

**Remedial Action Work Plan
for *In Situ* Source Treatment by Deep Soil Mixing
of the Southwest Groundwater Plume Volatile Organic
Source at the C-747-C Oil Landfarm
(Solid Waste Management Unit 1)
at the Paducah Gaseous Diffusion Plant,
Paducah, Kentucky**



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Paducah, Kentucky**

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Office of Environmental Management

Prepared by
LATA ENVIRONMENTAL SERVICES OF KENTUCKY, LLC
managing the
Environmental Remediation Activities at the
Paducah Gaseous Diffusion Plant
under contract DE-AC30-10CC40020

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CONTENTS

FIGURES	ix
TABLES	ix
ACRONYMS	xi
EXECUTIVE SUMMARY	xv
1. INTRODUCTION	1
1.1 REGIONAL GEOLOGY AND HYDROGEOLOGY	1
1.1.1 Regional Geology	1
1.1.2 Regional Hydrogeology	6
1.2 TREATMENT SITE LOCATION	7
1.3 CONCEPTUAL SITE MODEL	7
2. TREATMENT TECHNOLOGY	15
2.1 <i>IN SITU</i> SOURCE TREATMENT USING DEEP SOIL MIXING DESCRIPTION	15
2.2 APPLICABILITY TO THE PGDP SITE	16
3. TREATMENT SYSTEM OBJECTIVES AND UNCERTAINTY MANAGEMENT	17
3.1 INTERIM REMEDIAL ACTION OBJECTIVES	17
3.2 CRITERIA FOR CEASING REMEDIAL ACTION SYSTEM OPERATIONS	17
4. REMEDIAL ACTION APPROACH	19
4.1 DESIGN	21
4.2 CONSTRUCTION	22
4.3 SAMPLING AND ANALYSIS	24
4.4 OPERATIONS, MAINTENANCE, AND MONITORING	24
4.5 WASTE MANAGEMENT AND DISPOSITION	25
5. PROJECT ORGANIZATION	27
6. PROJECT PLANNING SCHEDULE	31
7. HEALTH AND SAFETY PLAN	33
7.1 INTEGRATED SAFETY MANAGEMENT/ENVIRONMENTAL MANAGEMENT	33
7.1.1 Define Scope of Work	33
7.1.2 Analyze Hazards	33
7.1.3 Develop and Implement Hazard Controls	33
7.1.4 Perform Work Within Controls	34
7.1.5 Feedback and Continuous Improvement	34
7.2 FLOWDOWN TO SUBCONTRACTORS	35
7.3 SUSPENDING/STOPPING WORK	35
7.4 ISMS/EMS BRIEFINGS	35
7.5 KEY PROJECT PERSONNEL AND RESPONSIBILITIES	35
7.6 GENERAL PROJECT HAZARDS	36
7.6.1 Operation of Project Vehicles and Heavy Equipment	36
7.6.2 Tools and Equipment	36
7.6.3 Material and Drum Handling	36

7.6.4	Fire Safety	36
7.6.5	Housekeeping	37
7.6.6	Slips, Trips, and Falls	37
7.6.7	Inclement Weather	37
7.6.8	Head, Eye, Hand, and Foot Hazards.....	37
7.6.9	Temperature Extremes	37
7.6.10	Biological Hazards	37
7.6.11	Noise.....	37
7.7	SITE CONTROL	38
7.8	HAZARD COMMUNICATION	38
7.8.1	Material Safety Data Sheet.....	38
7.8.2	Chemical Inventory	39
7.9	EMERGENCY MANAGEMENT.....	39
7.9.1	Potential Emergencies	39
7.9.2	Fires	39
7.9.3	Spills.....	39
7.9.4	Medical Emergencies	40
7.9.5	Reporting an Emergency	40
7.9.6	Telephone	40
7.9.7	Fire Alarm Pull Boxes.....	40
7.9.8	Radio	40
7.10	ALARM SIGNALS	40
7.10.1	Project-Specific Alarm	40
7.10.2	Evacuation Alarms	40
7.10.3	Radiation Alarms.....	41
7.10.4	Take-Cover Alarms	41
7.10.5	Standard Alerting Tone	41
7.10.6	Evacuation Procedures	41
7.10.7	Sheltering In Place	41
7.10.8	On-Site Relocation	41
7.10.9	Facility Evacuation.....	42
7.10.10	Emergency Equipment	42
7.11	HEAT AND COLD STRESS	42
7.11.1	Heat Stress.....	42
7.11.2	Preventive Measures.....	42
7.11.3	Heat Stress Monitoring.....	43
7.11.4	Cold Stress.....	43
7.11.5	Preventive Measures.....	43
7.11.6	Cold Stress Monitoring	43
7.12	EXPOSURE MONITORING	43
7.12.1	Routine Air Monitoring Requirements.....	44
7.12.2	Site-Specific Air Monitoring Requirements.....	44
7.12.3	Time Integrated Sample Collection.....	44
7.13	RADIOLOGICAL PROTECTION.....	44
7.13.1	Radiation Protection Plan	44
7.13.2	Contractor/Subcontractor Responsibilities.....	45
7.13.3	Site-Specific Radiation Safety Work Practices	45
7.13.4	Radiation Safety Training	46
7.14	HOISTING AND RIGGING PRACTICES.....	46

8.	SAMPLING AND ANALYSIS.....	47
8.1	POSTTREATMENT SAMPLING AND ANALYSIS.....	47
8.1.1	Soil Sampling.....	47
8.1.2	Monitoring Well Construction and Sampling.....	54
8.2	OPERATION AND MAINTENANCE SAMPLING.....	55
8.3	WASTE CHARACTERIZATION SAMPLING AND ANALYSIS PLAN.....	55
8.3.1	Contained-In/Contaminated-With Determinations.....	56
8.3.2	Waste Characterization.....	57
8.3.3	Sampling and Analysis of Waste.....	59
8.3.4	Waste Water Treatment.....	60
9.	QUALITY ASSURANCE PLAN.....	63
10.	DATA MANAGEMENT AND IMPLEMENTATION PLAN.....	65
10.1	INTRODUCTION.....	65
10.1.1	Project Mission.....	65
10.2	DATA MANAGEMENT ACTIVITIES.....	66
10.2.1	Acquire Existing Data.....	66
10.2.2	Plan Data Collection.....	66
10.2.3	Prepare for Field Activities.....	66
10.2.4	Collect Field Data.....	67
10.2.5	Process Field Data.....	67
10.2.6	Collect Field Samples.....	67
10.2.7	Real-Time Process Sampling and Analysis.....	68
10.2.8	Submit Samples for Analysis.....	68
10.2.9	Process Laboratory Analytical Data.....	68
10.2.10	Review Data.....	69
10.2.11	Verify Data.....	69
10.2.12	Coordinate and Perform Data Validation.....	69
10.2.13	Assess Data.....	69
10.2.14	Consolidate, Analyze, and Use Data and Records.....	70
10.2.15	Submit Data to the Paducah OREIS.....	70
10.3	DATA MANAGEMENT INTERACTIONS.....	70
10.4	DATA NEEDS AND SOURCES.....	71
10.4.1	Data Types.....	71
10.4.2	Historical Data.....	71
10.4.3	Field Measurements.....	71
10.4.4	Analytical Data.....	71
10.4.5	Real-time Process Measurements.....	71
10.5	GEOGRAPHIC INFORMATION SYSTEM DATA.....	72
10.6	DATA FORMS/LOGBOOKS.....	72
10.6.1	Field Forms.....	72
10.7	DATA AND DATA RECORDS TRANSMITTALS.....	74
10.7.1	Paducah OREIS Data Transmittals.....	74
10.7.2	Data Records Transmittals.....	74
10.8	DATA MANAGEMENT SYSTEMS.....	74
10.8.1	Paducah PEMS.....	74
10.8.2	Paducah OREIS.....	74
10.8.3	Paducah Analytical Project Tracking System.....	75
10.8.4	Data Acquisition System for Soil Mixing.....	75

10.9	DATA MANAGEMENT TASKS AND ROLES AND RESPONSIBILITIES	75
10.9.1	Data Management Tasks	75
10.9.2	Data Management Roles and Responsibilities	75
11.	ENVIRONMENTAL COMPLIANCE.....	77
11.1	INTRODUCTION	77
11.2	CHEMICAL-SPECIFIC ARARs/TBCs	77
11.3	LOCATION-SPECIFIC ARARs/TBC	77
11.3.1	Protection of Wetlands	77
11.3.2	Protection of Aquatic Ecosystems	78
11.4	ACTION-SPECIFIC ARARs/TBCs	78
11.4.1	Fugitive Dust Emissions.....	78
11.4.2	Toxic Emissions	78
11.4.3	Emissions Estimate	79
11.4.4	Monitoring Well Installation	80
11.4.5	Discharge of Storm Water and Treated Groundwater	80
11.4.6	Hazardous Waste Management	81
11.4.7	PCB Waste Management.....	82
11.4.8	National Emission Standards for Hazardous Air Pollutants.....	82
11.4.9	Transportation	83
11.4.10	Underground Injection Control	83
11.5	SUMMARY OF ARARS.....	84
12.	WASTE MANAGEMENT PLAN	85
12.1	OVERVIEW	85
12.2	WASTE GENERATION AND PLANNING	86
12.2.1	Waste Generation	86
12.2.2	Drill Cuttings from Soil Borings	87
12.2.3	Personal Protective Equipment	88
12.2.4	Purge/Decontamination/Drilling Water.....	88
12.2.5	Sediment and Mud from Separation of Decontamination and Purge Water	89
12.2.6	Treated Groundwater.....	89
12.2.7	Carbon Media and, Ion Exchange Resin, Zeolite Media, and Cloth Filters.....	90
12.2.8	Excavated Soil	90
12.2.9	Excess Zero-Valent Iron and Guar Mixture	94
12.2.10	Process Piping and Equipment Waste	94
12.2.11	Miscellaneous Noncontaminated Clean Trash	94
12.3	WASTE MANAGEMENT ROLES AND RESPONSIBILITIES.....	94
12.3.1	Waste Management Tracking Responsibilities	94
12.3.2	Waste Management Coordinator.....	94
12.3.3	Coordination with Field Crews	95
12.3.4	Coordination with Treatment, Storage, and Disposal Facilities.....	95
12.3.5	Waste Management Training	95
12.4	TRANSPORTATION OF WASTE.....	96
12.4.1	Screening of Analytical Samples	96
12.4.2	Field Screening.....	96
12.4.3	On-Site Laboratory Radiation Screening	96
12.5	SAMPLE RESIDUALS AND MISCELLANEOUS WASTE MANAGEMENT	96
12.6	WASTE MINIMIZATION	96
12.7	HEALTH AND SAFETY ISSUES RELATED TO WASTE ACTIVITIES	97

13. REFERENCES	99
APPENDIX A: MONITORING WELL DESIGN	A-1
APPENDIX B: QUALITY ASSURANCE PROJECT PLAN	B-1
APPENDIX C: ADDENDUM TO THE RAWP	C-1

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APPENDIX C
ADDENDUM TO THE RAWP

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ADDENDUM

Remedial Action Work Plan for In Situ Source Treatment by Deep Soil Mixing of the Southwest Groundwater Plume Volatile Organic Source at the C-747-C Oil Landfarm (Solid Waste Management Unit 1) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/LX/07-1287&D2/A1

Introduction: This addendum documents information developed by the Federal Facility Agreement (FFA) parties for the purposes of implementing additional investigation activities and closing the uncertainties described in the 2013 *Remedial Design Report In Situ Source Treatment Using Deep Soil Mixing for the Southwest Groundwater Plume Volatile Organic Compound Source at the C-747-C Oil Landfarm (Solid Waste Management Unit 1) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/LX/07-1276&D2/R1* (RDR). The RDR indicates the following in Section 1.5, Sequencing with Other Remedies:

Historical photographic documentation analysis performed by the FFA parties of SWMU 1 and information gathered from interviews of past workers at the SWMU 1 Landfarm have identified that activities (captured as images/shadows on air photographs) occurred at SWMU 1 east of the area planned for soil mixing operations. These activities, although unidentified, are not expected to have been actual landfarming of contaminated oil. Information collected to date, including WAG 27 RI test pit descriptions, place two oil landfarm plots in the western one-half of the SWMU 1 area. These activities, however, result in a level of uncertainty in landfarming plot location that cannot be addressed with the available current soil contaminant analytical data. To address this uncertainty, additional investigation activities will be performed in the southern and eastern areas of SWMU 1.

The FFA Parties discussed the scope of sampling activities to investigate this uncertainty during a conference call on March 24, 2014, and the decision rules and sampling strategy contained herein are the result of these discussions.

Purpose: Reduce the uncertainty of the presence of trichloroethene (TCE) and specific degradation products in two areas (to the east and south of the soil mixing area defined in the RDR) where oil landfarm activities may have occurred and that are not part of the currently planned soil mixing area. The FFA parties have agreed that the following sampling approach will provide a sufficient basis to evaluate the two areas for the presence of TCE and specific degradation products, and satisfy any questions concerning uncertainty:

- Drill and sample 3 soil borings in the Solid Waste Management Unit (SWMU) 1 area identified by dark areas in the 1970s Paducah Gaseous Diffusion Plant (PGDP) air photos; and
- Drill and sample 1 soil boring in SWMU 1 in an area adjacent to Test Pit TB3, Waste Area Grouping (WAG) 27 Remedial Investigation Report, Geophysical Survey and Excavation Report, Volume 2, DOE/OR/07-1777&D2.

Boundary: Areas identified on map to 60 ft below ground surface [see Figure C.1 (based on Figure 5 from the RDR)]. Areas correspond to (1) aerial photo depiction of *possible* drum storage location and (2) trenching performed during WAG 27 Remedial Investigation.

Number of Soil Borings: 4 [see Figure C.1 (based on Figure 5 from the RDR)]—The approximate coordinates for planned soil borings are shown in Table 1.

Table 1. SWMU 1 Soil Borings

Soil Boring Number	Approximate Plant Coordinates	
	East	North
001-359	-6,672	-1,741
001-360	-6,706	-1,751
001-361	-6,748	-1,764
001-362	-6,827	-1,779

Drilling Technology: Direct push

Sampling Method: The sampling approach previously was approved in Section 8 of the *Remedial Action Work Plan for In Situ Source Treatment by Deep Soil Mixing of the Southwest Groundwater Plume Volatile Organic Source at the C-747-C Oil Landfarm (Solid Waste Management Unit 1) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/LX/07-1287&D2 (RAWP)*.

1. Continuous soil core in 5-ft increments to the top of the Regional Gravel Aquifer (~ 60 ft to 62 ft).
2. Scan the soil core with the field photoionization detector (PID) by inserting a clean awl through the polyvinyl chloride core liner into the soil creating a small void in the soil core at each 0.5-ft depth increment and immediately scanning the soil core with a PID (using a water separator on the PID sample tube) at each 0.5-ft point of access. Record each PID reading in a field logbook. The field PID measurements will be used to identify sections of the soil core containing higher volatile organic compound (VOC) levels (if present) for subsampling with an En Core® sampler.
3. Cut open the soil core liner. Perform a radiological scan of the soil core if required by the field radiological technician to ensure the safety of the field sample crew.
4. Where the highest PID response is detected, collect a soil subsample for VOC analysis using an En Core® sampler. (12 subsamples per soil boring).
5. If no elevated PID response is measured, collect the soil subsample based on observations of greater sand content, if present and apparent. If no sandy zones

are obvious, collect the soil subsample for (VOC) analysis from the middle point of the length of the soil core.

6. Submit soil subsample to an existing DOE Sample Management Office Laboratory for analysis of the following VOCs, with standard 30-day turnaround:
 - TCE
 - *cis*-1,2-Dichloroethene
 - *trans*-1,2-Dichloroethene
 - Vinyl chloride

Quality assurance and health and safety requirements will be as included in the approved RAWP, DOE/LX/07-1287&D2.

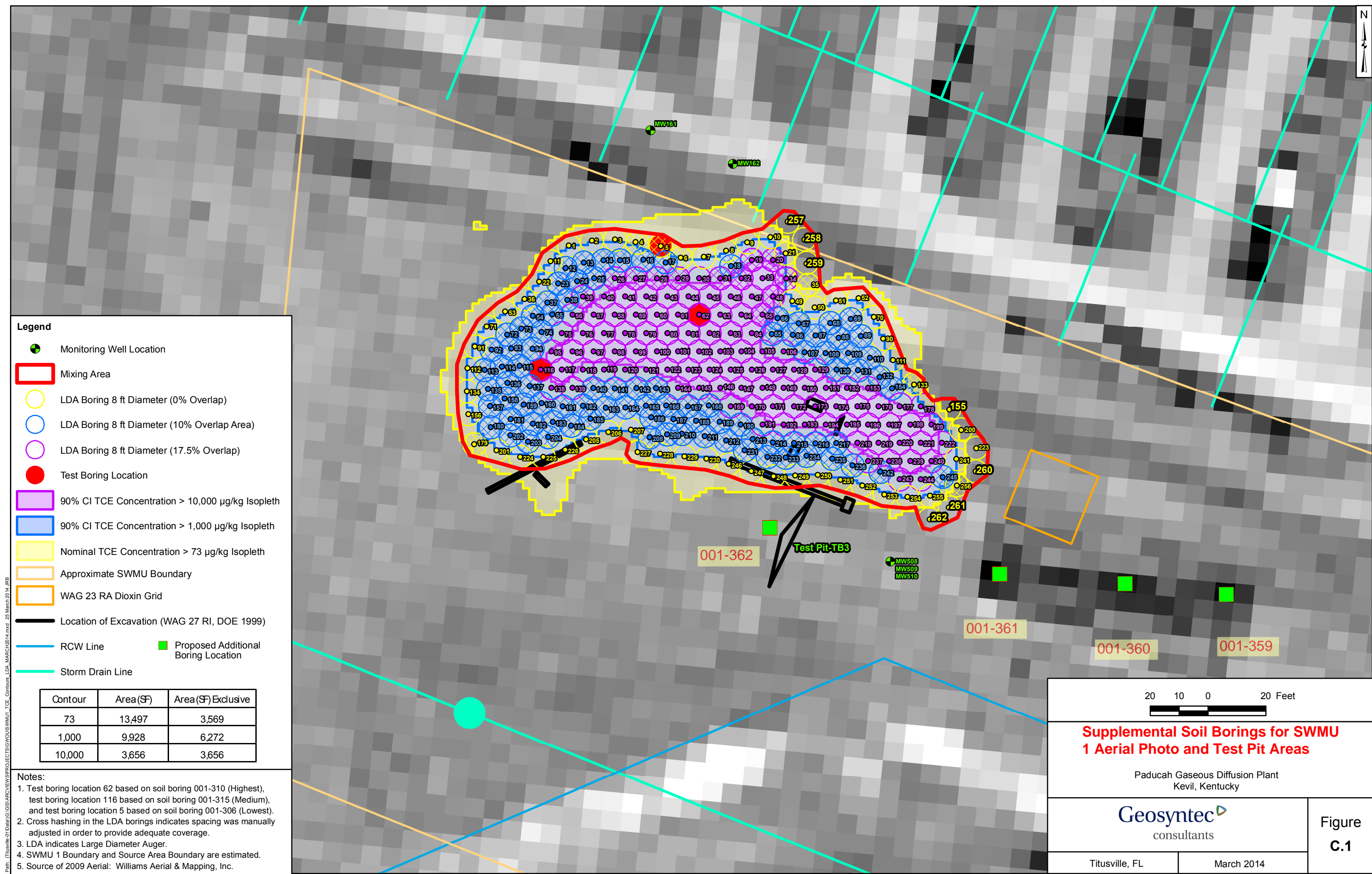
Project

Documentation: The results of this additional sampling will be documented by technical memorandum to FFA parties and inclusion in the post-*Record of Decision for Solid Waste Management Units 1, 211-A, 211-B, and Part of 102 Volatile Organic Compound Sources for the Southwest Groundwater Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0365&D2/R1 (ROD) post-ROD Administrative Record project file.

Decision Rules:

- IF an analysis of soil samples finds average TCE $\geq 1,000$ ppb in any single boring, THEN the FFA parties will reconvene to discuss the results and path forward (e.g., LTM, active remediation, added to the Post-GDP Groundwater Sources Operable Unit project, development of necessary documentation, etc.).
- IF an analysis of soil samples finds average TCE $< 1,000$ ppb and ≥ 75 ppb in any single boring AND any individual result from that boring finds TCE $\geq 1,000$ ppb, THEN the FFA parties will reconvene to discuss the results and path forward (e.g., LTM, active remediation, added to the Post-GDP Groundwater Sources Operable Unit project, development of necessary documentation, etc.).
- IF an analysis of soil samples finds an individual result of TCE $\geq 1,000$ ppb in any single boring, THEN the FFA parties will reconvene to discuss the results and path forward (e.g., LTM, active remediation, added to the Post-GDP Groundwater Sources Operable Unit project, development of necessary documentation, etc.).
- IF an analysis of soil samples finds average TCE $< 1,000$ ppb and ≥ 75 ppb in any single boring and all individual results TCE $< 1,000$ ppb, THEN those areas will be addressed by the action through long-term monitoring consistent with the ROD.
- IF an analysis of soil samples finds average TCE < 75 ppb in any single boring, THEN uncertainty for that boring will be considered addressed and the final remedial action completion report will document that no further CERCLA remedial action is necessary for that boring.

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Legend

- Monitoring Well Location
- Mixing Area
- LDA Boring 8 ft Diameter (0% Overlap)
- LDA Boring 8 ft Diameter (10% Overlap Area)
- LDA Boring 8 ft Diameter (17.5% Overlap)
- Test Boring Location
- 90% CI TCE Concentration > 10,000 µg/kg Isopleth
- 90% CI TCE Concentration > 1,000 µg/kg Isopleth
- Nominal TCE Concentration > 73 µg/kg Isopleth
- Approximate SWMU Boundary
- WAG 23 RA Dioxin Grid
- Location of Excavation (WAG 27 RI, DOE 1999)
- RCW Line
- Storm Drain Line
- Proposed Additional Boring Location

Contour	Area(SF)	Area(SF) Exclusive
73	13,497	3,569
1,000	9,928	6,272
10,000	3,656	3,656

Notes:

- Test boring location 62 based on soil boring 001-310 (Highest), test boring location 116 based on soil boring 001-315 (Medium), and test boring location 5 based on soil boring 001-306 (Lowest).
- Cross hashing in the LDA borings indicates spacing was manually adjusted in order to provide adequate coverage.
- LDA indicates Large Diameter Auger.
- SWMU 1 Boundary and Source Area Boundary are estimated.
- Source of 2009 Aerial: Williams Aerial & Mapping, Inc.

2010020 Feet

Supplemental Soil Borings for SWMU 1 Aerial Photo and Test Pit Areas

Paducah Gaseous Diffusion Plant
Kevil, Kentucky

Geosyntec
consultants

Titusville, FLMarch 2014

Figure C.1

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