

Section 5.2 Sediment

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5.2 Sediment

5.2.1 Sediment Investigations Prior to RFI

U.S. EPA Region 8 authorized Booz Allen Hamilton (Booz Allen) to conduct an Expanded Site Investigation (ESI) at the Silver Bow Plant in 2003 (Booz Allen, 2004). The purpose of the ESI was to gather new data and update existing data for re-evaluating the Rhodia site with respect to U.S. EPA's Hazard Ranking System criteria.

Booz Allen conducted a field program to collect samples of onsite wastes, and onsite and offsite groundwater, surface water and sediment, and surface soils. The field work was conducted from July 15 to July 24, 2003. The sediment sampling portion of the ESI included the collection of eight (8) surface water/sediment sample pairs and a field duplicate (ESI-SBC-1S, ESI-SBC-2S, ESI-SBC-3S, ESI-SBC-4S, ESI-SBC-5S, ESI-SBC-6S, ESI-SG-3S, ESI-BP-1S and ESI-BP-2S). Only ESI-SG-3S, ESI-BP-1S and ESI-BP-2S (duplicate of ESI-BP-1S) were collected from Sheep Gulch or the on-site beaver ponds (Booz Allen, 2004). The analytical results from these samples are included in Section 5.2.3. The other samples (ESI-SBC-1S, ESI-SBC-2S, ESI-SBC-3S, ESI-SBC-4S, ESI-SBC-5S, ESI-SBC-6S) were collected from Silver Bow Creek prior to the remedial actions implemented for the SSTOU superfund site and as such, are no longer representative of current conditions in Silver Bow Creek.

5.2.2 2008 RFI Sediment Investigation

The 2008 sediment investigation was designed to characterize sediment along Sheep Gulch and the beaver ponds at the Silver Bow Site. U.S. EPA/MDEQ and Rhodia reached agreement on the scope of the sediment sample program during an August 29, 2008 meeting. The RFI Work Plan (2009) describes the scope of work completed in 2008. The rationale for sediment quality monitoring stations is provided in Table 5.2-1. Sediment samples were collected from the 0- to 10-centimeter depth interval during the fall 2008 field mobilization (September 16, 2008 through September 21, 2008). Sediment samples were analyzed for elemental phosphorus, general chemistry, total metals, SVOCs, VOCs, and radionuclides. Figures 5.2-1a and 5.2-1b show the sediment sampling locations. Sediment samples were collected at the same locations as the surface water samples.

Sediment samples were collected along Sheep Gulch (SD-20, SD-8, SD-1, SD-3, SD-4, SD-6, SD-13,); in one of the beaver ponds (SD-5); and in surface water pathways that have flow during runoff events (SD-18, SD-19, SD-9, SD-2). Of these locations, SD-1, SD-3, SD-4, SD-5, SD-6, SD-8, SD-13, SD-20 were saturated with water, while locations SD-9, SD-2, SD-18, SD-19 were dry. No sediment samples were collected from Silver Bow Creek.

Sediment was sampled in saturated locations and SW-18 using a piston-tube corer in accordance with the SOP for Sediment Sample Collection, included in the Field Sampling Plan (Appendix D of the Final Phase 1 RFI Work Plan). In these locations, an aluminum tube with a rubber piston at the tube base was pushed into sediment to a depth of 10 cm as the piston was held at the surface of the sediment. The tube containing the sample was then pulled up and the sediment was either extruded or shaken into a stainless steel bowl. In order to obtain sufficient sample volume for laboratory analysis, multiple cores were collected at each location. The first core was sampled for VOCs and subsequent cores were taken near the first core and homogenized. The homogenized sediment was used to fill sample jars for the analysis of SVOCs, total metals, general chemistry, radionuclides, and elemental phosphorus.

A hand auger was used to collect sediment samples from three dry locations (SD-2, SD-9, and SD-19). This modification from the work plan was communicated to the U.S. EPA by email on Sept. 22, 2008. The hand auger was advanced to a mark placed 10 cm from the base of the barrel. The 10 cm did not include the auger teeth, and soil in the teeth was removed and discarded when brought to the surface. Soil from the first barrel was removed and placed in a stainless steel bowl and the VOC sample was packaged. Subsequent 0-10 cm cores were placed in the same stainless steel bowl, homogenized and sampled for the analysis of SVOCs, total metals, general chemistry, radionuclides, and elemental phosphorus.

5.2.3 2012 RFI Sediment Investigation

The 2012 investigation was designed to further characterize sediment in the beaver ponds at the Silver Bow Site (*see* Figure 5.2-1b). Three sediment samples were collected from the center pond, and two sediment samples were collected from each of the other three ponds (aka, southern, eastern and northern beaver pond) for a total of nine additional sediment samples (Figure 5.2-1b). Sediments were collected from a depth of 0 to 10 cm using a piston-tube corer. Sediment samples were analyzed for general chemistry, total metals, radiological parameters, and total phosphorus. Total organic carbon (TOC), pH, acid volatile sulfide (AVS)/simultaneously extracted metals (SEM) and grain size were also measured to assess the bioavailability of inorganic constituents from the sediment. Work was completed in accordance with the October 2012 RCRA Facility Investigation Work Plan (Barr 2012).

Water quality data was collected at each sediment sample location prior to sample retrieval. This data is presented in Section 5.1 of this report.

5.2.4 Sediment Investigation Results

The sediment investigation was designed to evaluate sediment quality for:

- Background/reference areas upstream of the Silver Bow Site (stations SD-8, SD-18, SD-19, and SD-20);
- Sheep Gulch (stations SD-1, SD-3, SD-4, SD-6, SD-13, and ESI sample ESI-SG-3S);
- Surface water pathways (i.e., contributory dry gulches) that channel flow to Sheep Gulch during run-off events (SD-2 and SD-9); and
- Beaver ponds (stations SD-5, and SD-21 through SD-29). The location ID SD-5 also refers to ESI samples ESI-BP-1S (taken 7/22/2003) and ESI-BP-2S (Field Duplicate taken 7/22/2003), which were collected from the same location as the 2008 sample.

Sample locations are shown in Figures 5.2-1a and 5.2-1b. The analytical data for the sediment stations along Sheep Gulch were compared to background values. Background values were determined from areas of Sheep Gulch upstream of the Silver Bow Site (stations SD-8, SD-18, SD-19, and SD-20, *see* Figure 5.2-1a) as discussed in Section 4.2 – Upstream Sediment Quality. 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). Site sediment analytical data and comparison tables are provided in Tables 5.2-2 to 5.2-6.

There is no known release of organic compounds to the sediments of Sheep Gulch even though trace levels of certain organic compounds were detected in most sediment samples (*see* Tables 5.2-4 and 5.2-5). Nearly all detected concentrations are J-qualified indicating that the concentrations are estimated, and those concentrations are near the method detection limit. There is no consistent pattern to the detected compounds that would indicate a release from the Silver Bow Plant. In addition, many of these parameters are common laboratory contaminants and are most likely the result of laboratory methods.

The reported 1 mg/kg p-cresol at SD-13 (which is located in the SSTOU) is the highest reported sediment concentration for this parameter by more than an order of magnitude (*see* Table 5.2-4). No upstream samples suggest an on-site source of this parameter from site sediments, so p-cresol is not a site-related constituent for the Silver Bow Plant.

Carbon disulfide was reported in samples along Sheep Gulch including upstream and downstream locations (*see* Table 5.2-5). Higher concentrations were reported in samples collected near the wetland areas (i.e., SD-1, SD-6 and SD-13). Carbon disulfide is ubiquitous throughout the environment and is produced naturally by sediment microorganisms (Concise International Chemical Assessment Document 46; http://www.who.int/ipcs/publications/cicad/cicad46_rev_1.pdf). Carbon disulfide may also be a laboratory contaminant. Since carbon disulfide is not associated with elemental phosphorus production and the higher concentrations are reported in sediments near the wetland areas, an onsite release is not indicated. From review of the data, we can conclude that none of these organic parameters are constituents of interest for the Silver Bow Site. The VOC and SVOC concentrations were not plotted on maps because these parameters were not detected in sufficient samples to gain any insight from a graphical presentation.

5.2.4.1 Sheep Gulch Sediment Quality

Sediment samples were collected at locations corresponding to the surface water locations (*see* Figure 5.2-1a) along Sheep Gulch (SD-1, SD-3, SD-4, SD-6, and SD-13) between September 18 and September 20, 2008. The analytical results of these samples and relevant samples from the ESI are summarized in Tables 5.2-2 to 5.2-6. Figures 5.2-2 through 5.2-9 depict the spatial distribution of sampled Sheep Gulch constituents.

5.2.4.1.1 General & Site-specific Parameters

The analytical results for the general and site-specific parameters included in the Sheep Gulch sediment sampling stations and the upstream data set for Sheep Gulch are summarized in Table 5.2-2. The background reference area maximum detected concentrations or the maximum detection limit for each parameter are included in the table for comparison purposes (background concentrations). As shown in Table 5.2-2, chloride, fluoride, ammonia (NH₃ as N), total phosphorus and sulfate exceed background concentrations for samples collected at sampling stations on Sheep Gulch (SD-1, SD-3, SD-4, SD-6 and SD-13). Spatial distribution of the general and site-specific parameters sampled in Sheep Gulch is presented on Figure 5.2-2.

Chloride concentrations in sediments along Sheep Gulch (SD-1, SD-3, SD-4, SD-6 and SD-13) exceed background concentrations and generally increase from station SD-3 (56.7 mg/kg) to SD-13 (605 mg/kg). The sample from station SD-1 had a chloride concentration of 359 mg/kg.

Fluoride concentrations in sediments along Sheep Gulch (sample locations SD-1, SD-3, SD-4, SD-6 and SD-13) were generally higher in samples taken to the northwest of the tailings basin (SD-4, SD-6 and SD-13). The fluoride concentrations are biased high since the laboratory did not use the proper

extraction method. The Bellack method is a more aggressive extraction method that produces higher fluoride concentrations. Comparison of the fluoride concentrations in the 2003 and 2008 samples from SD-5 suggests the concentrations produced by the Bellack method are about two orders of magnitude higher. Since the 2008 sample were analyzed by the same technique, the trends seen in the fluoride data are expected to be appropriate.

Ammonia concentrations are above the background concentration only in the sample from station SD-1. All other sediment samples had ammonia concentrations below the background concentration of ammonia.

The highest concentration of total phosphorus was measured in the sample from SD-4 (11,300 mg/kg). The second highest concentration of total phosphorus was measured in the sample from the next station downstream, SD-6 (4,870 mg/kg). Sediment samples from other stations on Sheep Gulch (SD-1, SD-3, SD-13 and ESI-SG-3S) were similar to each other, ranging from 667 mg/kg (SD-3; lower than background) to 1,630 mg/kg.

Sulfate concentrations were above the background concentration in the sample from SD-1 and in samples from downstream of the beaver pond (SD-6 and SD-13). Concentrations of sulfate in samples from other Sheep Gulch samples (SD-3 and SD-4) were below background concentrations.

Elemental phosphorus was not detected in the sediment samples collected along Sheep Gulch including location SD-13, near where a sample collected in 2003 (ESI-SG-3S) contained a trace level of elemental phosphorus. Therefore, the detected concentration for ESI-SG-3S is likely a false positive value since the concentration could not be confirmed through resampling.

Chloride, fluoride, ammonia, total phosphorus and sulfate are present in sediment samples at concentrations above the background sediment concentrations. These parameters may be elevated due to prior seepage of process water from the tailing basin. Ammonia exceeds background at only one station (SD-1). Elemental phosphorus was not detected in the sediment samples collected in fall 2008. The elemental phosphorus concentration in ESI-SG-3S was not confirmed though resampling and is considered a false positive value.

5.2.4.1.2 Metals

Spatial distribution of metals concentrations sampled in Sheep Gulch is presented on Figures 5.2-3 to 5.2-8 and the analytical data are summarized in Table 5.2-3 which also includes the background

reference area concentrations for comparison. For ease of discussion, and to more clearly present the spatial distribution of the data, the analyzed metal parameters were divided into subgroups.

5.2.4.1.2.1 Group A

Group A metals parameters include: arsenic, cadmium, chromium, and copper and are included in Table 5.2-3. The spatial distribution of the Group A metals sampled in Sheep Gulch are presented on Figure 5.2-3.

Arsenic concentrations in sediments collected in 2008 along Sheep Gulch (Sample locations SD-1, SD-3, SD-4, SD-6 and SD-13) range from 3.6 mg/kg to 12.4 mg/kg for samples collected at SD-3 and SD-4 respectively. The data for arsenic concentrations in the sediments along Sheep Gulch do not show a trend and the on-site sediment stations do not exceed the background/reference area concentration of 14.2 mg/kg. This included sample SD-13, near where a sample collected in 2003 (ESI-SG-3S) contained arsenic at 28.6 mg/kg. SD-13 and ESI-SG-3S are located within the SSTOU Superfund site, and the primary sediment contaminants of concern for the SSTOU include arsenic cadmium, copper, lead, mercury and zinc (Bighorn, 2010). The concentrations of each of these SSTOU parameters is higher in the SD-13 sample than in the final site sample upstream, SD-6 (*see* Table 5.2-3), strongly indicating SSTOU influence on the SD-13 sediment sample. In addition, ESI-SG-3S was collected prior to the implementation of the SSTOU remedy. The remedy may have reduced the arsenic concentration by a factor of two.

Cadmium, chromium and copper each exceeded sediment background concentrations in Sheep Gulch samples. Cadmium concentrations increase between sediment sampling stations SD-1 (1.86 mg/kg) and SD-6 (23.1 mg/kg) with a sharp increase at SD-4. This increase may be related to Silver Bow Site tailing that was placed on the outside of the dike along the western side of the basin and not covered or revegetated. However, a dike was constructed at the base of the slope to contain surface erosion of the tailing. The cadmium concentration reported for sample SD-1 (1.86 mg/kg) is above the background/reference area concentration (1.47 mg/kg) by less than a factor of two. The remaining samples from Sheep Gulch (SD-3, SD-4, SD-6, SD-13 and ESI-SG-3S) are above the background/reference area concentration for cadmium.

SD-13 and ESI-SG-3S are located within the SSTOU Superfund site, and the primary sediment contaminants of concern for the SSTOU include arsenic cadmium, copper, lead, mercury and zinc (Bighorn, 2010). The concentrations of each of these SSTOU parameters is higher in the SD-13 sample than in the final site sample upstream, SD-6 (*see* Table 5.2-3), strongly indicating SSTOU influence on the SD-13 sediment sample.

The sediment sample collected at SD-1 contained concentrations of copper above the background/reference area concentration. With the exception of station SD-13, samples from other downstream sediment locations (SD-3, SD-4, SD-6 and ESI-SG-3S) did not exceed the background/reference area concentration of copper. As discussed in the previous paragraph, the SD-13 sediment sample may be influenced by the SSTOU. Copper is also not associated with operations on the Rhodia site. For these reasons, the copper concentrations in Sheep Gulch above the sediment background/reference area concentration are not considered evidence of site influence on sediment.

The sediment samples collected at SD-1, SD-6, and SD-13 contained concentrations of chromium above the background/reference area concentration. Samples from other downstream sediment locations, SD-3, SD-4 and ESI-SG-3S (J-qualified, indicated estimated value), did not exceed the background/reference area concentration of chromium. The spatial distribution of chromium in Sheep Gulch samples, depicted on Figure 5.2-3, does not show an apparent pattern to the distribution.

5.2.4.1.2.2 Group B

Group B metals include: iron, lead, manganese, and nickel and are included in Table 5.2-3. The spatial distribution of the Group B metals sampled in Sheep Gulch is presented on Figure 5.2-4. Iron and lead concentrations are consistent with background concentrations.

Sediment background concentrations for manganese and nickel were exceeded for samples collected at various sample stations. Manganese exceeds the background/reference area concentration only at station SD-4. The sediment samples collected at SD-1, SD-4 and SD-13 contained concentrations of nickel above the background/reference area concentration. The concentration of nickel reported for the sediment sample collected at offsite location SD-13 is higher than the furthest downstream onsite sediment location SD-6, and there is no pattern to the distribution of nickel in the other Sheep Gulch samples (*see* Figure 5.2-4). SD-13 is located within the SSTOU Superfund site. The nickel concentrations in samples collected at SD-3 and SD-6 were consistent with background/reference area concentration.

5.2.4.1.2.3 Group C

Group C metals parameters include: selenium, silver, uranium, vanadium, and zinc and are included in Table 5.2-3. The spatial distribution of the Group C metals sampled in Sheep Gulch is presented on Figure 5.2-5. Sediment background concentrations for selenium, silver, uranium and zinc were exceeded for samples collected at various sample stations.

Concentrations of selenium in the sediment sample collected from stations SD-1, SD-3, SD-4, SD-6 and SD-13 exceeded the sediment background/reference area concentration. For the 2003 analysis of sample ESI-SG-3S, the laboratory reporting limit/method detection limit was higher than the background concentration. Station SD-4 sediment samples had the highest concentrations of selenium (15.9 mg/kg) of the sediment samples and values generally decreased in downstream samples (SD-6 and SD-13).

Concentrations of silver and zinc for the sample collected at SD-13 were above the background/reference area concentration. SD-13 is located within the SSTOU Superfund site, and the primary sediment contaminants of concern for the SSTOU include arsenic, cadmium, copper, lead, mercury and zinc (Bighorn, 2010). The concentrations of each of these SSTOU parameters is higher in the SD-13 sample than in the final site sample upstream, SD-6 (*see* Figures 5.2-3 through 5.2-8), strongly indicating SSTOU influence on the SD-13 sediment sample.

The sediment samples collected at SD-1, SD-6 and SD-13 contained concentrations of zinc above the background/reference area concentration. The concentration of zinc reported for the sediment sample collected at location SD-1 (375 mg/kg) is higher than all the downstream sediment locations (SD-3, SD-4, SD-6 and ESI-SG-3S).

The sediment sample collected at SD-1 contained concentrations of silver above the background/reference area concentration. With the exception of station SD-13, samples from other downstream sediment locations (SD-3, SD-4, SD-6 and ESI-SG-3S) did not exceed the background/reference area concentration of silver although the exceedences are by a factor of two or less. As discussed previously, the SD-13 sediment sample may be influenced by the SSTOU. For these reasons, the silver concentrations in Sheep Gulch above the sediment background/reference area concentration are not considered evidence of site influence on sediment.

Uranium concentrations exceeded the background/reference area concentrations at Sheep Gulch sediment stations SD-1, SD-4, SD-6 and SD-13. Spatial variations are shown on Figure 5.2-5. The distribution of uranium indicates a release from the tailing basin with higher concentrations at SD-1 and SD-4 with decreasing concentrations further downstream. Higher uranium is also found in the Beaver pond (SD-5) sample (*see* Section 5.2.4.3.2.3).

Vanadium did not exceed the background/reference area concentration in Sheep Gulch samples (SD-1, SD-3, SD-4, SD-6, SD-13 and ESI-SG-3S).

Selenium, uranium, and zinc concentrations generally show higher concentrations at SD-1, SD-4, SD-6 and SD-13.

5.2.4.1.2.4 Group D

Group D metals parameters include: antimony, barium, beryllium and cobalt and are included in Table 5.2-3. The spatial distribution of the Group D metals sampled in Sheep Gulch is presented on Figure 5.2-6. Barium and cobalt concentrations are consistent with background concentrations.

Antimony concentrations in samples collected in 2008 were consistent with background concentrations. Antimony concentration in ESI-SG-3S (collected in 2003) exceeded the background antimony concentration, but the antimony concentration in SD-13 collected near sample ESI-SG-3S was consistent with background concentrations. Therefore, the data for SD-13 indicate that antimony concentrations are not elevated at this location.

Beryllium concentrations in sediment samples exceeded background/reference area concentrations at SD-1, SD-6 and SD-13. The concentrations are less than two times background/reference area concentration. Sediment samples from other Sheep Gulch stations (SD-3, SD-4 and ESI-SG-3S) were consistent with background/reference area concentrations.

Antimony, barium and cobalt concentrations are consistent with background concentrations. Beryllium is above background at SD-1, SD-6 and SD-13.

5.2.4.1.2.5 Group E

Group E metals parameters include: calcium, magnesium, potassium, and sodium and are included in Table 5.2-3. The Group E metals consist of common elements which are commonly found in sediment as well as surface water and natural soil. The spatial distribution of Group E metals sampled in Sheep Gulch is presented on Figure 5.2-7. Group E metals each exceeded sediment background concentrations in various Sheep Gulch samples.

The sediment samples collected in 2008 at the stations along Sheep Gulch contained concentrations of calcium above the background/reference area concentrations. The sample ESI-SG-3S, taken in 2003, was below the calcium background concentration. Concentrations ranged from 17,200 mg/L (at SD-13) to 45,000 mg/L (at SD-6) in Sheep Gulch, while the background/reference area concentration was 5,740 mg/L. While Sheep Gulch sample calcium concentrations are generally higher than background/reference area concentration, there is not a clear pattern to the distribution (Figure 5.2-7).

Magnesium concentrations exceeded the background concentrations at stations SD-1 and SD-13. As none of the other Sheep Gulch samples (SD-3, SD-4, SD-6 and ESI-SG-3S) exceeded the background concentrations for magnesium, the magnesium concentrations in Sheep Gulch above the sediment background/reference area concentration are not considered evidence of site influence on sediment.

Sodium concentrations in Sheep Gulch samples exceeded background concentrations only in the samples from stations SD-1 and SD-13. As none of the other Sheep Gulch samples (SD-3, SD-4, SD-6 and ESI-SG-3S) exceeded the background concentrations for magnesium, the magnesium concentrations in Sheep Gulch above the sediment background/reference area concentration are not considered evidence of site influence on sediment.

Potassium concentrations did not exceed background concentrations in any of the Sheep Gulch station's samples. Only the duplicate sample from station SD-13 had a potassium concentration slightly higher than background, the sample from that location and the sample from nearby location ESI-SG-3S did not exceed the background concentration.

5.2.4.1.2.6 Group F

Group F metals parameters include: aluminum, mercury, and thallium and are included in Table 5.2-3. The spatial distribution for Group F metals sampled in Sheep Gulch is presented on Figure 5.2-8.

Samples from SD-13 contained the highest concentrations in Sheep Gulch. SD-13 is located within the SSTOU Superfund site, and the primary sediment contaminants of concern for the SSTOU include arsenic, cadmium, copper, lead, mercury and zinc (Bighorn, 2010). The concentrations of each of these SSTOU parameters is higher in the SD-13 sample than in the final site sample upstream, SD-6 (*see* Figure 5.2-8), strongly indicating SSTOU influence on the SD-13 sediment sample.

The sediment samples collected at SD-1, SD-6, and SD-13 contained concentrations of mercury above the background/reference area concentrations. Concentrations of mercury reported for the sediment sample collected at location SD-1 are higher than the downstream sediment locations (SD-3, SD-4, SD-6 and ESI-SG-3S) and the concentration in SD-13, located offsite in the SSTOU, was higher than in any other station. The sample collected at SD-4 was below the background/reference area concentrations for mercury.

Thallium concentrations in Sheep Gulch samples exceeded background concentrations only in the samples from stations SD-1 and SD-13, but the exceedence is less than 0.03 mg/kg. As none of the other Sheep Gulch samples (SD-3, SD-4, SD-6 and ESI-SG-3S) exceeded the background concentrations for thallium, the thallium concentrations in Sheep Gulch above the sediment background/reference area concentration are not considered evidence of site influence on sediment.

Aluminum was not included on the parameter list in the Phase 1 RFI Work Plan (Barr, 2009). A sample from sheep gulch (ESI-SG-3S) taken as part of the ESI was analyzed for aluminum concentrations in 2003. The measured concentration in this sample was 8940 mg/kg. No samples of background area sediments were taken to compare with this value.

5.2.4.1.3 Radionuclides

The analytical results for radionuclides included in the Sheep Gulch sediment sampling stations and the upstream data set for Sheep Gulch are summarized in Table 5.2-6. The background reference area maximum detected concentrations or the maximum detection limit for each parameter are included in the table for comparison purposes (background concentrations). Some parameters which were not included as sampling parameters in 2008, when the background samples were collected, do not have an associated background concentration. As shown in Table 5.2-6, gross alpha, gross beta, and radium 226 exceeded background concentrations for samples collected at various sampling stations on Sheep Gulch (SD-1, SD-3, SD-4, SD-6, SD-13 and ESI-SG-3S), but concentrations were either within the error bars of the value used to determine background or were J-qualified as estimated values. Spatial distributions of the radionuclides are presented on Figure 5.2-9.

5.2.4.2 Surface Water Pathways Sediment Quality

Sediment samples were collected on September 20, 2008 at surface water pathways that have flow during runoff events (runoff pathways) (SD-2 and SD-9) at locations shown on Figure 5.2-1a and were analyzed for elemental phosphorus, general chemistry, total metals, SVOCs, VOCs, and radionuclides. The analytical data for the sediment stations at runoff pathways were compared to background values similar to other Sheep Gulch samples. Background values were determined from areas of Sheep Gulch upstream of the Silver Bow Site (SD-8, SD-18, SD-19, and SD-20) as discussed in Section 4.2 – Upstream Sediment Quality. Runoff pathways flow into Sheep Gulch and the samples used to determine background values are not upstream of the SD-2 and SD-9 stations. Because of this spatial relationship, exceedences of background values at stations SD-2 and SD-9 may not be evidence of site influence on sediment.

5.2.4.2.1 General & Site-specific Parameters

The analytical results for the general and Site-specific parameters included in the Sheep Gulch sediment sampling stations and the upstream data set for Sheep Gulch are summarized in Table 5.2-2. The background reference area maximum detected concentrations or the maximum detection limit for each parameter are included in the table for comparison purposes (background concentrations). As shown in Table 5.2-2, fluoride, nitrate + nitrite and total phosphorus exceeded background concentrations for samples collected from both stations SD-2 and SD-9.

5.2.4.2.2 Metals

Spatial distribution of metals concentrations sampled from surface water pathways are presented on Figures 5.2-3 to 5.2-8 and the analytical data are summarized in Table 5.2-3, which also includes the background reference area concentrations for comparison. For ease of discussion and to more clearly present the spatial distribution of the data, the analyzed metal parameters were divided into subgroups.

5.2.4.2.2.1 Group A

Group A metals parameters include: arsenic, cadmium, chromium, and copper and are included in Table 5.2-3. The spatial distribution of the Group A metals sampled from surface water pathways are presented on Figure 5.2-3. Concentrations of all Group A metals parameters exceeded background concentrations in samples from both stations SD-2 and SD-9.

5.2.4.2.2.2 Group B

Group B metals include: iron, lead, manganese, and nickel and are included in Table 5.2-3. The spatial distribution of the Group B metals sampled from surface water pathways is presented on Figure 5.2-4. Concentrations of lead exceeded background concentrations in samples from both stations SD-2 and SD-9. Nickel concentrations in the sample from SD-2 slightly exceeded the background concentration, while SD-9 samples did not exceed the background concentration. Iron and manganese concentrations did not exceed background concentrations at either station SD-2 or SD-9.

5.2.4.2.2.3 Group C

Group C metals parameters include: selenium, silver, uranium, vanadium, and zinc and are included in Table 5.2-3. The spatial distribution of the Group C metals sampled from surface water pathways is presented on Figure 5.2-5. Selenium, silver, and zinc concentrations exceeded background concentrations in samples from both stations SD-2 and SD-9. Uranium and vanadium concentrations exceeded the background concentration only in the runoff pathway sample from station SD-2.

5.2.4.2.2.4 Group D

Group D metals parameters include: antimony, barium, beryllium and cobalt and are included in Table 5.2-3. The spatial distribution of the Group D metals sampled from surface water pathways is presented on Figure 5.2-6. Antimony concentrations exceeded background concentration in the sample from station SD-9 but not SD-2. Beryllium concentrations exceeded background concentration in the samples from both stations SD-2 and SD-9; however these values were less than the laboratory quantitation limit and are considered estimated values. Barium and cobalt concentrations did not exceed background concentrations at either station SD-2 or SD-9.

5.2.4.2.2.5 Group E

Group E metals parameters include: calcium, magnesium, potassium, and sodium and are included in Table 5.2-3. The group E metals consist of common elements which are commonly found in sediment as well as surface water and natural soil. The spatial distribution of Group E metals sampled from surface water pathways is presented on Figure 5.2-7. Calcium, magnesium and potassium concentrations exceeded background concentrations in samples from both stations SD-2 and SD-9. Sodium concentrations did not exceed background in samples from either station SD-2 or SD-9.

5.2.4.2.2.6 Group F

Group F metals parameters include: aluminum, mercury, and thallium and are included in Table 5.2-3. The spatial distribution of Group F metals sampled from surface water pathways is presented on Figure 5.2-8. Mercury and thallium concentrations exceeded background concentrations in samples from both stations SD-2 and SD-9. Samples from SD-2 and SD-9 were not analyzed for aluminum.

5.2.4.2.3 Radionuclides

The analytical results for radionuclides are summarized in Table 5.2-6. The background reference area maximum detected concentrations or the maximum detection limit for each parameter are included in the table for comparison purposes (background concentrations). Some parameters which were not included as sampling parameters in 2008, when the background samples were collected, do not have an associated background concentration. As shown in Table 5.2-6, gross beta exceeded the background concentration for the samples collected at SD-2 and SD-9. Radium 226 also exceeded the background concentration for the samples collected at SD-2 and SD-9; however the measured values were within the analytical error of the value used to determine background. Spatial distributions of the radionuclides are presented on Figure 5.2-9.

5.2.4.3 Beaver Pond Sediment Quality

The beaver ponds consist of four interconnected surface water bodies. Two sediment samples (SD-24 & SD-25) were collected from the southern beaver pond in October 2012. Three sediment samples (SD-21, SD-22, & SD-23) were collected from the large center beaver pond in October 2012, and one sediment sample (SD-5) was collected on September 18, 2008. Two sediment samples (SD-26 & SD-27) were collected from the eastern beaver pond and two sediment samples (SD-28 & SD-29) were collected from the northern beaver pond in October 2012. The sediment sample locations are shown on Figure 5.2-1b. These samples were analyzed for elemental phosphorus, general chemistry, metals, SVOCs, VOCs, and radionuclides. A sample and a field duplicate (FD) sample were also collected from the same location as part of the ESI on July 22, 2003 and analyzed for a similar set of parameters: these samples are referred to by their location, SD-5, in Tables 5.2-2 to 5.2-6. The laboratory results for the beaver pond sediment samples were compared to the sediment background/reference area data set.

5.2.4.3.1 General & Site-specific Parameters

The analytical results for the general and Site-specific parameters are summarized in Table 5.2-2 and displayed on Figure 5.2-10. The background/reference area maximum detected concentrations or the maximum detection limit for each parameter are included in the table for comparison purposes (background concentrations). As shown in Table 5.2-2, chloride, fluoride, ammonia, total phosphorus and sulfate exceeded background concentrations for sediment samples collected from the beaver ponds. Nitrate/nitrite concentrations were consistent with background concentrations. Elemental phosphorus was not detected (DL = 0.000015 mg/kg) in the sediment samples.

5.2.4.3.2 Metals

Spatial distribution of metals concentrations in the beaver ponds are presented on Figures 5.2-11 to 5.2-16 and the analytical data are summarized in Table 5.2-3. For ease of discussion and to more clearly present the spatial distribution of the data, the analyzed metal parameters were divided into subgroups.

5.2.4.3.2.1 Group A

Group A metals parameters include: arsenic, cadmium, chromium, and copper and are included in Table 5.2-3. The spatial distribution of the Group A metals in the beaver ponds are presented on Figure 5.2-11. One or more samples from each beaver pond contained Group A metal concentrations higher than the maximum background concentrations.

5.2.4.3.2.2 Group B

Group B metals include: iron, lead, manganese, and nickel and are included in Table 5.2-3. The Group B metals spatial distribution in the beaver ponds is presented on Figure 5.2-12.

The iron concentration was above the background concentration in the samples (SD-26 & SD-27) collected from the eastern beaver pond. Manganese concentrations were consistent with the background concentrations. Lead and nickel concentrations exceeded the background concentration in one or more samples from each of the beaver ponds.

5.2.4.3.2.3 Group C

Group C metals parameters include: selenium, silver, uranium, vanadium, and zinc and are included in Table 5.2-3. The spatial distribution of the Group C metals in the beaver ponds is presented on Figure 5.2-13. Selenium, uranium, vanadium, and zinc concentrations exceeded the background concentration in one or more samples from each of the beaver ponds. Silver exceeded the background concentration in SD-26, which was collected from the eastern beaver pond.

5.2.4.3.2.4 Group D

Group D metals parameters include: antimony, barium, beryllium and cobalt and are included in Table 5.2-3. The spatial distribution of the Group D metals in the beaver ponds is presented on Figure 5.2-14. Antimony exceeds the background concentration in SD-5, which was collected from the center beaver pond. Antimony concentrations were less than the background concentration in the other four samples collected from the center beaver pond. Antimony concentrations were consistent with the background concentrations in samples collected from the other beaver ponds.

Barium exceeded the background concentration in both samples collected from the eastern beaver pond. Beryllium concentrations were above background in samples collected from the southern, eastern and northern beaver ponds. Cobalt concentrations were above background in samples collected from the eastern and northern beaver ponds.

5.2.4.3.2.5 Group E

Group E metals parameters include: calcium, magnesium, potassium, and sodium and are included in Table 5.2-3. The group E metals consist of common elements which are commonly found in sediment as well as surface water and natural soil. Group E metals spatial distribution in the beaver ponds is presented on Figure 5.2-15. Calcium concentrations were above the background concentrations in samples collected from each of the beaver ponds. Magnesium concentrations were above background concentrations in one or more samples collected from the southern, eastern and

northern. Potassium concentrations were above background concentrations in both samples collected from the northern beaver pond. Sodium concentrations for samples from each beaver pond were consistent with background concentrations.

5.2.4.3.2.6 Group F

Group F metals parameters include: aluminum, mercury, and thallium and are included in Table 5.2-3. Group F metals spatial distribution in the beaver ponds is presented on Figure 5.2-16. Mercury and thallium concentrations exceeded their respective background concentrations in samples from each of the beaver ponds. Mercury concentrations were highest in samples from the southern beaver pond.

Aluminum was not included on the parameter list in the Phase 1 or October 2012 RFI Work Plan (Barr, 2009). The July 2003 samples were analyzed for aluminum. The measured concentration of sample SD-5 and its field duplicate was 9,520 mg/kg and 8,910 mg/kg, respectively. No samples of background area sediments were taken to compare with these values.

5.2.4.3.2 Radionuclides

The analytical results for radionuclides are summarized in Table 5.2-6. Spatial distribution of the radionuclides in the beaver ponds are presented on Figure 5.2-17. The background reference area maximum detected concentrations or the maximum detection limit for each parameter are included in the table for comparison purposes (background concentrations). Some parameters which were not included as sampling parameters in 2008, when the background samples were collected, do not have an associated background concentration.

Ra-226 and Ra-228 concentrations were consistent with background concentrations. Gross alpha concentrations were consistent with background concentrations in samples collected from the northern beaver pond. One or more samples from the other beaver ponds exceeded the gross alpha background concentration. Gross beta concentrations were above background concentrations in one or more samples from each of the beaver ponds.

5.2.5 Cumulative Sediment Quality Summary

The table below presents the upstream to downstream sediment quality data for Sheep Gulch for chemicals of interest and the respective moisture conditions during 2008 sampling.

September 2008 Sediment Concentrations (Upstream to Downstream)

Sediment Sample Station (moisture condition)	Concentrations of Chemicals of Interest							
	Arsenic [mg/kg]	Cadmium [mg/kg]	Copper [mg/kg]	Lead [mg/kg]	Mercury [mg/kg]	Nickel [mg/kg]	Silver [mg/kg]	Zinc [mg/kg]
SD-18 (Dry)	6.82	0.15 J	16.0	8.7 J	0.014 J	5.71	0.04	27.5
SD-19 (Dry)	14.2	1.47	65.8	25.5	0.033	7.28	0.18	91.9
SD-20 (Wet)	7.96 J	0.38 J	34.4	11.2 J	0.021	8.90	0.12 J	66.0
SD-8 (Wet)	9.72	0.83 J	72.1	29.0	0.031	6.23	0.25	81.8
SD-1 (Wet)	10.3	1.86	120	28.1	0.079	20.3	0.37	375
SD-2 (Dry)	27.7	5.66	136	44	0.075	9.68	0.55	188
SD-3 (Wet)	3.61	3.03	12.1	6.3 J	0.044	3.17 J	<0.02	30.1
SD-9 (Dry)	41.7	6.05	222	80.2	0.114	8.42	0.82	222
SD-4 (Wet)	12.4	83.3	16.7	7.0 J	0.008 J	29.7	0.05	73.1
SD-5 (Wet)	14.6	2.36	49.4	13.4 J	0.612	6.69	0.19	45.6
SD-6 (Wet)	8.68	23.1	21.6	8.7 J	0.047	4.7	0.22	107
SD-13 (Wet)	11.4	26.2	83.2	29	0.183	11.5	0.52	178

In general, downstream sediment samples have higher concentrations of the following metals compared to upstream sediment samples: arsenic, cadmium and mercury. In addition, dry samples collected west of the tailing basin (SD-2 and SD-9) have generally higher concentration trends than other upstream samples for arsenic, cadmium, copper, lead, silver and zinc. The higher concentrations of these parameters for dry samples suggest possible impacts related to the SSTOU which are likely from the deposition of windblown particulates. The results of the wet sediment samples from Sheep Gulch generally show lower concentrations of the SSTOU contaminants of concern parameters than the dry samples which further suggests these parameter concentrations are not cumulative or compounding due to surface water run-off events or run-off derived sedimentation.

5.2.6 Conclusions

Sediment quality has been evaluated along the length of Sheep Gulch from the REC Plant to its discharge to the constructed wetlands associated with the SSTOU remedy. Several constituents are present at concentrations above background which indicate a release from the tailing basin including: chloride, fluoride, total phosphorus, sulfate, cadmium, calcium, chromium, mercury, selenium, and uranium. The concentrations for these constituents are higher along the length of Sheep Gulch and Beaver Ponds. Impacts from the SSTOU superfund site are evident in the sediment quality data from SD-13.

There is sufficient information to conduct the risk assessment for the sediment. 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.

5.2.7 References

- Barr Engineering Company, 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.
- Barr Engineering Co. 2012. October 2012 RCRA Facility Investigation Work Plan, Corrective Action Order on Consent, Docket No. RCRA-08-2004-0001., Rhodia Silver Bow Plant, Butte, Montana, September, 2012.
- Bighorn Environmental, Confluence Consulting Inc., Montana Fish, Wildlife and Parks and BPS&J. 2010. Monitoring Report for 2009, Streamside Tailings Operable Unit, Silver Bow Creek/Butte Area NPL Site, May 2010.Booz Allen, 2004. Final Analytical Results Report, Expanded Site Investigation, Rhodia Inc. Silver Bow Plant. RCRA Enforcement, Permitting and Assistance (REPA3), U.S. EPA. Document Control Number: REPA3-0807-0078, Revision No. 1, April 5, 2004.
- United States Environmental Protection Agency, 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 5.2-1

**Rationale for Surface Water and Sediment Monitoring Stations
Rhodia Silver Bow Plant**

Station ID	Rationale	Parameter List(s)
Sheep Gulch		
SW-1/SD-1	Evaluate surface water quality, sediment quality and flow at southern extent of the tailing basin where Sheep Gulch Water is diverted west.	Common List ¹
SD-2	Evaluate sediment quality (and water quality if present) in tributary gulch. (Surface water station dry at time of sampling event.)	Common List ¹
SW-3/SD-3	Evaluate surface water quality, sediment quality and flow before Sheep Gulch combines with other gulch and immediately west of dry tailing stockpile.	Common List ¹
SW-4/SD-4	Evaluate surface water quality, sediment quality and flow before Sheep Gulch flow combines with Beaver Pond outflow.	Common List ¹
SW-6/SD-6	Evaluate surface water quality, sediment quality and flow at furthest downstream, on-site location.	Common List ¹
SW-8/SD-8	Evaluate surface water quality, sediment quality and flow upstream of the tailing basin & impacts of REC Plant wastewater.	Common List ¹
SD-9	Evaluate sediment quality (and water quality if present) in tributary gulch. Surface water station dry at time of sampling event.	Common List ¹
SW-10	Evaluate surface water quality and stage at Site pond (i.e., groundwater to surface water discharge area).	Common List ¹
SW-11	Evaluate surface water quality and stage at Site pond (i.e., groundwater to surface water discharge area).	Common List ¹
SW-12	Evaluate surface water quality and stage at Site pond (i.e., groundwater to surface water discharge area).	Common List ¹
SW-13/SD-13	Evaluate surface water quality at location furthest downstream that has not been altered by the SSTOU remedy.	Common List ¹
SD-18	Evaluate surface water quality and flow at location upstream of the REC Plant, if water is flowing in the channel. (Surface water station dry at time of sampling event.)	Common List ¹
SD-19	Evaluate surface water quality and flow of tributary channel. (Surface water station dry at time of sampling event.)	Common List ¹
SW-20/SD-20	Evaluate surface water quality and flow at location down stream of the REC Plant and upstream of confluence with tributary channel.	Common List ¹
Beaver Pond Area		
SW-5/SD-5	Evaluate surface water quality, sediment quality and stage at the Beaver Pond (i.e., groundwater to surface water discharge area).	Common List ¹
SD-21	Evaluate aquatic exposure and the bioavailability of inorganic constituents from sediment for risk assessment purposes.	Metals, radionuclides, total phosphorus, total organic carbon, pH, AVS/SEM ² , and grain size
SD-22		
SD-23		
SD-24		
SD-25		
SD-26		
SD-27		
SD-28		
SD-29		
Silver Bow Creek		
SW-14	Evaluate surface water quality and flow upstream of Silver Bow Plant.	Common List ¹
SW-15	Evaluate surface water quality and flow down stream of Silver Bow Plant.	Common List ¹
SW-16	Evaluate surface water quality and flow in primary flow channel created by SSTOU remedy adjacent to Silver Bow Plant.	Common List ¹
SW-17	Evaluate surface water quality and flow in secondary flow channel created by SSTOU remedy adjacent to Silver Bow Plant.	Common List ¹

Notes:¹ Common List includes Site-Specific, Metals, VOCs, SVOCs, General, Radionuclides² Acid Volatile Sulfide/Simultaneously Extracted Metals

Table 5.2-2
Sediment Data – General and Site-Specific Parameters
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentration in mg/kg, unless otherwise noted]

Chemical Name				Carbon, Total Organic [%]	Chloride	Fluoride	Fluoride by bellack	Nitrate + Nitrite, as N	Nitrogen, ammonia (NH3), as N	Orthophosphate, as P	pH [pH units]	Phosphorus, elemental (white)	Phosphorus, total	Sulfate	Sulfide, acid-volatile [umol/g]	Particle Diameter (0.001mm)	Particle Diameter (0.005mm)	Particle Diameter (0.074mm)
Background, Maximum Upstream Concentration, Exceedances Bold					59.7		230	0.8	28.3			0.00028	813	152				
Location ID	Sample Date	Depth	Sample Type															
Sheep Gulch																		
SD-18	09/21/2008	0 - 10 cm	N	--	2.3	--	222	0.7	< 0.6	--	--	< 0.000280	288	2.9	--	--	--	--
SD-19	09/21/2008	0 - 10 cm	N	--	6.2	--	216	< 0.6	24.1	--	--	< 0.000280	813	7.6	--	--	--	--
SD-20	09/21/2008	0 - 10 cm	N	--	45.8	--	223 J	< 0.8	27.4	--	--	< 0.000280 J	476	152	--	--	--	--
SD-8	09/20/2008	0 - 10 cm	N	--	59.7	--	230	< 0.8	28.3	--	--	< 0.000280	437	81.8	--	--	--	--
SD-1	09/20/2008	0 - 10 cm	N	--	359	--	641	< 1.8	97.2	--	--	< 0.000280	1050	774	--	--	--	--
SD-3	09/19/2008	0 - 10 cm	N	--	56.7	--	566	< 0.8	16.8	--	--	< 0.000280	667	85.3	--	--	--	--
SD-4	09/19/2008	0 - 10 cm	N	--	65.8	--	2070	< 0.8	1.9	--	--	< 0.000280	11300	38.3	--	--	--	--
SD-6	09/18/2008	0 - 10 cm	N	--	121	--	1130	< 0.9 J	20.2	--	--	< 0.000280	4870	278	--	--	--	--
SD-13	09/18/2008	0 - 10 cm	N	--	605	--	947 J	< 1.6 J	15.8	--	--	< 0.000280	1580	431	--	--	--	--
			FD	--	505	--	9840 J	< 1.6 J	15.5	--	--	< 0.000280	1630	541	--	--	--	--
ESI-SG-3S	07/22/2003		N	--	--	130	--	--	--	24 J	--	0.00185 J	1200 J	--	--	--	--	--
SD-2	09/20/2008	0 - 10 cm	N	--	6.9	--	436	2.2	0.8	--	--	< 0.000280	2650	12.7	--	--	--	--
SD-9	09/20/2008	0 - 10 cm	N	--	< 3.1	--	344	1.2	< 0.6	--	--	< 0.000280	1650	4.6	--	--	--	--
Beaver Ponds																		
Southern Beaver Pond																		
SD-24	10/07/2012	0 - 10 cm	N	0.746	162	10.1	--	< 0.85	< 0.83	--	7.63	< 0.000015	841	117	< 0.033	0.9	12.75	32.59
SD-25	10/07/2012	0 - 10 cm	N	3.09	224	20.6	--	< 1.0	1.1	--	7.80	< 0.000015	2040	88.3	1.02	11.08	31.12	64.67
Central Beaver Pond																		
SD-5	07/22/2003		N	--	--	42	--	--	--	6.9 J	--	< 0.000661 J	1200 J	--	--	--	--	--
			FD	--	--	15	--	--	--	4.7 J	--	< 0.000372 J	620 J	--	--	--	--	--
SD-5	09/18/2008	0 - 10 cm	N	--	90	--	2050 J	< 0.9 J	1.5	--	--	< 0.000280	1190	248	--	--	--	--
SD-21	10/06/2012	0 - 10 cm	N	3.99	460	26.4	--	< 1.7	124	--	7.9	< 0.000015	2310	185	46.2	25.71	49.45	89.19
SD-22	10/07/2012	0 - 10 cm	N	3.58	420	21.0	--	< 1.5	124	--	7.8	< 0.000015	1570	783	38.6	31.44	50.26	81.77
SD-23	10/07/2012	0 - 10 cm	N	0.318	88.6	7.63	--	< 0.74	< 0.72	--	7.62	< 0.000015	424	57.6	< 0.029	2.62	17.9	43.48
Northern Beaver Pond																		
SD-28	10/07/2012	0 - 10 cm	N	3.77	426	28.1	--	< 1.6	234	--	7.82	< 0.000015	1810	215	0.609	55.55	70.11	94.49
SD-29	10/07/2012	0 - 10 cm	N	1.59	175	12.0	--	< 0.93	27.0	--	7.96	< 0.000015	1310	203	28.1	1.8	15.02	37.15
Eastern Beaver Pond																		
SD-26	10/07/2012	0 - 10 cm	N	5.31	337	22.8	--	< 1.3	98.1	--	8.07	< 0.000015	3010	263	97.1	54.55	67.21	88.4
SD-27	10/07/2012	0 - 10 cm	N	3.07	319	20.1	--	< 1.3	57.7	--	8.07	< 0.000015	1990	1090	48.8	37.39	58.21	93.08
			FD	2.92	303	20.9	--	< 1.3	55.2	--	8.03	< 0.000015	1950	1540	46.7	40.39	60.18	93.3

Table 5.2-2
Sediment Data – General and Site-Specific Parameters
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentration in mg/kg, unless otherwise noted]

Chemical Name				SIEVE#3/8 (9.5 mm)	SIEVE#3/4 (19.0 mm)	SIEVE#4 (4.75 mm)	SIEVE#10 (2.00 mm)	SIEVE#20 (0.850 mm)	SIEVE#40 (0.425 mm)	SIEVE#60 (0.250 mm)	SIEVE#140 (0.106 mm)	SIEVE#200 (0.750 mm)
Background, Maximum Upstream Concentration, Exceedances Bold												
Location ID	Sample Date	Depth	Sample Type									
Sheep Gulch												
SD-18	09/21/2008	0 - 10 cm	N	--	--	--	--	--	--	--	--	--
SD-19	09/21/2008	0 - 10 cm	N	--	--	--	--	--	--	--	--	--
SD-20	09/21/2008	0 - 10 cm	N	--	--	--	--	--	--	--	--	--
SD-8	09/20/2008	0 - 10 cm	N	--	--	--	--	--	--	--	--	--
SD-1	09/20/2008	0 - 10 cm	N	--	--	--	--	--	--	--	--	--
SD-3	09/19/2008	0 - 10 cm	N	--	--	--	--	--	--	--	--	--
SD-4	09/19/2008	0 - 10 cm	N	--	--	--	--	--	--	--	--	--
SD-6	09/18/2008	0 - 10 cm	N	--	--	--	--	--	--	--	--	--
SD-13	09/18/2008	0 - 10 cm	N	--	--	--	--	--	--	--	--	--
			FD	--	--	--	--	--	--	--	--	--
ESI-SG-3S	07/22/2003		N	--	--	--	--	--	--	--	--	--
SD-2	09/20/2008	0 - 10 cm	N	--	--	--	--	--	--	--	--	--
SD-9	09/20/2008	0 - 10 cm	N	--	--	--	--	--	--	--	--	--
Beaver Ponds												
Southern Beaver Pond												
SD-24	10/07/2012	0 - 10 cm	N	91.97	104.01	82.18	64.25	52.35	43.96	38.62	32.95	30.68
SD-25	10/07/2012	0 - 10 cm	N	99.96	99.96	94.01	85.1	79.09	75.51	72.91	68.1	65.9
Central Beaver Pond												
SD-5	07/22/2003		N	--	--	--	--	--	--	--	--	--
			FD	--	--	--	--	--	--	--	--	--
SD-5	09/18/2008	0 - 10 cm	N	--	--	--	--	--	--	--	--	--
SD-21	10/06/2012	0 - 10 cm	N	100	100	100	100	97.84	97.22	96.48	94.37	91.61
SD-22	10/07/2012	0 - 10 cm	N	99.97	99.97	98.76	93.18	90.69	89.39	87.61	84.4	82.57
SD-23	10/07/2012	0 - 10 cm	N	99.99	99.99	90.75	77.07	67.65	60.56	55.96	50.53	48.53
Northern Beaver Pond												
SD-28	10/07/2012	0 - 10 cm	N	100	100	100	100	98.97	98.63	98.27	97.11	95.52
SD-29	10/07/2012	0 - 10 cm	N	100	100	98.56	97.75	95.83	93.29	88.06	56.67	40.24
Eastern Beaver Pond												
SD-26	10/07/2012	0 - 10 cm	N	99.98	99.98	99.91	98.75	95.67	94.47	93.16	90.74	89.2
SD-27	10/07/2012	0 - 10 cm	N	99.95	99.95	99.95	99.73	98.81	98.52	98.27	97.03	94.94
			FD	100	100	100	100	99.57	99.03	98.59	97.22	95.36

Table 5.2-3
Sediment Data - Metals and Simultaneously Extracted Metals
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentrations in mg/kg, unless otherwise noted]

Chemical Name				Total																							
				Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Uranium	Vanadium	Zinc
Background, Maximum Upstream Concentration, Exceedances Bold					1.680	14.2	295	0.69	1.47	5740	12.9	7.31	72.1	19400	29.0	4760	700	0.033	8.90	4920	0.4	0.25	1000	0.407	2.200	42.0	91.9
Location ID	Sample Date	Depth	Sample Type																								
Sheep Gulch																											
SD-18	09/21/2008	0 - 10 cm	N	--	1.680	6.82	245	0.43 J	0.15 J	5290	11.8	3.40	16.0	9550	8.7 J	3280	276	0.014 J	5.71	3130	< 0.4	0.04	78	0.164	0.39	22.9	27.5
SD-19	09/21/2008	0 - 10 cm	N	--	0.68	14.2	252	0.69 J	1.47	4880	10.3	7.31	65.8	19400	24.5	4760	700	0.033	7.28	4920	< 0.4	0.18	130	0.407	2.200	42.0	91.9
SD-20	09/21/2008	0 - 10 cm	N	--	0.32 J	7.96 J	295	0.62 J	0.38 J	5740	12.9	5.92	34.4	15100	11.2 J	3760	137	0.021	8.90	4220	< 0.4	0.12 J	1000	0.282 J	1.100 J	32.2	66.0
SD-8	09/20/2008	0 - 10 cm	N	--	0.84	9.72	178	0.45 J	0.83 J	4400	8.7	4.24	72.1	11800	29.0	3000	185	0.031	6.23	2960	< 0.4	0.25	649	0.248	1.000	25.5	81.8
SD-1	09/20/2008	0 - 10 cm	N	--	0.69	10.3	277	0.98 J	1.86	26100	20.1	6.00	120	17500	28.1	5380	243	0.079	20.3	4560	1.0 J	0.37	2390	0.421	3.400	36.0	375
SD-3	09/19/2008	0 - 10 cm	N	--	0.22	3.61	120	0.48 J	3.03	22900	6.3	3.28	12.1	11800	6.3 J	2260	418	0.044	3.17 J	1790	0.9 J	< 0.02	828	0.219	1.200	29.5	30.1
SD-4	09/19/2008	0 - 10 cm	N	--	0.47	12.4	186	0.56 J	83.3	33300	5.9	4.86	16.7	9940	7.0 J	2380	3710	0.008 J	29.7	1350	15.9	0.05	874	0.196	7.200	39.1	73.1
SD-6	09/18/2008	0 - 10 cm	N	--	0.42	8.68	182	1.37	23.1	45000	23.0	3.5	21.6	8980	8.7 J	3850	345	0.047	4.7	3400	4.9	0.22	920	0.232	4.200	25.9	107
SD-13	09/18/2008	0 - 10 cm	N	--	0.68	11.4	244	0.97 J	26.2	17200	14.1	6.69	83.2	16800	25.9	5090	556	0.183	11.5	4770	2.7	0.52	1590	0.427	2.600	34.1	178
			FD	--	0.65	11.2	249	1.01 J	25.6	17000	14.8	6.96	83.5	17900	26.1	5310	571	0.171	11.9	4980	2.7	0.51	1600	0.437	2.700	36.8	182
ESI-SG-3S	07/22/2003		N	8940	2.8 J	28.6	106	0.35 J	15.1	3940	8.5 J	2.8 J	49.8	9680	17.6	2460	146	0.070 J	4.4 J	2290	< 8.9 J	0.19 J	269 J	< 6.3	--	30.1	74.1
SD-2	09/20/2008	0 - 10 cm	N	--	1.340	27.7	279	0.81 J	5.66	11800	15.2	6.40	136	18200	45.4	5270	598	0.075	9.68	5800	0.9 J	0.55	183	0.459	3.800	45.3	188
SD-9	09/20/2008	0 - 10 cm	N	--	2.39	41.7	250	0.76 J	6.05	7320	14.2	7.18	222	19000	80.2	5230	623	0.114	8.42	5880	0.6 J	0.82	141	0.427	1.500	38.1	222
Beaver Ponds																											
Southern Beaver Pond																											
SD-24	10/07/2012	0 - 10 cm	N	--	0.616	8.53	71.1	0.51 J	1.39 J	6340	8.5 J	2.19 J	46.2	10400	19.4 J	2740	73.5	7.26	5.18 J	2480	12.8	< 1.0	411	0.169	8.600	60.3	43.1
SD-25	10/07/2012	0 - 10 cm	N	--	1.14	47.8	132	0.72 J	18.13	11800	19.5	4.21 J	81.6	14100	38.4 J	4790	124	5.92	9.82 J	4210	9.9	< 1.0	458	0.698	31.8	91.3	200
Central Beaver Pond																											
SD-5	07/22/2003		N	9520	2.0 J	15.7	92.6	0.44 J	0.63 J	4810	8.9 J	2.8 J	46.3	10800	18.4	3160	103	2.3	5.1 J	2940	7.1 J	< 2.8	349 J	< 7.0	--	50.4	41.9
			FD	8910	2.6 J	12.7	95.9	0.41 J	0.62 J	4550	8.5 J	2.5 J	47.8	9970	15.8	3020	98.2	3.3	5.1 J	2880	4.9 J	< 3.0	342 J	< 7.5	--	55.7	40.2
SD-5	09/18/2008	0 - 10 cm	N	--	0.94	14.6	92.9	0.34 J	2.36	6990	9.4	3.89	49.4	10300	13.4 J	2870	99.5	0.612	6.69	2920	8.9	0.19	341	0.287	8.300	83.3	45.6
SD-21	10/06/2012	0 - 10 cm	N	--	0.606 J	38.7	142	0.66 J	8.36	84500	14.4	5.42 J	85.8	12500	34.7 J	4370	364	1.49 R	10.2 J	3470	10.8	< 1.2	540	0.506	15.2	70.2	155
SD-22	10/07/2012	0 - 10 cm	N	--	0.504	29.7	147	0.58 J	6.92	50700	12.3	5.27 J	66.3	12900	24.7 J	4090	219	0.489	8.26 J	3370	6.8	< 1.0	451	0.562	14.9	60.3	124
SD-23	10/07/2012	0 - 10 cm	N	--	0.375	6.15	75.4	0.60 J	0.60 J	5520	8.1 J	2.99 J	24.4	16700	6.5 J	3700	104	1.03	4.09 J	3200	12.8	< 1.0	390	0.161	2.330	63.3	26.3
Northern Beaver Pond																											
SD-28	10/07/2012	0 - 10 cm	N	--	0.644	39.5	191	0.87 J	15.52	55700	14.4	7.39 J	84.5	16100	34.8 J	5290	414	0.432	12.2 J	4420	8.9	< 1.1	533	0.516	15.0	65.2	152
SD-29	10/07/2012	0 - 10 cm	N	--	0.383	23.9	108	0.46 J	2.58 J	27100	9.4 J	5.36 J	36.6	15400	15.4 J	3680	181	0.265	7.24 J	2960	6.0	< 1.0	390	0.274	10.5	45.2	62.2
Eastern Beaver Pond																											
SD-26	10/07/2012	0 - 10 cm	N	--	1.66	64.1	339	1.27 J	21.93	23900	22.8	11.46	213	26900	85.2 J	7530	492	0.732	15.1 J	7340	3.5	1.1 J	665	1.110	8.230	59.1	312
SD-27	10/07/2012	0 - 10 cm	N	--	0.774	39.6	324	1.22 J	32.68	39300	15.0	7.39 J	99.8	20400	39.9 J	6270	486	0.170	13.3 J	7170	6.6	< 1.0	702	1.000	8.440	49.6	216
			FD	--	0.772	38.1	315	1.12 J	33.32	39400	14.9	7.71 J	96.3	20000	39.3 J	6150	482	0.171	13.1 J	7050	6.0	< 1.0	695	0.954	8.100	49.4	214

Table 5.2-3
Sediment Data - Metals and Simultaneously Extracted Metals
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentrations in mg/kg, unless otherwise noted]

Chemical Name				SEM Metals [umol/g]					
				Cadmium	Copper	Lead	Mercury	Nickel	Zinc
Background, Maximum Upstream Concentration, Exceedances Bold									
Location ID	Sample Date	Depth	Sample Type						
Sheep Gulch									
SD-18	09/21/2008	0 - 10 cm	N	--	--	--	--	--	--
SD-19	09/21/2008	0 - 10 cm	N	--	--	--	--	--	--
SD-20	09/21/2008	0 - 10 cm	N	--	--	--	--	--	--
SD-8	09/20/2008	0 - 10 cm	N	--	--	--	--	--	--
SD-1	09/20/2008	0 - 10 cm	N	--	--	--	--	--	--
SD-3	09/19/2008	0 - 10 cm	N	--	--	--	--	--	--
SD-4	09/19/2008	0 - 10 cm	N	--	--	--	--	--	--
SD-6	09/18/2008	0 - 10 cm	N	--	--	--	--	--	--
SD-13	09/18/2008	0 - 10 cm	N	--	--	--	--	--	--
			FD	--	--	--	--	--	--
ESI-SG-3S	07/22/2003		N	--	--	--	--	--	--
SD-2	09/20/2008	0 - 10 cm	N	--	--	--	--	--	--
SD-9	09/20/2008	0 - 10 cm	N	--	--	--	--	--	--
Beaver Ponds									
Southern Beaver Pond									
SD-24	10/07/2012	0 - 10 cm	N	0.002077	0.0579	0.01245	< 0.000042	0.01171	0.0465
SD-25	10/07/2012	0 - 10 cm	N	0.029360	0.0195	0.02645	< 0.000052	0.01669	0.4797
Central Beaver Pond									
SD-5	07/22/2003		N	--	--	--	--	--	--
			FD	--	--	--	--	--	--
SD-5	09/18/2008	0 - 10 cm	N	--	--	--	--	--	--
SD-21	10/06/2012	0 - 10 cm	N	0.051949	0.0553	0.10406	< 0.000083	0.05915	1.08658
SD-22	10/07/2012	0 - 10 cm	N	0.032053	0.0138	0.05665	< 0.000099	0.02687	0.6412
SD-23	10/07/2012	0 - 10 cm	N	0.000984	0.0534	0.00313 J	0.000057 J	0.00708	0.0100
Northern Beaver Pond									
SD-28	10/07/2012	0 - 10 cm	N	0.003497	0.2802	0.26924	< 0.000122	0.06664	0.7134
SD-29	10/07/2012	0 - 10 cm	N	0.014608	0.0081	0.02972	< 0.000065	0.02439	0.2785
Eastern Beaver Pond									
SD-26	10/07/2012	0 - 10 cm	N	0.086732	0.0524	0.09475	< 0.000102	0.04024	1.30302
SD-27	10/07/2012	0 - 10 cm	N	0.146352	0.0174	0.07399	< 0.000091	0.03738	0.9686
			FD	0.135440	0.0131	0.06973	< 0.000081	0.03469	0.9170

Table 5.2-4
Sediment Data - SVOCs
Sheep Gulch, Surface Water Pathways and Beaver Ponds
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
Background, Maximum Upstream Concentration, Exceedances Bold				0.013	0.02	0.017	0.021	0.02	0.019	0.016	0.019	0.017	0.13	0.017	0.018	0.012
Location ID	Sample Date	Depth	Sample Type													
Sheep Gulch																
SD-18	09/21/2008	0 - 10 cm	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
SD-19	09/21/2008	0 - 10 cm	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
SD-20	09/21/2008	0 - 10 cm	N	< 0.013	< 0.020	< 0.017	< 0.021	< 0.020	< 0.019	< 0.016	< 0.019	< 0.017	< 0.13	< 0.017	< 0.018	< 0.012
SD-8	09/20/2008	0 - 10 cm	N	< 0.012	< 0.020	< 0.016	< 0.020	< 0.019	< 0.019	< 0.016	< 0.018	< 0.017	< 0.12	< 0.016	< 0.017	< 0.011
SD-1	09/20/2008	0 - 10 cm	N	< 0.028 J	< 0.046 J	< 0.037 J	< 0.047 J	< 0.045 J	< 0.044 J	< 0.037 J	< 0.042 J	< 0.039 J	< 0.29 J	< 0.038 J	< 0.040 J	< 0.026 J
SD-3	09/19/2008	0 - 10 cm	N	< 0.012	< 0.019	< 0.016	< 0.019	< 0.019	< 0.018	< 0.015	< 0.017	< 0.016	< 0.12	< 0.016	< 0.017	< 0.011
SD-4	09/19/2008	0 - 10 cm	N	< 0.012	< 0.019	< 0.016	< 0.020	< 0.019	< 0.019	< 0.016	< 0.018	< 0.016	< 0.12	< 0.016	< 0.017	< 0.011
SD-6	09/18/2008	0 - 10 cm	N	< 0.014	< 0.022	< 0.018	< 0.023	< 0.022	< 0.021	< 0.018	< 0.021	< 0.019	< 0.14	< 0.019	< 0.020	< 0.013
SD-13	09/18/2008	0 - 10 cm	N	< 0.026	< 0.042	< 0.035	< 0.043	< 0.041	< 0.041	< 0.034	< 0.039	< 0.036	< 0.27	< 0.035	< 0.037	< 0.024
			FD	< 0.027	< 0.043	< 0.035	< 0.044	< 0.042	< 0.041	< 0.034	< 0.039	< 0.036	< 0.27	< 0.036	< 0.038	< 0.024
SD-2	09/20/2008	0 - 10 cm	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
SD-9	09/20/2008	0 - 10 cm	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
Beaver Ponds																
Central Beaver Pond																
SD-5	09/18/2008	0 - 10 cm	N	< 0.015	< 0.025	< 0.020	< 0.025	< 0.024	< 0.024	< 0.020	< 0.023	< 0.021	< 0.16	< 0.021	< 0.021	< 0.014

Table 5.2-4
Sediment Data - SVOCs
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name				2-Chlorophenol	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
Background, Maximum Upstream Concentration, Exceedances Bold				0.011	0.16	0.13	0.19	0.16	0.03	0.2	0.014	0.019	0.016	0.018	0.2	0.17	0.015	0.018
Location ID	Sample Date	Depth	Sample Type															
Sheep Gulch																		
SD-18	09/21/2008	0 - 10 cm	N	< 0.0099	< 0.15	< 0.011	< 0.017	< 0.014	< 0.027	< 0.18	< 0.013	< 0.017	< 0.015	< 0.016	< 0.18	< 0.15	< 0.014	< 0.016
SD-19	09/21/2008	0 - 10 cm	N	< 0.0099	< 0.15	< 0.011	< 0.017	< 0.014	< 0.027	< 0.18	< 0.013	< 0.017	< 0.015	< 0.016	< 0.18	< 0.15	< 0.014	< 0.016
SD-20	09/21/2008	0 - 10 cm	N	< 0.011	< 0.16	< 0.013	< 0.019	< 0.016	< 0.030	< 0.20	< 0.014	< 0.019	< 0.016	< 0.018	< 0.20	< 0.17	< 0.015	< 0.018
SD-8	09/20/2008	0 - 10 cm	N	< 0.011	< 0.16	< 0.012	< 0.018	< 0.015	< 0.029	< 0.19	< 0.013	< 0.018	< 0.016	< 0.018	< 0.20	< 0.16	< 0.015	< 0.018
SD-1	09/20/2008	0 - 10 cm	N	< 0.026 J	< 0.37 J	< 0.028 J	< 0.043 J	< 0.036 J	< 0.069 J	< 0.45 J	< 0.031 J	< 0.043 J	< 0.037 J	< 0.041 J	< 0.46 J	< 0.37 J	< 0.034 J	< 0.041 J
SD-3	09/19/2008	0 - 10 cm	N	< 0.011	< 0.15	< 0.012	< 0.018	< 0.015	< 0.028	< 0.19	< 0.013	< 0.018	< 0.015	< 0.017	< 0.19	< 0.16	< 0.014	< 0.017
SD-4	09/19/2008	0 - 10 cm	N	< 0.011	< 0.16	< 0.012	< 0.018	< 0.015	< 0.029	< 0.19	< 0.013	< 0.018	< 0.016	< 0.017	< 0.19	< 0.16	< 0.015	< 0.017
SD-6	09/18/2008	0 - 10 cm	N	< 0.013	< 0.18	< 0.014	< 0.021	< 0.018	< 0.034	< 0.22	< 0.015	< 0.021	< 0.018	< 0.020	< 0.22	< 0.18	< 0.017	< 0.020
SD-13	09/18/2008	0 - 10 cm	N	< 0.024	< 0.34	< 0.026	< 0.040	< 0.033	< 0.064	< 0.41	< 0.029	< 0.039	< 0.034	< 0.038	< 0.42	< 0.35	< 0.032	< 0.038
			FD	< 0.024	< 0.35	< 0.027	< 0.041	< 0.033	< 0.065	< 0.42	< 0.029	< 0.040	< 0.035	< 0.038	< 0.43	< 0.35	< 0.032	< 0.038
SD-2	09/20/2008	0 - 10 cm	N	< 0.0099	< 0.15	< 0.011	< 0.017	< 0.014	< 0.027	< 0.18	< 0.013	< 0.017	< 0.015	< 0.016	< 0.18	< 0.15	< 0.014	< 0.016
SD-9	09/20/2008	0 - 10 cm	N	< 0.0099	< 0.15	< 0.011	< 0.017	< 0.014	< 0.027	< 0.18	< 0.013	< 0.017	< 0.015	< 0.016	< 0.18	< 0.15	< 0.014	< 0.016
Beaver Ponds																		
Central Beaver Pond																		
SD-5	09/18/2008	0 - 10 cm	N	< 0.014	< 0.20	< 0.015	< 0.023	< 0.019	< 0.037	< 0.24	< 0.017	< 0.023	< 0.020	< 0.022	< 0.25	< 0.20	< 0.019	< 0.022

Table 5.2-4
Sediment Data - SVOCs
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name				Anthracene	Benzdine	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
Background, Maximum Upstream Concentration, Exceedances Bold				0.016		0.014	0.022	0.019	0.023	0.022	0.46	0.019	0.013	0.013	0.016	0.021	0.018	0.013	0.014
Location ID	Sample Date	Depth	Sample Type																
Sheep Gulch																			
SD-18	09/21/2008	0 - 10 cm	N	< 0.014	< 0.42 R	< 0.013	< 0.020	< 0.018	< 0.021	< 0.020	< 0.14	< 0.017	< 0.011	< 0.012	< 0.015	< 0.019	< 0.017	< 0.012	< 0.012
SD-19	09/21/2008	0 - 10 cm	N	< 0.014	< 0.42 R	< 0.013	< 0.020	< 0.018	< 0.021	< 0.020	0.46 J	< 0.017	< 0.011	< 0.012	< 0.015	< 0.019	< 0.017	< 0.012	< 0.012
SD-20	09/21/2008	0 - 10 cm	N	< 0.016	< 0.47 R	< 0.014	< 0.022	< 0.019	< 0.023	< 0.022	< 0.16	< 0.019	< 0.013	< 0.013	< 0.016	< 0.021	< 0.018	< 0.013	< 0.014
SD-8	09/20/2008	0 - 10 cm	N	< 0.015	< 0.45 R	< 0.014	< 0.022	< 0.019	< 0.022	< 0.021	< 0.15	< 0.018	< 0.012	< 0.013	< 0.015	< 0.020	< 0.018	< 0.012	< 0.013
SD-1	09/20/2008	0 - 10 cm	N	< 0.036 J	< 1.1 R	< 0.032 J	< 0.051 J	< 0.044 J	< 0.052 J	< 0.050 J	< 0.36 J	< 0.043 J	< 0.028 J	< 0.030 J	< 0.036 J	< 0.048 J	< 0.042 J	< 0.029 J	< 0.030 J
SD-3	09/19/2008	0 - 10 cm	N	< 0.015	< 0.44 R	< 0.013	< 0.021	< 0.018	< 0.021	< 0.021	< 0.15	< 0.018	< 0.012	< 0.013	< 0.015	< 0.020	< 0.017	< 0.012	< 0.013
SD-4	09/19/2008	0 - 10 cm	N	< 0.015	< 0.45 R	< 0.013	< 0.021	< 0.019	< 0.022	< 0.021	< 0.15	< 0.018	< 0.012	< 0.013	< 0.015	< 0.020	< 0.018	< 0.012	< 0.013
SD-6	09/18/2008	0 - 10 cm	N	< 0.018	< 0.52 R	< 0.016	< 0.025	< 0.022	< 0.025	< 0.024	< 0.18	< 0.021	< 0.014	< 0.015	< 0.018	< 0.023	< 0.020	< 0.014	< 0.015
SD-13	09/18/2008	0 - 10 cm	N	< 0.033	< 0.99 R	< 0.029	< 0.047	< 0.041	< 0.048	< 0.046	1.3 J	< 0.040	< 0.026	< 0.028	< 0.033	< 0.044	< 0.039	< 0.027	< 0.028
			FD	< 0.033	< 1.0 R	< 0.030	< 0.047	< 0.041	< 0.048	< 0.047	1.3 J	< 0.040	< 0.027	< 0.028	< 0.034	< 0.045	< 0.039	< 0.027	< 0.028
SD-2	09/20/2008	0 - 10 cm	N	< 0.014	< 0.42 R	0.014 J	< 0.020	0.023 J	< 0.021	< 0.020	0.47 J	< 0.017	< 0.011	< 0.012	< 0.015	< 0.019	< 0.017	< 0.012	0.013 J
SD-9	09/20/2008	0 - 10 cm	N	< 0.014	< 0.42 R	0.015 J	< 0.020	< 0.018	< 0.021	< 0.020	0.48 J	< 0.017	< 0.011	< 0.012	< 0.015	< 0.019	< 0.017	< 0.012	0.014 J
Beaver Ponds																			
Central Beaver Pond																			
SD-5	09/18/2008	0 - 10 cm	N	< 0.019	< 0.57 R	< 0.017	< 0.027	< 0.024	< 0.028	< 0.027	< 0.19	< 0.023	< 0.015	< 0.016	< 0.019	< 0.026	< 0.022	< 0.016	< 0.016

Table 5.2-4
Sediment Data - SVOCs
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name				Dibenz(a,h) anthracene	Dibenzofuran	Diethyl phthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(1,2,3- cd)pyrene	Isophorone	Naphthalene
Background, Maximum Upstream Concentration, Exceedances Bold				0.031	0.014	0.016	0.019	0.014	0.027	0.013	0.015	0.017	0.016	0.014	0.024	0.043	0.016	0.016
Location ID	Sample Date	Depth	Sample Type															
Sheep Gulch																		
SD-18	09/21/2008	0 - 10 cm	N	< 0.028	< 0.012	< 0.015	< 0.017	< 0.013	< 0.024	< 0.012	< 0.013	< 0.015	< 0.015	< 0.013	< 0.022	< 0.039	< 0.014	< 0.015
SD-19	09/21/2008	0 - 10 cm	N	< 0.028	< 0.012	< 0.015	< 0.017	< 0.013	< 0.024	< 0.012	< 0.013	< 0.015	< 0.015	< 0.013	< 0.022	< 0.039	< 0.014	< 0.015
SD-20	09/21/2008	0 - 10 cm	N	< 0.031	< 0.014	< 0.016	< 0.019	< 0.014	< 0.027	< 0.013	< 0.015	< 0.017	< 0.016	< 0.014	< 0.024	< 0.043	< 0.016	< 0.016
SD-8	09/20/2008	0 - 10 cm	N	< 0.030	< 0.013	< 0.015	< 0.018	0.013 J	< 0.026	< 0.013	< 0.014	< 0.016	< 0.015	< 0.014	< 0.023	< 0.042	< 0.015	< 0.016
SD-1	09/20/2008	0 - 10 cm	N	< 0.070 J	< 0.030 J	< 0.036 J	< 0.042 J	0.046 J	< 0.061 J	< 0.030 J	< 0.033 J	< 0.038 J	< 0.036 J	< 0.032 J	< 0.055 J	< 0.099 J	< 0.036 J	< 0.037 J
SD-3	09/19/2008	0 - 10 cm	N	< 0.029	< 0.013	< 0.015	< 0.017	0.014 J	< 0.025	< 0.012	< 0.014	< 0.016	< 0.015	< 0.013	< 0.023	< 0.041	< 0.015	< 0.015
SD-4	09/19/2008	0 - 10 cm	N	< 0.030	< 0.013	< 0.015	< 0.018	0.014 J	< 0.026	< 0.013	< 0.014	< 0.016	< 0.015	< 0.014	< 0.023	< 0.042	< 0.015	< 0.016
SD-6	09/18/2008	0 - 10 cm	N	< 0.034	< 0.015	< 0.018	< 0.021	0.019 J	< 0.030	< 0.015	< 0.016	< 0.018	< 0.018	< 0.016	< 0.027	< 0.048	< 0.018	< 0.018
SD-13	09/18/2008	0 - 10 cm	N	< 0.065	< 0.028	< 0.033	< 0.039	0.036 J	< 0.057	< 0.027	< 0.031	< 0.035	< 0.033	< 0.030	< 0.051	< 0.092	< 0.033	< 0.034
			FD	< 0.066	< 0.028	< 0.034	< 0.039	0.039 J	< 0.057	< 0.028	< 0.031	< 0.035	< 0.034	< 0.030	< 0.052	< 0.093	< 0.034	< 0.035
SD-2	09/20/2008	0 - 10 cm	N	< 0.028	< 0.012	< 0.015	< 0.017	0.014 J	< 0.024	0.017 J	< 0.013	< 0.015	< 0.015	< 0.013	< 0.022	< 0.039	< 0.014	< 0.015
SD-9	09/20/2008	0 - 10 cm	N	< 0.028	< 0.012	< 0.015	< 0.017	0.015 J	< 0.024	0.026 J	< 0.013	< 0.015	< 0.015	< 0.013	< 0.022	< 0.039	< 0.014	< 0.015
Beaver Ponds																		
Central Beaver Pond																		
SD-5	09/18/2008	0 - 10 cm	N	< 0.038	< 0.016	< 0.019	< 0.023	0.018 J	< 0.033	0.022 J	< 0.018	< 0.020	< 0.019	< 0.017	< 0.030	< 0.053	< 0.019	< 0.020

Table 5.2-4
Sediment Data - SVOCs
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name				Nitrobenzene	N-Nitrosodimethylamine	N-Nitrosodi-n-propylamine	N-Nitrosodiphenylamine	o-Cresol	p-Cresol	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	Pyridine
Background, Maximum Upstream Concentration, Exceedances Bold				0.029	0.028	0.022	0.02	0.019	0.037	0.14	0.012	0.022	0.016	0.022
Location ID	Sample Date	Depth	Sample Type											
Sheep Gulch														
SD-18	09/21/2008	0 - 10 cm	N	< 0.027	< 0.026	< 0.020	< 0.018	< 0.017	< 0.017	< 0.13	< 0.010	< 0.020	< 0.014	< 0.020
SD-19	09/21/2008	0 - 10 cm	N	< 0.027	< 0.026	< 0.020	< 0.018	< 0.017	< 0.017	< 0.13	< 0.010	< 0.020	< 0.014	< 0.020
SD-20	09/21/2008	0 - 10 cm	N	< 0.029	< 0.028	< 0.022	< 0.020	< 0.019	0.037 J	< 0.14	< 0.012	< 0.022	< 0.016	< 0.022
SD-8	09/20/2008	0 - 10 cm	N	< 0.028	< 0.027	< 0.021	< 0.020	< 0.018	< 0.018	< 0.14	< 0.011	< 0.021	< 0.015	< 0.022
SD-1	09/20/2008	0 - 10 cm	N	< 0.067 J	< 0.064 J	< 0.049 J	< 0.046 J	< 0.043 J	< 0.043 J	< 0.32 J	< 0.026 J	< 0.050 J	< 0.036 J	< 0.051 J
SD-3	09/19/2008	0 - 10 cm	N	< 0.027	< 0.026	< 0.020	< 0.019	< 0.018	< 0.018	< 0.13	< 0.011	< 0.021	< 0.015	< 0.021
SD-4	09/19/2008	0 - 10 cm	N	< 0.028	< 0.027	< 0.021	< 0.019	< 0.018	< 0.018	< 0.14	< 0.011	< 0.021	< 0.015	< 0.021
SD-6	09/18/2008	0 - 10 cm	N	< 0.032	< 0.031	< 0.024	< 0.023	< 0.021	0.046 J	< 0.16	< 0.013	< 0.024	< 0.018	< 0.025
SD-13	09/18/2008	0 - 10 cm	N	< 0.062	< 0.059	< 0.045	< 0.043	< 0.040	1.1	< 0.30	< 0.024	0.16 J	< 0.033	< 0.047
			FD	< 0.062	< 0.060	< 0.046	< 0.043	< 0.040	0.97	< 0.30	< 0.024	0.12 J	< 0.034	< 0.048
SD-2	09/20/2008	0 - 10 cm	N	< 0.027	< 0.026	< 0.020	< 0.018	< 0.017	< 0.017	< 0.13	0.012 J	< 0.020	< 0.014	< 0.020
SD-9	09/20/2008	0 - 10 cm	N	< 0.027	< 0.026	< 0.020	< 0.018	< 0.017	< 0.017	< 0.13	0.023 J	< 0.020	0.019 J	< 0.020
Beaver Ponds														
Central Beaver Pond														
SD-5	09/18/2008	0 - 10 cm	N	< 0.036	< 0.034	< 0.026	< 0.025	< 0.023	< 0.023	< 0.17	< 0.014	< 0.027	< 0.019	< 0.027

Table 5.2-5
Sediment Data - VOCs
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name				1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,1,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloro-1-propene	1,1-Dichloroethane	1,1-Dichloroethylene	1,2,3-Trichlorobenzene	1,2,3-Trichloropropane	1,2,4-Trichlorobenzene	1,2,4-Trimethylbenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane
Background, Maximum Upstream Concentration, Exceedances Bold				0.0091	0.0036	0.0080	0.00016	0.00028	0.000087	0.00013	0.0079	0.00049	0.0054	0.0072	0.038	0.00035
Location ID	Sample Date	Depth	Sample Type													
Sheep Gulch																
SD-18	09/21/2008	0 - 10 cm	N	< 0.0091	< 0.0036	< 0.0080	< 0.012	< 0.022	< 0.0098	< 0.023	< 0.0079	< 0.024	< 0.0054	< 0.0072	< 0.038 J	< 0.0082
SD-19	09/21/2008	0 - 10 cm	N	< 0.00033	< 0.00028	< 0.00017	< 0.00016	< 0.00028	< 0.000087	< 0.00013	< 0.00026	< 0.00049	< 0.00040	< 0.00017	< 0.0015	< 0.00035
SD-20	09/21/2008	0 - 10 cm	N	< 0.00020	< 0.00017	< 0.000099	< 0.000098	< 0.00017	< 0.000054	< 0.000078	< 0.00016	< 0.00030	< 0.00025	< 0.00011	< 0.00087	< 0.00022
SD-8	09/20/2008	0 - 10 cm	N	< 0.00021	< 0.00017	< 0.00011	< 0.000099	< 0.00017	< 0.000054	< 0.000079	< 0.00016	< 0.00031	< 0.00025	< 0.00011	< 0.00088	< 0.00022
SD-1	09/20/2008	0 - 10 cm	N	< 0.00081 J	< 0.00068 J	< 0.00040 J	< 0.00040 J	< 0.00068 J	< 0.00022 J	< 0.00032 J	< 0.00063 J	< 0.0013 J	< 0.00099 J	< 0.00049 J	< 0.0035 J	< 0.00086 J
SD-3	09/19/2008	0 - 10 cm	N	< 0.00019	< 0.00016	< 0.000093	< 0.000092	< 0.00016	< 0.000050	< 0.000073	< 0.00015	< 0.00029	< 0.00023	< 0.00012	< 0.00081	< 0.00020
SD-4	09/19/2008	0 - 10 cm	N	< 0.00020	< 0.00017	< 0.000096	< 0.000095	< 0.00017	< 0.000052	< 0.000076	< 0.00016	< 0.00029	< 0.00024	< 0.00010	< 0.00084	< 0.00021
SD-6	09/18/2008	0 - 10 cm	N	< 0.00027	< 0.00022	< 0.00013	< 0.00013	< 0.00022	< 0.000070	< 0.00011	< 0.00021	< 0.00040	< 0.00032	< 0.00014	< 0.0012	< 0.00028
SD-13	09/18/2008	0 - 10 cm	N	< 0.00077	< 0.00064	< 0.00038	< 0.00038	< 0.00064	< 0.00021	< 0.00030	< 0.00060	< 0.0012	< 0.00093	0.00055 J	< 0.0033	< 0.00081
			FD	< 0.00085	< 0.00071	< 0.00042	< 0.00042	< 0.00071	< 0.00023	< 0.00033	< 0.00066	< 0.0013	< 0.0011	< 0.00044	< 0.0037	< 0.00090
SD-2	09/20/2008	0 - 10 cm	N	< 0.00031	< 0.00026	< 0.00016	< 0.00016	< 0.00026	< 0.000083	< 0.00013	< 0.00025	< 0.00047	< 0.00038	< 0.00048	< 0.0014	< 0.00033
SD-9	09/20/2008	0 - 10 cm	N	< 0.00037	< 0.00031	< 0.00019	< 0.00018	< 0.00031	< 0.000098	< 0.00015	< 0.00029	< 0.00056	< 0.00045	< 0.00019	< 0.0016	< 0.00039
Beaver Ponds																
Central Beaver Pond																
SD-5	09/18/2008	0 - 10 cm	N	< 0.00034	< 0.00029	< 0.00017	< 0.00017	< 0.00029	< 0.000090	< 0.00014	< 0.00027	< 0.00051	< 0.00042	< 0.00018	< 0.0015	< 0.00036

Table 5.2-5
Sediment Data - VOCs
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name				1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloroethylene, cis	1,2-Dichloroethylene, trans	1,2-Dichloropropane	1,3,5-Trimethylbenzene	1,3-Dichloro-1-propene trans	1,3-Dichloro-1-propene, cis	1,3-Dichlorobenzene	1,3-Dichloropropane	1,4-Dichlorobenzene	2,2-Dichloropropane
Background, Maximum Upstream Concentration, Exceedances Bold				0.0060	0.0061	0.00015	0.011	0.0092	0.0094	0.00019	0.000057	0.0067	0.000011	0.0085	0.00019
Location ID	Sample Date	Depth	Sample Type												
Sheep Gulch															
SD-18	09/21/2008	0 - 10 cm	N	< 0.0060	< 0.0061	< 0.013	< 0.011	< 0.0092	< 0.0094	< 0.011	< 0.010	< 0.0067	< 0.0098	< 0.0085	< 0.022
SD-19	09/21/2008	0 - 10 cm	N	< 0.00012	< 0.000098	< 0.00015	< 0.000087	< 0.00012	< 0.000073	< 0.00019	< 0.000057	< 0.00013	< 0.00011	< 0.00019	< 0.00019
SD-20	09/21/2008	0 - 10 cm	N	< 0.000070	< 0.000060	< 0.000090	< 0.000054	< 0.000072	< 0.000045	< 0.00012	< 0.000035	< 0.000078	< 0.000066	< 0.00012	< 0.00012
SD-8	09/20/2008	0 - 10 cm	N	< 0.000071	< 0.000061	< 0.000092	< 0.000054	< 0.000074	< 0.000045	< 0.00012	< 0.000035	< 0.000079	< 0.000067	< 0.00012	< 0.00012
SD-1	09/20/2008	0 - 10 cm	N	< 0.00029 J	< 0.00025 J	< 0.00037 J	< 0.00022 J	< 0.00030 J	< 0.00018 J	< 0.00045 J	< 0.00014 J	< 0.00032 J	< 0.00027 J	< 0.00045 J	< 0.00045 J
SD-3	09/19/2008	0 - 10 cm	N	< 0.000066	< 0.000057	< 0.000085	< 0.000050	< 0.000068	< 0.000042	< 0.00011	< 0.000033	< 0.000073	< 0.000062	< 0.00020	< 0.00011
SD-4	09/19/2008	0 - 10 cm	N	< 0.000068	< 0.000058	< 0.000087	< 0.000052	< 0.000070	< 0.000043	< 0.00011	< 0.000034	< 0.000076	< 0.000064	< 0.00025	< 0.00011
SD-6	09/18/2008	0 - 10 cm	N	< 0.000092	< 0.000079	< 0.00012	< 0.000070	< 0.000095	< 0.000058	< 0.00015	< 0.000045	< 0.00011	< 0.000086	< 0.00015	< 0.00015
SD-13	09/18/2008	0 - 10 cm	N	< 0.00027	< 0.00023	< 0.00035	< 0.00021	< 0.00028	< 0.00017	< 0.00043	< 0.00014	< 0.00030	< 0.00025	< 0.00043	< 0.00043
			FD	< 0.00030	< 0.00026	< 0.00039	< 0.00023	< 0.00031	< 0.00019	< 0.00048	< 0.00015	< 0.00033	< 0.00028	< 0.00048	< 0.00048
SD-2	09/20/2008	0 - 10 cm	N	< 0.00011	< 0.000093	< 0.00014	< 0.000083	< 0.00012	< 0.000069	< 0.00018	< 0.000054	< 0.00013	< 0.00011	< 0.00018	< 0.00018
SD-9	09/20/2008	0 - 10 cm	N	< 0.00013	< 0.00012	< 0.00017	< 0.000098	< 0.00014	< 0.000082	< 0.00021	< 0.000064	< 0.00015	< 0.00013	< 0.00021	< 0.00021
Beaver Ponds															
Central Beaver Pond															
SD-5	09/18/2008	0 - 10 cm	N	< 0.00012	< 0.00011	< 0.00016	< 0.000090	< 0.00013	< 0.000075	< 0.00019	< 0.000058	< 0.00014	< 0.00012	< 0.00019	< 0.00019

Table 5.2-5
Sediment Data - VOCs
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name				2-Chloroethyl Vinyl Ether	2-Hexanone	Acetone	Acrolein	Acrylonitrile	Benzene	Bromobenzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Butyl benzene	Butylbenzene sec	Butylbenzene tert-	Carbon disulfide	Carbon tetrachloride
Background, Maximum Upstream Concentration, Exceedances Bold				0.00057	0.22	0.32	0.0062	0.0019	0.016	0.00017	0.011	0.0000080	0.011	0.00076	0.0083	0.0088	0.012	0.0061	0.00015
Location ID	Sample Date	Depth	Sample Type																
Sheep Gulch																			
SD-18	09/21/2008	0 - 10 cm	N	< 0.049 J	< 0.22	< 0.27	< 0.20 R	< 0.036	< 0.0077	< 0.012	< 0.011	< 0.0098	< 0.011	< 0.022 J	< 0.0083	< 0.0088	< 0.012	< 0.017	< 0.024
SD-19	09/21/2008	0 - 10 cm	N	< 0.00057	< 0.0015	0.32 J	< 0.0062	< 0.0019	0.0036 J	< 0.00017	< 0.00046	< 0.000080	< 0.00046	< 0.00076	< 0.00016	< 0.00012	< 0.000098	0.0017 J	< 0.00015
SD-20	09/21/2008	0 - 10 cm	N	< 0.00035	< 0.00087	0.037 J	< 0.0038	< 0.0012	0.016	< 0.00011	< 0.00028	< 0.000049	< 0.00028	< 0.00047	< 0.000098	< 0.000072	< 0.000060	0.0061	< 0.000087
SD-8	09/20/2008	0 - 10 cm	N	< 0.00035	< 0.00088	0.032 J	< 0.0039	< 0.0012	0.0030 J	< 0.00011	< 0.00029	< 0.000050	< 0.00029	< 0.00048	< 0.000099	< 0.000074	< 0.000061	0.0052 J	< 0.000088
SD-1	09/20/2008	0 - 10 cm	N	< 0.0014 J	< 0.0035 J	0.29 J	< 0.016 J	< 0.0045 J	0.0082 J	< 0.00042 J	< 0.0012 J	< 0.00020 J	< 0.0012 J	< 0.0019 J	< 0.00040 J	< 0.00030 J	< 0.00025 J	0.049 J	< 0.00035 J
SD-3	09/19/2008	0 - 10 cm	N	< 0.00033	< 0.00081	0.016 J	< 0.0036	< 0.0011	0.0013 J	< 0.000096	< 0.00026	< 0.000046	< 0.00026	< 0.00044	< 0.000092	< 0.000068	< 0.000057	0.0044 J	< 0.000081
SD-4	09/19/2008	0 - 10 cm	N	< 0.00034	< 0.00084	0.2 J	< 0.0037	< 0.0011	< 0.00016	< 0.000099	< 0.00027	< 0.000048	< 0.00027	< 0.00056	< 0.000095	< 0.000070	< 0.000058	0.0022 J	< 0.000084
SD-6	09/18/2008	0 - 10 cm	N	< 0.00045	< 0.0012	0.04	< 0.0050	< 0.0015	< 0.00021	< 0.00014	< 0.00037	< 0.000064	< 0.00037	< 0.00061	< 0.00013	< 0.000095	< 0.000079	0.016	< 0.00012
SD-13	09/18/2008	0 - 10 cm	N	< 0.0014	< 0.0033	0.27	< 0.015	< 0.0043	0.0089 J	< 0.00039	< 0.0011	< 0.00019	< 0.0011	< 0.0018	< 0.00038	< 0.00028	< 0.00023	0.05	< 0.00033
			FD	< 0.0015	< 0.0037	0.28	< 0.017	< 0.0048	0.011 J	< 0.00044	< 0.0012	< 0.00021	< 0.0012	< 0.0020	< 0.00042	< 0.00031	< 0.00026	0.05	< 0.00037
SD-2	09/20/2008	0 - 10 cm	N	< 0.00054	< 0.0014	0.47 J	< 0.0059	< 0.0018	0.011	< 0.00016	< 0.00044	< 0.000076	< 0.00044	< 0.00073	< 0.00016	< 0.00012	< 0.000093	0.0015 J	< 0.00014
SD-9	09/20/2008	0 - 10 cm	N	< 0.00064	< 0.0016	0.19 J	< 0.0070	< 0.0021	0.0041 J	< 0.00019	< 0.00052	< 0.000090	< 0.00052	< 0.00086	< 0.00018	< 0.00014	< 0.00012	0.00065 J	< 0.00016
Beaver Ponds																			
Central Beaver Pond																			
SD-5	09/18/2008	0 - 10 cm	N	< 0.00058	< 0.0015	0.085	< 0.0064	< 0.0019	0.0072 J	< 0.00018	< 0.00047	< 0.000083	< 0.00047	< 0.00079	< 0.00017	< 0.00013	< 0.00011	0.0050 J	< 0.00015

Table 5.2-5
Sediment Data - VOCs
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name				Chlorobenzene	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	Chlorotoluene o-	Chlorotoluene p-	Cumene (isopropyl benzene)	Cymene p- (Toluene isopropyl p-)	Dibromomethane (methylene bromide)	Dichlorodifluoromethane (CFC-12)	Ethyl benzene
Background, Maximum Upstream Concentration, Exceedances Bold				0.0071	0.0077	0.017	0.000087	0.011	0.0070	0.00017	0.000057	0.0078	0.00033	0.00014	0.0051
Location ID	Sample Date	Depth	Sample Type												
Sheep Gulch															
SD-18	09/21/2008	0 - 10 cm	N	< 0.0071	< 0.0077	< 0.017	< 0.011	< 0.011	< 0.0070	< 0.0092	< 0.011	< 0.0078	< 0.020	< 0.024	< 0.0051
SD-19	09/21/2008	0 - 10 cm	N	< 0.000098	< 0.00029	< 0.00055	< 0.000087	< 0.00011	< 0.000093	< 0.00017	< 0.000057	< 0.00016	< 0.00033	< 0.00014	< 0.000075
SD-20	09/21/2008	0 - 10 cm	N	< 0.000060	< 0.00018	< 0.00034	< 0.000054	< 0.000064	< 0.000057	< 0.00011	< 0.000035	< 0.000092	< 0.00020	< 0.000080	< 0.000046
SD-8	09/20/2008	0 - 10 cm	N	< 0.000061	< 0.00018	< 0.00034	< 0.000054	< 0.000065	< 0.000058	< 0.00011	< 0.000035	< 0.000094	< 0.00021	< 0.000081	0.00026 J
SD-1	09/20/2008	0 - 10 cm	N	< 0.00025 J	< 0.00072 J	< 0.0014 J	< 0.00022 J	< 0.00026 J	< 0.00023 J	< 0.00042 J	< 0.00014 J	< 0.00038 J	< 0.00081 J	< 0.00033 J	0.0031 J
SD-3	09/19/2008	0 - 10 cm	N	< 0.000057	< 0.00017	< 0.00032	< 0.000050	< 0.000060	< 0.000053	< 0.000096	< 0.000033	< 0.000087	< 0.00019	< 0.000075	< 0.000043
SD-4	09/19/2008	0 - 10 cm	N	< 0.000058	< 0.00018	< 0.00033	< 0.000052	< 0.00062	< 0.000055	< 0.000099	< 0.000034	< 0.000089	< 0.00020	< 0.000078	0.00030 J
SD-6	09/18/2008	0 - 10 cm	N	< 0.000079	< 0.00024	< 0.00044	< 0.000070	< 0.000083	< 0.000074	< 0.00014	< 0.000045	0.00039 J	< 0.00027	< 0.00011	< 0.000060
SD-13	09/18/2008	0 - 10 cm	N	< 0.00023	< 0.00068	< 0.0013	< 0.00021	< 0.00025	< 0.00022	< 0.00039	< 0.00014	0.0011 J	< 0.00077	< 0.00031	0.0010 J
			FD	< 0.00026	< 0.00076	< 0.0015	< 0.00023	< 0.00027	< 0.00025	< 0.00044	< 0.00015	0.0039 J	< 0.00085	< 0.00034	< 0.00020
SD-2	09/20/2008	0 - 10 cm	N	< 0.000093	< 0.00028	< 0.00052	< 0.000083	< 0.000099	< 0.000088	< 0.00016	< 0.000054	< 0.00015	< 0.00031	0.0020 J	0.00060 J
SD-9	09/20/2008	0 - 10 cm	N	< 0.00012	< 0.00033	< 0.00062	< 0.000098	< 0.00031	< 0.00011	< 0.00019	< 0.000064	< 0.00017	< 0.00037	< 0.00015	< 0.000084
Beaver Ponds															
Central Beaver Pond															
SD-5	09/18/2008	0 - 10 cm	N	< 0.00011	< 0.00030	< 0.00057	< 0.000090	< 0.00011	< 0.000096	< 0.00018	< 0.000058	< 0.00016	< 0.00034	< 0.00014	< 0.000077

Table 5.2-5
Sediment Data - VOCs
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name				Hexachlorobutadiene	Iodomethane	Methyl ethyl ketone	Methyl isobutyl ketone	Methyl tertiary butyl ether (MTBE)	Methylene chloride	Naphthalene	Propylbenzene	Styrene	Tetrachloroethylene	Toluene	Trichloroethylene	Trichlorofluoromethane	Vinyl acetate
Background, Maximum Upstream Concentration, Exceedances Bold				0.018	0.0011	0.24	0.00044	0.00015	0.011	0.0077	0.00012	0.0051	0.00022	0.0096	0.015	0.0000098	0.0011
Location ID	Sample Date	Depth	Sample Type														
Sheep Gulch																	
SD-18	09/21/2008	0 - 10 cm	N	< 0.018	< 0.11	< 0.24	< 0.39	< 0.017	< 0.011	< 0.0077	< 0.011	< 0.0051	< 0.017	< 0.0096	< 0.015	< 0.026	< 0.042
SD-19	09/21/2008	0 - 10 cm	N	< 0.00031	< 0.0011	0.034 J	< 0.00044	< 0.00015	< 0.00026	< 0.00058	< 0.00012	< 0.00014	< 0.00022	0.0017 J	< 0.00024	< 0.000098	< 0.0011
SD-20	09/21/2008	0 - 10 cm	N	< 0.00019	< 0.00066	0.01 J	< 0.00027	< 0.000089	< 0.00016	< 0.00036	< 0.000069	< 0.000085	< 0.00014	0.0039 J	< 0.00015	< 0.000060	< 0.00067
SD-8	09/20/2008	0 - 10 cm	N	< 0.00020	< 0.00067	0.0044 J	< 0.00027	< 0.000090	< 0.00016	< 0.00036	< 0.000070	< 0.000086	< 0.00014	0.0025 J	< 0.00015	< 0.000061	< 0.00068
SD-1	09/20/2008	0 - 10 cm	N	< 0.00077 J	< 0.0027 J	0.046 J	< 0.0011 J	< 0.00036 J	< 0.00063 J	< 0.0015 J	< 0.00028 J	< 0.00035 J	< 0.00054 J	0.012 J	< 0.00059 J	< 0.00025 J	< 0.0027 J
SD-3	09/19/2008	0 - 10 cm	N	< 0.00018	< 0.00062	0.0030 J	< 0.00025	< 0.000083	< 0.00015	< 0.00046	< 0.000065	< 0.000079	< 0.00013	0.00072 J	< 0.00014	< 0.000057	< 0.00063
SD-4	09/19/2008	0 - 10 cm	N	< 0.00019	0.021 J	0.021 J	< 0.00026	< 0.000086	< 0.00016	< 0.00069	< 0.000067	< 0.000096	0.00038 J	0.00091 J	< 0.00014	< 0.000058	< 0.00065
SD-6	09/18/2008	0 - 10 cm	N	< 0.00025	< 0.00086	< 0.0024	< 0.00035	< 0.00012	< 0.00022	< 0.00047	< 0.000090	< 0.00012	< 0.00018	0.0012 J	< 0.00019	< 0.000079	< 0.00087
SD-13	09/18/2008	0 - 10 cm	N	< 0.00072	< 0.0025	0.048 J	< 0.0011	< 0.00034	< 0.0011	< 0.0014	< 0.00027	< 0.00033	< 0.00051	0.0063 J	< 0.00055	< 0.00023	< 0.0026
			FD	< 0.00081	< 0.0028	0.049 J	< 0.0012	< 0.00038	< 0.00066	< 0.0016	< 0.00030	< 0.00036	< 0.00057	0.0065 J	< 0.00062	< 0.00026	< 0.0029
SD-2	09/20/2008	0 - 10 cm	N	< 0.00030	< 0.0011	0.039	< 0.00042	< 0.00014	< 0.00059	< 0.0012	< 0.00011	< 0.00014	< 0.00021	0.0039 J	< 0.00023	< 0.000093	< 0.0011
SD-9	09/20/2008	0 - 10 cm	N	< 0.00035	0.0098 J	0.017 J	< 0.00049	< 0.00017	< 0.00029	< 0.00066	< 0.00013	< 0.00016	< 0.00025	0.0019 J	< 0.00027	< 0.00012	< 0.0013
Beaver Ponds																	
Central Beaver Pond																	
SD-5	09/18/2008	0 - 10 cm	N	< 0.00032	< 0.0012	0.013 J	< 0.00045	< 0.00015	< 0.00062	< 0.00060	< 0.00012	< 0.00015	< 0.00023	0.0046 J	< 0.00025	< 0.00011	< 0.0012

Table 5.2-5
Sediment Data - VOCs
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name				Vinyl chloride	Xylene m & p	Xylene, o-
Background, Maximum Upstream Concentration, Exceedances Bold				0.00011	0.011	0.0077
Location ID	Sample Date	Depth	Sample Type			
Sheep Gulch						
SD-18	09/21/2008	0 - 10 cm	N	< 0.022	< 0.011	< 0.0077
SD-19	09/21/2008	0 - 10 cm	N	< 0.00011	0.00096 J	0.00038 J
SD-20	09/21/2008	0 - 10 cm	N	< 0.000064	< 0.00049	0.00023 J
SD-8	09/20/2008	0 - 10 cm	N	< 0.000065	< 0.00047	0.00020 J
SD-1	09/20/2008	0 - 10 cm	N	< 0.00026 J	0.0025 J	0.00099 J
SD-3	09/19/2008	0 - 10 cm	N	< 0.000060	< 0.00040	0.00017 J
SD-4	09/19/2008	0 - 10 cm	N	< 0.000062	< 0.00072	0.00030 J
SD-6	09/18/2008	0 - 10 cm	N	< 0.000083 R	0.00058 J	0.00025 J
SD-13	09/18/2008	0 - 10 cm	N	< 0.00025 R	0.0028 J	0.0011 J
			FD	< 0.00027 R	0.0020 J	0.00080 J
SD-2	09/20/2008	0 - 10 cm	N	< 0.000099	0.0017 J	0.00057 J
SD-9	09/20/2008	0 - 10 cm	N	< 0.00012	< 0.00080	0.00035 J
Beaver Ponds						
Central Beaver Pond						
SD-5	09/18/2008	0 - 10 cm	N	< 0.00011 R	0.0010 J	0.00041 J

Table 5.2-6
Sediment Data - Radionuclides
Sheep Gulch, Surface Water Pathways and Beaver Ponds
Rhodia Silver Bow Plant
[concentrations in pCi/g]

Chemical Name				Actinium-228	Bismuth 212	Bismuth 214	Cesium 137	Gross Alpha (radiation)	Gross Beta (radiation)	Lead 212	Lead 214	Potassium 40	Radium 224	Radium 226	Radium 228	Thallium 208	Thorium 234
Background, Maximum Upstream Concentration, Exceedances Bold								16 +/- 2	14 +/- 1.2					3.4 +/- 0.74	4.1 +/- 1.3		
Location ID	Sample Date	Depth	Sample Type														
Sheep Gulch																	
SD-18	09/21/2008	0 - 10 cm	N	--	--	--	--	5.7 +/- 1.2	5.8 +/- 0.89	--	--	--	--	1.7 +/- 0.57	3.4 +/- 1.3	--	--
SD-19	09/21/2008	0 - 10 cm	N	--	--	--	--	12 +/- 1.8	14 +/- 1.2	--	--	--	--	3.4 +/- 0.74	3 +/- 1.3	--	--
SD-20	09/21/2008	0 - 10 cm	N	--	--	--	--	7.3 +/- 1.4	7.6 +/- 1	--	--	--	--	2.4 +/- 0.68	4.1 +/- 1.3	--	--
SD-8	09/20/2008	0 - 10 cm	N	--	--	--	--	16 +/- 2	8.2 +/- 1	--	--	--	--	2.4 +/- 0.63	< 2.8	--	--
SD-1	09/20/2008	0 - 10 cm	N	--	--	--	--	21 +/- 3.9	17 +/- 2.3	--	--	--	--	4.5 +/- 0.86	3.5 +/- 1.3	--	--
SD-3	09/19/2008	0 - 10 cm	N	--	--	--	--	7.3 +/- 1.3	6.6 +/- 1	--	--	--	--	2.4 +/- 0.67	< 3	--	--
SD-4	09/19/2008	0 - 10 cm	N	--	--	--	--	10 +/- 2	9.2 +/- 1.3	--	--	--	--	1.6 +/- 0.6	< 3	--	--
SD-6	09/18/2008	0 - 10 cm	N	--	--	--	--	12 +/- 1.8	11 +/- 1.2	--	--	--	--	3.5 +/- 0.74	< 3	--	--
SD-13	09/18/2008	0 - 10 cm	N	--	--	--	--	12 +/- 2.1	16 +/- 1.6	--	--	--	--	3.1 +/- 0.76	< 3	--	--
			FD	--	--	--	--	12 +/- 2.6	11 +/- 1.8	--	--	--	--	3.5 +/- 0.81	< 2.9	--	--
ESI-SG-3S	07/22/2003		N	1.34 +/- 0.365	1.30 +/- 0.572	0.721 +/- 0.141	< 0.0923	15.9 +/- 3.16 J	28.0 +/- 7.62 JB	1.42 +/- 0.208	0.854 +/- 0.184	32.5 +/- 2.97	3.19 +/- 0.960	0.943 +/- 0.305 J	--	0.492 +/- 0.0826	--
SD-2	09/20/2008	0 - 10 cm	N	--	--	--	--	14 +/- 2.4	18 +/- 1.9	--	--	--	--	3.7 +/- 0.81	< 2.9	--	--
SD-9	09/20/2008	0 - 10 cm	N	--	--	--	--	11 +/- 1.9	18 +/- 1.6	--	--	--	--	3.9 +/- 0.83	< 3 J	--	--
Beaver Ponds																	
Southern Beaver Pond																	
SD-24	10/07/2012	0 - 10 cm	N	--	--	--	--	32 +/- 2.7	28 +/- 1.5	--	--	--	--	3.4 +/- 0.67	1.6 +/- 1.1	--	--
SD-25	10/07/2012	0 - 10 cm	N	--	--	--	--	10 +/- 1.1 R	22 +/- 1.4	--	--	--	--	2.2 +/- 0.59	3.8 +/- 1.1	--	--
Central Beaver Pond																	
SD-5	07/22/2003		N	1.45 +/- 0.369	--	0.880 +/- 0.175	< 0.101	15.8 +/- 3.75 J	< 7.29 JB	1.72 +/- 0.254	0.948 +/- 0.216	29.5 +/- 2.96	--	2.38 +/- 0.485 J	--	0.526 +/- 0.0988	3.67 +/- 1.20
			FD	1.53 +/- 0.371	--	0.763 +/- 0.152	< 0.0929	16.3 +/- 3.46 J	37.1 +/- 7.39 JB	1.67 +/- 0.240	0.916 +/- 0.199	29.3 +/- 2.84	--	1.57 +/- 0.330 J	--	0.511 +/- 0.0866	2.74 +/- 1.02
SD-5	9/18/2008	0 - 10 cm	N	--	--	--	--	11 +/- 1.7	10 +/- 1.1	--	--	--	--	5.6 +/- 0.95	< 3	--	--
SD-21	10/06/2012	0 - 10 cm	N	--	--	--	--	11 +/- 3.2	14 +/- 2.5	--	--	--	--	1.5 +/- 0.45	3.4 +/- 1.1	--	--
SD-22	10/07/2012	0 - 10 cm	N	--	--	--	--	18 +/- 2.9	15 +/- 1.7	--	--	--	--	1.7 +/- 0.5	< 2.9	--	--
SD-23	10/07/2012	0 - 10 cm	N	--	--	--	--	7 +/- 1.3	7.5 +/- 0.92	--	--	--	--	1.3 +/- 0.47	1.5 +/- 0.98	--	--
Northern Beaver Pond																	
SD-28	10/07/2012	0 - 10 cm	N	--	--	--	--	16 +/- 2.9	16 +/- 1.8	--	--	--	--	1.5 +/- 0.45	< 2.4	--	--
SD-29	10/07/2012	0 - 10 cm	N	--	--	--	--	14 +/- 1.8	12 +/- 1.1	--	--	--	--	2.5 +/- 0.61	2.7 +/- 1.1	--	--
Eastern Beaver Pond																	
SD-26	10/07/2012	0 - 10 cm	N	--	--	--	--	14 +/- 2.2	15 +/- 1.4	--	--	--	--	3 +/- 0.7	3.4 +/- 1.1	--	--
SD-27	10/07/2012	0 - 10 cm	N	--	--	--	--	17 +/- 3	19 +/- 2	--	--	--	--	2.5 +/- 0.59	4.1 +/- 1.1	--	--
			FD	--	--	--	--	13 +/- 2.6	19 +/- 2	--	--	--	--	2.7 +/- 0.62	3.5 +/- 1.2	--	--

Figures



Barr Footer-ArcGIS 10.0, 2012-12-21 13:13 File: I:\Projects\2546\006\Gis\Maps\RFI_Workplan_2012\5.2_Sediment Sample Locations - Background, Sheep Gulch and Surface Water Pathways.mxd User: KLM

- Sediment Sample
- Fence Line
- Property Boundary

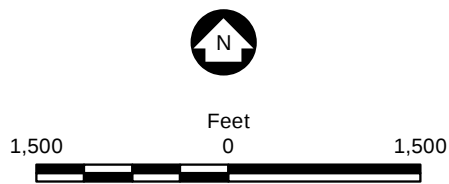
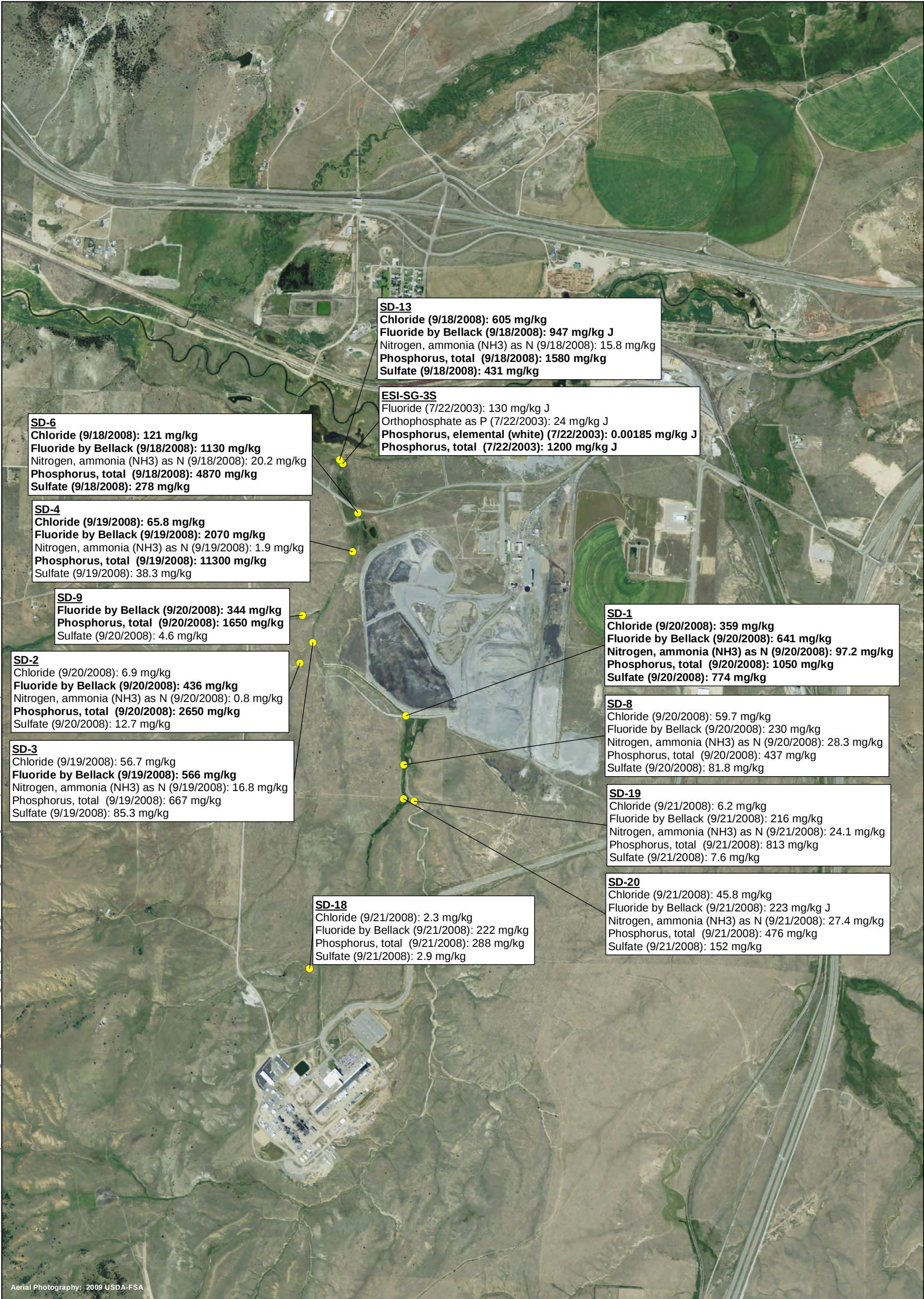


Figure 5.2-1a

SEDIMENT SAMPLE LOCATIONS -
BACKGROUND, SHEEP GULCH AND
SURFACE WATER PATHWAYS
Rhodia Silver Bow Plant
Montana

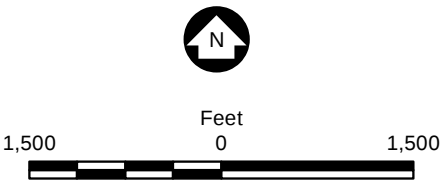


● Sample Location

Figure 5.2-2

BACKGROUND, SHEEP GULCH AND
SURFACE WATER PATHWAYS -
GENERAL PARAMETERS
Rhodia Silver Bow Plant
Montana

Bold font indicates that sample concentration is above background.
Only detected concentrations are shown on this figure.





● Sample Location

Bold font indicates that sample concentration is above background.
Only detected concentrations are shown on this figure.

1,500 Feet 0 1,500



Figure 5.2-3

BACKGROUND, SHEEP GULCH AND
SURFACE WATER PATHWAYS -
METALS A
Rhodia Silver Bow Plant
Montana

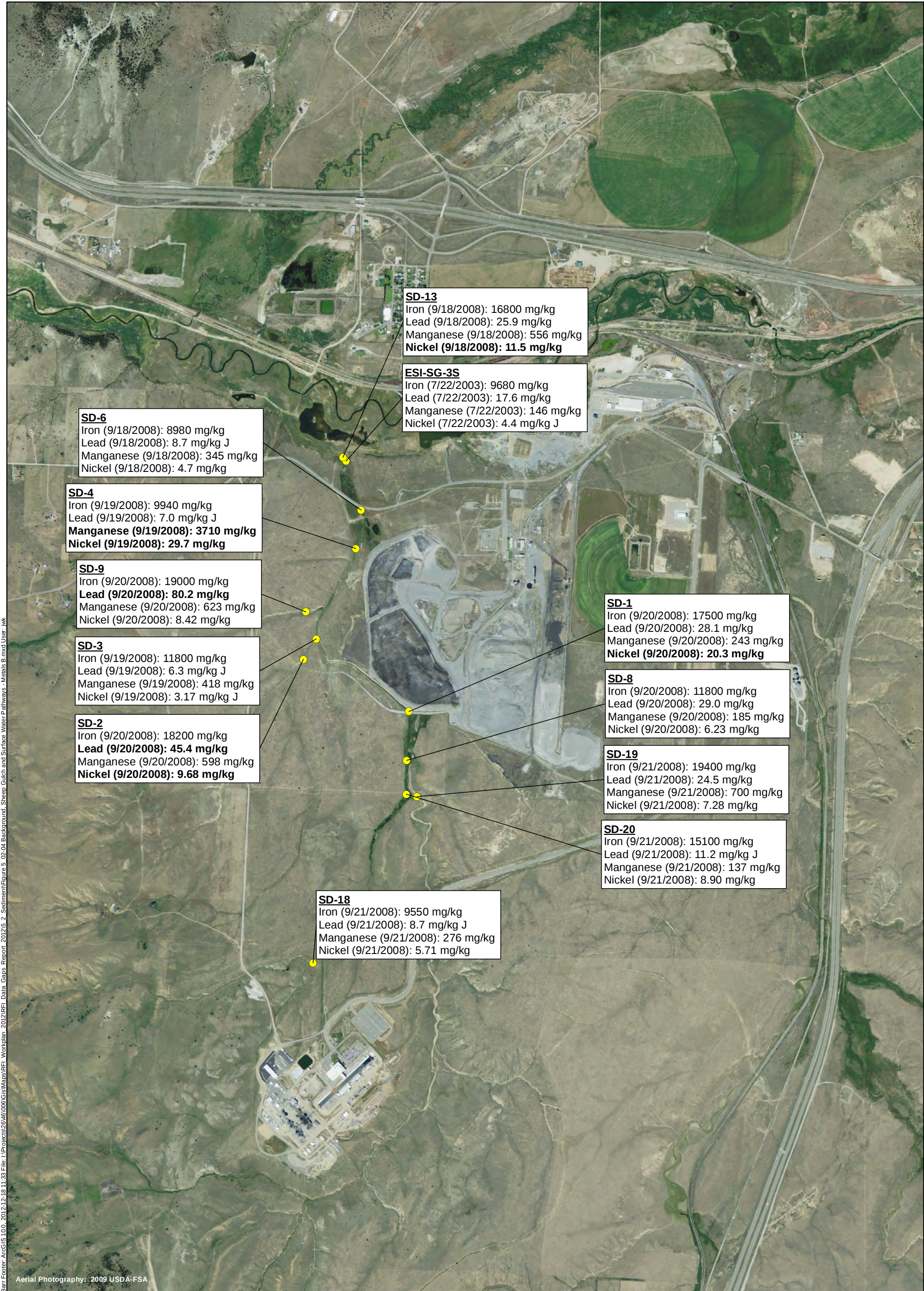


Figure 5.2-4

BACKGROUND, SHEEP GULCH AND
SURFACE WATER PATHWAYS -
METALS B
Rhodia Silver Bow Plant
Montana



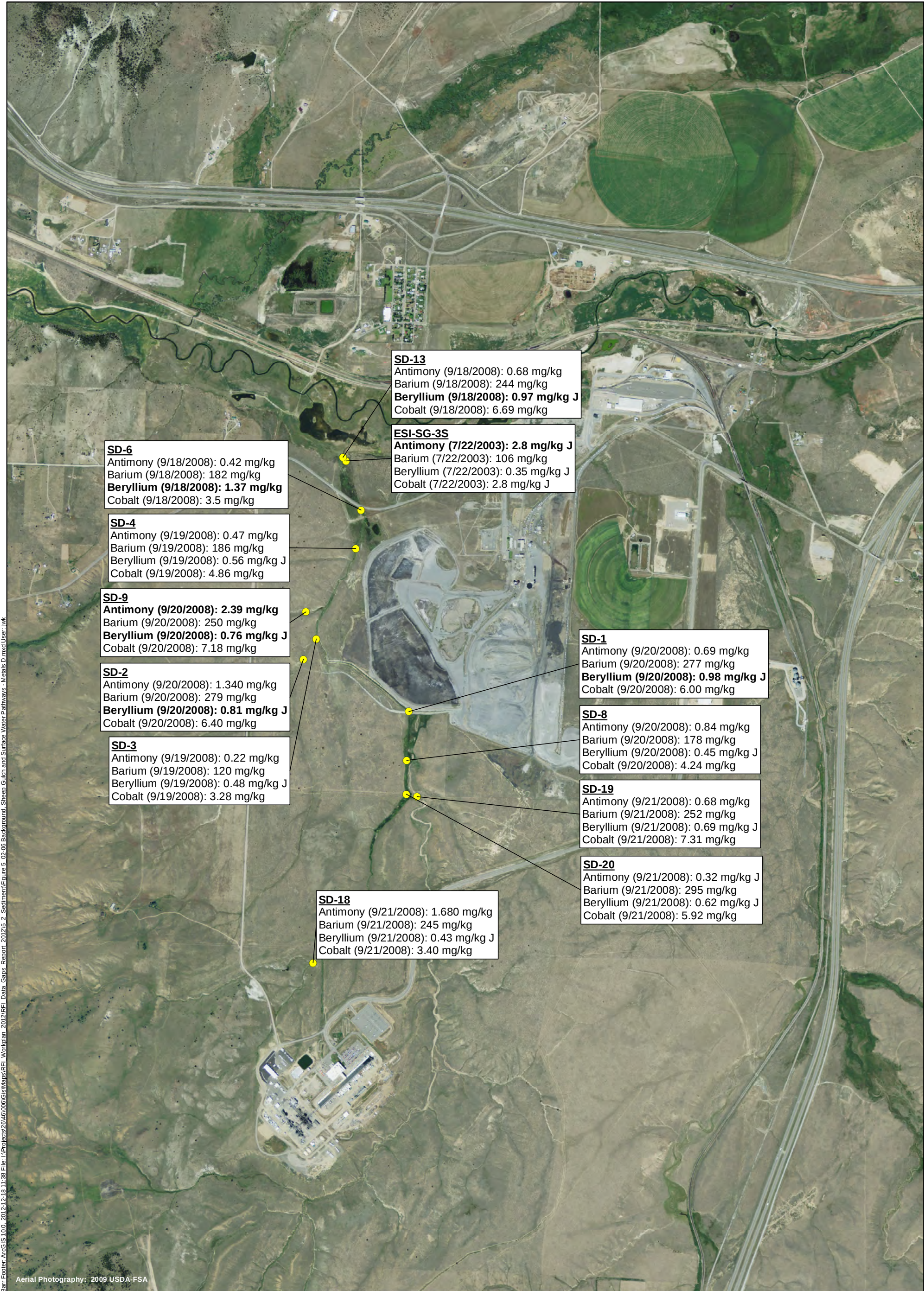
Bold font indicates that sample concentration is above background.
Only detected concentrations are shown on this figure.

1,500 0 1,500



Figure 5.2-5

BACKGROUND, SHEEP GULCH AND
SURFACE WATER PATHWAYS -
METALS C
Rhodia Silver Bow Plant
Montana



● Sample Location

Bold font indicates that sample concentration is above background.
Only detected concentrations are shown on this figure.

1,500 0 1,500
Feet



Figure 5.2-6

BACKGROUND, SHEEP GULCH AND
SURFACE WATER PATHWAYS -
METALS D
Rhodia Silver Bow Plant
Montana



● Sample Location

Bold font indicates that sample concentration is above background.
Only detected concentrations are shown on this figure.

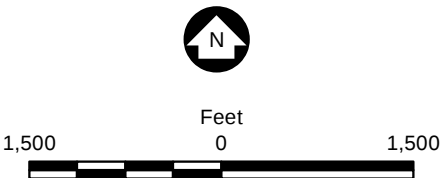


Figure 5.2-7
BACKGROUND, SHEEP GULCH AND
SURFACE WATER PATHWAYS -
METALS E
Rhodia Silver Bow Plant
Montana

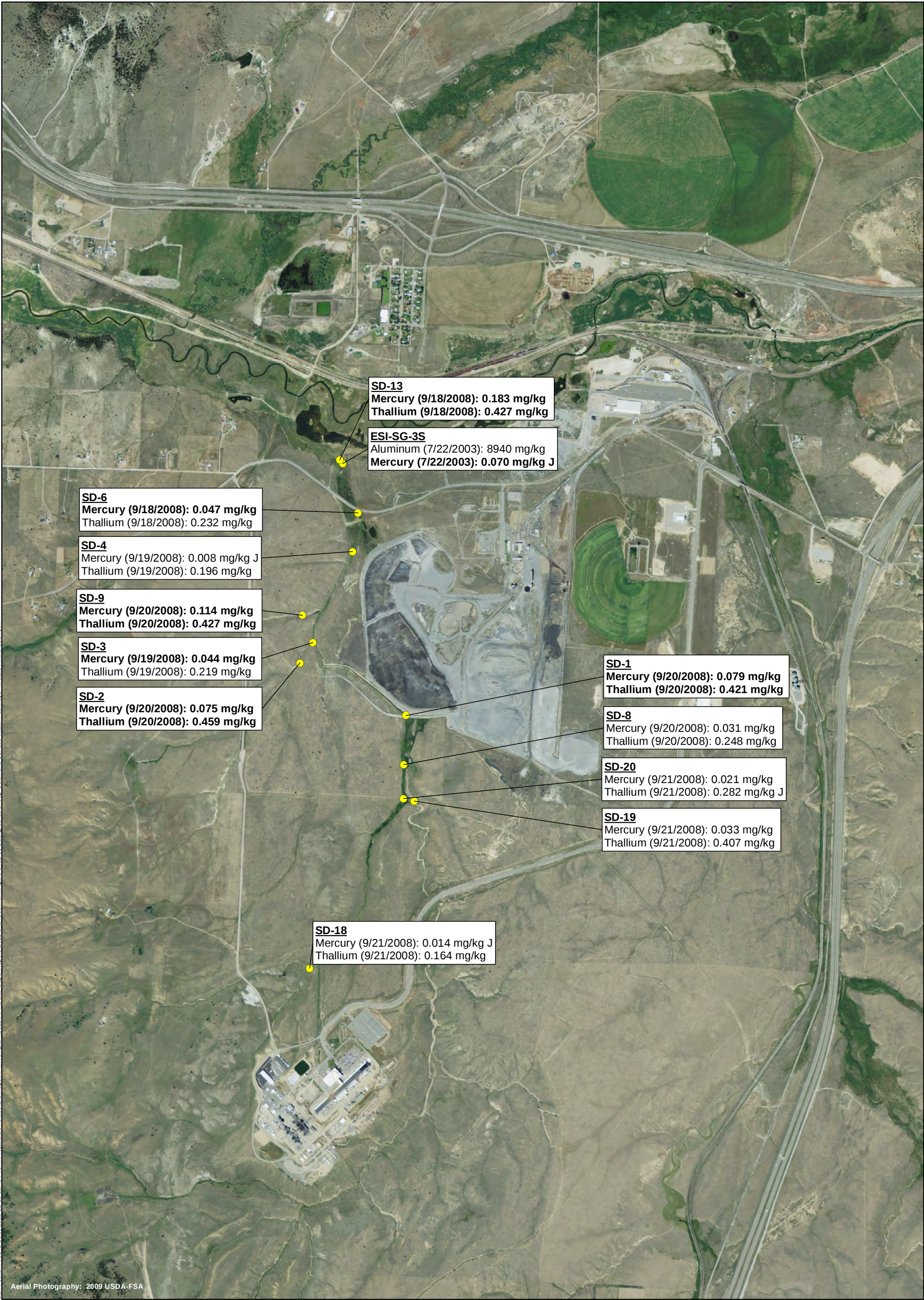


Figure 5.2-8

BACKGROUND, SHEEP GULCH AND
SURFACE WATER PATHWAYS -
METALS F
Rhodia Silver Bow Plant
Montana

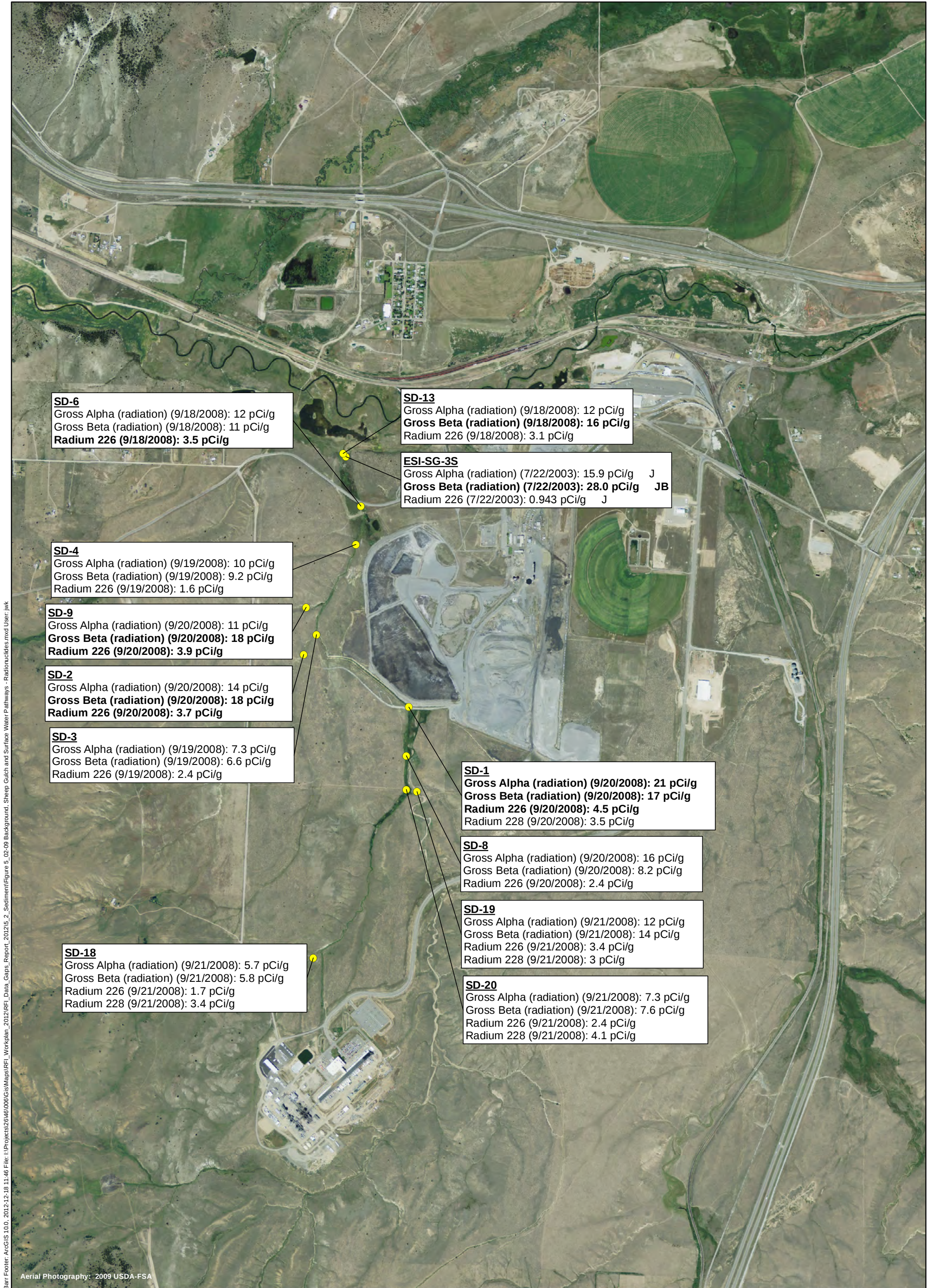
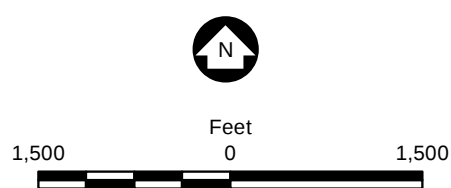


Figure 5.2-9

BACKGROUND, SHEEP GULCH AND
SURFACE WATER PATHWAYS -
RADIONUCLIDES
Rhodia Silver Bow Plant
Montana

Bold font indicates that sample concentration is above background.
Only detected concentrations are shown on this figure.



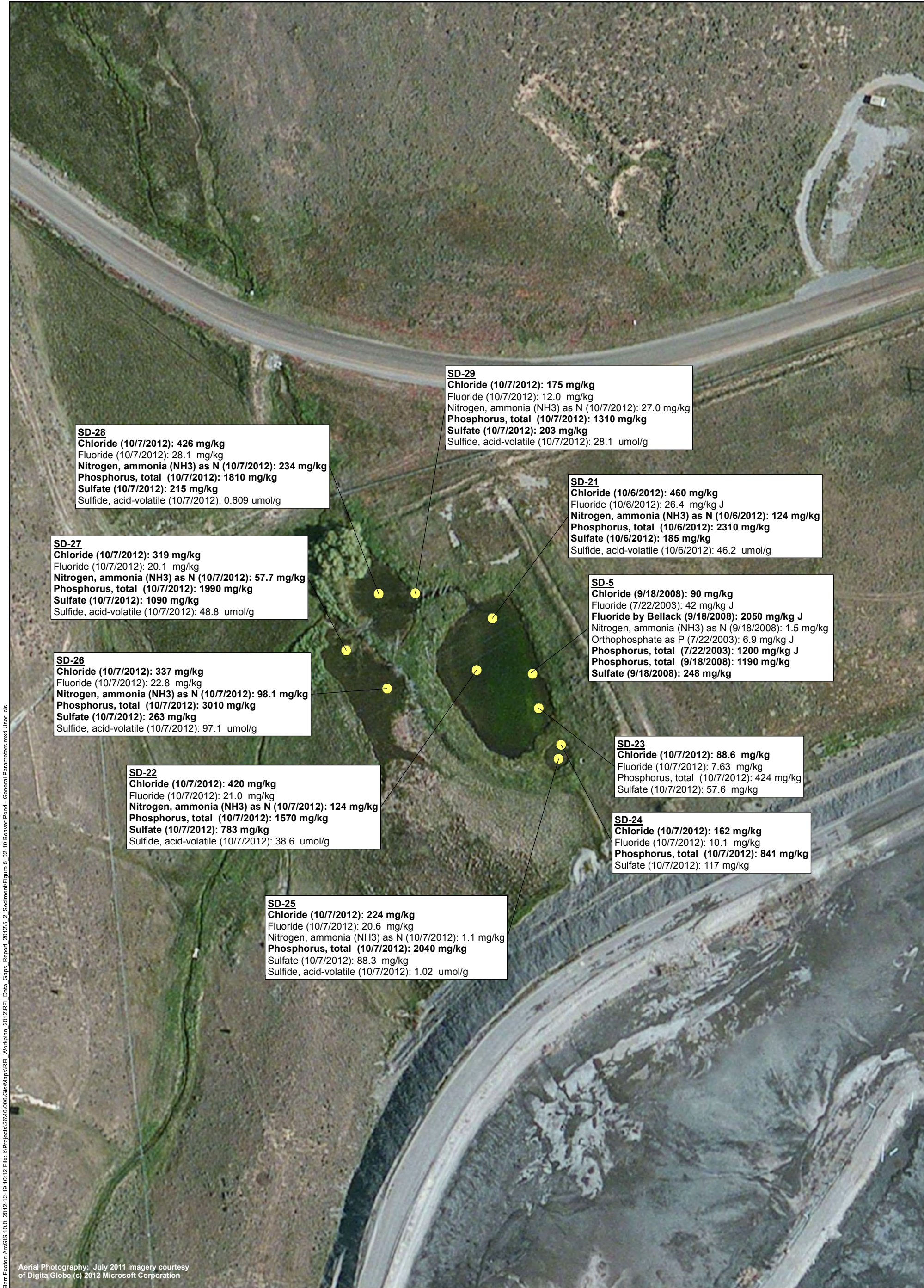
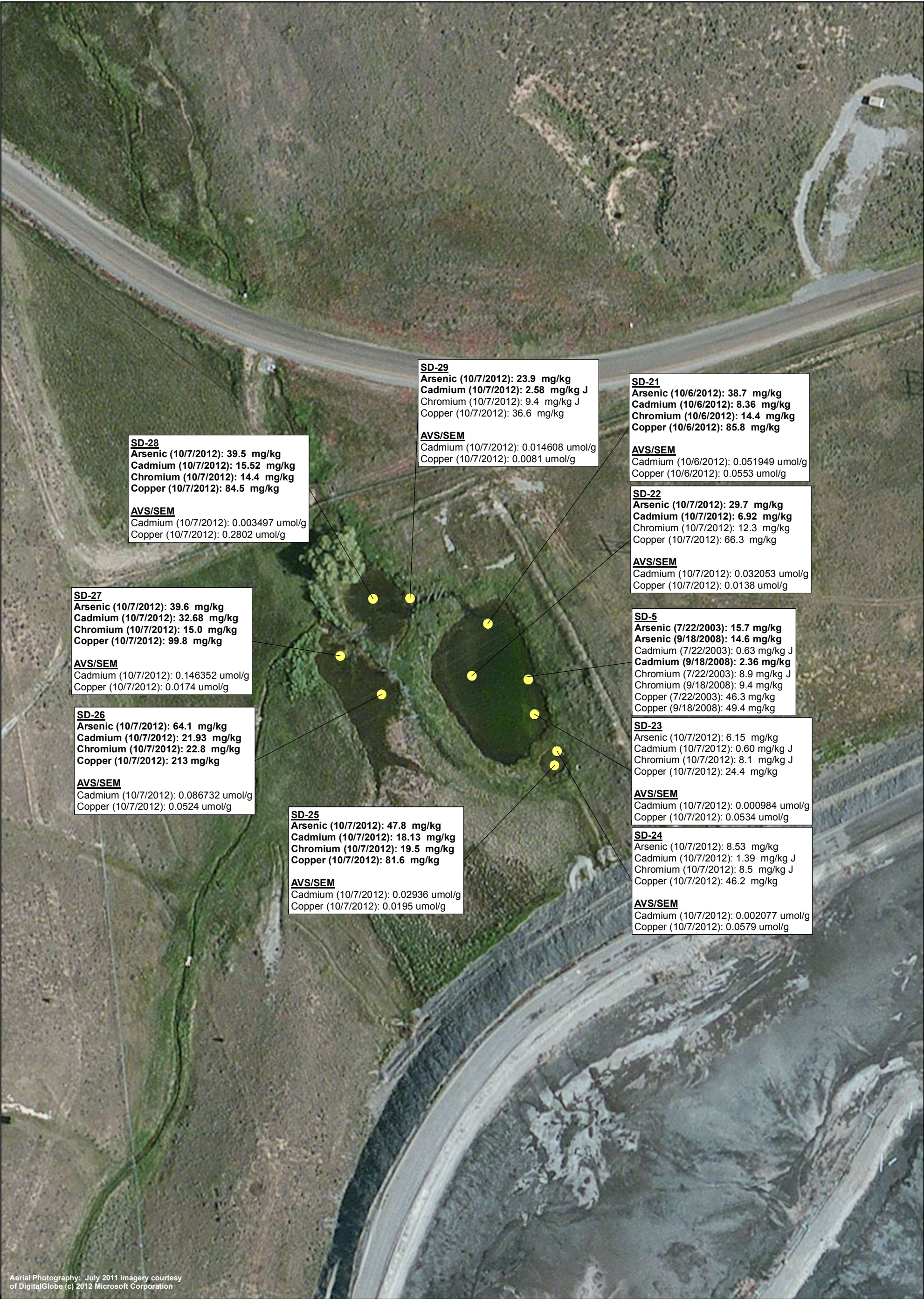


Figure 5.2-10
BEAVER POND -
GENERAL PARAMETERS
Rhodia Silver Bow Plant
Montana

Barr Foster, ArcGIS 10.0, 2012-12-18 12:06 File: I:\Projects\2546\006\Gis\Maps\RFI_Workplan_2012\RFI_Data_Caps_Report_2012\5_2_Sediment\Figure 5_02-11 Beaver Pond - Metals A.mxd User: jwk



● Sample Location

AVS/SEM = Acid Volatile Sulfide
Simultaneously Extracted Metals

Bold font indicates that sample concentration is above background.
Only detected concentrations are shown on this figure.

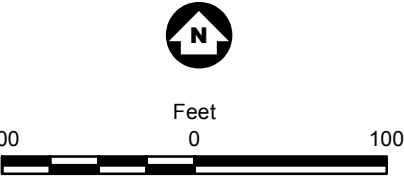
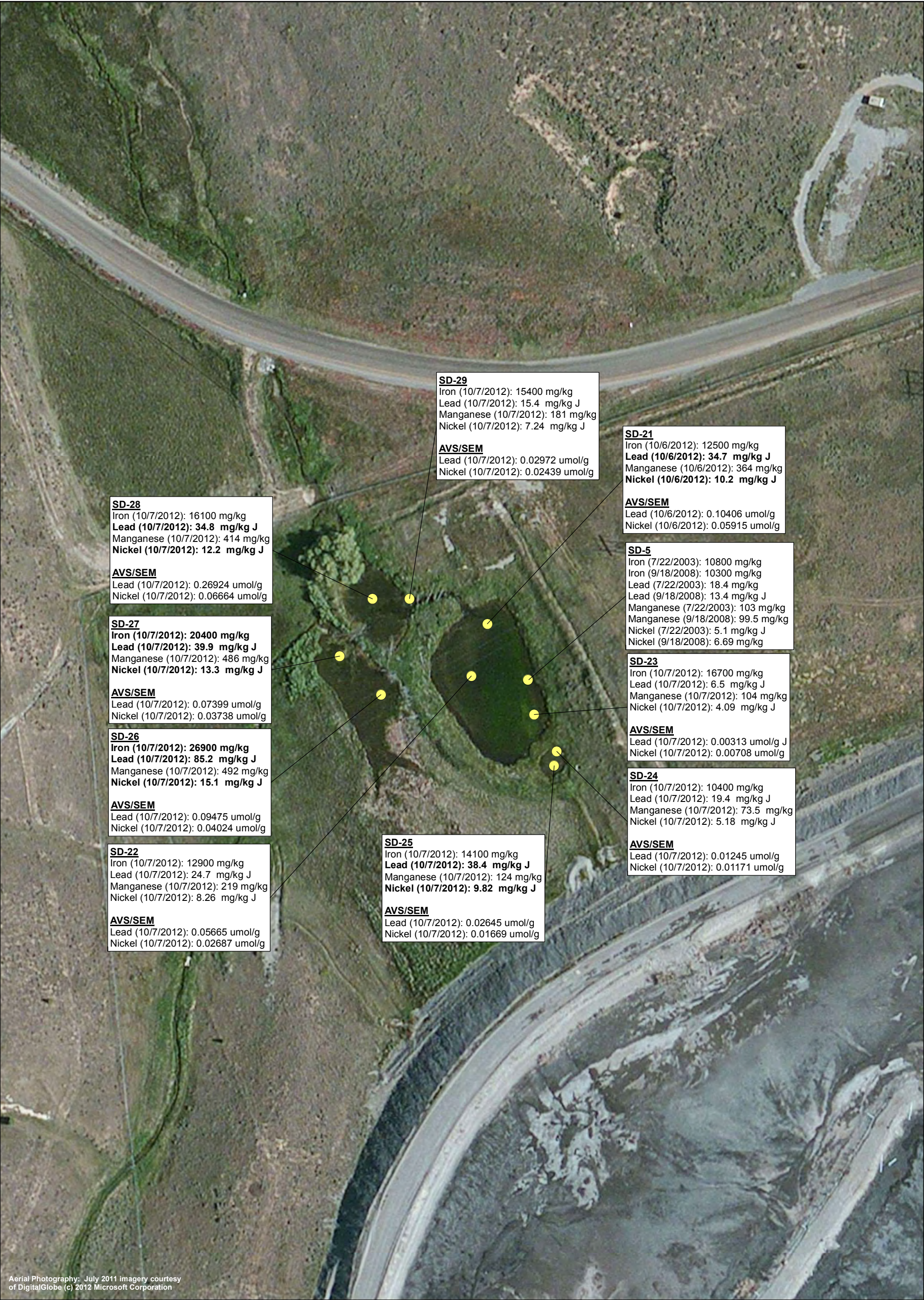


Figure 5.2-11
BEAVER POND -
METALS A
Rhodia Silver Bow Plant
Montana

Barr Forder, ArcGIS 10.0, 2012-12-18 12:08 File: I:\Projects\2546\006\GIS\Maps\RFI_Workplan_2012\RFI_Data_Caps_Report_2012\5_2_Sediment\Figure 5_02-12 Beaver Pond - Metals B.mxd User: jvk



● Sample Location

AVS/SEM = Acid Volatile Sulfide
Simultaneously Extracted Metals

Bold font indicates that sample concentration is above background.
Only detected concentrations are shown on this figure.

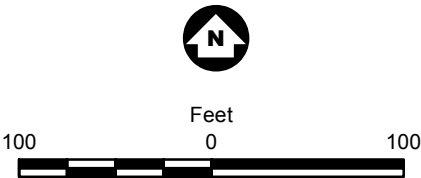
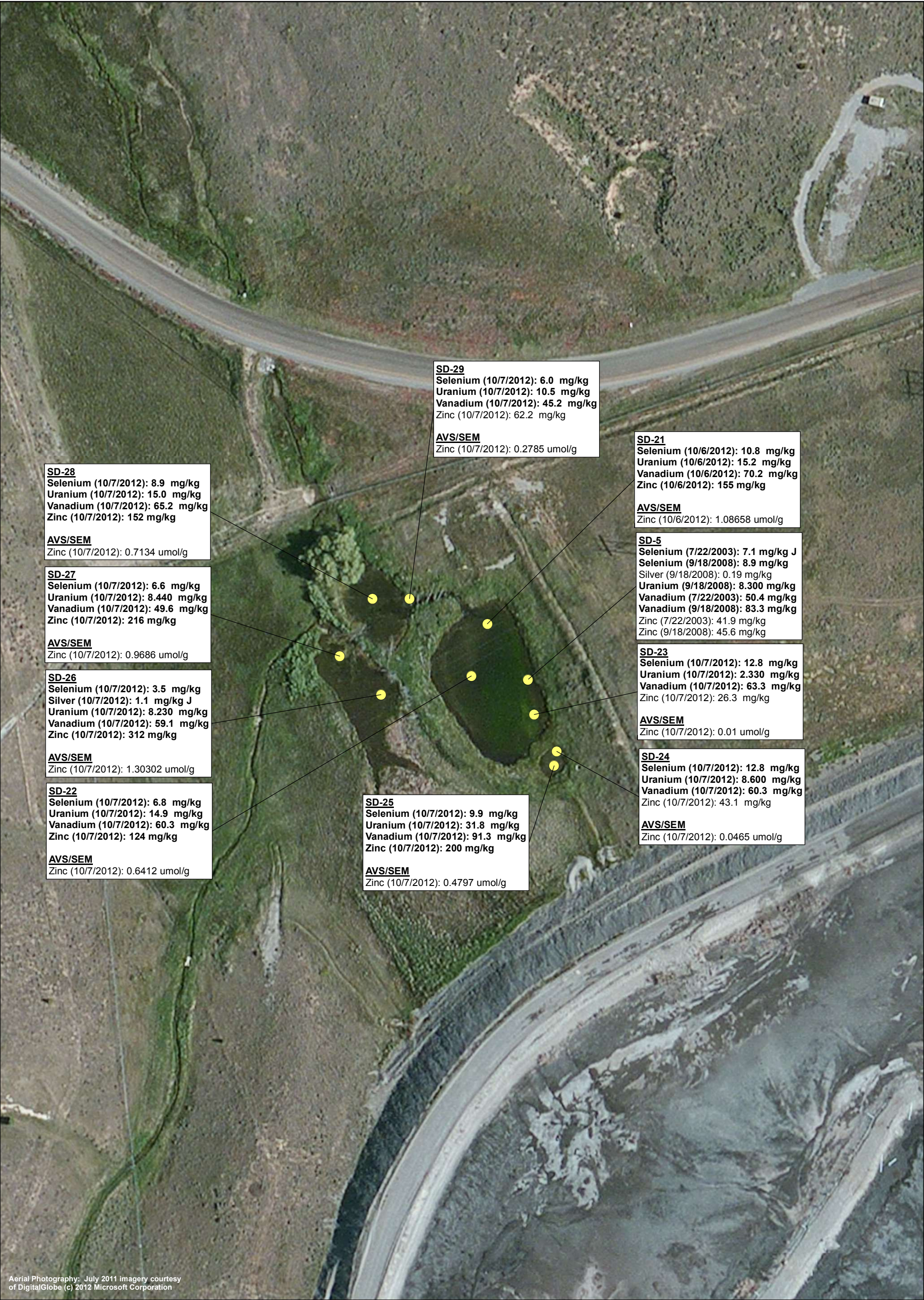


Figure 5.2-12
BEAVER POND -
METALS B
Rhodia Silver Bow Plant
Montana

Barr Footer: ArcGIS 10.0, 2012-12-18 12:10 File: I:\Projects\2546\006\GIS\Maps\RFI_Workplan_2012\RFI_Data_Caps_Report_2012\5_2_Sediment\Figure 5.02-13 Beaver Pond - Metals C.mxd User: jvk



● Sample Location

AVS/SEM = Acid Volatile Sulfide
Simultaneously Extracted Metals

Bold font indicates that sample concentration is above background.
Only detected concentrations are shown on this figure.

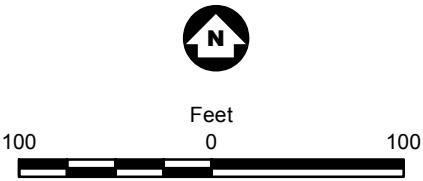
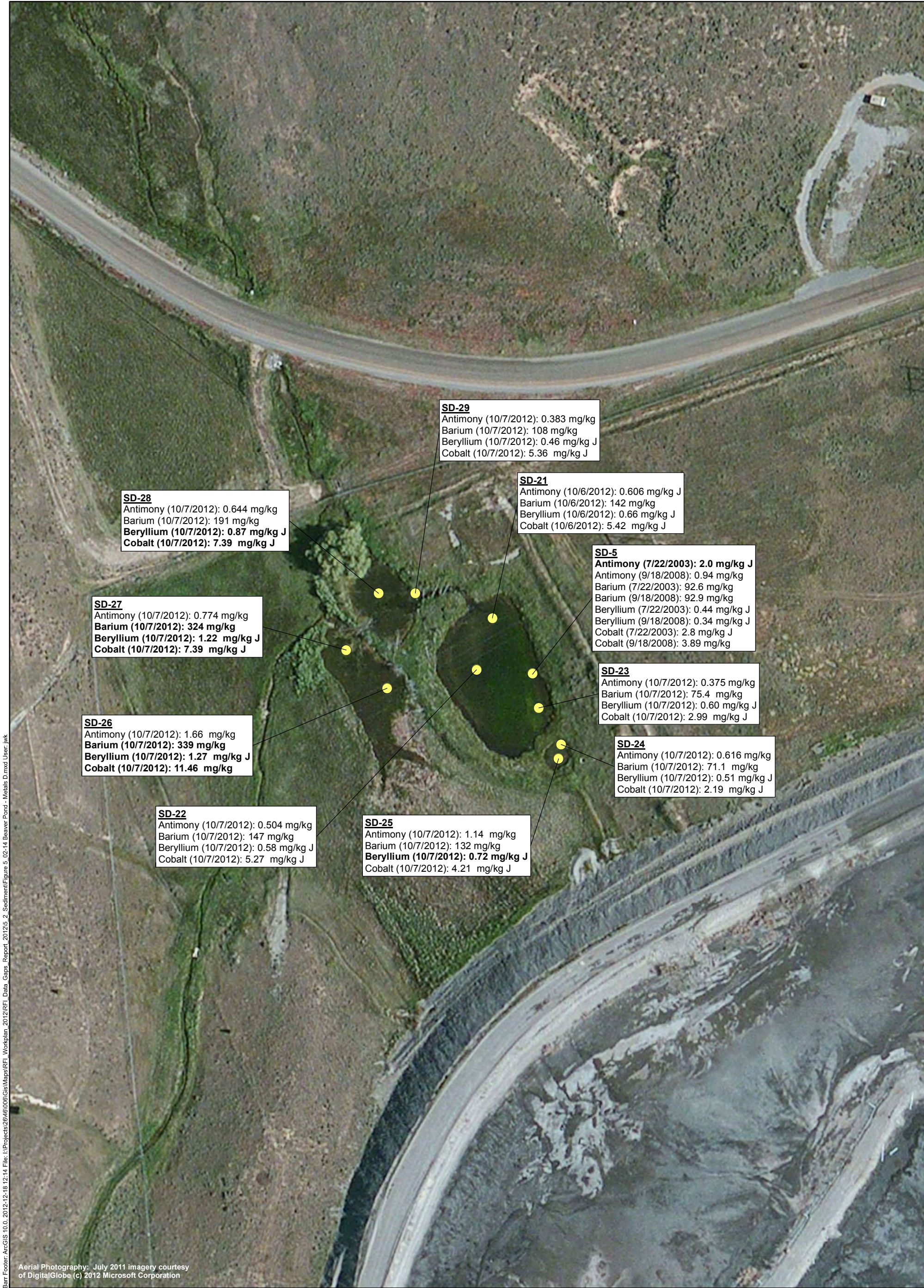


Figure 5.2-13
BVEAVER POND -
METALS C
Rhodia Silver Bow Plant
Montana



● Sample Location

Bold font indicates that sample concentration is above background. Only detected concentrations are shown on this figure.



Feet

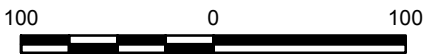


Figure 5.2-14
BEAVER POND -
METALS D
Rhodia Silver Bow Plant
Montana

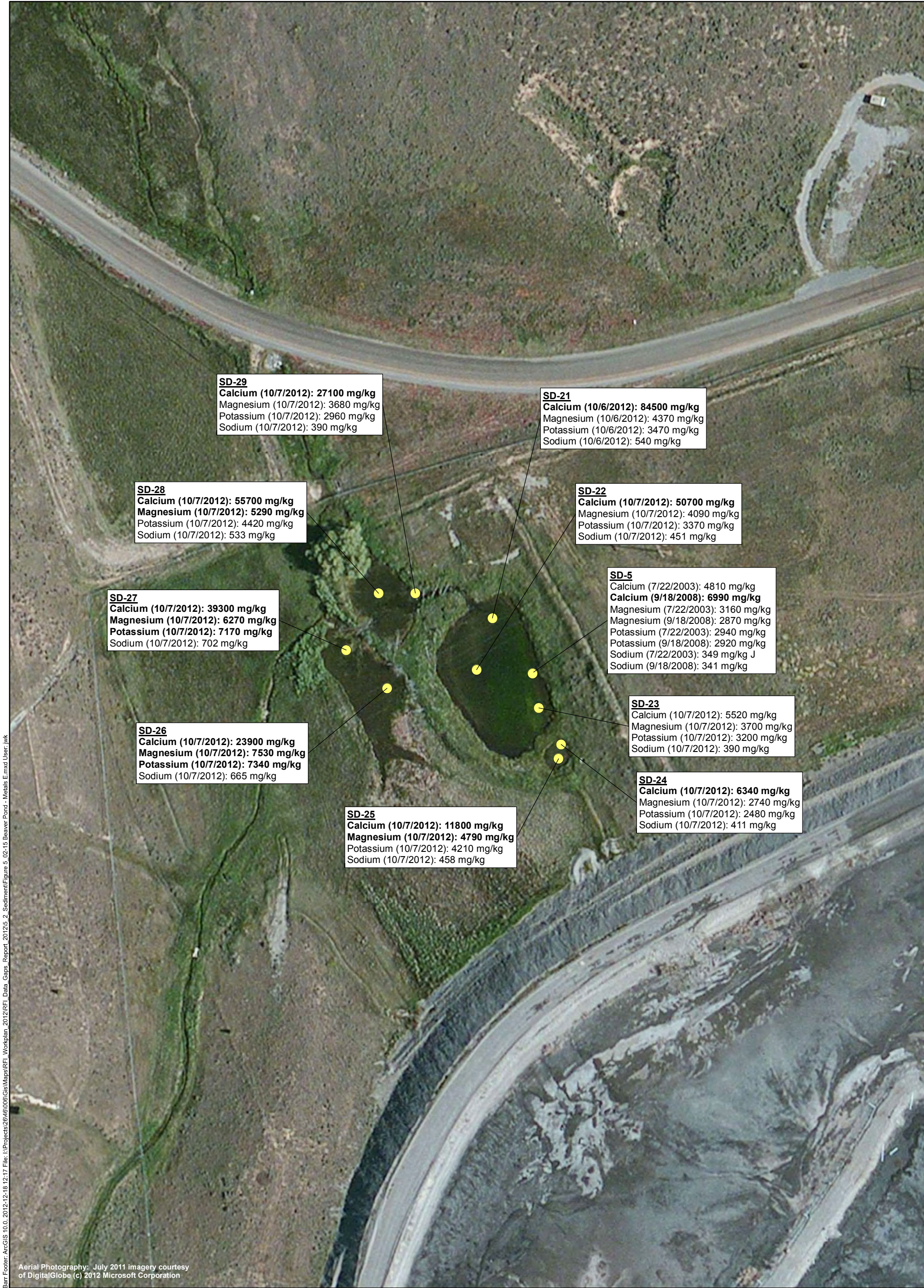
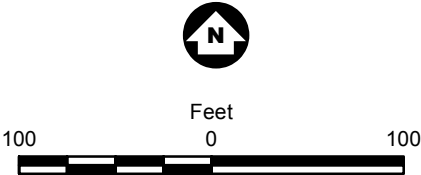


Figure 5.2-15
BEAVER POND -
METALS E
Rhodia Silver Bow Plant
Montana

Bold font indicates that sample concentration is above background.
Only detected concentrations are shown on this figure.



Barr Footer: ArcGIS 10.0, 2012-12-18 12:19 File: I:\Projects\2546\006\GIS\Maps\RFI_Workplan_2012\RFI_Data_Caps_Report_2012\5_2_Sediment\Figure 5_02-16 Beaver Pond - Metals F.mxd User: jwk



● Sample Location

AVS/SEM = Acid Volatile Sulfide
Simultaneously Extracted Metals

Bold font indicates that sample concentration is above background.
Only detected concentrations are shown on this figure.

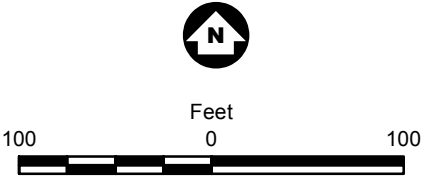


Figure 5.2-16
BEAVER POND -
METALS F
Rhodia Silver Bow Plant
Montana



Barr Forder ArcGIS 10.0, 2012-12-21 09:21 File: I:\Projects\2546\006\GIS\Maps\RFI_Workplan_2012\RFI_Data_Gaps_Report_20125_2_Sediment\Figure 5.02-17 Beaver Pond - Radionuclides.mxd User: cils

Bold font indicates that sample concentration is above background.
Only detected concentrations are shown on this figure.

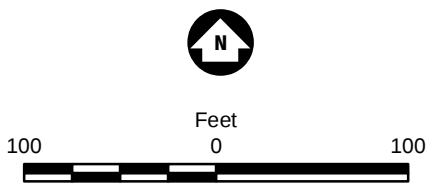


Figure 5.2-17
BEAVER POND -
RADIONUCLIDES
Rhodia Silver Bow Plant
Montana