in Tables 11.5.1 and 11.5.2 and provides the nature of the contamination in SWMU 160 surface soils. Figures 11.5.2–11.5.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 160 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 160 consists of one EU.



Judgmental Rad Sample Results

Analyte	Result	MDA	Units	Counting Uncertainty
Americium-241	0.002	0.037	pCi/g	0.018
Cesium-137	0.013	0.054	pCi/g	0.031
Neptunium-237	0.0012	0.021	pCi/g	0.0097
Plutonium-238	0.016	0.029	pCi/g	0.018
Plutonium-239/240	0.01	0.015	pCi/g	0.011
Technetium-99	0.03	1.1	pCi/g	0.66
Thorium-228	0.134	0.052	pCi/g	0.048
Thorium-230	0.71	0.02	pCi/g	0.09
Thorium-232	0.153	0.019	pCi/g	0.043
Uranium-234	0.68	0.02	pCi/g	0.09
Uranium-235/236	0.032	0.01	pCi/g	0.021
Uranium-238	0.596	0.018	pCi/g	0.082
Uranium	1.79	0.05	mg/kg	

Figure 11.5.1. SWMU 160 Gamma Walkover Survey

Table 11.5.1. Surface Soil Historical Data Summary: SWMU 160 C-745 Cylinder Yard (PCB Soils) Spoils

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.88E-01	0/1	1.88E+01	0/1	0/1	-
RADS	Technetium-99	pCi/g	1.70E+01	1.70E+01	1.70E+01	0/1	1/1	1/1	2.50E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	1/1	-

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.5.2. Surface Soil RI Data Summary: SWMU 160 C-745 Cylinder Yard Spoils-PCB Soils

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.13E+03	5.13E+03	5.13E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.3 - 5.3
METAL	Antimony	mg/kg	6.80E-01	6.80E-01	6.80E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.53 - 0.53
METAL	Arsenic	mg/kg	4.50E+00	8.22E+00	5.74E+00	0/2	2/2	0/2	1.20E+01	2/2	9.97E-01	0/2	9.97E+01	0/2	2/2	1.1 - 11
METAL	Barium	mg/kg	1.47E+02	1.47E+02	1.47E+02	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.1 - 2.1
METAL	Beryllium	mg/kg	3.60E-01	3.60E-01	3.60E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.53 - 0.53
METAL	Cadmium	mg/kg	2.40E-01	2.40E-01	2.40E-01	0/1	1/1	1/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.053 - 0.053
METAL	Calcium	mg/kg	1.40E+05	1.40E+05	1.40E+05	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	265 - 265
METAL	Chromium	mg/kg	1.26E+01	1.26E+01	1.26E+01	0/2	1/2	0/2	1.60E+01	0/2	3.02E+01	0/2	3.02E+03	0/2	0/2	1.1 - 85
METAL	Cobalt	mg/kg	3.60E+00	3.60E+00	3.60E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.21 - 0.21
METAL	Copper	mg/kg	6.10E+00	6.10E+00	6.10E+00	0/2	1/2	0/2	1.90E+01	0/2	1.43E+03	0/2	2.24E+05	0/2	0/2	1.1 - 35
METAL	Iron	mg/kg	1.01E+04	1.17E+04	1.06E+04	0/2	2/2	0/2	2.80E+04	0/2	2.51E+04	0/2	3.92E+06	2/2	2/2	5.3 - 100
METAL	Lead	mg/kg	1.04E+01	1.40E+01	1.28E+01	0/2	2/2	0/2	3.60E+01	0/2	4.00E+02	0/2	4.00E+02	0/2	1/2	0.32 - 13
METAL	Magnesium	mg/kg	6.22E+03	6.22E+03	6.22E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	53.1 - 53.1
METAL	Manganese	mg/kg	3.14E+02	3.33E+02	3.21E+02	0/2	2/2	0/2	1.50E+03	0/2	2.58E+03	0/2	1.16E+05	2/2	2/2	0.21 - 85
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	2.00E-01	0/2	9.00E-01	0/2	7.85E+02	0/2	0/2	0.0354 - 10
METAL	Molybdenum	mg/kg	7.70E-01	7.70E-01	7.70E-01	0/2	1/2	0/2	n/a	0/2	1.79E+02	0/2	2.80E+04	0/2	1/2	0.53 - 15
METAL	Nickel	mg/kg	7.70E+00	7.70E+00	7.70E+00	0/2	1/2	0/2	2.10E+01	0/2	4.28E+01	0/2	3.18E+04	0/2	1/2	0.53 - 65
METAL	Selenium	mg/kg	8.00E-01	8.00E-01	8.00E-01	0/2	1/2	0/2	8.00E-01	0/2	1.79E+02	0/2	2.80E+04	0/2	1/2	0.53 - 20
METAL	Silver	mg/kg	4.20E-02	4.20E-02	4.20E-02	0/2	1/2	0/2	2.30E+00	0/2	1.08E+01	0/2	9.15E+03	0/2	0/2	0.21 - 10
METAL	Sodium	mg/kg	7.35E+01	7.35E+01	7.35E+01	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	21.2 - 21.2
METAL	Thallium	mg/kg	3.00E-01	3.00E-01	3.00E-01	0/1	1/1	1/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.21 - 0.21
METAL	Uranium	mg/kg	1.79E+00	2.32E+00	2.19E+00	0/3	2/3	0/3	4.90E+00	0/3	1.07E+02	0/3	1.65E+04	0/3	0/3	0.05 - 20
METAL	Vanadium	mg/kg	1.59E+01	1.59E+01	1.59E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	4.08E+01	4.38E+01	4.18E+01	0/2	2/2	0/2	6.50E+01	0/2	1.08E+04	0/2	1.68E+06	0/2	2/2	2.1 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.88E-01	0/2	1.88E+01	0/2	0/2	0.32 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.7 - 1.7
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.35 - 0.35
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.35 - 0.35
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Benzo(ghi)perylene	mg/kg	4.20E-02	4.20E-02	4.20E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.5.2. Surface Soil RI Data Summary: SWMU 160 C-745 Cylinder Yard Spoils-PCB Soils (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.007 - 0.007
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.35 - 0.35
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Fluoranthene	mg/kg	5.40E-02	5.40E-02	5.40E-02	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.35 - 0.35
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.35 - 0.35
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.35 - 0.35
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.7 - 0.7
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.35 - 0.35
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.007 - 0.007
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.7 - 1.7
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.35 - 0.35
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Pyrene	mg/kg	5.20E-02	5.20E-02	5.20E-02	1/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.35 - 0.35
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.7 - 0.7
SVOA	Total PAH	mg/kg	5.29E-02	5.29E-02	5.29E-02	0/1	1/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	1.99E+01	2.45E+01	2.22E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.6 - 5.1
RADS	Americium-241	pCi/g	-5.00E-03	2.00E-03	-1.50E-03	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.032 - 0.037
RADS	Beta activity	pCi/g	1.20E+01	2.82E+01	2.01E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.2 - 3.2
RADS	Cesium-137	pCi/g	1.30E-02	1.60E-02	1.45E-02	0/2	2/2	0/2	4.90E-01	0/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.054 - 0.1
RADS	Neptunium-237	pCi/g	1.20E-03	1.70E-03	1.45E-03	0/2	2/2	0/2	1.00E-01	0/2	2.71E-01	0/2	2.71E+01	0/2	0/2	0.018 - 0.021
RADS	Plutonium-238	pCi/g	1.60E-02	2.30E-02	1.95E-02	0/2	2/2	0/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.029 - 0.032
RADS	Plutonium-239/240	pCi/g	8.00E-03	1.00E-02	9.00E-03	0/2	2/2	0/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.015 - 0.018
RADS	Technetium-99	pCi/g	0.00E+00	3.00E-02	1.50E-02	0/2	2/2	0/2	2.50E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	0/2	0.41 - 1.1
RADS	Thorium-228	pCi/g	1.34E-01	6.60E-01	3.97E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.02 - 0.052
RADS	Thorium-230	pCi/g	7.10E-01	9.30E-01	8.20E-01	0/2	2/2	0/2	1.50E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.02 - 0.02
RADS	Thorium-232	pCi/g	1.53E-01	7.90E-01	4.72E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.019 - 0.02
RADS	Uranium-234	pCi/g	6.80E-01	7.50E-01	7.15E-01	0/2	2/2	0/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	2.60E-02	3.20E-02	2.90E-02	0/2	2/2	0/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.01 - 0.022
RADS	Uranium-238	pCi/g	5.96E-01	7.80E-01	6.88E-01	0/2	2/2	0/2	1.20E+00	0/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.018 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

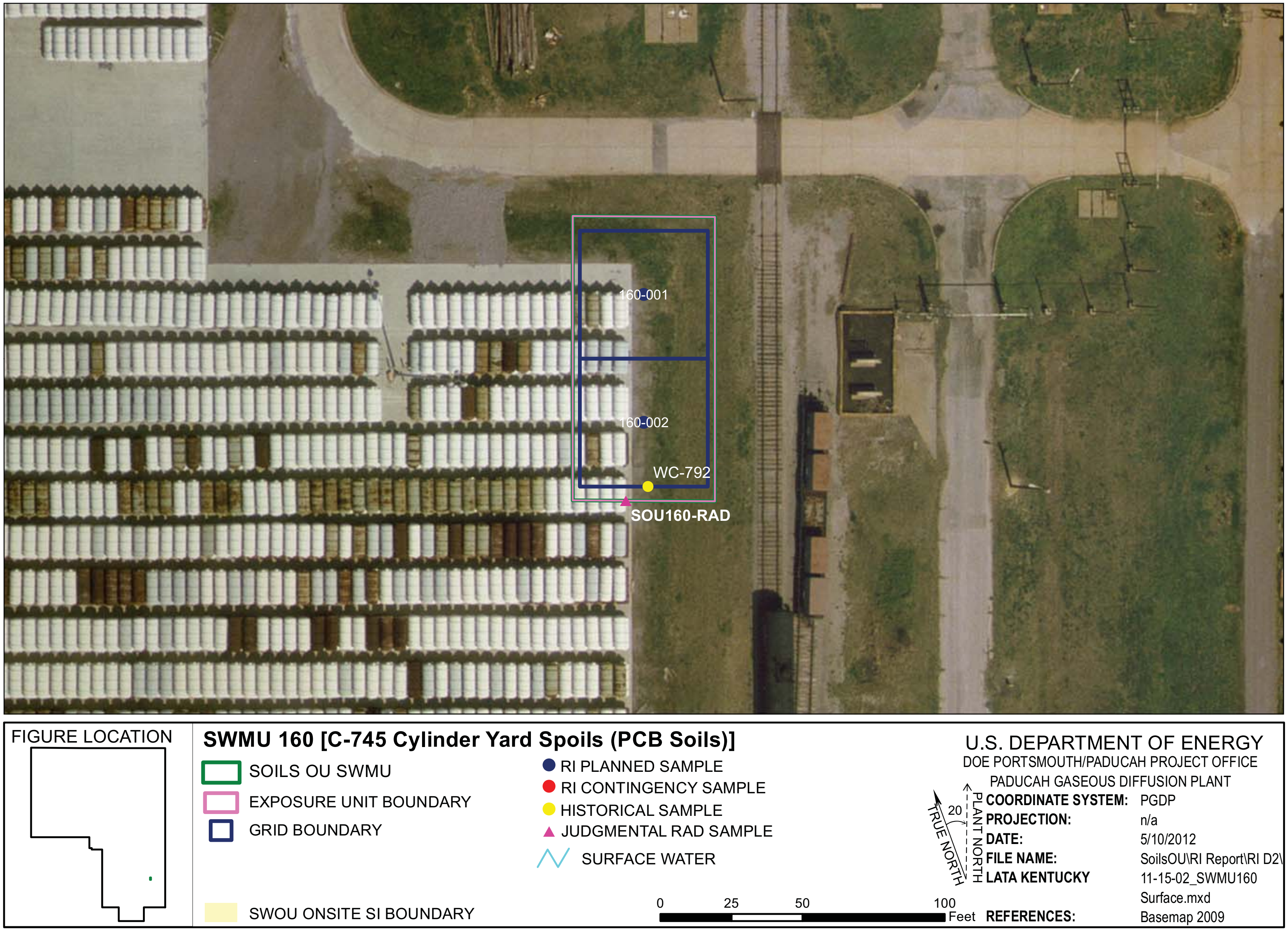


Figure 11.5.2. SWMU 160 Sample Locations - Surface Soil

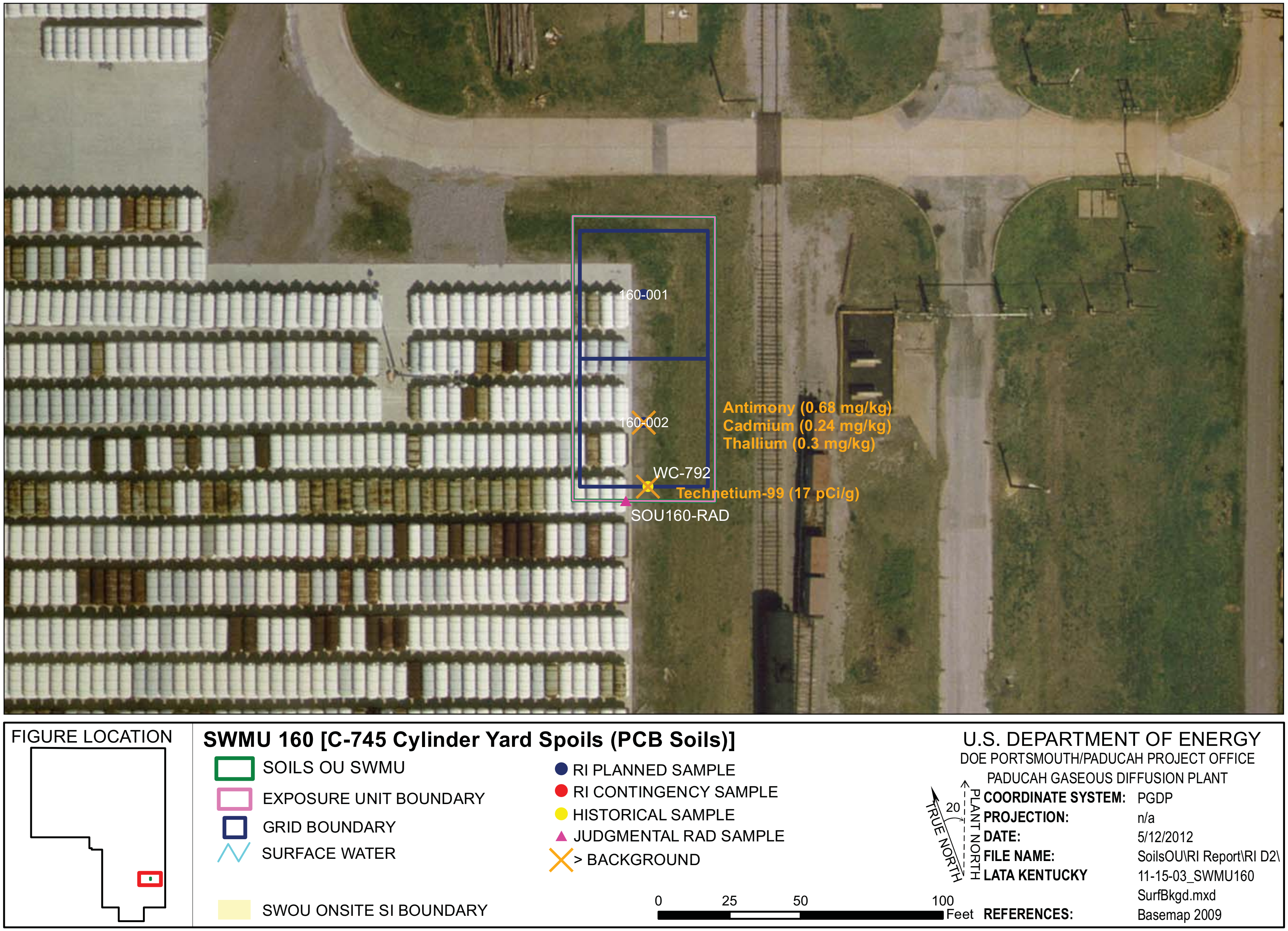


Figure 11.5.3. SWMU 160 Background Exceedances - Surface Soil

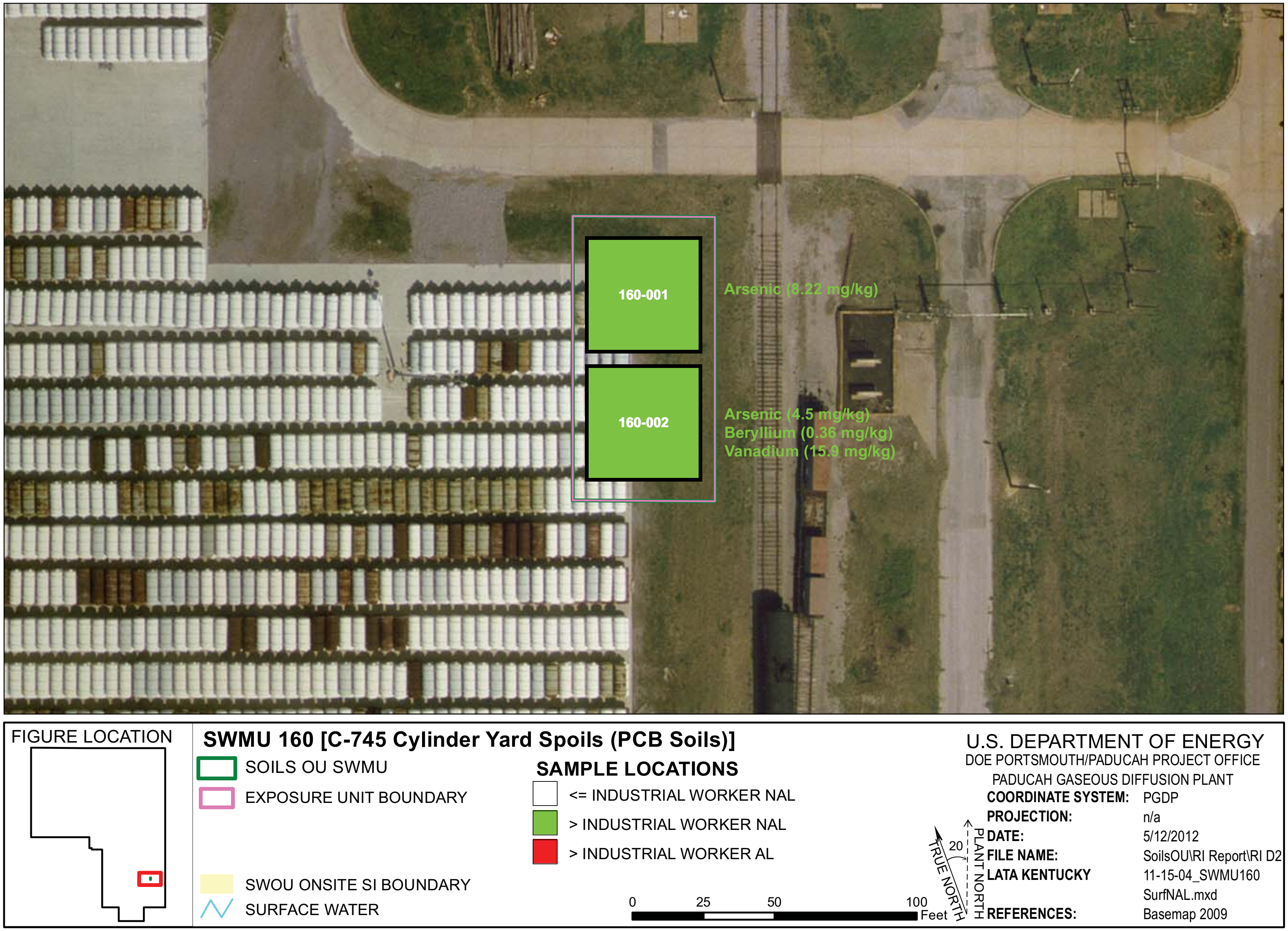


Figure 11.5.4. SWMU 160 NAL Exceedances - Surface Soil

Metals

No metals were detected above both the background screening levels and the industrial worker NALs or ALs in the SWMU 160 surface soil.

The following metals were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater: antimony, molybdenum (no background value available), and thallium in grid 2. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

No PCBs were detected in the SWMU 160 surface soil.

SVOCs

No SVOCs were detected above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of RGA groundwater. Total PAHs in grid 2 were detected above the SSLs for the protection of UCRS groundwater.

VOCs

No SWMU 160 surface soil samples were analyzed for VOCs.

Radionuclides

No radionuclides were detected in the SWMU 160 surface soil above both the background screening levels and the industrial worker NALs or ALs.

Technetium-99 in grid 2 was detected above both the background screening level and the SSLs for the protection of UCRS groundwater. No radionuclides were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

11.5.4 Nature and Extent of Contamination—Subsurface Soils

The representative data set for subsurface soils is presented in Tables 11.5.3 and 11.5.4 and provides the nature of contamination in SWMU 160 subsurface soils. Figures 11.5.5–11.5.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 160 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 160 consists of one EU.

Metals

Metals were detected in the SWMU 160 subsurface soil above the industrial worker NALs. The following are the metals detected above both background screening levels and the industrial worker NALs and the grids in which they were detected.

Table 11.5.3. Subsurface Soil Historical Data Summary: SWMU 160 C-745 Cylinder Yard (PCB Soils) Spoils

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range

There is no subsurface historical data.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.5.4. Subsurface Soil RI Data Summary: SWMU 160 C-745 Cylinder Yard Spoils-PCB Soils

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	1.01E+04	1.01E+04	1.01E+04	0/1	1/1	0/1	1.20E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	6 - 6
METAL	Antimony	mg/kg	1.70E-01	1.70E-01	1.70E-01	0/1	1/1	0/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	0/1	0.6 - 0.6
METAL	Arsenic	mg/kg	6.64E+00	6.64E+00	6.64E+00	0/3	1/3	0/3	7.90E+00	1/3	9.97E-01	0/3	9.97E+01	0/3	1/3	1.2 - 11
METAL	Barium	mg/kg	1.43E+02	1.43E+02	1.43E+02	0/1	1/1	0/1	1.70E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.4 - 2.4
METAL	Beryllium	mg/kg	4.40E-01	4.40E-01	4.40E-01	0/1	1/1	0/1	6.90E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.6 - 0.6
METAL	Cadmium	mg/kg	5.90E-02	5.90E-02	5.90E-02	0/1	1/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.06 - 0.06
METAL	Calcium	mg/kg	1.06E+04	1.06E+04	1.06E+04	0/1	1/1	1/1	6.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	59.5 - 59.5
METAL	Chromium	mg/kg	3.36E+01	4.63E+01	4.28E+01	0/3	3/3	2/3	4.30E+01	3/3	3.02E+01	0/3	3.02E+03	0/3	0/3	1.2 - 85
METAL	Cobalt	mg/kg	4.90E+00	4.90E+00	4.90E+00	0/1	1/1	0/1	1.30E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.24 - 0.24
METAL	Copper	mg/kg	1.12E+01	1.12E+01	1.12E+01	0/3	1/3	0/3	2.50E+01	0/3	1.43E+03	0/3	2.24E+05	0/3	0/3	1.2 - 35
METAL	Iron	mg/kg	1.37E+04	1.54E+04	1.46E+04	0/3	3/3	0/3	2.80E+04	0/3	2.51E+04	0/3	3.92E+06	3/3	3/3	6 - 100
METAL	Lead	mg/kg	1.08E+01	1.87E+01	1.36E+01	0/3	3/3	0/3	2.30E+01	0/3	4.00E+02	0/3	4.00E+02	0/3	1/3	0.36 - 13
METAL	Magnesium	mg/kg	1.80E+03	1.80E+03	1.80E+03	0/1	1/1	0/1	2.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	59.5 - 59.5
METAL	Manganese	mg/kg	1.88E+02	3.77E+02	3.16E+02	0/3	3/3	0/3	8.20E+02	0/3	2.58E+03	0/3	1.16E+05	3/3	3/3	0.24 - 85
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	1.30E-01	0/3	9.00E-01	0/3	7.85E+02	0/3	0/3	0.0397 - 10
METAL	Molybdenum	mg/kg	5.20E-01	5.20E-01	5.20E-01	0/3	1/3	0/3	n/a	0/3	1.79E+02	0/3	2.80E+04	0/3	1/3	0.6 - 15
METAL	Nickel	mg/kg	9.70E+00	9.70E+00	9.70E+00	0/3	1/3	0/3	2.20E+01	0/3	4.28E+01	0/3	3.18E+04	0/3	1/3	0.6 - 65
METAL	Selenium	mg/kg	1.30E+00	1.30E+00	1.30E+00	0/3	1/3	1/3	7.00E-01	0/3	1.79E+02	0/3	2.80E+04	0/3	1/3	0.6 - 20
METAL	Silver	mg/kg	3.80E-02	1.13E+01	3.78E+00	0/3	2/3	1/3	2.70E+00	1/3	1.08E+01	0/3	9.15E+03	1/3	1/3	0.24 - 10
METAL	Sodium	mg/kg	7.33E+01	7.33E+01	7.33E+01	0/1	1/1	0/1	3.40E+02	0/1	n/a	0/1	n/a	n/a	n/a	23.8 - 23.8
METAL	Thallium	mg/kg	2.50E-01	2.50E-01	2.50E-01	0/1	1/1	0/1	3.40E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.24 - 0.24
METAL	Uranium	mg/kg	2.93E+00	2.93E+00	2.93E+00	0/3	1/3	0/3	4.60E+00	0/3	1.07E+02	0/3	1.65E+04	0/3	0/3	0.05 - 20
METAL	Vanadium	mg/kg	2.33E+01	2.33E+01	2.33E+01	0/1	1/1	0/1	3.70E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.2 - 1.2
METAL	Zinc	mg/kg	3.65E+01	4.99E+01	4.33E+01	0/3	3/3	0/3	6.00E+01	0/3	1.08E+04	0/3	1.68E+06	0/3	3/3	2.4 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.88E-01	0/3	1.88E+01	0/3	0/3	0.36 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.9 - 1.9
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.39 - 0.39
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.39 - 0.39
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Benzo(ghi)perylene	mg/kg	5.60E-02	5.60E-02	5.60E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.5.4. Subsurface Soil RI Data Summary: SWMU 160 C-745 Cylinder Yard Spoils-PCB Soils (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0079 - 0.0079
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Fluoranthene	mg/kg	8.30E-02	8.30E-02	8.30E-02	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.39 - 0.39
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.39 - 0.39
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.39 - 0.39
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.79 - 0.79
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.39 - 0.39
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0079 - 0.0079
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.9 - 1.9
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Pyrene	mg/kg	9.00E-02	9.00E-02	9.00E-02	1/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.39 - 0.39
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.79 - 0.79
SVOA	Total PAH	mg/kg	1.02E-01	1.02E-01	1.02E-01	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	2.97E+01	2.97E+01	2.97E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	5.2 - 5.2
RADS	Americium-241	pCi/g	-7.00E-04	-7.00E-04	-7.00E-04	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.035 - 0.035
RADS	Beta activity	pCi/g	2.18E+01	2.18E+01	2.18E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	4.2 - 4.2
RADS	Cesium-137	pCi/g	2.00E-03	2.00E-03	2.00E-03	0/1	1/1	0/1	2.80E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.092 - 0.092
RADS	Neptunium-237	pCi/g	0.00E+00	0.00E+00	0.00E+00	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.01 - 0.01
RADS	Plutonium-238	pCi/g	1.20E-02	1.20E-02	1.20E-02	0/1	1/1	0/1	n/a	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.035 - 0.035
RADS	Plutonium-239/240	pCi/g	6.00E-03	6.00E-03	6.00E-03	0/1	1/1	0/1	n/a	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.021 - 0.021
RADS	Technetium-99	pCi/g	1.10E-01	1.10E-01	1.10E-01	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	0/1	0.47 - 0.47
RADS	Thorium-228	pCi/g	1.09E+00	1.09E+00	1.09E+00	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	1.17E+00	1.17E+00	1.17E+00	0/1	1/1	0/1	1.40E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	1.00E+00	1.00E+00	1.00E+00	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
RADS	Uranium-234	pCi/g	7.90E-01	7.90E-01	7.90E-01	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	8.20E-02	8.20E-02	8.20E-02	0/1	1/1	1/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.019 - 0.019
RADS	Uranium-238	pCi/g	9.70E-01	9.70E-01	9.70E-01	0/1	1/1	0/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.02 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

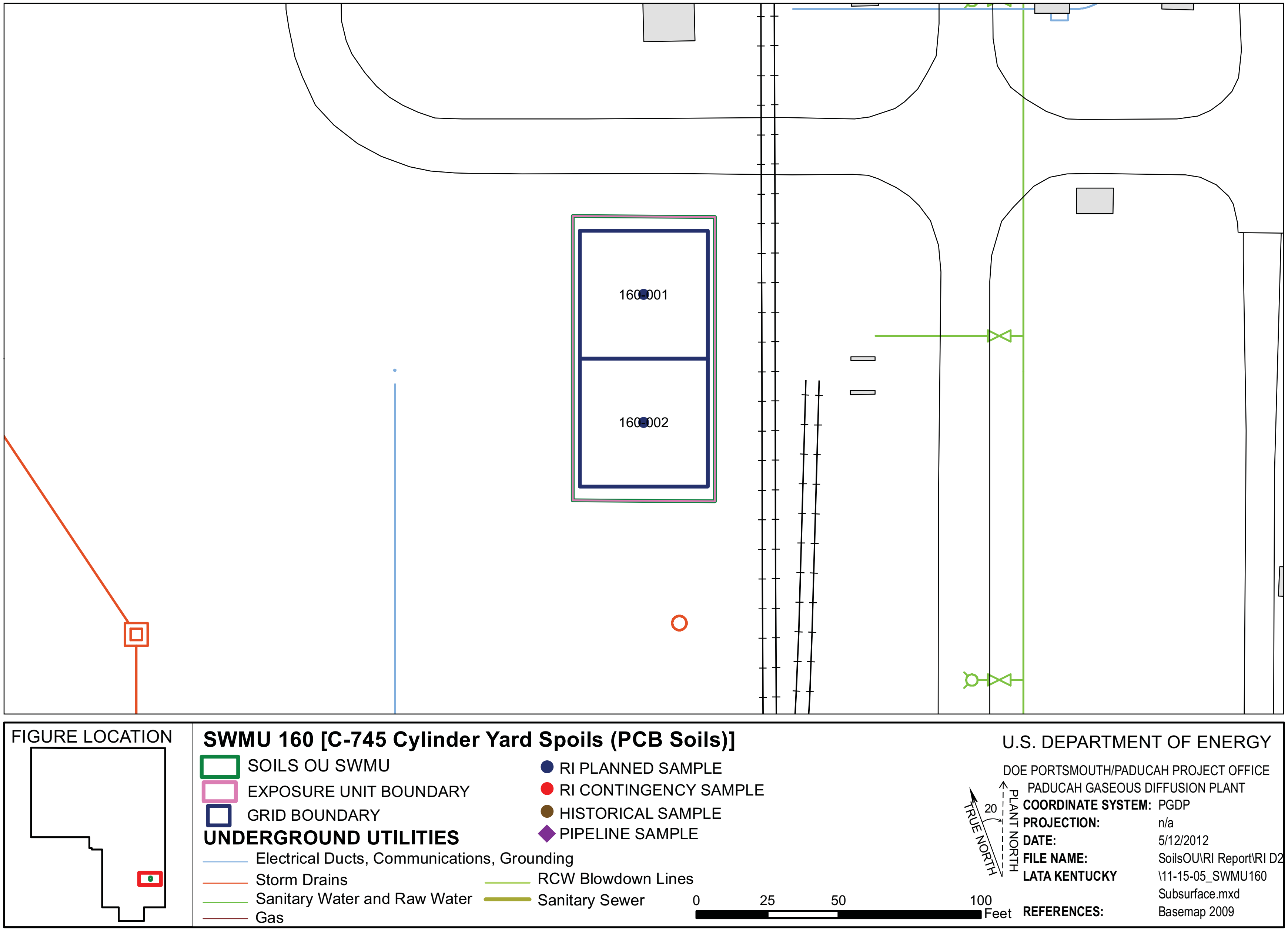


Figure 11.5.5. SWMU 160 Sample Locations - Subsurface Soil

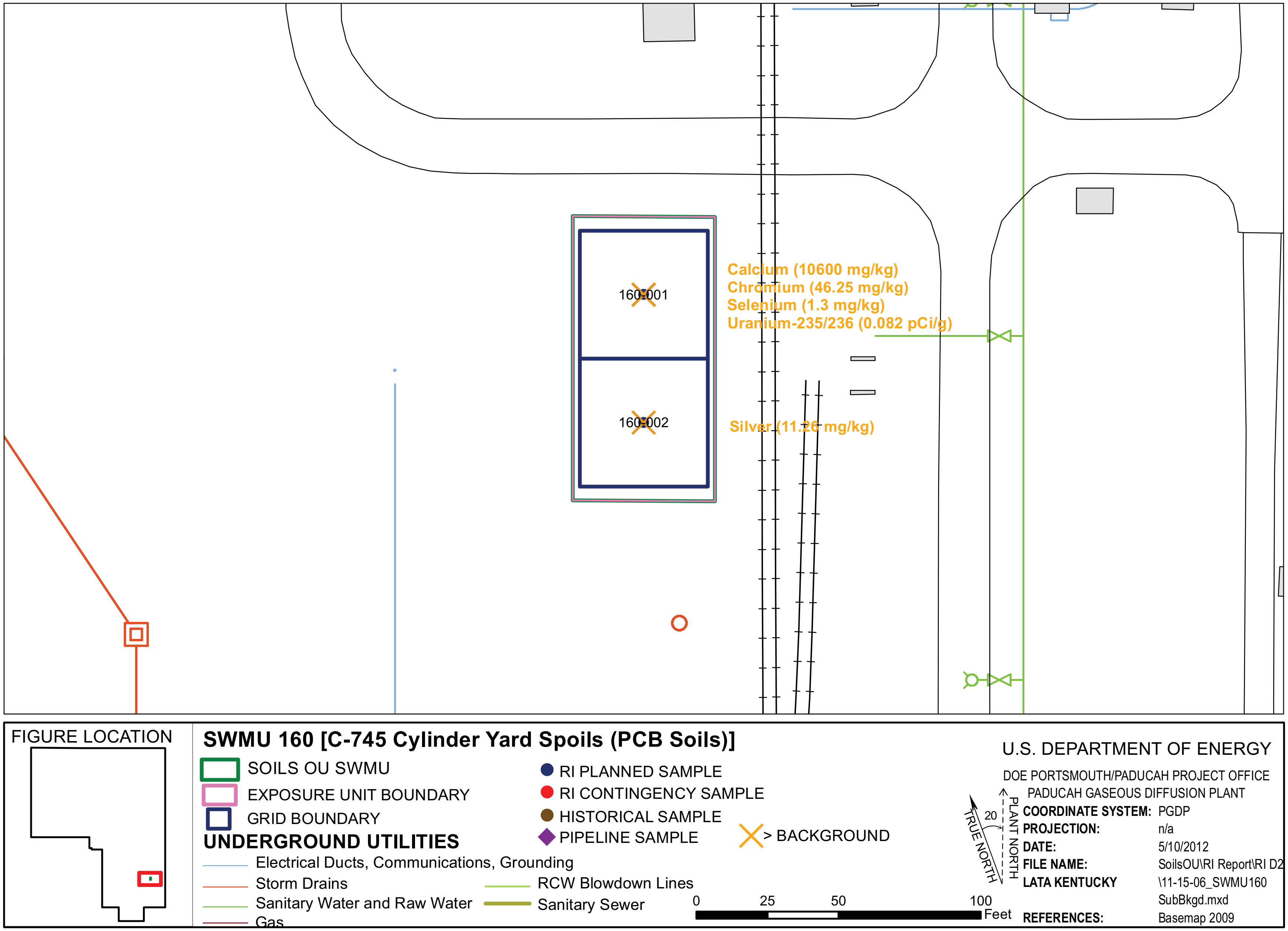


Figure 11.5.6. SWMU 160 Background Exceedances - Subsurface Soil

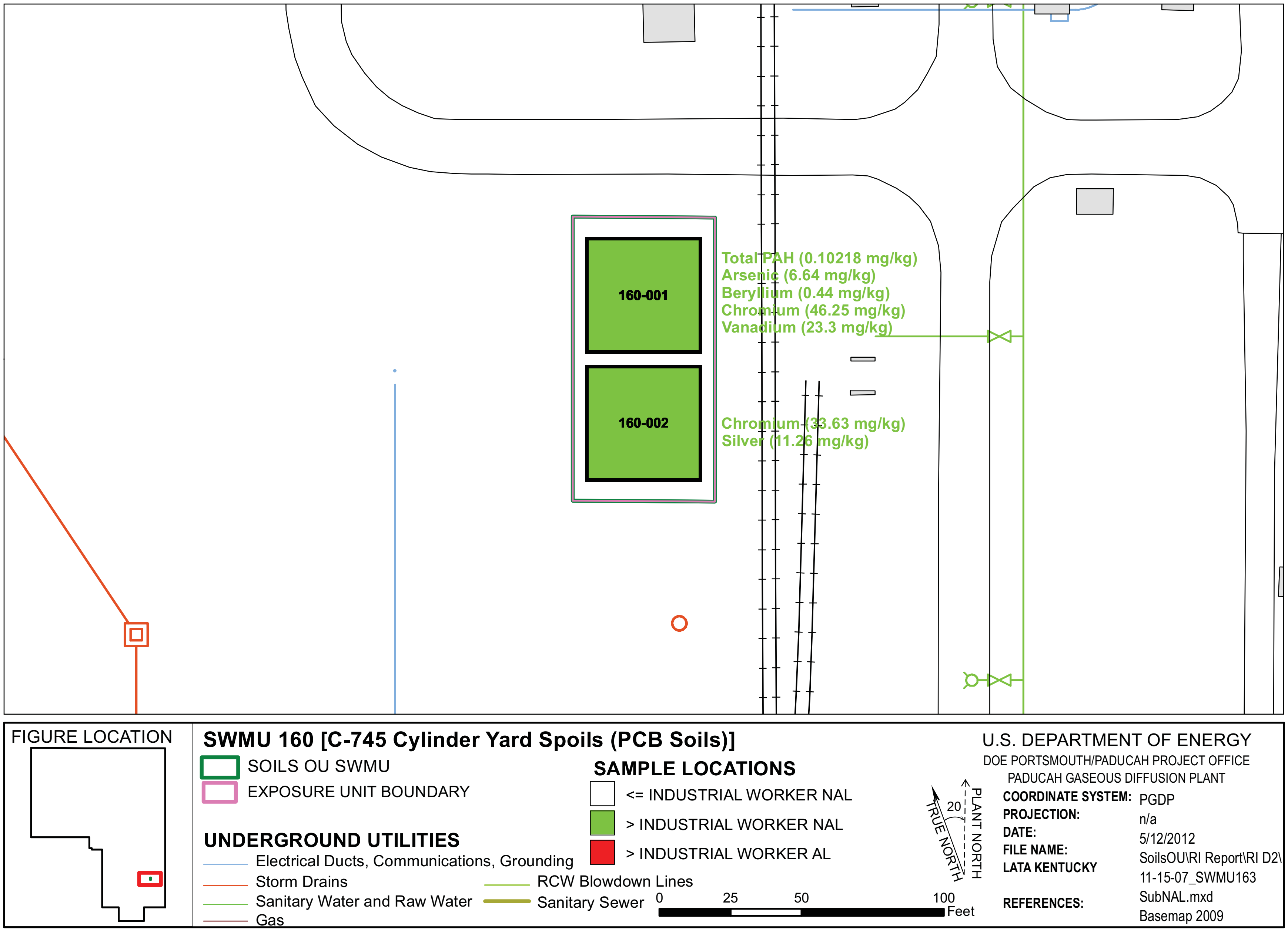


Figure 11.5.7. SWMU 160 NAL Exceedances - Subsurface Soil

Metal	Grid
Chromium	1
Silver	2

* SWMU 160 consists of one EU.

Grids 1 and 2 are both located on the border of SWMU 160, within the administrative boundary.

The maximum depth at which metals were detected above both the background screening levels and the industrial worker NALs was 4 ft bgs, which also was the end depth of each SWMU 160 borehole.

The following metals were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater: molybdenum (no background value available) and selenium in grid 1 and silver in grid 2. Silver in grid 2 was detected above both the background screening level and the SSL for the protection of RGA groundwater.

PCBs

No PCBs were detected in the SWMU 160 subsurface soil.

SVOCs

Total PAHs were detected in grid 1 at a maximum depth of 4 ft bgs above the industrial worker NAL in the SWMU 160 subsurface soil.

No SVOCs were detected above the industrial worker ALs or the SSLs for the protection of RGA groundwater. Total PAHs in grid 1 were detected above the SSLs for the protection of UCRS groundwater.

VOCs

No SWMU 160 subsurface soil samples were analyzed for VOCs.

Radionuclides

No radionuclides were detected in the SWMU 160 subsurface soil above both the background screening levels and the industrial worker NALs or ALs.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

11.5.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no direct connection to surface water. There is no concern for potential significant runoff due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

11.5.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 160 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 160 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 11.5.5 for the hypothetical resident. The future industrial worker and the excavation worker did not have any identified COCs. Table 11.5.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COC for these SWMUs under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 160 include metals. Potential hazards for ecological receptors and the associated COPECs (maximum HQ $\geq$ 10) are summarized in Table 11.5.6.

11.5.7 SWMU 160 Summary

The following text summarizes the results for SWMU 160 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

Plant processes that could have contributed to contamination at SWMU 160 are placement of contaminated soils that resulted in contaminants being released to the ground surface from soils that were stored here.

COPCs for surface and subsurface soils from SWMU 160 are shown on Tables 11.5.1–11.5.4 as those analytes with green boxes under the “Industrial Worker/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G. COPCs identified for SWMU 160 are metals, SVOCs, and radionuclides in surface soils and metals and SVOCs for subsurface soil.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 160 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMU 160. The CSM can be found in Appendix D.

Table 11.5.5. RGOs for SWMU 160

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3] 1 x 10^{-6}	RGOs for ELCR[3] 1 x 10^{-5}	RGOs for ELCR[3] 1 x 10^{-4}	HI[4]	RGOs for HI[3] 0.1	RGOs for HI[3] 1	RGOs for HI[3] 3
Hypothetical Resident[5]											
1	Total PAH	5.29E-02	mg/kg	2.7E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Cumulative			**2.7E-06**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.94, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.94, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 11.5.6 Ecological Screening for SWMU 160

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Gravel/soil/grass mix with concrete pads	No	27	Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-6 and 1, respectively, for the hypothetical residential scenario. COCs for this scenario for SWMU 160 are as follows:

- Future Industrial Worker
  - None
- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Total PAHs

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 160.

For SWMU 160, COPECs exceed ESVs. The priority COPEC (i.e., maximum HQ ≥ 10) is the following:

- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 160 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit are, as discussed in the Work Plan, posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 160 is across the railroad tracks from SWMU 77, the C-643-B Sulfuric Acid Storage Tank slab and underlying soils. Both of these two SWMUs are within the boundaries of SWMU 193, McGraw Construction Facilities (Southside Cylinder Yards), which is scheduled to be addressed by the GDP D&D OU (DUF_6 D&D subproject). A response action at SWMU 160 would not have an effect on either of the other two SWMUs mentioned, nor would it affect any integrator OUs.

11.5.8 SWMU 160 Conclusions

The RI adequately defined the nature and extent of contamination in soils at SWMU 160; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including the hypothetical resident (DOE 2010a). The reasonably anticipated future land use of this SWMU is industrial, as shown in the SMP (DOE 2012a).

11.6 SWMU 163, C-304 BUILDING/HVAC PIPING SYSTEM (SOIL BACKFILL)

11.6.1 Background

The C-304 Building/HVAC Piping System (soil backfill) (SWMU 163) is located in the central portion of the plant site. SWMU 163 is approximately 100-ft wide by 200-ft long.

Soils from the C-611-V Sludge Lagoon borrow area were used for fill material for C-304 Train and Cascade Office Building construction activities. The fill material was used as a base for the HVAC piping system and as a heat sink; it is located approximately 6 ft bgs.

The borrow area itself has not been characterized, but the lagoon was sampled, resulting in the identification of PCBs with a maximum concentration of 8.4 mg/kg, as noted in the 1998 *Sampling and Analysis, Quality Assurance, and Data Management Plan for the Site Evaluation of Waste Area Groupings 16 and 19* (DOE 1998d) and the SAR.

11.6.2 Fieldwork Summary

Two grid samples were collected of the 4 planned for the unit. Additional information was located regarding the geothermal system at this SWMU. As a result of this information, 27 contingency grab samples were planned for the perimeter of the system at a depth of 4–7 ft (the approximate depth of the system). Twenty-four of these contingency samples were collected. Those not collected were due to shallow refusal. Figure A.22 in Appendix A is the sampling rectification map.

The SWMU underwent a gamma radiological walkover survey (Figure 11.6.1) using a FIDLER; the 1,085 measurements ranged from 8,369 to 16,594 gross cpm and were consistent with background. The area consists entirely of soil and grass. A judgmental grab sample was collected for radiological constituents, although gamma walkover survey results were consistent with background.

11.6.3 Nature and Extent of Contamination—Surface Soils

For SWMU 163, the representative data set for surface soils is presented in Tables 11.6.1 and 11.6.2 and provides the nature of the contamination in SWMU 163 surface soils. Figures 11.6.2–11.6.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 163 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 163 consists of one EU.

<u>Metals</u>

Metals were detected above the industrial worker NALs in the SWMU 163 surface soil. Of those metals, only chromium was detected above both the background screening level and the industrial worker NAL. The detection was in grid 2, which is located on the border of SWMU 163, within the administrative boundary.

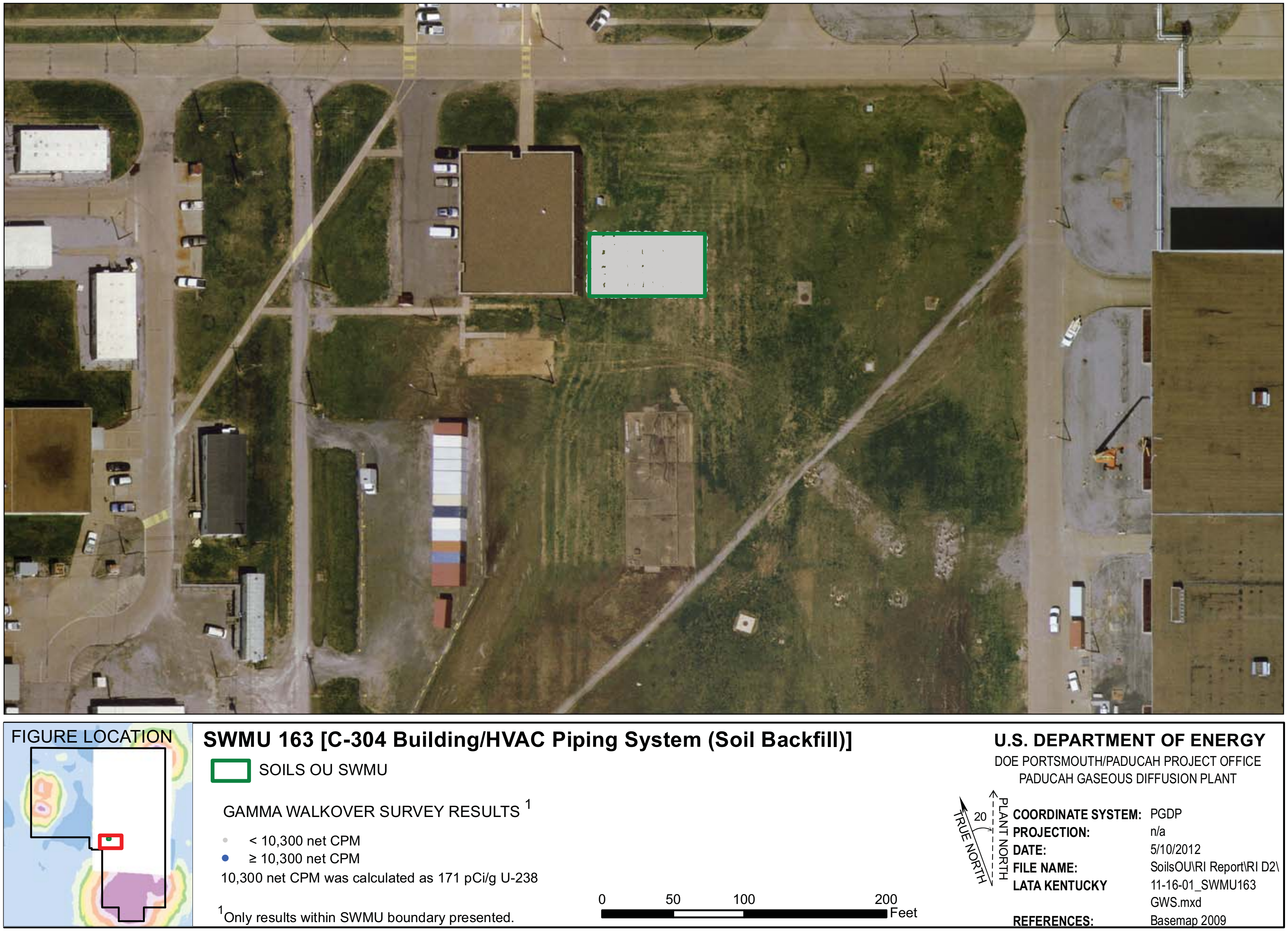


Figure 11.6.1. SWMU 163 Gamma Walkover Survey

Table 11.6.1. Surface Soil Historical Data Summary: SWMU 163 C-304 HVAC Piping System

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	4.65E+03	4.65E+03	4.65E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	20 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	0/1	20 - 20
METAL	Arsenic	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	1.20E+01	0/1	9.97E-01	0/1	9.97E+01	0/1	0/1	5 - 5
METAL	Barium	mg/kg	3.91E+01	3.91E+01	3.91E+01	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	0/1	1 - 1
METAL	Beryllium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	6.70E-01	0/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.5 - 0.5
METAL	Boron	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	7.14E+03	0/1	1.10E+06	0/1	0/1	100 - 100
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	2 - 2
METAL	Chromium	mg/kg	7.26E+00	7.26E+00	7.26E+00	0/1	1/1	0/1	1.60E+01	0/1	3.02E+01	0/1	3.02E+03	0/1	0/1	2 - 2
METAL	Cobalt	mg/kg	2.25E+00	2.25E+00	2.25E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	1 - 1
METAL	Copper	mg/kg	5.16E+00	5.16E+00	5.16E+00	0/1	1/1	0/1	1.90E+01	0/1	1.43E+03	0/1	2.24E+05	0/1	0/1	2 - 2
METAL	Iron	mg/kg	6.72E+03	6.72E+03	6.72E+03	0/1	1/1	0/1	2.80E+04	0/1	2.51E+04	0/1	3.92E+06	1/1	1/1	5 - 5
METAL	Lead	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	3.60E+01	0/1	4.00E+02	0/1	4.00E+02	0/1	0/1	20 - 20
METAL	Magnesium	mg/kg	1.70E+04	1.70E+04	1.70E+04	0/1	1/1	1/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	150 - 150
METAL	Manganese	mg/kg	1.63E+02	1.63E+02	1.63E+02	0/1	1/1	0/1	1.50E+03	0/1	2.58E+03	0/1	1.16E+05	1/1	1/1	1 - 1
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.00E-01	0/1	9.00E-01	0/1	7.85E+02	0/1	0/1	0.2 - 0.2
METAL	Nickel	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E+01	0/1	4.28E+01	0/1	3.18E+04	0/1	0/1	5 - 5
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	8.00E-01	0/1	1.79E+02	0/1	2.80E+04	0/1	0/1	5 - 5
METAL	Silver	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.30E+00	0/1	1.08E+01	0/1	9.15E+03	0/1	0/1	4 - 4
METAL	Sodium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	200 - 200
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	0/1	15 - 15
METAL	Vanadium	mg/kg	9.80E+00	9.80E+00	9.80E+00	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	2 - 2
METAL	Zinc	mg/kg	5.54E+01	5.54E+01	5.54E+01	0/1	1/1	0/1	6.50E+01	0/1	1.08E+04	0/1	1.68E+06	0/1	1/1	15 - 15
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.88E-01	0/1	1.88E+01	0/1	0/1	0.104 - 0.104
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.5
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.5
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	0.38 - 0.5
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.38 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Anthracene	mg/kg	1.16E-01	1.16E-01	1.16E-01	1/1	1/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.38 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	1.66E-01	1.66E-01	1.66E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.6.1. Surface Soil Historical Data Summary: SWMU 163 C-304 HVAC Piping System (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	1.70E-01	1.70E-01	1.70E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.5
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.75E+01	0/1	2.75E+03	n/a	n/a	0.38 - 0.5
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Diethyl phthalate	mg/kg	4.00E-01	4.00E-01	4.00E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Fluoranthene	mg/kg	3.10E-01	3.10E-01	3.10E-01	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.38 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.38 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.38 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.38 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.38 - 0.5
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.38 - 0.5
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.5
SVOA	Pyrene	mg/kg	2.95E-01	2.95E-01	2.95E-01	2/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.38 - 0.5
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.38 - 0.38
SVOA	Total PAH	mg/kg	2.85E-01	2.85E-01	2.85E-01	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	1/1	1/1	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.89E-02	0/1	5.53E+00	0/1	0/1	0.01 - 0.168
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.38E+02	0/1	8.21E+03	0/1	0/1	0.01 - 0.01
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.98E-01	0/1	8.22E+01	0/1	0/1	0.01 - 0.01
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.97E-01	0/1	5.76E+01	0/1	0/1	0.01 - 0.01
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.42E-01	0/1	2.49E+01	0/1	0/1	0.01 - 0.01
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.74E+00	0/1	1.93E+02	0/1	0/1	0.01 - 0.168
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.29E+00	0/1	3.84E+02	0/1	0/1	0.01 - 0.01
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.50E+01	0/1	1.07E+03	0/1	0/1	0.02 - 0.02
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.82E-01	0/1	7.08E+01	0/1	0/1	0.01 - 0.01
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.6.1. Surface Soil Historical Data Summary: SWMU 163 C-304 HVAC Piping System (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.07E+01	0/1	3.42E+02	0/1	0/1	0.01 - 0.168
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.69E-02	0/1	4.98E+00	0/1	0/1	0.01 - 0.168
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.04E-01	0/1	4.83E+01	0/1	0/1	0.01 - 0.168
RADS	Technetium-99	pCi/g	3.40E-01	3.40E-01	3.40E-01	0/1	1/1	0/1	2.50E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	0/1	5.13 - 5.13

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.6.2. Surface Soil RI Data Summary: SWMU 163 C-304 HVAC Piping System-Soil Backfill from C-611

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	8.66E+03	8.66E+03	8.66E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.4 - 5.4
METAL	Antimony	mg/kg	3.40E-01	3.40E-01	3.40E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.54 - 0.54
METAL	Arsenic	mg/kg	7.80E+00	9.48E+00	8.36E+00	0/3	2/3	0/3	1.20E+01	2/3	9.97E-01	0/3	9.97E+01	0/3	2/3	1.1 - 11
METAL	Barium	mg/kg	1.14E+02	1.14E+02	1.14E+02	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.2 - 2.2
METAL	Beryllium	mg/kg	4.60E-01	4.60E-01	4.60E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.11 - 0.11
METAL	Cadmium	mg/kg	1.00E-01	1.00E-01	1.00E-01	0/1	1/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.054 - 0.054
METAL	Calcium	mg/kg	1.56E+04	1.56E+04	1.56E+04	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	54 - 54
METAL	Chromium	mg/kg	3.36E+01	4.94E+01	4.41E+01	0/3	2/3	2/3	1.60E+01	2/3	3.02E+01	0/3	3.02E+03	0/3	0/3	1.1 - 85
METAL	Cobalt	mg/kg	7.30E+00	7.30E+00	7.30E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.22 - 0.22
METAL	Copper	mg/kg	1.36E+01	1.36E+01	1.36E+01	0/3	1/3	0/3	1.90E+01	0/3	1.43E+03	0/3	2.24E+05	0/3	0/3	1.1 - 35
METAL	Iron	mg/kg	1.58E+04	1.74E+04	1.70E+04	0/3	3/3	0/3	2.80E+04	0/3	2.51E+04	0/3	3.92E+06	3/3	3/3	5.4 - 100
METAL	Lead	mg/kg	1.28E+01	1.95E+01	1.51E+01	0/3	3/3	0/3	3.60E+01	0/3	4.00E+02	0/3	4.00E+02	0/3	2/3	0.32 - 13
METAL	Magnesium	mg/kg	2.02E+03	2.02E+03	2.02E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	54 - 54
METAL	Manganese	mg/kg	2.70E+02	3.53E+02	3.30E+02	0/3	3/3	0/3	1.50E+03	0/3	2.58E+03	0/3	1.16E+05	3/3	3/3	0.22 - 85
METAL	Mercury	mg/kg	2.86E-02	2.86E-02	2.86E-02	0/3	1/3	0/3	2.00E-01	0/3	9.00E-01	0/3	7.85E+02	0/3	0/3	0.036 - 10
METAL	Molybdenum	mg/kg	7.90E-01	7.90E-01	7.90E-01	0/3	1/3	0/3	n/a	0/3	1.79E+02	0/3	2.80E+04	0/3	1/3	0.54 - 15
METAL	Nickel	mg/kg	1.42E+01	1.42E+01	1.42E+01	0/3	1/3	0/3	2.10E+01	0/3	4.28E+01	0/3	3.18E+04	0/3	1/3	0.54 - 65
METAL	Selenium	mg/kg	1.30E+00	1.30E+00	1.30E+00	0/3	1/3	1/3	8.00E-01	0/3	1.79E+02	0/3	2.80E+04	0/3	1/3	0.54 - 20
METAL	Silver	mg/kg	3.10E-02	3.10E-02	3.10E-02	0/3	1/3	0/3	2.30E+00	0/3	1.08E+01	0/3	9.15E+03	0/3	0/3	0.22 - 10
METAL	Sodium	mg/kg	3.49E+01	3.49E+01	3.49E+01	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	21.6 - 21.6
METAL	Thallium	mg/kg	1.20E-01	1.20E-01	1.20E-01	0/1	1/1	0/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	0/1	0.22 - 0.22
METAL	Uranium	mg/kg	2.68E+00	2.71E+00	2.70E+00	0/4	2/4	0/4	4.90E+00	0/4	1.07E+02	0/4	1.65E+04	0/4	0/4	0.04 - 20
METAL	Vanadium	mg/kg	2.70E+01	2.70E+01	2.70E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	5.22E+01	6.07E+01	5.67E+01	0/3	3/3	0/3	6.50E+01	0/3	1.08E+04	0/3	1.68E+06	0/3	3/3	2.2 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.88E-01	0/3	1.88E+01	0/3	0/3	0.32 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.36 - 0.36
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.36 - 0.36
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.36 - 0.36
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.7 - 1.7
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.36 - 0.36
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.36 - 0.36
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.6.2. Surface Soil RI Data Summary: SWMU 163 C-304 HVAC Piping System-Soil Backfill from C-611 (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0071 - 0.0071
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.36 - 0.36
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Fluoranthene	mg/kg	4.30E-02	4.30E-02	4.30E-02	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.36 - 0.36
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.36 - 0.36
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.36 - 0.36
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.71 - 0.71
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.36 - 0.36
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0071 - 0.0071
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.7 - 1.7
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.7 - 1.7
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.36 - 0.36
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.71 - 0.71
SVOA	Total PAH	mg/kg	1.60E-02	1.60E-02	1.60E-02	0/1	1/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	2.13E+01	3.20E+01	2.67E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	4.1 - 4.2
RADS	Americium-241	pCi/g	4.00E-04	1.20E-03	8.00E-04	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.015 - 0.021
RADS	Beta activity	pCi/g	2.18E+01	2.28E+01	2.23E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.8 - 2.9
RADS	Cesium-137	pCi/g	-3.00E-02	8.90E-02	2.95E-02	0/2	2/2	0/2	4.90E-01	1/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.081 - 0.14
RADS	Neptunium-237	pCi/g	3.20E-03	6.00E-03	4.60E-03	0/2	2/2	0/2	1.00E-01	0/2	2.71E-01	0/2	2.71E+01	0/2	1/2	0.02 - 0.023
RADS	Plutonium-238	pCi/g	2.00E-03	3.70E-03	2.85E-03	0/2	2/2	0/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.015 - 0.022
RADS	Plutonium-239/240	pCi/g	7.70E-03	1.10E-02	9.35E-03	0/2	2/2	0/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.011 - 0.012
RADS	Technetium-99	pCi/g	-1.80E-01	4.10E-01	1.15E-01	0/2	2/2	0/2	2.50E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	1/2	0.48 - 0.59
RADS	Thorium-228	pCi/g	6.00E-01	9.30E-01	7.65E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.02 - 0.022
RADS	Thorium-230	pCi/g	8.90E-01	9.60E-01	9.25E-01	0/2	2/2	0/2	1.50E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.007 - 0.03
RADS	Thorium-232	pCi/g	7.20E-01	8.80E-01	8.00E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.007 - 0.02
RADS	Uranium-234	pCi/g	7.50E-01	8.20E-01	7.85E-01	0/2	2/2	0/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.02 - 0.03
RADS	Uranium-235/236	pCi/g	3.00E-02	6.10E-02	4.55E-02	0/2	2/2	1/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.008 - 0.026
RADS	Uranium-238	pCi/g	9.00E-01	9.00E-01	9.00E-01	0/2	2/2	0/2	1.20E+00	0/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.01 - 0.03

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

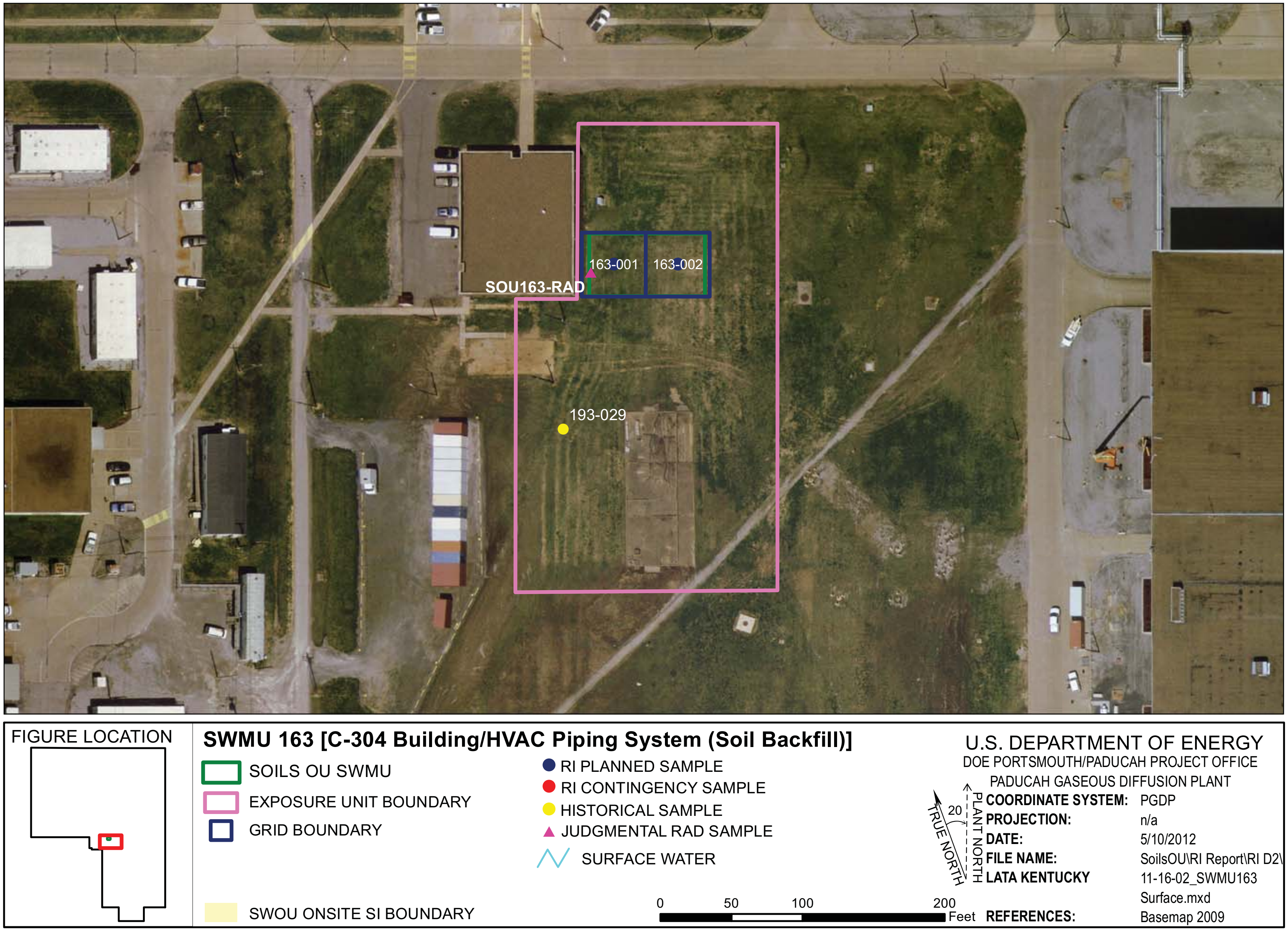


Figure 11.6.2. SWMU 163 Sample Locations - Surface Soil

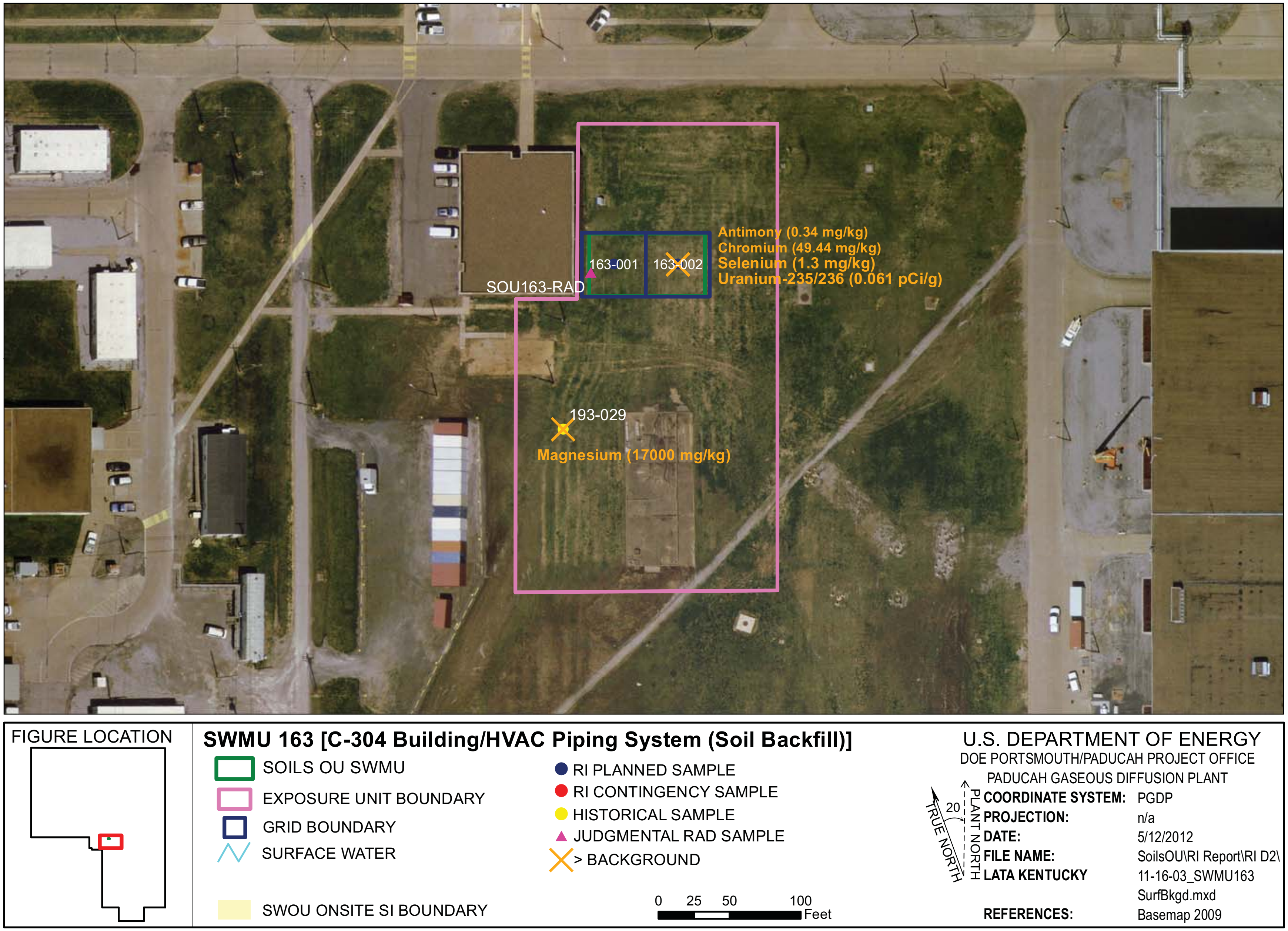


Figure 11.6.3. SWMU 163 Background Exceedances - Surface Soil

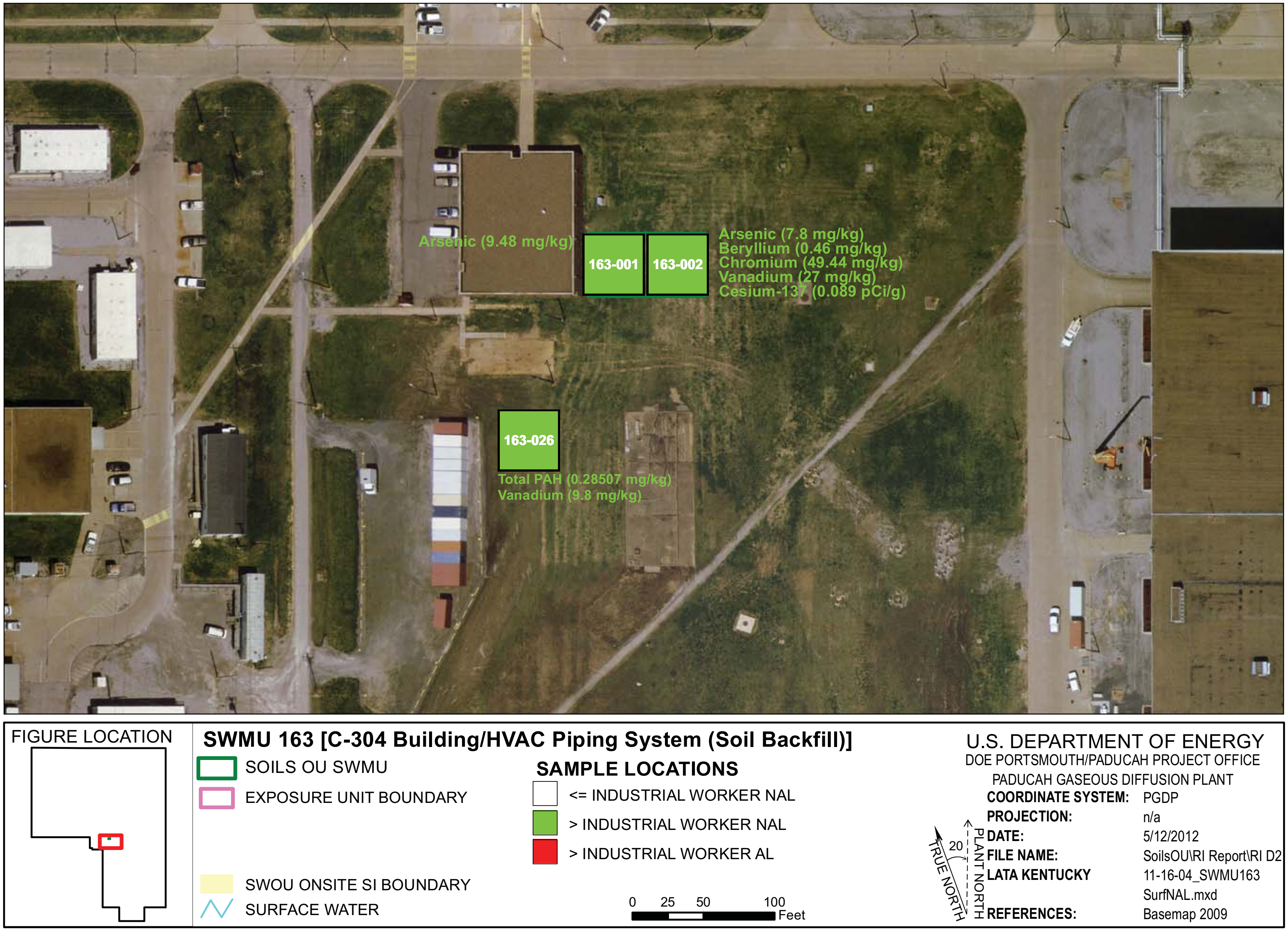


Figure 11.6.4. SWMU 163 NAL Exceedances - Surface Soil

No metals were detected above both the background screening levels and the industrial worker ALs in the SWMU 163 surface soil.

The following metals were detected in the SWMU 163 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater: antimony, molybdenum (no background available), and selenium in grid 2. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

No PCBs were detected in the SWMU 163 surface soil.

SVOCs

Total PAHs were detected in the SWMU 163 surface soil above the industrial worker NAL. The detection was in grid 26, which is outside the administrative boundary of SWMU 163.

No SVOCs were detected in the SWMU 163 surface soil above the industrial worker ALs.

Total PAHs were detected above the SSLs for the protection of UCRS groundwater in grids 2 and 26 and above the SSLs for the protection of RGA groundwater in grid 26.

VOCs

No VOCs were detected in SWMU 163 surface soil.

Radionuclides

No radionuclides were detected in the SWMU 163 surface soil above both the background screening levels and the industrial worker NALs or ALs.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

11.6.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 163, the representative data set for subsurface soils is presented in Tables 11.6.3 and 11.6.4 and provides the nature of contamination in SWMU 163 subsurface soils. Figures 11.6.5–11.6.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 163 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 163 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 163 subsurface soil. The following are the metals detected above both the background screening levels and the industrial worker NALs and the grids in which they were detected.

Table 11.6.3. Subsurface Soil Historical Data Summary: SWMU 163 C-304 HVAC Piping System

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	1.19E+04	1.19E+04	1.19E+04	0/1	1/1	0/1	1.20E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	20 - 20
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	0/1	20 - 20
METAL	Arsenic	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	7.90E+00	0/1	9.97E-01	0/1	9.97E+01	0/1	0/1	5 - 5
METAL	Barium	mg/kg	6.38E+01	6.38E+01	6.38E+01	0/1	1/1	0/1	1.70E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	0/1	1 - 1
METAL	Beryllium	mg/kg	5.50E-01	5.50E-01	5.50E-01	0/1	1/1	0/1	6.90E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.5 - 0.5
METAL	Boron	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	7.14E+03	0/1	1.10E+06	0/1	0/1	100 - 100
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	2 - 2
METAL	Chromium	mg/kg	2.77E+01	2.77E+01	2.77E+01	0/1	1/1	0/1	4.30E+01	0/1	3.02E+01	0/1	3.02E+03	0/1	0/1	2 - 2
METAL	Cobalt	mg/kg	3.44E+00	3.44E+00	3.44E+00	0/1	1/1	0/1	1.30E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	1 - 1
METAL	Copper	mg/kg	4.95E+00	4.95E+00	4.95E+00	0/1	1/1	0/1	2.50E+01	0/1	1.43E+03	0/1	2.24E+05	0/1	0/1	2 - 2
METAL	Iron	mg/kg	1.42E+04	1.42E+04	1.42E+04	0/1	1/1	0/1	2.80E+04	0/1	2.51E+04	0/1	3.92E+06	1/1	1/1	5 - 5
METAL	Lead	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.30E+01	0/1	4.00E+02	0/1	4.00E+02	0/1	0/1	20 - 20
METAL	Magnesium	mg/kg	1.29E+03	1.29E+03	1.29E+03	0/1	1/1	0/1	2.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	15 - 15
METAL	Manganese	mg/kg	1.50E+02	1.50E+02	1.50E+02	0/1	1/1	0/1	8.20E+02	0/1	2.58E+03	0/1	1.16E+05	1/1	1/1	1 - 1
METAL	Mercury	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	1.30E-01	0/1	9.00E-01	0/1	7.85E+02	0/1	0/1	0.2 - 0.2
METAL	Nickel	mg/kg	5.50E+00	5.50E+00	5.50E+00	0/1	1/1	0/1	2.20E+01	0/1	4.28E+01	0/1	3.18E+04	0/1	1/1	5 - 5
METAL	Selenium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	7.00E-01	0/1	1.79E+02	0/1	2.80E+04	0/1	0/1	5 - 5
METAL	Silver	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.70E+00	0/1	1.08E+01	0/1	9.15E+03	0/1	0/1	4 - 4
METAL	Sodium	mg/kg	2.39E+02	2.39E+02	2.39E+02	0/1	1/1	0/1	3.40E+02	0/1	n/a	0/1	n/a	n/a	n/a	200 - 200
METAL	Thallium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	3.40E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	0/1	15 - 15
METAL	Vanadium	mg/kg	2.70E+01	2.70E+01	2.70E+01	0/1	1/1	0/1	3.70E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	2 - 2
METAL	Zinc	mg/kg	2.21E+01	2.21E+01	2.21E+01	0/1	1/1	0/1	6.00E+01	0/1	1.08E+04	0/1	1.68E+06	0/1	1/1	15 - 15
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.88E-01	0/1	1.88E+01	0/1	0/1	0.116 - 0.116
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.5 - 0.5
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.5 - 0.5
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.5 - 0.5
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	0.5 - 0.5
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.5 - 0.5
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.5 - 0.5
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5

FOD = frequency of detection

FOE = frequency of exceedance

n/a = not applicable

* For RADS, all results are reported.

Table 11.6.3. Subsurface Soil Historical Data Summary: SWMU 163 C-304 HVAC Piping System (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.5 - 0.5
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Carbazole	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.75E+01	0/1	2.75E+03	n/a	n/a	0.5 - 0.5
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.5 - 0.5
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.5 - 0.5
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.5 - 0.5
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.5 - 0.5
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.5 - 0.5
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.5 - 0.5
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.5 - 0.5
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.5 - 0.5
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	0/1	-
VOA	1,1,1-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	1,1,2,2-Tetrachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1,2-Trichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	1,1-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	1,1-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.89E-02	0/1	5.53E+00	0/1	0/1	0.01 - 0.308
VOA	1,2-Dichloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	1,2-Dichloropropane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	1,2-Dimethylbenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.38E+02	0/1	8.21E+03	0/1	0/1	0.01 - 0.01
VOA	2-Hexanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	4-Methyl-2-pentanone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Benzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.98E-01	0/1	8.22E+01	0/1	0/1	0.01 - 0.01
VOA	Bromodichloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromoform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Bromomethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon disulfide	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Carbon tetrachloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.97E-01	0/1	5.76E+01	0/1	0/1	0.01 - 0.01
VOA	Chlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	Chloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Chloroform	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.42E-01	0/1	2.49E+01	0/1	0/1	0.01 - 0.01
VOA	Chloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	cis-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.74E+00	0/1	1.93E+02	0/1	0/1	0.01 - 0.5
VOA	cis-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Dibromochloromethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	Ethylbenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.29E+00	0/1	3.84E+02	0/1	0/1	0.01 - 0.01
VOA	m,p-Xylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	3.50E+01	0/1	1.07E+03	0/1	0/1	0.02 - 0.02
VOA	Methylene chloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	Styrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	Tetrachloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.82E-01	0/1	7.08E+01	0/1	0/1	0.01 - 0.01
VOA	Toluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.01 - 0.01
VOA	trans-1,2-Dichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.07E+01	0/1	3.42E+02	0/1	0/1	0.01 - 0.5

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.6.3. Subsurface Soil Historical Data Summary: SWMU 163 C-304 HVAC Piping System (Continued)

Type	Analysis	Unit	Detected Results* Min	Max	Avg	J-qualified FOD	FOD	Provisional Background FOE	Bkgd	Industrial Worker FOE	NAL	Industrial Worker FOE	AL	GW Protection Screen RGA	UCRS	DL Range
VOA	trans-1,3-Dichloropropene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
VOA	Trichloroethene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.69E-02	0/1	4.98E+00	0/1	0/1	0.005 - 0.308
VOA	Vinyl chloride	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.04E-01	0/1	4.83E+01	0/1	0/1	0.01 - 100
RADS	Technetium-99	pCi/g	1.37E+00	1.37E+00	1.37E+00	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	1/1	5.13 - 5.13

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.6.4. Subsurface Soil RI Data Summary: SWMU 163 C-304 HVAC Piping System-Soil Backfill from C-611

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	8.60E+03	9.26E+03	8.93E+03	0/2	2/2	0/2	1.20E+04	0/2	3.32E+04	0/2	3.97E+06	0/2	2/2	5.9 - 6.1
METAL	Antimony	mg/kg	2.20E-01	2.50E-01	2.35E-01	0/2	2/2	2/2	2.10E-01	0/2	2.53E+00	0/2	1.51E+03	0/2	0/2	0.59 - 0.61
METAL	Arsenic	mg/kg	5.78E+00	1.10E+01	7.89E+00	0/25	11/25	2/25	7.90E+00	11/25	9.97E-01	0/25	9.97E+01	0/25	11/25	1.2 - 11
METAL	Barium	mg/kg	1.18E+02	1.29E+02	1.24E+02	0/2	2/2	0/2	1.70E+02	0/2	5.92E+02	0/2	3.78E+05	0/2	2/2	2.4 - 2.4
METAL	Beryllium	mg/kg	5.80E-01	6.70E-01	6.25E-01	0/2	2/2	0/2	6.90E-01	2/2	1.40E-02	0/2	9.22E+00	0/2	0/2	0.12 - 0.12
METAL	Cadmium	mg/kg	4.60E-02	6.90E-02	5.75E-02	0/2	2/2	0/2	2.10E-01	0/2	3.16E+00	0/2	3.16E+02	0/2	0/2	0.059 - 0.061
METAL	Calcium	mg/kg	3.74E+03	4.10E+03	3.92E+03	0/2	2/2	0/2	6.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	59.2 - 60.8
METAL	Chromium	mg/kg	1.59E+01	5.89E+01	4.19E+01	0/25	15/25	6/25	4.30E+01	14/25	3.02E+01	0/25	3.02E+03	0/25	0/25	1.2 - 85
METAL	Cobalt	mg/kg	8.80E+00	1.17E+01	1.03E+01	0/2	2/2	0/2	1.30E+01	1/2	1.05E+01	0/2	1.52E+03	2/2	2/2	0.24 - 0.24
METAL	Copper	mg/kg	9.90E+00	2.02E+01	1.44E+01	0/25	3/25	0/25	2.50E+01	0/25	1.43E+03	0/25	2.24E+05	0/25	0/25	1.2 - 35
METAL	Iron	mg/kg	7.48E+03	2.28E+04	1.40E+04	0/25	25/25	0/25	2.80E+04	0/25	2.51E+04	0/25	3.92E+06	25/25	25/25	5.9 - 100
METAL	Lead	mg/kg	6.47E+00	1.63E+01	1.02E+01	0/25	22/25	0/25	2.30E+01	0/25	4.00E+02	0/25	4.00E+02	0/25	2/25	0.36 - 13
METAL	Magnesium	mg/kg	1.57E+03	2.33E+03	1.95E+03	0/2	2/2	1/2	2.10E+03	0/2	n/a	0/2	n/a	n/a	n/a	59.2 - 60.8
METAL	Manganese	mg/kg	6.21E+01	6.62E+02	2.87E+02	0/25	25/25	0/25	8.20E+02	0/25	2.58E+03	0/25	1.16E+05	24/25	25/25	0.24 - 85
METAL	Mercury	mg/kg	1.48E-02	7.53E+00	2.52E+00	0/25	2/25	1/25	1.30E-01	1/25	9.00E-01	0/25	7.85E+02	1/25	1/25	0.0395 - 10
METAL	Molybdenum	mg/kg	1.40E+00	1.60E+00	1.50E+00	0/25	2/25	0/25	n/a	0/25	1.79E+02	0/25	2.80E+04	0/25	2/25	0.59 - 15
METAL	Nickel	mg/kg	1.82E+01	7.81E+01	5.98E+01	0/25	8/25	7/25	2.20E+01	7/25	4.28E+01	0/25	3.18E+04	0/25	8/25	0.59 - 65
METAL	Selenium	mg/kg	1.80E+00	2.00E+00	1.90E+00	0/25	2/25	2/25	7.00E-01	0/25	1.79E+02	0/25	2.80E+04	0/25	2/25	0.59 - 20
METAL	Silver	mg/kg	2.50E-02	1.05E+01	2.13E+00	0/25	3/25	1/25	2.70E+00	0/25	1.08E+01	0/25	9.15E+03	1/25	1/25	0.24 - 10
METAL	Sodium	mg/kg	1.59E+02	1.62E+02	1.61E+02	0/2	2/2	0/2	3.40E+02	0/2	n/a	0/2	n/a	n/a	n/a	23.7 - 24.3
METAL	Thallium	mg/kg	2.00E-01	3.50E-01	2.75E-01	0/2	2/2	1/2	3.40E-01	0/2	2.87E+00	0/2	4.48E+02	0/2	2/2	0.24 - 0.24
METAL	Uranium	mg/kg	1.81E+00	2.75E+00	2.30E+00	0/25	3/25	0/25	4.60E+00	0/25	1.07E+02	0/25	1.65E+04	0/25	0/25	0.05 - 20
METAL	Vanadium	mg/kg	3.45E+01	3.75E+01	3.60E+01	0/2	2/2	1/2	3.70E+01	2/2	1.51E-01	0/2	9.30E+01	2/2	2/2	1.2 - 1.2
METAL	Zinc	mg/kg	1.32E+01	4.50E+01	3.21E+01	0/25	25/25	0/25	6.00E+01	0/25	1.08E+04	0/25	1.68E+06	0/25	22/25	2.4 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/13	0/13	0/13	n/a	0/13	1.88E-01	0/13	1.88E+01	0/13	0/13	0.36 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.39 - 0.41
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.39 - 0.41
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.39 - 0.41
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.9 - 2
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.9 - 2
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.30E+00	0/3	3.91E+01	0/3	0/3	1.9 - 2
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.9 - 2
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.9 - 2
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.9 - 2
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	6.02E+02	0/3	1.81E+04	0/3	0/3	0.39 - 0.41
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.05E+03	0/3	1.22E+05	0/3	0/3	0.39 - 0.41
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.6.4. Subsurface Soil RI Data Summary: SWMU 163 C-304 HVAC Piping System-Soil Backfill from C-611 (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.9 - 2
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.0078 - 0.0083
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	0.39 - 0.41
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	6.01E+02	0/3	1.80E+04	0/3	0/3	0.39 - 0.41
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.87E+02	0/3	1.46E+04	0/3	0/3	0.39 - 0.41
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.17E-01	0/3	1.17E+01	0/3	0/3	0.39 - 0.41
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.9 - 2
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.78 - 0.83
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	2.24E+00	0/3	2.24E+02	0/3	0/3	0.39 - 0.41
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.9 - 2
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	5.22E-02	0/3	5.22E+00	0/3	0/3	0.0078 - 0.0083
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	0/3	0/3	1.9 - 2
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.39 - 0.41
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	1.9 - 2
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	4.49E+02	0/3	1.35E+04	0/3	0/3	0.39 - 0.41
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	0.78 - 0.83
SVOA	Total PAH	mg/kg	5.20E-03	5.20E-03	5.20E-03	0/3	1/3	0/3	n/a	0/3	5.92E-02	0/3	5.92E+00	0/3	1/3	-
RADS	Alpha activity	pCi/g	2.19E+01	2.66E+01	2.36E+01	0/3	3/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	5.4 - 6
RADS	Americium-241	pCi/g	-7.00E-04	1.50E-02	6.77E-03	0/3	3/3	0/3	n/a	0/3	5.01E+00	0/3	5.01E+02	0/3	0/3	0.019 - 0.037
RADS	Beta activity	pCi/g	1.80E+01	2.73E+01	2.22E+01	0/3	3/3	0/3	n/a	0/3	n/a	0/3	n/a	n/a	n/a	2.7 - 3.2
RADS	Cesium-137	pCi/g	-2.00E-04	1.29E-01	4.29E-02	0/3	3/3	0/3	2.80E-01	1/3	8.61E-02	0/3	8.61E+00	0/3	0/3	0.087 - 0.17
RADS	Neptunium-237	pCi/g	-1.00E-03	4.10E-03	1.03E-03	0/3	3/3	0/3	n/a	0/3	2.71E-01	0/3	2.71E+01	0/3	0/3	0.011 - 0.019
RADS	Plutonium-238	pCi/g	5.00E-03	1.90E-02	1.00E-02	0/3	3/3	0/3	n/a	0/3	1.09E+01	0/3	1.09E+03	0/3	0/3	0.026 - 0.029
RADS	Plutonium-239/240	pCi/g	-1.10E-03	1.00E-02	4.47E-03	0/3	3/3	0/3	n/a	0/3	1.07E+01	0/3	1.07E+03	0/3	0/3	0.0061 - 0.029
RADS	Technetium-99	pCi/g	2.00E-02	1.40E-01	7.67E-02	0/3	3/3	0/3	2.80E+00	0/3	3.61E+02	0/3	3.61E+04	0/3	0/3	0.39 - 0.44
RADS	Thorium-228	pCi/g	8.40E-01	1.05E+00	9.37E-01	0/3	3/3	0/3	1.60E+00	0/3	n/a	0/3	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	8.50E-01	1.13E+00	9.67E-01	0/3	3/3	0/3	1.40E+00	0/3	1.38E+01	0/3	1.38E+03	0/3	3/3	0.007 - 0.02
RADS	Thorium-232	pCi/g	8.80E-01	1.04E+00	9.47E-01	0/3	3/3	0/3	1.50E+00	0/3	n/a	0/3	n/a	n/a	n/a	0.006 - 0.007
RADS	Uranium-234	pCi/g	5.83E-01	7.40E-01	6.88E-01	0/3	3/3	0/3	1.20E+00	0/3	1.89E+01	0/3	1.89E+03	0/3	0/3	0.01 - 0.02
RADS	Uranium-235/236	pCi/g	2.20E-02	4.00E-02	3.17E-02	0/3	3/3	0/3	6.00E-02	0/3	3.95E-01	0/3	3.95E+01	0/3	0/3	0.008 - 0.016
RADS	Uranium-238	pCi/g	6.02E-01	9.20E-01	7.84E-01	0/3	3/3	0/3	1.20E+00	0/3	1.70E+00	0/3	1.70E+02	0/3	0/3	0.018 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

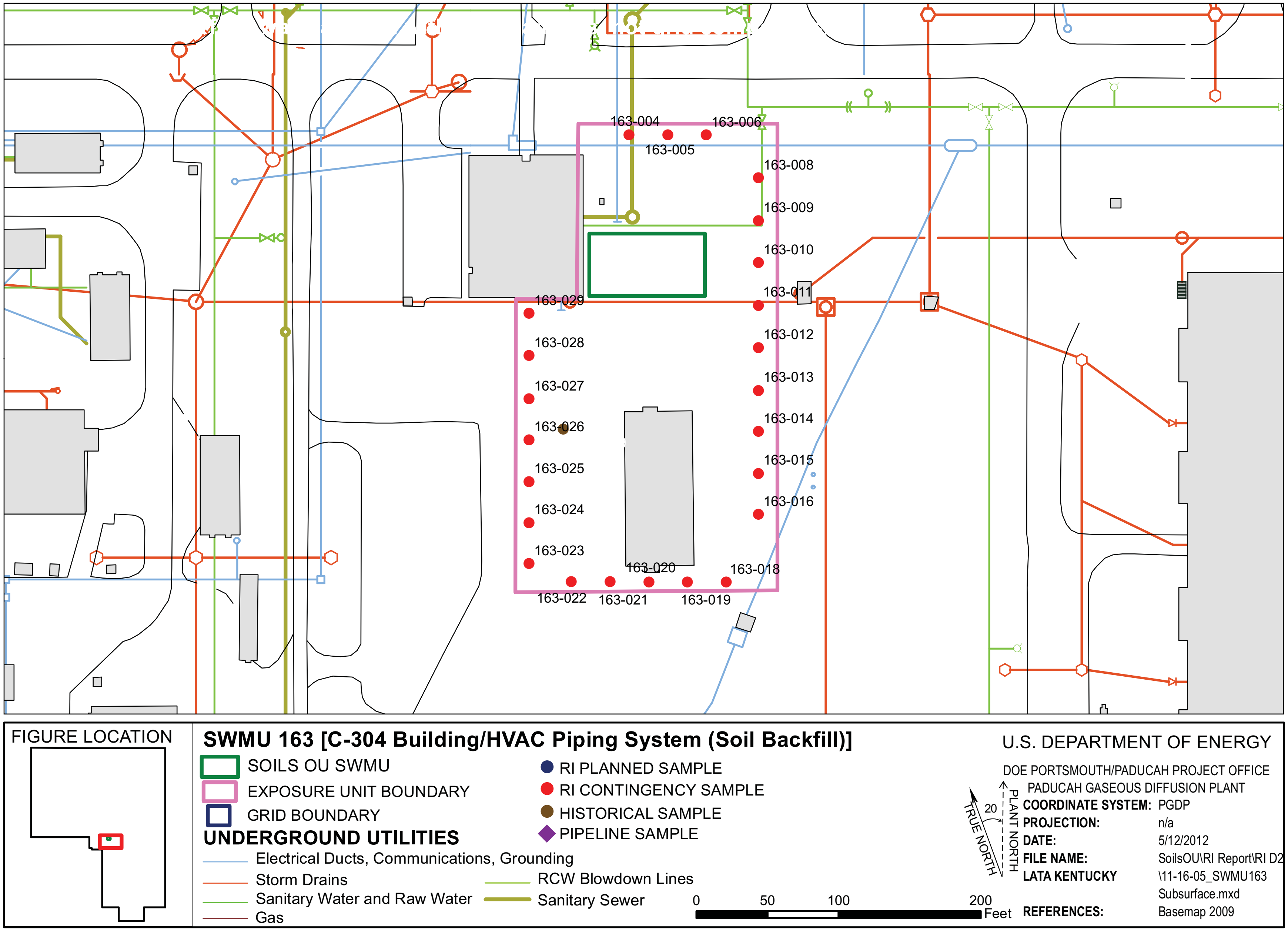


Figure 11.6.5. SWMU 163 Sample Locations - Subsurface Soil

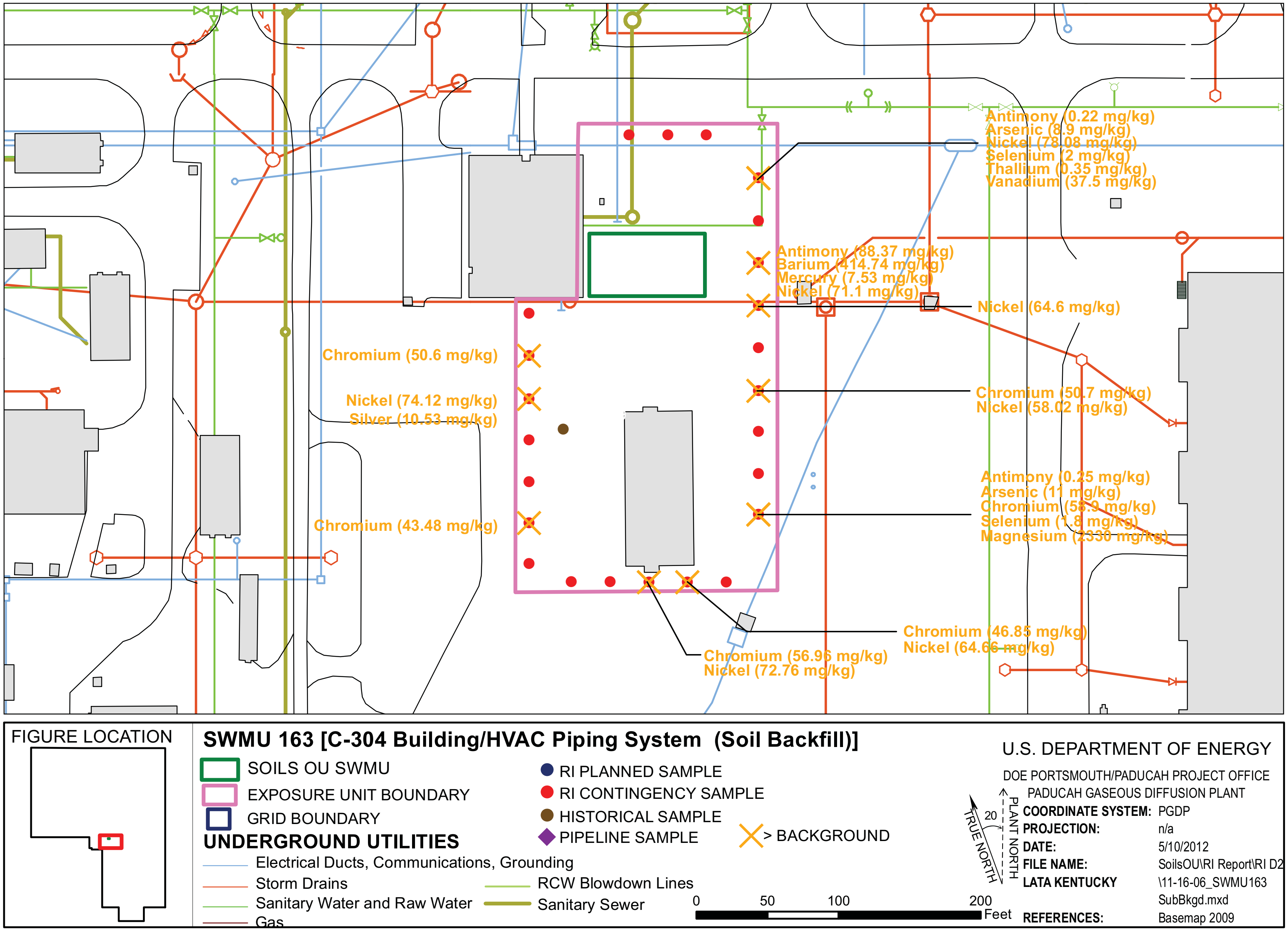


Figure 11.6.6. SWMU 163 Background Exceedances - Subsurface Soil

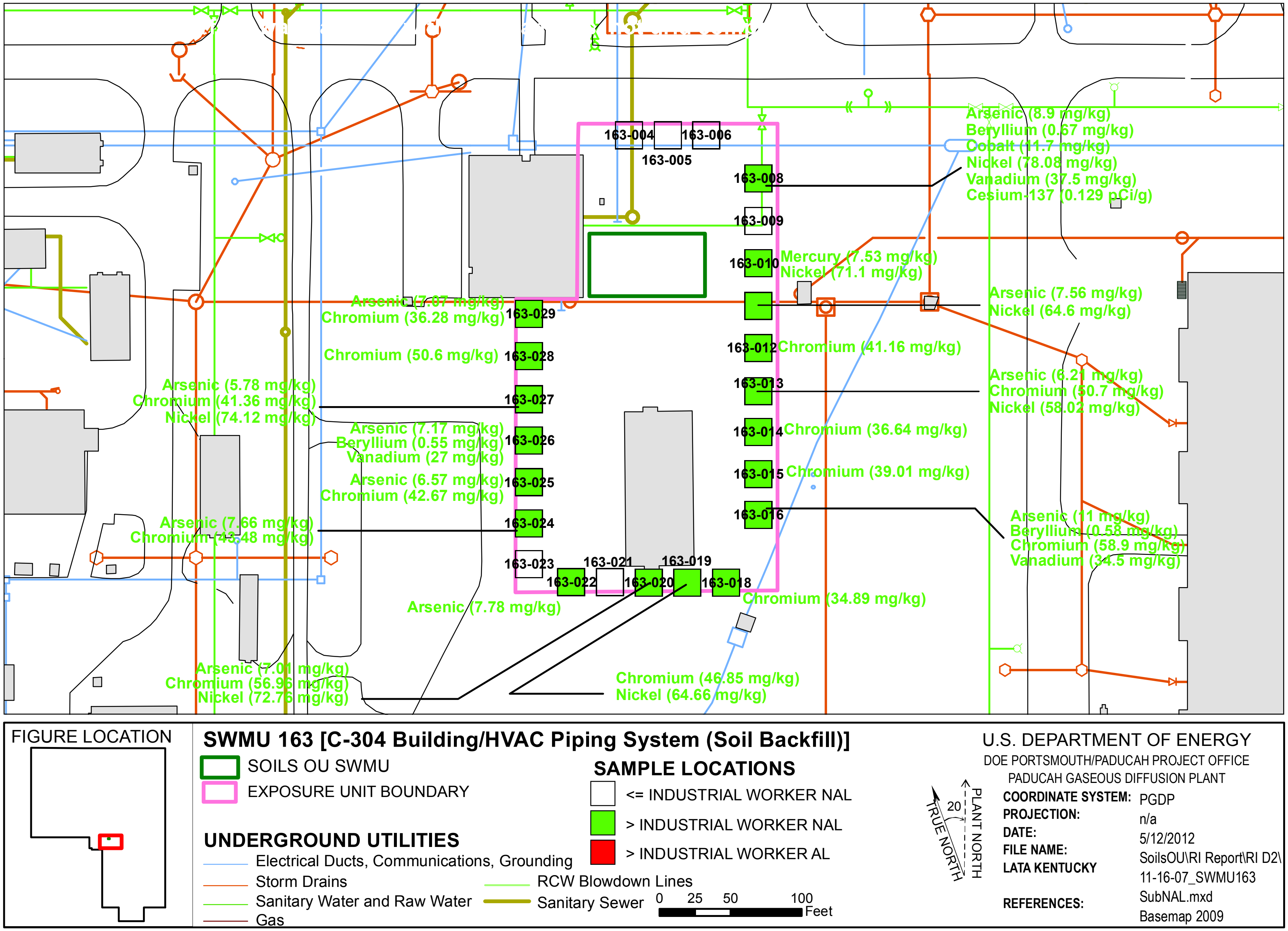


Figure 11.6.7. SWMU 163 NAL Exceedances - Subsurface Soil

Metal	Grab Sample Locations
Arsenic	8, 16
Chromium	13, 16, 19, 20, 24, 28
Mercury	10
Nickel	8, 10, 11, 13, 19, 20, 27
Vanadium	8

* SWMU 163 consists of one EU.

These grab samples were collected around the perimeter of the SWMU 163 geothermal system and are located outside the SWMU administrative boundary.

The maximum depth at which metals were detected above both the background screening levels and the industrial worker NALs was 7 ft bgs, which also was the maximum sampling depth at the locations listed above.

No metals were detected in the SWMU 163 subsurface soil above both the background screening levels and the industrial worker ALs.

The following are the metals detected above both the background screening levels and the SSLs for the protection of UCRS groundwater and the grids in which they were detected.

Metal	Grid
Arsenic	8, 16
Mercury	10
Molybdenum[1]	8, 16
Nickel	8, 10, 11, 13, 19, 20, 27
Selenium	8, 16
Silver	27
Thallium	8
Vanadium	8

* SWMU 163 consists of one EU.
[1] No background value is available.

Mercury in grid 10, silver in grid 27, and vanadium in grid 8 were detected above both the background screening level and the SSLs for the protection of RGA groundwater.

PCBs

No PCBs were detected in the SWMU 163 subsurface soil.

SVOCs

No SVOCs were detected in the SWMU 163 subsurface soil above the industrial worker NALs, industrial worker ALs, or the SSLs for the protection of RGA groundwater. Total PAHs in grid 20 were detected above the SSLs for the protection of UCRS groundwater.

VOCs

No VOCs were detected in SWMU 163 subsurface soils.

Radionuclides

No radionuclides were detected in the SWMU 163 subsurface soil above both the background screening levels and the industrial worker NALs or ALs.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

11.6.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no direct connection to surface water. There is no concern for potential significant runoff due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

11.6.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 163 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 163 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 11.6.5 for the future industrial worker and the hypothetical resident. The excavation worker did not have any identified COCs. Table 11.6.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COC for these SWMUs under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 163 include metals. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 11.6.6.

11.6.7 SWMU 163 Summary

The following text summarizes the results for SWMU 163 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

A plant process that could have contributed to contamination at this SWMU is placement of contaminated soils for fill at a building construction site.

Table 11.6.5. RGOs for SWMU 163

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1×10^{-6}	1×10^{-5}	1×10^{-4}		0.1	1	3
Future Industrial Worker											
1	Chromium	4.94E+01	mg/kg	1.6E-06	3.02E+01	3.02E+02	3.02E+03	< 1	n/a	n/a	n/a
	Total PAH	1.63E-01	mg/kg	2.8E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Cumulative			**4.4E-06**				**< 1**			
Hypothetical Resident[5]											
1	Chromium	4.94E+01	mg/kg	3.2E-06	1.55E+01	1.55E+02	1.55E+03	< 1	n/a	n/a	n/a
	Total PAH	1.63E-01	mg/kg	8.4E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Cumulative			**1.2E-05**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.96, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.96, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 11.6.6 Ecological Screening for SWMU 163

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
soil/grass mix	No	66	Antimony	2.10E-01	1.00E+01	2.70E-01	37
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

COPCs for surface and subsurface soils from SWMU 163 are shown on Tables 11.6.1–11.6.4 as those analytes with green boxes under the "Industrial Worker/FOE" columns for surface and shallow subsurface soil, and those with blue boxes under the "GW Protection Screen/RGA/UCRS" columns for groundwater. Contaminants were detected greater than background to a maximum depth of 7 ft bgs and greater than industrial worker NALs to a maximum depth of 13 ft bgs. A complete list of sampling results is provided in Appendix G. COPCs identified for SWMU 163 are metals and SVOCs for surface and subsurface soil.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 163 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-6 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. COCs for these scenarios for SWMU 163 are as follows:

- Future Industrial Worker
    - Chromium
    - Total PAHs
- Excavation worker
    - None
- Hypothetical Resident (hazards evaluated against the child resident)
    - Chromium
    - Total PAHs

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 163.

For SWMU 163, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ ≥ 10) are the following:

- Antimony
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 163 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit are, as discussed in the Work Plan, posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 163 is not near any other SWMUs. It is adjacent to C-304, the Train and Cascade Office Building, an office building in use by USEC. The contaminant source, soil from the C-611-V Sludge Lagoon is at 4–13 ft bgs. A response action at this depth could have an impact on the adjacent office building. A response action at SWMU 163 would not have an impact on integrator OUs.

11.6.8 SWMU 163 Conclusions

The RI adequately defined the nature and extent of contamination in soils at SWMU 163; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated future use for this SWMU is industrial, as shown in the SMP (DOE 2012b).

11.7 SWMU 219, C-728 OS-08

11.7.1 Background

SWMU 219 includes the former location of DMSA OS-08, and is located east of C-728 in the central portion of the plant site. SWMU 219 is an empty 4,722 ft^3 fiberglass tank that was used to store PCB-contaminated water prior to treatment, as appropriate, and disposal.

PCB spill documentation records indicate that this tank was used to store PCB-contaminated rainwater that had collected in a pit in the C-537 Switchyard. Two transformer spills in 1989 resulted in rainwater collecting in the C-537 pit that would have been subject to TSCA rules. This rainwater would have been transferred to SWMU 219. The SWMU 219 tank was documented as leaking inside the present location, a diked area covered with Hypalon®, in November 1991. The water from the diked area was sampled with results of PCBs at < 0.1 mg/L. The tank was drained and cleaned according to TSCA requirements. Additionally, personnel recall that this tank may have been used to clean up an RCW spill in C-333. The spill would have been subject to TSCA regulations because it came into contact with PCB troughs and gaskets.

11.7.2 Fieldwork Summary

Two grid samples were planned and collected for the unit.

The SWMU underwent a gamma radiological walkover survey (Figure 11.7.1) using a FIDLER; the 380 measurements ranged from 4,004 to 10,561 gross cpm. The area consists of concrete with soil and grass along the east and south perimeters of the SWMU. A judgmental grab sample was collected for radiological constituents, although gamma walkover survey results were consistent with background.

11.7.3 Nature and Extent of Contamination—Surface Soils

For SWMU 219, the representative data set for surface soils is presented in Table 11.7.1 and provides the nature of the contamination in SWMU 219 surface soils. Figures 11.7.2–11.7.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

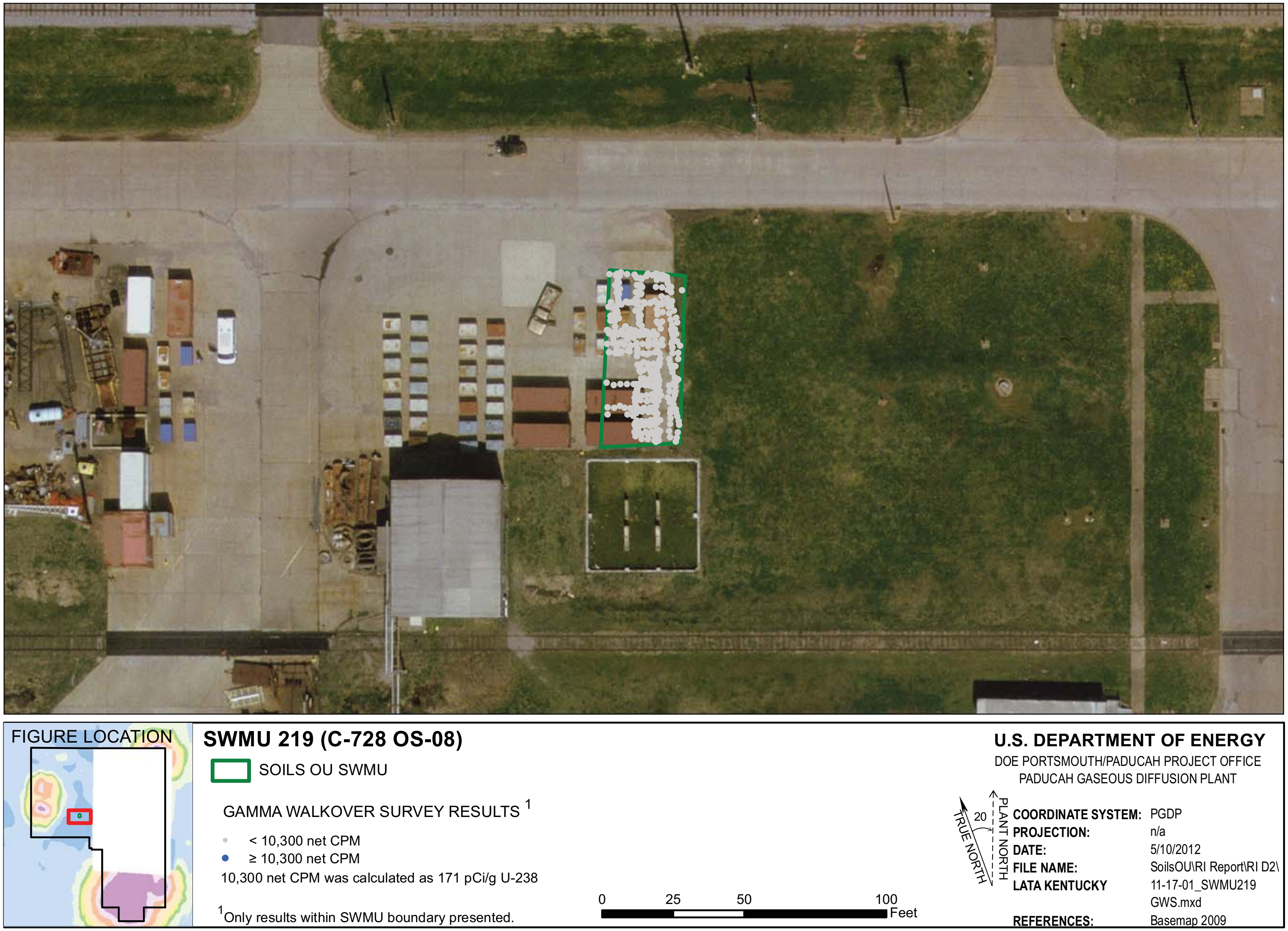


Figure 11.7.1. SWMU 219 Gamma Walkover Survey

Table 11.7.1. Surface Soil RI Data Summary: SWMU 219 DMSA OS-08

Type	Analysis	Unit	Detected Results* Min	Detected Results* Max	Detected Results* Avg	J-qualified FOD	FOD	Provisional Background FOE	Provisional Background Bkgd	Industrial Worker FOE	Industrial Worker NAL	Industrial Worker FOE	Industrial Worker AL	GW Protection Screen RGA	GW Protection Screen UCRS	DL Range
METAL	Aluminum	mg/kg	5.48E+03	5.48E+03	5.48E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.5 - 5.5
METAL	Antimony	mg/kg	3.80E-01	3.80E-01	3.80E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.55 - 0.55
METAL	Arsenic	mg/kg	3.40E+00	3.40E+00	3.40E+00	0/1	1/1	0/1	1.20E+01	1/1	9.97E-01	0/1	9.97E+01	0/1	1/1	1.1 - 11
METAL	Barium	mg/kg	8.70E+01	8.70E+01	8.70E+01	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.2 - 2.2
METAL	Beryllium	mg/kg	2.80E-01	2.80E-01	2.80E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.11 - 0.11
METAL	Cadmium	mg/kg	2.40E-01	2.40E-01	2.40E-01	0/1	1/1	1/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.055 - 0.055
METAL	Calcium	mg/kg	7.91E+04	7.91E+04	7.91E+04	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	275 - 275
METAL	Chromium	mg/kg	1.08E+01	1.08E+01	1.08E+01	0/1	1/1	0/1	1.60E+01	0/1	3.02E+01	0/1	3.02E+03	0/1	0/1	1.1 - 85
METAL	Cobalt	mg/kg	3.70E+00	3.70E+00	3.70E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.22 - 0.22
METAL	Copper	mg/kg	1.24E+01	1.24E+01	1.24E+01	0/1	1/1	0/1	1.90E+01	0/1	1.43E+03	0/1	2.24E+05	0/1	0/1	1.1 - 35
METAL	Iron	mg/kg	8.78E+03	8.78E+03	8.78E+03	0/1	1/1	0/1	2.80E+04	0/1	2.51E+04	0/1	3.92E+06	1/1	1/1	5.5 - 100
METAL	Lead	mg/kg	1.62E+01	1.62E+01	1.62E+01	0/1	1/1	0/1	3.60E+01	0/1	4.00E+02	0/1	4.00E+02	0/1	1/1	0.33 - 13
METAL	Magnesium	mg/kg	2.63E+03	2.63E+03	2.63E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	55 - 55
METAL	Manganese	mg/kg	2.12E+02	2.12E+02	2.12E+02	0/1	1/1	0/1	1.50E+03	0/1	2.58E+03	0/1	1.16E+05	1/1	1/1	0.22 - 85
METAL	Mercury	mg/kg	2.59E-02	2.59E-02	2.59E-02	0/1	1/1	0/1	2.00E-01	0/1	9.00E-01	0/1	7.85E+02	0/1	0/1	0.0367 - 10
METAL	Molybdenum	mg/kg	3.40E-01	3.40E-01	3.40E-01	0/1	1/1	0/1	n/a	0/1	1.79E+02	0/1	2.80E+04	0/1	1/1	0.55 - 15
METAL	Nickel	mg/kg	6.71E+01	6.71E+01	6.71E+01	0/1	1/1	1/1	2.10E+01	1/1	4.28E+01	0/1	3.18E+04	0/1	1/1	0.55 - 65
METAL	Selenium	mg/kg	1.10E+00	1.10E+00	1.10E+00	0/1	1/1	1/1	8.00E-01	0/1	1.79E+02	0/1	2.80E+04	0/1	1/1	0.55 - 20
METAL	Silver	mg/kg	5.60E-02	5.60E-02	5.60E-02	0/1	1/1	0/1	2.30E+00	0/1	1.08E+01	0/1	9.15E+03	0/1	1/1	0.22 - 10
METAL	Sodium	mg/kg	8.64E+01	8.64E+01	8.64E+01	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	22 - 22
METAL	Thallium	mg/kg	1.30E-01	1.30E-01	1.30E-01	0/1	1/1	0/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	0/1	0.22 - 0.22
METAL	Uranium	mg/kg	5.75E+00	1.32E+01	7.61E+00	0/2	2/2	2/2	4.90E+00	0/2	1.07E+02	0/2	1.65E+04	0/2	0/2	0.04 - 20
METAL	Vanadium	mg/kg	1.52E+01	1.52E+01	1.52E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	4.90E+01	4.90E+01	4.90E+01	0/1	1/1	0/1	6.50E+01	0/1	1.08E+04	0/1	1.68E+06	0/1	1/1	2.2 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.88E-01	0/1	1.88E+01	0/1	0/1	0.33 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.36 - 0.36
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.36 - 0.36
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.36 - 0.36
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.8 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.36 - 0.36
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.36 - 0.36
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.7.1. Surface Soil RI Data Summary: SWMU 219 DMSA OS-08 (Continued)

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0073 - 0.0073
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.36 - 0.36
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Fluoranthene	mg/kg	1.20E-01	1.20E-01	1.20E-01	1/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.36 - 0.36
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.36 - 0.36
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.36 - 0.36
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.73 - 0.73
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.36 - 0.36
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0073 - 0.0073
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.8 - 1.8
SVOA	Phenanthrene	mg/kg	7.40E-02	7.40E-02	7.40E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.36 - 0.36
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Pyrene	mg/kg	1.00E-01	1.00E-01	1.00E-01	1/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.36 - 0.36
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.73 - 0.73
SVOA	Total PAH	mg/kg	7.50E-02	7.50E-02	7.50E-02	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	3.49E+01	3.73E+01	3.61E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	5.2 - 5.7
RADS	Americium-241	pCi/g	1.00E-03	1.20E-02	6.50E-03	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.018 - 0.022
RADS	Beta activity	pCi/g	3.76E+01	4.58E+01	4.17E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	2.9 - 3.2
RADS	Cesium-137	pCi/g	4.40E-02	9.20E-02	6.80E-02	0/2	2/2	0/2	4.90E-01	1/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.077 - 0.084
RADS	Neptunium-237	pCi/g	2.80E-02	3.31E-01	1.80E-01	0/2	2/2	1/2	1.00E-01	1/2	2.71E-01	0/2	2.71E+01	1/2	2/2	0.015 - 0.017
RADS	Plutonium-238	pCi/g	7.30E-03	1.00E-02	8.65E-03	0/2	2/2	0/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.014 - 0.026
RADS	Plutonium-239/240	pCi/g	1.10E-02	3.20E-02	2.15E-02	0/2	2/2	1/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.012 - 0.017
RADS	Technetium-99	pCi/g	2.18E+00	1.00E+01	6.09E+00	0/2	2/2	1/2	2.50E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	2/2	0.4 - 0.49
RADS	Thorium-228	pCi/g	7.20E-01	8.40E-01	7.80E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	9.10E-01	1.01E+00	9.60E-01	0/2	2/2	0/2	1.50E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.02 - 0.02
RADS	Thorium-232	pCi/g	7.30E-01	9.20E-01	8.25E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.02
RADS	Uranium-234	pCi/g	1.32E+00	2.54E+00	1.93E+00	0/2	2/2	2/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.02 - 0.05
RADS	Uranium-235/236	pCi/g	6.50E-02	1.92E-01	1.29E-01	0/2	2/2	2/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.02 - 0.04
RADS	Uranium-238	pCi/g	1.92E+00	4.40E+00	3.16E+00	0/2	2/2	2/2	1.20E+00	2/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.01 - 0.03

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

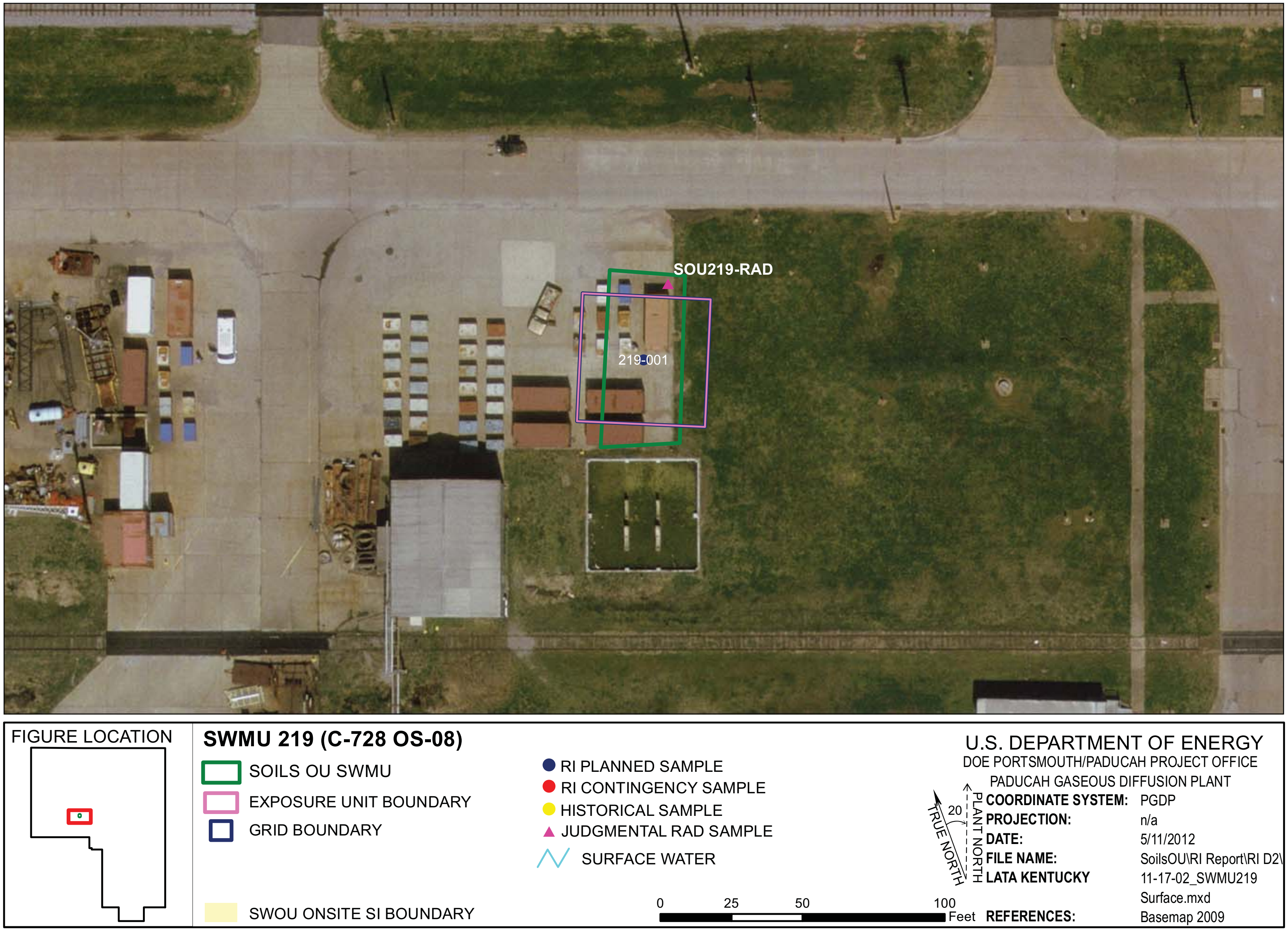


Figure 11.7.2. SWMU 219 Sample Locations - Surface Soil

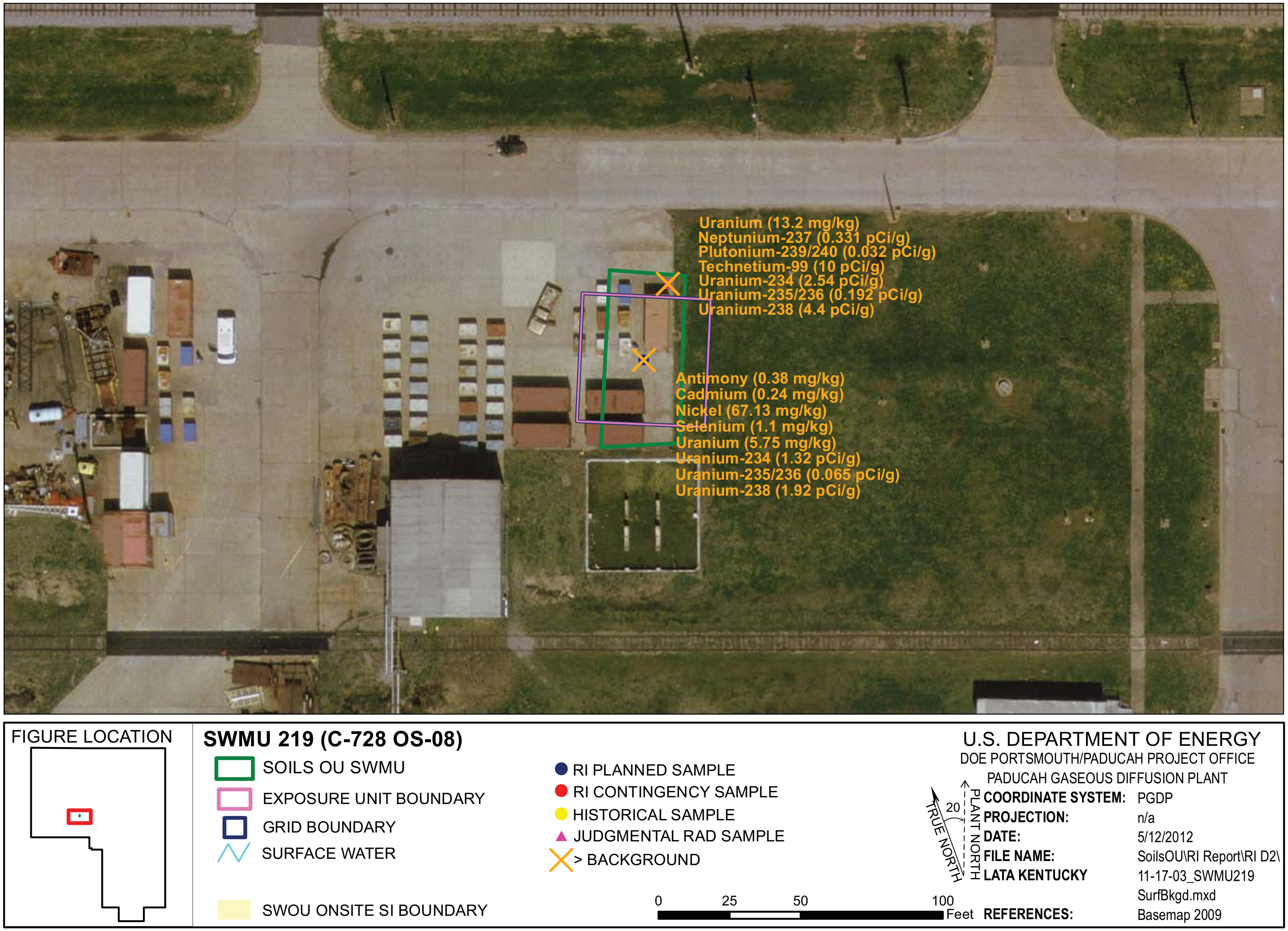


Figure 11.7.3. SWMU 219 Background Exceedances - Surface Soil

FIGURE LOCATION

SWMU 219 (C-728 OS-08)

SOILS OU SWMU

EXPOSURE UNIT BOUNDARY

SWOU ONSITE SI BOUNDARY

SURFACE WATER

SAMPLE LOCATIONS

<= INDUSTRIAL WORKER NAL

> INDUSTRIAL WORKER NAL

> INDUSTRIAL WORKER AL

0 25 50 100 Feet

20 TRUE NORTH PLANT NORTH

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

COORDINATE SYSTEM:	PGDP
PROJECTION:	n/a
DATE:	5/12/2012
FILE NAME:	SoilsOU\RI Report\RI D2
LATA KENTUCKY	11-17-04_SWMU219 SurfNAL.mxd
REFERENCES:	Basemap 2009

Figure 11.7.4. SWMU 219 NAL Exceedances - Surface Soil

The horizontal extent of SWMU 219 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 219 consists of one EU.

Metals

Nickel in grid 1 was detected above both the background screening level and the industrial worker NAL.

No metals were detected in the SWMU 219 surface soil above both the background screening levels and the industrial worker ALs.

The following metals were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater: antimony, molybdenum (no background available), nickel, and selenium in grid 1. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

No PCBs were detected in the SWMU 219 surface soil.

SVOCs

Total PAHs in grid 1 were detected in the SWMU 219 surface soil above the industrial worker NAL.

No SVOCs were detected in the SWMU 219 surface soil above the industrial worker ALs or the SSLs for the protection of RGA groundwater. Total PAHs in grid 1 were detected above the SSLs for the protection of UCRS groundwater.

VOCs

No SWMU 219 surface soil samples were analyzed for VOCs.

Radionuclides

Neptunium-237 and uranium-238 in grid 1 were detected in the SWMU 219 surface soil above both the background screening levels and the industrial worker NALs.

No radionuclides were detected in the SWMU 219 surface soil above both the background screening levels and the industrial worker ALs.

Neptunium-237 and Technetium-99 in grid 1 were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater. Neptunium-237 in grid 1 was detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

11.7.4 Nature and Extent of Contamination—Subsurface Soils

For SWMU 219, the representative data set for subsurface soils is presented in Table 11.7.2 and provides the nature of contamination in SWMU 219 subsurface soils. Figures 11.7.5–11.7.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

Table 11.7.2. Subsurface Soil RI Data Summary: SWMU 219 DMSA OS-08

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	4.64E+03	4.64E+03	4.64E+03	0/1	1/1	0/1	1.20E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.9 - 5.9
METAL	Antimony	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	0/1	0.59 - 0.59
METAL	Arsenic	mg/kg	2.20E+00	2.20E+00	2.20E+00	0/2	1/2	0/2	7.90E+00	1/2	9.97E-01	0/2	9.97E+01	0/2	1/2	1.2 - 11
METAL	Barium	mg/kg	6.64E+01	6.64E+01	6.64E+01	0/1	1/1	0/1	1.70E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	0/1	2.4 - 2.4
METAL	Beryllium	mg/kg	1.90E-01	1.90E-01	1.90E-01	0/1	1/1	0/1	6.90E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.12 - 0.12
METAL	Cadmium	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.059 - 0.059
METAL	Calcium	mg/kg	3.85E+03	3.85E+03	3.85E+03	0/1	1/1	0/1	6.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	59 - 59
METAL	Chromium	mg/kg	6.00E+00	6.00E+00	6.00E+00	0/2	1/2	0/2	4.30E+01	0/2	3.02E+01	0/2	3.02E+03	0/2	0/2	1.2 - 85
METAL	Cobalt	mg/kg	2.10E+00	2.10E+00	2.10E+00	0/1	1/1	0/1	1.30E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.24 - 0.24
METAL	Copper	mg/kg	3.90E+00	3.90E+00	3.90E+00	0/2	1/2	0/2	2.50E+01	0/2	1.43E+03	0/2	2.24E+05	0/2	0/2	1.2 - 35
METAL	Iron	mg/kg	4.61E+03	5.09E+03	4.93E+03	0/2	2/2	0/2	2.80E+04	0/2	2.51E+04	0/2	3.92E+06	2/2	2/2	5.9 - 100
METAL	Lead	mg/kg	9.02E+00	9.83E+00	9.56E+00	0/2	2/2	0/2	2.30E+01	0/2	4.00E+02	0/2	4.00E+02	0/2	0/2	0.35 - 13
METAL	Magnesium	mg/kg	5.18E+02	5.18E+02	5.18E+02	0/1	1/1	0/1	2.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	59 - 59
METAL	Manganese	mg/kg	8.29E+01	1.13E+02	1.03E+02	0/2	2/2	0/2	8.20E+02	0/2	2.58E+03	0/2	1.16E+05	1/2	2/2	0.24 - 85
METAL	Mercury	mg/kg	1.55E-02	1.55E-02	1.55E-02	0/2	1/2	0/2	1.30E-01	0/2	9.00E-01	0/2	7.85E+02	0/2	0/2	0.0393 - 10
METAL	Molybdenum	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.79E+02	0/2	2.80E+04	0/2	0/2	0.59 - 15
METAL	Nickel	mg/kg	3.40E+00	3.40E+00	3.40E+00	0/2	1/2	0/2	2.20E+01	0/2	4.28E+01	0/2	3.18E+04	0/2	1/2	0.59 - 65
METAL	Selenium	mg/kg	1.20E+00	1.20E+00	1.20E+00	0/2	1/2	1/2	7.00E-01	0/2	1.79E+02	0/2	2.80E+04	0/2	1/2	0.59 - 20
METAL	Silver	mg/kg	3.60E-02	3.60E-02	3.60E-02	0/2	1/2	0/2	2.70E+00	0/2	1.08E+01	0/2	9.15E+03	0/2	0/2	0.24 - 10
METAL	Sodium	mg/kg	3.21E+01	3.21E+01	3.21E+01	0/1	1/1	0/1	3.40E+02	0/1	n/a	0/1	n/a	n/a	n/a	23.6 - 23.6
METAL	Thallium	mg/kg	1.40E-01	1.40E-01	1.40E-01	0/1	1/1	0/1	3.40E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	0/1	0.24 - 0.24
METAL	Uranium	mg/kg	2.47E+00	2.52E+00	2.50E+00	0/2	2/2	0/2	4.60E+00	0/2	1.07E+02	0/2	1.65E+04	0/2	0/2	0.04 - 20
METAL	Vanadium	mg/kg	1.18E+01	1.18E+01	1.18E+01	0/1	1/1	0/1	3.70E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.2 - 1.2
METAL	Zinc	mg/kg	1.57E+01	1.99E+01	1.71E+01	0/2	2/2	0/2	6.00E+01	0/2	1.08E+04	0/2	1.68E+06	0/2	1/2	2.4 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.88E-01	0/2	1.88E+01	0/2	0/2	0.35 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.39 - 0.39
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.39 - 0.39
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.39 - 0.39
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.30E+00	0/2	3.91E+01	0/2	0/2	1.9 - 1.9
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.02E+02	0/2	1.81E+04	0/2	0/2	0.39 - 0.39
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.05E+03	0/2	1.22E+05	0/2	0/2	0.39 - 0.39
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.7.2. Subsurface Soil RI Data Summary: SWMU 219 DMSA OS-08 (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.0078 - 0.0078
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	0.39 - 0.39
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	6.01E+02	0/2	1.80E+04	0/2	0/2	0.39 - 0.39
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.87E+02	0/2	1.46E+04	0/2	0/2	0.39 - 0.39
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	1.17E-01	0/2	1.17E+01	0/2	0/2	0.39 - 0.39
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.78 - 0.78
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	2.24E+00	0/2	2.24E+02	0/2	0/2	0.39 - 0.39
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.22E-02	0/2	5.22E+00	0/2	0/2	0.0078 - 0.0078
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	0/2	0/2	1.9 - 1.9
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.39 - 0.39
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	1.9 - 1.9
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	4.49E+02	0/2	1.35E+04	0/2	0/2	0.39 - 0.39
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	0.78 - 0.78
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/2	0/2	0/2	n/a	0/2	5.92E-02	0/2	5.92E+00	0/2	0/2	-
RADS	Alpha activity	pCi/g	2.98E+01	3.15E+01	3.07E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	5.3 - 5.7
RADS	Americium-241	pCi/g	4.20E-03	5.20E-03	4.70E-03	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.015 - 0.017
RADS	Beta activity	pCi/g	2.76E+01	2.84E+01	2.80E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	3 - 3.6
RADS	Cesium-137	pCi/g	-4.00E-02	-1.40E-02	-2.70E-02	0/2	2/2	0/2	2.80E-01	0/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.1 - 0.1
RADS	Neptunium-237	pCi/g	0.00E+00	9.00E-04	4.50E-04	0/2	2/2	0/2	n/a	0/2	2.71E-01	0/2	2.71E+01	0/2	0/2	0.0094 - 0.02
RADS	Plutonium-238	pCi/g	3.30E-03	1.30E-02	8.15E-03	0/2	2/2	0/2	n/a	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.011 - 0.023
RADS	Plutonium-239/240	pCi/g	-2.60E-03	1.00E-02	3.70E-03	0/2	2/2	0/2	n/a	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.015 - 0.015
RADS	Technetium-99	pCi/g	2.40E-01	5.40E-01	3.90E-01	0/2	2/2	0/2	2.80E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	1/2	0.44 - 0.48
RADS	Thorium-228	pCi/g	9.90E-01	1.00E+00	9.95E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.02 - 0.02
RADS	Thorium-230	pCi/g	9.40E-01	1.02E+00	9.80E-01	0/2	2/2	0/2	1.40E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.01 - 0.01
RADS	Thorium-232	pCi/g	9.60E-01	1.01E+00	9.85E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
RADS	Uranium-234	pCi/g	7.30E-01	7.80E-01	7.55E-01	0/2	2/2	0/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.02 - 0.02
RADS	Uranium-235/236	pCi/g	3.30E-02	5.10E-02	4.20E-02	0/2	2/2	0/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.017 - 0.017
RADS	Uranium-238	pCi/g	8.20E-01	8.40E-01	8.30E-01	0/2	2/2	0/2	1.20E+00	0/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.01 - 0.01

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

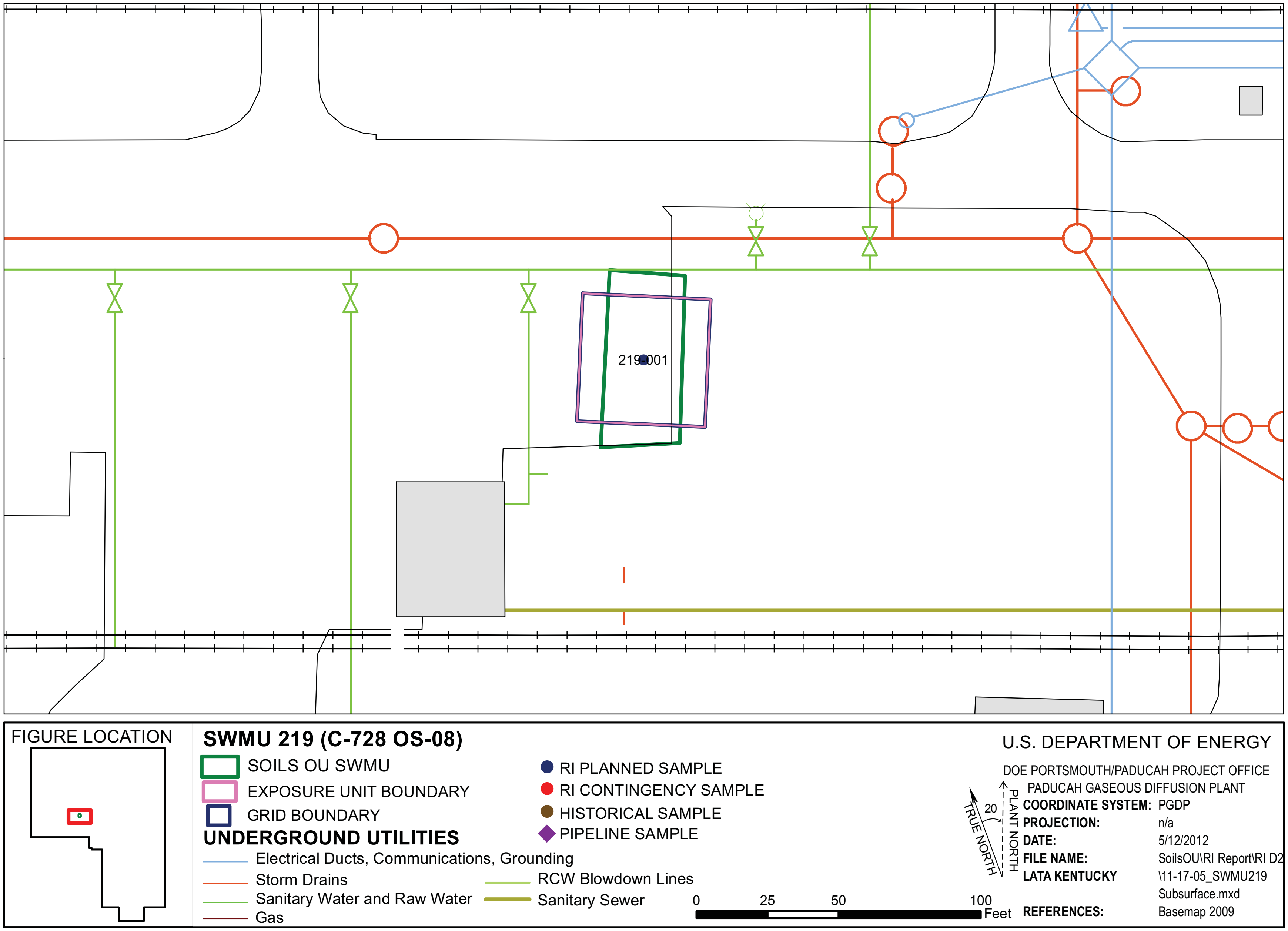


Figure 11.7.5. SWMU 219 Sample Locations - Subsurface Soil

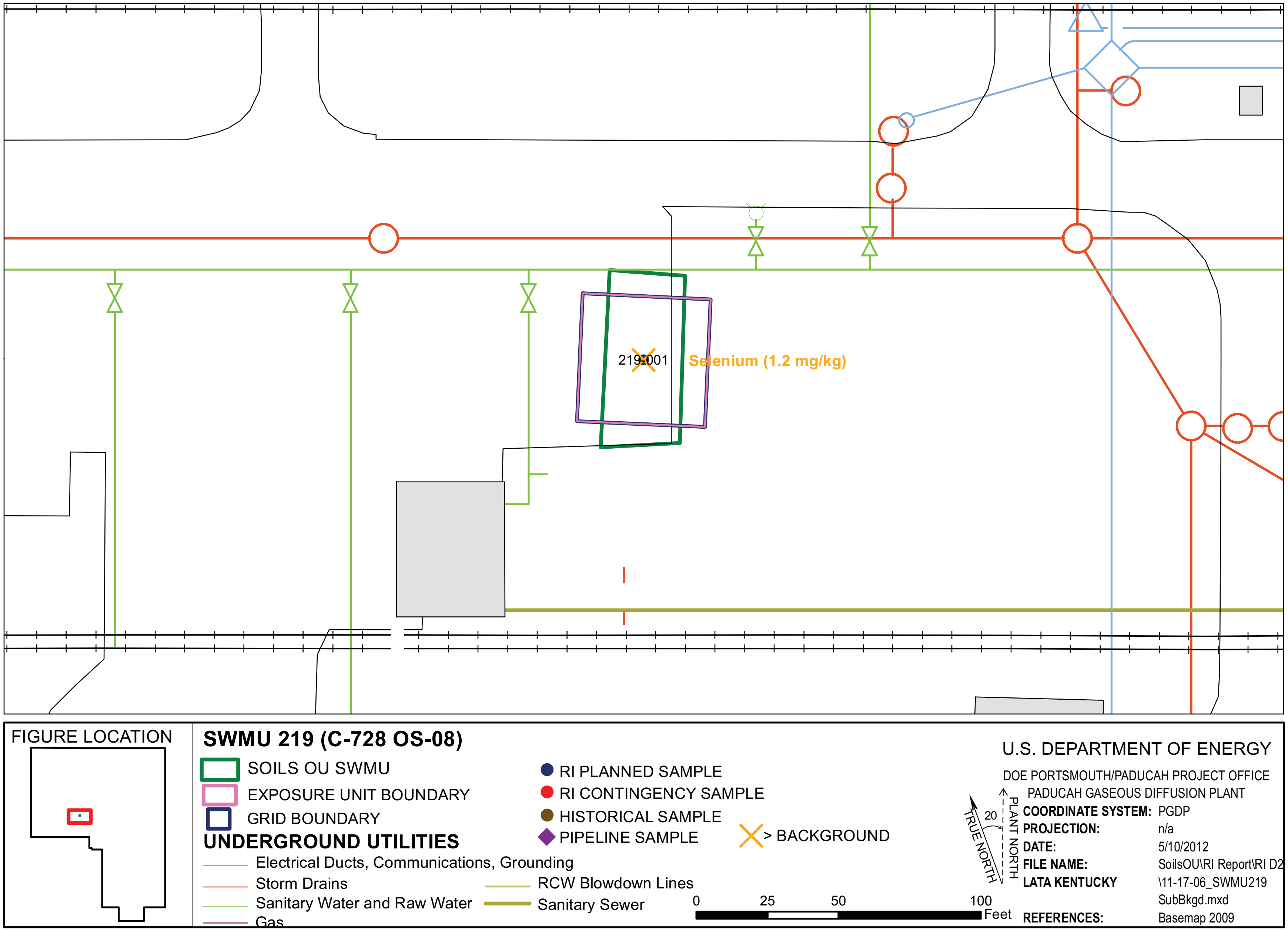


Figure 11.7.6. SWMU 219 Background Exceedances - Subsurface Soil

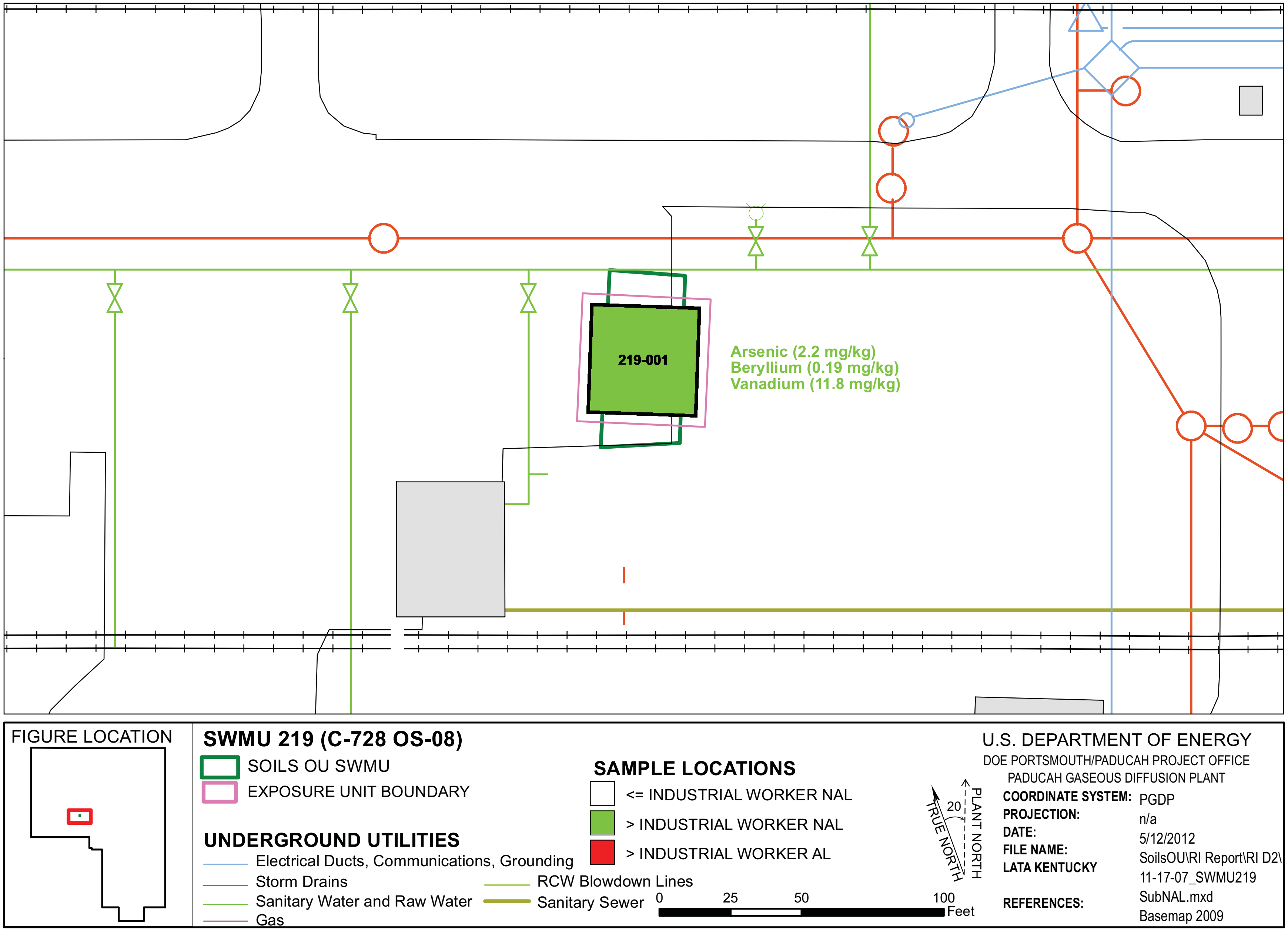


Figure 11.7.7 SWMU 219 NAL Exceedances - Subsurface Soil

The horizontal and vertical extent of SWMU 219 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 219 consists of one EU.

Metals

No metals were detected above both the background screening levels and the industrial worker NALs or ALs in the SWMU 219 subsurface soil.

Selenium in grid 1 was detected in the SWMU 219 subsurface soil above both the background screening level and the SSL for the protection of UCRS groundwater. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

No PCBs were detected in the SWMU 219 subsurface soil.

SVOCs

No SVOCs were detected in the SWMU 219 subsurface soil.

VOCs

No SWMU 219 subsurface soil samples were analyzed for VOCs.

Radionuclides

No radionuclides were detected in the SWMU 219 subsurface soil above both the background screening levels and the industrial worker NALs or ALs.

No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

11.7.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no direct connection to surface water. There is no concern for potential significant runoff due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

11.7.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 219 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 219 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 11.7.3 for the future industrial worker and the hypothetical resident. The excavation worker did not have any identified COCs. Table 11.7.3 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COC for these SWMUs under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 219 include metals. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ ≥ 10) are summarized in Table 11.7.4.

11.7.7 SWMU 219 Summary

The following text summarizes the results for SWMU 219 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

Plant processes that could have contributed to contamination at this SWMU are leaks from a storage tank for PCB-contaminated rainwater and RCW water that also was PCB-contaminated.

COPCs for surface and subsurface soils from SWMU 219 are shown on Tables 11.7.1 and 11.7.2 as those analytes with green boxes under the “Industrial Worker/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G. COPCs identified for SWMU 219 are metals, SVOCs, and radionuclides for surface soil and metals for subsurface soils.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 219 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMU 219. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-6 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. COCs for these scenarios for SWMU 219 are as follows:

- Future Industrial Worker
    - Neptunium-237
    - Total PAHs
    - Uranium-238

Table 11.7.3. RGOs for SWMU 219

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3]			HI[4]	RGOs for HI[3]		
					1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}		0.1	1	3
Future Industrial Worker											
1	Neptunium-237	3.31E-01	pCi/g	1.2E-06	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	n/a
	Total PAH	7.50E-02	mg/kg	1.3E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-238	4.40E+00	pCi/g	2.6E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**5.1E-06**				**< 1**			
Hypothetical Resident[5]											
1	Neptunium-237	3.31E-01	pCi/g	6.1E-06	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	n/a
	Total PAH	7.50E-02	mg/kg	3.9E-06	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-235	1.92E-01	pCi/g	2.4E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	4.40E+00	pCi/g	1.3E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**2.5E-05**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.98, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.98, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 11.7.4 Ecological Screening for SWMU 219

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Mostly concrete	No	30	Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)

- Excavation worker
  - None
- Hypothetical Resident (hazards evaluated against the child resident)
  - Neptunium-237
  - Total PAHs
  - Uranium-235
  - Uranium-238

There are no priority COCs (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for SWMU 219.

For SWMU 219, COPECs exceed ESVs. The priority COPEC (i.e., maximum HQ ≥ 10) is the following:

- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 219 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit are, as discussed in the Work Plan, posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 219 is adjacent to the south to SWMU 32, the C-728 Clean Waste Oil Tanks slab and underlying soils, which is part of this Soils OU RI, Chapter 7. SWMU 219 also is close to SWMUs 33 and 90; SWMU 33 is the C-728 Motor Cleaning Facility and SWMU 90 is the C-720 Underground Petroleum Naphtha Pipe, an NFA SWMU in the 2012 SMP. A response action at SWMU 219 would not have an impact on any of the nearby SWMUs mentioned and would not have an impact on integrator SWMUs.

11.7.8 SWMU 219 Conclusions

The RI adequately defined the nature and extent of contamination in soils at SWMU 219; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial as shown in the SMP (DOE 2012b).

11.8 SWMU 488, C-410 TRAILERS PCB CONTAMINATION AREA BY C-410 TRAILER COMPLEX

11.8.1 Background

The PCB Contamination Area by the C-410 Trailer Complex (SWMU 488) is a PCB soil contamination area located in a grassy drainage swale in the field north of the C-710 Laboratory in the central portion of the plant site. SWMU 488 is approximately 25 ft^2. It is unknown how this area experienced a PCB spill.

The contamination area was discovered as a result of a surface soil sampling and characterization conducted to place the DMSA office trailers. In May 2001, radiological surveys of this area indicated no radiological contamination was present. Soil samples were obtained as part of site characterization. The only contaminant detected above background in the soil was PCBs.

11.8.2 Fieldwork Summary

Two grid samples were planned and collected for the unit.

The SWMU underwent a gamma radiological walkover survey (Figure 11.8.1) using a FIDLER; the three measurements ranged from 12,639 to 12,871 gross cpm. The area consists entirely of soils and grass. A judgmental grab sample was collected for radiological constituents although gamma walkover survey results were consistent with background.

11.8.3 Nature and Extent of Contamination - Surface Soils

For SWMU 488, the representative data set for surface soils is presented in Tables 11.8.1 and 11.8.2 and provides the nature of the contamination in SWMU 488 surface soils. Figures 11.8.2–11.8.4 illustrate the horizontal extent. A complete list of sampling results is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal extent of SWMU 488 surface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 488 consists of one EU.

Metals

No metals were detected above both the background screening levels and the industrial worker NALs or ALs in the SWMU 488 surface soil.

The following metals were detected in the SWMU 488 surface soil above both the background screening levels and the SSLs for the protection of UCRS groundwater: antimony, molybdenum (no background available), selenium, thallium, and uranium in grid 1. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

Total PCBs in grid 1 were detected above the industrial worker NAL in the surface soil of SWMU 488. PCBs were not detected above the industrial worker AL in the SWMU 488 surface soil.

Total PCBs in grid 1 were detected above the SSLs for the protection of UCRS and RGA groundwater.

SVOCs

Total PAHs in grid 1 were detected above the industrial worker NAL in the surface soil of SWMU 488. No SVOCs were detected above the industrial worker ALs in the SWMU 488 surface soil.

Total PAHs in grid 1 were detected above the SSLs for the protection of UCRS groundwater, but no SVOCs were detected above the SSLs for the protection of RGA groundwater.

VOCs

No SWMU 488 surface soil samples were analyzed for VOCs.

Figure 11.8.1. SWMU 488 Gamma Walkover Survey

Table 11.8.1. Surface Soil Historical Data Summary: SWMU 488 C-410 Trailers PCB Contamination Area

Type	Analysis	Unit	Detected Results*			J-qualified	FOD	Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		DL Range
			Min	Max	Avg	FOD		FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	
PPCB	PCB, Total	mg/kg	1.03E+01	1.03E+01	1.03E+01	0/1	1/1	0/1	n/a	1/1	1.88E-01	0/1	1.88E+01	1/1	1/1	0.3 - 0.3

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.8.2. Surface Soil RI Data Summary: SWMU 488 PCB Contamination Area by the C-410 Trailer Complex

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	7.41E+03	7.41E+03	7.41E+03	0/1	1/1	0/1	1.30E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.6 - 5.6
METAL	Antimony	mg/kg	3.10E-01	3.10E-01	3.10E-01	0/1	1/1	1/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	1/1	0.56 - 0.56
METAL	Arsenic	mg/kg	5.33E+00	8.89E+00	7.70E+00	0/5	2/5	0/5	1.20E+01	2/5	9.97E-01	0/5	9.97E+01	0/5	2/5	1.1 - 11
METAL	Barium	mg/kg	9.93E+01	9.93E+01	9.93E+01	0/1	1/1	0/1	2.00E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.3 - 2.3
METAL	Beryllium	mg/kg	5.20E-01	5.20E-01	5.20E-01	0/1	1/1	0/1	6.70E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.11 - 0.11
METAL	Cadmium	mg/kg	1.80E-01	1.80E-01	1.80E-01	0/1	1/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.056 - 0.056
METAL	Calcium	mg/kg	3.11E+03	3.11E+03	3.11E+03	0/1	1/1	0/1	2.00E+05	0/1	n/a	0/1	n/a	n/a	n/a	56.3 - 56.3
METAL	Chromium	mg/kg	1.41E+01	1.41E+01	1.41E+01	0/5	1/5	0/5	1.60E+01	0/5	3.02E+01	0/5	3.02E+03	0/5	0/5	1.1 - 85
METAL	Cobalt	mg/kg	5.00E+00	5.00E+00	5.00E+00	0/1	1/1	0/1	1.40E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.23 - 0.23
METAL	Copper	mg/kg	1.06E+01	1.06E+01	1.06E+01	0/5	1/5	0/5	1.90E+01	0/5	1.43E+03	0/5	2.24E+05	0/5	0/5	1.1 - 35
METAL	Iron	mg/kg	6.49E+03	1.27E+04	9.27E+03	0/5	5/5	0/5	2.80E+04	0/5	2.51E+04	0/5	3.92E+06	5/5	5/5	5.6 - 100
METAL	Lead	mg/kg	1.10E+01	2.74E+01	2.07E+01	0/5	4/5	0/5	3.60E+01	0/5	4.00E+02	0/5	4.00E+02	0/5	2/5	0.34 - 13
METAL	Magnesium	mg/kg	1.02E+03	1.02E+03	1.02E+03	0/1	1/1	0/1	7.70E+03	0/1	n/a	0/1	n/a	n/a	n/a	56.3 - 56.3
METAL	Manganese	mg/kg	1.16E+02	3.64E+02	2.22E+02	0/5	5/5	0/5	1.50E+03	0/5	2.58E+03	0/5	1.16E+05	5/5	5/5	0.23 - 85
METAL	Mercury	mg/kg	5.03E-02	5.03E-02	5.03E-02	0/5	1/5	0/5	2.00E-01	0/5	9.00E-01	0/5	7.85E+02	0/5	0/5	0.0375 - 10
METAL	Molybdenum	mg/kg	5.50E-01	5.50E-01	5.50E-01	0/5	1/5	0/5	n/a	0/5	1.79E+02	0/5	2.80E+04	0/5	1/5	0.56 - 15
METAL	Nickel	mg/kg	1.19E+01	1.19E+01	1.19E+01	0/5	1/5	0/5	2.10E+01	0/5	4.28E+01	0/5	3.18E+04	0/5	1/5	0.56 - 65
METAL	Selenium	mg/kg	1.60E+00	1.60E+00	1.60E+00	0/5	1/5	1/5	8.00E-01	0/5	1.79E+02	0/5	2.80E+04	0/5	1/5	0.56 - 20
METAL	Silver	mg/kg	8.50E-02	8.50E-02	8.50E-02	0/5	1/5	0/5	2.30E+00	0/5	1.08E+01	0/5	9.15E+03	0/5	1/5	0.23 - 10
METAL	Sodium	mg/kg	3.05E+01	3.05E+01	3.05E+01	0/1	1/1	0/1	3.20E+02	0/1	n/a	0/1	n/a	n/a	n/a	22.5 - 22.5
METAL	Thallium	mg/kg	2.20E-01	2.20E-01	2.20E-01	0/1	1/1	1/1	2.10E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	1/1	0.23 - 0.23
METAL	Uranium	mg/kg	1.36E+01	1.48E+01	1.44E+01	0/6	3/6	3/6	4.90E+00	0/6	1.07E+02	0/6	1.65E+04	0/6	3/6	0.05 - 20
METAL	Vanadium	mg/kg	2.47E+01	2.47E+01	2.47E+01	0/1	1/1	0/1	3.80E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.1 - 1.1
METAL	Zinc	mg/kg	1.19E+01	4.63E+01	3.00E+01	0/5	5/5	0/5	6.50E+01	0/5	1.08E+04	0/5	1.68E+06	0/5	2/5	2.3 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/4	0/4	0/4	n/a	0/4	1.88E-01	0/4	1.88E+01	0/4	0/4	0.34 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.8 - 1.8
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Acenaphthene	mg/kg	4.10E-02	4.10E-02	4.10E-02	1/1	1/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.37 - 0.37
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Anthracene	mg/kg	6.60E-02	6.60E-02	6.60E-02	1/1	1/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.37 - 0.37
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Benzo(ghi)perylene	mg/kg	9.00E-02	9.00E-02	9.00E-02	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.8.2. Surface Soil RI Data Summary: SWMU 488 PCB Contamination Area by the C-410 Trailer Complex (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0074 - 0.0074
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	1.70E-01	1.70E-01	1.70E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.37 - 0.37
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Fluoranthene	mg/kg	4.70E-01	4.70E-01	4.70E-01	0/1	1/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.37 - 0.37
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.37 - 0.37
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.37 - 0.37
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.74 - 0.74
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.37 - 0.37
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0074 - 0.0074
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.8 - 1.8
SVOA	Phenanthrene	mg/kg	3.30E-01	3.30E-01	3.30E-01	1/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.37 - 0.37
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.8 - 1.8
SVOA	Pyrene	mg/kg	3.90E-01	3.90E-01	3.90E-01	0/1	1/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.37 - 0.37
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.74 - 0.74
SVOA	Total PAH	mg/kg	2.50E-01	2.50E-01	2.50E-01	0/1	1/1	0/1	n/a	1/1	5.92E-02	0/1	5.92E+00	0/1	1/1	-
RADS	Alpha activity	pCi/g	2.66E+01	3.99E+01	3.33E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	5.7 - 7.4
RADS	Americium-241	pCi/g	7.00E-04	2.50E-02	1.29E-02	0/2	2/2	0/2	n/a	0/2	5.01E+00	0/2	5.01E+02	0/2	0/2	0.021 - 0.029
RADS	Beta activity	pCi/g	2.93E+01	3.51E+01	3.22E+01	0/2	2/2	0/2	n/a	0/2	n/a	0/2	n/a	n/a	n/a	3.4 - 3.5
RADS	Cesium-137	pCi/g	4.50E-01	5.20E-01	4.85E-01	0/2	2/2	1/2	4.90E-01	2/2	8.61E-02	0/2	8.61E+00	0/2	0/2	0.09 - 0.12
RADS	Neptunium-237	pCi/g	5.60E-02	7.10E-02	6.35E-02	0/2	2/2	0/2	1.00E-01	0/2	2.71E-01	0/2	2.71E+01	0/2	2/2	0.02 - 0.022
RADS	Plutonium-238	pCi/g	5.00E-03	2.40E-02	1.45E-02	0/2	2/2	0/2	7.30E-02	0/2	1.09E+01	0/2	1.09E+03	0/2	0/2	0.023 - 0.028
RADS	Plutonium-239/240	pCi/g	6.10E-02	6.20E-02	6.15E-02	0/2	2/2	2/2	2.50E-02	0/2	1.07E+01	0/2	1.07E+03	0/2	0/2	0.013 - 0.015
RADS	Technetium-99	pCi/g	1.14E+00	1.66E+00	1.40E+00	0/2	2/2	0/2	2.50E+00	0/2	3.61E+02	0/2	3.61E+04	0/2	2/2	0.46 - 0.5
RADS	Thorium-228	pCi/g	8.00E-01	8.80E-01	8.40E-01	0/2	2/2	0/2	1.60E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.02
RADS	Thorium-230	pCi/g	1.40E+00	1.47E+00	1.44E+00	0/2	2/2	0/2	1.50E+00	0/2	1.38E+01	0/2	1.38E+03	0/2	2/2	0.01 - 0.02
RADS	Thorium-232	pCi/g	7.50E-01	8.70E-01	8.10E-01	0/2	2/2	0/2	1.50E+00	0/2	n/a	0/2	n/a	n/a	n/a	0.01 - 0.01
RADS	Uranium-234	pCi/g	2.28E+00	2.84E+00	2.56E+00	0/2	2/2	2/2	1.20E+00	0/2	1.89E+01	0/2	1.89E+03	0/2	0/2	0.009 - 0.02
RADS	Uranium-235/236	pCi/g	1.35E-01	1.49E-01	1.42E-01	0/2	2/2	2/2	6.00E-02	0/2	3.95E-01	0/2	3.95E+01	0/2	0/2	0.019 - 0.022
RADS	Uranium-238	pCi/g	3.53E+00	4.54E+00	4.04E+00	0/2	2/2	2/2	1.20E+00	2/2	1.70E+00	0/2	1.70E+02	0/2	0/2	0.02 - 0.02

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

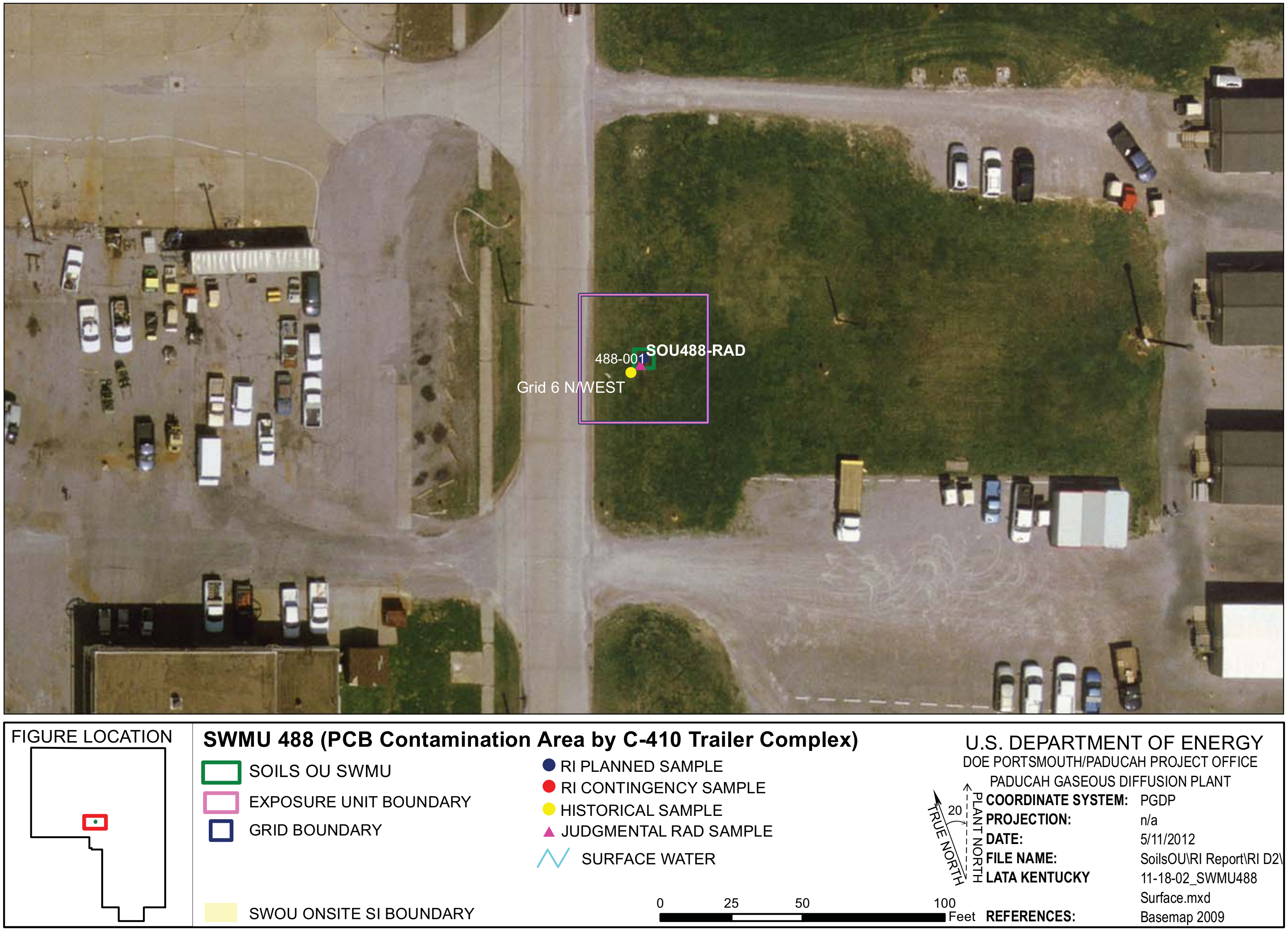


Figure 11.8.2. SWMU 488 Sample Locations - Surface Soil

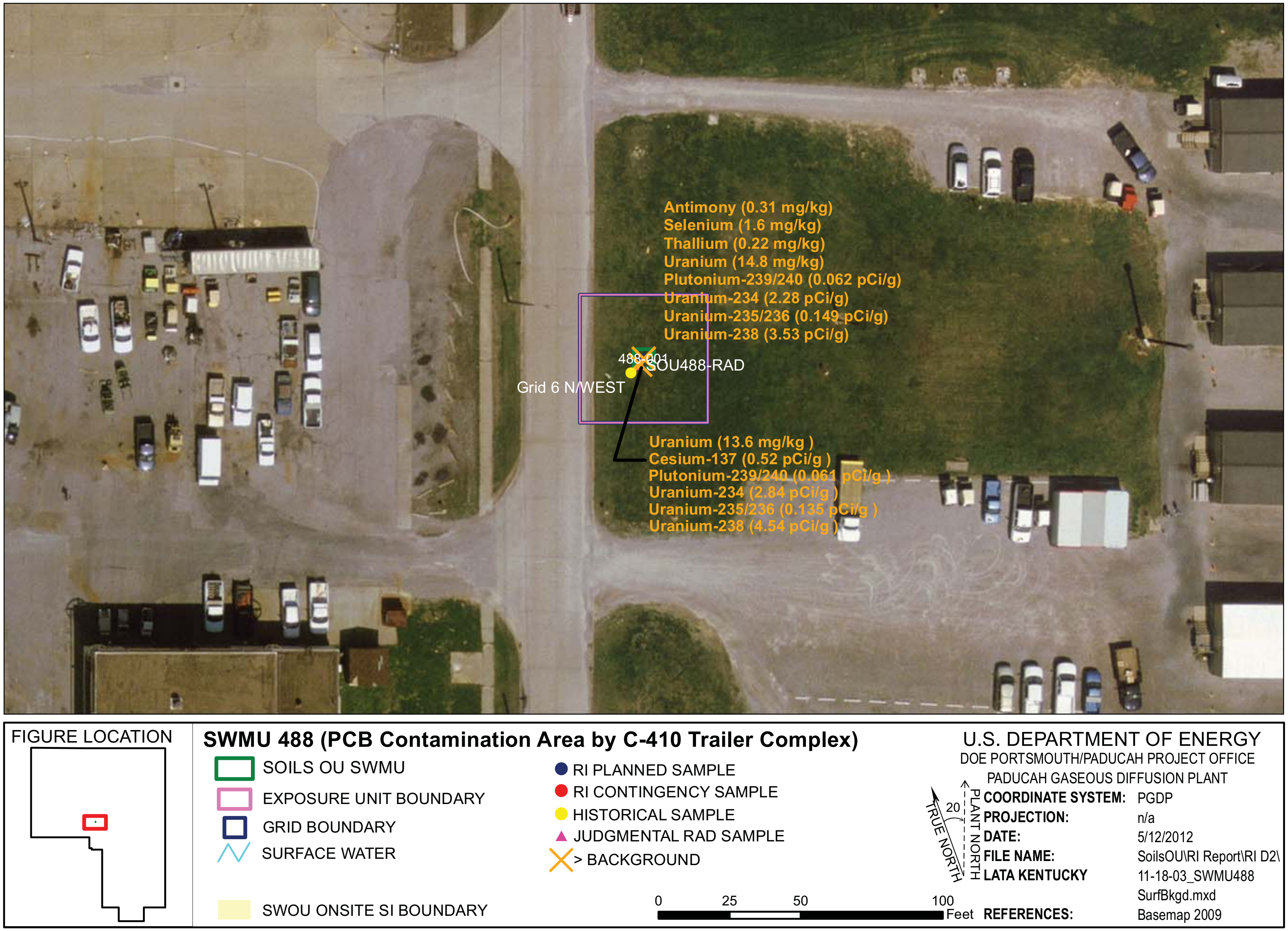


Figure 11.8.3. SWMU 488 Background Exceedances - Surface Soil

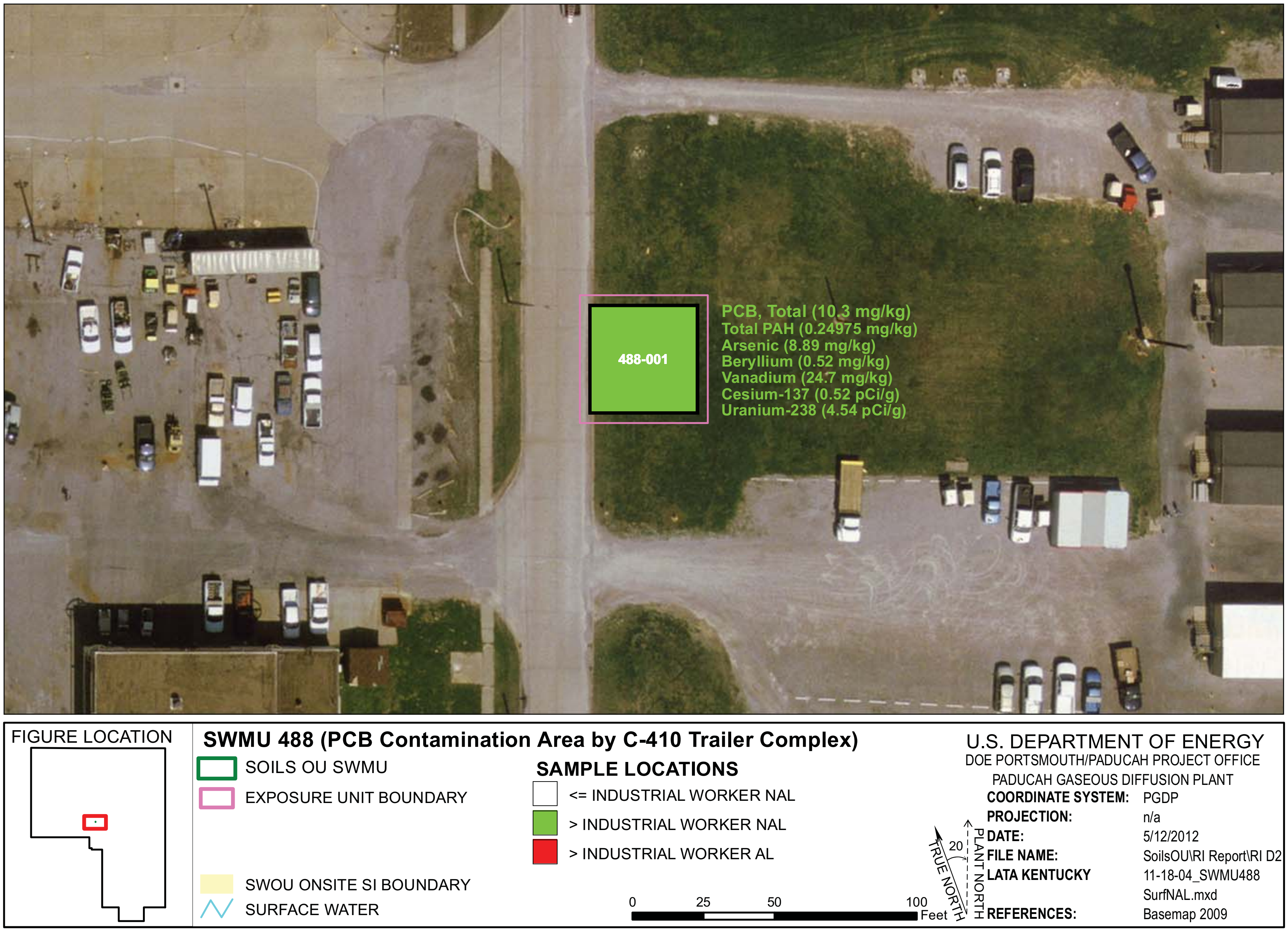


Figure 11.8.4. SWMU 488 NAL Exceedances - Surface Soil

Radionuclides

Cesium-137 and uranium-238 in grid 1 were detected above both the background screening levels and the industrial worker NALs in the surface soil of SWMU 488.

No radionuclides were detected above both the background screening levels and the industrial worker ALs or both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater in the SWMU 488 surface soil.

11.8.4 Nature and Extent of Contamination—Subsurface Soils

The representative data set presented in Tables 11.8.3 and 11.8.4 provides the nature of contamination in the SWMU 488 subsurface soils. Figures 11.8.5–11.8.7 illustrate the horizontal extent. A complete list of sampling results, including sampling depths, is provided in Appendix G. Grid numbers shown below are truncated from the figures. Figures contain the SWMU#–grid#, with zeros filling the appropriate spaces to make three digits.

The horizontal and vertical extent of SWMU 488 subsurface soil contamination is considered adequately defined for supporting the BRA and FS. SWMU 488 consists of one EU.

Metals

Metals were detected above the industrial worker NALs in the SWMU 488 subsurface soil. Of those metals, only chromium was detected above both the background screening level and the industrial worker NAL. The detection was at 4 ft bgs, which also was the end depth of the borehole.

No metals were detected in grid 1 above both the background screening levels and the industrial worker ALs in the SWMU 488 subsurface soil.

The following metals were detected above both the background screening levels and the SSLs for the protection of UCRS groundwater: molybdenum (no background value available) and selenium in grid 1. No metals were detected above both the background screening levels and the SSLs for the protection of RGA groundwater.

PCBs

PCBs were not detected in the SWMU 488 subsurface soil.

SVOCs

No SVOCs were detected in the SWMU 488 subsurface soil.

VOCs

No SWMU 488 subsurface soil samples were analyzed for VOCs.

Radionuclides

No radionuclides were detected above both the background screening levels and the industrial worker NALs or ALs in the SWMU 488 subsurface soil.

Table 11.8.3. Subsurface Soil Historical Data Summary: SWMU 488 C-410 Trailers PCB Contamination Area

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range

There is no subsurface historical data.

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.8.4. Subsurface Soil RI Data Summary: SWMU 488 PCB Contamination Area by the C-410 Trailer Complex

Type	Analysis	Unit	Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
			Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
METAL	Aluminum	mg/kg	5.74E+03	5.74E+03	5.74E+03	0/1	1/1	0/1	1.20E+04	0/1	3.32E+04	0/1	3.97E+06	0/1	1/1	5.9 - 5.9
METAL	Antimony	mg/kg	1.10E-01	1.10E-01	1.10E-01	0/1	1/1	0/1	2.10E-01	0/1	2.53E+00	0/1	1.51E+03	0/1	0/1	0.59 - 0.59
METAL	Arsenic	mg/kg	2.90E+00	6.30E+00	4.03E+00	0/2	2/2	0/2	7.90E+00	2/2	9.97E-01	0/2	9.97E+01	0/2	2/2	1.2 - 11
METAL	Barium	mg/kg	1.11E+02	1.11E+02	1.11E+02	0/1	1/1	0/1	1.70E+02	0/1	5.92E+02	0/1	3.78E+05	0/1	1/1	2.4 - 2.4
METAL	Beryllium	mg/kg	2.90E-01	2.90E-01	2.90E-01	0/1	1/1	0/1	6.90E-01	1/1	1.40E-02	0/1	9.22E+00	0/1	0/1	0.12 - 0.12
METAL	Cadmium	mg/kg	1.50E-02	1.50E-02	1.50E-02	0/1	1/1	0/1	2.10E-01	0/1	3.16E+00	0/1	3.16E+02	0/1	0/1	0.059 - 0.059
METAL	Calcium	mg/kg	1.60E+03	1.60E+03	1.60E+03	0/1	1/1	0/1	6.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	59.1 - 59.1
METAL	Chromium	mg/kg	7.60E+00	5.31E+01	2.28E+01	0/2	2/2	1/2	4.30E+01	1/2	3.02E+01	0/2	3.02E+03	0/2	0/2	1.2 - 85
METAL	Cobalt	mg/kg	2.50E+00	2.50E+00	2.50E+00	0/1	1/1	0/1	1.30E+01	0/1	1.05E+01	0/1	1.52E+03	1/1	1/1	0.24 - 0.24
METAL	Copper	mg/kg	6.60E+00	6.60E+00	6.60E+00	0/2	1/2	0/2	2.50E+01	0/2	1.43E+03	0/2	2.24E+05	0/2	0/2	1.2 - 35
METAL	Iron	mg/kg	7.25E+03	1.79E+04	1.08E+04	0/2	2/2	0/2	2.80E+04	0/2	2.51E+04	0/2	3.92E+06	2/2	2/2	5.9 - 100
METAL	Lead	mg/kg	1.03E+01	1.03E+01	1.03E+01	0/2	1/2	0/2	2.30E+01	0/2	4.00E+02	0/2	4.00E+02	0/2	0/2	0.35 - 13
METAL	Magnesium	mg/kg	6.80E+02	6.80E+02	6.80E+02	0/1	1/1	0/1	2.10E+03	0/1	n/a	0/1	n/a	n/a	n/a	59.1 - 59.1
METAL	Manganese	mg/kg	1.15E+02	2.03E+02	1.44E+02	0/2	2/2	0/2	8.20E+02	0/2	2.58E+03	0/2	1.16E+05	2/2	2/2	0.24 - 85
METAL	Mercury	mg/kg	1.36E-02	1.36E-02	1.36E-02	0/2	1/2	0/2	1.30E-01	0/2	9.00E-01	0/2	7.85E+02	0/2	0/2	0.0394 - 10
METAL	Molybdenum	mg/kg	2.10E-01	2.10E-01	2.10E-01	0/2	1/2	0/2	n/a	0/2	1.79E+02	0/2	2.80E+04	0/2	1/2	0.59 - 15
METAL	Nickel	mg/kg	4.50E+00	4.50E+00	4.50E+00	0/2	1/2	0/2	2.20E+01	0/2	4.28E+01	0/2	3.18E+04	0/2	1/2	0.59 - 65
METAL	Selenium	mg/kg	1.20E+00	1.20E+00	1.20E+00	0/2	1/2	1/2	7.00E-01	0/2	1.79E+02	0/2	2.80E+04	0/2	1/2	0.59 - 20
METAL	Silver	mg/kg	6.90E-02	6.90E-02	6.90E-02	0/2	1/2	0/2	2.70E+00	0/2	1.08E+01	0/2	9.15E+03	0/2	1/2	0.24 - 10
METAL	Sodium	mg/kg	6.95E+01	6.95E+01	6.95E+01	0/1	1/1	0/1	3.40E+02	0/1	n/a	0/1	n/a	n/a	n/a	23.6 - 23.6
METAL	Thallium	mg/kg	1.40E-01	1.40E-01	1.40E-01	0/1	1/1	0/1	3.40E-01	0/1	2.87E+00	0/1	4.48E+02	0/1	0/1	0.24 - 0.24
METAL	Uranium	mg/kg	3.57E+00	3.57E+00	3.57E+00	0/2	1/2	0/2	4.60E+00	0/2	1.07E+02	0/2	1.65E+04	0/2	0/2	0.02 - 20
METAL	Vanadium	mg/kg	1.53E+01	1.53E+01	1.53E+01	0/1	1/1	0/1	3.70E+01	1/1	1.51E-01	0/1	9.30E+01	1/1	1/1	1.2 - 1.2
METAL	Zinc	mg/kg	1.95E+01	5.42E+01	3.11E+01	0/2	2/2	0/2	6.00E+01	0/2	1.08E+04	0/2	1.68E+06	0/2	2/2	2.4 - 25
PPCB	PCB, Total	mg/kg	n/a	n/a	n/a	0/3	0/3	0/3	n/a	0/3	1.88E-01	0/3	1.88E+01	0/3	0/3	0.35 - 5
SVOA	1,2,4-Trichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	1,2-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	1,3-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	1,4-Dichlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	2,4,5-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4,6-Trichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dichlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dimethylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,4-Dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2,4-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2,6-Dinitrotoluene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chloronaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Chlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methyl-4,6-dinitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	2-Methylnaphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	2-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.30E+00	0/1	3.91E+01	0/1	0/1	1.9 - 1.9
SVOA	2-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	3,3'-Dichlorobenzidine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	3-Nitrobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	4-Bromophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chloro-3-methylphenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorobenzenamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Chlorophenyl phenyl ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	4-Nitrophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Acenaphthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.02E+02	0/1	1.81E+04	0/1	0/1	0.39 - 0.39
SVOA	Acenaphthylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Anthracene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.05E+03	0/1	1.22E+05	0/1	0/1	0.39 - 0.39
SVOA	Benzenemethanol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Benzo(ghi)perylene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

Table 11.8.4. Subsurface Soil RI Data Summary: SWMU 488 PCB Contamination Area by the C-410 Trailer Complex (Continued)

			Detected Results*			J-qualified		Provisional Background		Industrial Worker		Industrial Worker		GW Protection Screen		
Type	Analysis	Unit	Min	Max	Avg	FOD	FOD	FOE	Bkgd	FOE	NAL	FOE	AL	RGA	UCRS	DL Range
SVOA	Benzoic acid	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Bis(2-chloroethoxy)methane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-chloroethyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.0078 - 0.0078
SVOA	Bis(2-chloroisopropyl) ether	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Bis(2-ethylhexyl)phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	0.39 - 0.39
SVOA	Butyl benzyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dibenzofuran	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Diethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Dimethyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-butyl phthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Di-n-octylphthalate	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Fluoranthene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	6.01E+02	0/1	1.80E+04	0/1	0/1	0.39 - 0.39
SVOA	Fluorene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.87E+02	0/1	1.46E+04	0/1	0/1	0.39 - 0.39
SVOA	Hexachlorobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	1.17E-01	0/1	1.17E+01	0/1	0/1	0.39 - 0.39
SVOA	Hexachlorobutadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Hexachlorocyclopentadiene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Hexachloroethane	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Isophorone	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	m,p-Cresol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.78 - 0.78
SVOA	Naphthalene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	2.24E+00	0/1	2.24E+02	0/1	0/1	0.39 - 0.39
SVOA	Nitrobenzene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	N-Nitroso-di-n-propylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.22E-02	0/1	5.22E+00	0/1	0/1	0.0078 - 0.0078
SVOA	N-Nitrosodiphenylamine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Pentachlorophenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	0/1	0/1	1.9 - 1.9
SVOA	Phenanthrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	Phenol	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.39 - 0.39
SVOA	p-Nitroaniline	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	1.9 - 1.9
SVOA	Pyrene	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	4.49E+02	0/1	1.35E+04	0/1	0/1	0.39 - 0.39
SVOA	Pyridine	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	0.78 - 0.78
SVOA	Total PAH	mg/kg	n/a	n/a	n/a	0/1	0/1	0/1	n/a	0/1	5.92E-02	0/1	5.92E+00	0/1	0/1	-
RADS	Alpha activity	pCi/g	2.95E+01	2.95E+01	2.95E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	4.3 - 4.3
RADS	Americium-241	pCi/g	-3.00E-03	-3.00E-03	-3.00E-03	0/1	1/1	0/1	n/a	0/1	5.01E+00	0/1	5.01E+02	0/1	0/1	0.032 - 0.032
RADS	Beta activity	pCi/g	2.76E+01	2.76E+01	2.76E+01	0/1	1/1	0/1	n/a	0/1	n/a	0/1	n/a	n/a	n/a	2.5 - 2.5
RADS	Cesium-137	pCi/g	3.00E-03	3.00E-03	3.00E-03	0/1	1/1	0/1	2.80E-01	0/1	8.61E-02	0/1	8.61E+00	0/1	0/1	0.097 - 0.097
RADS	Neptunium-237	pCi/g	-1.20E-03	-1.20E-03	-1.20E-03	0/1	1/1	0/1	n/a	0/1	2.71E-01	0/1	2.71E+01	0/1	0/1	0.023 - 0.023
RADS	Plutonium-238	pCi/g	2.50E-02	2.50E-02	2.50E-02	0/1	1/1	0/1	n/a	0/1	1.09E+01	0/1	1.09E+03	0/1	0/1	0.03 - 0.03
RADS	Plutonium-239/240	pCi/g	9.00E-03	9.00E-03	9.00E-03	0/1	1/1	0/1	n/a	0/1	1.07E+01	0/1	1.07E+03	0/1	0/1	0.018 - 0.018
RADS	Technetium-99	pCi/g	1.90E-01	1.90E-01	1.90E-01	0/1	1/1	0/1	2.80E+00	0/1	3.61E+02	0/1	3.61E+04	0/1	0/1	0.44 - 0.44
RADS	Thorium-228	pCi/g	9.30E-01	9.30E-01	9.30E-01	0/1	1/1	0/1	1.60E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.03 - 0.03
RADS	Thorium-230	pCi/g	8.10E-01	8.10E-01	8.10E-01	0/1	1/1	0/1	1.40E+00	0/1	1.38E+01	0/1	1.38E+03	0/1	1/1	0.02 - 0.02
RADS	Thorium-232	pCi/g	9.50E-01	9.50E-01	9.50E-01	0/1	1/1	0/1	1.50E+00	0/1	n/a	0/1	n/a	n/a	n/a	0.01 - 0.01
RADS	Uranium-234	pCi/g	9.80E-01	9.80E-01	9.80E-01	0/1	1/1	0/1	1.20E+00	0/1	1.89E+01	0/1	1.89E+03	0/1	0/1	0.01 - 0.01
RADS	Uranium-235/236	pCi/g	3.00E-02	3.00E-02	3.00E-02	1/1	1/1	0/1	6.00E-02	0/1	3.95E-01	0/1	3.95E+01	0/1	0/1	0.02 - 0.02
RADS	Uranium-238	pCi/g	1.19E+00	1.19E+00	1.19E+00	0/1	1/1	0/1	1.20E+00	0/1	1.70E+00	0/1	1.70E+02	0/1	0/1	0.007 - 0.007

One or more samples exceed AL value[1]
One or more samples exceed NAL value[2]
One or more samples exceed background value
One or more samples exceed groundwater protection screening

[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal analytes, as applicable, as presented in the RGOs table.
[2] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal analytes, as applicable, as presented in the RGOs table.
Thallium metal results are compared to thallium chloride action levels/no action levels.
Counts of analyses are based on the maximum detected result from a sample (i.e., if a sample has analytical results from two different labs, only the maximum value is counted).
Field replicates, or separate samples are counted independently.
The uranium (metal)/uranium (isotopic) may not be from the same sample thus a correlation between uranium (metal)/uranium (isotopic) data may not be possible.

FOD = frequency of detection
FOE = frequency of exceedance
n/a = not applicable
* For RADS, all results are reported.

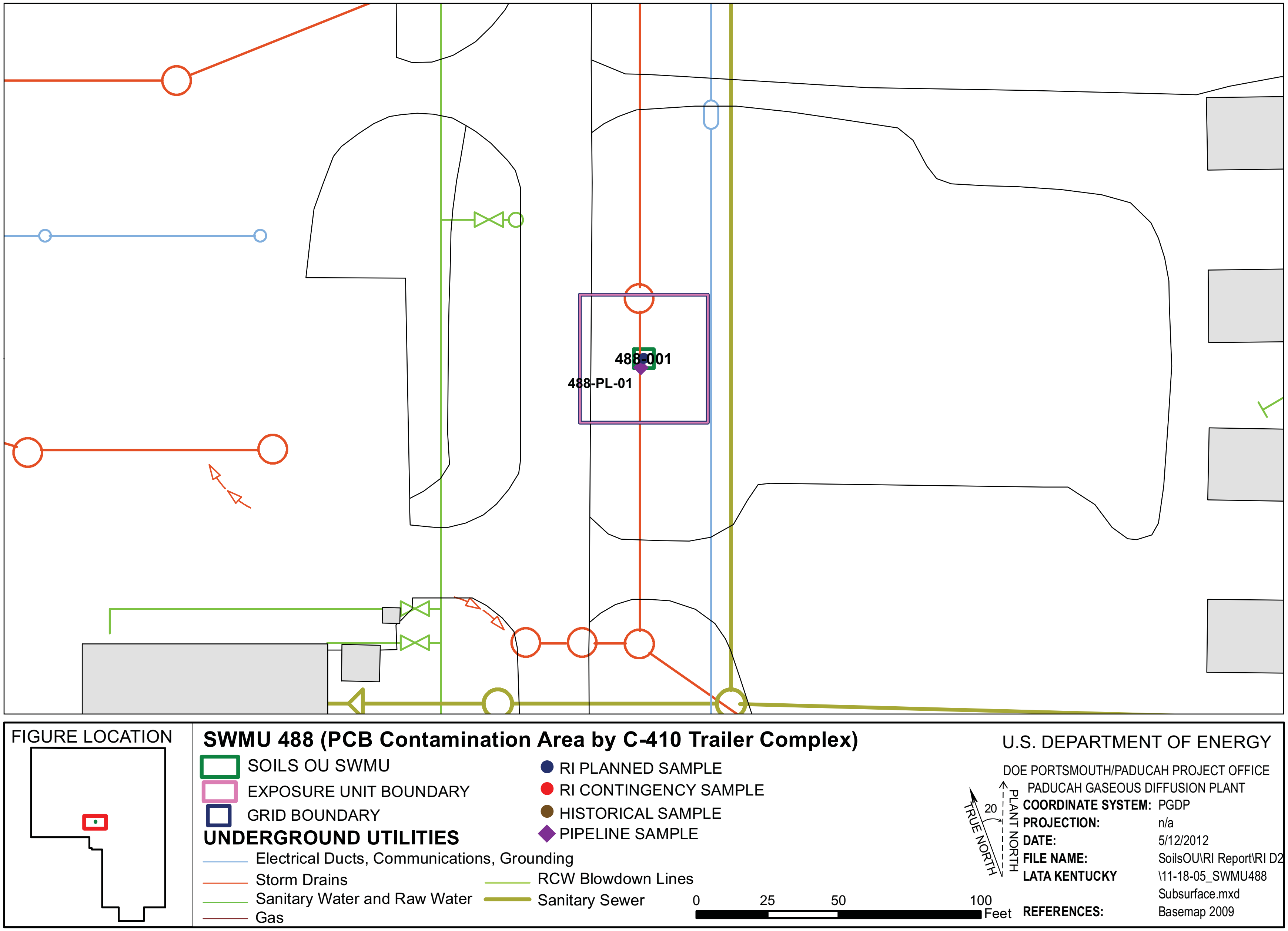


Figure 11.8.5. SWMU 488 Sample Locations - Subsurface Soil

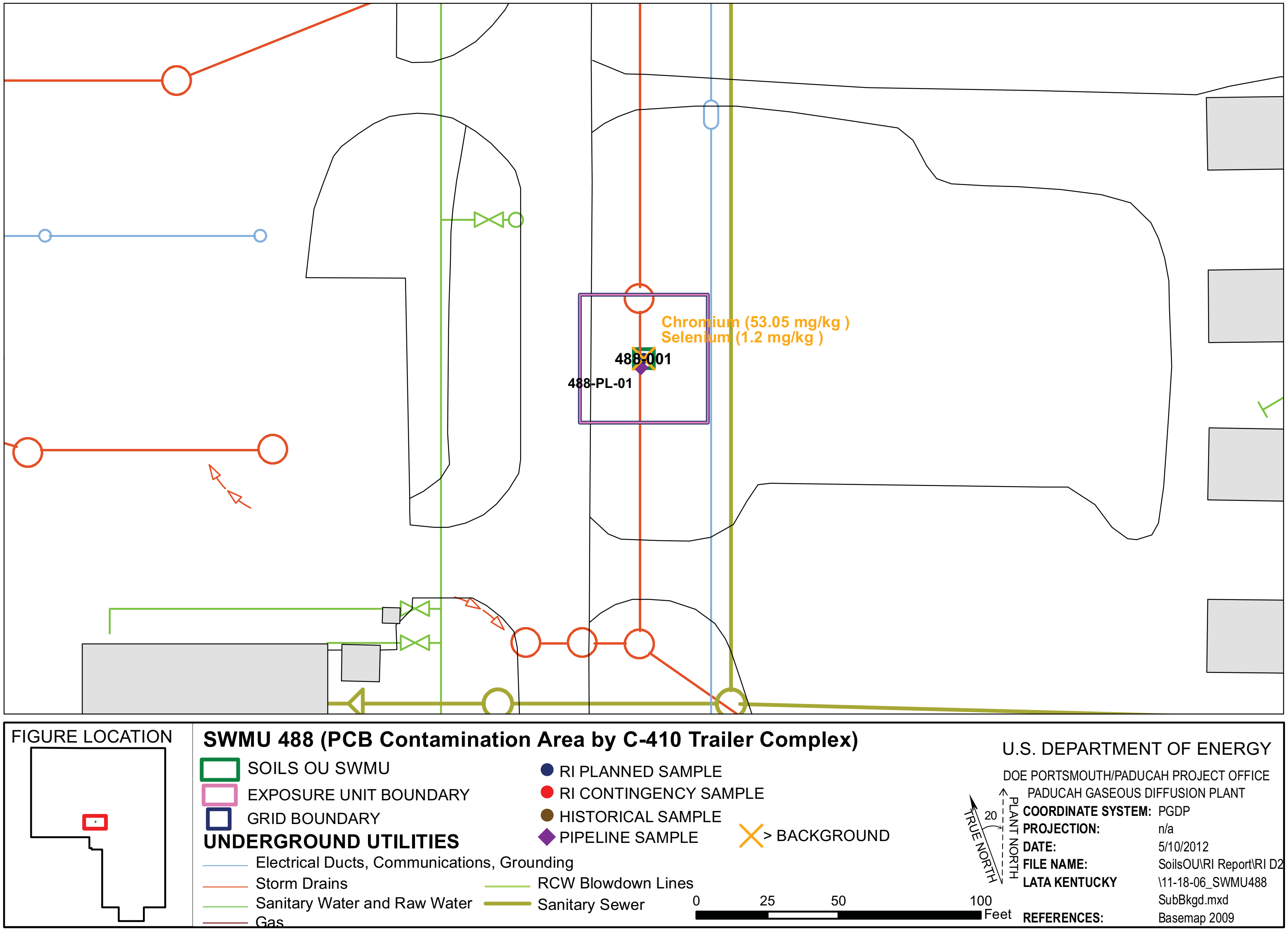


Figure 11.8.6. SWMU 488 Background Exceedances - Subsurface Soil

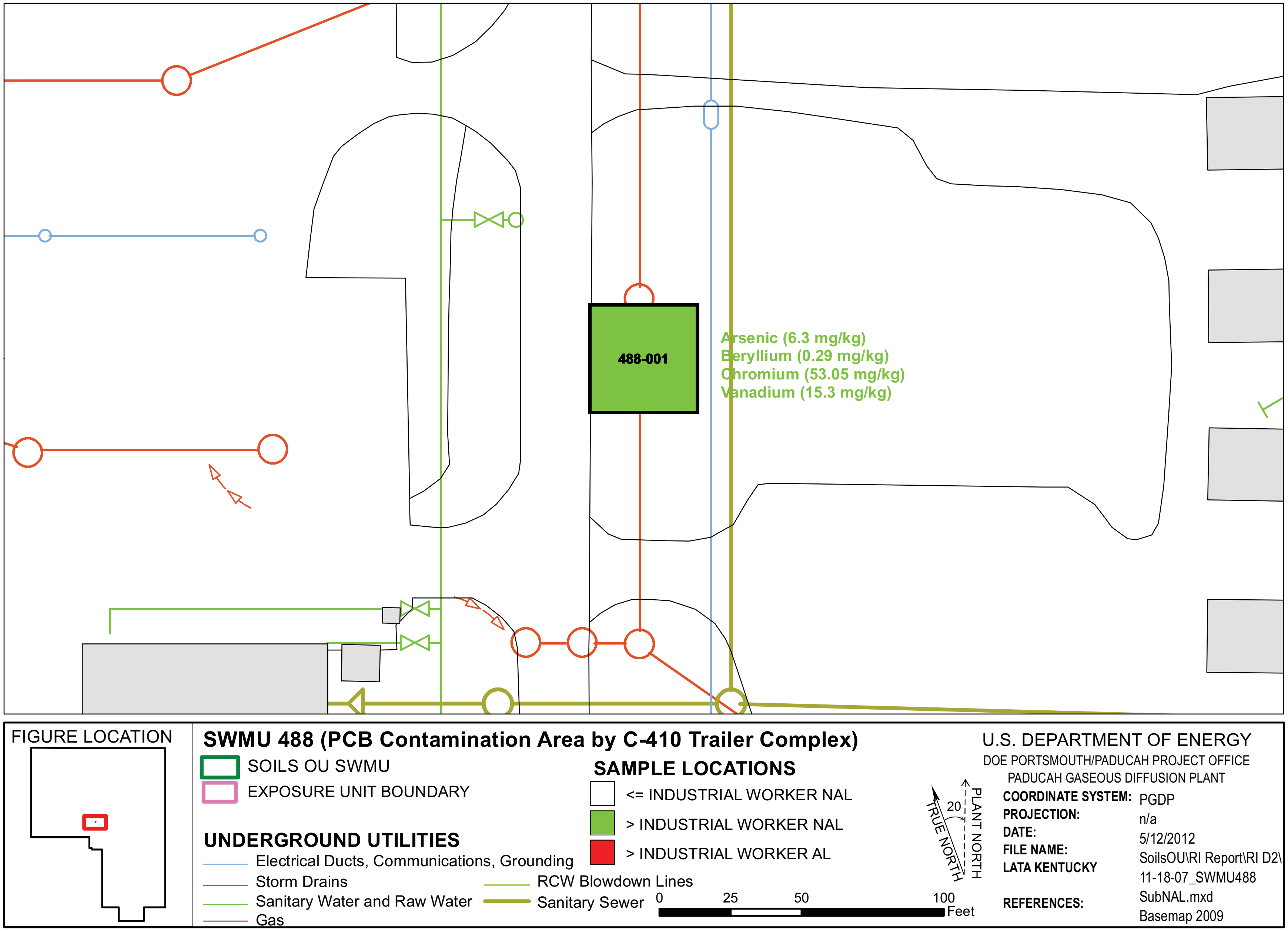


Figure 11.8.7. SWMU 488 NAL Exceedances - Subsurface Soil

No radionuclides were detected above both the background screening levels and the SSLs for the protection of UCRS and RGA groundwater.

11.8.5 Fate and Transport

No target chemicals were identified for further evaluation under fate and transport (Chapter 4). There is no direct connection to surface water. There is no concern for potential significant runoff due to the physical cover at the SWMU, which limits the potential for particulate transport through sheet flow. In addition, the conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs to surrounding ditches.

11.8.6 Baseline Risk Assessment

Human Health. Potential risks and hazards for current/future human health for SWMU 488 were evaluated for direct contact. These results are summarized in Appendix D and in the subsections that follow, including the COCs and relative contributions to the overall ELCR/HI.

The cumulative ELCR for SWMU 488 exceeds the cumulative ELCR benchmark of 1E-6 for one or more scenarios; therefore, as stated in the Work Plan, Decision Rule D1a (DOE 2010a), this SWMU will be evaluated in the FS. As described in the BHHRA (Appendix D), COCs were identified after considering the results of the risk characterization and the uncertainties affecting the results.

COCs were identified as those COPCs considered to contribute at least 1E-6 ELCR or 0.1 HI to a scenario of concern. The basis for COC identification is presented in Appendix D.

The identified COCs considered to contribute to the ELCR/HI, their EPC, and the RGOs calculated for a range of ELCR/HI benchmarks are presented in Table 11.8.5 for the future industrial worker and the hypothetical resident. The excavation worker did not have any identified COCs. Table 11.8.5 also compares the EPC to the RGO for each COC under each exposure scenario and summarizes the ELCR/HI posed by the COC for these SWMUs under each exposure scenario by depicting the maximum ELCR/HI contribution per COC.

Ecological Screening. COPECs for SWMU 488 include metals and PCBs. Potential hazards for ecological receptors and the associated priority COPECs (maximum HQ $\geq$ 10) are summarized in Table 11.8.6.

11.8.7 SWMU 488 Summary

The following text summarizes the results for SWMU 488 using the goals for the project identified during the DQO process for RI scoping.

Goal 1. Characterize Nature of Source Zone

The plant processes that resulted in contamination at this site are unknown.

COPCs for surface and subsurface soils from SWMU 488 are shown on Tables 11.8.1–11.8.4 as those analytes with green boxes under the “Industrial Worker/FOE” columns for surface and shallow subsurface soil, and those with blue boxes under the “GW Protection Screen/RGA/UCRS” columns for groundwater. Contaminants were detected greater than background and greater than industrial worker NALs to a maximum depth of 4 ft bgs. A complete list of sampling results is provided in Appendix G.

Table 11.8.5. RGOs for SWMU 488

EU	COC	EPC[1]	Units	ELCR[2]	RGOs for ELCR[3] 1 x 10^{-6}	RGOs for ELCR[3] 1 x 10^{-5}	RGOs for ELCR[3] 1 x 10^{-4}	HI[4]	RGOs for HI[3] 0.1	RGOs for HI[3] 1	RGOs for HI[3] 3
Future Industrial Worker											
1	Cesium-137	5.20E-01	pCi/g	6.0E-06	8.61E-02	8.61E-01	8.61E+00	n/a	n/a	n/a	n/a
	PCB, Total	1.03E+01	mg/kg	5.5E-05	1.88E-01	1.88E+00	1.88E+01	< 1	n/a	n/a	n/a
	Total PAH	2.50E-01	mg/kg	4.2E-06	5.92E-02	5.92E-01	5.92E+00	< 1	n/a	n/a	n/a
	Uranium-238	4.54E+00	pCi/g	2.7E-06	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	n/a
	Cumulative			**6.8E-05**				**< 1**			
Hypothetical Resident[5]											
1	Cesium-137	5.20E-01	pCi/g	3.0E-05	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	n/a
	PCB, Total	1.03E+01	mg/kg	1.6E-04	6.38E-02	6.38E-01	6.38E+00	< 1	n/a	n/a	n/a
	Total PAH	2.50E-01	mg/kg	1.3E-05	1.94E-02	1.94E-01	1.94E+00	< 1	n/a	n/a	n/a
	Uranium-235	1.49E-01	pCi/g	1.9E-06	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	n/a
	Uranium-238	4.54E+00	pCi/g	1.3E-05	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	n/a
	Cumulative			**2.2E-04**				**< 1**			

Grayed cells indicate EPC value is higher than RGO value or an RGO value is not applicable.
n/a = Not applicable because the COC was not applicable (i.e., the COC was of concern for HI but not ELCR or it was of concern for ELCR by not HI).
[1] See Table D.6 (Appendix D) for EPC values.
[2] See Appendix D, Exhibit D.100, for ELCR. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[3] See Table D.41 for RGOs.
[4] See Appendix D, Exhibit D.100, for HI. The results presented are those from Appendix D, Sections D.4.2 and D.6.5.
[5] RGOs for residential land use are based on exposure to a resident age 1-31. For carcinogens, the dose method incorporates age-adjusted values for the 30-year exposure duration. Because child soil ingestion rates are higher and body weights are lower, noncancer RGOs are based on the more conservative child resident exposure assumptions.

Table 11.8.6 Ecological Screening for SWMU 488

Ground Cover	Near a Surface Water Body?	Total HI (max)[a]	Priority COPECs	Background (mg/kg)[b]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
Soil/grass	No	547	PCB, Total	n/a	1.03E+01	2.00E-02	515
			Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.
[a] Total HI (max) includes HQ (max) from all COPECs, not only priority COPECs.
[b] Background value is from DOE 2011a.
ESV = ecological screening value (from DOE 2010b)
n/a = not applicable

COPCs identified for SWMU 488 are metals, PCBs, SVOCs, and radionuclides for surface soil and metals in the subsurface soil.

Goal 2. Determine Surface and Subsurface Transport Mechanisms and Pathways

The contaminants at SWMU 488 are readily adsorbed to soil particles, so they do not migrate without a direct connection to surface water. There are no underground pipelines at SWMU 488. The CSM can be found in Appendix D.

Goal 3. Complete a Baseline Risk Assessment for the Soils OU

Cumulative ELCRs or HIs exceeded their benchmarks of 1E-6 and 1, respectively, for the future industrial worker and hypothetical residential scenarios. COCs for these scenarios for SWMU 488 are as follows:

- Future Industrial Worker
    - Cesium-137
    - Total PAHs
    - Total PCBs
    - Uranium-238
- Excavation worker
    - None
- Hypothetical Resident (hazards evaluated against the child resident)
    - Cesium-137
    - Total PAHs
    - Total PCBs
    - Uranium-235
    - Uranium-238

Of the above, Total PCBs is a priority COC (i.e., HQ > 1 or chemical-specific ELCR > 1E-04) for the hypothetical resident. There are no other priority COCs for other scenarios.

For SWMU 488, COPECs exceed ESVs. Priority COPECs (i.e., maximum HQ $\geq$ 10) are the following:

- Total PCBs
- Selenium

Goal 4. Support Evaluation of Remedial Alternatives

The representative data set used for SWMU 488 is sufficient to support decision making and indicates that an FS is appropriate. Possible remedial technologies applicable for this unit are, as discussed in the Work Plan, posting, fencing (or other means of limiting access), *in situ* treatment, and excavation. SWMU 488 is not adjacent to any other SWMU, nor is it close to any operating facilities. A response action here would not impact other SWMU, nor would it impact integrator OUs.

11.8.8 SWMU 488 Conclusions

The RI adequately defined the nature and extent of contamination in soils at SWMU 488; an FS is appropriate for the SWMU due to risk exceeding the decision rule benchmark for scenarios including future industrial worker and hypothetical resident (DOE 2010a). The reasonably anticipated future land use for this SWMU is industrial as shown in the SMP (DOE 2012a).

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12. CONCLUSIONS FOR THE SOILS OU REMEDIAL INVESTIGATION

This Soils OU RI Report was designed to investigate nature and extent, fate and transport, and to characterize potential risks/hazards from current and future exposures as a basis for evaluating remedial alternatives in an FS for 50 SWMUs/AOCs using historical data along with data collected for this RI to supplement the existing data. The final representative data set includes samples analyzed by laboratory and field methods to join with the historical data. Among the objectives for the sampling and analysis strategy were to provide sufficient delineation of COCs, as well as provide grid-based sampling that allows better estimates of average concentrations to be used for risk estimates.

The goals of this RI, consistent with Work Plan (DOE 2010a), are as follows:

(1) Goal 1: Characterize Nature and Extent of Source Zone(s);
(2) Goal 2: Determine Surface and Subsurface Transport Mechanisms and Pathways;
(3) Goal 3: Complete a Baseline Risk Assessment for the Soils OU; and
(4) Goal 4: Support Evaluation of Remedial Alternatives.

The SWMUs/AOCs included in the Soils OU (Table ES.1) varied in the nature of the sources/releases, proximity to drainageways, size, cover, and location (within or outside the limited area). These SWMUs/AOCs together cover an area of approximately 86 acres and range in size from less than 100 ft^2 up to nearly 42 acres. Approximately 34 of these SWMUs/AOCs are less than 0.25 acre.

The goal of this summary is to highlight the observations on an OU-wide basis, recognizing that careful review of each SWMU/AOC individually is needed to make valid risk management decisions.

12.1 GOAL 1: CHARACTERIZE NATURE AND EXTENT OF SOURCE ZONE(S)

The nature and extent of contamination at the 50 SWMUs/AOCs is considered adequately defined. Extent for depth of contamination is uncertain at some SWMUs/AOCs, see Chapters 5–11, but this uncertainty will be managed in the FS.

To determine nature of contamination in surface soils, results of analyses in SWMUs/AOCs were compared to surface background values, where available. Results of analyses were further compared to industrial worker NALs[1] for SWMUs/AOCs inside the limited area and to the teen recreator NALs[2] for SWMUs/AOCs outside the limited area. Table 12.1 indicates the constituent that exceeded this screening in at least one location. Constituents that also exceed ALs[3] are shown in bold.

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[1] Due to the use of updated EPA guidance (i.e., RAGS Part E), NAL values may not correlate to an ELCR of 10-6/HI of 0.1 for the metal constituents, as applicable, as presented in the RGOs table.
[2] See note 1.
[3] Due to the use of updated EPA guidance (i.e., RAGS Part E), AL values may not correlate to an ELCR of 10-4/HI of 3 for the metal constituents, as applicable, as presented in the RGOs table.

Table 12.1. Exceedances of NAL Screening

	Surface Soils		Subsurface Soils	
	Industrial Worker	**Teen Recreator**	**Industrial Worker**	**Teen Recreator**
Metals				
Aluminum		X	X	
Antimony	X	X	X	
Arsenic	**X**	**X**	X	X
Barium	X	X	X	X
Beryllium	**X**	**X**	**X**	X
Cadmium	X	X	X	X
Chromium	X	X	X	X
Cobalt	X	X	X	X
Iron	X	X	X	X
Lead	**X**	**X**	**X**	
Manganese	X	X	X	X
Mercury	X	X	X	X
Nickel	X	X	X	X
Silver	X	X	X	X
Thallium		X	X	
Uranium	X	X	X	X
Vanadium	X	**X**	**X**	**X**
PCBs				
Total PCBs	**X**	**X**	X	**X**
SVOCs				
Carbazole	X			
Chrysene	X			
Naphthalene	X			
Total PAHs	**X**	**X**	**X**	X
VOCs				
cis-1,2-Dichloroethene			**X**	
trans-1,2-Dichloroethene			X	
Trichloroethene			**X**	
Vinyl chloride			X	
Radionuclides				
Americium-241		X		
Cesium-137	**X**	X		X
Cobalt-60	X	X	X	X
Neptunium-237	X	X	X	
Technetium-99	X			
Thorium-230	X			
Uranium-234	X	X	X	X
Uranium-235	X	X	X	X
Uranium-235/236	**X**	X	X	
Uranium-238	**X**	**X**	X	**X**

NOTE: NAL and AL exceedances of VOAs are from SWMU 1. These contaminants are being addressed by the Southwest Plume Remedial Action.

12.2 GOAL 2: DETERMINE SURFACE AND SUBSURFACE TRANSPORT MECHANISMS AND PATHWAYS

Migration to Groundwater

Screening evaluation, as described in Section 4 and Appendix C, identified SWMUs/AOCs 14, 81, 165, 541, and 564 as having potentially problematic soil contamination for leaching to groundwater and impacting the RGA above drinking water standards. Soil constituents at these SWMUs/AOCs included technetium-99, arsenic, chromium, nickel, Total PCBs, and uranium. Transport properties for the modeled constituents are listed in Table 12.2.

Table 12.2. Soils OU Constituents for the Groundwater Pathway and Properties

Soil Constituents	Mol. Wt. (MW) (g/gmol)	Solubility in water (mg/L)	Diffusion in air (cm^2/s)	Diffusion in water (m^2/hr)	Henry's Constant ($atm.m^3/mol$)	K_{oc} (L/kg)	$K_d{}^a$ (L/kg)	Degradation Half Life (years)
Arsenic	75	1.00E+07	n/a	3.60E-07	n/a	n/a	29	Assumed infinite
Chromium +3	52	1.20E+04	n/a	2.14E-06	n/a	n/a	1.80E+06	Assumed infinite
Chromium +6	52	1.20E+04	n/a	2.14E-06	n/a	n/a	190	Assumed infinite
Nickel	59	4.22E+05	n/a	1.76E-05	2.44E-02	n/a	65	Assumed infinite
Technetium-99	99	7.18E+03*	n/a	3.60E-07	n/a	n/a	0.2	2.13E+05
Total PCBs	292	2.77E-01	1.75E-02	2.88E-06	3.42E-04	n/a	156	Assumed infinite[1]
Uranium	238	1.00E+07	n/a	3.60E-07	n/a	n/a	66.8	4.47E+9

Note: Technetium-99 solubility is derived from the geochemical database 'thermo.com.V8.R6.230,' which was prepared by Lawrence Livermore National Laboratory. The exact database used here is 'llnl.dat 4023 2010-02-09 21:02:42Z,' which was converted to PHREEQC format by Greg Anderson and David Parkhurst of the U.S. Geological Survey.

[1] For purposes of the modeling, no degradation of PCBs was assumed; thus, the concentrations of PCBs that are predicted to reach the RGA are an upper bound.

With the exception of uranium and technetium-99, the contaminants were assumed not to degrade in the environment (i.e., infinite half-life) for the purposes of modeling. These subsequently were modeled (Appendix C) to provide estimates of RGA groundwater concentrations at the SWMU/AOC boundary and potential downgradient points of exposure.

Based on the modeling results, technetium-99 present in soil at SWMU 14 has the potential to impact the RGA groundwater at the SWMU boundary at concentrations (1,700 pCi/L) that exceed 900 pCi/L, as depicted in Table 12.3. A review of the RGA monitoring well and extraction well data does not show incremental impacts to the RGA technetium-99 plume from SWMU 14 (see also Appendix C, Attachment C1). Technetium-99 concentrations from the extraction wells have not exceeded 900 pCi/L since 1998. The RGA technetium-99 plume is from the vicinity of C-400, without measured change as it passes by SWMU 14.

Table 12.3. RGA Groundwater Modeling Results at the SWMU/AOC Boundary and Points of Exposure

SWMU/ AOC	Soil Constituents	MCL	RGA Groundwater Concentration at SWMU/AOC Boundary (Time to Reach Boundary)	RGA Groundwater Concentration at DOE Property Boundary (Time to Reach Boundary)	RGA Groundwater Concentration at Discharge Location[a] (Time to Reach Location)
14	Technetium-99	900 pCi/L[b]	1,700 pCi/L (38 years)	1,020 pCi/L (38 years)	339 pCi/L (45 years)
14	Chromium	Uranium, arsenic, Total PCBs, chromium (+3 or +6), and nickel do not reach the RGA in the 1,000-year SESOIL modeling period.			
14	Nickel				
81	Total PCBs				
81	Uranium				
165	Arsenic				
541	Total PCBs				
564	Arsenic				

[a] The discharge location is the location to which RGA groundwater discharges to surface water.
[b] 900 pCi/L is the value derived by EPA from the 4 mrem/yr MCL for technetium-99 (EPA 2002).

Runoff

Each of the SWMU/AOC discussions and Table 12.7, included in the summary of the potential ecological risks, identifies the ground cover and whether the SWMU/AOC is located near a drainageway or outfall. Impacts in these receiving areas have been evaluated separately in the SWOU and are not quantified in this assessment for each SWMU/AOC (DOE 2008a). The conservative evaluation of surface soil as a source area provides a surrogate for risks posed by the potential migration of contaminants from the SWMUs/AOCs to surrounding ditches. Where elevated surface soil contamination is present in proximity to these drainageways, it is identified as a factor to be considered in the selection of remedial alternatives.

12.3 GOAL 3: COMPLETE A BASELINE RISK ASSESSMENT FOR THE SOILS OU

The relative hazards and prioritization process to address current issues related to these SWMUs/AOCs can be complex. This is one tool that provides insights into the relative magnitude of the risk (ELCR)/hazard (HI). This section discusses the following:

(1) Priority Contaminants. Clarification of the contaminants that most frequently are present and contribute most substantially to the ELCR/HI estimates at many of the SWMUs/AOCs.

(2) Relative Risks (ELCRs)/Hazards (HIs). Relative risks (ELCRs)/hazards (HIs) among SWMUs/AOCs based on contact with contaminants in soil and interpretation of these as priorities for management action.

(3) Ecological risk/hazard considerations of potential ecological receptors.

(4) Other COPECs/Uncertainties

Priority Contaminants

To determine use scenarios of concern, risk characterization results for Total HI and Total ELCR were compared to benchmarks of 1.0 and 1E-6, respectively. Use scenarios with Total HI or Total ELCR exceeding either of these benchmarks were deemed use scenarios of concern. To determine COCs, risk characterization results for chemical-specific HQ and chemical-specific ELCR over all pathways within a use scenario of concern were compared to benchmarks of 0.1 and 1E-6, respectively. COPCs within a use scenario of concern exceeding either of these benchmarks were deemed COCs for the use scenario of concern. The COCs are identified in tables in Chapters 5–11. In addition, priority COCs have been identified in this report. Priority COCs are those COCs with either a chemical-specific HQ or chemical-specific ELCR over all pathways greater than 1 and 1E-4, respectively. Priority COCs are identified to highlight those COCs contributing most to Total HI and Total ELCR for each SWMU/AOC.

For the Soils OU sites, there were four priority COCs (Total PCBs, Total PAHs, uranium-235, and uranium-238) that had an ELCR > 1E-4 for the future industrial worker scenario or the teen recreational user scenario, as appropriate. There is one priority COC (uranium) where the individual metal results in an HI > 1 for the future industrial worker or the teen recreational user scenario, as appropriate. These are summarized in Tables 12.4 and 12.5.

Table 12.4. Soils OU Future Industrial Worker Priority COCs (SWMUs/AOCs inside the Limited Area)

SWMUs/EUs with Priority COCs	COC	Exposure Point Concentration	HQ	ELCR
1/2	Total PCBs	32.11 mg/kg	n/a	1.7E-04
81/1	Uranium[a]	6,500 mg/kg	1.1	n/a
81/1	Total PCBs	159.8 mg/kg	n/a	8.5E-04
518/1	Total PAHs	38.96 mg/kg	n/a	6.6E-04
14/9	Uranium-235	54.55 pCi/g	n/a	1.4E-04
14/9	Uranium-238	1,200 pCi/g	n/a	7.1E-04

[a] An uncertainty exists using the historical uranium data for SWMU 81. Historical samples were analyzed using a radionuclide method and converted to a concentration for uranium metal. These results appear to show uranium at a higher level than would be expected at this site. The results also are inconsistent with the gamma radiological walkover survey shown in Figure 11.2.1, which indicates results are less than the project action limit for uranium-238. These results have been carried forward to fate and transport screening and the BHHRA, but it should be noted that these results may overstate the actual risks at this site.

Table 12.5. Soils OU Teen Recreational User Priority COCs (SWMUs/AOCs outside the Limited Area)

SWMUs/EUs with Priority COCs	COC	Exposure Point Concentration	HQ	ELCR
492/1	Total PCBs	44.1 mg/kg	n/a	1.5E-04
541/1	Total PCBs	60.6 mg/kg	n/a	2.0E-04
541/1	Uranium-238	1,001 pCi/g	n/a	1.2E-04

Although the risk assessment estimates ELCR for radionuclides to be considered in the total risk, a dose assessment for these constituents allows comparison of the detected levels (pCi/g) with an estimate of mrem/yr to consider DOE guidelines for radiation exposure. The results of this analysis indicate in a parallel analysis that these are significant contributors to the risk. Specifically, each of the SWMUs/AOCs that exceeds the 25 mrem/yr reference level defined in the 2011 Risk Methods Document also showed unacceptable risks for the future industrial worker scenario (DOE 2011a).

Relative Risks (ELCRs)/Hazards (HIs)

The BHHRA process allows a range of scenarios to be considered to help understand the contaminants that pose the greatest hazards. For soil impacted sites, scenarios consistent with realistically anticipated future use include default assumptions used for future industrial worker (inside the limited area) and for the teen recreator (outside of the limited area) (DOE 2011a). Similarly, evaluation of ELCRs/HIs, if the site were to become residential, provide an upper bounding estimate.

Scenarios that assume some future contact with contaminants in the subsurface soil (e.g., the excavation worker) are used to consider contact with the entire soil column (0–16 ft bgs) either during construction or over the longer term as the site soils are mixed and disturbed for alternate uses.

Table 12.6 shows a summary of direct contact risks for each SWMU/AOC, along with the highlighted scenario. The scenarios highlighted are those for the realistically anticipated future use of the area of the SWMU/AOC, as presented in the SWMU/AOC-specific discussions in Chapters 5–11. Additionally, for SWMU/AOCs with more than one EU, the highest Total HI, Total ELCR, and Total Dose across all EUs are presented.

Table 12.6. Summary of Direct Contact Total HI, Total ELCR, and Total Doses for the Soils OU SWMUs/AOCs by Grouping

		Direct Contact*		
SWMU/AOC	**Scenario**	**Total HI**	**Total ELCR**	**Total Dose (mrem)**
Former Facilities—See Chapter 5				
1	Industrial Worker (Future)	< 1	***1.8E-04***	1.15
99B	Teen Recreational User	< 1	< 1E-06	< 0.1
194	Teen Recreational User	< 1	**3.7E-05**	0.15
196	Industrial Worker (Future)	< 1	**2.2E-05**	0.14
489	Industrial Worker (Future)	< 1	**3.6E-06**	< 0.1
531	Industrial Worker (Future)	< 1	**5.2E-05**	0.15
Storage Areas—See Chapter 6				
200	Industrial Worker (Future)	< 1	**2.5E-05**	0.51
212	Industrial Worker (Future)	< 1	**6.1E-05**	3.73
213	Industrial Worker (Future)	< 1	**6.3E-06**	< 0.1
214	Teen Recreational User	< 1	< 1E-06	n/a[1]
215	Industrial Worker (Future)	< 1	**3.3E-06**	n/a[1]
216	Industrial Worker (Future)	< 1	**4.1E-06**	< 0.1
217	Industrial Worker (Future)	< 1	**2.3E-05**	< 0.1
221	Industrial Worker (Future)	< 1	**2.3E-05**	< 0.1
222	Industrial Worker (Future)	< 1	**2.6E-05**	0.85
227	Industrial Worker (Future)	< 1	**6.8E-05**	2.34
228	Industrial Worker (Future)	< 1	**1.3E-05**	0.37
Underground/Tanks—See Chapter 7				
27	Industrial Worker (Future)	n/a[2]	n/a[2]	n/a[2]
76	Industrial Worker (Future)	< 1	**3.2E-05**	< 0.1
165	Industrial Worker (Future)	< 1	***2.3E-04***	5.26
170	Industrial Worker (Future)	< 1	**1.3E-06**	0.08
Chromium Areas—See Chapter 8				
158	Industrial Worker (Future)	< 1	**2.1E-05**	0.16
169	Industrial Worker (Future)	< 1	***1.6E-04***	0.38
Soils/Rubble Piles—See Chapter 9				
19	Industrial Worker (Future)	< 1	**8.8E-05**	n/a[1]
138	Industrial Worker (Future)	< 1	**1.7E-05**	n/a[1]

Table 12.6. Summary of Direct Contact Total HI, Total ELCR, and Total Doses for the Soils OU SWMUs/AOCs by Grouping (Continued)

		Direct Contact*		
SWMU/AOC	**Scenario**	**Total HI**	**Total ELCR**	**Total Dose (mrem)**
180	Teen Recreational User	< 1	**4.3E-05**	n/a[1]
181	Teen Recreational User	< 1	< 1E-06	n/a[1]
195	Teen Recreational User	< 1	**9.3E-06**	< 0.1
486	Teen Recreational User	< 1	**4.2E-06**	0.37
487	Teen Recreational User	< 1	**3.4E-06**	0.30
492	Teen Recreational User	< 1	***2.1E-04***	5.14
493	Industrial Worker (Future)	< 1	**1.7E-05**	0.29
517	Industrial Worker (Future)	< 1	**1.1E-05**	0.46
541	Teen Recreational User	< 1	***3.6E-04***	13.83
561	Teen Recreational User	< 1	***1.4E-04***	5.51
562	Teen Recreational User	< 1	**7.8E-05**	7.75
563	Teen Recreational User	< 1	**4.5E-06**	0.16
564	Teen Recreational User	< 1	**3.4E-05**	0.27
567	Teen Recreational User	< 1	< 1E-06	< 0.1
Scrap Yards—See Chapter 10				
14	Industrial Worker (Future)	< 1	***9.9E-04***	19.41
518	Industrial Worker (Future)	< 1	***6.6E-04***	< 0.1
520	Industrial Worker (Future)	< 1	**1.9E-05**	0.34
PCB Areas—See Chapter 11				
57/81	Industrial Worker (Future)	**1.17**	***8.8E-04***	< 0.1
153	Industrial Worker (Future)	< 1	**4.2E-06**	n/a[1]
156	Industrial Worker (Future)	< 1	**5.9E-06**	< 0.1
160	Industrial Worker (Future)	< 1	< 1E-06	n/a[1]
163	Industrial Worker (Future)	< 1	**4.4E-06**	n/a[1]
219	Industrial Worker (Future)	< 1	**5.6E-06**	< 0.1
488	Industrial Worker (Future)	< 1	**6.8E-05**	0.18

For each SWMU, the Total HI, Total ELCR, and total dose from the EU showing the highest result is presented.
Bold indicates Total HI > 1 or Total ELCR > 1E-06; ***bold italics*** indicates Total ELCR > 1E-04.
n/a[1] = Not applicable because total dose was not assessed because there were no radiological COPCs for the SWMU.
n/a[2] = Not applicable because SWMU is gravel-covered, and no surface soil samples are available to characterize risk for direct contact to the industrial worker.
* For direct contact, future industrial worker for SWMUs/AOCs inside the limited area and the teen recreational user for SWMUs/AOCs outside the limited area are presented. Total HI and Total ELCR represent the cumulative value across all exposure routes assessed within this BHHRA (i.e., incidental ingestion, dermal contact, inhalation, and external exposure).
Only total dose above 0.1 mrem is summarized.

The reasonably anticipated future use of areas containing SWMUs/AOCs outside the limited area is recreational, specifically hunting. At this time, for the recreational scenario, only the teen recreational user has been assessed. Although some contact with soils would be expected during hunting, the exposure duration, frequency, clothing worn, etc., would limit these intakes. In addition, these activities are unlikely to focus on small areas. The more typical exposure scenario at Paducah would include ingestion of game; this evaluation (consumption of fish and/or game) was not part of this BHHRA. Characterization of risks from this pathway in earlier risk assessments prepared for PGDP shows that risks and hazards from game ingestion are lower than those from direct contact with contaminated soil (DOE 2008a).

Following are the uncertainties affecting the estimation of ELCR and HI in the human health risk assessment for the Soils OU RI.

- The range of background was not considered beyond the initial screening against site-specific background.

- Overly conservative dermal toxicity factors potentially lead to an overestimation of risk.

- Arithmetic average lead concentration is compared to the NAL to determine if additional risk analysis is needed, potentially leading to missed lead exposure.

- Concentration of total cancerous PAHs was used to estimate risk, and the minimum detection limit of the PAHs with toxicity equivalence factors was used when PAHs were not detected.

- Some detection limits for XRF data are above background concentrations and NALs; the COPCs identified using these data are expected to overstate the presence of these metals.

- For those constituents that never were detected within an EU, even if the detection limit is greater than the NAL, the constituent was not considered a COPC.

- For determining COPCs, maximum detected values were screened against background values presented in the Risk Methods Document regardless of analytical method used (DOE 2011a). For uranium-238, this presents an uncertainty with respect to those samples analyzed using nitric extraction. The adjusted background value for uranium-238 is lower that the value used to screen.

- UCL concentrations were used as EPCs if there were a sufficient number of samples and distinct results to calculate a UCL. This likely will lead to an overestimation of actual exposure because receptors are assumed to be exposed to the UCL concentration for the entire exposure duration.

- Conservative (i.e., health protective) exposure factors are used when information available is limited in the form of using RME assumptions, per the Risk Methods Document (DOE 2011a). This may result in an overestimation of potential risk.

- Many of the SWMUs/AOCs evaluated in this assessment are very small, and the assumptions used for the levels of exposures (duration, frequency) overstate potential chronic exposures in these units.

- The risk assessment does not consider that concentrations of some COCs may be lower or higher in the future because of processes such as degradation and attenuation.

- Additivity of multiple chemicals is assumed. Whether assuming additivity can lead to an underestimation or overestimation of risk is unknown.

- Most of the assumptions about exposure and toxicity used in the BHHRA are representative of statistical upper-bounds or even maximums for each parameter. The result of combining several such upper-bound assumptions is that the final estimate of potential exposure or potential risk is conservative.

Ecological Risk Considerations

The comparison of maximum concentrations in surface soils to ecological screening levels for these SWMUs/AOCs identifies contaminants of potential ecological concern (COPEC), but does not accurately reflect the limited habitat, SWMU/AOC size, or other factors that may provide risk managers with a framework to prioritize these issues. The following observations were made as summarized on Table 12.7.

Table 12.7. Soils OU Ecological Risk by SWMU/AOC

Group	Group Name	Description	SWMU	Area Acres	Ground Cover	Near a Surface Water Body?	Total HI (max)	Priority COPECs	Background (mg/kg)[a]	Maximum or ½ Detection Limit (mg/kg)	Soil ESV (mg/kg)	HQ (max)
1	Former Facility	Oil Landfarm (disposal of waste oil)	1	2.29	grass	Yes	2008	Cadmium	2.10E-01	6.50E+00	3.60E-01	18
								Lead	3.60E+01	3.23E+02	1.10E+01	29
								Mercury	2.00E-01	7.70E+00	1.00E-01	77
								PCB, Total	n/a	3.50E+01	2.00E-02	1750
								Phenol	n/a	1.80E+00	5.00E-02	36
								Selenium	8.00E-01	9.75E+00	5.20E-01	19
								Silver	2.30E+00	4.25E+01	4.20E+00	10
								Trichloroethene	n/a	1.50E-02	1.00E-03	15
		Kellogg Building Site—Septic System/Leach Field	99B	0.34	mostly gravel with grass over the small eastern section	Yes	127	Mercury	2.00E-01	9.53E+00	1.00E-01	95
								Zinc	6.50E+01	4.72E+02	4.60E+01	10
		McGraw Construction Facilities	194	41.7	wooded area, mix of mostly soil/grass, and concrete/buildings	Yes	1152	Antimony	2.10E-01	1.00E+01	2.70E-01	37
								Lead	3.60E+01	3.58E+02	1.10E+01	33
								Manganese	1.50E+03	4.67E+03	2.20E+02	21
								Mercury	2.00E-01	8.92E+00	1.00E-01	89
								PCB, Total	n/a	1.80E+01	2.00E-02	900
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
								Zinc	6.50E+01	6.40E+02	4.60E+01	14
		Septic System	196	0.4156	grassy	No	186	Nickel	2.10E+01	5.56E+02	3.80E+01	15
								PCB, Total	n/a	2.50E+00	2.00E-02	125
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
		Septic Tank	489	0.02082	gravel	No	29	Selenium	8.00E-01	1.00E+01	5.20E-01	19
		Aluminum Slag Reacting Area	531	0.21	gravel	No	152	Lead	3.60E+01	5.31E+02	1.10E+01	48
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
								Zinc	6.50E+01	2.45E+03	4.60E+01	53

Table 12.7. Soils OU Ecological Risk by SWMU/AOC (Continued)

Group	Group Name	Description	SWMU	Area Acres	Ground Cover	Near a Surface Water Body?	Total HI (max)	Priority COPECs	Background (mg/kg)[a]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
1	Storage Area	TSCA Waste Storage Facility	200	0.81	mostly soil/grass with a few patches of gravel	No	251	Mercury	2.00E-01	6.71E+00	1.00E-01	67
								PCB, Total	n/a	2.60E+00	2.00E-02	130
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
		Radiological Contamination Area	212	0.09	grass/soil/gravel mix to all gravel	No	180	Antimony	2.10E-01	4.87E+00	2.70E-01	18
								PCB, Total	n/a	2.50E+00	2.00E-02	125
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
		DMSA OS-02	213	0.16258	grassy	Yes	168	PCB, Total	n/a	2.50E+00	2.00E-02	125
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
		DMSA OS-03	214	0.01355	mostly grassy/ some gravel	Yes	29	Selenium	8.00E-01	1.00E+01	5.20E-01	19
		DMSA OS-04	215	0.01	gravel	No	46	Selenium	8.00E-01	1.00E+01	5.20E-01	19
								Zinc	6.50E+01	5.73E+02	4.60E+01	12
		C-206, OS-05	216	0.027	grassy	No	34	Selenium	8.00E-01	1.00E+01	5.20E-01	19
		DMSA OS-06	217	0.98	mostly gravel	No	218	Antimony	2.10E-01	1.00E+01	2.70E-01	37
								Mercury	2.00E-01	8.59E+00	1.00E-01	86
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
								Uranium	4.90E+00	1.00E+02	5.00E+00	20
								Zinc	6.50E+01	5.89E+02	4.60E+01	13
		DMSA OS-10	221	0.21	mostly gravel to grass/soil mix	No	168	PCB, Total	n/a	2.50E+00	2.00E-02	125
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
		DMSA OS-11	222	0.05279	grassy	No	176	PCB, Total	n/a	2.50E+00	2.00E-02	125
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
								Uranium	4.90E+00	5.86E+01	5.00E+00	12
		DMSA OS-16	227	1.28	mostly gravel	Yes	2887	Mercury	2.00E-01	8.41E+00	1.00E-01	84
								Nickel	2.10E+01	6.53E+02	3.80E+01	17
								PCB, Total	n/a	5.28E+01	2.00E-02	2641
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
								Uranium	4.90E+00	4.38E+02	5.00E+00	88
		DMSA OS-17	228	0.23	mostly gravel with some soil/grass	No	156	Cadmium	2.10E-01	3.90E+00	3.60E-01	11
								Mercury	2.00E-01	9.37E+00	1.00E-01	94
								Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table 12.7. Soils OU Ecological Risk by SWMU/AOC (Continued)

Group	Group Name	Description	SWMU	Area Acres	Ground Cover	Near a Surface Water Body?	Total HI (max)	Priority COPECs	Background (mg/kg)[a]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
2	Underground/ Tank	Acid Neutralization Tank	27	0.0027	concrete/gravel	No	n/a	None				
		Sulfuric Acid Storage Tank	76	0.02	mostly gravel	No	155	PCB, Total	n/a	2.50E+00	2.00E-02	125
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
		Pipeline and Vault Soil Contamination	165	0.49	mostly soil/grass with gravel and concrete pavement	Yes	2737	Antimony	2.10E-01	5.00E+00	2.70E-01	19
								PCB, Total	n/a	5.10E+01	2.00E-02	2550
								Selenium	8.00E-01	1.25E+01	5.20E-01	24
								Silver	2.30E+00	8.33E+01	4.20E+00	20
								Toluene	n/a	3.05E-01	1.00E-02	31
								Uranium	4.90E+00	2.68E+02	5.00E+00	54
		Acetylene Building Drain Pits	170	0.0029	mostly concrete	No	n/a	None				
2	Chromium Areas	Chilled Water System Leak Site	158	0.06	soil/grass, soil/gravel mix, and concrete pavement	Yes	167	Mercury	2.00E-01	1.05E+01	1.00E-01	105
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
		Hydrogen Fluoride Vent Surge Protection Tank	169	0.002	mostly soil/grass with a hint of gravel	No	724	Antimony	2.10E-01	1.02E+01	2.70E-01	38
								Copper	1.90E+01	3.74E+02	2.80E+01	13
								Lead	3.60E+01	1.54E+02	1.10E+01	14
								Mercury	2.00E-01	7.87E+00	1.00E-01	79
								Nickel	2.10E+01	5.49E+02	3.80E+01	14
								PCB, Total	n/a	1.00E+01	2.00E-02	500
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
								Uranium	4.90E+00	5.03E+01	5.00E+00	10
								Zinc	6.50E+01	4.73E+02	4.60E+01	10

Table 12.7. Soils OU Ecological Risk by SWMU/AOC (Continued)

Group	Group Name	Description	SWMU	Area Acres	Ground Cover	Near a Surface Water Body?	Total HI (max)	Priority COPECs	Background (mg/kg)[a]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
2	Soil/ Rubble Piles	HF Neutralization Lagoon	19	0.04419	soil/grass	No	31	None				
		Southside Berm	138	0.91754	grassy	No	451	Antimony	2.10E-01	7.34E+00	2.70E-01	27
								Cadmium	2.10E-01	7.30E+00	3.60E-01	20
								Lead	3.60E+01	2.81E+02	1.10E+01	26
								Mercury	2.00E-01	2.13E+01	1.00E-01	213
								PCB, Total	n/a	2.50E+00	2.00E-02	125
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
		Outdoor Firing Range	180	2.21	soil/grass mix with gravel/soil	No	322	Lead	3.60E+01	1.99E+03	1.10E+01	181
								Mercury	2.00E-01	8.28E+00	1.00E-01	83
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
		Outdoor Firing Range (PGDP)	181	0.50891	grassy	Yes	39	Antimony	2.10E-01	4.17E+00	2.70E-01	15
		Curlee Road Contaminated Soil Mounds	195	9.70968	grassy	Yes	243	Mercury	2.00E-01	5.00E+00	1.00E-01	50
								PCB, Total	n/a	2.50E+00	2.00E-02	125
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
								Vanadium	3.80E+01	7.97E+01	7.80E+00	10
		Rubble Pile WKWMA	486	0.069	grassy	No	n/a	None				
		Rubble Pile WKWMA	487	0.22	grassy	No	n/a	None				
		Contaminated Soil Area	492	0.04664	grassy	Yes	2641	Chromium	1.60E+01	1.04E+03	2.60E+01	40
								PCB, Total	n/a	4.41E+01	2.00E-02	2205
								Uranium	4.90E+00	1.77E+03	5.00E+00	354
								Zinc	6.50E+01	6.62E+02	4.60E+01	14
		Concrete Rubble Piles	493	0.12949	concrete piles	Yes	67	Manganese	1.50E+03	3.55E+03	2.20E+02	16
								PCB, Total	n/a	2.60E-01	2.00E-02	13
		Rubble and debris, erosion control fill area	517	0.01	concrete rubble with soil	Yes	68	PCB, Total	n/a	5.00E-01	2.00E-02	25
								Zinc	6.50E+01	1.25E+03	4.60E+01	27
		Contaminated Soil Area	541	2	soil/grass mix with trees	Yes	8945	Chromium	1.60E+01	3.35E+03	2.60E+01	129
								HMW PAHs	n/a	1.10E+01	1.10E+00	10
								PCB, Total	n/a	9.40E+01	2.00E-02	4700
								Uranium	4.90E+00	2.02E+04	5.00E+00	4040
								Zinc	6.50E+01	1.09E+03	4.60E+01	24

Table 12.7. Soils OU Ecological Risk by SWMU/AOC (Continued)

Group	Group Name	Description	SWMU	Area Acres	Ground Cover	Near a Surface Water Body?	Total HI (max)	Priority COPECs	Background (mg/kg)[a]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
2	Soil/ Rubble Piles	Soil Pile I	561	9.45	soil/grass mix with trees	Yes	5544	Antimony	2.10E-01	2.20E+01	2.70E-01	81
								Boron	n/a	2.34E+01	5.00E-01	47
								Chromium	1.60E+01	1.37E+03	2.60E+01	53
								Lead	3.60E+01	2.25E+02	1.10E+01	20
								Manganese	1.50E+03	5.23E+03	2.20E+02	24
								PCB, Total	n/a	7.90E+01	2.00E-02	3950
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
								Thallium	2.10E-01	1.00E+01	1.00E+00	10
								Uranium	4.90E+00	6.41E+03	5.00E+00	1282
								Vanadium	3.80E+01	8.69E+01	7.80E+00	11
								Zinc	6.50E+01	1.13E+03	4.60E+01	25
		Soil Piles C, D, E, F, G, H, J, K, and P in Subunit 1	562	0.11	soil/grass mix with trees	Yes	182	PCB, Total	n/a	2.50E+00	2.00E-02	125
								Uranium	4.90E+00	2.08E+02	5.00E+00	42
		Soil Piles 20, BW, and CC in Subunit 4	563	0.100	soil/grass mix with trees	Yes	65	Chromium	1.60E+01	2.85E+02	2.60E+01	11
								PCB, Total	n/a	7.40E-01	2.00E-02	37
		Soils Pile AT in Subunit 5	564	0.0012	soil/grass mix with trees	Yes	153	PCB, Total	n/a	1.93E+00	2.00E-02	97
								Uranium	4.90E+00	5.83E+01	5.00E+00	12
								Vanadium	3.80E+01	8.06E+01	7.80E+00	10
		Contaminated Soil Area K013	567	1.7172	soil/grass mix with trees	No	16	None				

Table 12.7. Soils OU Ecological Risk by SWMU/AOC (Continued)

Group	Group Name	Description	SWMU	Area Acres	Ground Cover	Near a Surface Water Body?	Total HI (max)	Priority COPECs	Background (mg/kg)[a]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
3	Scrap Yards	E Scrap Yard	14	5.75	gravel with a soil/grass mix	Yes	2123	Antimony	2.10E-01	4.30E+00	2.70E-01	16
								Cadmium	2.10E-01	3.90E+00	3.60E-01	11
								Chromium	1.60E+01	8.98E+02	2.60E+01	35
								Copper	1.90E+01	1.10E+03	2.80E+01	39
								Lead	3.60E+01	1.49E+02	1.10E+01	14
								Manganese	1.50E+03	2.67E+03	2.20E+02	12
								Mercury	2.00E-01	4.37E+01	1.00E-01	437
								Molybdenum	n/a	2.87E+01	2.00E+00	14
								Nickel	2.10E+01	2.67E+03	3.80E+01	70
								PCB, Total	n/a	1.00E+01	2.00E-02	500
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
								Uranium	4.90E+00	4.60E+03	5.00E+00	920
								Zinc	6.50E+01	7.37E+02	4.60E+01	16
		Field south of P1 yard	518	0.81	soil/grass and gravel	No	476	HMW PAHs	n/a	1.70E+02	1.10E+00	155
								PCB, Total	n/a	1.64E+00	2.00E-02	82
								Selenium	8.00E-01	8.85E+00	5.20E-01	17
								Uranium	4.90E+00	1.00E+03	5.00E+00	200
		Scrap Material	520	2.89	mostly gravel and some soil/grass patches	Yes	340	Antimony	2.10E-01	1.00E+01	2.70E-01	37
								Mercury	2.00E-01	1.19E+01	1.00E-01	119
								Nickel	2.10E+01	8.10E+02	3.80E+01	21
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
								Uranium	4.90E+00	5.00E+02	5.00E+00	100

Table 12.7. Soils OU Ecological Risk by SWMU/AOC (Continued)

Group	Group Name	Description	SWMU	Area Acres	Ground Cover	Near a Surface Water Body?	Total HI (max)	Priority COPECs	Background (mg/kg)[a]	Maximum (mg/kg)	Soil ESV (mg/kg)	HQ (max)
3	PCB Areas	PCB Spill Site	81	0.26	gravel/soil/ grass with gravel driveways, and concrete pads	No	19948	Antimony	2.10E-01	6.55E+00	2.70E-01	24
								Mercury	2.00E-01	8.33E+00	1.00E-01	83
								PCB, Total		3.70E+02	2.00E-02	18500
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
								Uranium	4.90E+00	6.50E+03	5.00E+00	1300
		PCB Soil Contamination	153	0.6	gravel	No	152	PCB, Total		2.50E+00	2.00E-02	125
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
		PCB Soil Contamination	156	0.46	gravel	No	274	Manganese	1.50E+03	2.83E+03	2.20E+02	13
								Mercury	2.00E-01	9.87E+00	1.00E-01	99
								PCB, Total		2.50E+00	2.00E-02	125
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
		Cylinder Yard (PCB soils) Spoils	160	0.11	gravel/soil/ grass mix with concrete pads	No	27	Selenium	8.00E-01	1.00E+01	5.20E-01	19
		HVAC Piping System (soil backfill from C-611)	163	0.08	soil/grass mix	No	66	Antimony	2.10E-01	1.00E+01	2.70E-01	37
								Selenium	8.00E-01	1.00E+01	5.20E-01	19
		DMSA OS-08	219	0.038	mostly concrete	No	30	Selenium	8.00E-01	1.00E+01	5.20E-01	19
		PCB Contamination Area	488	0	soil/grass	No	547	PCB, Total		1.03E+01	2.00E-02	515
								Selenium	8.00E-01	1.00E+01	5.20E-01	19

Table is from Appendix E, Table E.1.

[a] Background values are for surface soil taken from DOE 2011a; ESV = ecological screening value (from DOE 2010b); HI = hazard index; HQ = hazard quotient; PAH = polycyclic aromatic hydrocarbon; PCB = polychlorinated biphenyl; n/a = not applicable

HMW PAHs = high molecular weight PAHs [benz(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; chrysene; benzo(ghi)perylene; dibenz(a,h)anthracene; and indeno(1,2,3-cd)pyrene]

The two primary risk drivers for ecological risk are the same as those for human health:

- **Total PCBs.** The maximum PCB concentration was greater than 10 times the ESVs of 0.02 mg/kg at 28 SWMUs, with a combined area of about 78 acres. The largest of these was SWMU 194 (41.7 acres). Runoff from this SWMU discharges to Outfall 017. The maximum concentration for these 28 SWMUs was 370 mg/kg at SWMU 81. There may be some bias when using field data because PCBs were not detected in some areas. The ESV is 0.02 mg/kg and is well below the detection limit for field screening; therefore, the risk may be overstated, since one-half the detection limit is used for non-detected constituents.

- **Uranium.** The maximum uranium concentration was above 10 times the ESV of 5 mg/kg (background is 4.9 mg/kg) at 8 SWMUs, representing a combined area of 19 acres. The highest concentration was 20,200 mg/kg at AOC 541 (2 acres).

<u>**Other COPECs/Uncertainties**</u>

- **Metals.** As indicated in the Appendix B, there may be uncertainties when using XRF data to estimate risks, particularly when comparing with conservative screening values. Two metals (mercury and selenium) show exceedances of the ESVs at numerous SWMUs. Figure 12.1 is an illustration of the distribution of mercury by method and by SWMU to highlight this uncertainty when making decisions for particular SWMUs during the FS.

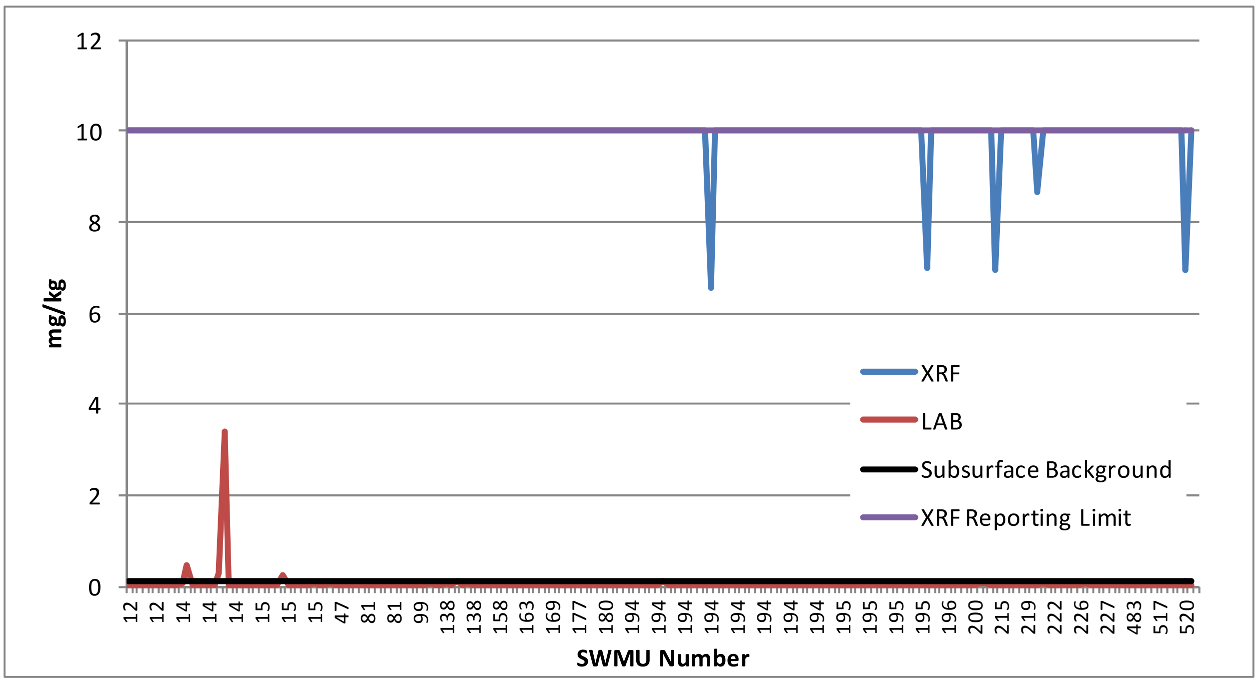

Figure 12.1. Distribution of Mercury by Method and SWMU/AOC

12.4 GOAL 4: SUPPORT EVALUATION OF REMEDIAL ALTERNATIVES

The representative data set used for the SWMUs/AOCs is sufficient to support decision making and indicates that an FS is appropriate for 49 of 50 SWMUs/AOCs. Other information was gathered in support of the evaluation of remedial alternatives to include infrastructure issues, extent of contamination, and verification of site descriptions. Possible remedial technologies applicable for these units are, as discussed in the Work Plan, posting, fencing (or other means of limiting access), treatment, and excavation. Chapters 5-11 contain the SWMU/AOC specific details.

Remedial Goal Options

All SWMUs/AOCs, with the exception of SWMU 27, require further review in the FS to evaluate the appropriate options to address current or potential future risks/hazards. The BHHRA in this RI characterized the risks and hazards (i.e., Total ELCR and Total HI, respectively) potentially resulting from exposure to contaminants in soil.

RGOs were calculated for each COC, as determined by the conclusions of the BHHRA. These RGOs should not be interpreted as being cleanup goals, but as risk-based values that may be used to guide the development of cleanup goals by risk managers. Cleanup goals will be determined in later decision documents. COCs and RGOs are for direct contact and are presented for the future industrial worker, excavation worker, and hypothetical future resident for the SWMUs inside the Limited Area and for the outdoor worker, excavation worker, hypothetical future resident, and teen recreator for the SWMUs/AOCs outside the Limited Area. These COCs and RGOs are shown in Table 12.8. SWMU/AOC-specific revised preliminary remediation goals consistent with RAOs will be developed from the RGOs, as appropriate, as part of the Soils OU FS.

Table 12.8. Consolidated RGOs for the Soils OU SWMUs/AOCs

COC	RGO at ELCR=1E-6	RGO at ELCR=1E-5	RGO at ELCR=1E-4	RGO at HI=0.1	RGO at HI=1	RGO at HI=3	Units
Future Industrial Worker							
Arsenic	9.97E-01	9.97E+00	9.97E+01	n/a	n/a	n/a	mg/kg
Cesium-137	8.61E-02	8.61E-01	8.61E+00	n/a	n/a	n/a	pCi/g
Chromium	3.02E+01	3.02E+02	3.02E+03	n/a	n/a	n/a	mg/kg
Neptunium-237	2.71E-01	2.71E+00	2.71E+01	n/a	n/a	n/a	pCi/g
PCB, Total	1.88E-01	1.88E+00	1.88E+01	n/a	n/a	n/a	mg/kg
Technetium-99	3.61E+02	3.61E+03	3.61E+04	n/a	n/a	n/a	pCi/g
Thorium-230	1.38E+01	1.38E+02	1.38E+03	n/a	n/a	n/a	pCi/g
Total PAH	5.92E-02	5.92E-01	5.92E+00	n/a	n/a	n/a	mg/kg
Uranium	n/a	n/a	n/a	6.00E+02	6.00E+03	1.80E+04	mg/kg
Uranium-234	1.89E+01	1.89E+02	1.89E+03	n/a	n/a	n/a	pCi/g
Uranium-235	3.95E-01	3.95E+00	3.95E+01	n/a	n/a	n/a	pCi/g
Uranium-238	1.70E+00	1.70E+01	1.70E+02	n/a	n/a	n/a	pCi/g
Outdoor Worker Exposed to Surface Soil							
Americium-241	1.73E+00	1.73E+01	1.73E+02	n/a	n/a	n/a	pCi/g
Arsenic	4.15E-01	4.15E+00	4.15E+01	6.65E+00	6.65E+01	1.99E+02	mg/kg
Cesium-137	1.15E-01	1.15E+00	1.15E+01	n/a	n/a	n/a	pCi/g
Chromium	4.08E+01	4.08E+02	4.08E+03	n/a	n/a	n/a	mg/kg
Cobalt	n/a	n/a	n/a	8.53E+00	8.53E+01	2.56E+02	mg/kg
Iron	n/a	n/a	n/a	2.01E+04	2.01E+05	6.04E+05	mg/kg
Neptunium-237	3.28E-01	3.28E+00	3.28E+01	n/a	n/a	n/a	pCi/g
PCB, Total	1.62E-01	1.62E+00	1.62E+01	n/a	n/a	n/a	mg/kg
Thallium	n/a	n/a	n/a	2.30E+00	2.30E+01	6.91E+01	mg/kg
Thorium-230	2.20E+00	2.20E+01	2.20E+02	n/a	n/a	n/a	pCi/g
Total PAH	4.85E-02	4.85E-01	4.85E+00	n/a	n/a	n/a	mg/kg
Uranium	n/a	n/a	n/a	8.61E+01	8.61E+02	2.58E+03	mg/kg
Uranium-234	2.83E+00	2.83E+01	2.83E+02	n/a	n/a	n/a	pCi/g
Uranium-235	4.55E-01	4.55E+00	4.55E+01	n/a	n/a	n/a	pCi/g
Uranium-238	1.17E+00	1.17E+01	1.17E+02	n/a	n/a	n/a	pCi/g
Excavation Worker							
Antimony	n/a	n/a	n/a	3.68E+01	3.68E+02	1.10E+03	mg/kg
Arsenic	3.32E+01	3.32E+02	3.32E+03	2.12E+01	2.12E+02	6.37E+02	mg/kg
Cadmium	n/a	n/a	n/a	6.50E+01	6.50E+02	1.95E+03	mg/kg
cis-1,2-Dichloroethene	n/a	n/a	n/a	1.86E+01	1.86E+02	5.58E+02	mg/kg
Cobalt	n/a	n/a	n/a	2.73E+01	2.73E+02	8.18E+02	mg/kg
Manganese	n/a	n/a	n/a	7.76E+03	7.76E+04	2.33E+05	mg/kg
PCB, Total	1.30E+01	1.30E+02	1.30E+03	n/a	n/a	n/a	mg/kg
Thallium	n/a	n/a	n/a	7.35E+00	7.35E+01	2.21E+02	mg/kg
Thorium-230	1.76E+02	1.76E+03	1.76E+04	n/a	n/a	n/a	pCi/g
Total PAH	3.88E+00	3.88E+01	3.88E+02	n/a	n/a	n/a	mg/kg
Trichloroethene	4.96E+00	4.96E+01	4.96E+02	6.24E+00	6.24E+01	1.87E+02	mg/kg
Uranium	n/a	n/a	n/a	2.75E+02	2.75E+03	8.25E+03	mg/kg
Uranium-234	2.26E+02	2.26E+03	2.26E+04	n/a	n/a	n/a	pCi/g
Uranium-235	3.64E+01	3.64E+02	3.64E+03	n/a	n/a	n/a	pCi/g
Uranium-238	9.38E+01	9.38E+02	9.38E+03	n/a	n/a	n/a	pCi/g

Table 12.8. Consolidated RGOs for the Soils OU SWMUs/AOCs (Continued)

COC	RGO at ELCR=1E-6	RGO at ELCR=1E-5	RGO at ELCR=1E-4	RGO at HI=0.1	RGO at HI=1	RGO at HI=3	Units
Teen Recreational User							
Cesium-137	4.10E-01	4.10E+00	4.10E+01	n/a	n/a	n/a	pCi/g
Uranium-235	1.90E+00	1.90E+01	1.90E+02	n/a	n/a	n/a	pCi/g
Uranium-238	8.56E+00	8.56E+01	8.56E+02	n/a	n/a	n/a	pCi/g
Future Hypothetical Resident							
Aluminum	n/a	n/a	n/a	7.27E+03	7.27E+04	2.18E+05	mg/kg
Americium-241	1.09E+00	1.09E+01	1.09E+02	n/a	n/a	n/a	pCi/g
Antimony	n/a	n/a	n/a	3.13E+00	3.13E+01	9.39E+01	mg/kg
Arsenic	2.35E-01	2.35E+00	2.35E+01	1.64E+00	1.64E+01	4.93E+01	mg/kg
Bis(2-ethylhexyl)phthalate	1.24E+01	1.24E+02	1.24E+03	n/a	n/a	n/a	mg/kg
Cadmium	n/a	n/a	n/a	4.90E+00	4.90E+01	1.47E+02	mg/kg
Carbazole	8.66E+00	8.66E+01	8.66E+02	n/a	n/a	n/a	mg/kg
Cesium-137	1.71E-02	1.71E-01	1.71E+00	n/a	n/a	n/a	pCi/g
Chromium	1.55E+01	1.55E+02	1.55E+03	n/a	n/a	n/a	mg/kg
Cobalt	n/a	n/a	n/a	2.30E+00	2.30E+01	6.91E+01	mg/kg
Copper	n/a	n/a	n/a	3.13E+02	3.13E+03	9.39E+03	mg/kg
Iron	n/a	n/a	n/a	5.48E+03	5.48E+04	1.64E+05	mg/kg
Manganese	n/a	n/a	n/a	5.34E+02	5.34E+03	1.60E+04	mg/kg
Mercury	n/a	n/a	n/a	2.35E+00	2.35E+01	7.04E+01	mg/kg
Naphthalene	1.14E+00	1.14E+01	1.14E+02	n/a	n/a	n/a	mg/kg
Neptunium-237	5.40E-02	5.40E-01	5.40E+00	n/a	n/a	n/a	pCi/g
Nickel	n/a	n/a	n/a	1.44E+02	1.44E+03	4.33E+03	mg/kg
PCB, Total	6.38E-02	6.38E-01	6.38E+00	n/a	n/a	n/a	mg/kg
Plutonium-239/240	2.78E+00	2.78E+01	2.78E+02	n/a	n/a	n/a	pCi/g
Technetium-99	8.67E+01	8.67E+02	8.67E+03	n/a	n/a	n/a	pCi/g
Thallium	n/a	n/a	n/a	6.26E-01	6.26E+00	1.88E+01	mg/kg
Thorium-230	3.57E+00	3.57E+01	3.57E+02	n/a	n/a	n/a	pCi/g
Total PAH	1.94E-02	1.94E-01	1.94E+00	n/a	n/a	n/a	mg/kg
Uranium	n/a	n/a	n/a	2.34E+01	2.34E+02	7.01E+02	mg/kg
Uranium-234	4.82E+00	4.82E+01	4.82E+02	n/a	n/a	n/a	pCi/g
Uranium-235	7.87E-02	7.87E-01	7.87E+00	n/a	n/a	n/a	pCi/g
Uranium-238	3.46E-01	3.46E+00	3.46E+01	n/a	n/a	n/a	pCi/g
Vanadium	n/a	n/a	n/a	3.91E+01	3.91E+02	1.17E+03	mg/kg
Zinc	n/a	n/a	n/a	2.35E+03	2.35E+04	7.04E+04	mg/kg

n/a = not applicable

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