SWMU 7 -- Elemental Phosphorus Production Area

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5.5.7 SWMU 7 - Elemental Phosphorus Production Area

The location of Solid Waste Management Unit (SWMU) 7 is shown on Figure 5.5.7-1a and SWMU 7 monitoring stations and sample locations are provided on Figure 5.5.7-1b. SWMU 7, the Elemental Phosphorus Production Area, is where elemental phosphorus was produced and/or handled during operations at the Silver Bow Plant and includes the furnace area, slag pits and granulation area, phosphorus processing tanks, concrete silos, P4 Handling area, powerhouse area, roaster area, and phosphoric acid plant. The production area also includes the following SWMUs and Areas of Concern (AOC):

- Clarifier (SWMU 2),
- Crude Phosphorus Burial Area (SWMU 11),
- Sulfuric Acid Tank Area (AOC B)

Information for each of these specific SWMUs also appears in Section 5.5.2 (SWMU 2), 5.5.11 (SWMU 11), and 5.5.29 (AOC B), and will not be repeated here.

The production facility was decontaminated during the demolition activities. Buildings were demolished and sold as scrap metal. Tanks, piping and equipment containing elemental phosphorus were cleaned and recycled, except a few items that were stockpiled. The phosphorus storage tanks were above ground stainless steel tanks that have been cleaned and recycled. The phosphorus process tanks generally had bases recessed four feet into the ground, with the majority of the stainless steel tank above ground. These tanks have also been cleaned and recycled. Foundations have been covered by 3 feet of soil/slag. Concrete silos and the kiln scrubbers remain.

5.5.7.1 RFI Investigation

Elemental phosphorus was produced and handled in SWMU 7. SWMU 7 was investigated in accordance with the RCRA Facility Investigation Work Plan (RFI) work plan (Barr, 2009). Consistent with investigation activities at other elemental phosphorus production facilities, the purpose of the investigation at the production area was to identify an outer perimeter of the area that is contaminated with elemental phosphorus. Such a horizontal delineation would be necessary in the event capping is required of the elemental phosphorus contaminated area. The Elemental Phosphorus Production Area (SWMU 7) was covered by three to four feet of coarse slag during the Plant demolition activities in the late 1990s.

One soil boring was installed approximately every 200 feet around the perimeter of the production area to a depth of 10 feet into native soil to delineate the horizontal extent of the elemental phosphorus production area (*see* Figure 5.5.7-1b). Fourteen borings were installed using 5.25-inch diameter hollow stem auger drilling equipment. Soil samples were collected at approximately 2½-foot intervals using split-spoon samplers as described in the Field Sampling Plan of the RFI Work Plan (Barr, 2009). None of the soil cuttings or soil samples smoked and/or ignited, therefore, the investigation area was not expanded. Upon completion of each boring, the boring was backfilled with bentonite chips which were then hydrated. The boring logs are provided in Appendix 5.5.7-A.

One sample was collected from each split spoon for XRF (x-ray fluorescent) analysis and potential laboratory analysis. These samples were analyzed in the field laboratory according to the XRF screening and confirmatory protocols. The sample with the overall highest metals concentrations at each borehole was selected for confirmatory analysis for the metals.

As detailed in the RFI Work Plan, a separate aliquot from each split spoon was placed in a stainless steel bowl and covered with aluminum foil between split spoon samples. Immediately upon collection of the last aliquot, the soils were mixed and a sample was collected for analysis of elemental phosphorus. Although this compositing scheme could allow some elemental phosphorus to oxidize, the overall process would represent the average concentration to which a hypothetical construction worker could be exposed. Construction activity would bring soils to the surface allowing oxidation of elemental phosphorus in the spoil pile and at the trench side walls and floor. Therefore, the compositing program is appropriate to evaluate the exposure concentration for the construction worker scenario.

5.5.7.2 RFI Results

This section discusses the results of the investigation at the Elemental Phosphorus Production Area. The SWMU sample data and background values (i.e., mean, maximum, and 95% upper confidence limit of the mean) are summarized in Tables 5.5.7-1 through 5.5.7-4. The locations of the samples are shown on Figure 5.5.7-1b. Figures 5.5.7-2 through 5.5.7-26, show the locations, concentrations and depth intervals for the data reported on the tables.

Soil data from SWMU 7 were compared to the background/reference area concentrations. Concentrations above the 95% upper confidence limit of the mean background/reference area concentrations are highlighted on the constituent delineation figures presented in this section. Where

a 95% upper limit could not be calculated, the maximum detected concentration or the maximum detection limit was selected.

Constituent concentrations are described in this report as above background/reference area concentrations if the mean and maximum concentrations of the SWMU data exceed both of the mean and maximum background/reference area values. All data will be retained for evaluation in the human health and ecological risk assessments. The definitive background comparison will be conducted in the risk assessment using a statistical approach consistent with EPA guidance (U.S. EPA 2002).

5.5.7.2.1 Elemental Phosphorus

Fourteen soil borings (EPP-1 through EPP-14) were installed around the perimeter of the elemental phosphorus production area. None of the soil cuttings or soil samples from this investigation smoked and/or ignited indicating that elemental phosphorus is not present at hazardous waste characteristic concentrations. Fourteen composite soil samples were analyzed for elemental phosphorus. The analytical data is summarized in Table 5.5.7-1 and plotted on Figure 5.5.7-2. Elemental phosphorus was not detected in any of the fourteen soil samples from the perimeter of SWMU 7. The horizontal extent of elemental phosphorus was established by the investigation program. Soil within this area is known to contain elemental phosphorus. As such, corrective measures to manage future construction through this former production area are warranted.

5.5.7.2.2 Radionuclides

The elemental phosphorus production area is covered by 3 to 4 feet of slag. As such, the area represents the same radionuclide profile as the slag piles (i.e., SWMU 12 and SWMU 13). Slag contains naturally occurring radioactive materials (NORM). The radioactivity is almost exclusively due to trace levels of uranium and its decay products (Lloyd, 1983). Typical radionuclide concentrations for the long lasting radionuclides in slag are as follows:

Radionuclide	Typical Concentration
Pb-210	1 pCi/g
Ra-226	28 pCi/g
Th-230	47 pCi/g
U234	24 pCi/g
U238	24 pCi/g

Radionuclides were evaluated at one location (FS3) within the perimeter of SWMU 7 (*see* Figure 5.5.7-3). Sample FS3 was collected from a slag covered area near the crude phosphorus burial area and southeast of the clarifier. The radionuclide data are presented in Table 5.5.7-2 and are consistent with slag as the source of the radionuclides (i.e., elevated Uranium-238 and Radium-226).

5.5.7.2.3 Metals

The analytical laboratory and correlated XRF data were combined to assist the delineation of the hazardous constituents. Hazardous constituent concentrations based on the XRF data were estimated using the linear equations presented in Section 5.4.2 for the respective hazardous constituents. The correlation coefficient (R^2) is greater than 0.7 for these hazardous constituents. The metals data are presented in Table 5.5.7-3. The 2009 XRF evaluation provided data for arsenic, cadmium, chromium, lead, manganese, selenium, silver, uranium, vanadium, and zinc.

5.5.7.2.3.1 Group A

The metals included in Group A are arsenic, cadmium, chromium, and copper. The distribution of these metal constituents is shown on Figures 5.5.7-4 through 5.5.7-7, respectively, and the data are presented on Table 5.5.7-3.

Arsenic and copper concentrations are consistent with background concentrations. Cadmium and chromium are present at concentrations above the background concentrations. However, these constituents were not detected in the majority of the samples. Samples collected at the top of native soils at EPP-10 and EPP-11 had the highest concentrations of cadmium. Cadmium was not detected in the deepest interval sampled below these higher concentrations. Similarly, chromium was reported at higher concentrations in the top of native soils at EPP-9 and EPP-10 and chromium was not detected in the interval below the higher concentrations. The sample from the 4.5- to 6.5-feet interval at EPP-1 reported higher concentrations of cadmium and chromium. Cadmium was not detected in the samples above and below this higher interval.

5.5.7.2.3.2 Group B

The metals included in Group B are iron, lead, manganese, and nickel. The distribution of these metal constituents is shown on Figures 5.5.7-8 through 5.5.7-11, respectively, and the data are presented on Table 5.5.7-3. The iron, lead, and manganese concentrations are consistent with background concentrations. Nickel is present at concentrations above background. Only one sample (EEP-9 0-2 feet) exceeds the maximum nickel concentration reported in the background data set, and the exceedence is less than a factor of two.

5.5.7.2.3.3 Group C

The metals included in Group C are selenium, silver, uranium vanadium, and zinc. The distribution of these metal constituents is shown on Figures 5.5.7-12 through 5.5.7-16, respectively, and the data are presented on Table 5.5.7-3. Vanadium concentrations are consistent with background concentrations. The mean concentration across the SWMU data is less than the mean concentration of the background dataset.

Selenium was detected in samples for EPP-1, EPP-9, EPP-11 and EPP-12. The higher concentrations were reported in the top of native soils at EPP-9, EPP-11 and EPP-12. Selenium is not widely distributed across the SWMU as it was detected in only 7 of 60 samples.

Silver is not widely distributed across the SWMU as it was only detected in 6 of 60 samples, but concentrations are above background in samples from EPP-4, EPP-8 and EPP-11.

Uranium was detected in 17 of 60 soil samples at concentrations ranging from 0.02 mg/kg to 20.1 mg/kg. The highest concentration was found in the 5- to 7-foot interval at EPP-11. Uranium was not detected in the interval below this sample.

Zinc is naturally present in native soils across the United States. Zinc was detected in 60 of 60 soil samples at concentrations ranging from 22 mg/kg to 586 mg/kg. Both the maximum and average zinc concentrations are higher than the maximum and average background concentrations, therefore zinc is considered to be above background. Zinc concentrations were above the maximum background concentration at only EPP-1 so the elevated zinc concentrations are not widely distributed around the SWMU.

5.5.7.2.3.4 Group D

The metals included in Group D are barium, beryllium, cobalt, mercury, and thallium. The distribution of these metal constituents are shown on Figures 5.5.7-17 through 5.5.7-21, respectively, and the data are presented on Table 5.5.7-3.

Barium is naturally present in native soils across the United States. Barium was detected in 15 of 15 soil samples at concentrations ranging from 116 mg/kg to 299 mg/kg. The maximum concentration is only 9 mg/kg higher than the maximum background concentration and was found at EPP-2 between 7-9 feet. There is no discernible spatial distribution of barium concentrations.

Beryllium concentrations are consistent with background concentrations.

Cobalt concentrations are somewhat higher than background as both the mean and maximum concentrations are above the mean and maximum background concentrations. The maximum concentration only exceeds the background maximum by 0.4 mg/kg.

The highest concentration of mercury was found at EPP-10 between 7-8 feet bgs. This sample was obtained from the original ground surface. The boring log indicates there is 7 feet of fill overlying the native soil at this location.

Thallium was detected in 15 of the 15 soil samples ranging in concentrations from 0.18 mg/kg to 4.69 mg/kg. Both the maximum and average thallium concentration are higher than the maximum and average background concentrations, therefore thallium is considered to be above background. The highest concentration was recorded at EPP-1 between 4.5-6.5 feet. Samples from EPP-10 and EPP-11 also contained thallium concentrations above the maximum background concentration.

5.5.7.2.3.5 Metals - Group E

The metals included in Group E are antimony, calcium, magnesium, potassium, and sodium. The distribution of these metal constituents are shown on Figures 5.5.7-22 through 5.5.7-26, respectively, and the data are presented on Table 5.5.7-3. Antimony concentrations are consistent with background concentrations.

Calcium, magnesium, potassium, and sodium were found at concentrations above the background concentrations. These parameters are not hazardous constituents.

5.5.7.2.3.6 Metals Delineation

The following metals were identified as above background based on comparison to the background/reference area values: barium, cadmium, calcium, chromium, cobalt, magnesium, mercury, nickel, potassium, selenium, silver, sodium, thallium, uranium, and zinc. Boring EPP-1, EPP-10 and EPP-11 reported the higher metals concentrations than samples from the other borings. The metals concentrations will be evaluated in the risk assessment. The risk assessment will identify which metals, if any, are present at concentrations that warrant corrective measures. The dataset would be reviewed at that time and additional sampling may be necessary to inform the corrective measures study or later during the corrective measures design phase.

5.5.7.2.4 SVOCs

Boring EPP-14 was installed through a former railroad track area. The boring log for EPP-14 identifies a railroad tie covered by asphalt in the surface interval (*see* Appendix 5.5.7-A). Railroad ties are typically treated with creosote as a wood preservative. The driller augured through the

railroad tie to advance the boring to deeper intervals. The soils in the surface interval contained a faint naphthalene-like odor. The soil sample from the 7-9 foot interval at EPP-14 had a moderate naphthalene-like odor. The soil sample below the 7-9 foot interval did not have a naphthalene-like odor. A sample from the 7-9 foot interval was analyzed for semi volatile organic compounds (SVOCs) to evaluate the naphthalene-like odor.

The SVOC data are summarized in Table 5.5.7-4. The SVOCs detected in the SWMU 7 samples belong to a subgroup of SVOCs known as polynuclear aromatic hydrocarbons (PAHs). These multi-benzene-ringed compounds are present in creosote. The creosoted treated railroad ties are the likely source of the PAHs detected in the soil sample. The PAH concentrations are typical of concentrations associated with railroad tracks and creosote treated ties.

5.5.7.3 Conclusions/Data Gaps

This SWMU encompasses the entire elemental phosphorus production area. Fourteen soil borings were installed around the perimeter of the elemental phosphorus production area. None of the soil cuttings or soil samples from this investigation smoked and/or ignited indicating that elemental phosphorus is not present at hazardous waste characteristic concentrations. In addition, elemental phosphorus was not detected in any of the 14 soil samples from the perimeter of SWMU 7. The horizontal extent of elemental phosphorus was established by the investigation program.

Soil and groundwater inside the defined area are known to contain elemental phosphorus. SWMU 7 includes the clarifier and the crude phosphorus burial area. The clarifier contains approximately 500,000 gallons of crude phosphorus, which contains about 20% elemental phosphorus, and crude phosphorus was buried at the crude phosphorus burial area (SWMU 11). Elemental phosphorus was also detected in groundwater samples collected from wells at the clarifier (*see* Section 5.5.2). Elemental phosphorus was not found in groundwater samples outside the perimeter of SWMU 7. The horizontal extent of elemental phosphorus was established by the investigation program.

Several metals were found at concentrations above the background concentrations in samples collected from the perimeter borings including barium, cadmium, calcium, chromium, cobalt, magnesium, mercury, nickel, potassium, selenium, silver, sodium, thallium, uranium, and zinc. Higher metals concentrations were typically associated with Borings EPP-1, EPP-10 and EPP-11. However, there is no discernible distribution to the higher metals concentrations.

Boring EPP-14 was advanced through a railroad track area that had creosote treated ties. Soils from this boring had a naphthalene-like odor and the interval with the strongest odor was analyzed for

SVOCs. This sample contained creosote-related PAH compounds as would be associated with railroad track areas.

The elemental phosphorus production area is covered by several feet of slag. Therefore, radionuclides associated with slag are present at concentrations represented by slag. A surface sample collected from with the production area confirmed that elevated concentrations of radium-226 and uranium-238 are present in the production area.

The horizontal extent of elemental phosphorus was established by the investigation program and soils within the perimeter of SWMU 7 contain elemental phosphorus. Corrective measures to manage future construction through this former production area are warranted.

There is sufficient information to conduct the risk assessment for this SWMU. The risk assessment will identify which parameters, if any, are present at concentrations that warrant corrective measures. The dataset would be reviewed at that time and additional sampling may be necessary to inform the corrective measures study or later during the corrective measures design phase.

5.5.7.4 References

Barr Engineering Co. 2009. Final Phase I RCRA Facility Investigation Work Plan Corrective Action Order on Consent, Docket No. RCRA-08-2004-0001., Rhodia Silver Bow Plant, Butte, Montana, March 2009.

Lloyd, L.L. June 1983. Evaluation of Radon Sources and Phosphate Slag in Butte, Montana. Occupational Health Bureau, Montana Department of Health and Environmental Sciences.

U.S. EPA. 2002. Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites. U.S. Environmental Protection Agency. EPA 540-R-01-003. OSWER 9285.7-41. September 2002

Tables

Table 5.5.7-1
Soil Data - General and Site-Specific Parameters
SWMU 7
Rhodia Silver Bow Plant
[concentrations in mg/kg]

			Chemical Name	Phosphorus, elemental (white)
Location ID	Sample Date	Depth	Sample Type	
EPP-1	5/19/2009	0 - 11.5 ft	N	< 0.00047
			FD	< 0.00047
EPP-2	5/18/2009	0 - 11.5 ft	N	< 0.00047
EPP-3	5/18/2009	0 - 12.5 ft	N	< 0.00047
EPP-4	5/18/2009	0 - 22.5 ft	N	< 0.00047
EPP-5	5/16/2009	0 - 16 ft	N	< 0.00047
EPP-6	5/16/2009	0 - 13 ft	N	< 0.00047
EPP-7	5/16/2009	0 - 12 ft	N	< 0.00047
EPP-8	5/16/2009	0 - 11 ft	N	< 0.00047
EPP-9	5/17/2009	0 - 10 ft	N	< 0.00047
EPP-10	5/17/2009	0 - 12 ft	N	< 0.00047
EPP-11	5/17/2009	0 - 12 ft	N	< 0.00047
EPP-12	5/17/2009	0 - 9.5 ft	N	< 0.00047
EPP-13	5/18/2009	0 - 10.5 ft	N	< 0.00047
EPP-14	5/18/2009	0 - 11.5 ft	N	< 0.00047

Table 5.5.7-2
Soil Data - Radionuclides
SWMU 7
Rhodia Silver Bow Plant
[concentrations in pCi/g]

		Chemical Name	Radium 226	Thorium 232	Uranium 238
		Background Mean, Exceedances **Bold**	**3.6**		**0.78**
		Background Maximum, Exceedances Underline	12		2.7
		Background 95% UCL, Exceedances *Italic*	*5.0*		*1.6*
Location ID	**Sample Date**	**Sample Type**			
FS3	1/1/1999	N	***17 +/- 0.81***	1.3 +/- 0.86	***62 +/- 46.00***

Table 5.5.7-3
Soil Data - Metals
SWMU 7
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name / Analysis Location				Antimony Lab	Arsenic Lab	Arsenic Field	Barium Lab	Beryllium Lab	Cadmium Lab	Cadmium Field	Calcium Lab	Chromium Lab	Chromium Field	Cobalt Lab	Copper Lab	Iron Lab	Lead Lab	Lead Field	Magnesium Lab	Manganese Lab	Manganese Field	Mercury Lab
Background Mean, Exceedances **Bold**				**0.50**	23	**23**	**150**	**0.51**	**1.6**	**1.6**	**3900**	**11**	**11**	**5.9**	**35**	**19600**	**17**	**17**	**3500**	**540**	**540**	**0.021**
Background Maximum, Exceedances Underline				3.9	120	120	290	1.3	8.9	8.9	14000	48	48	9.5	300	35300	190	190	5700	1100	1100	0.20
Background 95% UCL, Exceedances *Italic*				*1.0*	40	40	*165.1*	*0.546*	*1.057*	*1.057*	*4500*	*12.46*	*12.46*	*6.145*	63.87	*20600*	*34.98*	*34.98*	*3700*	*570*	*570*	*0.0381*
Location ID	**Sample Date**	**Depth**	**Sample Type**																			
EPP-1	5/19/2009	2 - 4 ft	N	--	--	10 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	**22 J**	--	--	285	--
			FD	--	--	16 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	13 J	--	--	345	--
EPP-1	5/19/2009	4.5 - 6.5 ft	N	***1.57***	4.1	< 18	116	0.48 J	***36.6***	***30***	***32700***	***22.8***	< 2	3.8	15.2	**20200**	***72***	***87***	***3910***	201	293	0.015 J
			FD	***1.41***	4.5	18 J	131	0.50 J	***31.3***	***27***	***37600***	***27.8***	< 2	4.3	14.6	**19900**	***65.3***	***103***	**3700**	235	248	0.013 J
EPP-1	5/19/2009	7 - 9 ft	N	--	--	**26 J**	--	--	--	< 0.2	--	--	3 J	--	--	--	--	***65***	--	--	315	--
			FD	--	--	16 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	***72***	--	--	308	--
EPP-1	5/19/2009	9.5 - 11.5 ft	N	--	--	14 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	***46***	--	--	195 J	--
			FD	--	--	14 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	***43***	--	--	143 J	--
EPP-2	5/18/2009	2 - 4 ft	N	--	--	< 11	--	--	--	< 0.2	--	--	< 2	--	--	--	--	7 J	--	--	398	--
EPP-2	5/18/2009	4.5 - 6.5 ft	N	--	--	11 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	12 J	--	--	458	--
EPP-2	5/18/2009	7 - 9 ft	N	0.37	5.5	13 J	***299***	***0.64 J***	< 0.2	< 0.2	***8640***	8.7	< 2	***9.2 J***	29	***21600***	13.3 J	15 J	***4990 J***	***1070***	***810***	**0.024**
EPP-2	5/18/2009	9.5 - 11.5 ft	N	--	--	11 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	8 J	--	--	420	--
EPP-3	5/18/2009	3 - 4 ft	N	**0.68**	15.6	18 J	138	0.46 J	*1.2*	< 0.2	***21200***	**11.1**	< 2	4.1	27	14400	10.3 J	8 J	***4710***	290	323	**0.034**
EPP-3	5/18/2009	5 - 7 ft	N	--	--	9 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	8 J	--	--	285	--
EPP-3	5/18/2009	8 - 10 ft	N	--	--	< 12	--	--	--	< 0.2	--	--	< 2	--	--	--	--	15 J	--	--	360	--
EPP-3	5/18/2009	10.5 - 12.5 ft	N	--	--	12 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	9 J	--	--	368	--
EPP-4	5/18/2009	13 - 15 ft	N	--	--	13 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	15 J	--	--	465	--
EPP-4	5/18/2009	15.5 - 17.5 ft	N	**0.51**	6.4	17 J	***247***	***0.72 J***	< 0.2	< 0.2	***5930***	7.8	< 2	***8.8***	34.6	***25700***	**23.3**	**22 J**	***6080***	531	518	0.018 J
EPP-4	5/18/2009	18 - 20 ft	N	--	--	< 0.2	--	--	--	< 2	--	--	**12 J**	--	--	--	--	< 1	--	--	***735***	--
EPP-4	5/18/2009	20.5 - 22.5 ft	N	--	--	15 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	13 J	--	--	525	--
EPP-5	5/16/2009	5 - 6 ft	N	--	--	12 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	13 J	--	--	495	--
EPP-5	5/16/2009	7 - 9 ft	N	0.38	5.5	14 J	***178***	***0.67 J***	< 0.2	< 0.2	3770	6.8	< 2	***9.9***	28.5	***23600***	9.8 J	12 J	***6400***	522	480	**0.026**
EPP-5	5/16/2009	10 - 11 ft	N	--	--	12 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	12 J	--	--	450	--
EPP-5	5/16/2009	12 - 14 ft	N	--	--	11 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	9 J	--	--	503	--
EPP-6	5/16/2009	3 - 5.5 ft	N	--	--	13 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	8 J	--	--	473	--
EPP-6	5/16/2009	5.5 - 8 ft	N	0.29	5.6	14 J	***192***	***0.58 J***	< 0.2	< 0.2	***5210***	6.7	< 2	***6.9***	22.2	17600	7.3 J	12 J	***4610***	475	473	0.015 J
EPP-6	5/16/2009	8.5 - 10.5 ft	N	--	--	12 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	11 J	--	--	488	--
EPP-6	5/16/2009	11 - 13 ft	N	--	--	10 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	**18 J**	--	--	**555**	--
EPP-7	5/16/2009	2 - 4 ft	N	--	--	12 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	8 J	--	--	***885***	--
EPP-7	5/16/2009	5 - 7 ft	N	--	--	11 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	8 J	--	--	***960***	--
EPP-7	5/16/2009	7.5 - 9.5 ft	N	--	--	10 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	6 J	--	--	***728***	--
EPP-7	5/16/2009	10 - 12 ft	N	0.45	3.6	13 J	***270***	0.34 J	< 0.2	< 0.2	3230	7.2	< 2	5.3	13.9	18300	< 3.3	10 J	2410	***708***	***960***	0.014 J
EPP-8	5/16/2009	1 - 3.5 ft	N	0.42	19.1	23 J	**163**	**0.52 J**	0.5 J	< 0.2	***22100***	**11.6**	< 2	5.1	22.1	17300	9.8 J	5 J	***4000***	311	308	**0.029**
EPP-8	5/16/2009	5 - 6 ft	N	--	--	10 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	8 J	--	--	405	--
EPP-8	5/16/2009	6.5 - 8.5 ft	N	--	--	10 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	9 J	--	--	368	--
EPP-8	5/16/2009	9 - 11 ft	N	--	--	12 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	7 J	--	--	450	--
EPP-9	5/17/2009	0 - 2 ft	N	**0.74**	12.8	12 J	***169***	***0.67 J***	*1.2*	< 0.2	***19900***	***145***	***237***	5.4	**43.3**	**20300**	9.5 J	13 J	***4000***	356	435	0.018 J
EPP-9	5/17/2009	3 - 5 ft	N	--	--	13 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	10 J	--	--	435	--
EPP-9	5/17/2009	5.5 - 7.5 ft	N	--	--	14 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	9 J	--	--	503	--
EPP-9	5/17/2009	8 - 10 ft	N	--	--	10 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	17 J	--	--	405	--
EPP-10	5/17/2009	7 - 8 ft	N	***1.21***	15.9	22 J	**162**	***0.61 J***	***14.6***	***6 J***	**4250**	7.2	< 2	5.4	29.8	15500	11.5 J	8 J	3150	372	390	***0.645***
EPP-10	5/17/2009	9 - 11 ft	N	--	--	14 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	11 J	--	--	435	--
EPP-10	5/17/2009	12 - 14 ft	N	--	--	18 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	8 J	--	--	383	--
EPP-10	5/17/2009	15 - 17 ft	N	--	--	12 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	13 J	--	--	255	--
EPP-11	5/17/2009	2.5 - 4.5 ft	N	--	--	**24 J**	--	--	--	***32***	--	--	< 2	--	--	--	--	17 J	--	--	315	--
EPP-11	5/17/2009	5 - 7 ft	N	***2.13***	21.6	**29 J**	***236***	***0.82 J***	***42.5***	***30***	***71700***	***66.4***	***89***	4.2	**43**	16900	**31.3**	**32**	***4680***	283	383	***0.217***
EPP-11	5/17/2009	7.5 - 9.5 ft	N	--	--	12 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	8 J	--	--	383	--
EPP-11	5/17/2009	10 - 12 ft	N	--	--	12 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	14 J	--	--	368	--
EPP-12	5/17/2009	0 - 2 ft	N	**0.77**	8	18 J	***171***	***0.65 J***	***5.2***	< 0.2	***13300***	10.7	< 2	**6.1**	24.1	18300	9.4 J	10 J	***4040***	473	488	**0.032**
EPP-12	5/17/2009	2.5 - 4.5 ft	N	--	--	14 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	7 J	--	--	450	--
EPP-12	5/17/2009	5 - 7 ft	N	--	--	10 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	12 J	--	--	458	--

Table 5.5.7-3
Soil Data - Metals
SWMU 7
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name / Analysis Location				Antimony Lab	Arsenic Lab	Arsenic Field	Barium Lab	Beryllium Lab	Cadmium Lab	Cadmium Field	Calcium Lab	Chromium Lab	Chromium Field	Cobalt Lab	Copper Lab	Iron Lab	Lead Lab	Lead Field	Magnesium Lab	Manganese Lab	Manganese Field	Mercury Lab
Background Mean, Exceedances **Bold**				**0.50**	23	**23**	**150**	**0.51**	**1.6**	**1.6**	**3900**	**11**	**11**	**5.9**	**35**	**19600**	**17**	**17**	**3500**	**540**	**540**	**0.021**
Background Maximum, Exceedances Underline				3.9	120	120	290	1.3	8.9	8.9	14000	48	48	9.5	300	35300	190	190	5700	1100	1100	0.20
Background 95% UCL, Exceedances *Italic*				*1.0*	40	40	*165.1*	*0.546*	*1.057*	*1.057*	*4500*	*12.46*	*12.46*	*6.145*	63.87	*20600*	*34.98*	*34.98*	*3700*	*570*	*570*	*0.0381*
Location ID	**Sample Date**	**Depth**	**Sample Type**																			
EPP-12	5/17/2009	7.5 - 9.5 ft	N	--	--	12 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	10 J	--	--	353	--
EPP-13	5/18/2009	2 - 3 ft	N	**0.65**	6.4	13 J	***204***	***0.55 J***	0.7 J	< 0.2	***7240***	5.7	< 2	***7.5***	17.9	18500	5.9 J	8 J	***4330***	**553**	***593***	***0.052***
EPP-13	5/18/2009	3.5 - 5.5 ft	N	--	--	11 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	10 J	--	--	***578***	--
EPP-13	5/18/2009	6 - 8 ft	N	--	--	13 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	8 J	--	--	***585***	--
EPP-13	5/18/2009	8.5 - 10.5 ft	N	--	--	12 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	9 J	--	--	525	--
EPP-14	5/19/2009	2 - 4 ft	N	**0.88**	6.4	10 J	***264***	**0.53 J**	< 0.2	< 0.2	***6660***	4.1	< 2	***6.9***	21.1	**20000**	4.6 J	8 J	**3520**	400	443	**0.022**
EPP-14	5/19/2009	4.5 - 6.5 ft	N	--	--	10 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	7 J	--	--	473	--
EPP-14	5/19/2009	7 - 9 ft	N	--	--	10 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	6 J	--	--	435	--
EPP-14	5/19/2009	9.5 - 11.5 ft	N	--	--	11 J	--	--	--	< 0.2	--	--	< 2	--	--	--	--	4 J	--	--	**548**	--

Table 5.5.7-3
Soil Data - Metals
SWMU 7
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name / Analysis Location				Nickel Lab	Potassium Lab	Selenium Lab	Selenium Field	Silver Lab	Silver Field	Sodium Lab	Thallium Lab	Uranium Lab	Uranium Field	Vanadium Lab	Vanadium Field	Zinc Lab	Zinc Field
Background Mean, Exceedances **Bold**				**5.3**	**3000**	**0.41**	**0.41**	**0.73 (1)**	**0.73 (1)**	**140**	**0.35**	**1.8**	**1.8**	**41**	**41**	**59**	**59**
Background Maximum, Exceedances Underline				21	5300	0.70	0.70	1.7 (1)	1.7 (1)	620	1.0	4.1	4.1	83	83	380	380
Background 95% UCL, Exceedances *Italic*				*6.0*	*3161*	*0.47*	*0.47*	*0.346 (1)*	*0.346 (1)*	*220*	*0.462*	*2.0*	*2.0*	*43.3*	*43.3*	*98.46*	*98.46*
Location ID	**Sample Date**	**Depth**	**Sample Type**														
EPP-1	5/19/2009	2 - 4 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	**2 J**	--	17 J	--	***136***
			FD	--	--	--	< 1	--	< 2	--	--	--	< 8	--	***45 J***	--	***116***
EPP-1	5/19/2009	4.5 - 6.5 ft	N	4.6	**3110**	< 0.8	< 3	< 0.4	< 0.4	***302***	***4.200 J***	***9.710 J***	***11 J***	***66.4***	***60 J***	***540***	***586***
			FD	**5.9**	**3130**	***0.9 J***	< 3	< 0.4	< 2	***312***	***4.69***	***7.86***	< 9	***68.5***	30 J	***466***	***571***
EPP-1	5/19/2009	7 - 9 ft	N	--	--	--	***7 J***	--	< 2	--	--	--	< 9	--	***105 J***	--	***143***
			FD	--	--	--	***10 J***	--	< 2	--	--	--	< 9	--	***45 J***	--	***164***
EPP-1	5/19/2009	9.5 - 11.5 ft	N	--	--	--	***1 J***	--	< 1	--	--	--	< 7	--	21 J	--	**88**
			FD	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	< 2	--	**60**
EPP-2	5/18/2009	2 - 4 ft	N	--	--	--	< 0.7	--	***1 J***	--	--	--	< 8	--	< 2	--	33 J
EPP-2	5/18/2009	4.5 - 6.5 ft	N	--	--	--	< 1	--	< 2	--	--	--	< 9	--	17 J	--	33 J
EPP-2	5/18/2009	7 - 9 ft	N	***7.5***	***4180***	< 0.8	< 0.7	< 0.5	< 1	***647***	**0.457**	***3.84***	**2 J**	***45.8***	30 J	53.4	41
EPP-2	5/18/2009	9.5 - 11.5 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	< 12	--	39
EPP-3	5/18/2009	3 - 4 ft	N	**5.8**	***3400***	< 0.8	< 0.7	< 0.5	< 1	***269***	0.291	**1.9**	< 7	34.4	< 2	**70.8**	**75**
EPP-3	5/18/2009	5 - 7 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 6	--	< 2	--	36
EPP-3	5/18/2009	8 - 10 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	8 J	--	39
EPP-3	5/18/2009	10.5 - 12.5 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	***60 J***	--	38
EPP-4	5/18/2009	13 - 15 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 8	--	***45 J***	--	44
EPP-4	5/18/2009	15.5 - 17.5 ft	N	***7.1***	***4910***	< 0.8	< 1	< 0.5	< 1	***897***	**0.425**	1.79	< 9	**42.6**	***45 J***	**67.8**	54
EPP-4	5/18/2009	18 - 20 ft	N	--	--	--	< 1	--	***12 J***	--	--	--	< 8	--	17 J	--	40
EPP-4	5/18/2009	20.5 - 22.5 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 8	--	26 J	--	54
EPP-5	5/16/2009	5 - 6 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 7	--	***45 J***	--	41
EPP-5	5/16/2009	7 - 9 ft	N	***7.1***	***5740***	< 0.9	< 1	< 0.5	< 1	***1940***	**0.445**	1.53	< 8	***46.2***	< 2	57.1	41
EPP-5	5/16/2009	10 - 11 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 8	--	15 J	--	41
EPP-5	5/16/2009	12 - 14 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 8	--	3 J	--	40
EPP-6	5/16/2009	3 - 5.5 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	< 11	--	44
EPP-6	5/16/2009	5.5 - 8 ft	N	5.3	***4300***	< 0.8	< 1	< 0.5	< 1	***1230***	**0.401**	***3.06***	< 7	33.8	8 J	44.6	45
EPP-6	5/16/2009	8.5 - 10.5 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	***45 J***	--	46
EPP-6	5/16/2009	11 - 13 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	20 J	--	52
EPP-7	5/16/2009	2 - 4 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	27 J	--	28 J
EPP-7	5/16/2009	5 - 7 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	< 26	--	33 J
EPP-7	5/16/2009	7.5 - 9.5 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 6	--	< 2	--	22 J
EPP-7	5/16/2009	10 - 12 ft	N	3.0 J	2370	< 0.8	< 0.7	< 0.4	< 2	***712***	0.18	1	< 8	***46.6***	21 J	25.3	29 J
EPP-8	5/16/2009	1 - 3.5 ft	N	4.6 J	***3180***	< 0.8	< 1	< 0.5	***2 J***	***338***	**0.393**	***3.7***	< 7	**42.2**	6 J	**61.3**	**62**
EPP-8	5/16/2009	5 - 6 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 8	--	8 J	--	38
EPP-8	5/16/2009	6.5 - 8.5 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	< 2	--	40
EPP-8	5/16/2009	9 - 11 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 7	--	< 2	--	37
EPP-9	5/17/2009	0 - 2 ft	N	***35.4***	***3770***	***3.2***	< 1	***1.4 J***	***3 J***	***404***	***0.799***	***14.9***	< 8	***130***	***210***	**88.4**	**88**
EPP-9	5/17/2009	3 - 5 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 6	--	12 J	--	45
EPP-9	5/17/2009	5.5 - 7.5 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	< 2	--	41
EPP-9	5/17/2009	8 - 10 ft	N	--	--	--	< 0.7	--	< 0.4	--	--	--	< 6	--	< 2	--	46
EPP-10	5/17/2009	7 - 8 ft	N	***6.2***	2900	< 0.8	< 1	*0.5 J*	< 1	***261***	***2.87***	1.39	< 7	33.1	30 J	57.3	58
EPP-10	5/17/2009	9 - 11 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 6	--	< 2	--	40
EPP-10	5/17/2009	12 - 14 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 7	--	< 2	--	41
EPP-10	5/17/2009	15 - 17 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 6	--	< 2	--	38
EPP-11	5/17/2009	2.5 - 4.5 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	***9 J***	--	< 2	--	***193***
EPP-11	5/17/2009	5 - 7 ft	N	***19.9***	***3550***	***3.8***	***7 J***	***2.0 J***	< 0.4	***676***	***1.51***	***20.1***	***12 J***	***114***	***105 J***	***375***	***375***
EPP-11	5/17/2009	7.5 - 9.5 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 6	--	< 2	--	35 J
EPP-11	5/17/2009	10 - 12 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 5	--	< 2	--	42
EPP-12	5/17/2009	0 - 2 ft	N	**5.7**	***3860***	***1.2 J***	< 1	< 0.5	< 1	***324***	***0.706***	***2.66***	< 8	***46.5***	26 J	**76.7**	**82**
EPP-12	5/17/2009	2.5 - 4.5 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	< 2	--	43
EPP-12	5/17/2009	5 - 7 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 6	--	< 2	--	38

Table 5.5.7-3
Soil Data - Metals
SWMU 7
Rhodia Silver Bow Plant
[concentrations in mg/kg]

			Chemical Name	Nickel	Potassium	Selenium	Selenium	Silver	Silver	Sodium	Thallium	Uranium	Uranium	Vanadium	Vanadium	Zinc	Zinc
			Analysis Location	Lab	Lab	Lab	Field	Lab	Field	Lab	Lab	Lab	Field	Lab	Field	Lab	Field
Background Mean, Exceedances **Bold**				**5.3**	**3000**	**0.41**	**0.41**	**0.73 (1)**	**0.73 (1)**	**140**	**0.35**	**1.8**	**1.8**	**41**	**41**	**59**	**59**
Background Maximum, Exceedances Underline				21	5300	0.70	0.70	1.7 (1)	1.7 (1)	620	1.0	4.1	4.1	83	83	380	380
Background 95% UCL, Exceedances *Italic*				*6.0*	*3161*	*0.47*	*0.47*	*0.346 (1)*	*0.346 (1)*	*220*	*0.462*	*2.0*	*2.0*	*43.3*	*43.3*	*98.46*	*98.46*
Location ID	**Sample Date**	**Depth**	**Sample Type**														
EPP-12	5/17/2009	7.5 - 9.5 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 6	--	14 J	--	39
EPP-13	5/18/2009	2 - 3 ft	N	4.4 J	***4450***	< 0.9	< 1	< 0.5	< 1	***423***	**0.372**	***2.18***	< 6	33.8	17 J	41	54
EPP-13	5/18/2009	3.5 - 5.5 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	< 17	--	30 J
EPP-13	5/18/2009	6 - 8 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 7	--	12 J	--	40
EPP-13	5/18/2009	8.5 - 10.5 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 7	--	< 2	--	46
EPP-14	5/19/2009	2 - 4 ft	N	3.5 J	***3320***	< 0.9	< 0.7	< 0.5	< 1	***554***	0.246	***2.28***	**2 J**	31.4	< 2	36.8	34 J
EPP-14	5/19/2009	4.5 - 6.5 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 6	--	30 J	--	41
EPP-14	5/19/2009	7 - 9 ft	N	--	--	--	< 1	--	< 1	--	--	--	< 6	--	< 2	--	38
EPP-14	5/19/2009	9.5 - 11.5 ft	N	--	--	--	< 0.7	--	< 1	--	--	--	< 0.02	--	< 2	--	34 J

Table 5.5.7-4
Soil Data - SVOCS
SWMU 7
Rhodia Silver Bow Plant
[concentrations in mg/kg]

			Chemical Name	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,2-Diphenylhydrazine	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Chloronaphthalene	2-Chlorophenol
Location ID	Sample Date	Depth	Sample Type														
EPP-14	5/19/2009	7 - 9 ft	N	< 0.011	< 0.018	< 0.015	< 0.019	< 0.018	< 0.018	< 0.015	< 0.017	< 0.016	< 0.12	< 0.015	< 0.016	< 0.010	< 0.0099

Table 5.5.7-4
Soil Data - SVOCS
SWMU 7
Rhodia Silver Bow Plant
[concentrations in mg/kg]

			Chemical Name	2-Methyl-4,6-dinitrophenol	2-Methylnaphthalene	2-Nitroaniline	2-Nitrophenol	3,3`-Dichlorobenzidine	3-Nitroaniline	4-Bromophenyl phenyl ether	4-Chloro-3-methylphenol	4-Chloroaniline	4-Chlorophenyl phenyl ether	4-Nitroaniline	4-Nitrophenol	Acenaphthene	Acenaphthylene	Anthracene	Benzidine
Location ID	Sample Date	Depth	Sample Type																
EPP-14	5/19/2009	7 - 9 ft	N	< 0.15	**0.062 J**	< 0.017	< 0.014	< 0.027	< 0.18	< 0.013	< 0.017	< 0.015	< 0.016	< 0.18	< 0.15	**0.23 J**	< 0.016	**0.25 J**	< 0.42 R

Table 5.5.7-4
Soil Data - SVOCS
SWMU 7
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name				Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(g,h,i) perylene	Benzo(k) fluoranthene	Benzoic Acid	Benzyl alcohol	Bis(2-chloroethoxy)methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl)ether	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Carbazole	Chrysene	Dibenz(a,h) anthracene	Dibenzofuran	Diethyl phthalate
Location ID	Sample Date	Depth	Sample Type																	
EPP-14	5/19/2009	7 - 9 ft	N	**0.16 J**	**0.077 J**	**0.10 J**	**0.038 J**	**0.045 J**	< 0.14	< 0.017	< 0.011	< 0.012	< 0.015	< 0.019	< 0.017	**0.059 J**	**0.17 J**	< 0.028	**0.12 J**	< 0.015

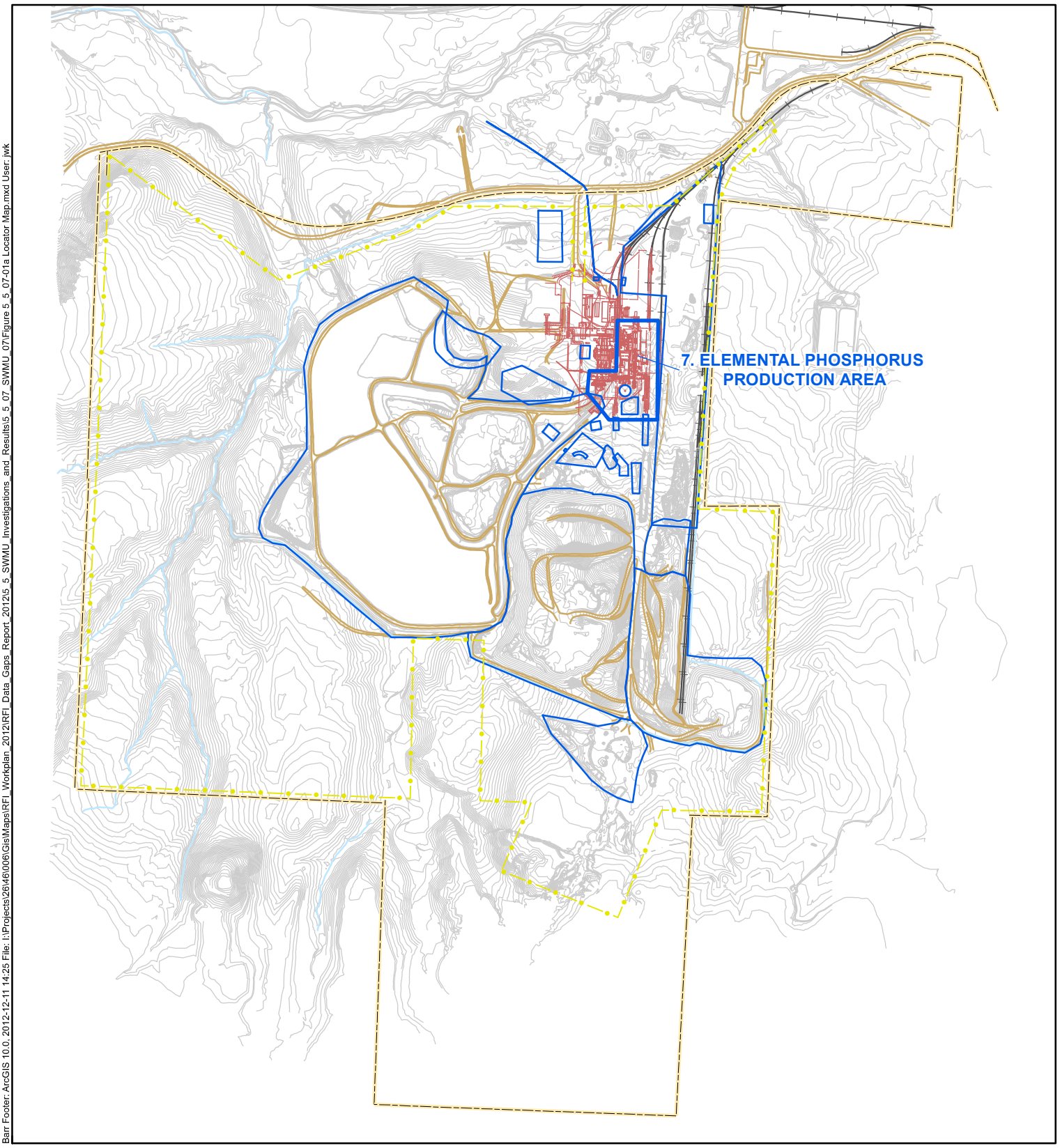
Table 5.5.7-4
Soil Data - SVOCS
SWMU 7
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name				Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone	Naphthalene	Nitrobenzene	N-Nitrosodimethylamine	N-Nitrosodi-n-propylamine
Location ID	Sample Date	Depth	Sample Type															
EPP-14	5/19/2009	7 - 9 ft	N	< 0.017	< 0.013	< 0.024	**0.63**	**0.22 J**	< 0.015	< 0.015	< 0.013	< 0.022	< 0.039	< 0.014	**0.040 J**	< 0.027	< 0.026	< 0.020

Table 5.5.7-4
Soil Data - SVOCS
SWMU 7
Rhodia Silver Bow Plant
[concentrations in mg/kg]

			Chemical Name	N-Nitrosodiphenylamine	o-Cresol	p-Cresol	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	Pyridine
Location ID	Sample Date	Depth	Sample Type								
EPP-14	5/19/2009	7 - 9 ft	N	< 0.018	< 0.017	< 0.017	< 0.13	**0.91**	< 0.020	**0.52**	< 0.020

Figures



Barr Footer: ArcGIS 10.0, 2012-12-11 14:25 File: I:\Projects\26\46006\GisMaps\RFI_Workplan_2012\RFI_Data_Gaps_Report_2012\5_5_SWMU_Investigations_and_Results\5_5_07_SWMU_07\Figure 5_5_07-01a Locator Map.mxd User: jwk

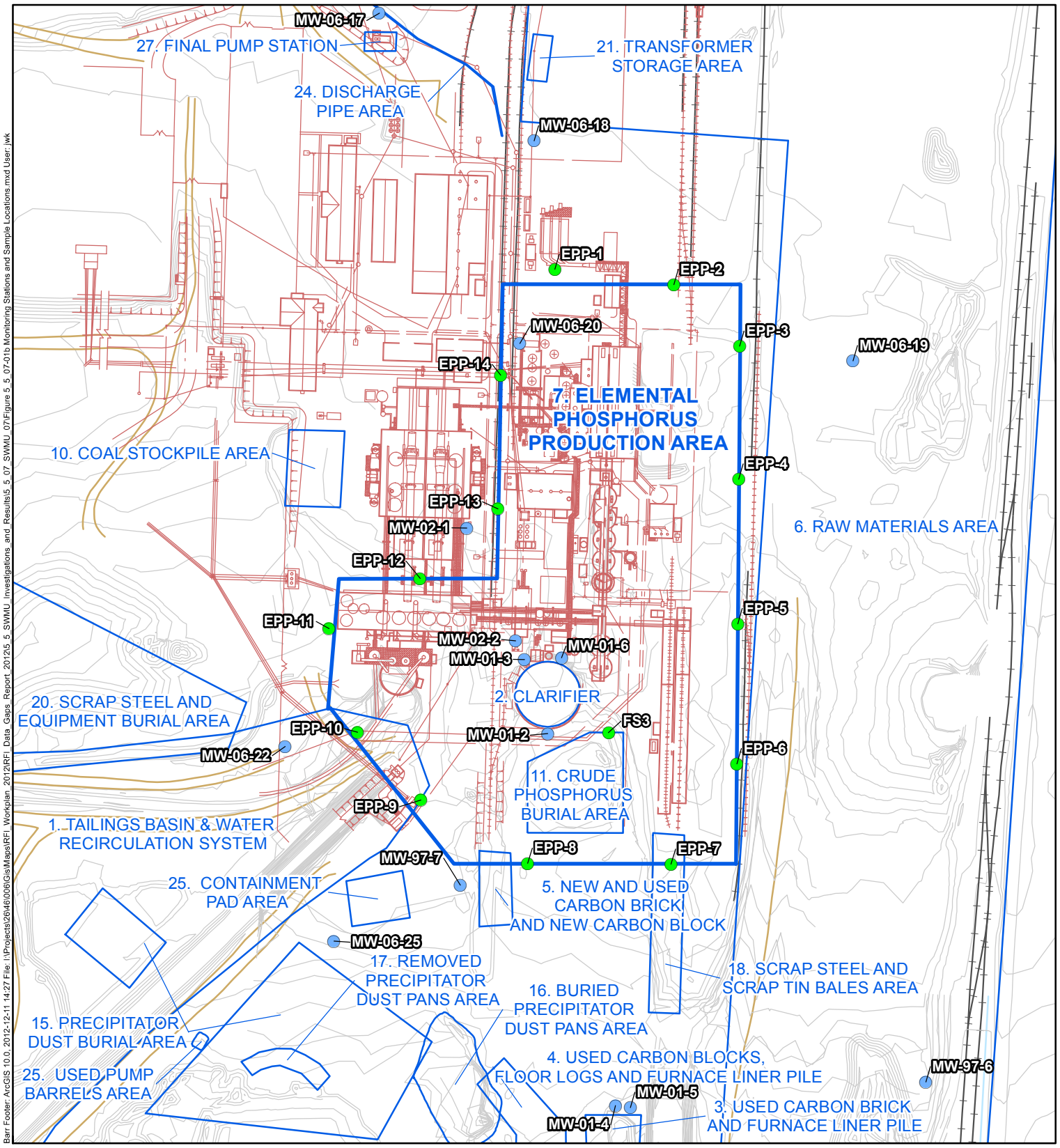
SWMU 7
Other SWMUs
Elevation Contour
Drainage
Railroad
Road
Former Plant Structures
Property Boundary
Fence Line

N

Feet
1,000 0 1,000

Figure 5.5.7-1a

SWMU 7 LOCATION
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-11 14:27 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_2012\5_5_SWMU_Investigations_and_Results\5_5_07_SWMU_07\Figure 5_5_07-01b Monitoring Stations and Sample Locations.mxd User: jwk

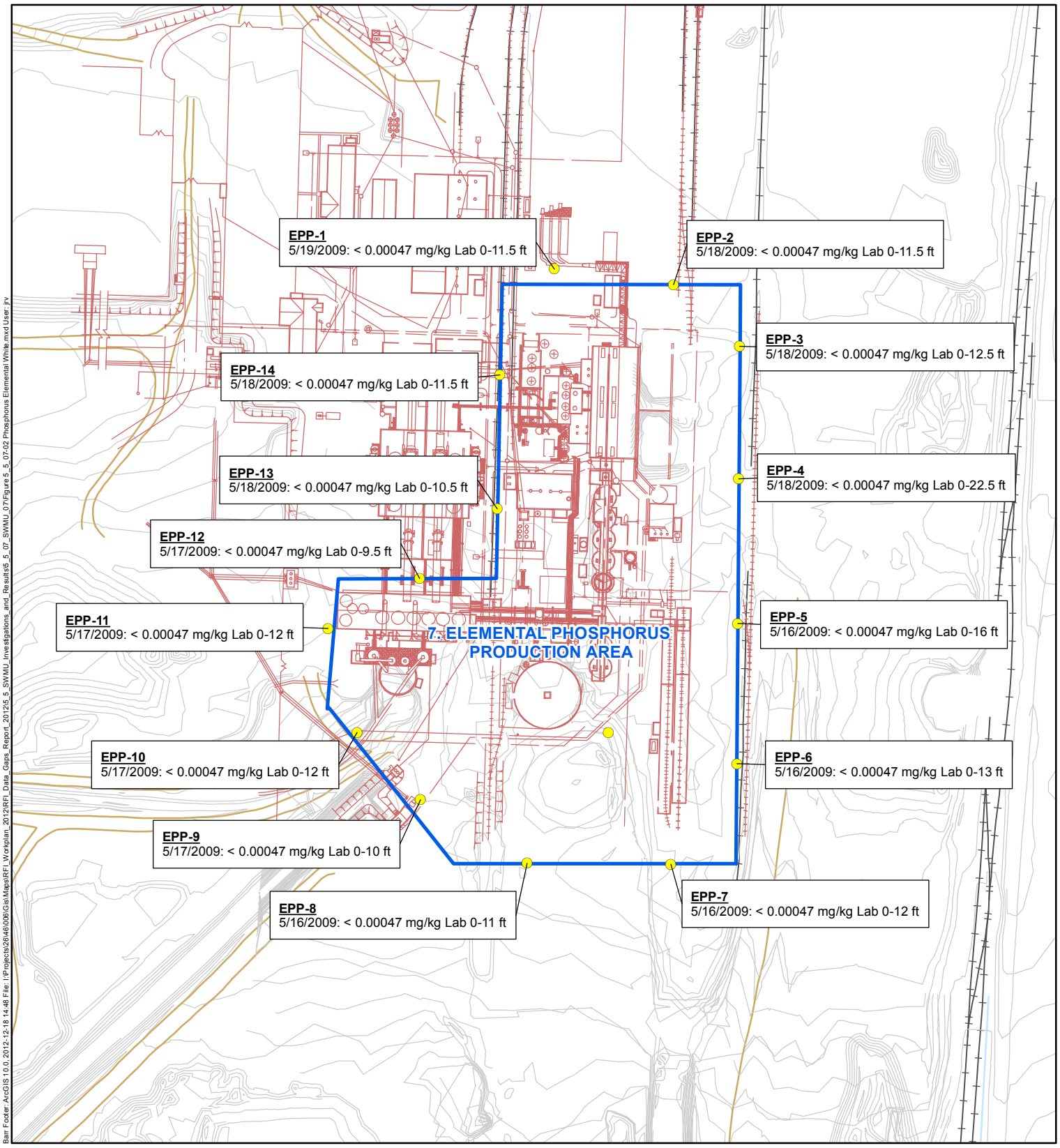
Monitoring Well
Soil Sample
SWMU 7
Other SWMUs
Elevation Contour
Drainage
Railroad
Road
Former Plant Structures

N

Feet
200 0 200

Figure 5.5.7-1b

SWMU 7
MONITORING STATIONS
AND SAMPLE LOCATIONS
Rhodia Silver Bow Plant
Montana



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Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

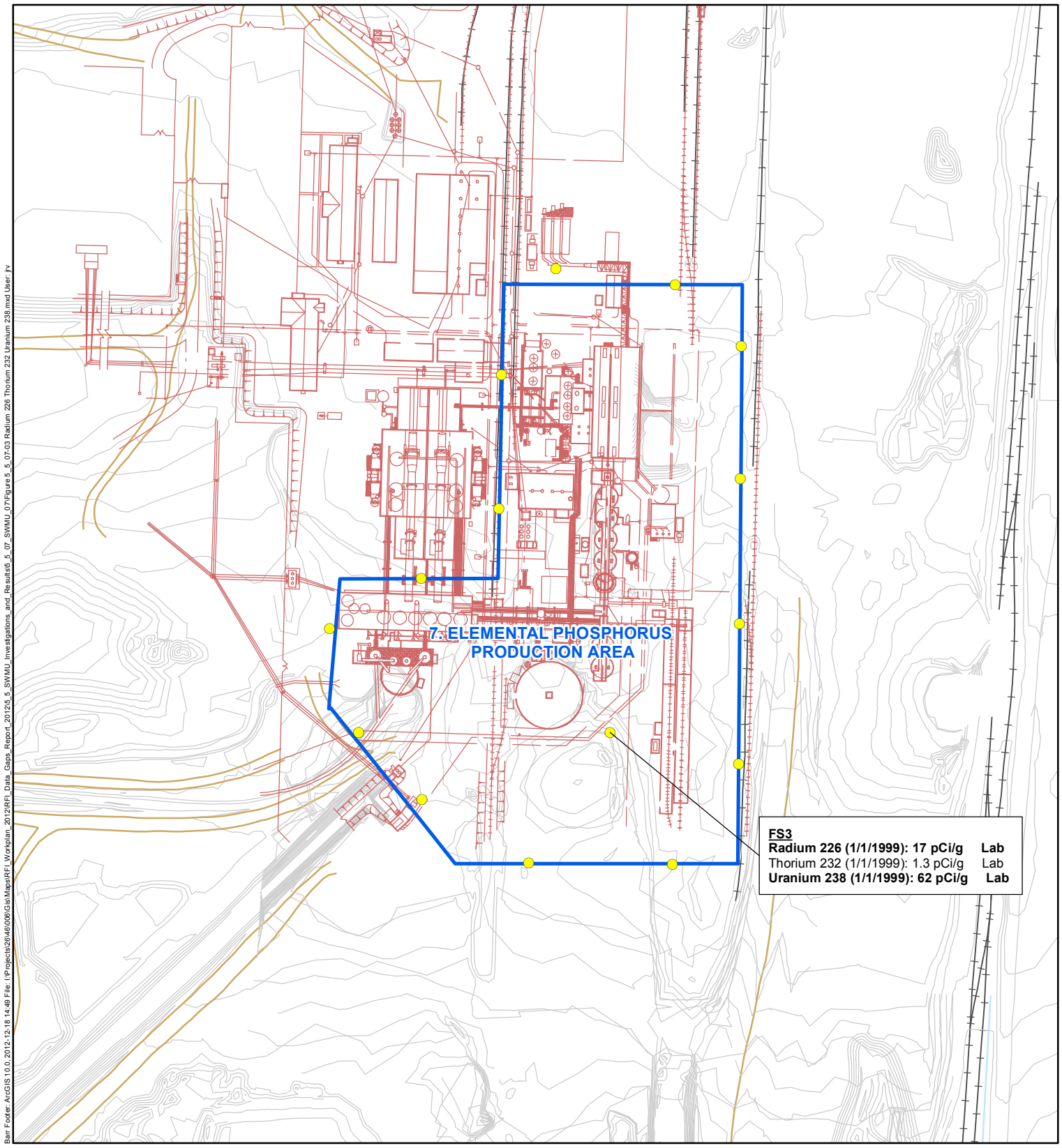
N

Feet

200 0 200

Figure 5.5.7-2

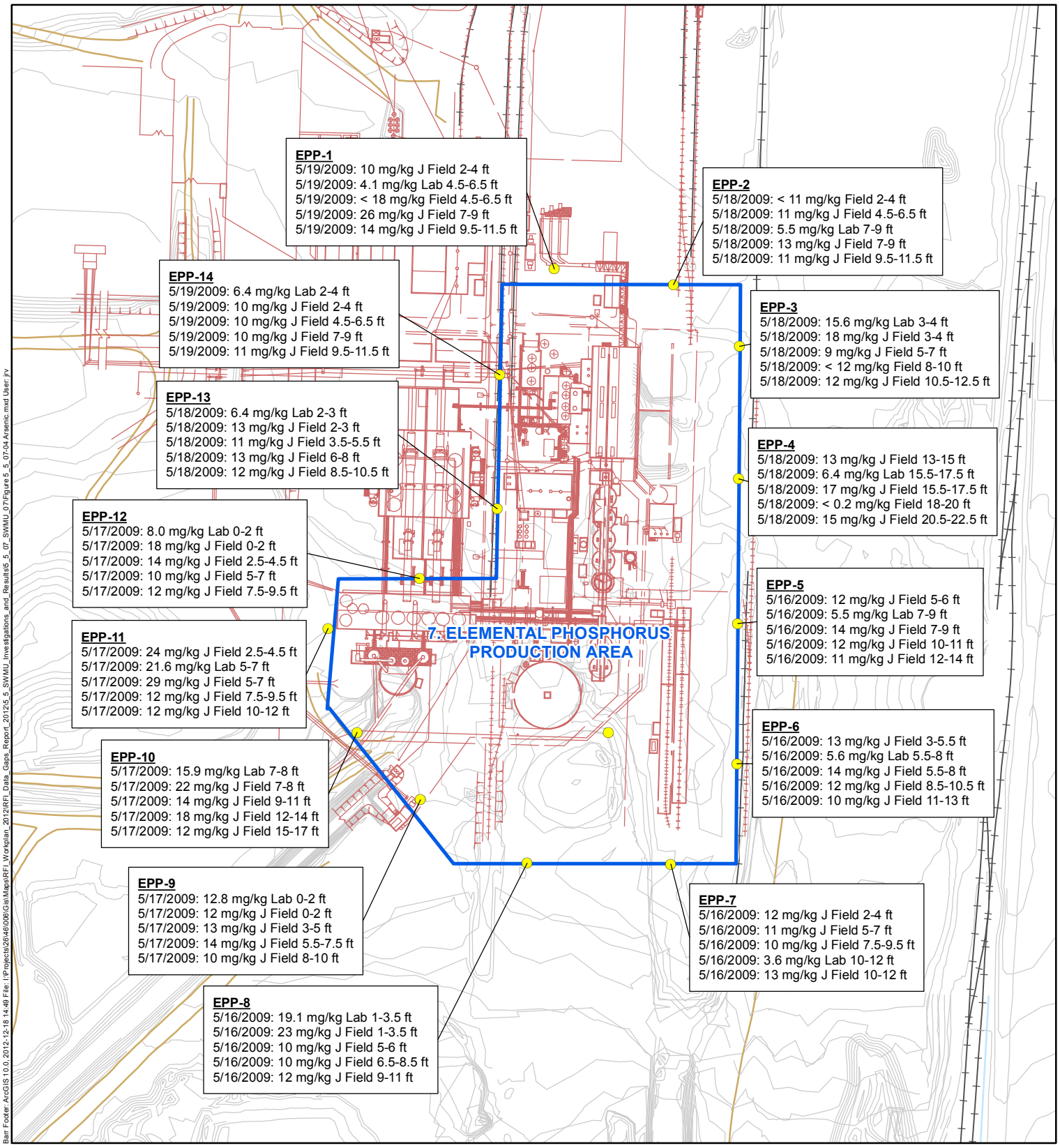
SWMU 7
PHOSPHORUS, ELEMENTAL (WHITE)
Rhodia Silver Bow Plant
Montana



Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

Figure 5.5.7-3

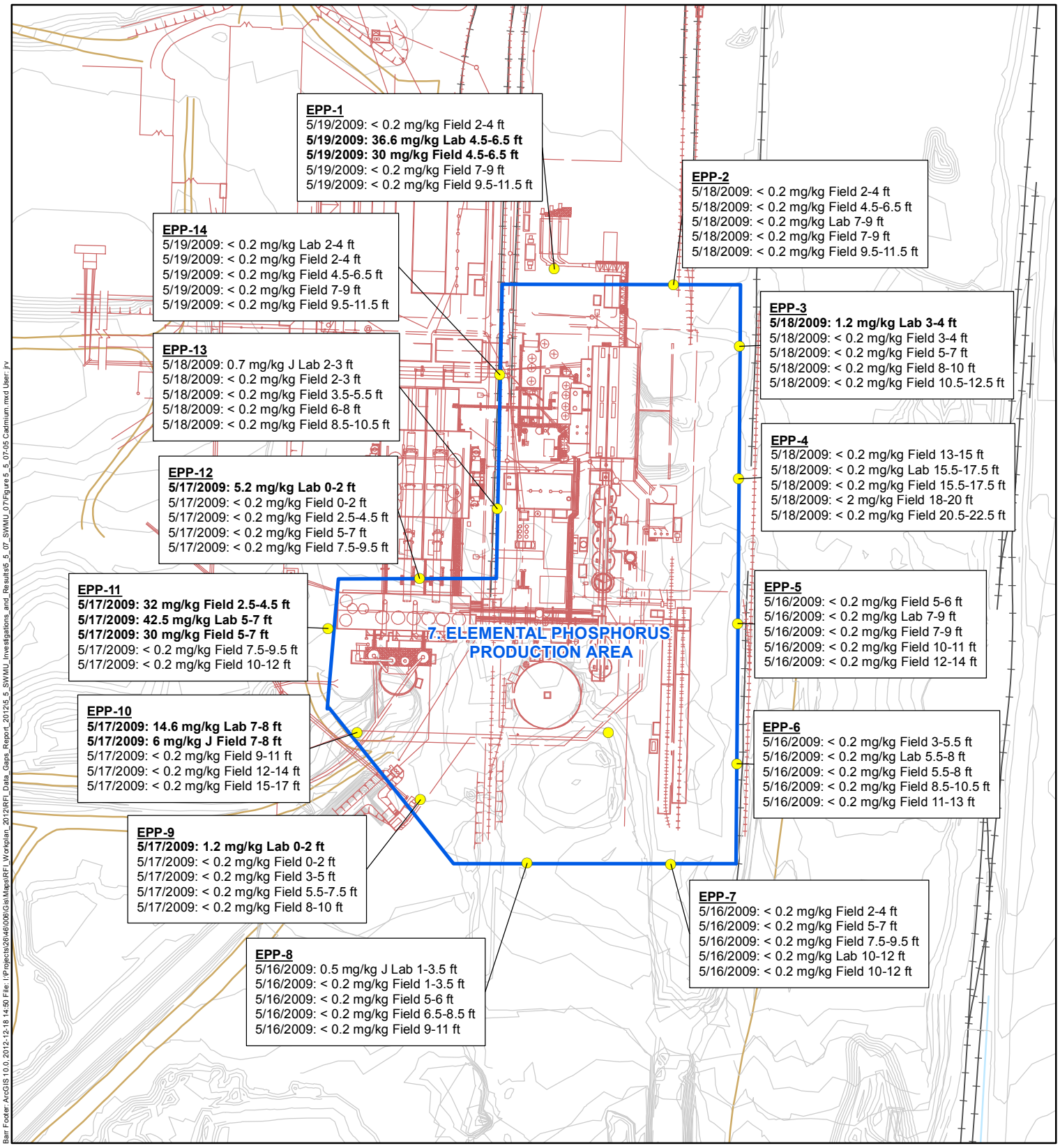
SWMU 7
RADIUM 226, THORIUM 232, AND URANIUM 238
Rhodia Silver Bow Plant
Montana



Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

Figure 5.5.7-4

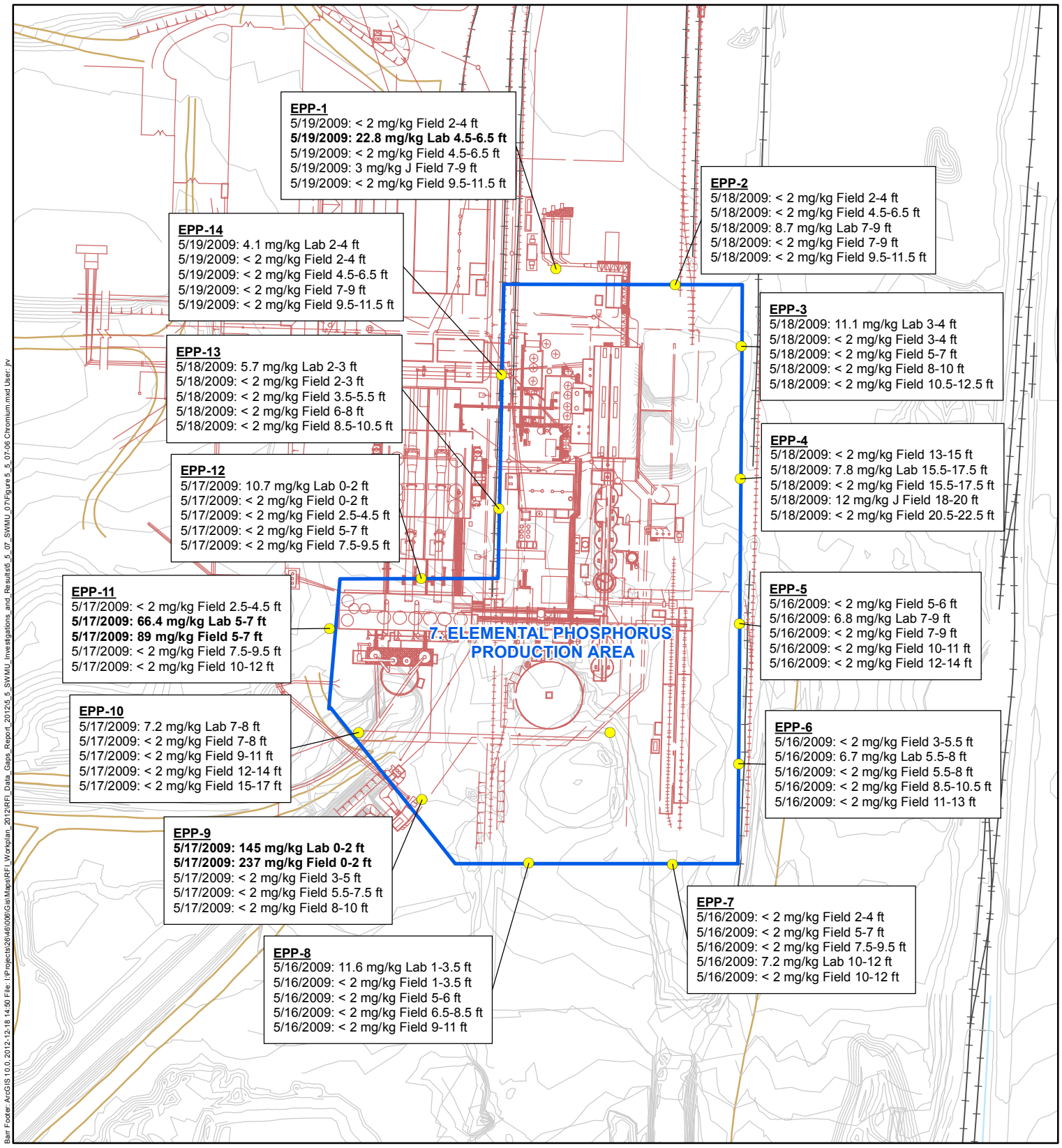
SWMU 7
ARSENIC
Rhodia Silver Bow Plant
Montana



Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

Figure 5.5.7-5

SWMU 7
CADMIUM
Rhodia Silver Bow Plant
Montana



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Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

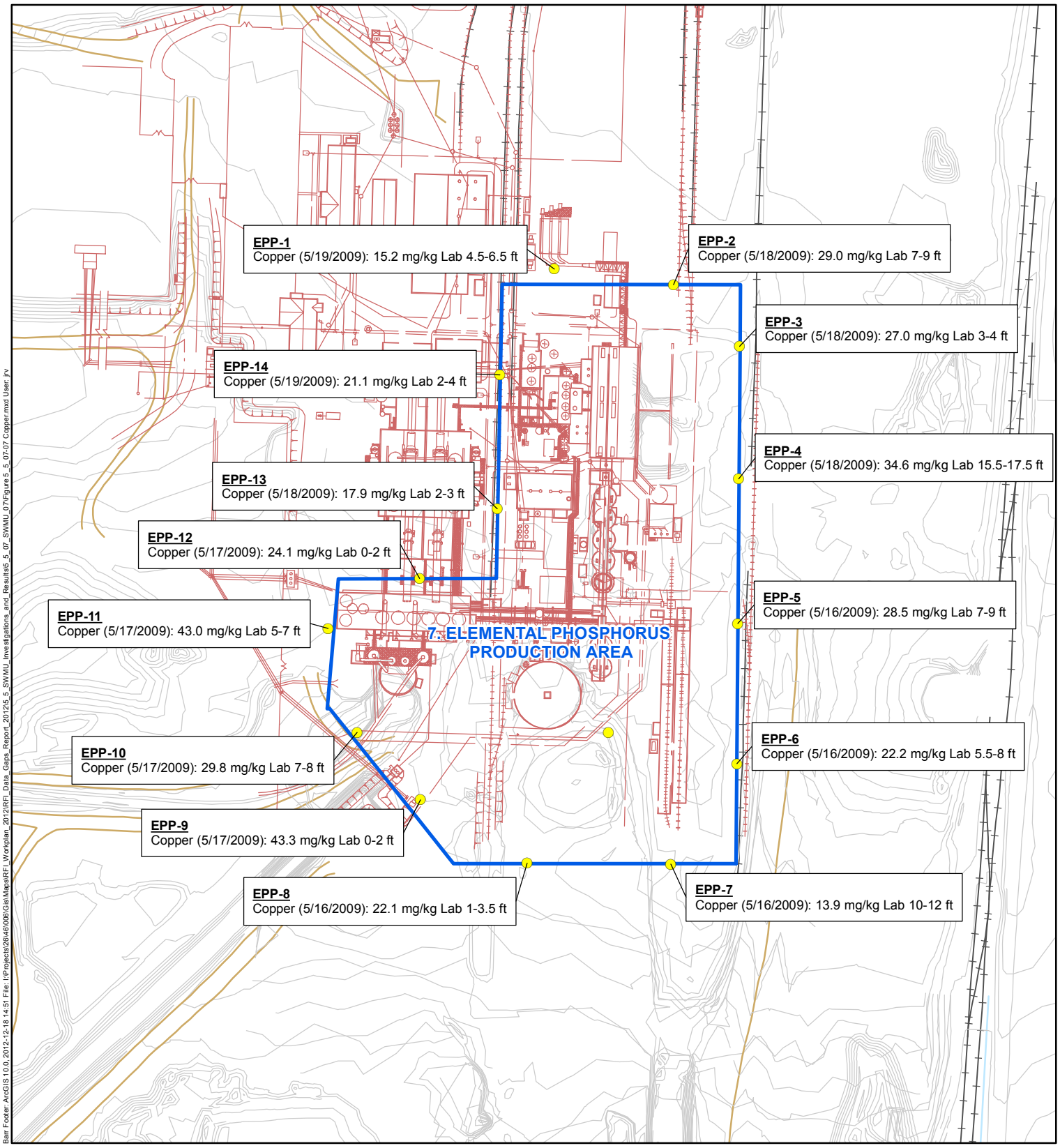
N

Feet

200 0 200

Figure 5.5.7-6

SWMU 7
CHROMIUM
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-18 14:51 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_20125_5_SWMU_investigations_and_Results\5_5_07_SWMU_07\Figure 5_5_07-07 Copper.mxd User: jrv

Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

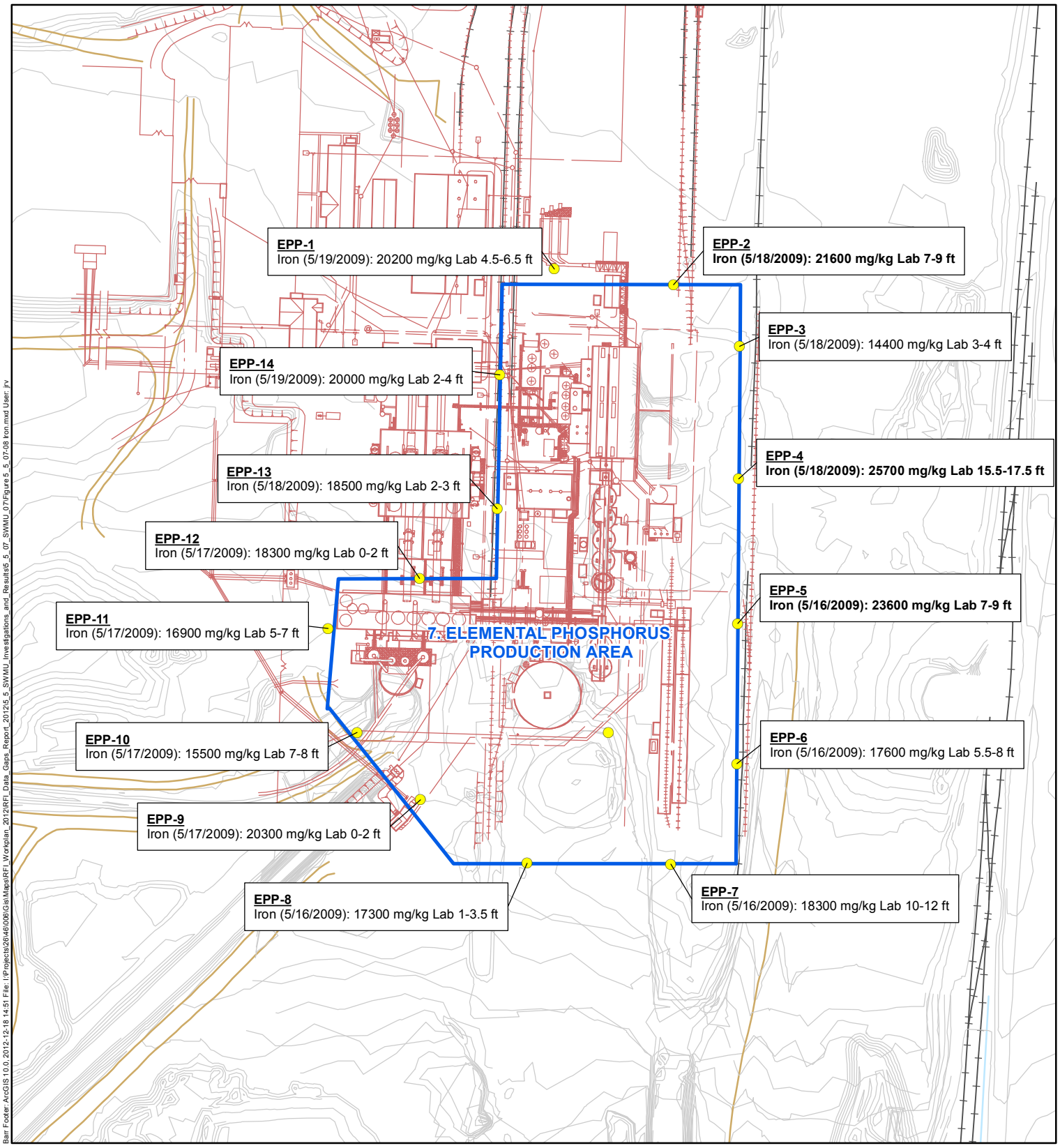
N

Feet

200 0 200

Figure 5.5.7-7

SWMU 7
COPPER
Rhodia Silver Bow Plant
Montana



Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

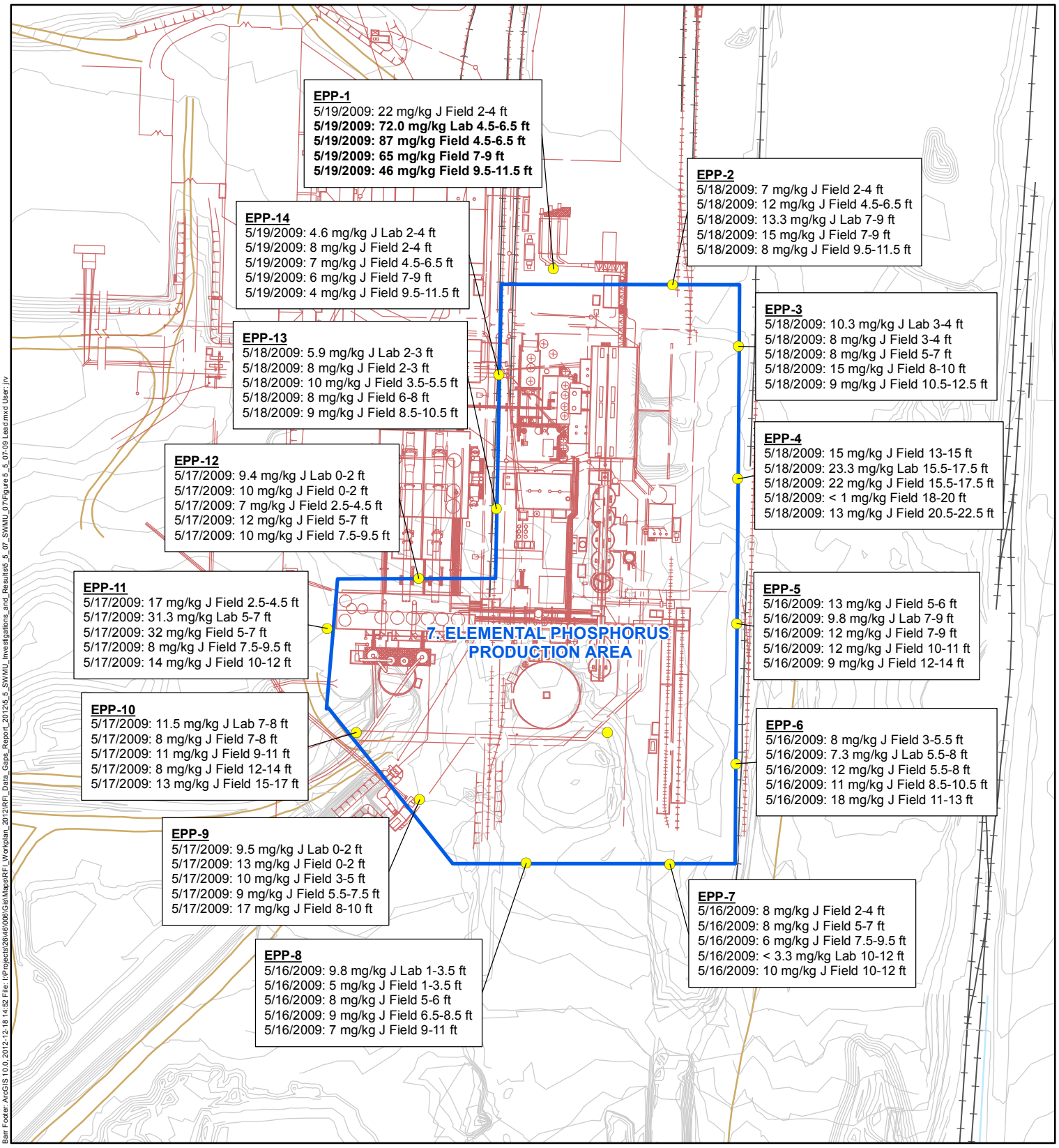
N

Feet

200 0 200

Figure 5.5.7-8

SWMU 7
IRON
Rhodia Silver Bow Plant
Montana



Sample Location
SWMU 7
Elevation Contour
Drainage
Railroad
Road
Former Plant Structures

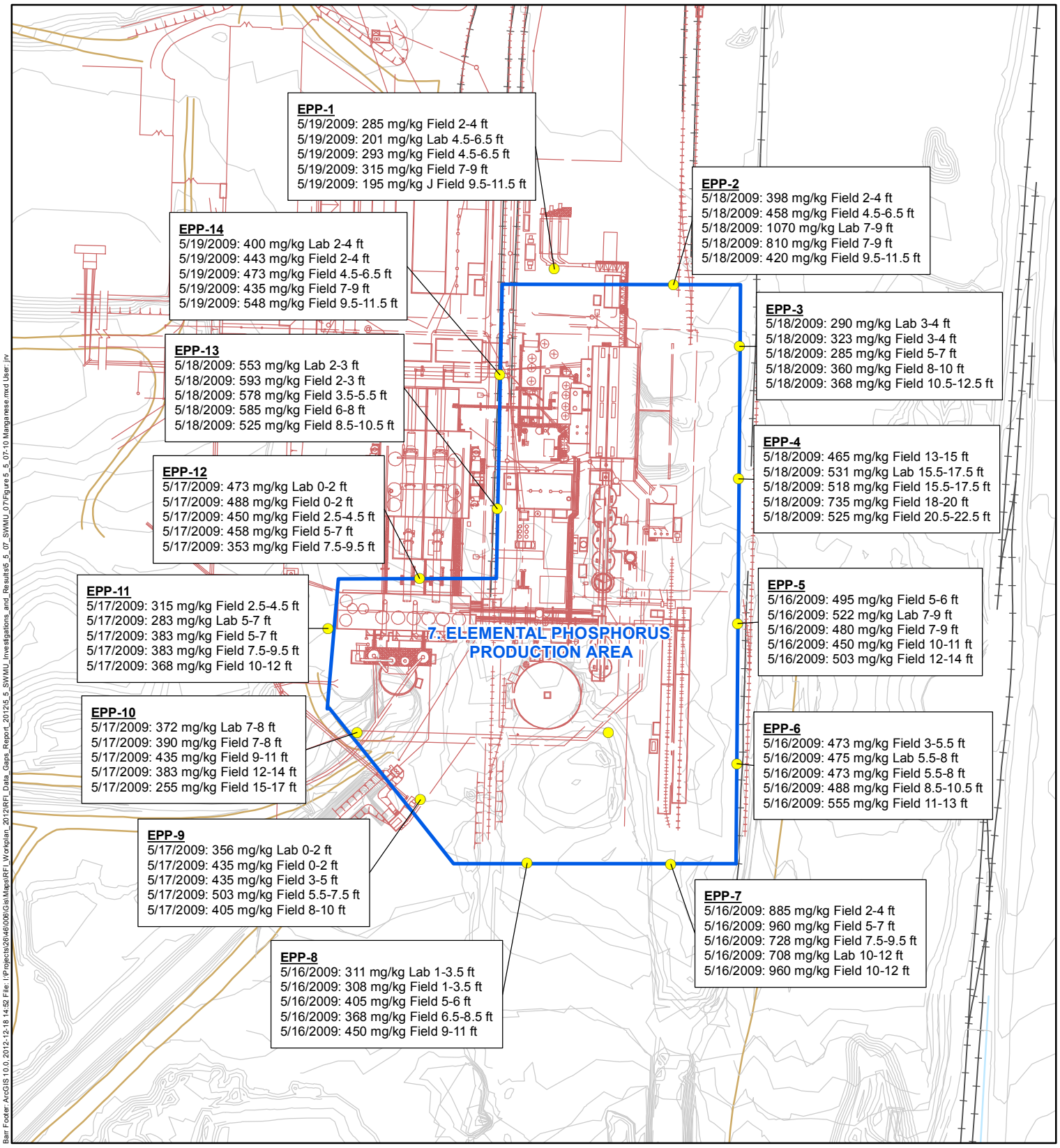
Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

N

Feet
200 0 200

Figure 5.5.7-9

SWMU 7
LEAD
Rhodia Silver Bow Plant
Montana



Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

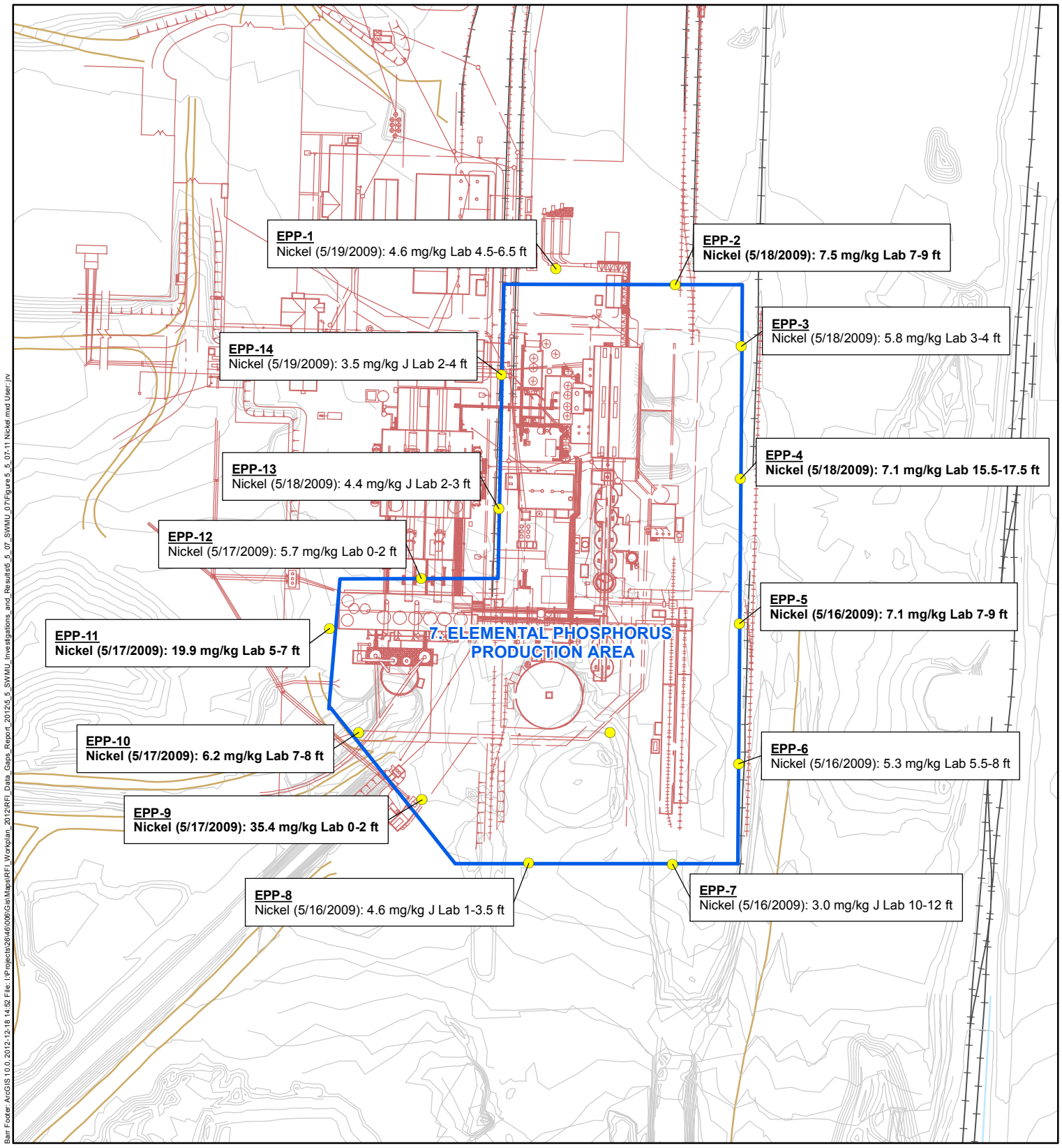
N

Feet

200 0 200

Figure 5.5.7-10

SWMU 7
MANGANESE
Rhodia Silver Bow Plant
Montana



Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

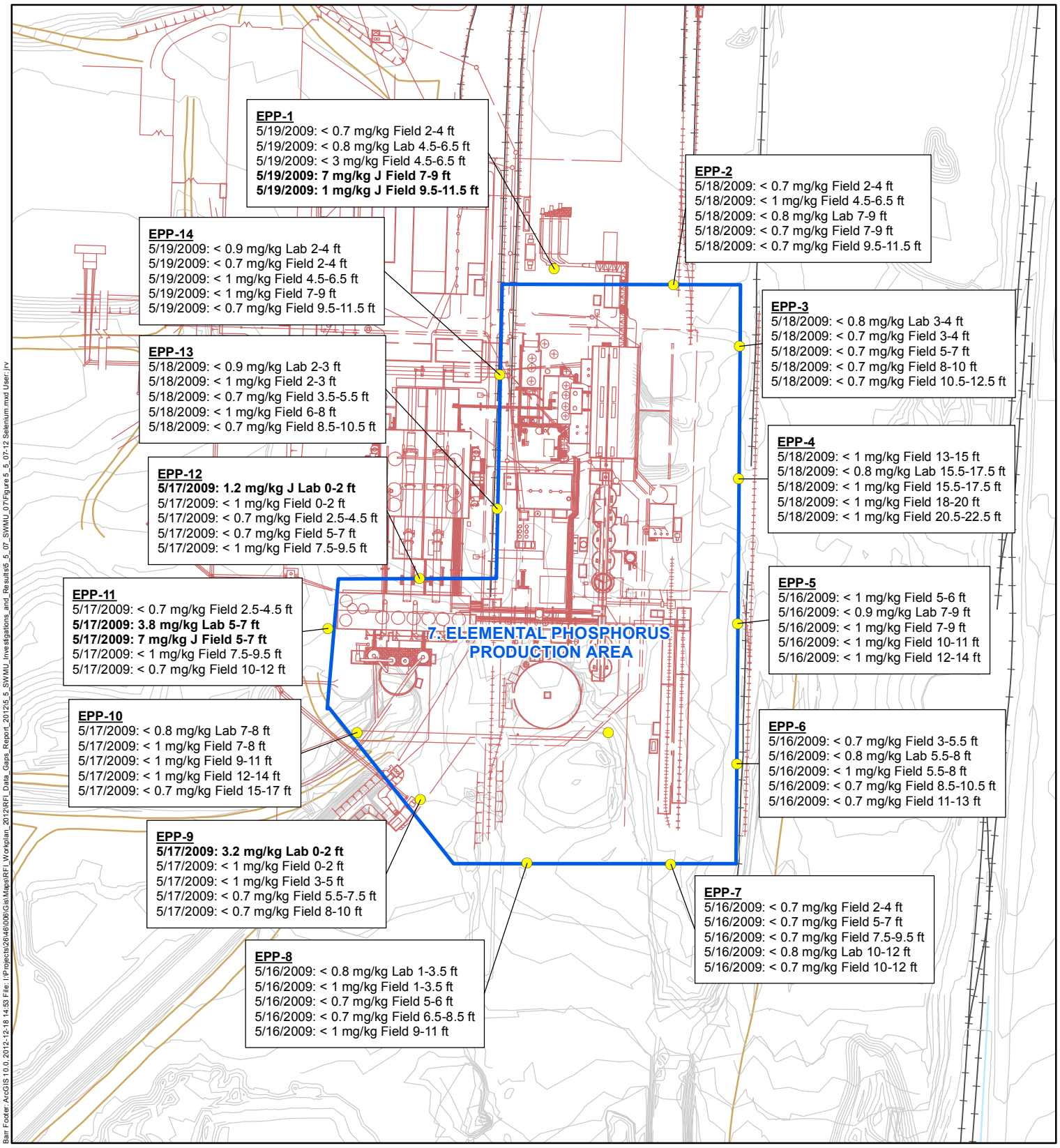
N

Feet

200 0 200

Figure 5.5.7-11

SWMU 7
NICKEL
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-18 14:53 File: I:\Projects\26\46\006\GIs\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_201205_5_SWMU_Investigations_and_Results\5_5_07_SWMU_07\Figure 5_5_07-12 Selenium.mxd User: jrv

Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

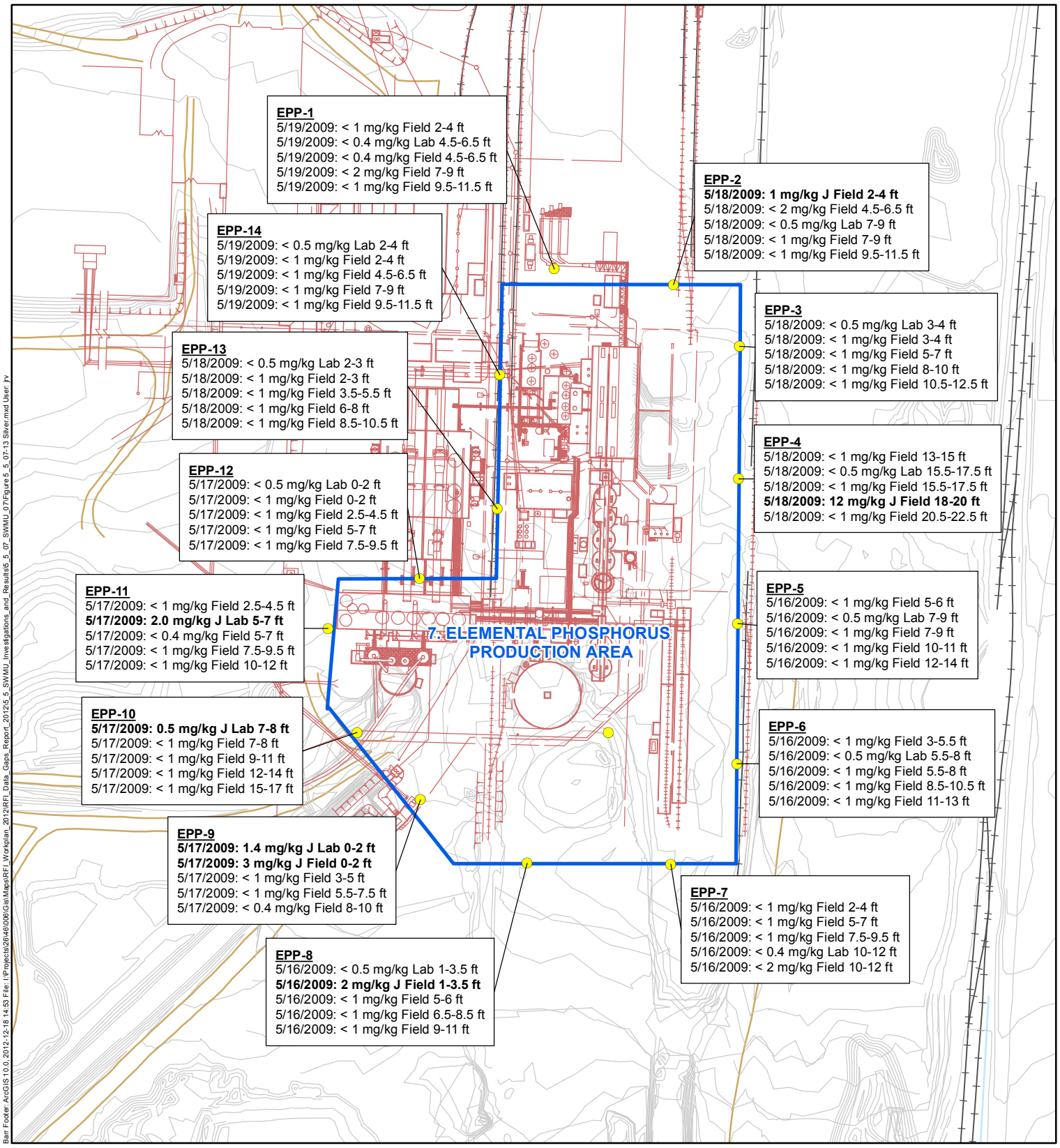
N

Feet

200 0 200

Figure 5.5.7-12

SWMU 7
SELENIUM
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-18 14:53 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_201205_5_SWMU_Investigations_and_Results\5_05_07_SWMU_07\Figure 5_5_07-13 Silver.mxd User: jrv

Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

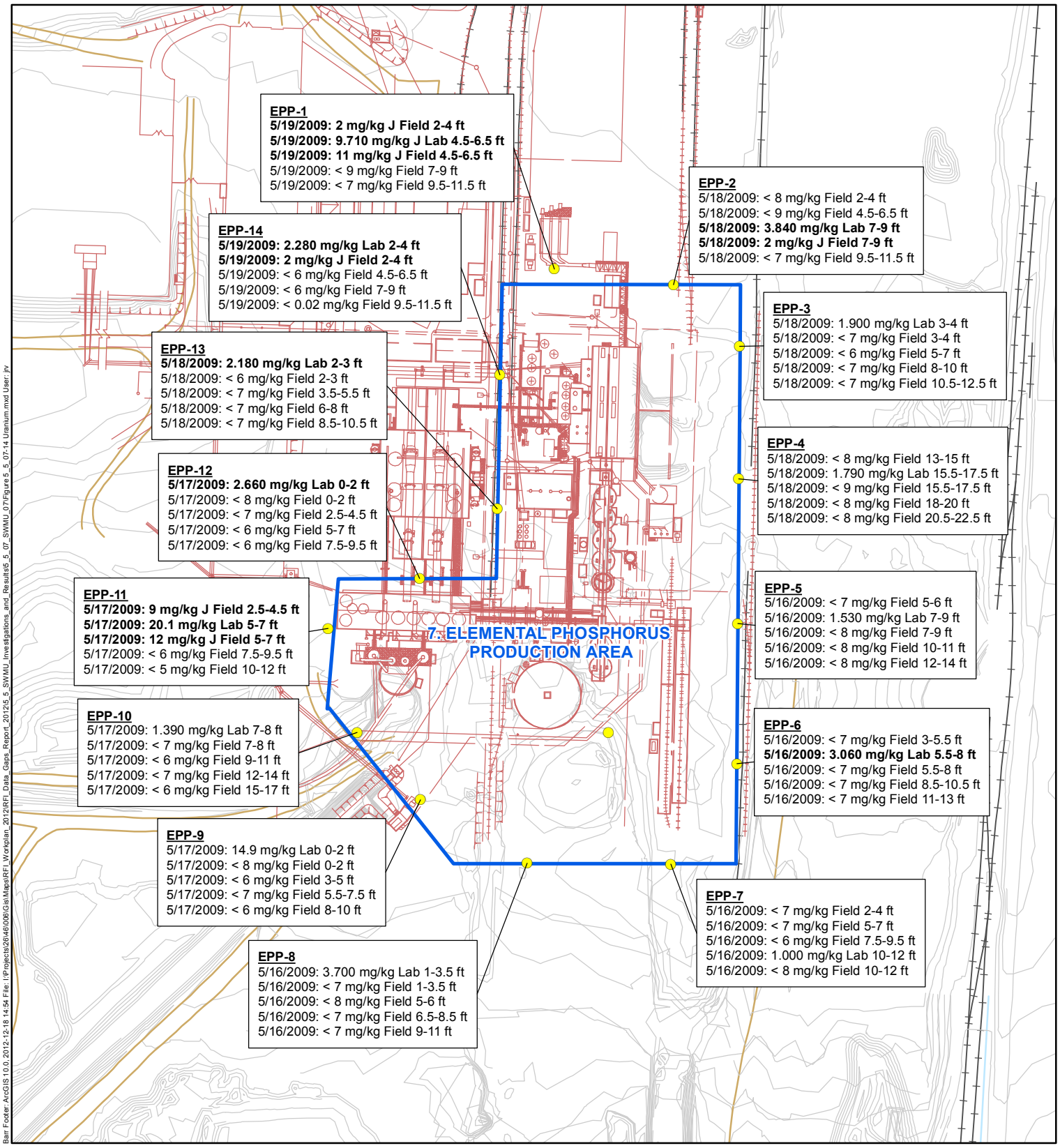
N

Feet

200 0 200

Figure 5.5.7-13

SWMU 7
SILVER
Rhodia Silver Bow Plant
Montana



Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

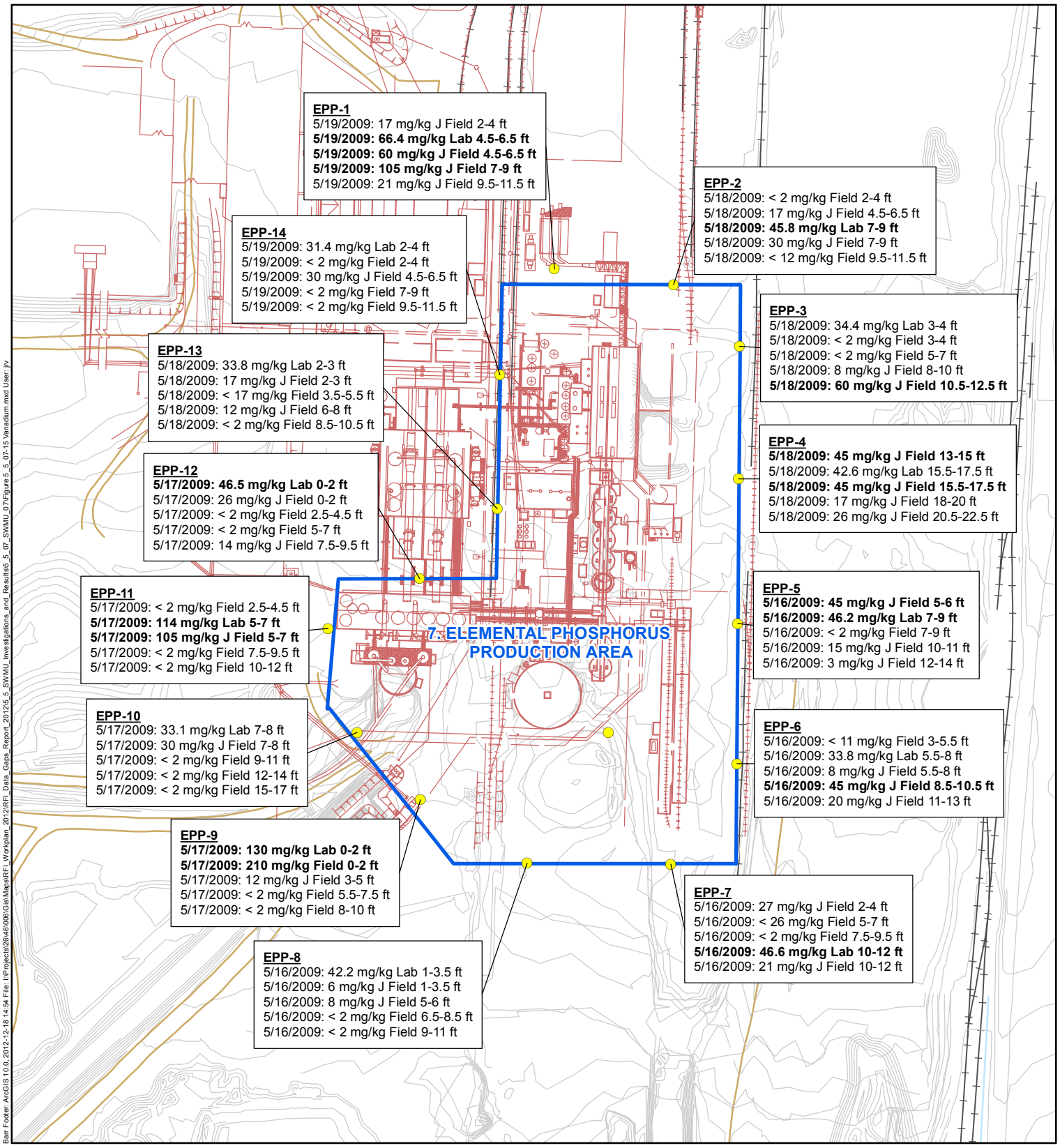
N

Feet

200 0 200

Figure 5.5.7-14

SWMU 7
URANIUM
Rhodia Silver Bow Plant
Montana



Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

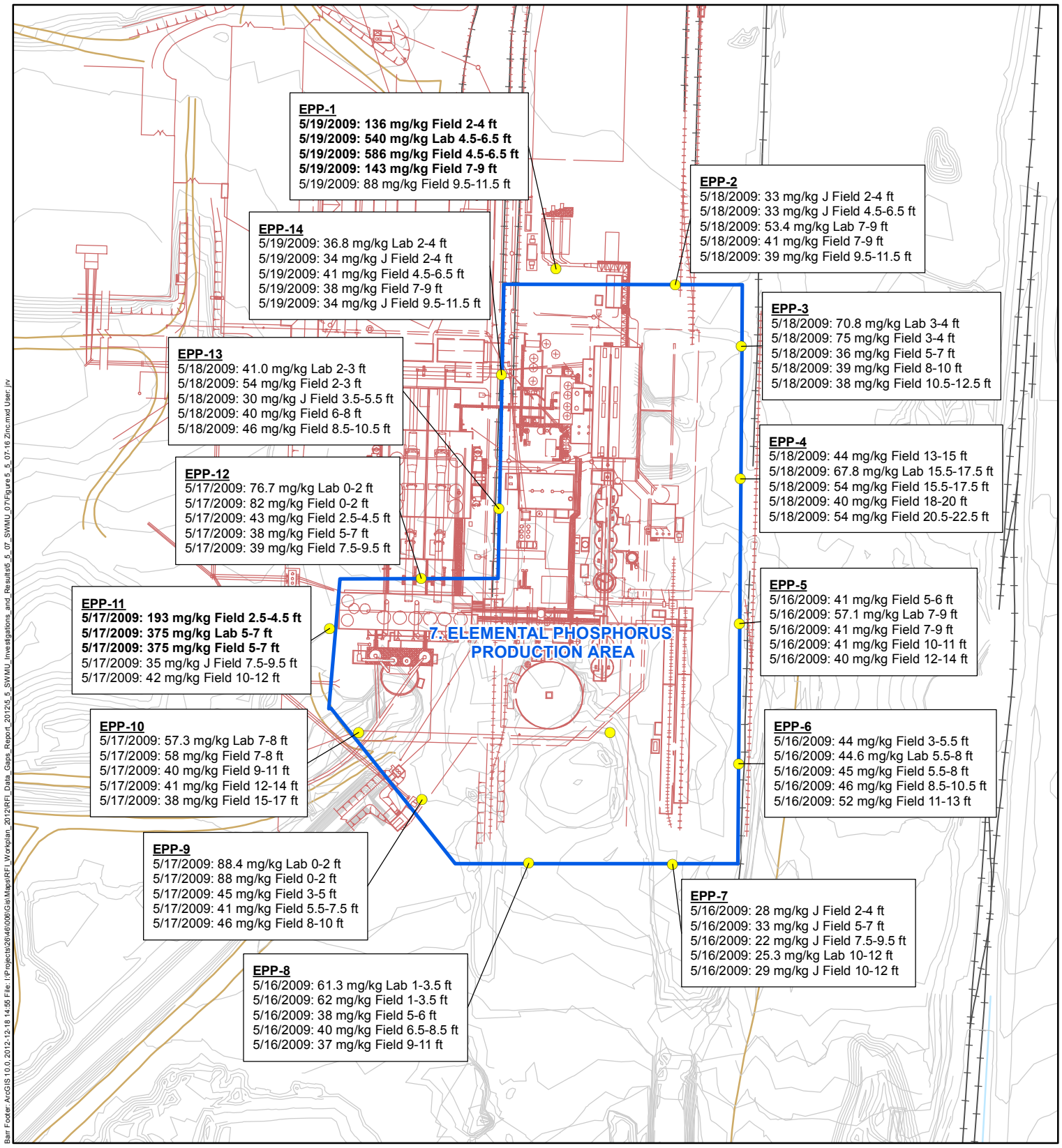
N

Feet

200 0 200

Figure 5.5.7-15

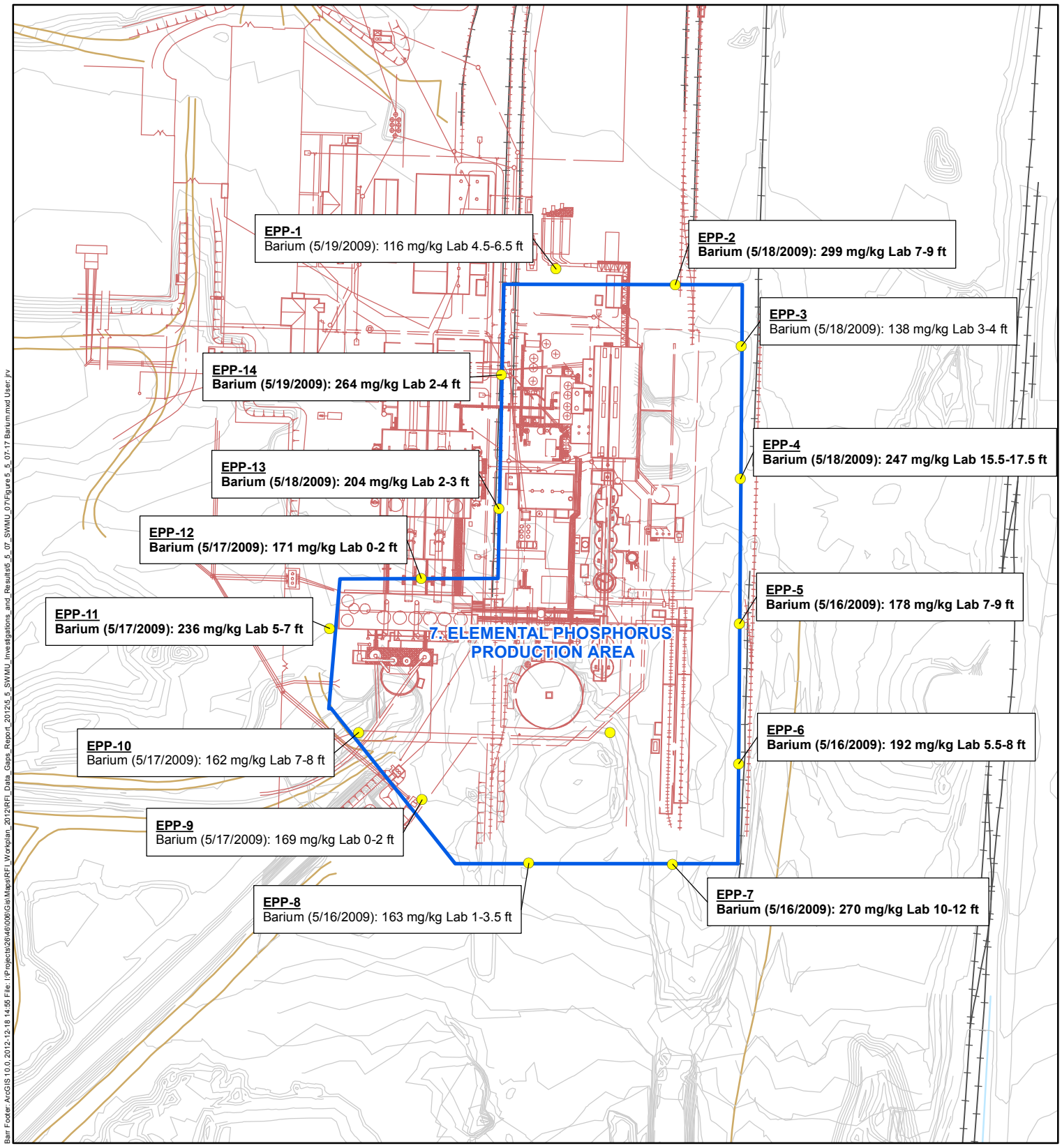
SWMU 7
VANADIUM
Rhodia Silver Bow Plant
Montana



Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

Figure 5.5.7-16

SWMU 7
ZINC
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-18 14:55 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_2012\5_5_SWMU_Investigations_and_Results\5_5_07_SWMU_07\Figure 5_5_07-17 Barium.mxd User: jrv

Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

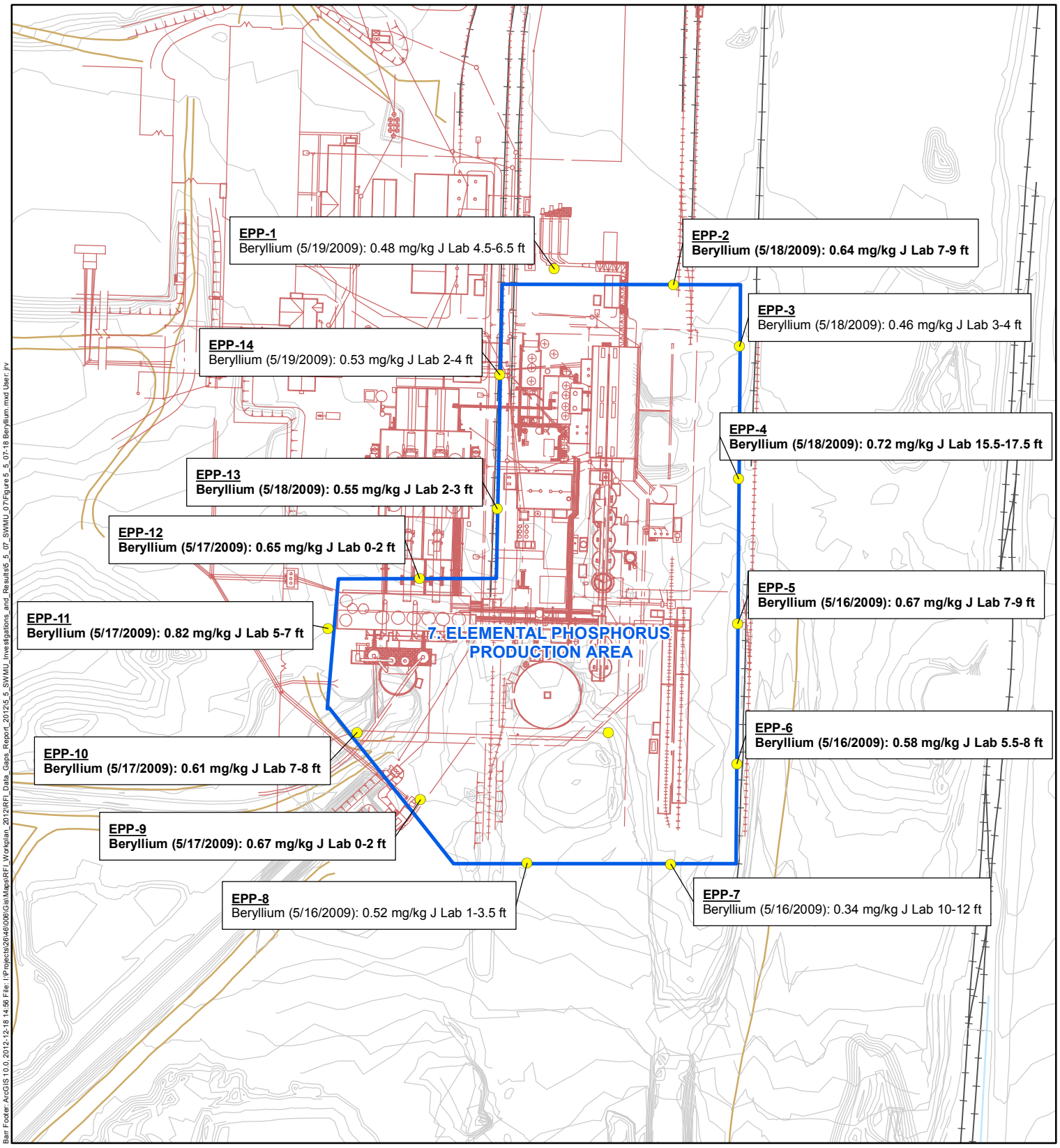
N

Feet

200 0 200

Figure 5.5.7-17

SWMU 7
BARIUM
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-18 14:56 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_2012\5_5_SWMU_Investigations_and_Results\5_5_07_SWMU_07\Figure 5_5_07-18 Beryllium.mxd User: jrv

Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

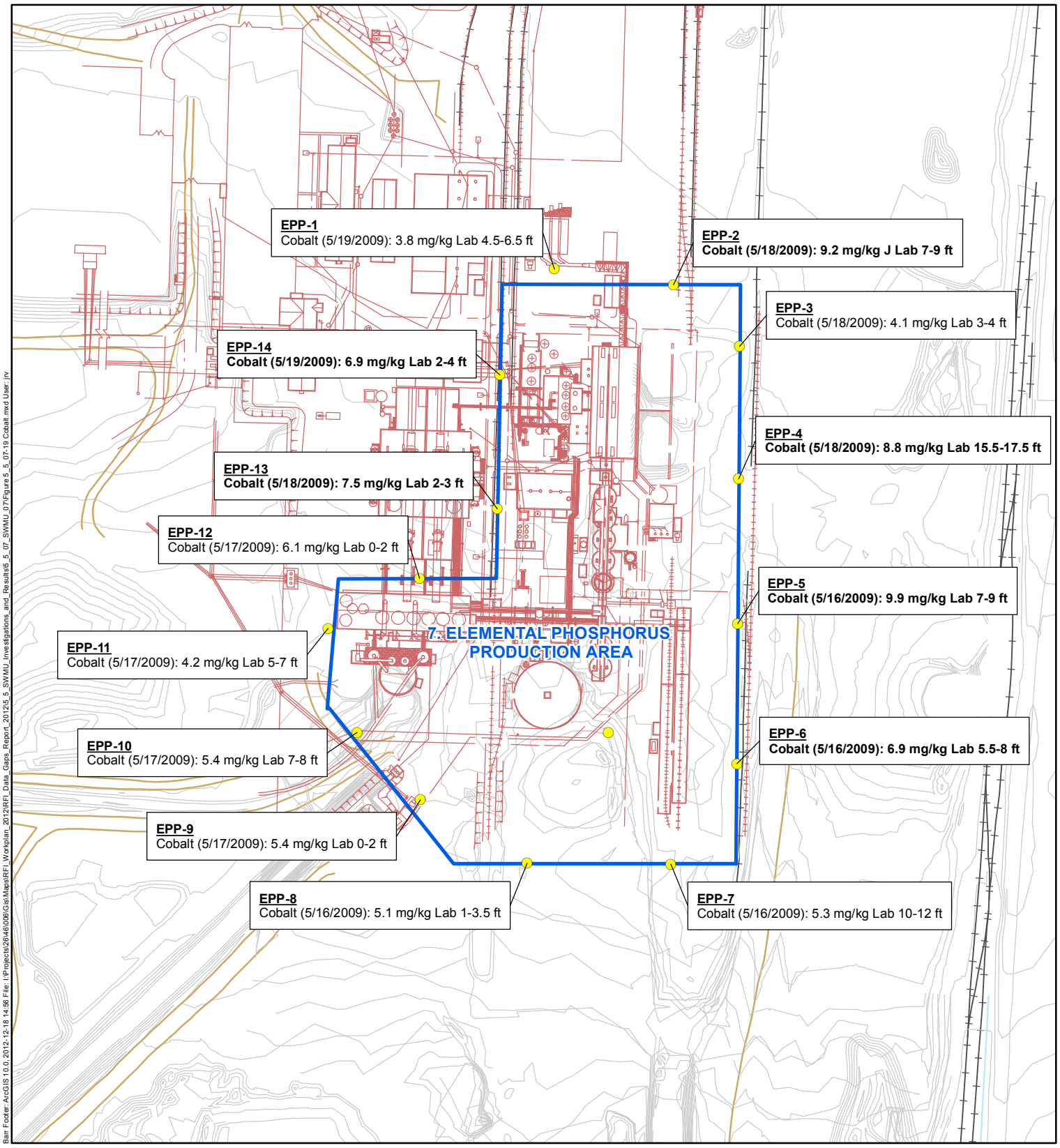
N

Feet

200 0 200

Figure 5.5.7-18

SWMU 7
BERYLLIUM
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-18 14:56 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_2012\5_5_SWMU_Investigations_and_Results\5_5_07_SWMU_07\Figure 5_5_07-19 Cobalt.mxd User: jrv

Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

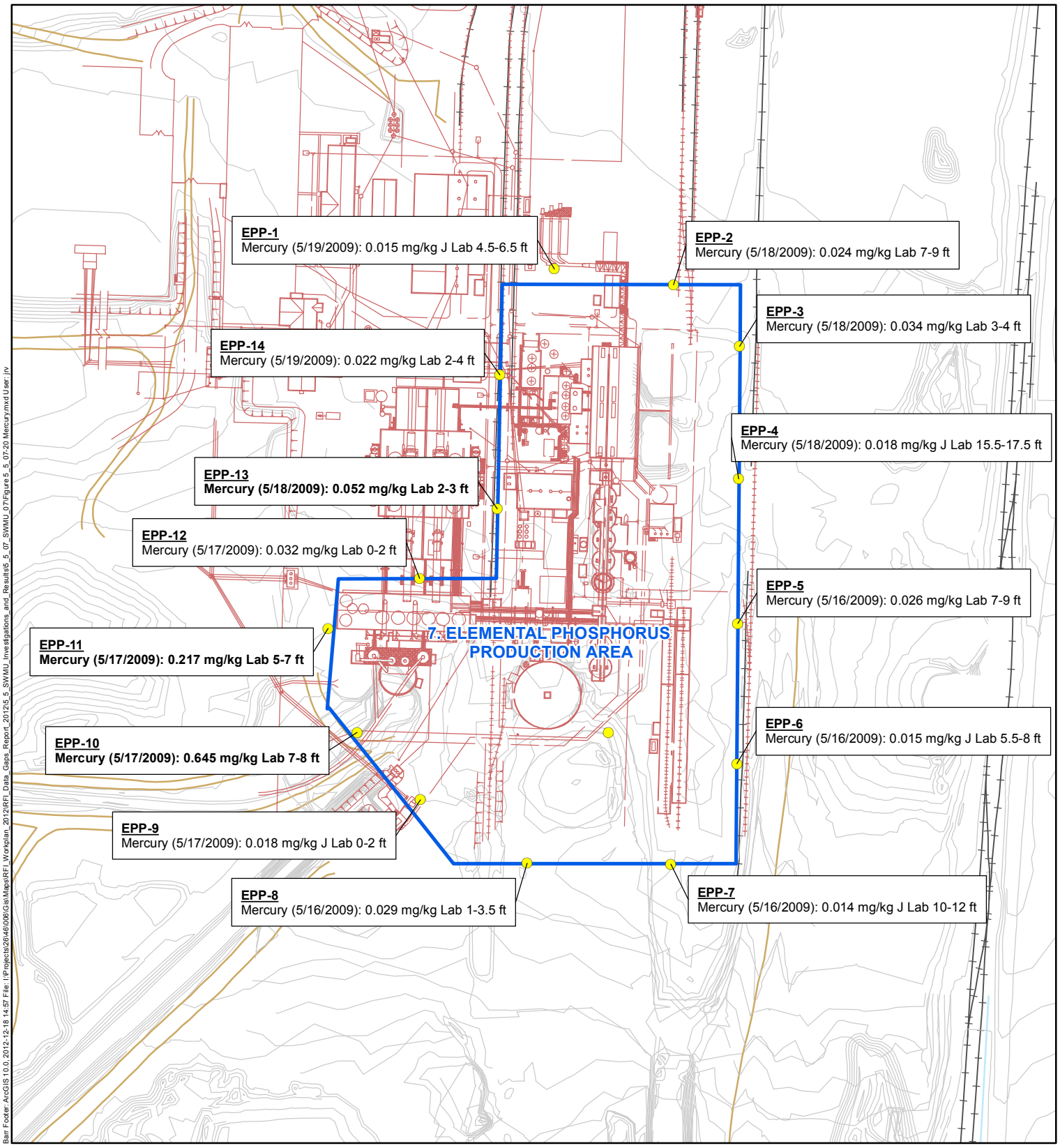
N

Feet

200 0 200

Figure 5.5.7-19

SWMU 7
COBALT
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-18 14:57 File: I:\Projects\26\46\006\GIs\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_2012\5_5_SWMU_Investigations_and_Results\5_5_07_SWMU_07\Figure 5_5_07-20 Mercury.mxd User: jrv

Sample Location
SWMU 7
Elevation Contour
Drainage
Railroad
Road
Former Plant Structures

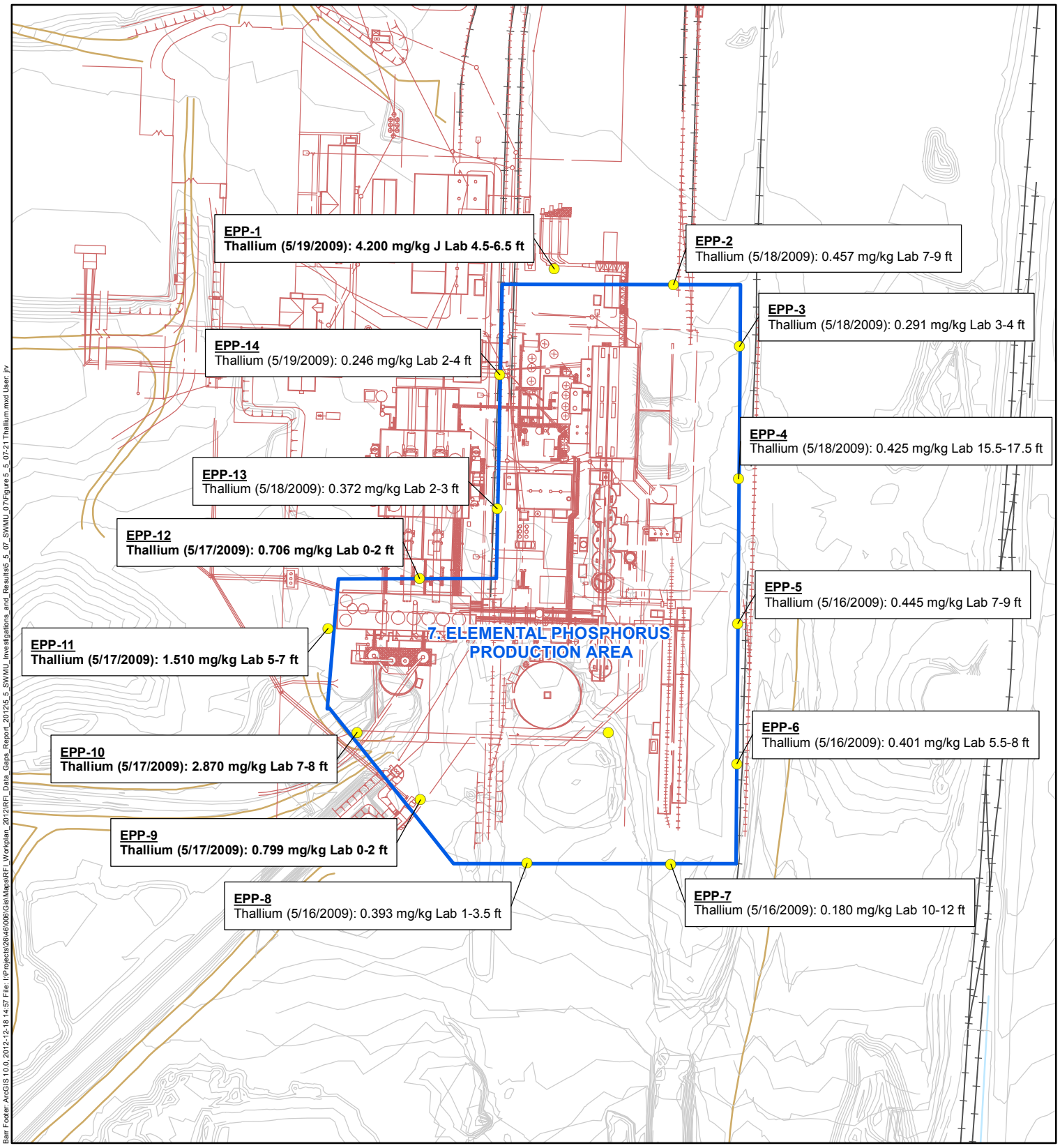
Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

N

Feet
200 0 200

Figure 5.5.7-20

SWMU 7
MERCURY
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-18 14:57 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_2012\5_5_SWMU_Investigations_and_Results\5_5_07_SWMU_07\Figure 5_5_07-21 Thallium.mxd User: jrv

Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

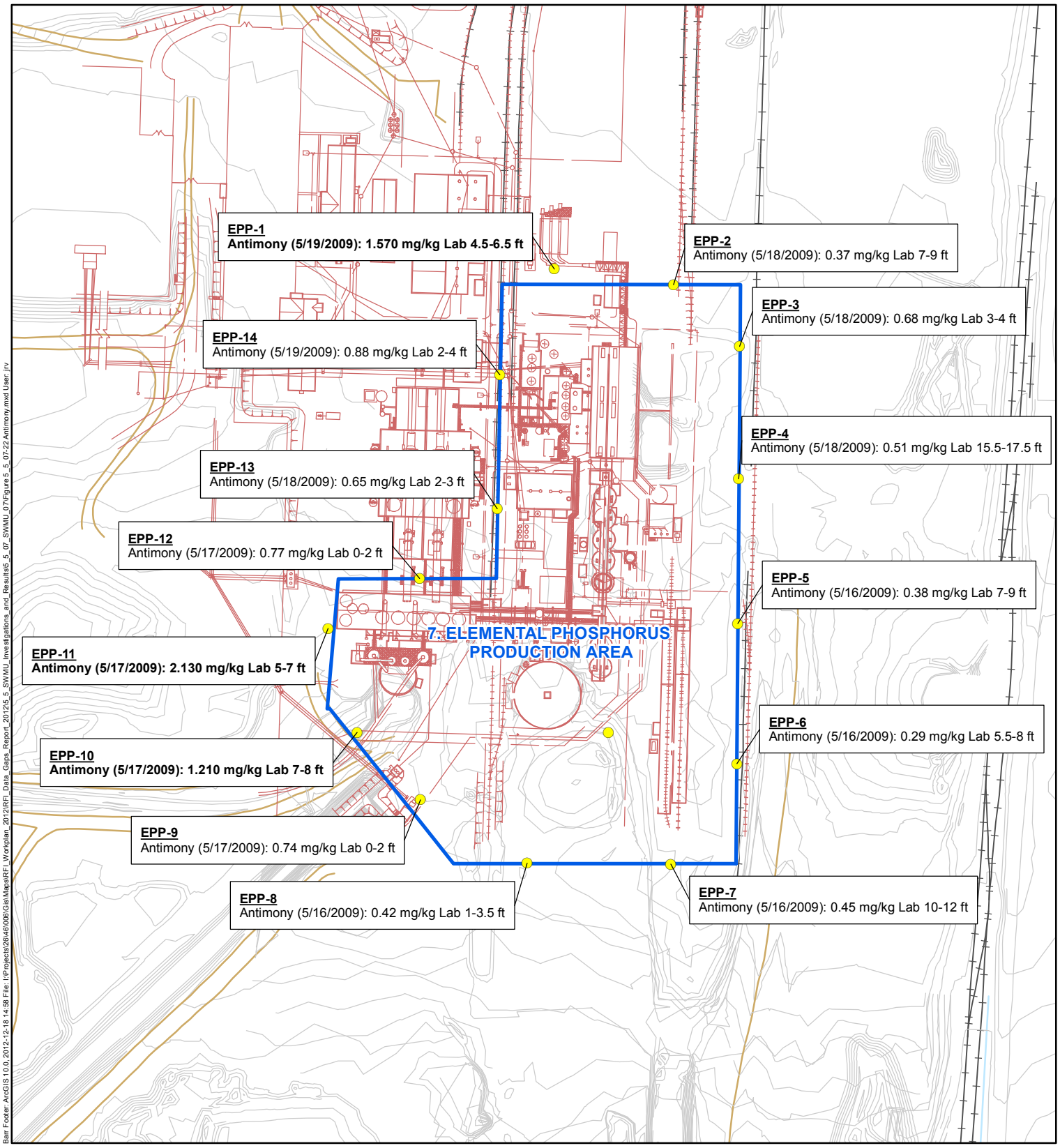
N

Feet

200 0 200

Figure 5.5.7-21

SWMU 7
THALLIUM
Rhodia Silver Bow Plant
Montana



Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

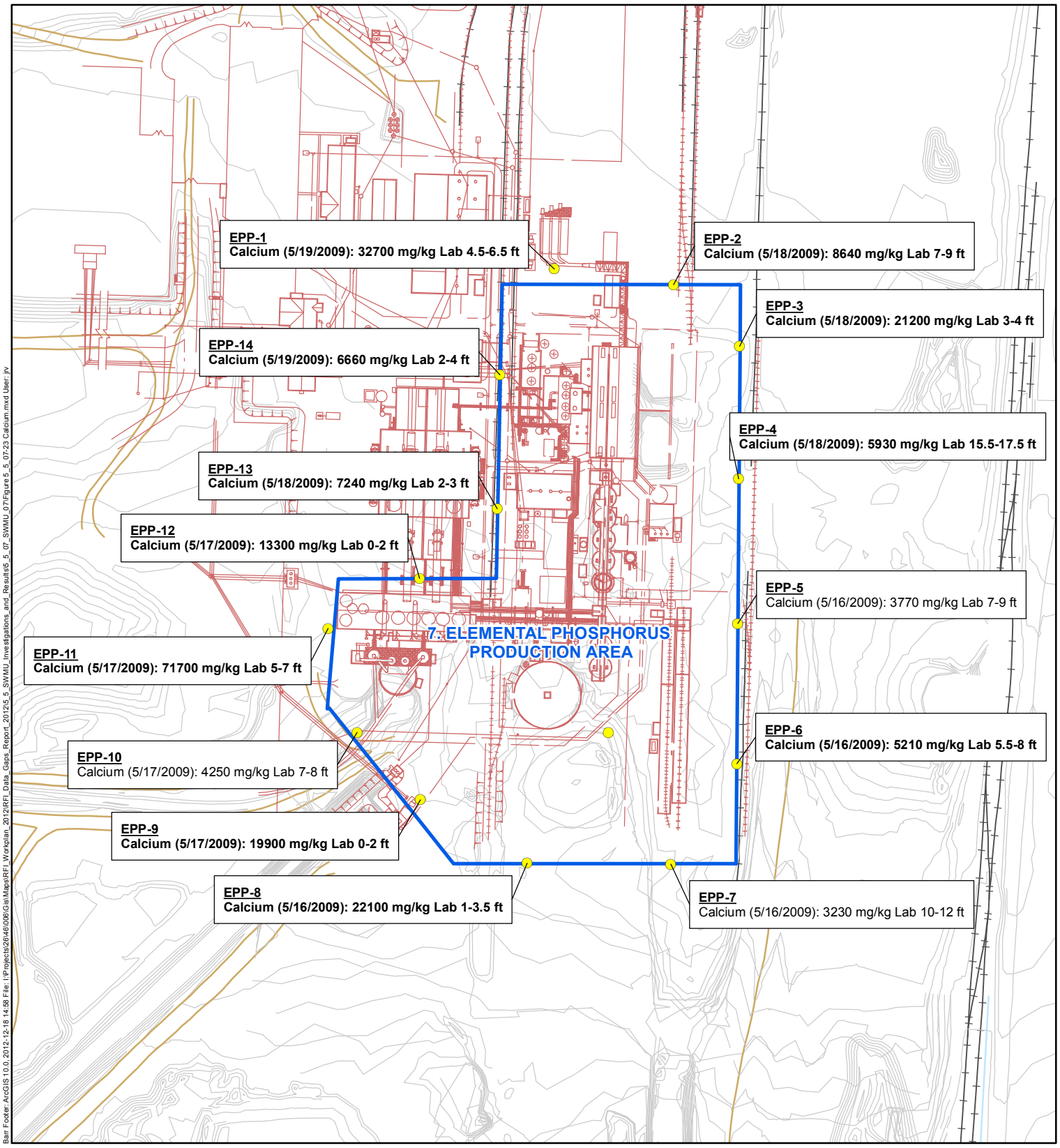
N

Feet

200 0 200

Figure 5.5.7-22

SWMU 7
ANTIMONY
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-18 14:58 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_20125\5_SWMU_Investigations_and_Results\5_07_SWMU_07\Figure 5_5_07-23 Calcium.mxd User: jrv

Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

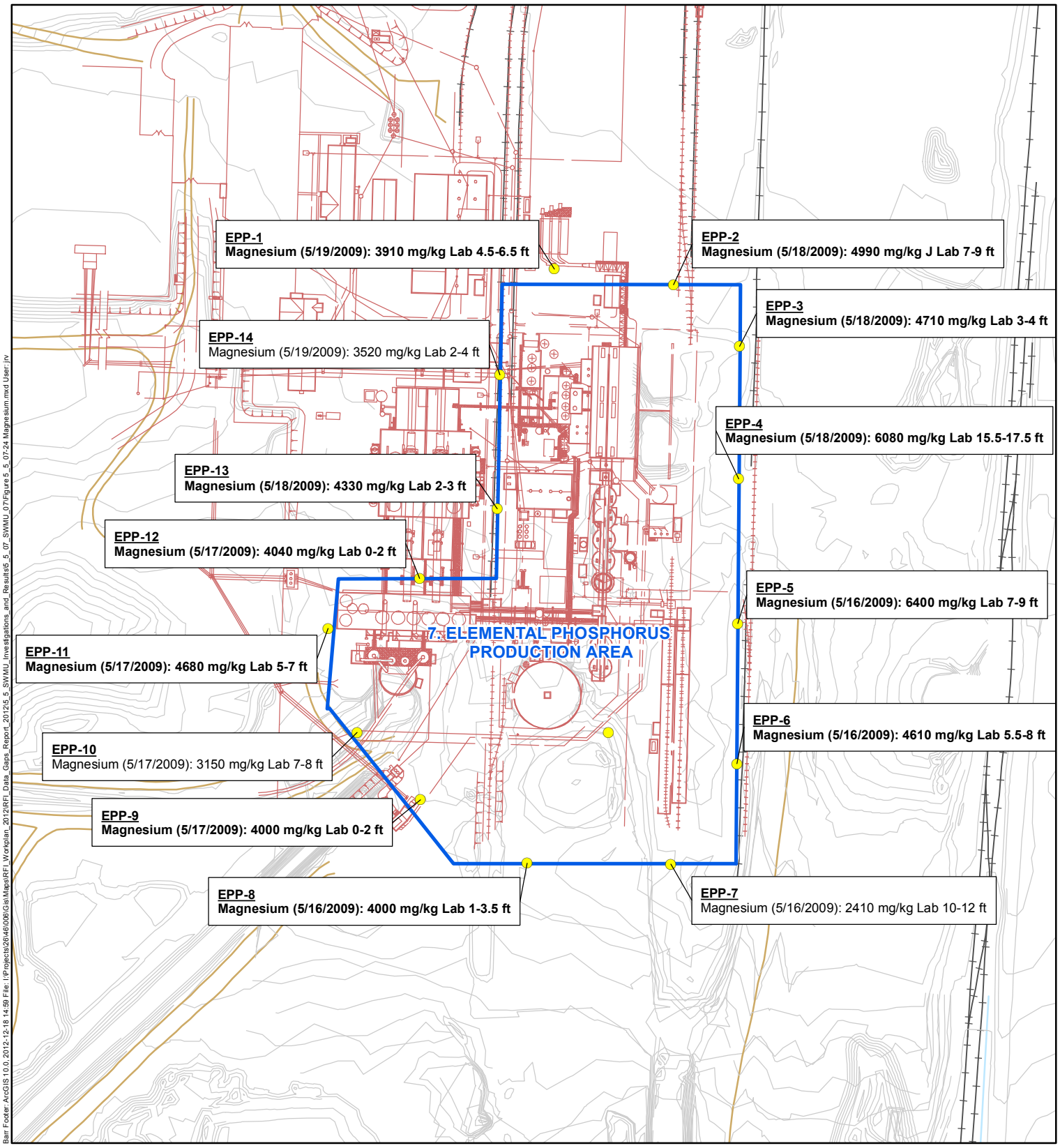
N

Feet

200 0 200

Figure 5.5.7-23

SWMU 7
CALCIUM
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-18 14:59 File: I:\Projects\26\46\006\GIs\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_20125\5_SWMU_investigations_and_Results\5_5_07_SWMU_07\Figure 5_5_07-24 Magnesium.mxd User: jrv

Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

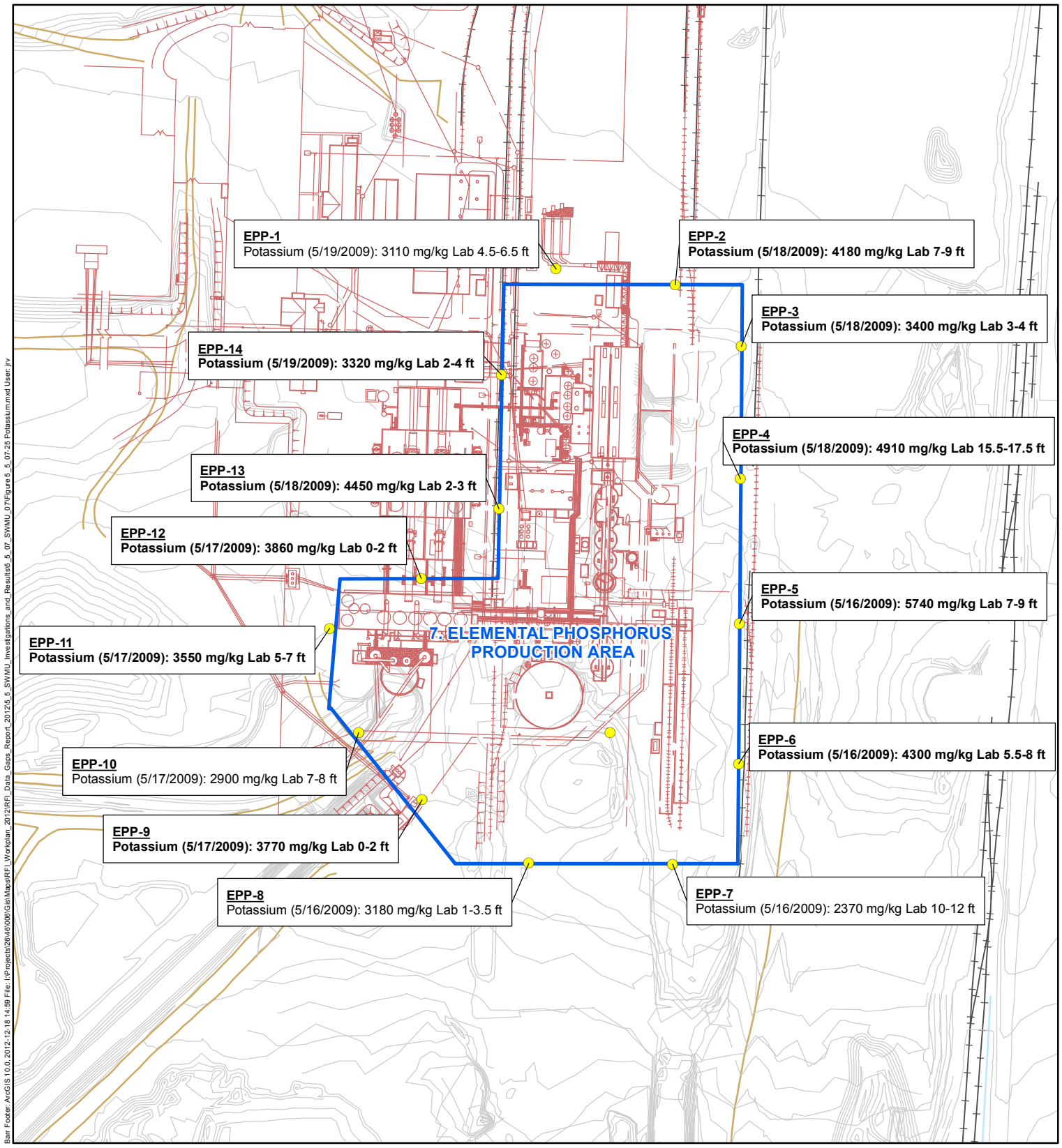
N

Feet

200 0 200

Figure 5.5.7-24

SWMU 7
MAGNESIUM
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-18 14:59 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_2012\5_5_SWMU_investigations_and_Results\5_5_07_SWMU_07\Figure 5_5_07-25 Potassium.mxd User: jrv

Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

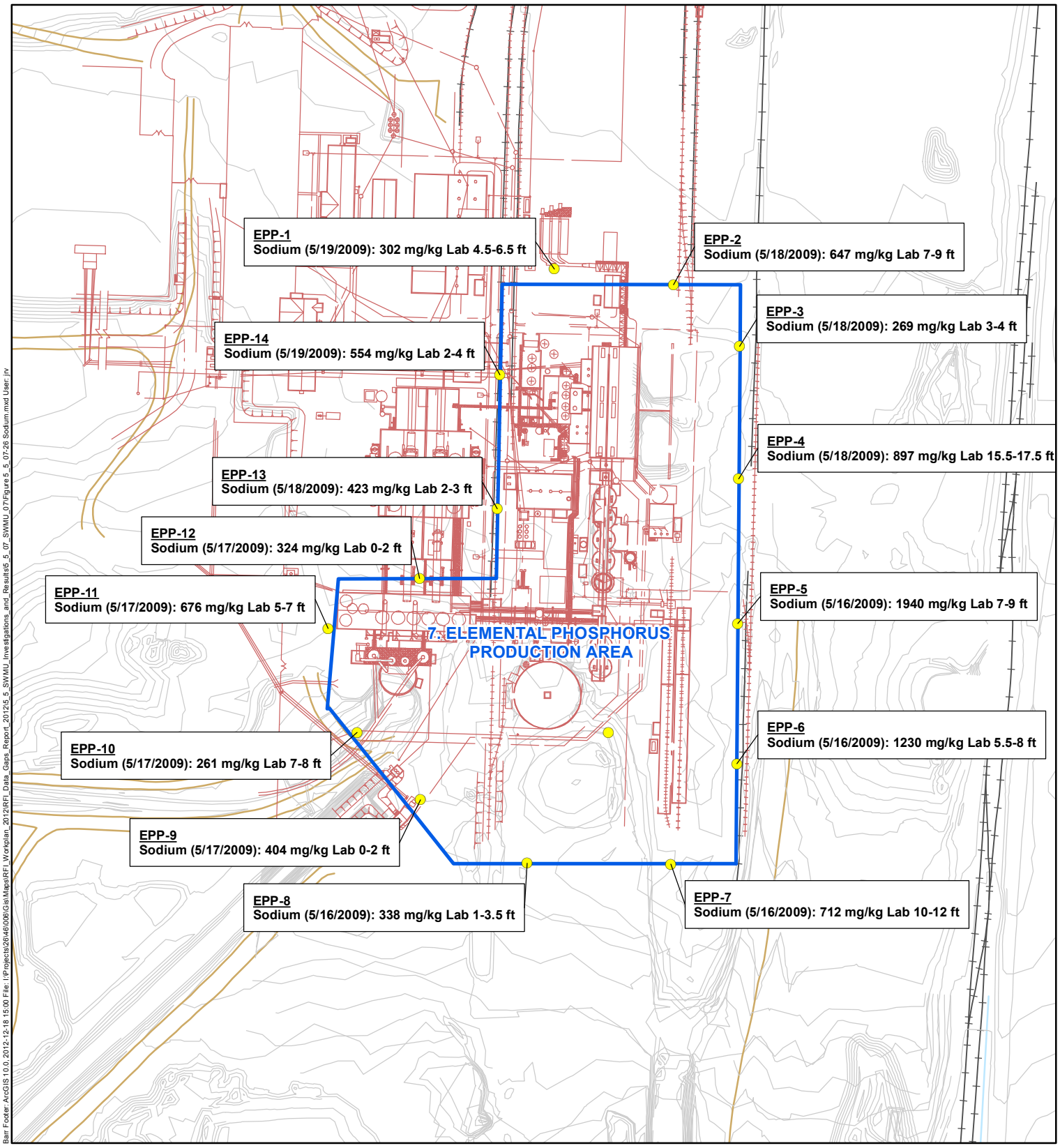
N

Feet

200 0 200

Figure 5.5.7-25

SWMU 7
POTASSIUM,
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-12-18 15:00 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_2012\5_5_SWMU_Investigations_and_Results\5_5_07_SWMU_07\Figure 5_5_07-28 Sodium.mxd User: jrv

Sample Location

SWMU 7

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

N

Feet

200 0 200

Figure 5.5.7-26

SWMU 7
SODIUM
Rhodia Silver Bow Plant
Montana

Appendices

Appendix 5.5.7-A

Boring Logs

LOG OF Boring EPP-1

SHEET 1 OF 1

Client Rhodia
Project Name Rhodia RFI
Number 26/46-006
Location Silver Bow, Montana

Drill Contractor O'Keefe
Drill Method HSA
Drilling Started 5/19/09 Ended 5/19/09
Logged By MMB/JLS4

Elevation --
Total Depth 11.5

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
		1	9-9-9-17	None None None	Dry	FILL		0-2': Fill, gray coarse slag with some black coke fines.	
2		2	10-16-22-61	None None None	Dry	ML		2-5': Sandy silt, brownish yellow(10 yr 6/6), firm, non-plastic, sand is fine to medium-grained. pH of soil in water : 6.98	2
4									4
		3	22-55-21-14	None None None	Dry	FILL		5-6': Fill, black coke fines mixed with gray coarse and granular slag. pH of soil in water : 6.87	
6						SP		6-11.5': Silty fine to medium-grained sand, brownish yellow(10 yr 6/6), micaceous.	6
		4	9-14-14-21	None None None	Dry			7-9': Sand with 15-20% gravel with reddish Fe-oxide staining surrounding gravel pieces. pH of soil in water : 6.32	
8									8
10		5	15-24-23-44	None None None	Dry			pH of soil in water : 5.95	10
								End of Boring - 11.5 feet	
12									12
14									14

Barr Engineering Co.
4700 West 77th Street, Suite 200
Minneapolis, MN 55435-4803
Telephone: (952) 832-2600
Fax: (952) 832-2601

Remarks: Collected analytical soil samples at 2-4', 4.5-6.5', 7-9', 9.5-11.5' and composite sample 2-11.5'.
pH of soil in water samples refrigerated until tests conducted on 5/27/09.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.

LOG OF Boring EPP-2

SHEET 1 OF 1

Client Rhodia | Drill Contractor O'Keefe

Project Name Rhodia RFI | Drill Method HSA

Number 26/46-006 | Drilling Started 5/18/09 Ended 5/18/09 | Elevation --

Location Silver Bow, Montana | Logged By MMB/JLS4 | Total Depth 11.5

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
		1	14-42-103-54	None None None	Dry	FILL		0-1.5': Fill, mix of granular slag and silica rock fragments, gray to dark brown.	
								1.5-2': Gray granular and coarse slag.	
2		2	9-16-25-36	None None None	Dry	SP-SM		2-6.5': Sand with silt, brownish yellow(10 yr 6/6), several very coarse-grained sand lenses, ~0.5" thick. pH of soil in water : 7.04	2
4									4
		3	13-32-43-52	None None None	Dry			pH of soil in water : 7.84	
6									6
		4	21-32-25-26	None None None	Dry	ML		7-11.5': Silt with sand, brownish yellow(10 yr 6/6). (contact with sand with silt above estimated) pH of soil in water : 7.70	
8									8
10		5	13-21-27-37	None None None	Dry			pH of soil in water : 7.80	10
								End of Boring - 11.5 feet	
12									12
14									14

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Fax: (952) 832-2601

Remarks: Collected analytical soil samples at 2-4', 4.5-6.5', 7-9', 9.5-11.5' and composite sample 2-11.5'.
pH of soil in water samples refrigerated until tests conducted on 5/27/09.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.

LOG OF Boring EPP-3

SHEET 1 OF 1

Client Rhodia
Project Name Rhodia RFI
Number 26/46-006
Location Silver Bow, Montana

Drill Contractor O'Keefe
Drill Method HSA
Drilling Started 5/18/09 Ended 5/18/09
Logged By MMB/JLS4

Elevation --
Total Depth 12.5

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
		1	20-26-22-45	None None None	Dry	FILL		0-3': Fill, mix of granular slag and silica rock fragments, gray to dark brown.	
2		2	29-22-24-24	None None None	Dry				2
						ML/SP-SM		3-8': Silt with sand or sand with silt, brownish yellow to brown(10 yr 6/6), color lighter with depth, sand is fine to medium-grained. pH of soil in water : 7.40	
4									4
6		3	14-18-24-35	None None None	Dry			pH of soil in water : 7.50	6
8		4	16-17-17-19	None None None	Dry	ML		8-12.5': Sandy silt, brownish yellow(10 yr 6/6), sand is fine-grained, micaceous. pH of soil in water : 8.17	8
10									10
12		5	12-14-17-26	None None None	Dry			pH of soil in water : 7.83	12
								End of Boring - 12.5 feet	
14									14

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Fax: (952) 832-2601

Remarks: Collected analytical soil samples at 3-4', 5-7', 8-10', 10.5-12.5' and collected composite sample 3-12.5'.
pH of soil in water samples refrigerated until tests conducted on 5/27/09.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.

LOG OF Boring EPP-4

SHEET 1 OF 1

Client Rhodia
Project Name Rhodia RFI
Number 26/46-006
Location Silver Bow, Montana

Drill Contractor O'Keefe
Drill Method HSA
Drilling Started 5/14/09 Ended 5/14/09
Logged By MMB/JLS4

Elevation --
Total Depth 22.5

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
					Moist	FILL		0-0.7': Silica rock.	
		1	17-33-59-49	None None None	Dry				
		2	16-14-17-12	None None None	Dry			3-13': Slag, fine to coarse-grained, bluish-gray(gley 1 5B/1).	
5		3	12-14-12-13	None None None	Dry				5
		4	12-9-5-4	None None None	Dry	FILL			
10		5	7-6-6-6		Dry				10
		6	11-16-14-18	None None None	Dry	ML		13-14': Silt with 10-15% fine-grained sand, brown(10 yr 5/3), dense, laminated with silty sand lenses, micaceous.	
15						ML-SM		14-16': Laminated silt and silty sand, yellowish brown(10 yr 5/6) 14-16'.	15
		7	11-12-26-32	None None None	Dry	ML		16-18': Silt with 10-15% fine-grained sand, brown(10yr 5/3).	
		8	13-22-26-35	None None None	Dry	SP		18-19': Sand, fine to medium-grained, grayish brown, sharp contact with above and below.	
20						ML		19-21': Silt, thinly bedded to laminated, with 2-3" thick fine-coarse-grained sand interbeds.	20
		9	14-16-29-39	None None None	Dry	SM		21-22.5': Silty sand, fine to medium-grained, thinly bedded to laminated, yellowish brown, micaceous.	
								End of Boring - 22.5 feet	

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Remarks: Collected analytical soil samples at 13-15', 15.5-17.5', 18-20', 20.5-22.5', and composite sample 13-22.5'.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.

LOG OF Boring EPP-5

SHEET 1 OF 1

Client Rhodia
Project Name Rhodia RFI
Number 26/46-006
Location Silver Bow, Montana

Drill Contractor O'Keefe
Drill Method HSA
Drilling Started 5/16/09 Ended 5/16/09
Logged By MMB/JLS4

Elevation --
Total Depth 16.0

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
		1	9-29-76-88	None None None	Dry	FILL		0-1.2': Fill, loose silica.	
		2	33-63-40-44	None None None	Dry	SM		1.2-3': Fine to coarse sand with 40% fine gravel and 20% fines. Dark yellow-brown. 3-4': Silty sand with gray slag cobbles, light yellowish brown(10 yr 6/4).	
5		3	18-44-39-59	None None None	Dry	FILL		4-5': Fill, heterogenous silty clay with sand with gray slag pieces and thin sandy black and gray lenses.	5
						CL		5-6': Sandy clay, micaceous, light yellowish brown sand, fine to coarse-grained, up to 30% sand at 6'.	
		4	13-14-17-25	None None None	Dry	ML		7-16': Sandy silt, sand(15-20%) is fine-grained, micaceous, finely laminated, light yellow brown. (contact with sandy clay above estimated)	
10		5	14-22-26-41	None None None	Dry				10
		6	18-26-32-34	None None None	Dry				
15		7	12-19-29-43	None None None	Dry				15
								End of Boring - 16 feet	

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Remarks: Collected analytical soil samples at 5-6', 7-9', 10-11', 12-14' and composite sample 5-14'.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.

LOG OF Boring EPP-6

SHEET 1 OF 1

Client Rhodia
Project Name Rhodia RFI
Number 26/46-006
Location Silver Bow, Montana

Drill Contractor O'Keefe
Drill Method HSA
Drilling Started 5/16/09 Ended 5/16/09
Logged By MMB/JLS4

Elevation --
Total Depth 13.0

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
		1	7-40-36-46	None None None	Dry	FILL		0-3': Fill; black, slag material and granular tailings, fines, dense below 1', black to reddish brown.	
2									2
		2	15-14-14-21	None None None	Dry			3-13': Silt, non-plastic, 20% fine-grained sand, micaceous, light yellowish brown(10 yr 6/4).	
4									4
		3	12-15-13-21	None None None	Dry	ML			
6								Small white mottling.	6
		4	16-19-20-28	None None None	Dry				
8									8
		5	11-16-23-28	None None None	Dry	ML-SM		Sand content increases.	
10									10
		6	13-22-28-39	None None None	Dry				
12									12
								End of Boring - 13 feet	
14									14

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Remarks: Collected analytical soil samples at 3-5.5', 5.5-8', 8.5-10.5', 11-13' and composite sample 3-13'.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.

LOG OF Boring EPP-7

SHEET 1 OF 1

Client Rhodia
Project Name Rhodia RFI
Number 26/46-006
Location Silver Bow, Montana

Drill Contractor O'Keefe
Drill Method HSA
Drilling Started 5/16/09 Ended 5/16/09
Logged By MMB/JLS4

Elevation --
Total Depth 12.0

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
		1	6-11-17-16	None None None	Dry	FILL		0-2': Fill; black heterogenous, slag and granular coke fines and silica rock cobbles.	
2		2	8-17-31-31	None None None	Dry			2-7': Silty sand, micaceous, light yellowish brown(10 yr 6/4).	2
4						SM			4
		3	12-22-32-42	None None None	Dry			2" coarse sand layer. Color changes to yellowish brown(10 yr 5/6).	
6									6
8		4	21-25-25-36	None None None	Dry	SP		7.5-11.2': Sand, fine to coarse-grained, yellowish brown. (contact with silty sand above estimated)	8
10		5	22-33-52-87	None None None	Dry				10
						SM		11.2-12': Silty sand, little mica, yellowish brown with reddish mottling.	
12								End of Boring - 12 feet	12
14									14

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Remarks: Collected analytical soil samples at 2-4', 5-7', 7.5-9.5', 10-12' and composite sample 2-12'.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.

LOG OF Boring EPP-8

SHEET 1 OF 1

Client Rhodia
Project Name Rhodia RFI
Number 26/46-006
Location Silver Bow, Montana

Drill Contractor O'Keefe
Drill Method HSA
Drilling Started 5/16/09 Ended 5/16/09
Logged By MMB

Elevation --
Total Depth 11.0

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
		1	10-24-29-14	None None None	Dry	FILL		0-1': Black fill with gray slag, loose, G/S/F: 20/60/20	
2		2	6-9-8-8	None None None	Dry	SM		1-2': Silty sand with some gravel, very dense, brown(10 yr 4/3). 2-6': Silty sand, fine-grained, homogenous, light yellowish brown(10 yr 6/4).	2
4		3	6-4-5-14	None None None	Dry	SM-ML		Silt content increases, micaceous.	4
6		4	12-20-27-35	None None None	Dry	ML		6-9': Silty with sand(15-20%), sand fine to medium-grained, homogenous, non-plastic, light yellowish brown. (contact with silt above estimated)	6
8									8
10		5	4-20-28-32	None None None	Dry	SM		9-11': Silty sand, fine to medium-grained, occasional pebbles, homogenous, non-plastic, light yellowish brown.	10
								End of Boring - 11 feet	
12									12
14									14

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Remarks: Collected analytical soil sample at 1-3.5', 3.5-6', 6.5-8.5', 9-11' and composite sample 1-11'.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.

LOG OF Boring EPP-9

SHEET 1 OF 1

Client Rhodia
Project Name Rhodia RFI
Number 26/46-006
Location Silver Bow, Montana

Drill Contractor O'Keefe
Drill Method HSA
Drilling Started 5/17/09 Ended 5/17/09
Logged By JLS4

Elevation --
Total Depth 10.0

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
0		1	6-6-12-4	None None None	Dry	SM		0-1.5': Reworked soil with black coke fines, brown(10 yr 5/3) with reddish and white mottling. 1.5-2': Silty sand, yellowish brown(10 yr 5/4).	0
2		2	6-6-8-17	None None None	Dry	ML		3-5': Silt with sand, some mica, light yellowish brown(10 yr 6/4) with white mottling and white flecks. (contact with silty sand above estimated)	2
4		3	11-17-23-30	None None None	Dry	SP-SM		5.5-10': Sand with silt, micaceous, light yellowish brown with white flecks. (contact with sand with silt above estimated)	4
6		4	14-29-42-52	None None None	Dry				6
8									8
10								End of Boring - 10 feet	10
12									12
14									14

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Remarks: Collected analytical soil sample at 0-2', 3-5', 5.5-7.5', 8-10' and composite sample 0-10'.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.

LOG OF Boring EPP-10

SHEET 1 OF 1

Client Rhodia
Project Name Rhodia RFI
Number 26/46-006
Location Silver Bow, Montana

Drill Contractor O'Keefe
Drill Method HSA
Drilling Started 5/17/09 Ended 5/17/09
Logged By JLS4

Elevation --
Total Depth 17.0

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
		1	6-7-7-11	None None None				0-5.7': Black heterogeneous fill, slag cobbles, coke fines, silica gravel, G/S/F: 50/40/10.	
		2	7-8-9-10	None None None	Dry	FILL			
5		3	10-29-49-26	None None None					5
								5.7-7': Fill - fine grained silty tailing? non plastic, laminated, dark reddish brown (7.5 r 3/2) nonsmoking, no odor.	
		4	8-8-10-11	None None None	Slightly moist			7-17': Sandy silt, fine-grained sand, micaceous, hard, brown(10 yr 4/3), to light yellowish brown(10 yr 5/6).	
10		5	7-10-12-14	None None None	Dry				10
						ML			
		6	14-20-29-36	None None None					
15				None None None	Dry				15
		7	18-30-35-45						
								End of Boring - 17 feet	

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Remarks: Collected analytical soil samples at 7-8', 9-11', 12-14', 15-17' and composite sample 7-17'.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.

LOG OF Boring EPP-11

SHEET 1 OF 1

Client Rhodia
Project Name Rhodia RFI
Number 26/46-006
Location Silver Bow, Montana

Drill Contractor O'Keefe
Drill Method HSA
Drilling Started 5/17/09 Ended 5/17/09
Logged By MMB/JLS4

Elevation --
Total Depth 12.0

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
		1	8-12-17-17	None Faint Sulfur None	Dry	FILL		0-2': Fill, coarse granular slag, gray to dark brown.	
2									2
		2	7-8-7-7	None None None	Dry	ML		2.0-7.0': Silt with fine grained sand, yellowish brown (10 yr 5/4), non-plastic, firm.	
4									4
		3	10-4-4-6	None None None	Dry				
6									6
		4	13-16-23-32	None None None	Dry	SM		7.5-9.5': Silty sand, light yellowish brown(10 yr 6/4), non-plastic, firm-hard. (contact with silt above estimated)	
8									8
		5	20-25-38-59	None None None	Dry	ML		10-12': Silt with sand, brownish yellow (10 yr 6/6), non-plastic, firm-hard. (contact with silty sand above estimated)	
10									10
12								End of Boring - 12 feet	12
14									14

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Remarks: Collected analytical soil samples at 2.5-4.5', 5-7', 7.5-9.5', 10-12'.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.

LOG OF Boring EPP-12

SHEET 1 OF 1

Client Rhodia
Project Name Rhodia RFI
Number 26/46-006
Location Silver Bow, Montana

Drill Contractor O'Keefe
Drill Method HSA
Drilling Started 5/17/09 Ended 5/17/09
Logged By MMB/JLS4

Elevation --
Total Depth 9.5

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
						FILL		0-0.3': Fill, black, organic(?).	
		1	4-12-19-23	None None None	Dry			0.3-7.5': Silt with sand, brownish yellow(10 yr 6/6), non-plastic, firm to hard, micaceous.	
2									2
		2	8-15-22-27	None None None	Dry	ML			
4									4
		3	15-27-33-38	None None None	Dry				
6									6
		4	14-21-31-52	None None None	Dry	SM		7.5-9.5': Silty sand, yellowish brown(10 yr 5/4) sand is fine to medium-grained, coarsening toward 9.5', hard non-plastic.	
8									8
								End of Boring - 9.5 feet	
10									10
12									12
14									14

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Remarks: Collected analytical soil samples at 0-2', 2.5-4.5', 5-7', and 7.5-9.5' and composite sample 0-9.5'.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.

LOG OF Boring EPP-13

SHEET 1 OF 1

Client Rhodia
Project Name Rhodia RFI
Number 26/46-006
Location Silver Bow, Montana

Drill Contractor O'Keefe
Drill Method HSA
Drilling Started 5/18/09 Ended 5/18/00
Logged By MMB/JLS4

Elevation --
Total Depth 10.5

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
						FILL		0-1': Fill, railroad tie and granular slag.	
2		1	11-16-25-36		Dry	ML		2-4': Sandy silt, brownish yellow(10 yr 6/6), firm non-plastic.	2
4		2	9-17-26-36	None None None	Dry			4.5-5.5': Light yellowish brown(10 yr 6/4).	4
6		3	9-21-45-56	None None None	Dry	SM		6-8': Silty fine-grained sand, yellowish brown(10 y 5/4), dense, non-plastic, homogeneous.	6
8									8
10		4	19-37-15-63	None None None	Dry			End of Boring - 10.5 feet	10
12									12
14									14

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Remarks: Collected analytical soil samples at 2-3', 3.5-5.5', 6-8', 8.5-10.5' and composite sample 2-10.5'.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.

LOG OF Boring EPP-14

SHEET 1 OF 1

Client Rhodia
Project Name Rhodia RFI
Number 26/46-006
Location Silver Bow, Montana

Drill Contractor O'Keefe
Drill Method HSA
Drilling Started 5/19/09 Ended 5/19/09
Logged By MMB/JLS4

Elevation --
Total Depth 11.5

DEPTH FEET	SAMP. LENGTH & RECOVERY	SAMP. NUMBER	Blows/6 in.	Discoloration-Odor-Sheen	Moisture	ASTM	LITHOLOGY	DESCRIPTION	DEPTH FEET
		1	50+---	None Faint naphthalene None	Dry	FILL		0-2': Fill, railroad tie covered by asphalt. Drillers augered through railroad tie.	
2		2	15-29-37-50	None None None	Dry	SM		2-4.5': Silty fine-grained sand, yellowish brown(10 yr 5/4), firm, non-plastic, with thin, white partings below 3'. pH of soil in water : 8.00	2
4		3	4-28-38-47	None None None	Dry	SP-SM		4.5-5.5': Fine-grained sand with silt, yellowish brown, firm, non-plastic, micaceous. pH of soil in water : 7.88	4
6		4	20-34-49-69	None Moderate Naphthalene None	Dry	ML		7-11.5': Sandy silt, yellowish brown, sand is fine-grained, non-plastic, homogeneous, hard. pH of soil in water : 7.87	6
8		5	21-37-45-49	None None None	Dry			pH of soil in water : 7.72	8
10								End of Boring - 11.5 feet	10
12									12
14									14

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Remarks: Collected soil analytical samples at 2-4', 4.5-6.5', 7-9', 9.5-11.5' and composite sample 2-11.5'.
pH of soil in water samples refrigerated until tests conducted on 5/27/09.

BGS = "below ground surface"
Additional data may have been collected in the field which is not included on this log.