

Radionuclides

Americium-241, ^{137}Cs , ^{237}Np , ^{239}Pu , ^{99}Tc , ^{230}Th , and the three uranium isotopes were detected in the soil samples collected from 27 soil borings. Activity for the isotopes ^{241}Am , ^{137}Cs , ^{237}Np , and ^{239}Pu remained less than 0.7 pCi/g, which is slightly above screening levels.

The highest activity for ^{99}Tc was 4.7 pCi/g in a shallow subsurface sample from Boring 400-211. Technetium-99 was detected in only 3 of the 144 samples. Thorium-230 (with 7 detections out of 144 analyses above background) was detected at a maximum activity of 1.8 pCi/g in soil collected from 20 ft bgs at Boring 400-009. The 8-ft-bgs sample from Boring 011-005 contained the highest ^{234}U (one detection) and ^{235}U (one detection) activities of 3.5 and 4.3 pCi/g, respectively. Uranium-238 was detected in 10 of 144 samples at a maximum activity of 4.3 pCi/g. Among the radioisotopes with the highest activities, no systematic distribution was detected.

4.2.5 Sector 5

4.2.5.1 Site History

Location and Physical Description

Sector 5 is located on the southwest corner of the C-400 Building and is bordered by Sector 4 to the east and Sector 6 to the north. It extends 450 ft west of the building, to include three borings west of 10th Street, and continues south of the building. Most borings are located north of Tennessee Avenue and east of 10th Street, with the highest density located along utility lines and the two sets of railroad tracks.

Several utility lines (recirculated water and stormwater) extending north-south are located east of and parallel to 10th Street; another set of utilities extending east-west is located north of Tennessee Avenue. One sanitary line exits the C-400 Building and extends due west between Borings 400-010 and 400-172, and a second sanitary line exits the building and extends south between Borings 400-142 and 400-089 to the main line. Two parallel sets of railroad tracks are located immediately south of the C-400 Building. Aboveground structures include a high tower on a concrete pad west of the C-400 Building and aboveground steam lines.

Practice and Release Information

No practices or processes within Sector 5 are known to have led to past contamination of the soils. Migration of contamination from the adjoining Technetium Storage Tank (SWMU 47) in Sector 6 to the north and the Trichlorethylene Leak Site (SWMU 11) in Sector 4 was considered to have the largest impact potential. Therefore, utility corridors and other migration pathways were the target for the RI sampling activities within this sector. Sector 5 has not been sampled previously.

4.2.5.2 Nature and Extent of Contaminants

To evaluate the condition of the soil within Sector 5, seven surface soil samples were analyzed for SVOAs, three for PCBs, six for inorganic constituents, and four for radionuclides. Subsurface soil samples from several shallow and deep borings were collected to a depth of 48 ft bgs. One-hundred-six of these were analyzed for VOAs, 85 for SVOAs, 8 for PCBs, 54 for metal constituents, and 68 for radionuclides. Fig. 4.14 is a map of Sector 5 showing the position of the

28 locations sampled. The results of the analyses are summarized in Tables 4.23 through 4.26. A frequency of detection table (Table 4.27) presents summary information concerning the analytical results.

Summary of Findings

The sampling in Sector 5 was aimed at evaluating the impact of possible spills within the C-400 Building and assessing whether the buried utilities or utility corridors either released contaminants or served as a pathway for the migration of contaminants into surrounding soils. Two general areas of soil contamination were identified.

The first area, which has been impacted by high concentrations of VOAs, is located on the southwest corner of the C-400 Building. Fig. 4.12 shows the maximum TCE content in the Sector 5 soils. Several vadose zone samples collected between 4 and 48 ft bgs contained low to high concentrations of TCE and its degradation products. The vertical extent of the soil contaminated by TCE is defined by deeper borings which contained no VOAs. Data from several soil boring samples to approximately 48 ft bgs were used to assess the depth of the impacted area. One deep soil boring located near the center of the impacted area contained TCE throughout the vertical extent, including high values at its end depth of 43 ft bgs. High TCE concentrations in Sector 5 soils suggest that TCE is present as DNAPL. A release of a considerable quantity of TCE in the immediate vicinity of Boring 400-015 near the southwest corner of the C-400 Building appears to have occurred. This boring was drilled adjacent to the building perimeter drain waste collection line, which transports various process wastes from inside the building to the Waste Discard Sump at SWMU 203.

A second area of contamination is located in the northwestern portion of Sector 5 (west of the C-400 Building). This area has been impacted by a myriad of constituents including VOAs, SVOAs, metals, and radionuclides. Surface samples from this area exhibit some of the highest SVOA concentrations from WAG 6. Antimony and arsenic at concentrations above background, as well as low radionuclide activity, also were detected in shallow subsurface samples collected from several soil borings within this area. TCE and cis-1,2-dichloroethene were detected at low concentrations in a sample from a total depth of 47 ft bgs. Releases from the building perimeter drain collection line or a sewer line leading from the C-400 Building may have resulted in this multi-contaminant impact.

Surface and Subsurface Soils

Organics

VOAs. A total of 11 VOAs were detected in the samples collected between 0 and 48 ft bgs from 28 locations. Only five of the VOAs were detected in quantities above the SQL. These were carbon tetrachloride, TCE, and its degradation products, vinyl chloride and cis- and trans-1,2-dichloroethene. Only one sample contained carbon tetrachloride. This sample was collected from 47 ft bgs in Boring 400-010 immediately west of the C-400 Building and also contained TCE and cis-1,2-dichloroethene at concentrations of 110 and 130 $\mu\text{g}/\text{kg}$, respectively. VOAs were not detected in the other soil intervals sampled in this boring.

In the southern portion of Sector 5, the maximum reported TCE soil content was 168,200 $\mu\text{g}/\text{kg}$ in a sample collected at 23 ft bgs from Boring 400-015. As shown on the East-West cross-section in Fig. 4.11b, this boring exhibited high TCE concentrations throughout its

vertical extent, with 94,000 $\mu\text{g}/\text{kg}$ at 32.5 ft bgs and 28,000 $\mu\text{g}/\text{kg}$ in soil at the end depth of 43 ft bgs. Soil samples collected at 10 ft bgs in Borings 400-045 and 400-089 contained 18,200 and 12,000 $\mu\text{g}/\text{kg}$ TCE, respectively. Similarly, the North-South cross-section (Fig. 4.15) shows TCE concentrations of 2900 and 3000 $\mu\text{g}/\text{kg}$ between 8 and 18 ft bgs in Borings 400-073 and 400-087, respectively. Soil samples collected from this cluster of borings on the southwest corner of the C-400 Building (400-113, 400-159, 400-204, 400-074, 400-114, and 400-072) exhibited no VOAs.

At the eastern edge of Sector 5, TCE-contaminated soil in Boring 400-089 is contiguous with TCE-contaminated soil that originates from Sector 4.

Deep subsurface soil samples containing less than 25 $\mu\text{g}/\text{kg}$ TCE were collected from Boring 400-145 at 44 ft bgs, from Boring 400-192 at 48 ft, and Boring 400-194 at 44 ft bgs. These delineate the TCE soil contamination as defined by a 100- $\mu\text{g}/\text{kg}$ contour in Fig. 4.12 and on the cross-sections in Figs. 4.11.b and 4.15. TCE's degradation products follow very similar trends.

SVOAs. Six surface samples contained SVOA constituents. Most of the 21 SVOA constituents detected above the SQL in Sector 5 were PAHs (Fig. 4.16). The maximum total SVOA concentration was 153,774 $\mu\text{g}/\text{kg}$ for surface sample Boring 400-010 (a few feet west of the C-400 Building). Surface soils from Borings 400-041, 400-009, and 400-036 contained total SVOA concentrations of 63,800, 49,070, and 43,938 $\mu\text{g}/\text{kg}$, respectively, with fluoranthene (9,900 $\mu\text{g}/\text{kg}$) and pyrene (7,300 $\mu\text{g}/\text{kg}$) contributing most to the analytical results. Samples 400-017 and 400-045 had much lower total SVOA values, and most individual PAH constituents were below the SQL.

Only one subsurface soil sample contained SVOAs above the SQL. This sample was collected from Boring 400-041 at a depth of 30 ft bgs and contained 5000 $\mu\text{g}/\text{kg}$ of diethyl phthalate, an SVOA constituent not found in any surface soil analyses.

PCBs. Three surface samples from Sector 5 were analyzed for PCBs and contained between 3 and 38 $\mu\text{g}/\text{kg}$ of PCB-1260. No PCBs were detected in the subsurface samples.

Inorganics

Soil was sampled for metals analysis from 28 borings within Sector 5 between the depths of 0 and 47 ft bgs. Several of these soil samples (including all surface samples) contained one or more of the 13 detected metals at concentrations that slightly exceeded background levels.

Four metals—antimony, arsenic, silver, and thallium—exceeded PGDP subsurface concentrations by a factor of two or more. The highest concentration of arsenic was 25.8 mg/kg (3.3 times background) from Boring 400-088 at 10 ft bgs. Silver concentrations in two samples exceeded the SQL. The highest detected silver concentration was 25.1 mg/kg (9.3 times background) in Boring 400-192 at 8 ft bgs. Antimony was found above the SQL at a concentration of 7.5 mg/kg (36 times background) only in a soil sample collected from 6 ft bgs at Boring 400-010. This soil sample also contained 7.48 mg/kg of silver. Thallium (1.6 mg/kg , 4.7 times background) exceeded the SQL in only one soil sample that was collected at 20 ft bgs

from Boring 400-145. The deepest soil samples contained concentrations of these metals that were below background levels, which can be used to delineate the vertical extent of the impacted soil.

Beryllium was reported above background levels in 14 soil samples. The highest concentration was 1.05 mg/kg from 4 to 8 ft bgs in Boring 400-204 (Fig. 4.17). Most of the beryllium detections were from less than 15 ft bgs in samples collected along the railroad tracks on the southwest corner of the building.

Radionuclides

Nine isotopes were detected above background levels in the soil sampled from 15 borings that were analyzed for radionuclides. While radioisotope activity in three of the four surface samples only slightly exceeded background values, the surface sample from Boring 400-036 (Fig. 4.18) exhibited higher activities for ^{234}U (10.9 pCi/g, or 4.4 times background), ^{238}U (16.7 pCi/g, or 14 times background), and ^{99}Tc (33 pCi/g, or 13.2 times background). A subsurface sample analyzed from the same boring at 14 ft bgs contained only traces of ^{237}Np (0.2 pCi/g).

Most subsurface samples contained radionuclides only at low activities (less than 2 pCi/g). However, the shallow subsurface soil sample collected from 4 ft bgs at Boring 400-141 exhibited 7.3 pCi/g of ^{99}Tc , 2.7 pCi/g of ^{234}U , and 4.6 pCi/g of ^{238}U , while the sample from 20 ft bgs at 400-192 contained 3.1 pCi/g of ^{99}Tc .

4.2.6 Sector 6 [Technetium Storage Tank (SWMU 47)]

4.2.6.1 Site History

Location and Physical Description

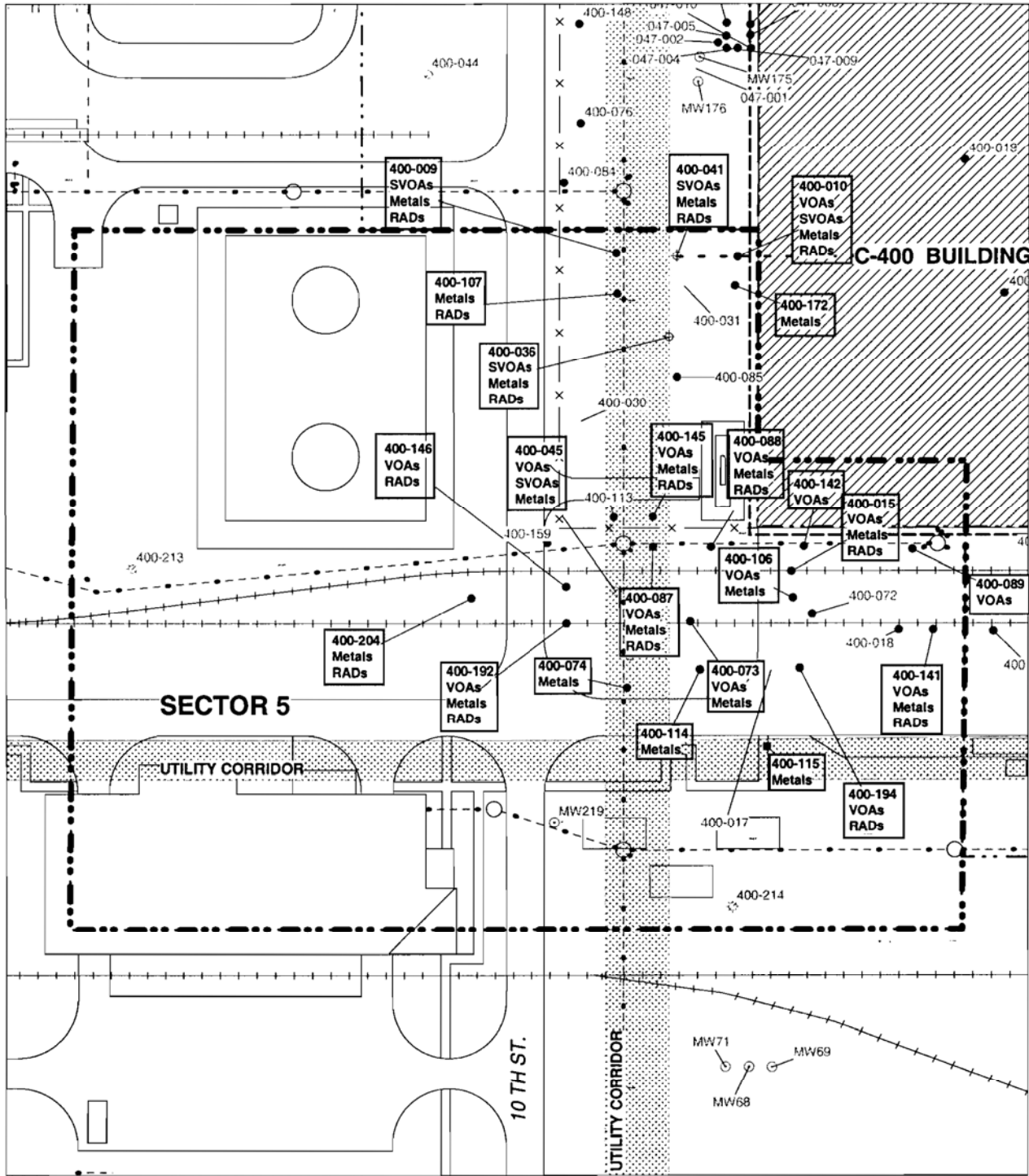
The Technetium Storage Tank (SWMU 47) was located within a bermed area on a concrete pad outside of the C-400 Building, on the west side of the building. The tank was removed in 1986, but the concrete pad and berms are still present. Approximately 600 gal of residual waste was in the tank at the time of its removal. The waste was composed of approximately 200 gal of solution and 400 gal of sludge. Analytical results of samples collected during the tank removal show that Tc, Cr, U, Np, Pu, and Th were in the tank.

Practice and Release Description

The 4000-gal storage tank was used in the early 1960s to store a waste solution containing ^{99}Tc and chromium. No spills are known to have occurred from the Technetium Storage Tank.

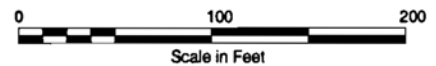
Location and Results of Previous Sampling

The Technetium Storage Tank (SWMU 47) area was investigated during the Phase II SI conducted in 1991 and 1992. Field activities completed during the Phase II SI include the installation of two groundwater monitoring wells (MW-175 and MW-176) and one shallow soil boring. All sampling locations from the Phase II SI were located approximately 50 to 75 ft south of the former tank location, limiting the applicability of the results for source characterization.



LEGEND

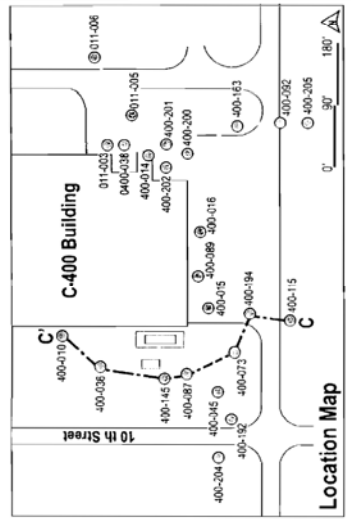
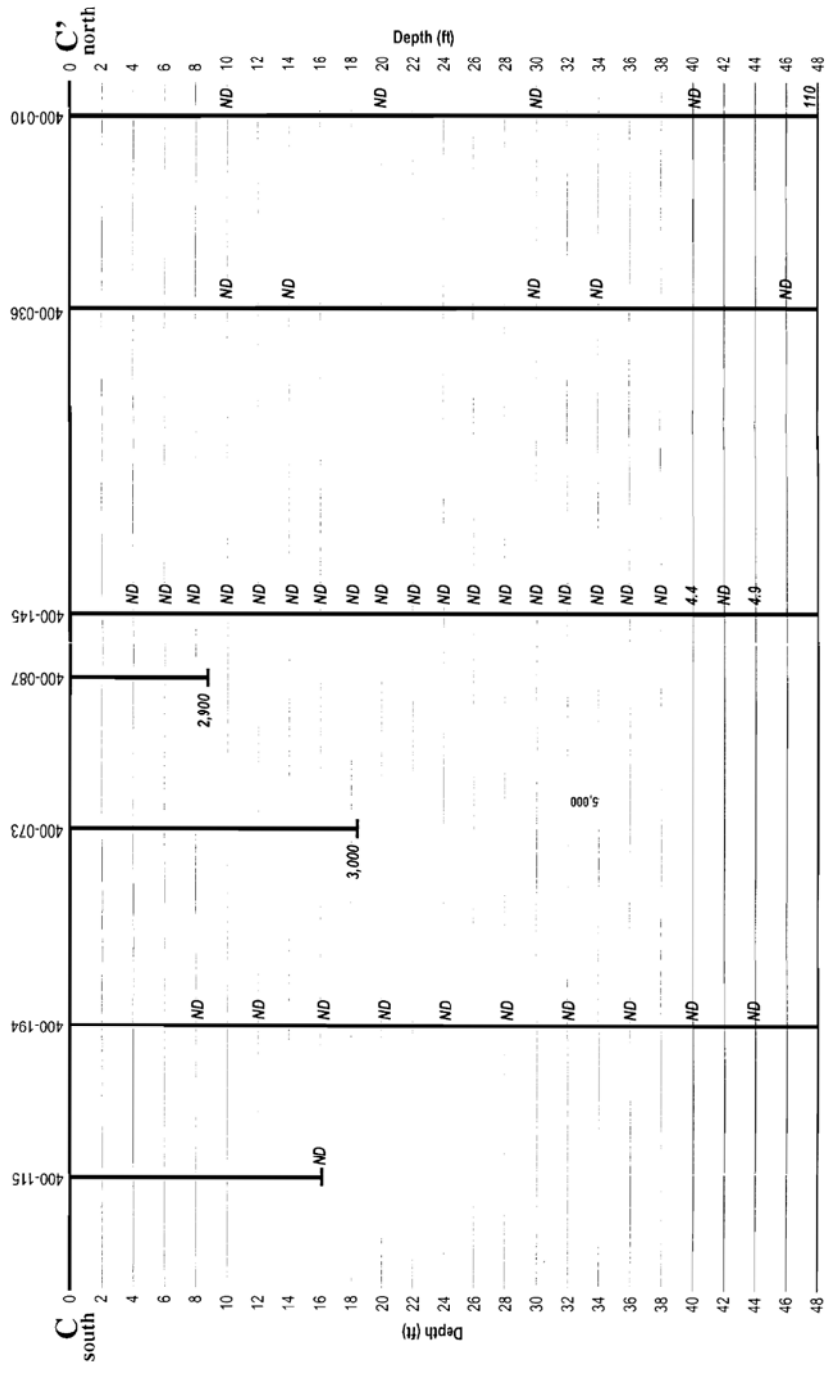
- UCRS Boring
- ⊕ RGA Boring
- ⊕ McNaury Boring
- ⊕ Piezometer Location
- ⊕ New Monitoring Well Location
- ⊕ Existing Monitoring Well Location
- Sector Boundary
- x Fence
- ++ RR Tracks
- Stormsewer
- Drain Waste Collection



694-14.WOR - 7/19/98

REFERENCE TABLE 4.3

Fig. 4.14. Sector 5 site map showing contaminant groups detected in UCRS soil above SQL at each sample location.



LEGEND

ND Not Detected

23,700 TCE Concentrations in ug/kg

100,000 to 1,000,000 ug/kg TCE

50,000 to 100,000 ug/kg TCE

5,000 to 50,000 ug/kg TCE

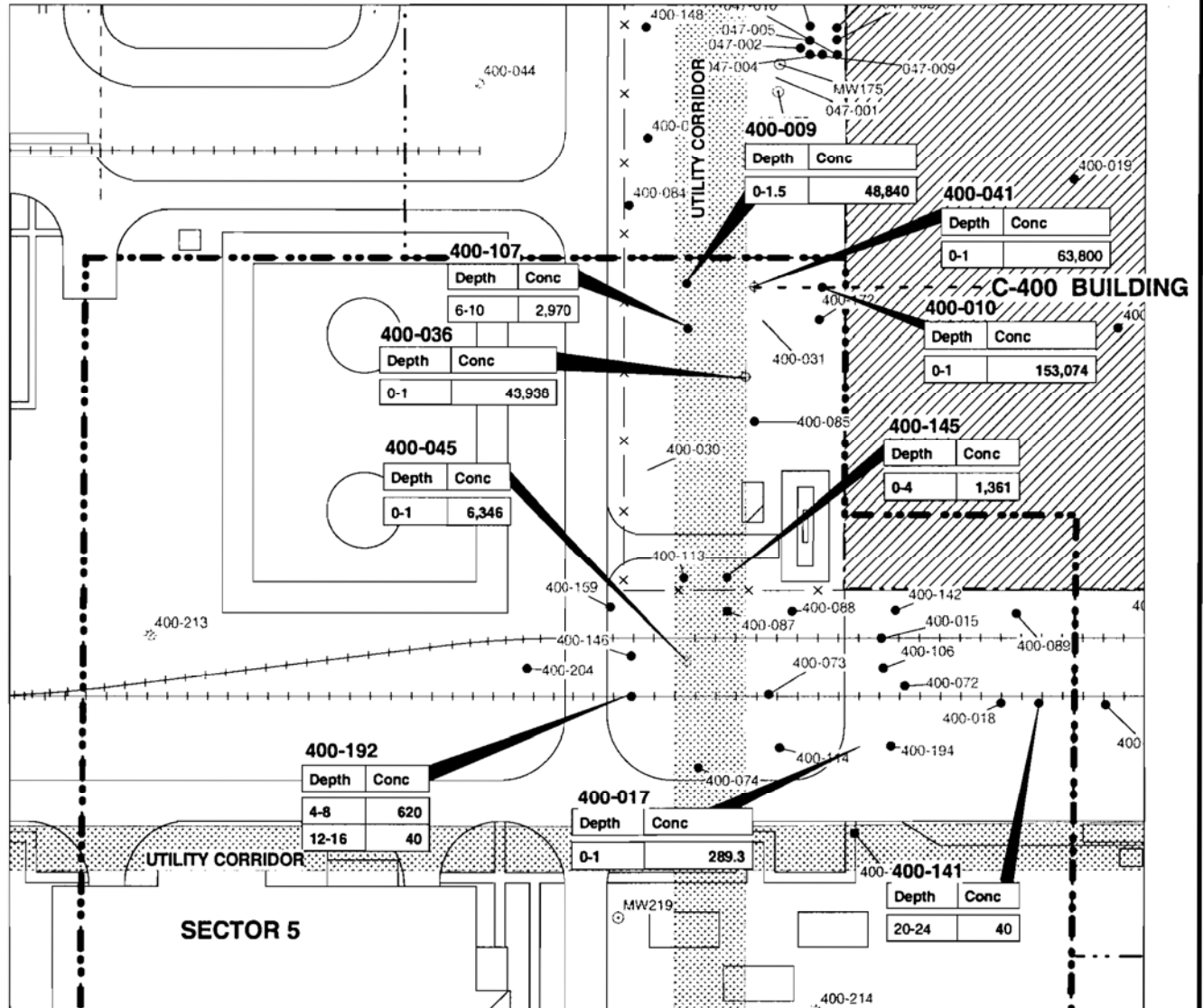
<5,000 ug/kg TCE

SCALE

0' 25' 50'

Vertical Exaggeration: 6.25x

Fig. 4.15. North-south cross-section C-C' showing the distribution of TCE in the UCRS soils at sector 5.

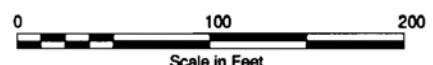


Soil samples not containing detectable PAH compounds in Sector 5 are:

400009SA030, 400010SA005, 400010SA010, 400010SA020, 400010SA030, 400010SA040, 400010SA044, 400015SA005, 400015SA010, 400015SA020, 400015SA030, 400015SA040, 400018SA001, 400030SA015, 400036SA030, 400036SA034, 400041SA005, 400041SA046, 400045SA015, 400072SA015, 400073SA015, 400074SA015, 400085SA015, 400087SA015, 400089SA015, 400106SA015, 400113SA015, 400114SA015, 400115SA015, 400141SA004, 400141SA008, 400141SA012, 400141SA016, 400141SA020, 400141SA028, 400141SA032, 400141SA036, 400141SA040, 400141SA044, 400141SA048, 400142SA015, 400145SA008, 400145SA016, 400145SA020, 400145SA024, 400145SA028, 400145SA032, 400145SA036, 400145SA040, 400145SA044, 400146SA018, 400159SA018, 400172SA015, 400192SA012, 400192SA024, 400192SA028, 400192SA032, 400192SA036, 400192SA040, 400192SA044, 400194SA004, 400194SA008, 400194SA012, 400194SA016, 400194SA020, 400194SA024, 400194SA028, 400194SA032, 400194SA036, 400194SA040, 400194SA044

LEGEND

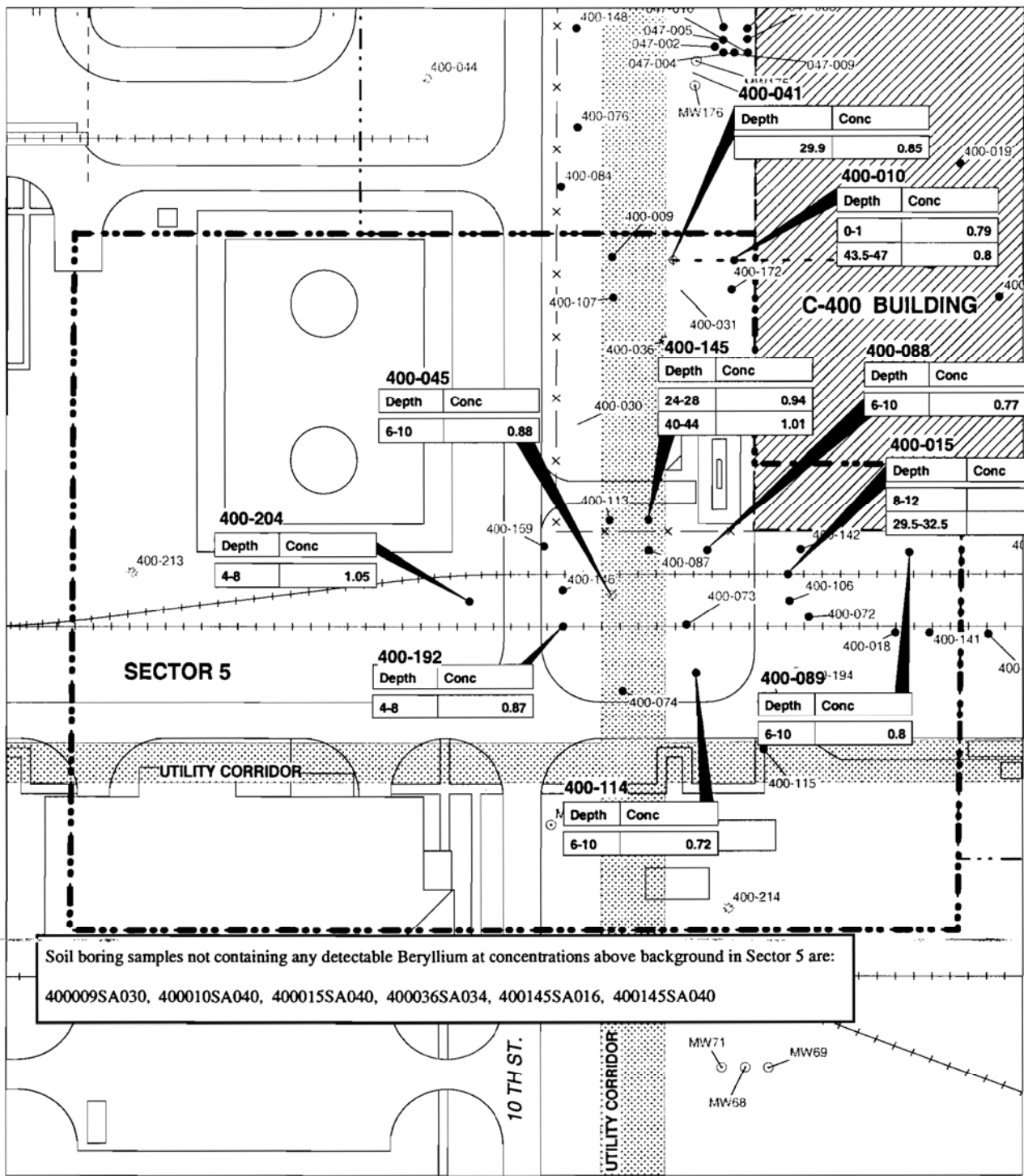
- UCRS Boring
- ⊗ RGA Boring
- ⊕ McNairy Boring
- ⊕ Piezometer Location
- ⊕ New Monitoring Well Location
- ⊕ Existing Monitoring Well Location
- Sector Boundary
- x Fence
- +++ RR Tracks



Units
Total PAHs given in ug/kg
Depth in feet below ground surface

REFERENCE TABLE 4.3

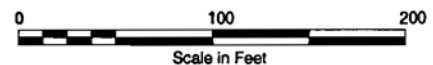
Fig. 4-16. Map showing distribution and total concentration of PAHs detected in sector 5 UCRS soil.



Soil boring samples not containing any detectable Beryllium at concentrations above background in Sector 5 are:
 400009SA030, 400010SA040, 400015SA040, 400036SA034, 400145SA016, 400145SA040

LEGEND

- UCRS Boring
- ⊗ RGA Boring
- ⊕ McNairy Boring
- ⊕ Piezometer Location
- ⊕ New Monitoring Well Location
- Existing Monitoring Well Location
- Sector Boundary
- × Fence
- ⊕ RR Tracks

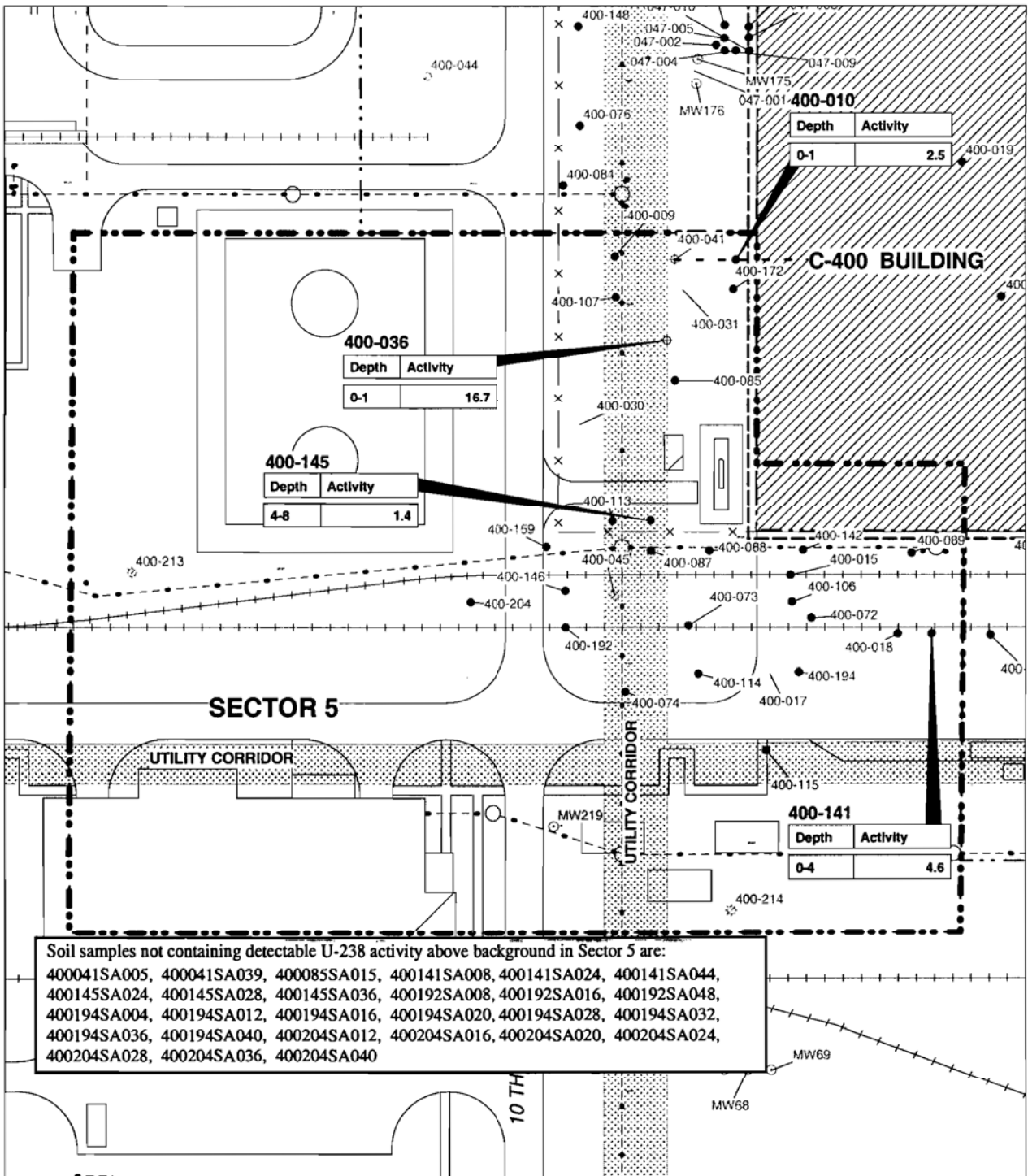


Units
 Total Beryllium given in ug/kg
 Depth in feet below ground surface

REFERENCE TABLE 4.3

Fig. 4.17. Map showing distribution and total concentration of Beryllium detected in sector 5 UCRS soil.

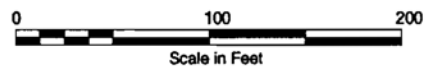
Fig-4.17.WOR - 7/8/98



LEGEND

- UCRS Boring
- ⊛ RGA Boring
- ⊕ McNairy Boring
- ⊕ Piezometer Location
- ⊕ New Monitoring Well Location
- ⊕ Existing Monitoring Well Location
- Sector Boundary
- x Fence
- RR Tracks
- Stormsewer
- Drain Waste Collection

KEY LOCATION MAP



Units
 Total U-238 Activity given in pCi/g
 Depth in feet below ground surface

REFERENCE TABLE 4.3

Fig-18.WOR - 7/2008

Fig. 4.18. Map showing distribution and activity of U-238 detected in sector 5 UCRS soil.

**Table 4.25. Metals detected in Sector 5
UCRS soil**

Sample Type	Sample ID	Sample Interval (ft bgs)		Analytical Compound	Results mg/kg	Lab Qualifier	Validation Qualifier	Data Assessment	Background mg/kg
		Top	Bottom						
Soil	400041SA001	0	1	Thallium	0.9	B	=		0.21
	400041SA005	5	5	Antimony	0.8	B	?		0.21
		5	5	Sodium	521		?		340
	400041SA013	13	13	Aluminum	12100		?		12000
		13	13	Sodium	639		?		340
	400041SA030	29.9	29.9	Beryllium	0.85		?		0.69
		29.9	29.9	Sodium	708		?		340
	400045SA001	0	1	Antimony	1.1	B	?		0.21
		0	1	Cadmium	0.78		?		0.21
		0	1	Calcium	277000		?		200000
		0	1	Copper	20.7		?		19
		0	1	Magnesium	10800		?		7700
		0	1	Nickel	23.5		?		21
		0	1	Zinc	111		?		65
	400045SA015	6	10	Aluminum	13200		?		12000
		6	10	Beryllium	0.88		?		0.69
		6	10	Cadmium	0.26	B	?		0.21
	6	10	Magnesium	2770		?		2100	
	6	10	Nickel	22.8		?		22	
	6	10	Sodium	558		?		340	
400072SA015	13	17	Sodium	364		?		340	

**Table 4.25. Metals detected in Sector 5
UCRS soil**

Sample Type	Sample ID	Sample Interval (ft bgs)		Analytical Compound	Results mg/kg	Lab Qualifier	Validation Qualifier	Data Assessment	Background mg/kg
		Top	Bottom						
Soil	400073SA015	13	17	Aluminum	12200		?		12000
		13	17	Sodium	395		?		340
	400074SA015	14	18	Aluminum	16500		?		12000
		14	18	Sodium	651		?		340
	400085SA015	13.5	17.5	Sodium	359		=		340
	400087SA015	4	8	Antimony	0.7	B	?		0.21
		4	8	Beryllium	1.02		?		0.69
		4	8	Cadmium	0.37	B	?		0.21
		4	8	Iron	29000		?		28000
		4	8	Sodium	493		?		340
		4	8	Vanadium	38.7		?		37
	400088SA015	6	10	Arsenic	25.8		?		7.9
		6	10	Beryllium	0.77		?		0.69
		6	10	Cadmium	0.25	B	?		0.21
		6	10	Sodium	371		?		340
	400089SA015	6	10	Beryllium	0.8	B	?		0.69
		6	10	Sodium	360	B	?		340
	400106SA015	13	17	Aluminum	14800		?		12000
		13	17	Sodium	462		?		340
	400107SA015	6	10	Arsenic	8.6		?		7.9
		6	10	Sodium	388		?		340

**Table 4.25. Metals detected in Sector 5
UCRS soil**

Sample Type	Sample ID	Sample Interval (ft bgs)		Analytical Compound	Results mg/kg	Lab Qualifier	Validation Qualifier	Data Assessment	Background mg/kg
		Top	Bottom						
Soil	400113SA015	13	14	Sodium	382		?		340
	400114SA015	6	10	Beryllium	0.72		?		0.69
		6	10	Magnesium	2520		?		2100
		6	10	Sodium	522		?		340
	400115SA015	14	18	Aluminum	13000		?		12000
		14	18	Sodium	429		?		340
	400141SA004	0	4	Sodium	582		?		340
	400141SA008	4	8	Antimony	1.5	B	?		0.21
		4	8	Arsenic	16		?		7.9
		4	8	Sodium	509		?		340
	400141SA012	8	12	Aluminum	12400		?		12000
		8	12	Barium	195		?		170
		8	12	Magnesium	2800		?		2100
		8	12	Sodium	661		?		340
	400142SA015	7	11	Magnesium	2370		?		2100
		7	11	Sodium	467		?		340
	400145SA008	4	8	Antimony	1	B	?		0.21
		4	8	Sodium	522		?		340
	400145SA012	8	12	Aluminum	14900		?		12000
		8	12	Barium	193		?		170
	8	12	Magnesium	2220		?		2100	

**Table 4.25. Metals detected in Sector 5
UCRS soil**

Sample Type	Sample ID	Sample Interval (ft bgs)		Analytical Compound	Results mg/kg	Lab Qualifier	Validation Qualifier	Data Assessment	Background mg/kg
		Top	Bottom						
Soil	400145SA012	8	12	Sodium	605		?		340
		8	12	Thallium	0.6	B	?		0.34
	400145SA020	16	20	Sodium	524		?		340
		16	20	Thallium	1.6		?		0.34
	400145SA024	20	24	Sodium	378		?		340
	400145SA028	24	28	Aluminum	14700		?		12000
		24	28	Beryllium	0.94		?		0.69
		24	28	Sodium	598		?		340
		24	28	Thallium	0.7	B	?		0.34
	400145SA032	28	32	Sodium	485		?		340
		28	32	Thallium	0.8	B	?		0.34
	400145SA036	32	34	Sodium	400		?		340
	400145SA044	40	44	Beryllium	1.01		?		0.69
		40	44	Sodium	683		?		340
		40	44	Vanadium	59.5		?		37
	400146SA018	15	19	Sodium	433		?		340
	400159SA018	14	18	Sodium	644		?		340
	400172SA015	6	10	Aluminum	19600		?		12000
		6	10	Arsenic	12.5		?		7.9
		6	10	Sodium	684		?		340
	400192SA008	4	8	Aluminum	17100		?		12000

**Table 4.25. Metals detected in Sector 5
UCRS soil**

Sample Type	Sample ID	Sample Interval (ft bgs)		Analytical Compound	Results mg/kg	Lab Qualifier	Validation Qualifier	Data Assessment	Background mg/kg
		Top	Bottom						
Soil	400192SA008	4	8	Antimony	0.7	B	?		0.21
		4	8	Beryllium	0.87		?		0.69
		4	8	Magnesium	2270		?		2100
		4	8	Silver	25.1		?		2.7
	400192SA012	4	8	Sodium	858		?		340
		8	12	Aluminum	12100		?		12000
		8	12	Antimony	2.1	B	?		0.21
		8	12	Magnesium	2320		?		2100
	400194SA004	8	12	Sodium	738		?		340
		0	4	Sodium	671		?		340
		4	8	Sodium	645		?		340
		0	4	Antimony	1.2	B	?		0.21
400204SA004	0	4	Cadmium	0.27	B	?		0.21	
	0	4	Calcium	144000		?		6100	
	0	4	Magnesium	4070		?		2100	
	4	8	Beryllium	1.05		?		0.69	
400009SA030, 400010SA040, 400015SA040, 400036SA034, 400145SA016, 400145SA040	4	8	Magnesium	2650		?		2100	
	4	8	Sodium	630		?		340	

**Note: Soil boring samples not containing any detectable metals at concentrations above background in Sector 5 are:
400009SA030, 400010SA040, 400015SA040, 400036SA034, 400145SA016, 400145SA040**

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**Table 4.26. Radioactive isotopes detected in Sector 5
UCRS soil**

Sample Type	Sample ID	Sample Interval (ft bgs)		Analytical Compound	Results pCi/g	Lab Qualifier	Validation Qualifier	Data Assessment	Background pCi/g
		Top	Bottom						
Soil	400009SA001	0	1.5	Thorium-230	1.6		?		1.5
	400009SA033	31	34.5	Cesium-137	0.4		?		0.28
	400010SA001	0	1	Neptunium-237	0.3		?		0.1
		0	1	Thorium-230	2.2		?		1.5
		0	1	Uranium-238	2.5		?		1.2
	400010SA044	43.5	47	Neptunium-237	0.4		?		0
	400015SA040	39.5	43	Neptunium-237	0.2		?		0
	400036SA001	0	1	Plutonium-239	0.2		=		0.025
		0	1	Technetium-99	33		=		2.5
		0	1	Uranium-234	10.9		=		2.5
		0	1	Uranium-235	0.6		=		0.14
		0	1	Uranium-238	16.7		=		1.2
	400036SA014	14	14	Neptunium-237	0.2		?		0
	400041SA001	0	1	Uranium-238	1.8		=		1.2
	400041SA013	13	13	Cesium-137	0.3		?		0.28
		13	13	Neptunium-237	0.3		?		0
	400041SA030	29.9	29.9	Neptunium-237	0.2		?		0
	400041SA046	46	46	Neptunium-237	0.2		?		0
	400087SA015	4	8	Neptunium-237	0.2		?		0
		4	8	Thorium-230	1.6		?		1.4
	400088SA015	6	10	Neptunium-237	0.2		?		0

**Table 4.26. Radioactive isotopes detected in Sector 5
UCRS soil**

Sample Type	Sample ID	Sample Interval (ft bgs)		Analytical Compound	Results pCi/g	Lab Qualifier	Validation Qualifier	Data Assessment	Background pCi/g
		Top	Bottom						
Soil	400088SA015	6	10	Thorium-230	2		?		1.4
	400107SA015	6	10	Americium-241	1		?		0
	400141SA004	6	10	Neptunium-237	0.2		?		0
		0	4	Technetium-99	7.3		?		2.8
		0	4	Uranium-234	2.7		?		2.4
		0	4	Uranium-235	0.4		?		0.14
		0	4	Uranium-238	4.6		?		1.2
	400141SA012	8	12	Cesium-137	0.4		?		0.28
		8	12	Neptunium-237	0.3		?		0
	400141SA016	12	16	Neptunium-237	0.2		?		0
	400141SA020	16	20	Cesium-137	0.3		?		0.28
	400141SA028	24	28	Cesium-137	0.3		?		0.28
		24	28	Uranium-235	0.2		?		0.14
	400141SA032	28	32	Neptunium-237	0.2		?		0
	400141SA036	32	36	Cesium-137	0.3		?		0.28
	400141SA040	36	40	Cesium-137	0.3		?		0.28
		36	40	Neptunium-237	0.2		?		0
	400141SA048	44	48	Cesium-137	0.3		?		0.28
	400145SA008	4	8	Neptunium-237	0.4		?		0
		4	8	Uranium-238	1.4		?		1.2
	400145SA012	8	12	Neptunium-237	0.3		?		0

**Table 4.26. Radioactive isotopes detected in Sector 5
UCRS soil**

Sample Type	Sample ID	Sample Interval (ft bgs)		Analytical Compound	Results pCi/g	Lab Qualifier	Validation Qualifier	Data Assessment	Background pCi/g
		Top	Bottom						
Soil	400145SA012	8	12	Thorium-230	1.7		?		1.4
	400145SA016	12	16	Cesium-137	0.4		?		0.28
	400145SA020	16	20	Neptunium-237	0.3		?		0
		16	20	Thorium-230	2		?		1.4
	400145SA032	28	32	Neptunium-237	0.2		?		0
	400145SA040	36	40	Cesium-137	0.3		?		0.28
		36	40	Neptunium-237	0.3		?		0
	400145SA044	40	44	Neptunium-237	0.2		?		0
	400146SA018	15	19	Cesium-137	0.5		?		0.28
		15	19	Neptunium-237	0.3		?		0
	400192SA012	8	12	Cesium-137	0.4		?		0.28
		8	12	Neptunium-237	0.3		?		0
	400192SA020	16	20	Technetium-99	3.1		?		2.8
	400192SA024	20	24	Cesium-137	0.4		?		0.28
	400192SA028	24	28	Cesium-137	0.6		?		0.28
		24	28	Neptunium-237	0.2		?		0
	400192SA032	28	32	Neptunium-237	0.2		?		0
	400192SA036	32	36	Neptunium-237	0.3		?		0
	400192SA040	36	40	Cesium-137	0.3		?		0.28
		36	40	Neptunium-237	0.2		?		0
400192SA044	40	44	Cesium-137	0.4		?		0.28	

**Table 4.26. Radioactive isotopes detected in Sector 5
UCRS soil**

Sample Type	Sample ID	Sample Interval (ft bgs)		Analytical Compound	Results pCi/g	Lab Qualifier	Validation Qualifier	Data Assessment	Background pCi/g
		Top	Bottom						
Soil	400192SA044	40	44	Neptunium-237	0.2		?		0
	400194SA008	4	8	Neptunium-237	0.2		?		0
	400194SA024	20	24	Neptunium-237	0.2		?		0
	400194SA044	40	44	Neptunium-237	0.3		?		0
	400204SA004	0	4	Cesium-137	0.3		?		0.28
		0	4	Thorium-230	1.5		?		1.4
	400204SA008	4	8	Cesium-137	0.4		?		0.28
	400204SA032	28	32	Cesium-137	0.4		?		0.28

Note: Soil boring samples not containing any detectable radioactive isotopes at concentrations above background in Sector 5 are:

400041SA005, 400041SA039, 400085SA015, 400141SA008, 400141SA024, 400141SA044, 400145SA024, 400145SA028, 400145SA036, 400192SA008, 400192SA016, 400192SA048, 400194SA004, 400194SA012, 400194SA016, 400194SA020, 400194SA028, 400194SA032, 400194SA036, 400194SA040, 400204SA012, 400204SA016, 400204SA020, 400204SA024, 400204SA028, 400204SA036, 400204SA040

Table 4.27. Frequency of detection of organic compounds, metals, and radioactive isotopes in Sector 5 UCRS soil

Analytical Group	Analytical Compound	No. of Detects	No. of Analyses	Maximum Result	Minimum Result	Average Result	Units
VOA	cis-1,2-Dichloroethene	25	107	1000.00	1.41	165.68	ug/kg
	Trichloroethene	22	106	168200.00	1.45	9436.49	ug/kg
	Toluene	18	81	5.50	1.20	2.19	ug/kg
	trans-1,2-Dichloroethene	9	107	15300.00	2.20	7933.46	ug/kg
	Vinyl chloride	6	107	35.00	1.90	12.55	ug/kg
	Chloroform	4	81	5.60	1.90	2.98	ug/kg
	1,1,2-Trichloroethane	1	81	3.90	3.90	3.90	ug/kg
	2-Hexanone	1	81	4.40	4.40	4.40	ug/kg
	Carbon tetrachloride	1	81	13.00	13.00	13.00	ug/kg
	Iodomethane	1	81	700.00	700.00	700.00	ug/kg
	Vinyl acetate	1	81	55.00	55.00	55.00	ug/kg
	Fluoranthene	10	92	30000.00	40.00	4671.00	ug/kg
	Pyrene	10	92	26000.00	40.00	3902.95	ug/kg
	Benz(a)anthracene	9	92	14000.00	21.00	2402.44	ug/kg
	Benzo(b)fluoranthene	9	92	14000.00	18.00	2683.72	ug/kg
	Benzo(k)fluoranthene	9	92	8751.00	16.00	2153.28	ug/kg
	Chrysene	9	92	12000.00	22.00	2374.67	ug/kg
	Diethyl phthalate	9	92	5000.00	40.00	606.67	ug/kg
	Benzo(a)pyrene	8	92	13000.00	19.00	2750.88	ug/kg
Benzo(ghi)perylene	8	92	6100.00	12.00	1692.88	ug/kg	
Phenanthrene	8	92	16000.00	46.00	3113.88	ug/kg	
Anthracene	7	92	5323.00	10.00	1214.79	ug/kg	
Indeno(1,2,3-cd)pyrene	7	92	3900.00	11.00	1539.86	ug/kg	
Acenaphthene	6	92	2800.00	6.10	657.10	ug/kg	
Fluorene	5	92	1200.00	4.80	446.96	ug/kg	
Dibenz(a,h)anthracene	4	92	1300.00	77.00	744.25	ug/kg	
Dibenzofuran	4	92	700.00	2.80	243.20	ug/kg	
Naphthalene	2	92	120.00	2.40	61.20	ug/kg	
Acenaphthylene	1	92	220.00	220.00	220.00	ug/kg	
Di-n-octylphthalate	1	92	606.00	606.00	606.00	ug/kg	
N-Nitroso-di-n-propylamine	1	92	582.00	582.00	582.00	ug/kg	
N-Nitrosodiphenylamine	1	92	582.00	582.00	582.00	ug/kg	

Table 4.27. Frequency of detection of organic compounds, metals, and radioactive isotopes in Sector 5 UCRS soil

Analytical Group	Analytical Compound	No. of Detects	No. of Analyses	Maximum Result	Minimum Result	Average Result	Units
PCB	PCB-1260	3	11	38.00	3.00	15.03	ug/kg
Metals	Sodium	46	60	858.00	359.00	540.57	mg/kg
	Aluminum	16	60	19600.00	12100.00	14156.25	mg/kg
	Beryllium	14	60	1.05	0.70	0.87	mg/kg
	Antimony	13	60	7.50	0.70	1.82	mg/kg
	Magnesium	11	60	10800.00	2130.00	3356.36	mg/kg
	Cadmium	10	60	0.78	0.22	0.34	mg/kg
	Thallium	6	60	1.60	0.60	1.02	mg/kg
	Arsenic	5	60	25.80	8.60	14.33	mg/kg
	Vanadium	4	60	59.50	38.70	45.95	mg/kg
	Barium	3	60	195.00	179.00	189.00	mg/kg
	Calcium	3	60	277000.00	13000.00	144666.67	mg/kg
	Iron	3	60	37000.00	28100.00	31366.67	mg/kg
	Chromium	2	60	48.00	20.80	34.40	mg/kg
	Nickel	2	60	23.50	22.80	23.15	mg/kg
	Silver	2	60	25.10	7.48	16.29	mg/kg
	Copper	1	60	20.70	20.70	20.70	mg/kg
	Manganese	1	60	860.00	860.00	860.00	mg/kg
	Selenium	1	60	1.30	1.30	1.30	mg/kg
	Zinc	1	60	111.00	111.00	111.00	mg/kg
Radioactive isotopes	Neptunium-237	30	72	0.40	0.20	0.25	pCi/g
	Cesium-137	19	72	0.60	0.30	0.37	pCi/g
	Thorium-230	7	72	2.20	1.50	1.80	pCi/g
	Uranium-238	5	72	16.70	1.40	5.40	pCi/g
	Technetium-99	3	72	33.00	3.10	14.47	pCi/g
	Uranium-235	3	72	0.60	0.20	0.40	pCi/g
	Uranium-234	2	72	10.90	2.70	6.80	pCi/g
	Americium-241	1	72	1.00	1.00	1.00	pCi/g
	Plutonium-239	1	72	0.20	0.20	0.20	pCi/g