

PCBs. Surface soil samples collected from Borings 047-002 and 047-007 exhibited PCBs above the SQL at 77 $\mu\text{g}/\text{kg}$ and 960 $\mu\text{g}/\text{kg}$ PCB-1254, respectively (Fig. 4.21). No PCBs were detected in the subsurface soil samples.

Inorganics

Numerous metals were detected at concentrations above the PGDP background screening levels. Most of the metal concentrations were only slightly above background levels. However, one surface soil sample from Boring 047-002 contained cadmium at 4.25 mg/kg , which is approximately 20 times the PGDP background level. Beryllium was found at concentrations slightly above background in four surface and shallow subsurface samples (Fig. 4.22), all of which were collected outside the bermed area.

Radionuclides

Nine radionuclides, ^{241}Am , ^{137}Cs , ^{230}Th , ^{237}Np , ^{239}Pu , ^{99}Tc , ^{234}U , ^{235}U , and ^{238}U , exceeded PGDP background screening levels. The maximum activities of seven of the nine isotopes were found in the surface soil sample from Boring 047-002, adjacent to the bermed area. These included 53 pCi/g of ^{99}Tc , 31.1 pCi/g of ^{234}U , 1.9 pCi/g of ^{235}U , and 39.5 pCi/g of ^{238}U . All other surface soils collected around the berm also exhibited elevated activities for various combinations of the radionuclides. Technetium and the three uranium radioisotopes were detected at activities that exceeded background in a soil sample collected from 4.5 ft. bgs at Boring 047-002. Only two isolated soil samples below 4.5 ft bgs in Sector 6 contained radionuclide isotopes with activities above background values. Uranium-238 was detected in all seven of the surface soil samples collected from the bermed area (Fig. 4.23).

4.2.7 Sector 7 [Waste Discard Sump (SWMU 203)]

4.2.7.1 Site History

Location and Physical Description

The Waste Discard Sump located at the northwest corner of the building is a convergence point for effluent from the C-400 Cleaning Facility (primarily from the west side). The unit is a 6-ft-wide \times 11-ft-long \times 6-ft-deep concrete pit that includes a 4-ft-diameter \times 4-1/2-ft-deep sump in the floor. The concrete walls of the sump are lined with acid-proof brick. Influent to the system is discharged directly into the sump, which empties into the North-South Diversion Ditch.

Practice and Release Description

A pump discharged wastewater through the C-401 Transfer Line (SWMU 26) prior to 1957. Beginning in 1957, a drain in the sump was opened to allow gravity-fed discharge through a storm sewer line to the North-South Diversion Ditch. In the 1950s, the Waste Discard Sump handled discharges from a variety of processes in the C-400 Building. Many of these discharges were discontinued after 1957. The sump continues to collect effluent from a high-pressure water-jet system in the C-400 Spray Booth and a vacuum pump on the C-400 Lime Precipitation Unit. No contaminants are expected from the current waste streams.

Location and Results of Previous Sampling

Characterization sampling of the sump sludge and adjacent surface soil occurred in late 1994 and early 1995. The characterization included two samples of the sump sludge and one soil sample. The sludge contained TCE, PCBs, and several transuranic elements.

Approximately 6 in. of sludge covered the base of the 4-ft-diameter sump in June 1995, when a removal action was performed. Twenty-eight 55-gal drums were used to containerize the sludge and water purged from the sump.

4.2.7.2 Nature and Extent of Contaminants

Seven surface soil samples from Sector 7 were analyzed for SVOAs, 3 for PCBs, 11 for inorganics, and 4 for radionuclides. Thirty subsurface soil samples (including two duplicate samples) that were collected between 1 and 48.5 ft bgs within Sector 7 were analyzed for VOAs, 25 (including two duplicate samples) for SVOAs and inorganic constituents, 18 (including one duplicate) for PCBs, and 15 (including 2 duplicates) for radionuclides. Sampling locations in Sector 7 are shown in Fig. 4.24. The analytical results are described below and summarized in Tables 4.33 through 4.36. Additional information regarding the analytical results is presented in Table 4.37 (frequency of detection).

Summary of Findings

Sampling in Sector 7 was primarily targeted at finding any impact that processes connected to the Waste Discard Sump may have had on the surrounding soil. Surface and subsurface soils of Sector 7 showed contamination in one area associated with the Waste Discard Sump. A surface soil sample collected in the area surrounding the Waste Discard Sump contained mercury at a concentration that exceeds the PGDP background level by a factor of 41. The same sample exhibited high radioactivity from ⁹⁹Tc. While mercury was not detected in subsurface samples collected from approximately 15 and 32 ft bgs at this location, ⁹⁹Tc activity slightly exceeded the background value at 15 ft bgs. Both mercury and ⁹⁹Tc are probably related to spills and releases of C-400 Building effluent to the Waste Discard Sump.

TCE also was detected at 4500 mg/kg at a depth of 28.5 to 32 ft bgs in the same boring that contained elevated metals and radioactivity. The source for the TCE may be the Waste Discard Sump, but the lack of TCE at shallow depths near the sump suggests a different source. A subsurface spill or release from the northwest corner of the C-400 Building, which is located approximately 25 ft to the southeast, may have been the source for the TCE.

Only isolated low concentrations of analytes were detected in samples collected from other borings drilled within the sector to assess the utility corridors.

Analytical Results—Surface and Subsurface Soils

Organics

VOAs. Four VOAs (1,1-dichloroethene, cis-1,2-dichloroethene, toluene, and TCE) were detected in the 19 soil borings of Sector 7. Trichloroethene, found in three samples, was the only VOA detected from Sector 7 soils that exceeded the SQL. The maximum concentration of 4500 µg/kg was detected in the deepest sample collected (at 32 ft bgs) from Boring 203-003. This sample was collected adjacent to and below the SWMU 203 Waste Discard Sump.

SVOAs. Two surface and one subsurface sample from 400-004 and 400-111, respectively, contained SVOA constituents (Fig. 25). The values for all individual SVOA compounds were below the SQL.

PCBs. Only one of the 21 soil samples analyzed from Sector 7 contained detectable levels of PCBs. PCB-1260 was found at 7.9 µg/kg in soil (at 16.5 ft bgs) from Boring 203-006. This concentration is below the SQL.

Inorganics

Sixteen metals from the 24 locations sampled exhibited concentrations above PGDP background screening levels in Sector 7. Fourteen of these metals were detected only at concentrations that slightly exceeded background levels: aluminum, arsenic, beryllium, cadmium, chromium, cobalt, iron, lead, manganese, nickel, silver, sodium, thallium, and vanadium. Two metals that were reported at the higher concentrations were antimony at 9.4 µg/kg (45 times background) in the surface soil sample from Boring 400-004 and mercury at 8.3 µg/kg (42 times background) in the surface soil sample from Boring 203-003. Mercury was detected only once at a level above background, and antimony, although detected in 11 of the 36 samples, exceeded the SQL only in one sample. The distributions of beryllium and lead, two highly toxic metals, are shown in Fig. 4.26.

Radionuclides

Two of the 19 samples collected from 13 locations within Sector 7 were found to contain radionuclides at concentrations above PGDP screening levels. Nine radioactive isotopes were identified: ²⁴¹Am, ¹³⁷Cs, ²³⁷Np, ²³⁹Pu, ⁹⁹Tc, ²³⁰Th, ²³⁴U, ²³⁵U, and ²³⁸U. The surface soil sample collected from Boring 203-003, located immediately adjacent to the C-203 Waste Discard Sump, exhibited an activity of 43.3 pCi/g for ⁹⁹Tc, which is 17 times the PGDP background screening level. This sample also contained elevated activities of six other isotopes including ²³⁸U at an activity of 14.8 pCi/g (Fig. 4.27). The highest documented radioactivity in the subsurface was 3.1 pCi/g (⁹⁹Tc) in soil collected from 14.5 ft bgs in Boring 203-003.

4.2.8 Sector 8 [C-401 Transfer Line (SWMU 26)]

4.2.8.1 Site History

Location and Physical Description

Little is known about the construction characteristics of the C-401 Transfer Line. Available documentation of the Transfer Line pipe material provides conflicting information. The pipe material was reported as being 6-in. vitrified clay pipe and 4-in. iron pipe with leaded joints. Excavation of a small section of the pipe in 1998 showed the pipe to be made of metal, probably iron. The Transfer Line lies 3 to 5 ft bgs, parallel with Virginia Avenue and approximately 60 ft to the north toward C-404 where its course deviates to enter C-404. Blueprints document that feeder lines extend north from the C-400 Building to the Transfer Line, located across the North-South Diversion Ditch from the C-400 Area. Pumps in the C-403 Neutralization Tank and Waste Discard Sump pressurized the system during discharge periods.

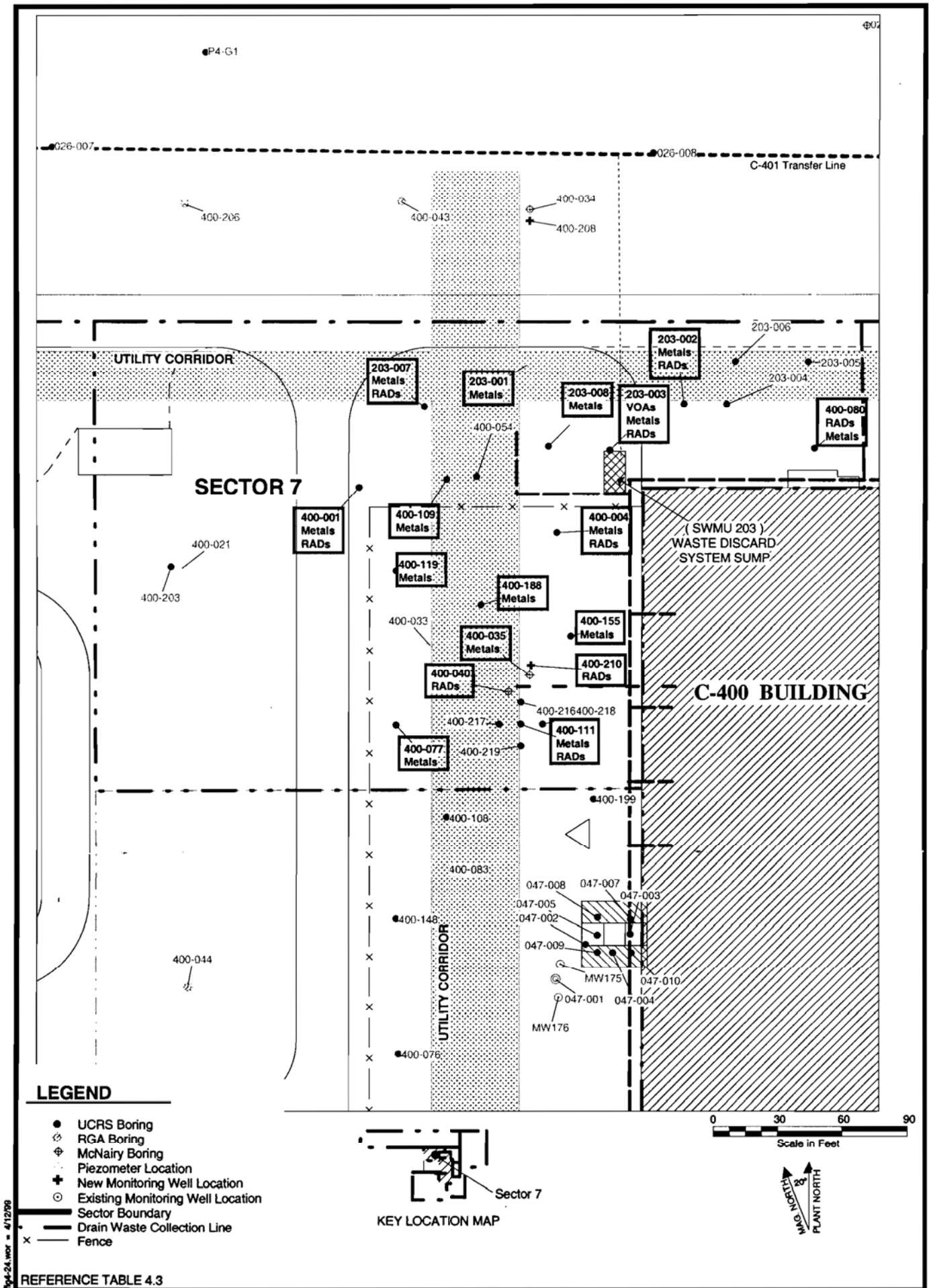


Fig. 4.24, rev. = 4/12/98

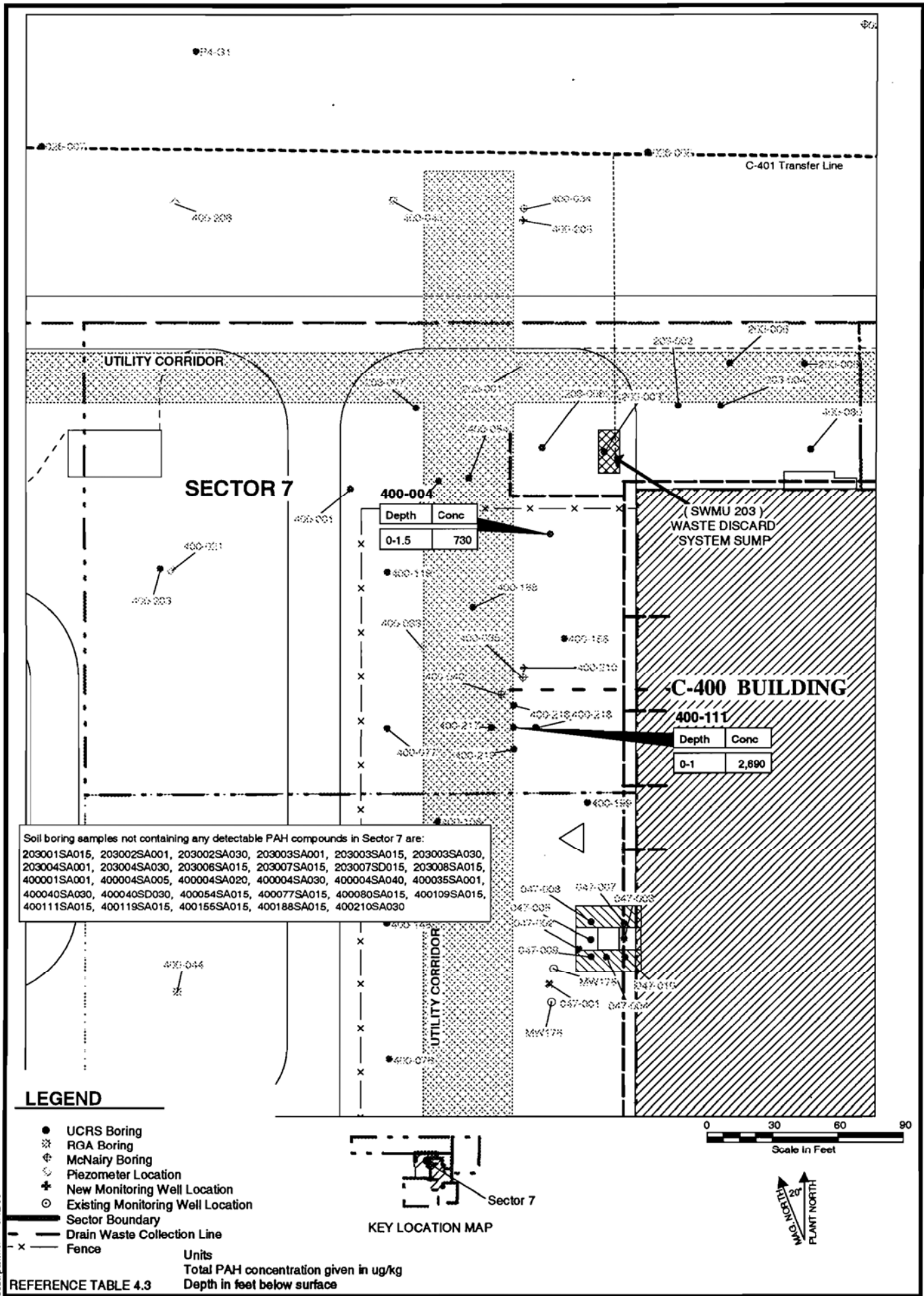


Fig. 4.25. Map showing distribution and total concentration of PAHs detected in sector 7 UCRS soil.

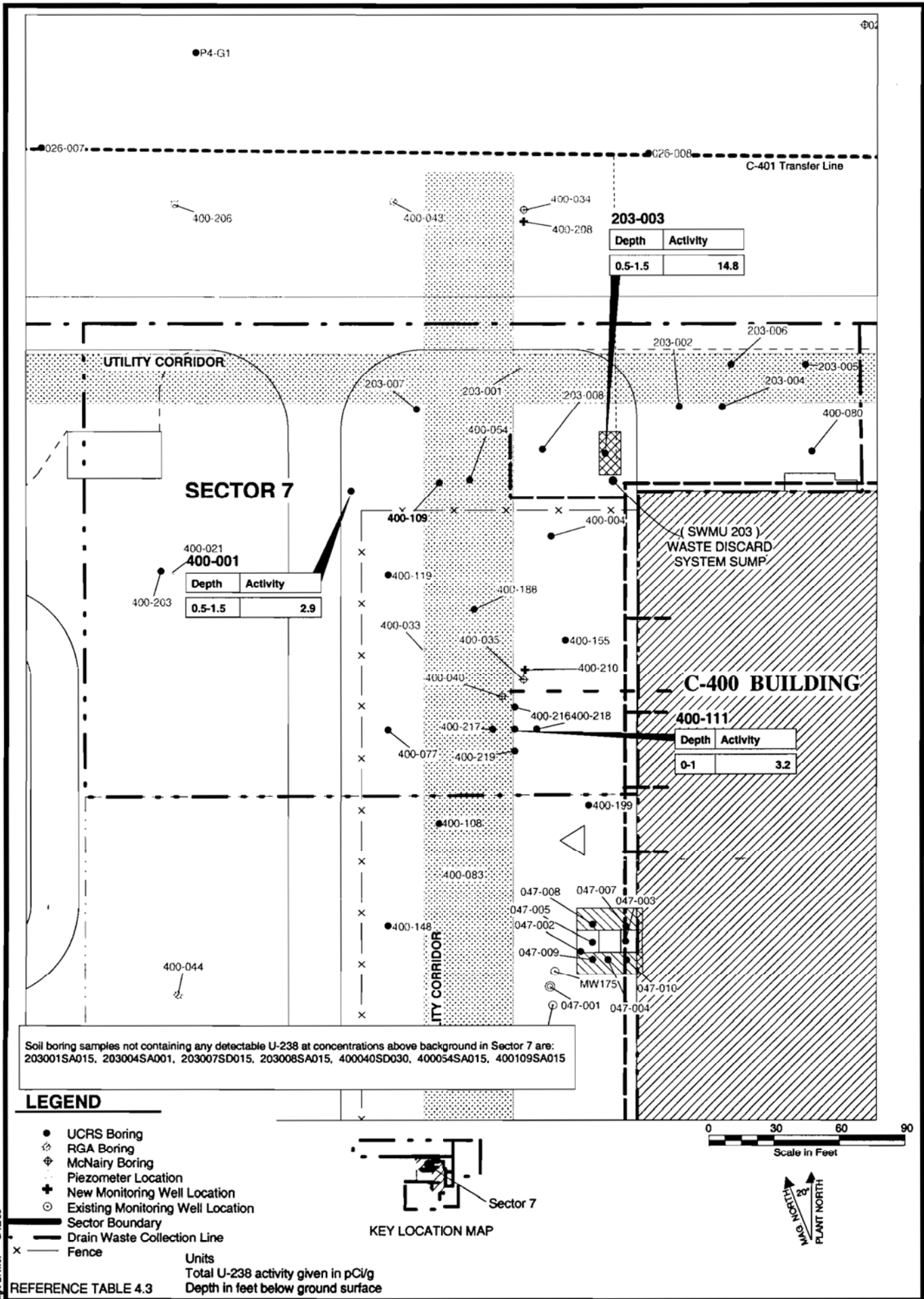


Fig. 4.27. Map showing distribution and activity of U-238 detected in sector 7 UCRS soil.

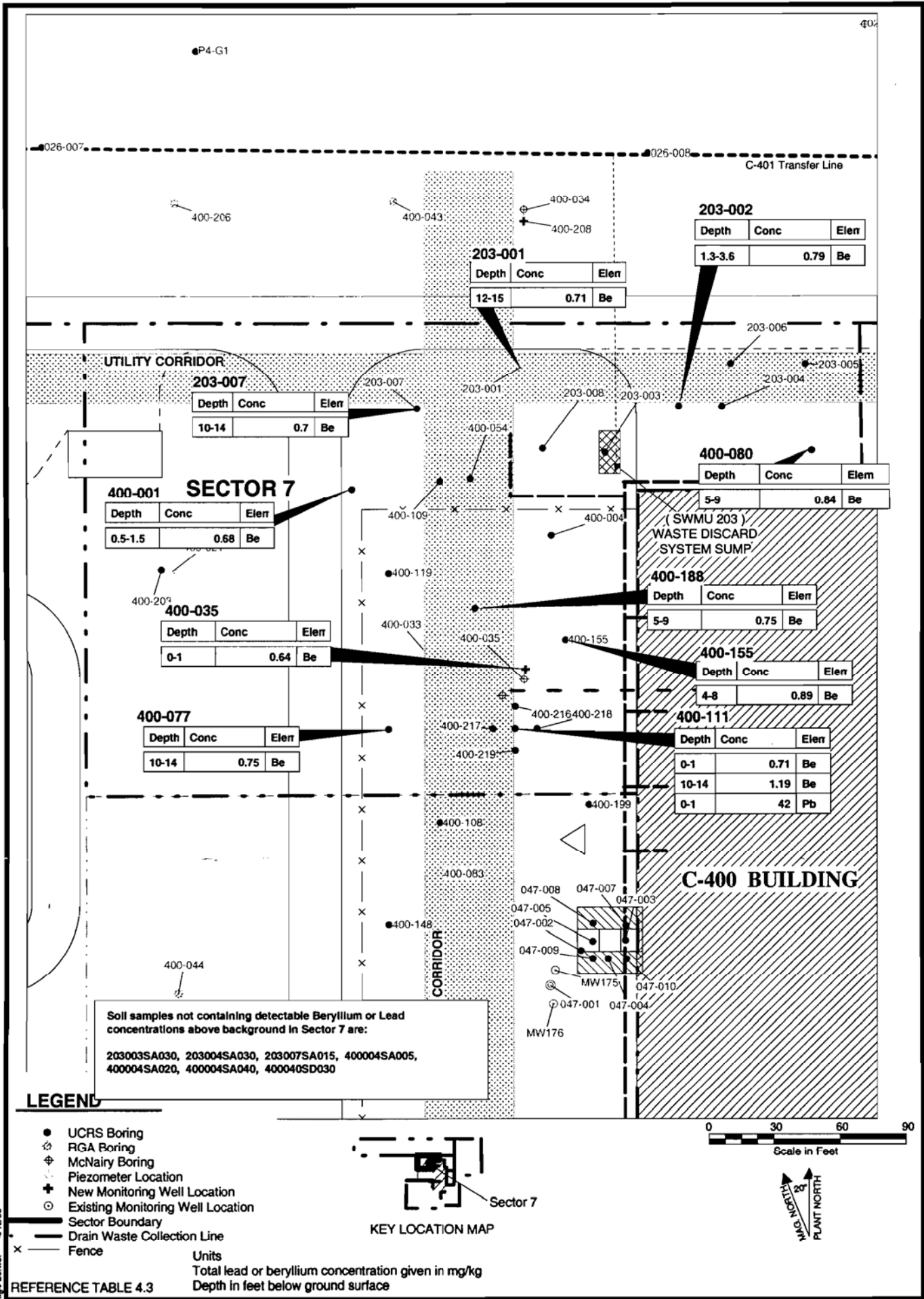


Fig. 4.26. Map showing distribution and total concentration of Lead and Beryllium detected in sector 7 UCRS soil.

**Table 4.33. VOA compounds detected in Sector 7
UCRS soil**

Sample Type	Sample ID	Sample Interval (ft bgs)		Analytical Compound	Results ug/kg	Lab Qualifier	Validation Qualifier	Data Assessment
		Top	Bottom					
Soil	203003SA015	11	14.5	1,1-Dichloroethene	1.4	J	?	
		11	14.5	Trichloroethene	4	J	?	
	203003SA030	28.5	32	Trichloroethene	4500		?	
	400004SA010	10.5	14	Toluene	6	J	?	
	400040SD030	30	31	cis-1,2-Dichloroethene	1.6	J	?	
		30	31	Trichloroethene	5.4	J	?	

Note: Soil boring samples not containing any detectable VOA compounds in Sector 7 are:

203001SA015, 203002SA030, 203004SA030, 203006SA015, 203007SA015, 203007SD015, 203008SA015, 400004SA005, 400004SA020, 400004SA030, 400004SA040, 400021SA019, 400040SA005, 400040SA030, 400054SA015, 400077SA015, 400080SA015, 400109SA015, 400111SA015, 400119SA015, 400155SA015, 400188SA015, 400210SA010, 400210SA024, 400210SA030, 400210SA045

**Table 4.34. SVOA and PCB compounds detected in Sector 7
UCRS soil**

Sample Type	Analytical Group	Sample ID	Sample Interval (ft bgs)		Analytical Compound	Results ug/kg	Lab Qualifier	Validation Qualifier	Data Assessment
			Top	Bottom					
Soil	SVOA	40004SA001	0	1.5	Benz(a)anthracene	70	J	?	
			0	1.5	Benzo(a)pyrene	80	J	?	
			0	1.5	Benzo(b)fluoranthene	120	J	?	
			0	1.5	Benzo(k)fluoranthene	70	J	?	
			0	1.5	Chrysene	80	J	?	
			0	1.5	Fluoranthene	140	J	?	
			0	1.5	Phenanthrene	50	J	?	
			0	1.5	Pyrene	120	J	?	
			10.5	14	N-Nitroso-di-n-propylamin	522	J	?	
			0	1	Benzo(a)anthracene	300	J	?	
			0	1	Benzo(a)pyrene	400	J	?	
			0	1	Benzo(b)fluoranthene	600	J	?	
			0	1	Benzo(k)fluoranthene	300	J	?	
			0	1	Chrysene	290	J	?	
			0	1	Fluoranthene	400	J	?	
0	1	Pyrene	400	J	?				
	PPCB	203006SA015	12.5	16.5	PCB-1260	7.9	J	?	

**Table 4.34. SVOA and PCB compounds detected in Sector 7
UCRS soil**

Sample Type	Analytical Group	Sample ID	Sample Interval (ft bgs)		Analytical Compound	Results ug/kg	Lab Qualifier	Validation Qualifier	Data Assessment
			Top	Bottom					

Note: Soil boring samples not containing any detectable SVOA compounds in Sector 7 are:

- 203001SA015, 203002SA001, 203002SA030, 203003SA001, 203003SA015, 203003SA030, 203004SA001, 203004SA030, 203006SA015,
- 203007SA015, 203007SD015, 203008SA015, 400001SA001, 400004SA005, 400004SA020, 400004SA030, 400004SA040, 400035SA001,
- 400040SA030, 400040SD030, 400054SA015, 400077SA015, 400080SA015, 400109SA015, 400111SA015, 400119SA015, 400155SA015,
- 400188SA015, 400210SA030

Soil boring samples not containing any detectable PCB compounds in Sector 7 are:

- 203001SA015, 203002SA030, 203003SA030, 203004SA030, 203007SA015, 203007SD015, 203008SA015, 400001SA001, 400004SA001,
- 400004SA005, 400004SA010, 400004SA020, 400004SA030, 400004SA040, 400054SA015, 400080SA015, 400109SA015, 400111SA001,
- 400111SA015, 400210SA030

**Table 4.35. Metals detected in Sector 7
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	203001SA015	12	15	Aluminum	16100		=		12000
		12	15	Beryllium	0.71		=		0.69
		12	15	Sodium	433		=		340
		12	15	Vanadium	38.1		=		37
	203002SA001	1.3	3.6	Beryllium	0.79		?		0.67
		1.3	3.6	Cadmium	0.32	B	?		0.21
		1.3	3.6	Chromium	27.5		?		16
		1.3	3.6	Sodium	532		?		320
	203002SA030	28	31	Antimony	0.7	B	?		0.21
	203003SA001	0.5	1.5	Antimony	1.4	B	?		0.21
		0.5	1.5	Cadmium	0.29	B	?		0.21
		0.5	1.5	Chromium	22.4		?		16
		0.5	1.5	Mercury	8.3		?		0.2
	203003SA015	11	14.5	Antimony	0.6	B	?		0.21
		11	14.5	Cadmium	0.22	B	?		0.21
		11	14.5	Sodium	503		?		340
	203004SA001	1.4	4	Antimony	0.7	B	?		0.21
		1.4	4	Sodium	466		?		320
	203006SA015	12.5	16.5	Sodium	373		?		340
	203007SD015	10	14	Aluminum	17400		?		12000
		10	14	Beryllium	0.7		?		0.69

**Table 4.35. Metals detected in Sector 7
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	203007SD015	10	14	Sodium	372		?		340
	203008SA015	11	15	Aluminum	12800		=		12000
		11	15	Cobalt	17.7		=		13
		11	15	Manganese	887		=		820
		11	15	Sodium	372		=		340
	400001SA001	0.5	1.5	Aluminum	14500		=		13000
		0.5	1.5	Beryllium	0.68		=		0.67
		0.5	1.5	Chromium	18.1		=		16
		0.5	1.5	Sodium	787		=		320
	400004SA001	0	1.5	Antimony	9.4		?		0.21
		0	1.5	Chromium	30.1		?		16
	400004SA010	10.5	14	Sodium	461		?		340
	400035SA001	0	1	Beryllium	0.69		?		0.67
		0	1	Chromium	22.8		?		16
	400040SA030	30	31	Sodium	440		?		340
	400040SD030	30	31	Sodium	420		?		340
	400054SA015	10	14	Antimony	0.6	B	=		0.21
	400077SA015	10	14	Aluminum	16600		?		12000
		10	14	Antimony	1.1	B	?		0.21
		10	14	Beryllium	0.75		?		0.69
		10	14	Vanadium	50.5		?		37

**Table 4.35. Metals detected in Sector 7
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	400080SA015	5	9	Beryllium	0.84		?		0.69
		5	9	Cadmium	0.22	B	?		0.21
		5	9	Sodium	375		?		340
	400109SA015	9	13	Arsenic	9.5		?		7.9
		0	1	Antimony	1	B	?		0.21
		0	1	Beryllium	0.71	B	?		0.67
	400111SA001	0	1	Cadmium	0.75	B	?		0.21
		0	1	Chromium	66		?		16
		0	1	Iron	30500		?		28000
	400111SA015	0	1	Lead	42		?		36
		0	1	Vanadium	42.4		?		38
		10	14	Beryllium	1.19	B	?		0.69
		10	14	Cadmium	0.52	B	?		0.21
		10	14	Cobalt	15.5		?		13
		10	14	Iron	37400		?		28000
10		14	Nickel	29.1		?		22	
10		14	Sodium	457		?		340	
10		14	Vanadium	67.2		?		37	
400119SA015	9	13	Aluminum	15400		?		12000	
400155SA015	4	8	Aluminum	15500		?		12000	
	4	8	Beryllium	0.89		?		0.69	

**Table 4.35. Metals detected in Sector 7
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	400188SA015	5	9	Antimony	0.8	B	?		0.21
		5	9	Arsenic	10.3		?		7.9
		5	9	Beryllium	0.75		?		0.69
		5	9	Sodium	445		?		340
		5	9	Thallium	0.7	B	?		0.34
	400210SA030	33.5	34	Antimony	3.8	B	?		0.21
		33.5	34	Silver	3.03		?		2.7
		33.5	34	Sodium	488		?		340
	400216SA001	0	0.5	Sodium	483		?		320
	400217SA001	0	0.5	Sodium	410		?		320
	400218SA001	0	0.5	Sodium	491		?		320
	400219SA001	0	0.5	Antimony	0.6	B	?		0.21
		0	0.5	Sodium	420		?		320

Note: Soil boring samples not containing any detectable metals at concentrations above background in Sector 7 are:
203003SA030, 203004SA030, 203007SA015, 400004SA005, 400004SA020, 400004SA040, 400040SD030

**Table 4.36. Radioactive isotopes detected in Sector 7
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	203002SA030	28	31	Americium-241	0.2		?		0
	203003SA001	0.5	1.5	Neptunium-237	0.8		?		0.1
		0.5	1.5	Plutonium-239	0.2		?		0.025
		0.5	1.5	Technetium-99	43.3		?		2.5
		0.5	1.5	Thorium-230	5.6		?		1.5
		0.5	1.5	Uranium-234	7.4		?		2.5
		0.5	1.5	Uranium-235	0.4		?		0.14
		0.5	1.5	Uranium-238	14.8		?		1.2
		11	14.5	Americium-241	0.4		?		0
		11	14.5	Neptunium-237	0.4		?		0
		11	14.5	Technetium-99	3.1		?		2.8
		28.5	32	Neptunium-237	0.3		?		0
		29	32.5	Neptunium-237	0.2		?		0
		10	14	Americium-241	0.12		?		0
		0.5	1.5	Uranium-235	0.3		=		0.14
	0.5	1.5	Uranium-238	2.9		=		1.2	
	30	31	Cesium-137	0.3		?		0.28	
	5	9	Thorium-230	1.5		?		1.4	
	0	1	Technetium-99	4.2		?		2.5	
	0	1	Uranium-234	2.8		?		2.5	
	0	1	Uranium-238	3.2		?		1.2	

**Table 4.36. Radioactive isotopes detected in Sector 7
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	400111SA015	10	14	Thorium-230	1.8		?		1.4
	400210SA030	33.5	34	Cesium-137	0.3		?		0.28

Note: Soil boring samples not containing any detectable radioactive isotopes at concentrations above background in Sector 7 are:
203001SA015, 203004SA001, 203007SD015, 203008SA015, 400040SD030, 400054SA015, 400109SA015

Table 4.37. Frequency of detection of organic compounds, metals, and radioactive isotopes in Sector 7 UCRS soil

Analytical Group	Analytical Compound	No. of Detects	No. of Analyses	Maximum Result	Minimum Result	Average Result	Units
VOA	Trichloroethene	3	30	4500.00	2.10	753.48	ug/kg
	1,1-Dichloroethene	1	30	1.40	1.40	1.40	ug/kg
	cis-1,2-Dichloroethene	1	30	1.60	1.60	1.60	ug/kg
	Toluene	1	20	6.00	6.00	6.00	ug/kg
	Benz(a)anthracene	2	32	300.00	70.00	185.00	ug/kg
	Benz(a)pyrene	2	32	400.00	80.00	240.00	ug/kg
	Benz(b)fluoranthene	2	32	600.00	120.00	360.00	ug/kg
	Benz(k)fluoranthene	2	32	300.00	70.00	185.00	ug/kg
	Chrysene	2	32	290.00	80.00	185.00	ug/kg
	Fluoranthene	2	32	400.00	140.00	270.00	ug/kg
PCB	Pyrene	2	32	400.00	120.00	260.00	ug/kg
	N-Nitroso-di-n-propylamine	1	32	522.00	522.00	522.00	ug/kg
	Phenanthrene	1	32	50.00	50.00	50.00	ug/kg
	PCB-1260	1	21	7.90	7.90	7.90	ug/kg
	Sodium	19	36	787.00	372.00	459.37	mg/kg
	Antimony	11	36	9.40	0.60	1.88	mg/kg
	Beryllium	11	36	1.19	0.68	0.79	mg/kg
	Aluminum	7	36	17400.00	12800.00	15471.43	mg/kg
	Cadmium	6	36	0.75	0.22	0.39	mg/kg
	Chromium	6	36	66.00	18.10	31.15	mg/kg
Metals	Vanadium	4	36	67.20	38.10	49.55	mg/kg
	Arsenic	2	36	10.30	9.50	9.90	mg/kg
	Cobalt	2	36	17.70	15.50	16.60	mg/kg
	Iron	2	36	37400.00	30500.00	33950.00	mg/kg
	Lead	1	36	42.00	42.00	42.00	mg/kg
	Manganese	1	36	887.00	887.00	887.00	mg/kg
	Mercury	1	36	8.30	8.30	8.30	mg/kg
	Nickel	1	36	29.10	29.10	29.10	mg/kg
	Silver	1	36	3.03	3.03	3.03	mg/kg
	Thallium	1	36	0.70	0.70	0.70	mg/kg
Radioactive isotopes	Neptunium-237	4	19	0.80	0.20	0.43	pCi/g
	Americium-241	3	19	0.40	0.12	0.24	pCi/g

**Table 4.37. Frequency of detection of organic compounds, metals, and radioactive isotopes in Sector 7
UCRS soil**

Analytical Group	Analytical Compound	No. of Detects	No. of Analyses	Maximum Result	Minimum Result	Average Result	Units
Radioactive isotopes	Technetium-99	3	19	43.30	3.10	16.87	pCi/g
	Thorium-230	3	19	5.60	1.50	2.97	pCi/g
	Uranium-238	3	19	14.80	2.90	6.97	pCi/g
	Cesium-137	2	19	0.30	0.30	0.30	pCi/g
	Uranium-234	2	19	7.40	2.80	5.10	pCi/g
	Uranium-235	2	19	0.40	0.30	0.35	pCi/g
	Plutonium-239	1	19	0.20	0.20	0.20	pCi/g