SWMU 5 – New and Used Carbon Block and New Carbon Brick

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5.5.5 SWMU 5 - New and Used Carbon Block and New Carbon Brick

The location of Solid Waste Management Unit (SWMU) 5 is shown on Figure 5.5.5-1a and SWMU 5 monitoring stations and sample locations are provided on Figure 5.5.5-1b. SWMU 5 was an outdoor storage area for new and used carbon block and new carbon brick for the furnaces. Soil was not interspersed with the bulk carbon materials in SWMU 5 so there are no soil piles in SWMU 5. SWMU 5 is located in an area south of the clarifier (SWMU 2) and SWMU 11 (Crude Phosphorus Burial Area), west of the plant new equipment storage area, east of groundwater monitoring well MW97-7, east of SWMU 25 (the containment pad area), and north of SWMU's 15 and 16. There are no underground utilities or plant process lines in the area. A railroad spur that serviced the clarifier area was located just west of the SWMU. The SWMU area was used primarily for storing new carbon blocks and new carbon bricks for the furnaces. The few used carbon blocks stored in the SWMU were blocks that could be reused in the furnaces. The area was approximately 120 feet long by 30 feet wide and 5 to 6 feet high where the new blocks were stored. The new carbon materials represent excess material that was not used in the furnaces before the Plant ceased operations. There are still several pallets of new carbon brick stored in the area. Photographs of the new carbon brick are provided as Figure 5.5.5-2.

5.5.5.1 Corrective Measures

Rhodia implemented the corrective measures for this SWMU during 2008. The few used carbon blocks in the area were tested for ignitability using the ignitability test protocol and management program for the carbon materials that was reviewed and approved by EPA in a letter dated May 28, 2008 (Appendix 5.5.3-E). Based on the Pilot Test Program (referenced in greater detail in 5.5.3.3), the ignitability characteristic was used to evaluate the carbon materials for hazardous waste. The carbon blocks that passed the ignitability testing were approved for recycling, and were transported to the recycling facility (Pamas and Company) in Elberton, Georgia. The new brick was also tested and did not exhibit hazardous waste characteristics, having not been exposed to the elemental phosphorus.

The corrective measures for SWMU 5 are complete as indicated by the EPA's approval of Rhodia's Complete Report (Rhodia, 2009) in a letter dated May 15, 2009 (Appendix 5.5.3-H).

Since SWMU 5 contained the same materials that were contained in SWMU 3, the results of the groundwater monitoring program conducted at SWMU 3 are relevant to expected conditions at SWMU 5. The groundwater quality dataset for SWMU 3 demonstrates that there are no significant groundwater impacts related to the former storage area for new and used carbon blocks and new

carbon brick. Therefore, no significant groundwater impacts are expected for SWMU 5. SWMU 3 groundwater quality is discussed in detail in Section 5.5.3.5.

5.5.5.2 RFI Activities and Results

In October 2012 soil samples were collected from a test pit sidewall at a randomly selected location in SWMU 5. Soil samples were collected from the 0-2 inch interval (SWMU-5 SP-1 0-2") and the 2-12 inch interval (SWMU-5 SP-1 2-12") of a test pit excavated with a rubber tire backhoe. The test pit log is provided in Appendix 5.5.5-A, and the test pit location is shown on Figure 5.5.5-1b (SWMU-5 SP-1). The soil samples were analyzed for general and site-specific parameters (fluoride, elemental phosphorus, total phosphorus) and total metals (*see* Tables 5.5.4-1 and 5.5.4-2, respectively). The soil samples were also analyzed in the field according to the XRF screening and confirmatory analytical program (*see* Section 5.4.2).

Soil data from SWMU 5 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).

5.5.5.2.1 General Chemistry

The general chemistry data are presented in Table 5.5.5-1 and shown in Figure 5.5.5-3. Fluoride was detected in both soil samples with a maximum concentration of 12.3 mg/kg. Fluoride concentrations are consistent with background/reference area concentrations. Elemental phosphorus was not detected (DL = 0.000015 mg/kg) in the soil samples. Total phosphorus was detected in both soil samples with a maximum concentration of 25,800 mg/kg. The mean total phosphorus concentration in Silver Bow County is 880 mg/kg (USGS, 2012).

5.5.5.2.2 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 for the respective metals. The correlation coefficient (R^2) is greater than 0.7 for these metals. The 2012 metals data for SWMU 5 are presented in Table 5.5.5-2 and includes both laboratory and XRF (field) data. The 2012 XRF evaluations provided correlated data for arsenic, cadmium, chromium, lead, manganese, selenium, silver, uranium, vanadium and zinc.

The total metals soil data are presented in Table 5.5.5-2 and the 0-2 inch and the 2-12 inch interval data are shown on Figures 5.5.5-4 and 5.5.5-5, respectively. Antimony, arsenic, barium, cobalt, copper, iron, lead, magnesium, manganese and mercury concentrations are consistent with background/reference area concentrations. The mean and maximum concentrations of beryllium, cadmium, calcium, chromium, nickel, potassium, selenium, silver, sodium, thallium, uranium, vanadium and zinc exceeded their respective mean and maximum concentrations in the background data set and are considered above background.

5.5.5.3 Conclusions

The following conclusions were developed based on review of the information presented in this section:

- The few used carbon blocks present in the SWMU were tested to demonstrate the carbon pieces were not ignitable and were recycled.
- The new and used carbon blocks were recycled by Pamas and Company in Elberton, Georgia.
- EPA approved the Completion Report in a letter dated May 15, 2009 signifying that corrective measures under the 7003 Order are complete.
- The groundwater quality dataset for SWMU 3 (*see* Section 5.5.3.5) demonstrates that there are no significant groundwater impacts related to the former storage area of new and used carbon blocks and new carbon bricks in SWMU 5.
- SWMU 5 soil sampling identified total phosphorus concentrations above the mean concentration reported for Silver Bow County.
- Surface soil sampling in SWMU 5 indicated the following metals are above background concentrations: beryllium, cadmium, calcium, chromium, nickel, potassium, selenium, silver, sodium, thallium, uranium, vanadium and zinc.

There is sufficient information to conduct the risk assessment for SWMU 5. The risk assessment will identify which parameters, if any, are present at concentrations that warrant corrective measures. The dataset will 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.

5.5.5.4 References

Rhodia, 2009. Rhodia's Completion Report Used Carbon and Electrode Project, Silver Bow, Montana, April 9, 2009.

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.

U.S. Geological Survey, 2012. Average concentrations of elements in Silver Bow County, Montana. Open-File Report 2004-1001. Accessed December 11, 2012, at http://mrdata.usgs.gov/geochem/county.php?place=f30093&el=P&rf=northwestern

Tables

Table 5.5.5-1
Soil Data - General and Site Specific Parameters
SWMU 5
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name				Fluoride	Phosphorus, elemental (white)	Phosphorus, total
Background Mean, Exceedances **Bold**				**4.1**		
Background Maximum, Exceedances Underline				37		
Background 95% UCL, Exceedances *Italic*				*7.6*		
Location ID	**Sample Date**	**Depth**	**Sample Type**			
SWMU-5 SP-1	10/02/2012	0 - 2 in	N	***8.95***	< 0.000015	25800
SWMU-5 SP-1	10/02/2012	2 - 12 in	N	***12.3***	< 0.000015	14200

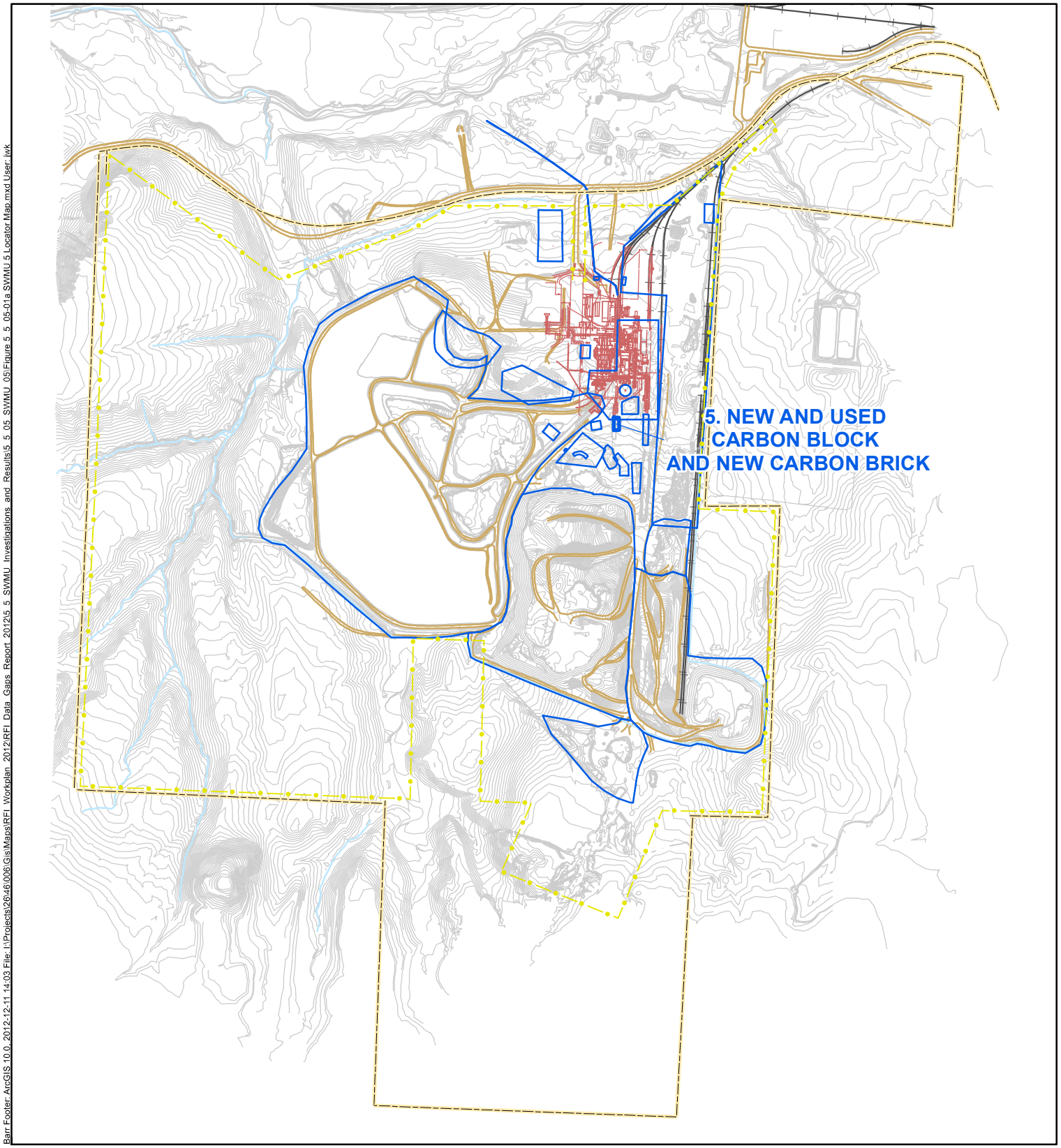
Table 5.5.5-2
Soil Data - Metals
SWMU 5
Rhodia Silver Bow Plant
[concentrations in mg/kg]

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	Nickel Lab	Potassium Lab	Selenium Lab	Selenium Field	Silver 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**	**5.3**	**3000**	**0.41**	0.41	**0.73 (1)**
Background Maximum, Exceedances Underline				3.9	120	120	290	1.3	8.9	8.9	14000	48	48	9.5	301	35300	190	190	5700	1100	1100	0.20	21	5300	0.70	0.70	1.7 (1)
Background 95% UCL, Exceedances *Italic*				*1.0*	40	40	*170*	*0.55*	*1.1*	*1.1*	*4500*	*12*	*12*	6.1	*64*	20600	*35*	*35*	*3700*	570	570	*0.038*	*6.0*	*3200*	*0.47*	0.47	*0.35 (1)*
Location ID	**Sample Date**	**Depth**	**Sample Type**																								
SWMU-5 SP-1	10/02/2012	0 - 2 in	N	***1.99***	5.03	--	***188***	***2.05 J***	***28.96***	--	***242000***	***185***	--	1.35 J	***157***	11200	***74.4 J***	--	***5230***	195	--	***0.054***	***26.4***	***6900***	***4.1***	--	***10.1***
SWMU-5 SP-1	10/02/2012	2 - 12 in	N	0.258	2.36	--	***243***	***2.59 J***	***17.92***	--	***310000***	***192***	--	< 0.98	10.6	1200	8.3 J	--	***4560***	135	--	0.012 J	***9.11 J***	***8160***	***3.4***	--	***2.6 J***
SWMU-5 SP-1	10/05/2012	0 - 2 in	N	--	--	< 17.10	--	--	--	***19.84 J***	--	--	***181.15 J***	--	--	--	--	***52.25 J***	--	--	228.89 J	--	--	--	--	< 0.7 J	--
SWMU-5 SP-1	10/05/2012	2 - 12 in	N	--	--	< 16.17	--	--	--	***21.75 J***	--	--	***246.31 J***	--	--	--	--	***41.28 J***	--	--	95.10	--	--	--	--	< 0.7 J	--
			FD	--	--	< 15.98	--	--	--	***20.76 J***	--	--	***249.25 J***	--	--	--	--	***36.77 J***	--	--	81.69	--	--	--	--	< 0.7 J	--

Table 5.5.5-2
Soil Data - Metals
SWMU 5
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name / Analysis Location				Silver Field	Sodium Lab	Thallium Lab	Uranium Lab	Uranium Field	Vanadium Lab	Vanadium Field	Zinc Lab	Zinc Field
Background Mean, Exceedances **Bold**				**0.73 (1)**	**140**	**0.35**	**1.8**	**1.8**	**41**	**41**	**59**	**59**
Background Maximum, Exceedances Underline				1.7 (1)	620	1.0	4.1	4.1	83	83	380	380
Background 95% UCL, Exceedances *Italic*				*0.35 (1)*	*220*	*0.46*	*2.0*	*2.0*	*43*	*43*	*98*	*98*
Location ID	**Sample Date**	**Depth**	**Sample Type**									
SWMU-5 SP-1	10/02/2012	0 - 2 in	N	--	***3340***	***2.230***	***97.7***	--	***213***	--	***1590***	--
SWMU-5 SP-1	10/02/2012	2 - 12 in	N	--	***3730***	***0.485***	***138***	--	***187***	--	***280***	--
SWMU-5 SP-1	10/05/2012	0 - 2 in	N	***14.30 J***	--	--	--	***77.14 J***	--	***232.95***	--	***1765.82 J***
SWMU-5 SP-1	10/05/2012	2 - 12 in	N	***9.12 J***	--	--	--	***117.02 J***	--	***275.28***	--	***991.70 J***
			FD	***9.20 J***	--	--	--	***110.52 J***	--	***279.02***	--	***941.02 J***

Figures



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SWMU 5
Other SWMUs
Elevation Contour
Drainage
Railroad
Road
Former Plant Structures
Fence Line
Property Boundary

N

Feet
1,000 0 1,000

Figure 5.5.5-1a

SWMU 5 LOCATION
Rhodia Silver Bow Plant
Montana

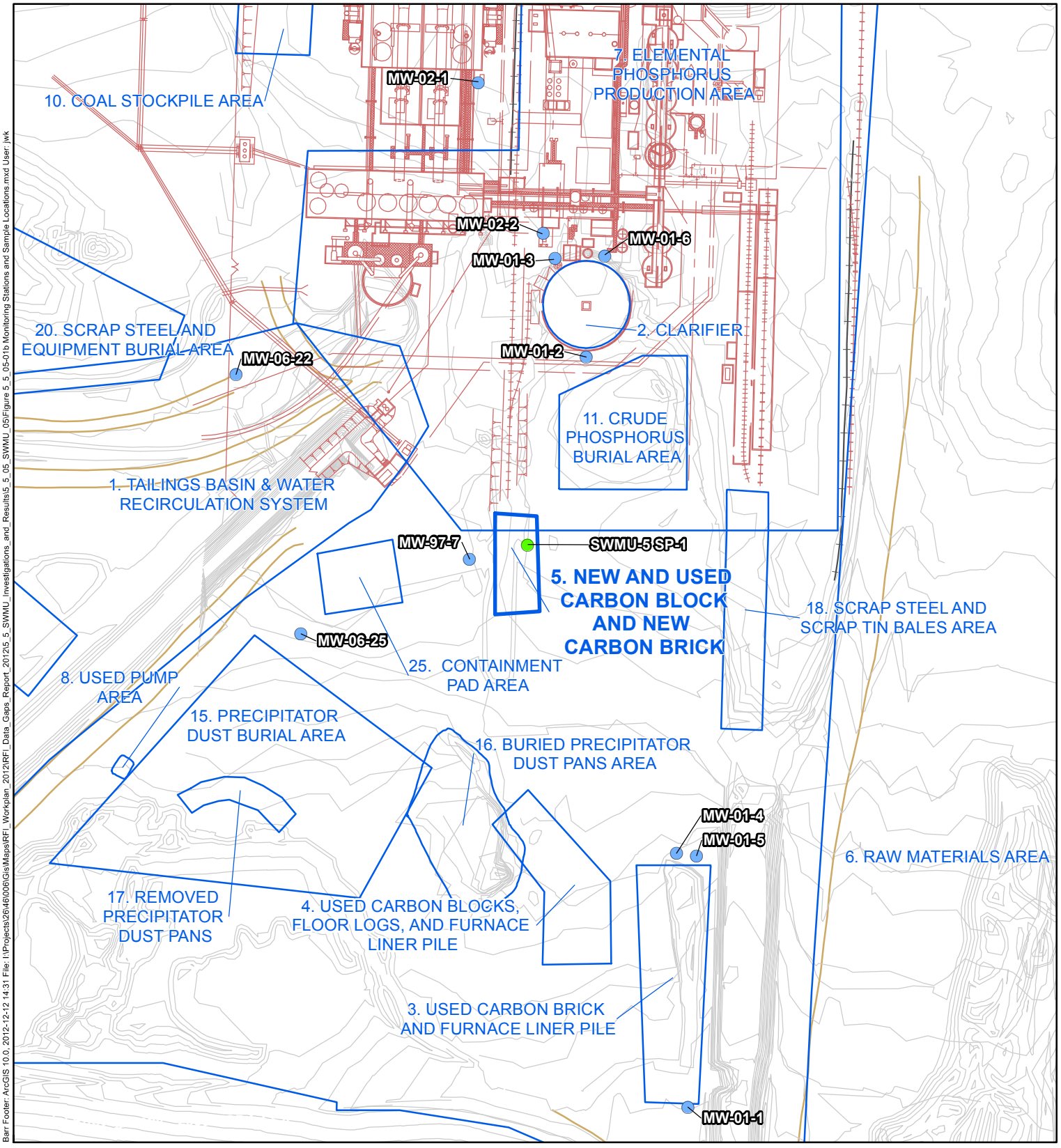
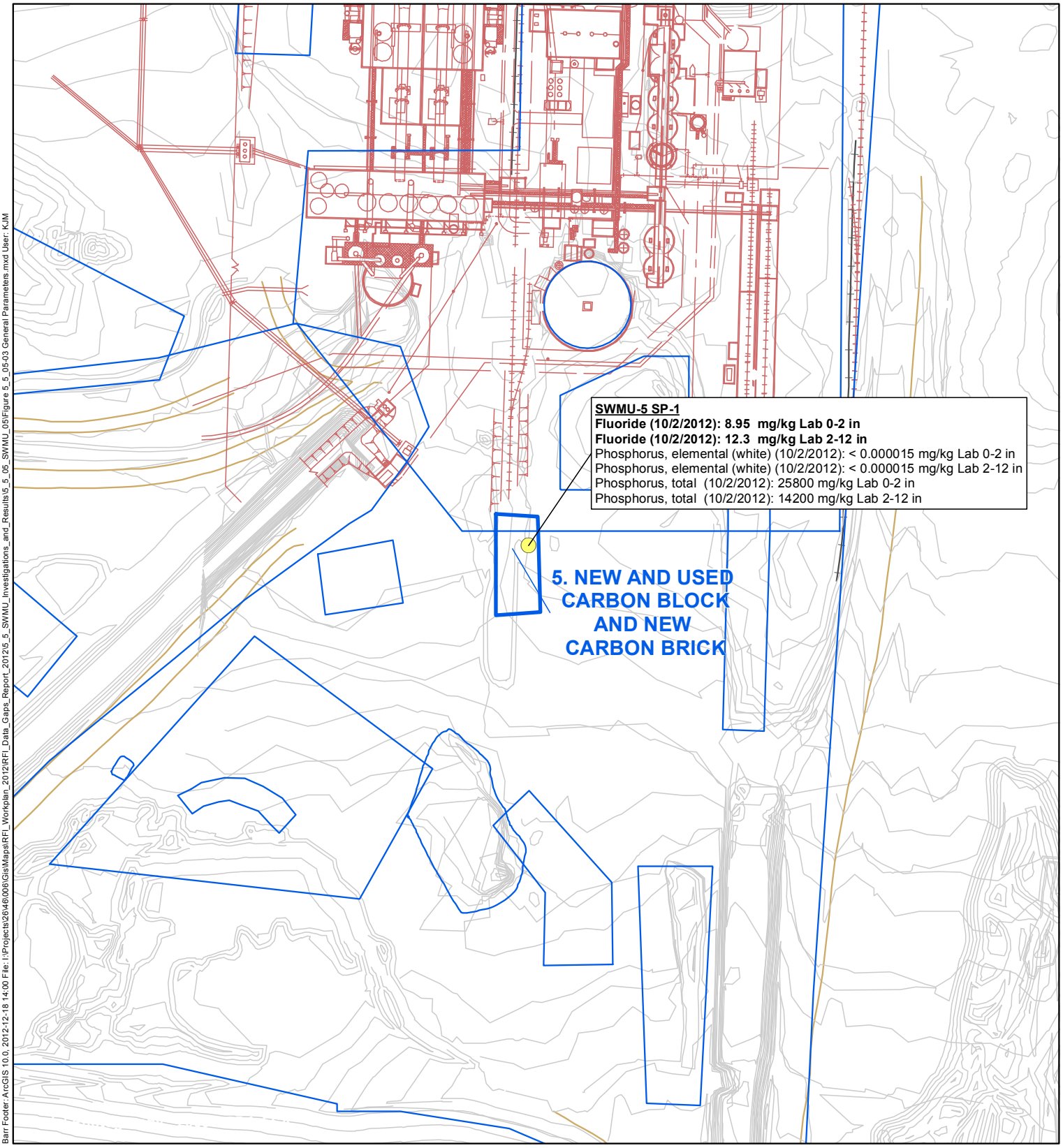


Figure 5.5.5-1b

SWMU 5
MONITORING STATIONS
AND SAMPLE LOCATIONS
Rhodia Silver Bow Plant
Montana

Figure 5.5.5-2
Photographs of New Carbon Brick in SWMU 5
Rhodia Silver Bow Plant



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- Sample Location
- SWMU 5
- Other SWMUs
- 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.

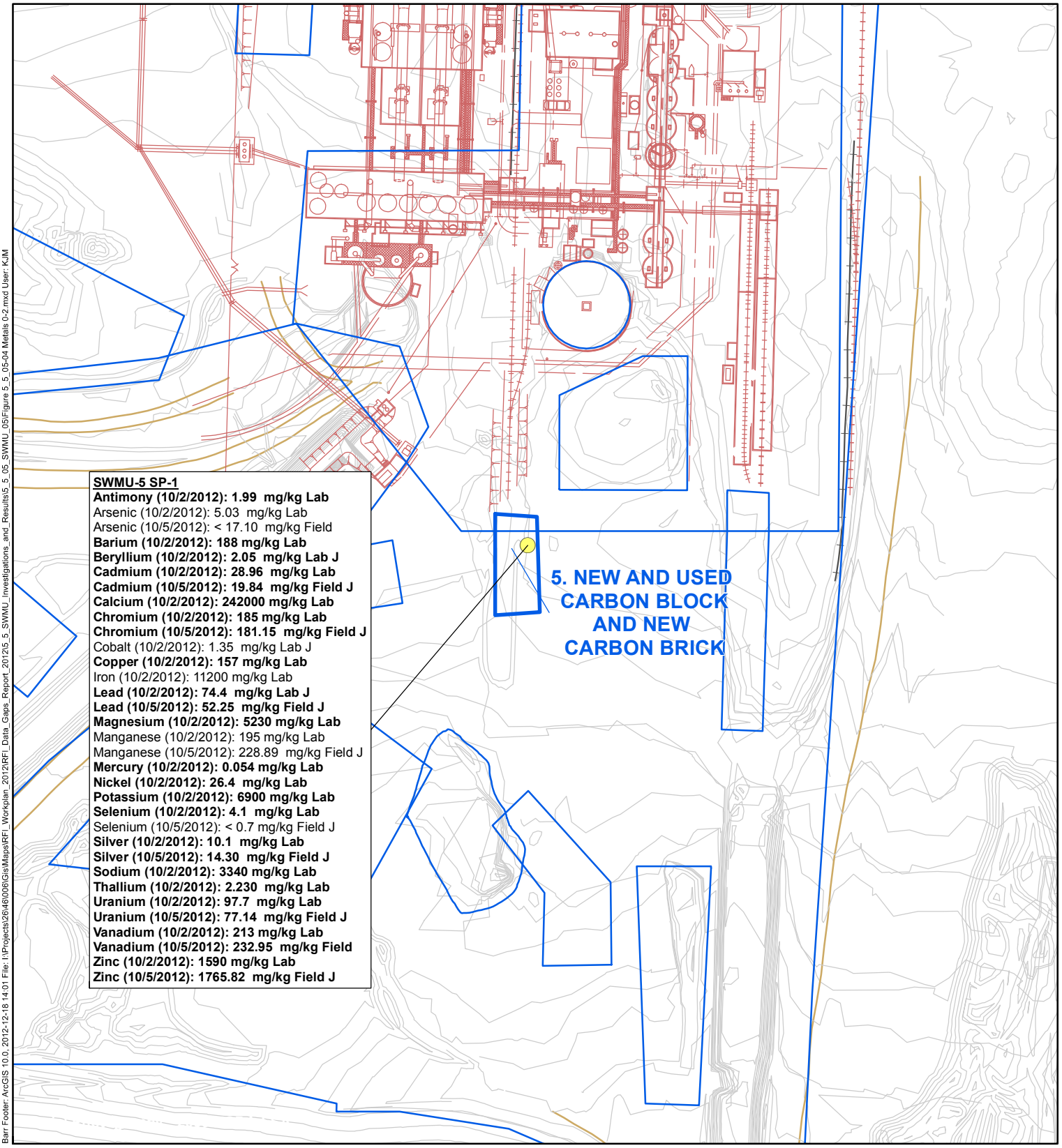
N

Feet

150 0 150

Figure 5.5.5-3

SWMU 5
GENERAL PARAMETERS
Rhodia Silver Bow Plant
Montana



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Sample Location
SWMU 5
Other SWMUs
Elevation Contour
Drainage
Railroad
Road
Former Plant Structures

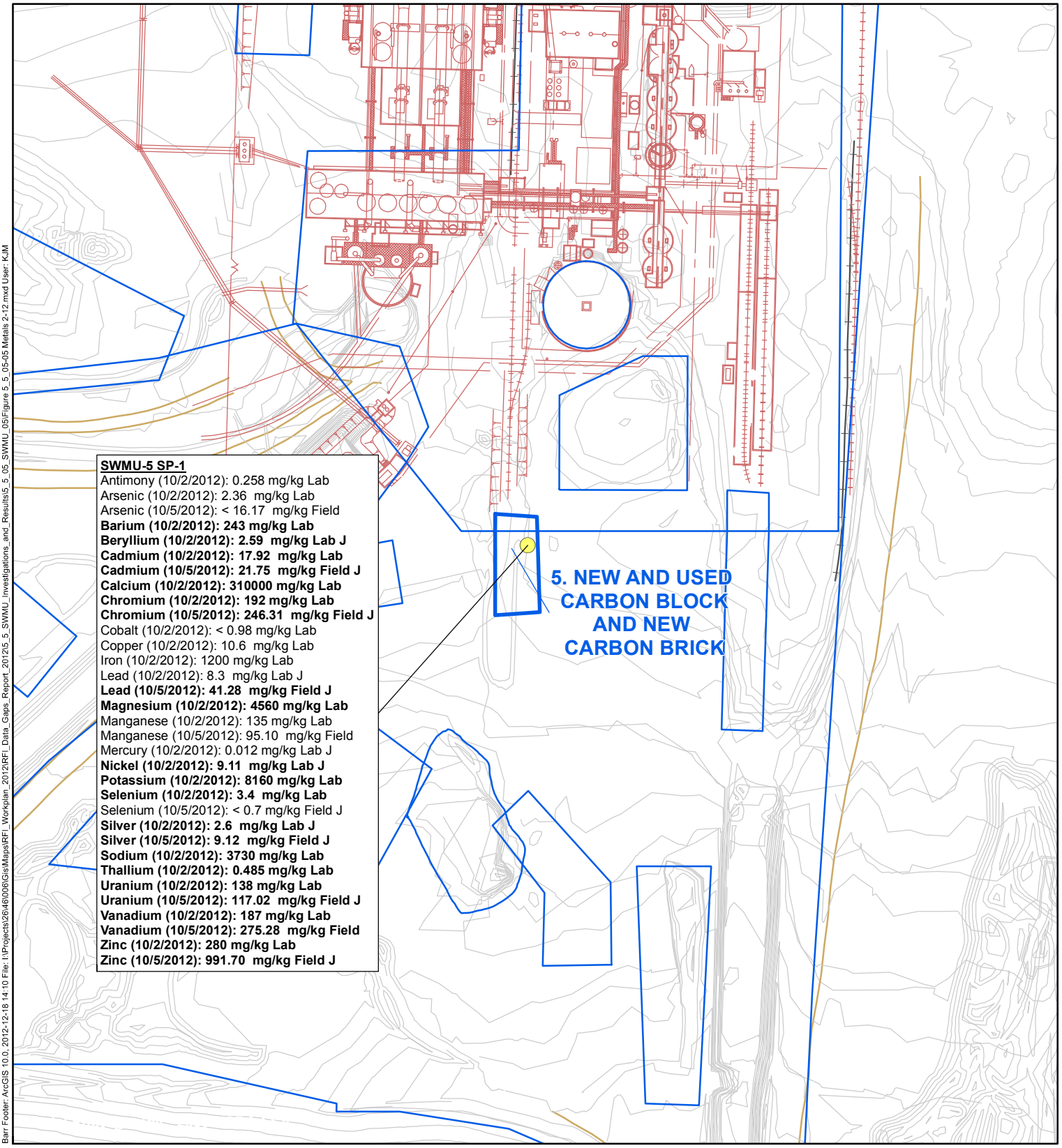
Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

N

Feet
150 0 150

Figure 5.5.5-4

SWMU 5
METALS, 0-2 INCHES
Rhodia Silver Bow Plant
Montana



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Sample Location
SWMU 5
Other SWMUs
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
150 0 150

Figure 5.5.5-5

SWMU 5
METALS, 2-12 INCHES
Rhodia Silver Bow Plant
Montana

Appendices

Appendix 5.5.5-A

Test Pit Log

PROJECT NO. 26460006

TEST PIT NO. SWMU-5 SP-1 SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT Rhodia RFI LOCATION SWMU-5 Carbon Block/Brick MAP OF N WALL OF PIT

ELEVATION N/A CONTRACTOR MT Reclamation & Landscaping DATE EXCAVATED 10/2/12

WATER LEVEL AND DATE N/A - Dry EXCAVATION METHOD Backhoe LOGGER BJL2

APPROXIMATE DIMENSIONS LENGTH 4' WIDTH 2' DEPTH 2' REMARKS

ELEVATION | DEPTH BELOW SURFACE ( ) | SAMPLE: INTERVAL, TYPE AND NUMBER

0

0" 2" SWMU-5 SP-1 (0-2)

1

12" SWMU-5 SP-220 (0-2) [field blank]

2

SWMU-5 SP-1 (2-12)

0-24": Gray slag. Varies from small cobbles to large gravel. Sand and fines is likely pulverized slag.

g/s/f

7/20/10

0 1 2 3 4

LENGTH

COMMENTS

All material in excavation appears to be non-native.

Sample collected at 15:30 SWMU-5 SP-1 (0-2)

Sample collected at 15:45 SWMU-5 SP-220 (0-2) [field blank]

Sample collected at 16:00 SWMU-5 SP-1 (2-12)

Appendix 5.5.5-B

2012 XRF Data

Appendix 5.5.5-B - XRF Instrument Concentrations

Element	SWMU-5 SP-1 0-2 in			SWMU-5 SP-1 2-12 in			SWMU-5 SP-1 2-12 in R		
	Concentration	Instrument		Concentration	Instrument		Concentration	Instrument	
		Reading	2σ		Reading	2σ		Reading	2σ
Molybdenum	8 J	8.09	5	11 U	< LOD	7.58	12 U	< LOD	7.76
Zirconium	235	235.18	12.47	213	212.82	12.77	234	234.17	13.18
Strontium	763	763.35	16.09	913	912.62	17.86	928	928.47	18.11
Uranium	94	93.75	14.05	135	134.87	15.5	128	128.16	15.51
Rubidium	51	51.4	6.27	24 J	23.57	5.84	29 J	29.4	6.03
Thorium	12 J	11.75	6.63	14 U	< LOD	9.13	14 U	< LOD	9.28
Lead	75	75.19	10.86	61	61.13	10.23	55	55.35	9.94
Selenium	8 J	7.55	4.36	9 J	9.27	4.58	9 J	8.66	4.52
Arsenic	20 U	< LOD	13.54	19 U	< LOD	12.58	19 U	< LOD	12.39
Mercury	22 U	< LOD	14.68	22 U	< LOD	14.52	22 U	< LOD	14.71
Zinc	2299	2299.49	63.92	1341	1341.09	49.9	1277	1276.93	48.97
Tungsten	177 U	< LOD	118.18	168 U	< LOD	111.83	165 U	< LOD	109.98
Copper	120 J	119.58	24.66	55 J	55.23	22.07	56 J	55.72	22.23
Nickel	117 J	116.66	48.35	100 J	99.79	48.28	83 J	82.64	47.52
Cobalt	256 U	< LOD	170.72	140 U	< LOD	93.34	138 U	< LOD	92
Iron	21325	21325.35	350.15	5403	5403.02	181.33	5677	5677.45	186.65
Manganese	325 J	325.19	71.93	147 J	146.8	55.39	129 J	128.92	53.79
Chromium	282	281.89	22.6	361	361.35	22.31	365	364.94	22.24
Vanadium	235	235.3	32.63	264	263.52	29.03	266	266.01	28.76
Titanium	1434	1434.19	98.95	878	877.95	85.4	896	895.95	84.43
Scandium	517 J	516.84	160.91	568 J	568.14	184.76	526 J	525.55	184.55
Calcium	140670	140670.48	876.23	205951	205951.19	1011.65	206070	206069.7	1011.86
Potassium	13365	13365.23	444.36	9544	9544.27	397.22	9497	9496.53	396.72
Sulfur	1754 U	< LOD	1169.09	1863 J	1863.15	878.05	1883 U	< LOD	1255.55
Barium	663	663.2	41.66	621	621.21	42.34	679	679.37	43.71
Cesium	135	135.44	11.4	121	120.89	11.61	144	143.78	11.99
Tellurium	217	217.34	36.1	239	239.02	37.15	244	244.19	38.04
Antimony	52 J	51.61	13.26	55 J	55.31	13.61	72	72.38	14.13
Tin	67	67.08	11.81	56 J	55.62	11.91	79	78.64	12.49
Cadmium	40 J	39.84	8.47	42 J	41.75	8.69	41 J	40.76	8.86
Silver	26 J	25.98	6.31	20 J	20.02	6.27	20 J	20.12	6.41
Palladium	16 J	16.21	8.09	21 J	20.77	8.44	21 J	20.83	8.64