Section 5.1 Surface Water

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5.1 Surface Water

5.1.1 Surface Water Investigations Prior to RFI

The U.S. EPA performed a site screening study at the Silver Bow Plant in 1988. The results were presented in a January 1989 report *Analytical Results Report, Stauffer Chemicals Company, Silver Bow, Montana* by Ecology & Environment, Inc. and the report is provided in Appendix 5.1-A. The results of that study were used in the September 24, 1992 study, *Site Inspection Prioritization, Stauffer Chemical Company* included as Appendix 5.1-B, to assess the Silver Bow Plant site for National Priority List (NPL) status. Based on this U.S. EPA study, the Silver Bow Plant was assigned a score of 12.92 according to the PREscore process. The U.S. EPA and Montana Department of Health and Environmental Sciences concurred on declaring the Silver Bow Plant as "Site Evaluation Accomplished" in a letter dated October 7, 1992. Due to the low score, the site was not proposed for listing on the NPL.

The site screening study sample locations are shown on Figure 3-1 from the Current Conditions Release Assessment (CCRA) which is included as Appendix 5.1-C. The locations are identified by the site screening study name. The samples were also given a CCRA data summary name, shown here in parentheses for cross-identification purposes. The study included collection of Silver Bow Creek surface water samples at the locations indicated as SCC-SW-1, SCC-SW-2, SCC-SW-3 (SW-EPA-1, SW-EPA-2, SW-EPA-3); and collection of a beaver pond surface water sample: SCC-OP-1 (SW-OP-1). The locations of these samples are shown on Appendix 5.1-C, Figure 3-1.

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. 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 fieldwork was conducted from July 15 to July 24, 2003. The surface water sampling portion of the ESI included the collection of eight (8) surface water/sediment sample pairs and one (1) onsite surface water sample. The sample locations are shown on Figure 3-3 from the CCRA and is included as Appendix 5.1-D.

5.1.2 RFI Surface Water Quality Investigation

Surface water sampling was conducted at the Silver Bow Site during a spring 2008 event (May 19, 2008 through May 24, 2008) and a Fall 2008 event (September 16, 2008 through September 21,

2008). The rationale for surface water quality monitoring stations is provided in Table 5.1-1. During both events, water was sampled at locations SW-1, SW-3 through SW-6, SW-8, SW-10 through 17, and SW-20, shown on Figure 5.1-1. Two channels were present at SW-8. The water sample was collected from midstream of the western channel, which contained the higher flow during both sampling events. No water was sampled at SW-2, SW-9, SW-18, and SW-19 because these locations were dry during both events.

Stations along Silver Bow Creek (SW-14, SW-15, SW-16, and SW-17) were adjusted because Silver Bow Creek was reconstructed during the time that the Phase 1 RFI Work Plan was being developed. SW-15 and SW-14 moved to the north, remaining downstream (SW-15) and upstream (SW-14) of inflow from Sheep Gulch, and SW-16 and SW-17 moved to the northwest to remain on the primary (SW-16) and secondary (SW-17) flow channels of Silver Bow Creek. The station location adjustments were communicated to and approved by the U.S. EPA in the field on May 19, 2008.

Surface water was sampled in accordance with the Standard Operating Procedures for Collection of Surface Water Samples included in the Field Sampling Plan of the Final RFI Work Plan (Barr 2009). Water was collected from approximately mid-depth of midstream by a battery powered peristaltic pump, through new PVC and silicone tubing at each of the locations. Surface water samples were analyzed for elemental phosphorus, general chemistry, total and dissolved metals, semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), and radionuclides. The polynuclear aromatic hydrocarbon (PAH) portion of the SVOC analysis was done by selected ion monitoring (SIM) analysis for the fall event to achieve lower reporting limits than the large volume extraction analysis used on the spring samples.

Field parameters (i.e., dissolved oxygen, pH, redox, specific conductance, and temperature) were measured in the overlying surface water prior to collection of sediment samples SD-21 through SD-29 in 2012. Measurements of field parameters were taken from a probe set at mid-depth in the water column. The field parameter data are summarized in Appendix 5.1-E and the sample locations are shown on Figure 5.2-1.

5.1.3 Surface Water Quality Results

Surface water quality monitoring stations were established along Sheep Gulch and Silver Bow Creek at the locations shown on Figure 5.1-1. Two rounds of surface water samples were collected during the RFI, one targeting higher (i.e. spring) flow and the other targeting lower (i.e. fall) flow conditions as described in the RFI Work Plan (Barr 2009) and discussed in Sections 4.1 –Upstream Surface

Water Quality. In addition, surface water samples were collected from Sheep Gulch and Silver Bow Creek during several events prior to the RFI investigation. The analytical results for the surface water quality data set are summarized in Tables 5.1-2 through 5.1-11 and plotted on Figures 5.1-2 through 5.2-23.

5.1.3.1 Sheep Gulch Water Quality

Sheep Gulch is an ephemeral stream that, under normal conditions, has no continuous surface flow upstream of the Beaver Pond Area. After the Renewable Energy Corporation (REC) Plant, which is south of the Rhodia plant, began to discharge its wastewater to Sheep Gulch, the presence of continuous surface flow was dependent on the flow rate of the REC Plant discharge. Water was present in the main channel of Sheep Gulch during the spring and fall 2008 sampling events. Data obtained from the Enforcement & Compliance History Online (ECHO) database indicates that REC was discharging about 1.25 cubic feet per second (cfs) and 1.23 cfs during May and September, 2008, respectively (http://www.epa-echo.gov/echo/).

The analytical data for the surface water stations along Sheep Gulch were compared to the background reference area concentrations reported for the samples collected from upstream locations (SW-20 & SW-8) as detailed in Section 5.3 of the U.S. EPA-approved Final RFI Work Plan (Barr 2009). Stations SW-20 and SW-8 are located in Sheep Gulch upstream of the tailing basin and were established to provide upstream concentrations for surface water in Sheep Gulch. SW-20 is located on the branch of Sheep Gulch that flows from the REC Plant, and consequently, surface water quality is influenced by REC's wastewater discharge. SW-8 is located below the confluence of the main stem and branch from the REC Plant. The main stem was dry during both sampling events conducted in 2008. The analytical data were also compared to the surface water criteria identified in Circular DEQ-7. The Sheep Gulch surface water quality data are summarized in Tables 5.1-2 through 5.1-6. The Sheep Gulch data is also plotted in Figures 5.1-2 through 5.1-12.

The discussion of surface water quality focuses on the Spring and Fall 2008 surface water quality data set. This data set is the most current and complete data set for Sheep Gulch. The prior data is incorporated into the discussion of surface water quality trends over time and is shown on Figures 5.1-24 through 5.1-50.

5.1.3.1.1 General and Site-specific Parameters

The analytical results for the general and Site-specific parameters included in the Sheep Gulch surface monitoring stations and the upstream data set for Sheep Gulch are summarized in Table 5.1-2. The surface water criteria and background reference area concentration for each parameter are

included in the Tables for comparison purposes (background concentrations). The spatial distributions of these parameters are plotted against the station locations in order from upstream to downstream in the charts in Appendix 5.1-F.

Alkalinity (carbonate as CaCO3 and bicarbonate as CaCO3) are present at concentrations above background concentrations at some locations. The spatial distribution charts for these parameters (*see* Appendix 5.1-F) show an inconsistent pattern between the Spring 2008 and Fall 2008 data sets. Alkalinity, bicarbonate and alkalinity, carbonate concentrations are variable along Sheep Gulch. Overall, alkalinity, bicarbonate concentrations decrease from about 360 mg/L in upstream samples to about 200 or 278 mg/L in downstream samples from SW-13 and alkalinity, carbonate concentrations decrease from about 41 mg/l in upstream samples to about 24 mg/L in downstream samples from SW-13.

Chloride concentrations are above background concentrations with the highest concentrations reported in the Spring 2008 samples from SW-1 and SW-3 *(see* chloride chart in Appendix 5.1-F). Overall, chloride concentrations increase from 125 mg/l in upstream samples to about 300 mg/l in downstream samples from SW-13.

The fluoride chart (Appendix 5.1-F) shows about an order of magnitude increase in the samples collected from the Beaver Ponds (SW-10, SW-5, SW-12, and SW-11). This increase is attributed to the groundwater discharge to these surface water features located north of the tailing basin. The fluoride concentration decreases at SW-6 and remains steady at SW-13. Overall, fluoride concentrations increase from 0.7 mg/l in upstream samples to about 1.9 mg/L in downstream samples from SW-13. The fluoride concentrations over time are shown on Figure 5.1-26. Fluoride concentrations have decreased over time at all long term monitoring stations with the exception of SW-5. Fluoride concentrations in samples from SW-1and SW-6 have dropped by 96% and 65%, respectively. Fluoride concentrations at SW-5 have remained steady.

Nitrate + nitrite concentration was reported above the background concentration in only one sample (i.e., Spring 2008 sample from SW-1). Nitrogen, ammonia (NH3) was reported above background in Spring 2008 samples from SW-1 and SW-3 *(see* Figure 5.1-3). Although these concentrations are above the background concentrations, the concentrations do not exceed the surface water criteria and the concentrations above background are not widely distributed along Sheep Gulch.

Elemental phosphorus was not detected in any surface water sample (*see* Table 5.1-2 and Figures 5.1-5 and 5.1-24).

Samples from SW-11 had total phosphorus concentrations at two times the background concentration or less. Overall, total phosphorus concentrations decrease from 0.24 mg/L in upstream samples to 0.11 mg/L in downstream samples from SW-13. Total phosphorus concentrations have decreased at the long term monitoring stations with the largest decreases seen at SW-5 (98% reduction) and SW-6 (98% reduction) (*see* Figure 5.1-25).

The sulfate chart (Appendix 5.1-F) shows higher concentrations in the samples collected from the Beaver Ponds (SW-10, SW-5, SW-12, and SW-11) with concentrations around 200 to 330 mg/l. The chart also shows a smaller concentration increase in samples from SW-1 (i.e., to about 100 mg/l). Overall, sulfate concentrations increase from 35 mg/L in upstream samples to about 170 mg/L in downstream samples from SW-13. As with total phosphorus, sulfate concentrations have decreased over time at the long term monitoring stations (*see* Figure 5.1-27). Sulfate concentrations have decreased in samples from SW-1, SW-5, and SW-6 by 98%, 70% and 87%, respectively.

The concentration trends in the general and site-specific parameters demonstrate improving surface water quality after the Silver Bow Plant was shut down and process water was no longer cycled through the tailing basin.

5.1.3.1.2 Metals

Spatial distribution of metals concentrations are presented on Figures 5.1-6 to 5.1-11, and the analytical data are summarized in Table 5.1-3, which also includes surface water standards and the background reference area concentrations for comparison. For ease of discussion and to more clearly present the spatial distribution of the data, the metals parameters were divided into subgroups.

5.1.3.1.2.1 Group A

Group A metals parameters include: arsenic, cadmium, chromium, and copper and are included in Table 5.1-3. The spatial distribution of the Group A metals are presented on Figure 5.1-6. Arsenic and cadmium concentrations are above background concentrations.

The total arsenic concentrations for the spring and fall 2008 surface water samples are plotted in Appendix 5.1-F. The arsenic chart shows an order of magnitude concentration increase in the samples collected from the Beaver Ponds (SW-10, SW-5, SW-12, and SW-11). This increase is attributed to the groundwater discharge to these surface water features located north of the tailing basin. The arsenic concentrations do not exceed surface water aquatic life standards, but are above the surface water human health standards. The surface water from the beaver ponds discharges to the Sheep Gulch between SW-4 and SW-6. The arsenic concentrations in samples from SW-6 are higher

than in samples from SW-4 but lower than samples from SW-11. Overall, arsenic concentrations increase from about 5 µg/L in upstream samples to about 25 µg/L in downstream samples from SW-13.

The arsenic concentrations over time are plotted on Figure 5.1-29. Arsenic concentrations have decreased over time at SW-1 (97%), SW-3 (93%), SW-4 (93%), and SW-6 (59%). At SW-5, arsenic concentrations increased between 1997 and 2003, and then decreased to the original 1997 concentrations in 2008.

Cadmium concentrations show a different spatial distribution than arsenic (*see* cadmium chart in Appendix 5.1-F). Cadmium concentrations increase at SW-3 and again at SW-4. The collocated sediment sample at SW-4 (i.e., SD-4) had the highest cadmium concentration along Sheep Gulch. Cadmium concentrations are lower in three of the four beaver ponds, but higher concentrations are found in samples from SW-11. Cadmium concentrations also increase between SW-6 and SW-13, which may be attributed to Streamside Tailings Operable Unit (SSTOU) impacts. Overall, cadmium concentrations increase from about 0.02 µg/L in upstream samples to about 0.65 µg/L in downstream samples from SW-13. Cadmium concentrations have decreased over time in samples from stations SW-3 (>99%), SW-4 (>99%), and SW-6 (98%) (*see* Figure 5.1-32). Concentrations trends are not evident for SW-1 and SW-5 due to infrequent detections of cadmium in samples from these locations.

Chromium and copper concentrations are consistent with background concentrations. No apparent increases are seen in the respective spatial distribution charts provided in Appendix 5.1-F and Figures 5.1-34 and 5.1-36, respectively.

5.1.3.1.2.2 Group B

Group B metals include: iron, lead, manganese, and nickel and are included in Table 5.1-3. The Group B metals spatial distribution is presented on Figure 5.1-7. Surface water background concentrations for each Group B metal were exceeded for samples collected at various times at various sample stations. Spatial distribution charts are provided in Appendix 5.1-F. The Group B metals concentrations did not exceed any of the surface water standards.

The chart for iron shows increased iron concentrations in samples from SW-1 and SW-11. Overall, total iron concentrations increase from about 50 µg/L in upstream samples to 100 µg/L in downstream samples from SW-13. As seen in Table 5.1-3, dissolved iron concentrations are considerably lower than the total concentrations indicating that iron may be associated with

suspended particulates in the surface water. No apparent long-term concentrations trends over time are observed in the data presented on Figure 5.1-37.

Although the lead was reported at concentrations above the background concentrations at a few surface water stations, the exceedances are less than 3 times the background concentrations. The spatial distribution chart in Appendix 5.1-F does not show differences in lead concentrations compared to the surface water standard. Overall, there is no change in lead concentrations between the upstream samples and downstream samples from SW-13. No apparent long-term concentrations trends over time are observed in the data presented on Figure 5.1-38.

Manganese concentrations are above background concentrations at the surface water monitoring stations. The spatial distribution chart for manganese (*see* Appendix 5.1-F) shows higher manganese concentrations in samples from the Beaver Ponds (SW-10, SW-5, SW-12, and SW-11). The concentrations decrease from SW-6 to SW-13. Overall, manganese concentrations increase from about 4 µg/L in upstream samples to about 40 µg/L in downstream samples from SW-13. Manganese concentrations over time are shown on Figure 5.1-40. Manganese concentrations have decreased over time in samples collected from the flow channel of Sheep Gulch (SW-1 (99%), SW-3 (>99%), SW-4 (>99%), and SW-6(88%)). Manganese concentrations have remained steady over time in samples collected from the largest beaver pond (SW-5).

Nickel concentrations in samples from the beaver ponds (SW-10, SW-5, SW-12, and SW-11) are above the background concentrations (*see* Table 5.1-3). There is no difference between the dissolved and total nickel concentrations indicating that nickel is present in the dissolved phase. Overall, there is a 0.5 µg/L increase in the nickel concentrations between the upstream and downstream samples from SW-13. Figure 5.1-42 shows the nickel concentrations over time. Nickel concentrations have decreased over time in samples collected from the flow channel of Sheep Gulch (SW-1 (77%), SW-3 (87%), SW-4 (88%), and SW-6(58%)). Nickel concentrations have decreased over time in samples collected from the largest beaver pond (SW-5) by 63%.

5.1.3.1.2.3 Group C

Group C metals parameters include: selenium, silver, uranium, vanadium, and zinc and are included in Table 5.1-3. The spatial distribution of the Group C metals is presented on Figure 5.1-8. Silver and zinc concentrations are consistent with background concentrations. Silver was not detected in the surface water samples and zinc was only 0.5 µg/L above the background concentration in one sample.

Selenium concentrations are higher than background in samples from the beaver pond stations (SW-10, SW-5 SW-12 and SW-11), and the downstream stations SW-6 and SW-13. The spatial distribution chart is provided in Appendix 5.1-F. Selenium was above the aquatic life standard in one of two samples from SW-10 (*see* Table 5.1-3). Selenium is present in the dissolved phase since there is no difference between the dissolved and total concentrations. Overall, the selenium concentrations increase from not detected at 1 µg/L to about 2 µg/L in downstream samples (SW-13).

The selenium concentrations over time are plotted on Figure 5.1-44. Selenium concentrations have decreased over time in samples from the flow channel of Sheep Gulch (SW-1 (80%), SW-3 (95%), SW-4 (95%) and SW-6 (67%). Selenium concentrations have remained steady over time in samples collected from the largest beaver pond (SW-5).

As with selenium, uranium and vanadium concentrations are higher in samples from the beaver ponds (SW-10, SW-5, SW-12 and SW-11), and the downstream stations SW-6 and SW-13 (*see* respective charts in Appendix 5.1-F). Overall, the uranium and vanadium concentrations increase from 2.4 µg/L to about 5 µg/L in downstream samples (SW-13). Uranium and vanadium are present in the dissolved phase since there is no difference between the dissolved and total concentrations. The concentrations do not exceed the surface water standards.

Uranium concentrations have decreased over time in samples from SW-1 (95%) and SW3 (60%), and (*see* Figure 5.1-48). Uranium concentrations in samples collected from SW-5 in 2008 are abut 4 µg/L higher than previous samples. Uranium concentrations in samples collected from SW-6 are steady over time.

Vanadium was not detected in the early samples so trends over time cannot be evaluated.

5.1.3.1.2.4 Group D

Group D metals parameters include: antimony, barium, beryllium and cobalt and are included in Table 5.1- 3. Beryllium concentrations are consistent with background.

Concentrations reported for dissolved and total antimony (Table 5.1-3) were generally above the surface water background concentrations. However, the concentrations are less than two times the background concentration, and are below the surface water standard. Overall, there is a 0.1 µg/L difference between the upstream concentrations compared to the downstream concentrations (SW-13). Antimony was not detected in the early samples so trends over time cannot be evaluated.

Concentrations reported for dissolved and total barium (Table 5.1-3) were generally above the surface water background concentrations. However, the concentrations are less than two times the background concentration, and are below the surface water standard. Overall, there is no difference between the upstream concentrations (i.e., 0.036 µg/L) compared to the downstream concentrations for SW-13 (i.e., 0.033 µg/L).

Dissolved cobalt concentrations are higher than the total cobalt concentrations for a majority of the samples. Therefore, the dissolved cobalt data is suspect. The total cobalt concentrations are generally above the background concentrations with higher concentrations reported for the beaver pond samples (SW-10, SW-5, SW-12, and SW-11). Overall, there is a 0.3 µg/L difference between the upstream concentrations (i.e., 0.12 µg/L) compared to the downstream concentrations for SW-13 (i.e., 0.4 µg/L).

5.1.3.1.2.5 Group E

Group E metals parameters include: calcium, magnesium, potassium, and sodium and are included in Table 5.1-3. The group E metals consist of elements which are commonly found in surface water as well as sediment and soil. Group E metals spatial distribution is presented on Figure 5.1-10. The spatial distribution is shown on respective charts in Appendix 5.1-F

Calcium, magnesium, and potassium concentrations have a similar distribution pattern with higher concentrations at the beaver ponds (SW-10, SW-5 SW-12 and SW-11) and lower concentrations at the downstream stations (SW-6 and SW-13), but the SW-6 and SW-13 concentrations are still above background. Overtime, calcium, magnesium, and potassium concentrations have decreased in samples collected from the long term monitoring stations (*see* Figures 5.1-33, 5.5-39, and 5.1-43, respectively).

Sodium concentrations are higher in the Sheep Gulch (SW-1, SW-3, and SW-4) than in the beaver pond samples (SW-10, SW-5, SW-12, and SW-11). The downstream sodium concentrations are between the SW-4 and beaver pond sample concentrations. The sodium concentrations over time are more variable but seem to indicate higher concentrations in the samples analyzed in 2008 than prior samples (*see* Figure 5.1-46). Sodium concentrations in samples over time from SW-5 indicate a small decreasing trend.

5.1.3.1.2.6 Group F

Group F metals parameters include: mercury, and thallium and are included in Table 5.1-3. Mercury was not detected in the surface water samples. Thallium was only detected in one sample (SW-11) from the Spring 2008 event, but was not detected in the SW-11 sample for Fall 2008.

5.1.3.1.3 Surface Water Quality Trends along Sheep Gulch

All useable data is presented in Tables 5.1-2 through 5.1-6 and spatial distribution of these chemicals is shown on Figures 5.1-2 through 5.1-12. Chemical concentrations over time for general, site specific and metals are shown on Figures 5.1-24 through 5.1-50. The metal parameters arsenic, cadmium, and selenium have been selected based on sample result concentrations and distribution of detections to focus discussion of surface water trends. In addition, the Site-specific parameters of total phosphorus, fluoride, and sulfate will be used in the following paragraphs to evaluate the trends in surface water quality over time and along Sheep Gulch. Together, the three above mentioned metals and the other three chemicals that help in the evaluation of trends will collectively be referred to below as chemicals of interest. Laboratory reported data for the chemicals of interest were extracted from Tables 5.1-2 and 5.1-3 and inserted into the charts provided in the text below for discussion purposes.

5.1.3.1.4 Trends at SW-1

Surface water station SW-1 is in the constructed channel of Sheep Gulch immediately south of the tailing basin. During Plant operations, surface water has generally been found at this station, even when upstream locations were dry, indicating that water at this location might be associated with seepage of tailing basin water to the Sheep Gulch channel. In addition, water at SW-1 may be connected to groundwater, as evidenced by the ground elevations shown on the topographic map shown in Figure 1-3 (*see* Section 1.0 of this report). The REC Plant discharge also contributes to the presence of water at SW-1. Surface water quality data for the constituents of interest at SW-1 are summarized in the following chart.

SW-1 Analytical Data for Constituents of Interest

Date	Constituents of Interest					
	Arsenic [mg/L]	Cadmium [mg/L]	Fluoride [mg/L]	Selenium [mg/L]	Total Phosphorus [mg/L]	Sulfate [mg/L]
Nov 1997	0.092	<0.001	18.3	0.005	0.32	1,010
Oct 1998	0.030	<0.001	5.69	<0.005	0.43	168
Jul 2003	0.0087	<0.002	1.3	<0.010	0.26	---
May 2008	0.0057	0.00003	0.3	<0.001	0.11	78.5
Sep 2008	0.0055	0.00003	0.7	<0.001	0.16	23.1

Date	Constituents of Interest					
	Arsenic [mg/L]	Cadmium [mg/L]	Fluoride [mg/L]	Selenium [mg/L]	Total Phosphorus [mg/L]	Sulfate [mg/L]
Reduction	**97%**	**---**	**96%**	**> 80%**	**50%**	**98%**

From 1997 to 2008, the arsenic and fluoride concentrations in the SW-1 samples have dropped by over 95%. Selenium declined from 0.005 mg/L to not detected at 0.001 mg/L in the 2008 samples. Cadmium was not detected in the samples collected in 1997, 1998 and 2003, despite the 6 mg/L levels of cadmium reported for tailing basin water. Cadmium was detected in the 2008 samples due to the lowering of the detection limit, but the detected concentrations are an order of magnitude lower than its chronic surface water standard. Total phosphorus concentrations have dropped about 50% over this time-period and sulfate concentrations have dropped 98%.

The 1997 time-period is at the end of Rhodia's elemental phosphorus production at the Silver Bow Site. Beginning around this time, the water sent to the tailing basin was predominantly groundwater (from production wells), not process waters. This means the only water that would have flowed into the tailing basin after the Plant was demolished was groundwater from production wells and precipitation. After 1998, the tailing basin has been dewatering naturally due to evaporation and seepage. By the fall of 2003, there was no surface water remaining in the tailing basin, other than infrequent rainwater puddles. This change from the addition of production water, to only groundwater and precipitation influence, to a naturally dewatered basin has resulted in improved SW-1 surface water quality.

5.1.3.1.5 Trends at SW-5

Surface water station SW-5 is located just north of the tailing basin in the Beaver Pond Area. Groundwater has been observed to seep into this pond along the south and east side. The concentrations over time are summarized below:

SW-5 Analytical Data for Constituents of Interest

Date	Constituents of Interest					
	Arsenic [mg/L]	Cadmium [mg/L]	Fluoride [mg/L]	Selenium [mg/L]	Total Phosphorus [mg/L]	Sulfate [mg/L]
Nov 1997	0.048	<0.001	3.34	<0.005	7.41	1,100
Oct 1998	0.043	<0.001	3.88	<0.005	29	1,060
Jul 2003	0.0713	<0.005	5.2	0.0041J	1.4	---
May 2008	0.0471	0.00008	3.7	0.0039	0.13	328

Sep 2008	0.0466	<0.00002	5.0	0.006	0.12	331
Reduction	**---**	**---**	**---**	**---**	**98%**	**70%**

Total phosphorus has dropped by over 98% and sulfate has dropped by 70%, which are consistent with concentration trends for samples from nearby monitoring wells MW-97-3 and MW-97-4. The surface water concentrations for arsenic, fluoride, and selenium have been relatively steady over this monitoring period and are similar to the concentrations in groundwater samples collected from nearby monitoring wells MW-97-3 and MW-97-4. Trend analysis cannot be conducted on cadmium given the single detection.

Despite being downgradient of the tailing basin in the seepage discharge zone, water quality is remaining fairly constant for the attenuated/retarded parameters (arsenic, cadmium, fluoride, and selenium) and is substantially improving for the early indicators (total phosphorus and sulfate).

5.1.3.1.6 Trends at SW-6

Surface water station SW-6 is just upstream of the culvert where Sheep Gulch flows north off the Silver Bow Site, and is representative of surface water quality leaving the Silver Bow Site. SW-6 generally has continuous flow except in periods of drought. The concentrations over time are summarized below:

SW-6 Analytical Data for Constituents of Interest

Date	Constituents of Interest					
	Arsenic [mg/L]	**Cadmium [mg/L]**	**Fluoride [mg/L]**	**Selenium [mg/L]**	**Total Phosphorus [mg/L]**	**Sulfate [mg/L]**
Nov 1997	0.049	0.003	3.23	<0.005	7.43	1,090
Oct 1998	0.051	0.019	5.56	0.006	5.61	1,030
Apr 1999	---	---	3.3	---	2.0	---
Sep 2002	0.058	<0.001	5.06	<0.005	0.34	---
May 2008	0.0314	0.00036	2.3	0.0028	0.09	208
Sep, 2008	0.0208	0.00020	1.6	0.002	0.13	137
Reduction	**59%**	**98%**	**65%**	**67%**	**98%**	**87%**

The concentrations of arsenic, cadmium, fluoride, selenium, total phosphorus, and sulfate in SW-6 samples have been decreasing over time, as shown in the above chart, likely attributed to the closure of the Silver Bow Site in 1997.

5.1.3.1.7 Trends along Sheep Gulch

The surface water quality conditions measured at each station were quite consistent between the May and September 2008 sampling events. The May 2008 surface water sample concentrations for the chemicals of interest are presented from upstream to downstream in the following table:

May 2008 – Sheep Gulch (Upstream to Downstream) Analytical Data

Surface Water Station	Chemicals of Interest					
	Arsenic [mg/L]	Cadmium [mg/L]	Fluoride [mg/L]	Selenium [mg/L]	Total Phosphorus [mg/L]	Sulfate [mg/L]
Upstream						
SW-20	0.0044	<0.00002	0.6	<0.001	0.24	19.4
SW-8	0.0042	0.00003	0.5	<0.001	0.21	22.8
On-site						
SW-1	0.0057	0.00003	0.3	<0.001	0.11	78.5
SW-3	0.0045	0.00019	0.4	<0.001	0.05	83.8
SW-4	0.0054	0.00045	0.5	<0.001	0.04	48.8
SW-5*	0.0455	0.00008	3.7	0.0039	0.13	328
Downstream						
SW-6	0.0314	0.00036	2.3	0.0028	0.09	208
SW-13	0.0292	0.00050	2.2	0.0023	0.09	203

* SW-5 is located within the Beaver Pond Area and is a groundwater fed location.

Cadmium concentrations in surface water increase as the surface water flows around the tailing basin from SW-3 to SW-6, and is about 5 times lower in the pond at SW-5 while arsenic, fluoride, selenium and sulfate concentrations increase at SW-5. Sample location SW-5, located within the Beaver Pond Area, is a groundwater-fed location and has concentrations similar to groundwater samples collected from nearby monitoring wells MW-97-3 and MW-97-4. Surface water, from SW-5 and the other ponds in the area, flows into Sheep Gulch upstream of SW-6. Surface water concentrations of arsenic, fluoride, selenium and sulfate decrease downstream of SW-5 and are relatively consistent at SW-6 and SW-13. Total phosphorus concentrations are fairly consistent to slightly decreasing along Sheep Gulch, and the concentrations are highest upstream of the Site.

The September 2008 sample concentrations for the chemicals of interest are presented from upstream to downstream in the following table:

September 2008 – Sheep Gulch (Upstream to Downstream) Analytical Data for Constituents of Interest

Surface Water Station	Constituents of Interest					
	Arsenic [mg/L]	Cadmium [mg/L]	Fluoride [mg/L]	Selenium [mg/L]	Total Phosphorus [mg/L]	Sulfate [mg/L]
Upstream						
SW-20	0.0045	<0.00002	0.7	<0.001	0.19	36
SW-8	0.0047	0.00003	0.7	<0.001	0.18	21.3
On-site						
SW-1	0.0055	0.00003	0.7	<0.001	0.16	23.1
SW-3	0.0060	0.00013	0.5	<0.001	0.17	53.8
SW-4	0.0059	0.00028	0.6	<0.001	0.16	55.3
SW-5	0.0438	<0.00002	5.0	0.006	0.12	331
Downstream						
SW-6	0.0208	0.00020	1.6	0.002	0.13	137
SW-13	0.0221	0.00020	1.6	0.002	0.12	138

'* SW-5 is located within the Beaver Pond Area and is a groundwater fed location.

September 2008 data is similar to the May 2008 data. Cadmium concentrations in surface water increase as the surface water flows around the tailing basin from SW-3 to SW-6 and is lower at SW-5 than it is at other stations. Arsenic, fluoride, and sulfate concentrations are higher at SW-5 compared to upstream locations while selenium was not detected until sample location SW-5, SW-6 and SW-13. Surface water concentrations of arsenic, fluoride, selenium and sulfate decrease downstream of the intersection of the Beaver Pond Area with Sheep Gulch, and are relatively consistent at SW-6 and SW-13. Total phosphorus concentrations are fairly consistent along Sheep Gulch; again being highest upstream of the Site.

The concentration data presented above and the measured surface water flows along Sheep Gulch support the conceptual model that Sheep Gulch is influenced by groundwater and was historically influenced by seepage from the tailing basin. As previously discussed, the concentration trends for samples collected at SW-1 (upstream of tailing basin) and SW-6 (downstream of tailing basin) have shown a significant decrease over time since Rhodia stopped elemental phosphorus production and the circulation of process water thru the tailing basin at the Silver Bow Site.

5.1.3.1.8 VOCs

The analytical results for the VOCs are summarized in Table 5.1-4 along with applicable surface water standards and the background reference area concentrations for comparison. VOCs were generally not detected in the analyzed surface water samples.

Low-level detections reported as estimated concentrations near the method detection limit and below the method reporting limit for acetone, carbon disulfide, toluene and naphthalene. These chemicals were detected in samples from the May 2008 sample event and were not detected in the September 2008 sample event with the exception of carbon disulfide.

There is no known release to the surface waters of Sheep Gulch that would result in detections of the VOC's. Naphthalene detections reported for the May 2008 sample VOC analysis was not detected in the SVOC analysis. In addition, acetone, toluene, and naphthalene are common laboratory contaminants and given the low-level concentrations reported for the May 2008 samples is likely the result of laboratory methods.

Carbon disulfide was the only organic compound detected at low-level concentrations in both the May and September 2008 sampling events. Carbon disulfide can also be a laboratory contaminant. However, Carbon disulfide is also a chemical, which is ubiquitous throughout the environment and is produced naturally by sediment microorganisms (World Health Organization 2002).

The low-level detections of VOC's are likely to be the result of laboratory methods or naturally occurring processes. Based on the above information, the low-level VOC concentrations reported by the laboratory do not appear to be related to a release to the environment.

5.1.3.1.9 SVOCs

The analytical results for the SVOCs included in the data set for Sheep Gulch are summarized in Table 5.1-5 along with applicable surface water standards and the background reference area concentrations for comparison. In general, SVOC's were not detected above the laboratory method reporting limit for the analyzed surface water samples.

Low-level detections reported for diethylphthalate and di-n-octylphthalate are J-qualified indicating estimated concentrations. These chemicals were detected only in samples from the May 2008 sample event and were not detected in the samples collected during the September 2008 sample event. The remaining SVOC's were reported as below the method detection limit.

There is no known release to the surface waters of Sheep Gulch that would result in detections of the above listed SVOC's. The detected chemicals are common laboratory contaminants and are ingredients found in plastics. The low-level detections of SVOC's are the result of laboratory methods or sample collection methods.

5.1.3.1.10 Radionuclides

The analytical results for the radionuclides included in the data set for Sheep Gulch are summarized in Table 5.1-6 along with applicable surface water standards and the background reference area concentrations for comparison. Spatial distribution of the radionuclides is presented on Figure 5.1-12.

Gross alpha radiation concentrations were detected above background levels and surface water human health standards for samples collected at sample stations SW-3, SW-4, SW-5, SW-10, SW-11, SW-12, and SW-13 during various sample events (Table 5.1-6). The concentrations are higher in the beaver ponds samples.

Gross beta radiation concentrations were detected above background levels for samples collected at sample stations SW-1, SW-3, SW-5, SW-6, SW-10, SW-11, SW-12, and SW-13. The spatial distribution of gross beta as presented on Figure 5.1-12. The Beaver Pond sample (SW-5, SW-10, SW-11, and SW-12) concentrations are higher than samples from the flow channel of Sheep Gulch.

Radium 226 and radium 228 concentrations were below the background concentrations and were generally below the method detection limit. The spatial distribution of radium 226 and 228 is generally random with the highest reported concentrations at the background surface water sample stations of SW-8 and SW-20 (*see* Figure 5.1-12).

5.1.3.2 Silver Bow Creek Water Quality

Silver Bow Creek is the focus of the SSTOU, which is part of an ongoing Superfund remedial action not associated with the Rhodia plant. The primary contaminants of concern for the SSTOU include arsenic, cadmium, copper, lead, zinc, mercury, and manganese (Bighorn, 2010).

The remedy implemented for the SSTOU in 2004 through 2007 included reconstruction of the Silver Bow Creek flow channel and construction of wetlands along the south side of the flow channel in the area of the Silver Bow Site. The wetlands were constructed in the former flow channel of Silver Bow Creek and water quality continues to be impacted by SSTOU-related contaminants.

Surface water quality samples were collected from four locations along Silver Bow Creek in accordance with the RFI Work Plan (2009) at the locations shown on Figure 5.1-1. Stations SW-14, SW-16 and SW-15 are located on Silver Bow Creek with SW-14 being upstream of the Silver Bow Site, SW-15 being downstream, and SW-16 being cross-stream, respectively.

Sample location SW-17 is located on the outlet of a constructed wetland adjacent to Silver Bow Creek. The outlet of the pond discharges directly to Silver Bow Creek immediately downstream of station SW-16. This constructed wetland is in the former Silver Bow Creek flow channel and water quality in the wetland remains impacted by SSTOU constituents.

The downstream sample location, SW-15, is downstream of SW-13 and the Sheep Gulch outlet to Silver Bow Creek.

The analytical data for the surface water stations along Silver Bow Creek were compared to the background reference area concentrations reported for the samples collected from upstream location (SW-14) as detailed in Section 5.3 of the U.S. EPA-approved Final RFI Work Plan (Barr 2009). The analytical data were also compared to the surface water criteria identified in Circular DEQ-7. The Silver Bow Creek surface water quality data are summarized in Tables 5.1-7 through 5.1-11. The Sheep Gulch data is also plotted in Figures 5.1-13 through 5.1-23. All tables and figures also present the background reference area concentrations as applicable. The discussion of surface water quality focuses on the Spring and Fall 2008 surface water quality data set. This data set is the most current and complete data set for Silver Bow Creek.

5.1.3.2.1 General and Site-specific Parameters

The analytical results for the general and Site-specific parameters are summarized in Table 5.1-7. The surface water criteria and background reference area concentrations are included in the table for comparison purposes. As shown in Table 5.1-7, the general and Site-specific parameter concentrations are relatively consistent among samples and sampling events as demonstrated by the fluoride sample results. The sediment samples collected in 2003 are not compared to background because they were collected before Silver Bow Creek was reconstructed and the samples represent a different stream configuration.

The general and Site-specific parameter concentrations are consistent along the flow channel of Silver Bow Creek. Figures 5.1-13 through 5.1-16 show the spatial distribution of the general and Site-specific parameters. Higher concentrations of alkalinity, chloride, fluoride and sulfate were found at SW-17 which is located on the outlet of a constructed wetland adjacent to Silver Bow Creek. This wetland is within the former Silver Bow Creek flow channel. The fluoride concentration was 0.1 mg/L higher than the adjacent flow channel samples (SW-16). Total phosphorus, nitrate + nitrite and nitrogen, ammonia concentrations are lower at SW-17 than in the Silver Bow Creek stream channel. Elemental phosphorus was not detected in the Silver Bow Creek surface water samples.

5.1.3.2.2 Metals

The analytical data are summarized in Table 5.1-8 which also includes applicable surface water standards and the background reference area concentrations for comparison. Spatial distribution of metals concentrations are presented on Figures 5.1-17 to 5.1-22. For ease of discussion and to more clearly present the spatial distribution of the data, the analyzed metals parameters were divided into subgroups.

5.1.3.2.2.1 Group A

Group A metals parameters include: arsenic, cadmium, chromium, and copper and are included in Table 5.1-8. The spatial distribution of the Group A metals are presented on Figure 5.1-17.

Arsenic concentrations are consistent along the Silver Bow Creek stream channel. Upstream total arsenic concentrations ranged from 6.6 µg/L to 7.8 µg/L and downstream concentrations ranged from 6.6 µg/L to 7.9 µg/L. Higher arsenic concentrations (on the order of 25 µg/L) were found at SW-17, located at the outlet of the constructed wetland adjacent to Silver Bow Creek. The arsenic concentrations are below the aquatic life surface water criteria, but are above the human health criteria.

Cadmium concentrations are consistent along the stream channel with only a 1 µg/L difference between the upstream and downstream concentrations. As with arsenic, cadmium concentrations are about an order of magnitude higher in samples collected at the outlet of the constructed wetland adjacent to Silver Bow Creek (SW-17).

Chromium concentrations were reported at or below background concentrations and below the surface water criteria.

Copper concentrations are consistent along the stream channel. As with arsenic and cadmium, copper concentrations are about an order of magnitude higher in samples collected at the outlet of the constructed wetland adjacent to Silver Bow Creek (SW-17).

Arsenic, cadmium and copper are primary contaminants of concern for the SSTOU (Bighorn, 2010). Chromium is not included in the list of primary contaminants of concern.

5.1.3.2.2.2 Group B

Group B metals include iron, lead, manganese, and nickel and are included in Tables 5.1-8. The Group B metals spatial distribution is presented on Figure 5.1-18. Reported concentrations for each

Group B metal were generally higher at the upstream sample station SW-14, with the exceptions noted below. The Group B metals concentrations did not exceed the surface water standards.

Iron concentrations are consistent along the Silver Bow Creek flow channel although the May 2008 sample from SW-16 was about 0.03 mg/L higher than the upstream concentration. The downstream concentrations (SW-15) are lower than the upstream concentrations at SW-14. The iron concentrations at SW-17 are about an order of magnitude lower than samples form the flow channel.

Lead concentrations are consistent along the flow channel. Although the concentration at SW-16 was 2 µg/L higher than the upstream sample, the downstream concentrations are less than the upstream concentrations.

The manganese distribution is similar to the arsenic distribution. Upstream total manganese concentrations ranged from 0.209 mg/L to 0.272 mg/L and the downstream concentrations ranged from 0.248 to 0.299 mg/L. Higher manganese concentrations (ranging form 0.55 to 1.53 mg/L) were found at SW-17 located at the outlet of the constructed wetland adjacent to Silver Bow Creek. Manganese is a primary contaminant of concern for the SSTOU (Bighorn, 2010).

Nickel concentrations are consistent along the Silver Bow Creek flow channel. The downstream concentrations are 0.3 µg/L higher than upstream, and the nickel concentrations are below surface water standards. Nickel concentrations are higher at SW-17 by a factor of 2.

5.1.3.2.2.3 Group C

Group C metals parameters include: selenium, silver, uranium, vanadium, and zinc and are included in Table 5.1-8. The spatial distribution of the Group C metals is presented on Figure 5.1-19. None of these constituents exceeded the surface water criteria.

Selenium was not detected in the surface water samples from the Silver Bow Creek flow channel at a detection limit of 0.001 mg/L. Selenium was detected in both samples from SW-17.

The highest silver concentration was reported for the May 2008 sample from SW-17. The highest concentration was only 0.02 µg/L higher than the upstream concentration.

Uranium and vanadium concentrations are consistent along the flow channel, although September 2008 sample was 1.6 µg/L higher than the background concentration. Uranium and vanadium concentrations are higher at SW-17.

Zinc concentrations are higher in the downstream samples than the upstream and the concentrations in the flow channel increase from SW-4 to SW-16 and SW-16 to SW-15. The overall increase is only 0.037 mg/L for the May 2008 event and 0.023 mg/L for the September event. The highest concentrations were reported for samples from SW-17. Zinc is a primary contaminant of concern for the SSTOU (Bighorn, 2010).

5.1.3.2.2.4 Group D

Group D metals parameters include: antimony, barium, beryllium and cobalt and are included in Table 5.1-8 and in Figure 5.1-20. None of these constituents exceeded the surface water criteria.

Antimony and barium concentrations are consistent along the Silver Bow Creek stream channel. Higher concentrations are found at SW-17, but the antimony concentrations are only 0.11 µg/L and the barium concentrations are only 0.005 mg/L higher than upstream concentrations.

Beryllium was not detected in the Silver Bow Creek surface water samples.

Cobalt concentrations are consistent along the Silver Bow Creek stream channel. Cobalt concentrations in samples from SW-17 are 1 µg/L higher than the upstream concentration.

5.1.3.2.2.5 Group E

Group E parameters include: calcium, magnesium, potassium, and sodium and are included in Table 5.1-8. Group E consists of common elements, which are found in surface water as well as sediment and natural soil. Group E metals spatial distribution is presented on Figure 5.1-21.

Each of these common elements has higher concentrations in the downstream samples compared to the upstream concentrations. The concentration differences are as follows: calcium – 3 mg/L; magnesium - 0.5 mg/L; potassium – 0.6 mg/L; and sodium – 8.1 mg/L. The highest concentrations are found in samples from SW-17 located at the outlet of the constructed wetland adjacent to Silver Bow Creek.

5.1.3.2.2.6 Group F

Group F metals parameters include: aluminum, mercury, and thallium and is included in Table 5.1-8 and Figure 5.2-22. This parameter was analyzed for one sample collected in 1988 (SW-EPA-2) and was not analyzed during the 2008 sampling events.

Mercury was not detected in the surface water samples collected during the 2008 RFI.

Thallium was not detected in the surface water samples from the Silver Bow Creek flow channel. Thallium was detected in one of two samples collected at SW-17. The detected concentration was only 0.01 µg/L above the detection limit based upstream concentration.

5.1.3.2.3 SSTOU Contaminants

The primary contaminants of concern for the SSTOU include arsenic, cadmium, copper, lead, zinc, mercury, and manganese (Bighorn, 2010). These primary contaminants of concern and the chemicals of interest for the Silver Bow Site are summarized below (Note: the primary contaminants of concern for the SSTOU are highlighted):

May 2008

Station	Arsenic [mg/L]	Cadmium [mg/L]	Fluoride [mg/L]	Selenium [mg/L]	Copper [mg/L]	Lead [mg/L]	Zinc [mg/L]	Mercury [mg/L]	Manganese [mg/L]	Total P [mg/L]
Silver Bow Creek Upstream to Downstream										
SW-14	0.0068	0.00011	0.4	<0.001	0.0152	0.00036	0.244	<0.0002	0.135	0.53
SW-16	0.0066	0.00013	0.4	<0.001	0.0150	0.00037	0.0390	<0.0002	0.175	0.47
SW-15	0.0066	0.00017	0.4	<0.001	0.0130	0.00017	0.0427	<0.0002	0.233	0.36

September 2008

Station	Arsenic [mg/L]	Cadmium [mg/L]	Fluoride [mg/L]	Selenium [mg/L]	Copper [mg/L]	Lead [mg/L]	Zinc [mg/L]	Mercury [mg/L]	Manganese [mg/L]	Total P [mg/L]
Silver Bow Creek Upstream to Downstream										
SW-14	0.0059	0.00015	0.5	<0.001	0.0094	0.00014	0.0405	<0.0002	0.1029	0.45
SW-16	0.0066	0.00017	0.5	<0.001	0.0111	0.00017	0.0559	<0.0002	0.1179	0.51
SW-15	0.0076	0.00021	0.5	<0.001	0.0112	0.00013	0.0590	<0.0002	0.1239	0.44

The concentrations reported for the samples collected downstream (SW-15) of the Rhodia Silver Bow Site are consistent with the upstream concentrations (SW-14). Since Silver Bow Creek is the receiving body for both surface water discharges and groundwater from the Rhodia site, these data show that the surface water discharges from Sheep Gulch and groundwater from the Rhodia plant do not cause significant increases in concentrations in Silver Bow Creek.

Of particular interest, in terms of impact from the SSTOU, is the surface water quality at SW-17. Notably higher concentrations of metals were observed at this location (*see* Table 5.1-8). SW-17 is located on the outlet of a constructed wetland adjacent to Silver Bow Creek. This wetland was constructed in the former Silver Bow Creek flow channel. The primary contaminants of concern for the SSTOU include arsenic, cadmium, copper, lead, zinc, mercury, and manganese (Bighorn, 2010).

The concentrations at SW-17 for these metals are up to an order of magnitude higher than the concentrations in the flow channel. Although metals that are not listed as primary contaminates of concern have higher concentration at SW-17, there are only a few parts per billion differences. Therefore, the water quality impacts seen in the SW-17 water quality are associated with the ongoing remediation of the SSTOU.

5.1.3.2.4 VOCs

The analytical results for the VOCs are summarized in Table 5.1-9 with applicable surface water standards and the background area concentrations for comparison purposes. VOCs were generally not detected in the analyzed surface water samples collected from Silver Bow Creek.

Acetone and chloroform were detected in samples from the May 2008 sample event and were not detected in the September 2008 sample event. The concentrations detected in the samples were below the background concentrations. In addition, acetone and chloroform are common laboratory contaminants and given the low-level concentrations reported for the May 2008 samples is likely the result of laboratory methods.

5.1.3.2.5 SVOCs

The analytical results for the SVOCs included in the data set for Silver Bow Creek are summarized in Table 5.1-10. Surface water standards and the background reference area concentrations are also included for comparison. SVOC's were generally not detected in the surface water samples.

Four SVOCs constituents were reported at concentrations higher than the background concentrations for Silver Bow Creek. Carbazole was detected in the field duplicate sample for SW-15 from the September 2008 event, but was not detected in the original sample or the May 2008 sample. Fluoranthene was identified above the upstream concentration in the May 2008 sample from SW-15, but the concentration was only 0.011 µg/L higher than the upstream concentration. Naphthalene was found above upstream in the September 2008 sample from SW-16. Naphthalene was not detected in any other surface water sample. The pyrene concentration was 0.07 µg/L higher than the upstream concentration in one of three samples from SW-15.

Other SVOCs were detected in the surface water samples, but the concentrations were below the upstream concentrations. The following SVOC compounds were detected during the May 2008

sampling event (sample station of the detections are included in parentheses): fluoranthene (SW-15) and pyrene (SW-14, SW-15, SW-16, and SW-17).

The SVOC compounds detected during the September 2008 sampling event include the following: acenaphthene (SW-15 and SW-15 field duplicate); acenapthylene (SW-15); benzo-a-pyrene (SW-17); indeno(1,2,3-cd); and phenanthrene (SW-14, SW-15, SW-15 field duplicate, and SW-16). The only compounds that were detected during the May and September sampling events were fluoranthene and pyrene. Of these two compounds, only pyrene was detected at the same sample station (SW-16) during the May and September 2008 sampling events.

The detected SVOC compounds are generally hydrocarbon based and can be associated with creosote, coal tar, and incomplete combustion of fossil fuels. There is no known release to the surface waters of Silver Bow Creek from the Rhodia Site that would result in detections of the above listed SVOC's. Given that none of these SVOC compounds were detected in the Sheep Gulch surface water samples, Sheep Gulch and the Rhodia Site are not considered a potential source. The suspected source of these very low-level SVOC detections is from leaching of railroad ties/wooden trestles in the vicinity or upstream of the sample stations or potentially associated with storm water runoff from asphalt pavement.

5.1.3.2.6 Radionuclides

The analytical results for the radionuclides included in data set for Silver Bow Creek are summarized in Table 5.1-11. The applicable surface water standards and background reference area concentrations are included for comparison. Spatial distribution of the radionuclides is presented on Figure 5.1-23.

Gross alpha radiation concentrations were detected above background levels and surface water human health standards for all 2003 ESI surface water samples. It should be noted that these samples were collected prior to the reconstruction of Silver Bow Creek and are not likely representative of current conditions. Various samples from sample stations SW-15, SW-16, and SW-17 were above background concentrations for May and September 2008 sampling events. All 2008 analyzed samples with the exception of the September 2008 field duplicate sample collected at sample station SW-15 were above the surface water human health standards as shown in Table 5.1-11. Distribution of gross alpha radiation appears to be randomly distributed (Figure 5.1-23).

Gross beta radiation concentrations were detected above background levels for samples collected at sample stations ESI-SBC-5, SW-16, and SW-17. Of the reported gross beta radiation, the highest

concentrations appear to be associated with the samples collected from sample station SW-17 (Table 5.1-11). The remaining sample concentrations are fairly consistent and are randomly distributed as shown on Figure 5.1-23.

Radium 226 was also above background concentrations for the sample collected at sample station ESI-SBC-5 in 2003. However, as previously mentioned, the ESI samples were collected prior to the reconstruction of Silver Bow Creek and are not likely representative of current conditions. All remaining reported radionuclide concentrations were below background concentrations and applicable surface water standards. Radium 228 concentrations were below the background concentrations and were generally below the RDL. The radium distribution (shown on Figure 5.1-23) of reported concentrations appear to be consistent among analyzed samples and randomly distributed.

Cesium 137 was analyzed in 2003 for samples collected from all six ESI sample stations (ESI-SBC-1 through ESI-SBC-6). The laboratory reported concentrations of cesium 137 were generally below the RDL and relatively consistent among the analyzed samples. Figure 5.1-23 shows the spatial distribution of the reported concentrations for cesium 137 is generally random.

5.1.3.3 Conclusions

Surface water quality at monitoring stations along Sheep Gulch has shown significant improvements over time. Current arsenic concentrations are 60% to 98% lower than the concentrations from the late 1990s. Fluoride concentrations are 65% to 96% lower than the concentrations from the late 1990s. Total phosphorus and sulfate concentrations have been reduce by 98% and 87% respectively. Although groundwater seepage and prior releases from the tailing basin have shown greater impacts to the surface water quality at SW-5 and the other nearby ponds, constituent concentrations in the surface water leaving the Silver Bow Site property meet surface water standards for protection of aquatic life.

Silver Bow Creek is the ultimate receiving water for the groundwater and surface water from the Silver Bow Site. Upstream and downstream data in Silver Bow Creek show that surface water and groundwater from the Rhodia site are having no significant influence on Silver Bow Creek. Higher metal concentrations measured at SW-17 are likely due to SSTOU-impacted tailings and waters, not indicative of Rhodia Silver Bow Site groundwater or surface water. The concentrations upstream of the Silver Bow Site are essentially the same as the downstream concentrations.

5.1.4 References

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

Barr Engineering Co. 2012. October 2012 RFI 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.

World Health Organization. 2002. Concise International Chemical Assessment Document 46 – Carbon Disulfide (2002). http://www.who.int/ipcs/publications/cicad/cicad46_rev_1.pdf

Tables

Table 5.1-1

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-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]
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]
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, Radionuclides

Table 5.1-2
Surface Water Quality - General and Site-Specific Parameters
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		Alkalinity, bicarbonate as CaCO3	Alkalinity, bicarbonate as HCO3	Alkalinity, carbonate as CaCO3	Alkalinity, total	Chloride	Fluoride	Nitrate + Nitrite	Nitrogen, ammonia (NH3) as N	Nitrogen, Nitrate (NO3)	Nitrogen, Nitrite (NO2)	Phosphate as P	Phosphate, Ortho as PO4	Phosphorus, elemental (white)	Phosphorus, total	Solids, total dissolved	Sulfate
MT DEQ-7 Human Health Stds, Aug 2010 Exceedances **Bold**							**4**		**0.6**	10	1						
Background, Maximum Upsteam Concentration Exceedances Boxed		357		41		125		0.47	0.29					0.0000234	0.24		35.6
Location ID	**Sample Date**																
SW-20	5/23/2008	107	--	41	--	50.7	0.6	0.32	0.14	--	--	--	--	< 0.0000234	0.24	--	19.4
SW-20	9/21/2008	357	--	< 2	--	45.2	0.7	0.41	< 0.05	--	--	--	--	< 0.0000234	0.19	--	35.6
SW-SHPGLCH	10/8/1998	--	185	--	152	132	0.49	--	--	< 0.05	< 0.05	--	--	--	0.03	462	22
SW-8	5/23/2008	170	--	< 2	--	125	0.5	0.47	0.29	--	--	--	--	< 0.0000234	0.21	--	22.8
SW-8	9/20/2008	198	--	< 2	--	14.2	0.7	0.09	< 0.05	--	--	--	--	< 0.0000234	0.18	--	21.3
SW-1	11/5/1997	--	--	--	190	325	18.3	--	--	< 0.05	< 0.05	--	--	--	0.32	2540	1010
SW-1	10/8/1998	--	235	0	193	176	4.69	--	--	0.06	< 0.05	--	--	--	0.43	827	168
SW-1	4/14/1999	--	--	--	--	--	3.4	--	--	--	--	--	--	< 0.0000040	1.4	--	--
SW-1	7/15/2003	--	--	--	--	--	1.3	--	--	--	--	< 1.0	--	< 0.0001	0.26	--	--
SW-1	5/22/2008	286	--	30	--	663	0.3	0.71	**2.73**	--	--	--	--	< 0.0000234	0.11	--	78.5
SW-1	9/20/2008	242	--	< 2	--	23.6	0.7	0.07	< 0.05	--	--	--	--	< 0.0000234	0.16	--	23.1
SW-3	11/6/1997	--	--	--	103	221	1.95	--	--	< 0.05	< 0.05	--	--	--	2.68	2140	1120
SW-3	10/8/1998	--	109	--	90	215	**9.2**	--	--	0.98	< 0.05	--	--	--	2.47	1860	905
SW-3	5/22/2008	375	--	< 2	--	625	0.4	0.46	**3.92**	--	--	--	--	< 0.0000234	0.05	--	83.8
SW-3	9/19/2008	587	--	40	--	229	0.5	0.18	< 0.05	--	--	--	--	< 0.0000234	0.17	--	53.8
SW-4	10/8/1998	--	114	--	93	214	**9.2**	--	--	0.69	< 0.05	--	--	--	2.52	1880	915
SW-4	5/21/2008	129	--	65	--	270	0.5	0.25	< 0.05	--	--	--	--	< 0.0000234	0.04	--	48.3
SW-4	9/19/2008	592	--	42	--	209	0.6	0.13	< 0.05	--	--	--	--	< 0.0000234	0.16	--	54.3
SW-10	5/21/2008	190	--	< 2	--	229	**4.0**	< 0.05	< 0.05	--	--	--	--	< 0.0000234	0.11	--	189
SW-10	9/18/2008	187	--	< 2	--	220	**4.3**	< 0.05	< 0.05	--	--	--	--	< 0.0000234	0.10	--	172
SW-5	11/5/1997	--	--	--	80	188	3.34	--	--	< 0.05	< 0.05	--	--	--	7.41	2150	1100
SW-5	10/8/1998	--	90	--	74	194	3.88	--	--	< 0.05	< 0.05	--	--	--	5.29	2080	1060
SW-5	3/19/1999	--	--	--	--	--	3.47	--	--	--	--	--	--	--	--	--	--
SW-5	4/14/1999	--	--	--	--	--	2.4	--	--	--	--	--	--	< 0.0000040	1.4	--	--
SW-5	9/9/2002	--	--	--	--	--	**4.22**	--	--	--	--	--	0.11	< 0.0005	0.35	--	--
SW-5	7/22/2003	--	--	--	--	--	**4.2**	--	--	--	--	< 1.0	--	< 0.0001	0.13	--	--
SW-5	5/20/2008	155	--	< 2	--	188	3.7	< 0.05	< 0.05	--	--	--	--	< 0.0000234	0.13	--	328
SW-5	9/18/2008	155	--	< 2	--	185	**4.0**	< 0.05	< 0.05	--	--	--	--	< 0.0000234	0.12	--	331
SW-12	5/21/2008	160	--	< 2	--	192	3.8	< 0.05	< 0.05	--	--	--	--	< 0.0000234	0.12	--	326
SW-12	9/19/2008	160	--	< 2	--	185	**4.0**	< 0.05	< 0.05	--	--	--	--	< 0.0000234	0.09	--	317
SW-11	5/21/2008	132	--	29	--	208	3.9	< 0.05	< 0.05	--	--	--	--	< 0.0000234	0.26	--	345
SW-11	9/19/2008	194	--	< 2	--	235	**4.8**	< 0.05	< 0.05	--	--	--	--	< 0.0000234	0.48	--	263
SW-6	11/5/1997	--	--	--	85	187	3.23	--	--	< 0.05	< 0.05	--	--	--	7.43	2160	1090
SW-6	10/12/1998	--	108	--	89	198	**4.56**	--	--	0.08	< 0.05	--	--	--	4.61	2070	1030
SW-6	4/14/1999	--	--	--	--	--	3.3	--	--	--	--	--	--	< 0.000004	2.0	--	--
SW-6	9/9/2002	--	--	--	--	--	**4.06**	--	--	--	--	--	0.21	< 0.0005	0.34	--	--
SW-6	5/20/2008	135	--	40	--	345	2.3	< 0.05	< 0.05	--	--	--	--	< 0.0000234	0.09	--	208
SW-6	9/18/2008	397	--	19	--	211	1.6	0.22	< 0.05	--	--	--	--	< 0.0000234	0.13	--	137
SW-13	4/14/1999	--	--	--	--	--	3.4	--	--	--	--	--	--	< 0.000004	2.0	--	--
SW-13	5/20/2008	200	--	< 2	--	354	2.2	< 0.05	< 0.05	--	--	--	--	< 0.0000234	0.09	--	203
SW-13	9/17/2008	278	--	24	--	247	1.6	0.37	< 0.05	--	--	--	--	< 0.0000234	0.12	--	138
ESI-SG-3	7/22/2003	--	--	--	--	--	**4.8**	--	--	--	--	1.6	--	< 0.0001	1.8	--	--

Table 5.1-3
Surface Water Quality - Metals
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		Aluminum Dissolved	Aluminum Total	Antimony Dissolved	Antimony Total	Arsenic Dissolved	Arsenic Total	Arsenic III Total	Arsenic V Total	Barium Dissolved	Barium Total	Beryllium Dissolved	Beryllium Total	Cadmium Dissolved	Cadmium Total	Calcium Dissolved	Calcium Total	Chromium Dissolved	Chromium Total
MT DEQ-7 Human Health Stds, 8/1/2010 Exceedances **Bold**				0.0056	0.0056	**0.010 (29)**	**0.010 (29)**			1	1	0.004	0.004	**0.005**	0.005			0.1	0.1
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 Exceedances Underline		0.75				0.34	0.34							8.73 (12)	8.73 (12)				
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 Exceedances Shade		0.087				0.150	0.150							0.76 (12)	0.76 (12)				
Background, Maximum Upsteam Concentration Exceedances Boxed				0.00033	0.00030	0.0047	.0047			0.03011	.03654	0.00002	0.00002	0.00003	0.00002	53.2	56.5	0.0005	0.0008
Location ID	**Sample Date**																		
SW-20	5/23/2008	--	--	0.00031	0.00029	0.0044	0.0044	--	--	0.00940	0.0110	< 0.00002	< 0.00002	< 0.00002	< 0.00002	42.3	46	0.0005	0.0006
SW-20	9/21/2008	--	--	0.00025	0.00021	0.0045	0.0045	--	--	0.03011	0.03654	< 0.00002	< 0.00002	< 0.00002	< 0.00002	53.2	56.5	< 0.0007	< 0.0009
SW-SHPGLCH	10/8/1998	< 0.1	--	< 0.003	--	--	0.005	0.002	0.003	< 0.1	--	< 0.001	--	< 0.001	--	--	83	< 0.01	--
SW-8	5/23/2008	--	--	0.00033	0.00030	0.0042	0.0044	--	--	0.0141	0.0155	< 0.00002	< 0.00002	0.00003	0.00002	50.4	54.1	0.0005	0.0008
SW-8	9/20/2008	--	--	0.00030	0.00024	0.0047	0.0047	--	--	0.01551	0.01592	< 0.00002	< 0.00002	0.00003	< 0.00002	49.4	49.8	< 0.0007	< 0.0007
SW-1	11/5/1997	< 0.1	--	< 0.05	--	**0.092**	--	--	--	0.1	--	< 0.001	--	< 0.001	--	--	495	< 0.01	--
SW-1	10/8/1998	< 0.1	--	< 0.003	--	--	**0.030**	0.001	0.029	< 0.1	--	< 0.001	--	< 0.001	--	--	146	< 0.01	--
SW-1	7/22/2003	--	0.0926	--	< 0.0040	--	0.0087	--	--	--	0.0479	--	< 0.0020	--	< 0.0020	--	--	--	0.00092 J
SW-1	5/22/2008	--	--	0.00042	0.00040	0.0057	0.0058	--	--	0.0514	0.0545	< 0.00002	< 0.00002	0.00003	0.00006	104	111	0.0006	0.0006
SW-1	9/20/2008	--	--	0.00030	0.00027	0.0055	0.0056	--	--	0.01831	0.02062	< 0.00002	< 0.00002	0.00003	< 0.00002	47.9	48.5	< 0.0006	< 0.0007
SW-3	11/6/1997	< 0.1	--	< 0.05	--	**0.021**	--	--	--	< 0.1	--	< 0.001	--	**0.013**	--	--	459	< 0.01	--
SW-3	10/8/1998	< 0.1	--	< 0.003	--	**0.087**	--	0.009	0.078	< 0.1	--	< 0.001	--	**0.117**	--	--	360	< 0.01	--
SW-3	5/22/2008	--	--	0.00033	0.00033	0.0045	0.0046	--	--	0.0492	0.0517	< 0.00002	< 0.00002	0.00019	0.00032	89	90.6	0.0003	0.0006
SW-3	9/19/2008	--	--	0.00033	0.00030	0.0060	0.0060	--	--	0.03373	0.04207	< 0.00002	< 0.00002	0.00013	0.00027	48.1	49.0	< 0.0008	< 0.0009
SW-4	10/8/1998	< 0.1	--	< 0.003	--	--	**0.087**	0.008	0.079	< 0.1	--	< 0.001	--	**0.129**	--	--	357	< 0.01	--
SW-4	5/21/2008	--	--	0.00036	0.00035	0.0054	0.0056	--	--	0.0198	0.0212	< 0.00002	< 0.00002	0.00045	0.00067	52.1	51	0.0003	0.0004
SW-4	9/19/2008	--	--	0.00034	0.00030	0.0059	0.0063	--	--	0.03449	0.04183	< 0.00002	< 0.00002	0.00028	0.00054	49.1	50.6	< 0.0007	< 0.0008
SW-10	5/21/2008	--	--	0.00042	0.00041	**0.0576**	**0.0569**	--	--	0.0359	0.0371	< 0.00002	< 0.00002	0.00006	0.00009	165	162	< 0.0002	< 0.0002
SW-10	9/18/2008	--	--	0.00042	0.00038	**0.0635**	**0.0632**	--	--	0.04301	0.04357	< 0.00002	< 0.00002	< 0.00002	< 0.00002	150	152	< 0.0003	< 0.0003
SW-5	11/5/1997	< 0.1	--	< 0.05	--	**0.048**	--	--	--	< 0.1	--	< 0.001	--	< 0.001	--	--	392	< 0.01	--
SW-5	10/8/1998	< 0.1	--	< 0.003	--	**0.043**	--	0.002	0.041	< 0.1	--	< 0.001	--	< 0.001	--	--	380	< 0.01	--
SW-5	3/19/1999	--	--	--	--	**0.039**	--	--	--	--	--	--	--	< 0.001	--	--	--	--	--
SW-5	9/9/2002	--	--	--	--	--	**0.068**	--	--	--	< 0.1	--	--	--	< 0.001	--	--	--	--
SW-5	7/22/2003	--	0.0246 J	--	< 0.0100	--	**0.0715**	--	--	--	0.0259 J	--	< 0.0050	--	< 0.0050	--	--	--	< 0.010
SW-5	5/20/2008	--	--	0.00044	0.00044	**0.0455**	**0.0471**	--	--	0.0316	0.0326	< 0.00002	< 0.00002	0.00008	0.00012	190	181	< 0.0002	< 0.0002
SW-5	9/18/2008	--	--	0.00050	0.00046	**0.0438**	**0.0466**	--	--	0.01794	0.02251	< 0.00002	< 0.00002	< 0.00002	< 0.00002	183	175	< 0.0003	< 0.0003
SW-12	5/21/2008	--	--	0.00042	0.00041	**0.0468**	**0.0476**	--	--	0.0296	0.0306	< 0.00002	< 0.00002	0.00005	0.00007	183	184	< 0.0002	< 0.0002
SW-12	9/19/2008	--	--	0.00036	0.00035	**0.0520**	**0.0518**	--	--	0.02797	0.02875	< 0.00002	< 0.00002	< 0.00002	< 0.00002	182	176	< 0.0003	< 0.0003
SW-11	5/21/2008	--	--	0.00046	0.00048	**0.0473**	**0.0508**	--	--	0.0204	0.0220	< 0.00002	< 0.00002	0.00014	0.00031	190	191	< 0.0002	< 0.0002
SW-11	9/19/2008	--	--	0.00043	0.00043	**0.0402**	**0.0511**	--	--	0.03574	0.04229	< 0.00002	< 0.00002	< 0.00002	0.00066	186	183	< 0.0003	< 0.0005
SW-EPA-OP-1	8/5/1988	--	< 0.028	--	< 0.029	--	0.046	--	--	--	< 0.0489 B	--	< 0.001	--	< 0.005	--	348	--	< 0.005
SW-6	11/5/1997	< 0.1	--	< 0.05	--	**0.049**	--	--	--	< 0.1	--	< 0.001	--	0.003	--	--	409	< 0.01	--
SW-6	10/12/1998	< 0.1	--	< 0.003	--	--	**0.051**	0.046	0.005	< 0.1	--	< 0.001	--	**0.019**	--	--	391	< 0.01	--
SW-6	9/9/2002	--	--	--	--	--	**0.058**	--	--	--	< 0.1	--	--	--	< 0.001	--	--	--	--
SW-6	5/20/2008	--	--	0.00043	0.00043	**0.0314**	**0.0305**	--	--	0.0295	0.0310	< 0.00002	< 0.00002	0.00036	0.00057	135	131	0.0002	0.0003
SW-6	9/18/2008	--	--	0.00036	0.00034	**0.0208**	**0.0210**	--	--	0.03282	0.03483	< 0.00002	< 0.00002	0.00020	0.00041	85.8	88.9	< 0.0005	< 0.0006
SW-13	5/20/2008	--	--	0.00040	0.00041	**0.0292**	**0.0292**	--	--	0.0318	0.0340	< 0.00002	< 0.00002	0.00050	0.00078	143	144	0.0002	0.0003
SW-13	9/17/2008	--	--	0.00037	0.00036	**0.0221**	**0.0213**	--	--	0.03199	0.03271	< 0.00002	< 0.00002	0.00020	0.00049	81.8	87.7	< 0.0005	< 0.0006
ESI-SG-3	7/22/2003	--	0.0307 J	--	< 0.010	--	**0.118**	--	--	--	0.0439 J	--	< 0.0050	--	< 0.0050	--	--	--	< 0.0100

Table 5.1-3
Surface Water Quality - Metals
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		Cobalt Dissolved	Cobalt Total	Copper Dissolved	Copper Total	Iron Dissolved	Iron Total	Lead Dissolved	Lead Total	Magnesium Dissolved	Magnesium Total	Manganese Dissolved	Manganese Total	Mercury Dissolved	Mercury Total	Nickel Dissolved	Nickel Total
MT DEQ-7 Human Health Stds, 8/1/2010 Exceedances **Bold**				1.3	1.3	(23)	(23)	0.015	0.015			(24)	(24)	0.00005	0.00005	0.1	0.1
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 Exceedances Underline				51.68 (12)	51.68 (12)			476.82 (12)	476.82 (12)					0.0017	0.0017	1515.92 (12)	1515.92 (12)
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 Exceedances Shade				30.50 (12)	30.50 (12)	1	1	18.58 (12)	18.58 (12)					0.00091	0.00091	168.54 (12)	168.54 (12)
Background, Maximum Upsteam Concentration Exceedances Boxed		0.00060	.00012	0.0068	0.0088	0.020	0.057	0.0001	0.00026	12.5	12.7	0.00330	0.00391	0.0002	0.00020	0.0030	0.0026
Location ID	**Sample Date**																
SW-20	5/23/2008	0.00015	0.00011	0.0068	0.0088	< 0.02	0.043	0.00007	0.00017	7.3	7.86	0.00261	0.00391	< 0.0002	< 0.0002	0.0025	0.0025
SW-20	9/21/2008	0.00043	0.00012	0.0049	0.0073	< 0.020	0.044	0.00008	0.00026	12.5	12.7	0.00148	0.00199	< 0.0002	< 0.0002	0.0025	0.0026
SW-SHPGLCH	10/8/1998	< 0.01	--	< 0.01	--	< 0.03	--	< 0.01	--	--	10	< 0.01	--	< 0.001	--	< 0.01	--
SW-8	5/23/2008	0.00040	0.00012	0.0064	0.0086	< 0.02	0.05	0.00010	0.00022	7.43	7.89	0.00330	0.00387	< 0.0002	< 0.0002	0.0030	0.0030
SW-8	9/20/2008	0.00060	0.00012	0.0038	0.0050	< 0.020	0.057	0.00008	0.00019	11.8	11.6	0.00190	0.00172	< 0.0002	< 0.0002	0.0024	0.0023
SW-1	11/5/1997	< 0.01	--	< 0.01	--	0.05	--	< 0.01	--	--	31	0.27	--	< 0.001	--	0.01	--
SW-1	10/8/1998	< 0.01	--	< 0.01	--	< 0.03	--	< 0.01	--	--	17	0.07	--	< 0.001	--	< 0.01	--
SW-1	7/22/2003	--	0.00046 J	--	0.0042	--	--	--	0.00042 J	--	--	--	0.247	--	< 0.00020	--	0.0164
SW-1	5/22/2008	0.00055	0.00027	0.0059	0.0085	< 0.02	0.244	0.00013	0.00061	11.9	12.6	0.0141	0.0172	< 0.0002	< 0.0002	0.0024	0.0024
SW-1	9/20/2008	0.00054	0.00013	0.0035	0.0047	0.027	0.090	0.00010	0.00027	11.2	11.2	0.00358	< 0.00358	< 0.0002	< 0.0002	0.0022	0.0023
SW-3	11/6/1997	< 0.01	--	< 0.01	--	< 0.03	--	< 0.01	--	--	40	0.04	--	< 0.001	--	< 0.01	--
SW-3	10/8/1998	< 0.01	--	< 0.01	--	< 0.03	--	< 0.01	--	--	33	1.57	--	< 0.001	--	0.02	--
SW-3	5/22/2008	0.00026	0.00016	0.0070	0.0082	< 0.02	0.067	0.00009	0.00020	11.8	12	0.00672	0.00937	< 0.0002	< 0.0002	0.0023	0.0023
SW-3	9/19/2008	0.00029	0.00015	0.0061	0.0079	0.021	0.080	0.00008	0.00033	10.5	10.4	< 0.00277	0.00497	< 0.0002	< 0.0002	0.0021	0.0025
SW-4	10/8/1998	< 0.01	--	< 0.01	--	< 0.03	--	< 0.01	--	--	32	1.25	--	< 0.001	--	0.02	--
SW-4	5/21/2008	0.00015	0.00015	0.0055	0.0061	0.026	0.093	0.00009	0.00020	9.91	9.75	0.00427	0.00822	< 0.0002	< 0.0002	0.0017	0.0018
SW-4	9/19/2008	0.00040	0.00016	0.0051	0.0068	< 0.020	0.081	0.00007	0.00029	10.3	10.4	< 0.00278	0.00554	< 0.0002	< 0.0002	0.0021	0.0024
SW-10	5/21/2008	0.00042	0.00035	< 0.0008	0.0009	< 0.02	< 0.02	0.00003	0.00004	30.7	30.3	0.0880	0.0702	< 0.0002	< 0.0002	0.0026	0.0024
SW-10	9/18/2008	0.00110	0.00043	0.0008	0.0009	< 0.02	< 0.02	0.00002	0.00004	28.5	28.8	0.03153	0.02790	< 0.0002	< 0.0002	0.0068	0.0066
SW-5	11/5/1997	< 0.01	--	< 0.01	--	< 0.03	--	< 0.01	--	--	71	0.16	--	< 0.001	--	< 0.01	--
SW-5	10/8/1998	< 0.01	--	< 0.01	--	< 0.03	--	< 0.01	--	--	69	0.19	--	< 0.001	--	< 0.01	--
SW-5	3/19/1999	--	--	--	--	--	--	--	--	--	--	0.21	--	--	--	--	--
SW-5	9/9/2002	--	--	--	--	--	< 0.03	--	--	--	--	--	0.11	--	--	--	--
SW-5	7/22/2003	--	0.00090 J	--	0.0034 J	--	--	--	0.00039 J	--	--	--	0.176	--	< 0.00020	--	0.0267
SW-5	5/20/2008	0.00082	0.00070	< 0.0007	0.0010	< 0.02	0.042	< 0.00002	0.00008	34.5	32.9	0.192	0.205	< 0.0002	< 0.0002	0.0040	0.0039
SW-5	9/18/2008	0.00145	0.00099	0.0013	0.0015	< 0.02	0.03	< 0.00002	0.00004	33.6	32.0	0.20300	0.20260	< 0.0002	< 0.0002	0.0108	0.0098
SW-12	5/21/2008	0.00073	0.00069	< 0.0008	0.0011	< 0.02	0.033	< 0.00002	0.00007	33.2	33.2	0.191	0.197	< 0.0002	< 0.0002	0.0042	0.0040
SW-12	9/19/2008	0.00101	0.00078	0.0006	0.0007	< 0.020	< 0.020	< 0.00002	< 0.00002	33.3	32.1	0.22010	0.21940	< 0.0002	< 0.0002	0.0084	0.0092
SW-11	5/21/2008	0.00076	0.00072	0.0015	0.0022	< 0.02	0.272	< 0.00002	0.00018	36.7	36.8	0.168	0.189	< 0.0002	< 0.0002	0.0042	0.0042
SW-11	9/19/2008	0.00132	0.00085	0.0005	0.0021	0.050	0.982	< 0.00002	0.00058	36.3 J	35.8 J	0.47600	0.49520	< 0.0002	< 0.0002	0.0080	0.0085
SW-EPA-OP-1	8/5/1988	--	< 0.0051 B	--	< 0.0082 B	--	0.300	--	< 0.002 CJ	--	65.3	--	0.0335	--	< 0.0002	--	< 0.009
SW-6	11/5/1997	< 0.01	--	< 0.01	--	< 0.03	--	< 0.01	--	--	73	0.51	--	< 0.001	--	< 0.01	--
SW-6	10/12/1998	< 0.01	--	< 0.01	--	< 0.03	--	< 0.01	--	--	63	0.66	--	< 0.001	--	0.01	--
SW-6	9/9/2002	--	--	--	--	--	0.06	--	--	--	--	--	0.14	--	--	--	--
SW-6	5/20/2008	0.00049	0.00045	0.0031	0.0034	< 0.02	0.088	0.00004	0.00018	24.1	23.4	0.0665	0.0743	< 0.0002	< 0.0002	0.0031	0.0029
SW-6	9/18/2008	0.00059	0.00034	0.0033	0.0043	< 0.02	0.08	0.00005	0.00019	16.0	16.6	0.06967	0.07685	< 0.0002	< 0.0002	0.0042	0.0042
SW-13	5/20/2008	0.00047	0.00048	0.0029	0.0037	0.021	0.107	0.00006	0.00026	24	24.2	0.0445	0.0562	< 0.0002	< 0.0002	0.0032	0.0033
SW-13	9/17/2008	0.00045	0.00034	0.0040	0.0047	< 0.02	0.09	0.00006	0.00023	15.3	16.4	0.02939	0.03283	< 0.0002	< 0.0002	0.0042	0.0038
ESI-SG-3	7/22/2003	--	0.0041	--	0.0029 J	--	--	--	0.00040 J	--	--	--	1.45	--	< 0.00020	--	0.0413

Table 5.1-3
Surface Water Quality - Metals
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		Potassium Dissolved	Potassium Total	Selenium Dissolved	Selenium Total	Silver Dissolved	Silver Total	Sodium Dissolved	Sodium Total	Strontium Dissolved	Thallium Dissolved	Thallium Total	Uranium Dissolved	Uranium Total	Vanadium Dissolved	Vanadium Total	Zinc Dissolved	Zinc Total
MT DEQ-7 Human Health Stds, 8/1/2010 Exceedances **Bold**				0.05	0.05	0.1	0.1			4	0.00024	**0.00024**	0.03	**0.03**			2	2
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 Exceedances Underline				0.02	0.02	44.05 (12)	44.05 (12)										387.83 (12)	387.83 (12)
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 Exceedances Shade				0.005	0.005												387.83 (12)	387.83 (12)
Background, Maximum Upsteam Concentration Exceedances Boxed		2.03	2.11	0.001	0.001	0.00002	0.00002	120	126		0.00002	0.00002	0.00243	0.00236	0.0023	0.0024	0.0074	0.0116
Location ID	**Sample Date**																	
SW-20	5/23/2008	< 2	< 2	< 0.0010	< 0.0010	< 0.00002	< 0.00002	43.4	48.8	--	< 0.00002	< 0.00002	0.0014	0.0014	0.0021	0.0022	0.0035	< 0.0058
SW-20	9/21/2008	2.03	2.11	< 0.001	< 0.001	< 0.00002	< 0.00002	120	126	--	< 0.00002	< 0.00002	0.00243	0.00236	0.0017	0.0018	0.0074	0.0116
SW-SHPGLCH	10/8/1998	--	3	< 0.005	--	< 0.005	--	--	42	0.1	< 0.1	--	--	--	< 0.1	--	0.26	--
SW-8	5/23/2008	< 2	< 2	< 0.0010	< 0.0010	< 0.00002	< 0.00002	94.2	106	--	< 0.00002	< 0.00002	0.0014	0.0014	0.0023	0.0024	0.0050	0.0071
SW-8	9/20/2008	< 2.00	< 2.00	< 0.001	< 0.001	< 0.00002	< 0.00002	31.0	31.3	--	< 0.00002	< 0.00002	0.00214	0.00215	0.0018	0.0018	0.0059	0.0070
SW-1	11/5/1997	--	20	0.005	--	< 0.005	--	--	160	2.5	< 0.1	--	--	**0.0478**	< 0.1	--	< 0.01	--
SW-1	10/8/1998	--	14	< 0.005	--	< 0.005	--	--	68	0.6	< 0.1	--	--	--	< 0.1	--	< 0.01	--
SW-1	7/22/2003	--	--	--	< 0.0100	--	< 0.0020	--	--	--	--	< 0.0020	--	--	--	< 0.0020	--	0.0099
SW-1	5/22/2008	2.89	3.38	< 0.0010	< 0.0010	< 0.00002	< 0.00002	387	432	--	< 0.00002	< 0.00002	0.0018	0.0019	0.0043	0.0047	< 0.0021	< 0.0057
SW-1	9/20/2008	< 2.00	< 2.00	< 0.001	< 0.001	< 0.00002	< 0.00002	60.8	61.7	--	< 0.00002	< 0.00002	0.00220	0.00217	0.0019	0.0020	0.0056	0.0072
SW-3	11/6/1997	--	13	0.011	--	< 0.005	--	--	111	1.4	< 0.1	--	--	0.0058	< 0.1	--	< 0.01	--
SW-3	10/8/1998	--	15	0.021	--	< 0.005	--	--	129	1.1	< 0.1	--	--	--	< 0.1	--	0.02	--
SW-3	5/22/2008	3.54	3.66	< 0.0010	< 0.0010	< 0.00002	< 0.00002	418	431	--	< 0.00002	< 0.00002	0.0017	0.0018	0.0023	0.0026	< 0.0024	< 0.0036
SW-3	9/19/2008	2.37	2.36	< 0.001	< 0.001	< 0.00002	< 0.00002	374	376	--	< 0.00002	< 0.00002	0.00226	0.00239	0.0040	0.0041	0.0072	0.0121
SW-4	10/8/1998	--	15	0.021	--	< 0.005	--	--	127	1.1	< 0.1	--	--	--	< 0.1	--	< 0.01	--
SW-4	5/21/2008	< 2	< 2	< 0.0010	< 0.0010	< 0.00002	< 0.00002	214	210	--	< 0.00002	< 0.00002	0.0018	0.0018	0.0031	0.0032	< 0.0015	< 0.0030
SW-4	9/19/2008	2.24	2.28	< 0.001	< 0.001	< 0.00002	< 0.00002	356	360	--	< 0.00002	< 0.00002	0.00233	0.00239	0.0036	0.0038	0.0077	0.0099
SW-10	5/21/2008	17.3	16.9	0.0054	0.0058	< 0.00002	< 0.00002	67.7	67	--	< 0.00002	< 0.00002	0.0098	0.0100	0.0088	0.0086	< 0.0012	< 0.0011
SW-10	9/18/2008	15.4	15.5	0.005	0.005	< 0.00002	< 0.00002	60.7	60.8	--	< 0.00002	< 0.00002	0.00992	0.00936	0.0090	0.0089	< 0.0016	0.0030
SW-5	11/5/1997	--	21	< 0.005	--	< 0.005	--	--	88	2.5	< 0.1	--	--	0.0036	< 0.1	--	< 0.01	--
SW-5	10/8/1998	--	22	< 0.005	--	< 0.005	--	--	86	2.5	< 0.1	--	--	--	< 0.1	--	< 0.01	--
SW-5	3/19/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SW-5	9/9/2002	--	--	--	< 0.005	--	--	--	--	--	--	--	--	--	--	--	--	< 0.01
SW-5	7/22/2003	--	--	--	0.0041 J	--	< 0.0050	--	--	--	--	0.00023 J	--	--	--	0.0065	--	0.0028 J
SW-5	5/20/2008	18.5	17.2	0.0039	0.0040	< 0.00002	< 0.00002	73.7	68.8	--	< 0.00002	< 0.00002	0.0083	0.0085	0.0079	0.0083	< 0.0008	< 0.0012
SW-5	9/18/2008	16.8	16.3	0.006	0.005	< 0.00002	< 0.00002	65.3	63.2	--	< 0.00002	< 0.00002	0.00779	0.00773	0.0105	0.0104	< 0.0013	0.0025
SW-12	5/21/2008	17.9	17.7	0.0039	0.0041	< 0.00002	< 0.00002	71.2	71.1	--	< 0.00002	< 0.00002	0.0085	0.0085	0.0067	0.0070	< 0.0012	< 0.0009
SW-12	9/19/2008	16.9	16.3	0.005	0.005	< 0.00002	< 0.00002	67.6	65.4	--	< 0.00002	< 0.00002	0.00837	0.00820	0.0053	0.0055	< 0.0011	0.0018
SW-11	5/21/2008	18	18.1	0.0037	0.0038	< 0.00002	< 0.00002	78	78.1	--	0.00002	0.00003	0.0081	0.0081	0.0056	0.0058	< 0.0009	< 0.0015
SW-11	9/19/2008	18.0	17.9	0.002	0.002	< 0.00002	< 0.00002	80.2	78.6	--	< 0.00002	< 0.00002	0.00378	0.00362	0.0023	0.0028	< 0.0016	0.0056
SW-EPA-OP-1	8/5/1988	--	21	--	< 0.020 J	--	< 0.004	--	82.4	--	--	< 0.0026 BJ	--	--	--	< 0.004	--	< 0.0169 B
SW-6	11/5/1997	--	22	< 0.005	--	< 0.005	--	--	93	2.6	< 0.1	--	--	0.0042	< 0.1	--	0.02	--
SW-6	10/12/1998	--	21	0.006	--	< 0.005	--	--	105	2.1	< 0.1	--	--	--	< 0.1	--	< 0.01	--
SW-6	9/9/2002	--	--	--	< 0.005	--	--	--	--	--	--	--	--	--	--	--	--	< 0.01
SW-6	5/20/2008	11.6	11.1	0.0028	0.0022	< 0.00002	< 0.00002	186	180	--	< 0.00002	< 0.00002	0.0058	0.0057	0.0065	0.0065	< 0.0009	< 0.0035
SW-6	9/18/2008	6.4	6.7	0.002	0.002	< 0.00002	< 0.00002	236	245	--	< 0.00002	< 0.00002	0.00424	0.00450	0.0042	0.0044	< 0.0046	0.0071
SW-13	5/20/2008	11.3	11.4	0.0023	0.0023	< 0.00002	< 0.00002	194	195	--	< 0.00002	< 0.00002	0.0053	0.0054	0.0051	0.0054	< 0.0012	< 0.0024
SW-13	9/17/2008	6.4	6.8	0.002	0.002	< 0.00002	< 0.00002	211	226	--	< 0.00002	< 0.00002	0.00424	0.00436	0.0051	0.0050	< 0.0044	0.0075
ESI-SG-3	7/22/2003	--	--	--	0.0033 J	--	< 0.0050	--	--	--	--	**0.00028 J**	--	--	--	0.0012 J	--	0.0075

Table 5.1-4
Surface Water Quality - VOCs
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-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
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances											
Background, Maximum Upsteam Concentration Exceedances Boxed		0.000047	0.000050	0.000064	0.000061	0.000051	0.000042	0.00010	0.00010	0.00014	0.00013
Location ID	**Sample Date**										
SW-20	5/23/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-20	9/21/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-8	5/23/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-8	9/20/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-1	11/5/1997	--	--	--	--	--	--	--	--	--	--
SW-1	5/22/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-1	9/20/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-3	11/6/1997	--	--	--	--	--	--	--	--	--	--
SW-3	5/22/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-3	9/19/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-4	5/21/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-4	9/19/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-10	5/21/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-10	9/18/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-5	11/5/1997	--	--	--	--	--	--	--	--	--	--
SW-5	5/20/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-5	9/18/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-12	5/21/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-12	9/19/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-11	5/21/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-11	9/19/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-6	11/5/1997	--	--	--	--	--	--	--	--	--	--
SW-6	5/20/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-6	9/18/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-13	5/20/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-13	9/17/2008	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013
SW-EPA-OP-1	8/5/1988	--	< 0.005	< 0.005	< 0.005	--	< 0.005	< 0.005	--	--	--

Table 5.1-4
Surface Water Quality - VOCs
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		1,2,4-Trimethylbenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloroethylene	1,2-Dichloroethylene, cis	1,2-Dichloroethylene, trans	1,2-Dichloropropane	1,3,5-Trimethylbenzene
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances											
Background, Maximum Upsteam Concentration Exceedances Boxed		0.000037	0.00022	0.000084	0.000044	0.000073	0.000073	0.000045	0.000048	0.000042	0.000042
Location ID	**Sample Date**										
SW-20	5/23/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-20	9/21/2008	< 0.000037	< 0.00022 J	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-8	5/23/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-8	9/20/2008	< 0.000037	< 0.00022 J	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-1	11/5/1997	--	--	--	--	--	--	--	--	--	--
SW-1	5/22/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-1	9/20/2008	< 0.000037	< 0.00022 J	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-3	11/6/1997	--	--	--	--	--	--	--	--	--	--
SW-3	5/22/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-3	9/19/2008	< 0.000037	< 0.00022 J	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-4	5/21/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-4	9/19/2008	< 0.000037	< 0.00022 J	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-10	5/21/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-10	9/18/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-5	11/5/1997	--	--	--	--	--	--	--	--	--	--
SW-5	5/20/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-5	9/18/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-12	5/21/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-12	9/19/2008	< 0.000037	< 0.00022 J	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-11	5/21/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-11	9/19/2008	< 0.000037	< 0.00022 J	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-6	11/5/1997	--	--	--	--	--	--	--	--	--	--
SW-6	5/20/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-6	9/18/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-13	5/20/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-13	9/17/2008	< 0.000037	< 0.00022	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042
SW-EPA-OP-1	8/5/1988	--	--	--	--	< 0.005	< 0.005	--	--	< 0.005	--

Table 5.1-4
Surface Water Quality - VOCs
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		1,3-Dichloro-1-propene trans	1,3-Dichloro-1-propene, cis	1,3-Dichlorobenzene	1,3-Dichloropropane	1,4-Dichlorobenzene	2,2-Dichloropropane	2-Chloroethyl Vinyl Ether	2-Hexanone	Acetone	Acrolein
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances											
Background, Maximum Upsteam Concentration Exceedances Boxed		0.000041	0.000038	0.000041	0.000032	0.000054	0.000050	0.00019	0.0029	0.0025	0.0020
Location ID	**Sample Date**										
SW-20	5/23/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
SW-20	9/21/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
SW-8	5/23/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
SW-8	9/20/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
SW-1	11/5/1997	--	--	--	--	--	--	--	--	--	--
SW-1	5/22/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	0.0027 J	< 0.0020
SW-1	9/20/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0059	< 0.0020
SW-3	11/6/1997	--	--	--	--	--	--	--	--	--	--
SW-3	5/22/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
SW-3	9/19/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0055	< 0.0020
SW-4	5/21/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
SW-4	9/19/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0029	< 0.0020
SW-10	5/21/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
SW-10	9/18/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0041	< 0.0020
SW-5	11/5/1997	--	--	--	--	--	--	--	--	--	--
SW-5	5/20/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
SW-5	9/18/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0030	< 0.0020
SW-12	5/21/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
SW-12	9/19/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0031	< 0.0020
SW-11	5/21/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	0.0028 J	< 0.0020
SW-11	9/19/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0051	< 0.0020
SW-6	11/5/1997	--	--	--	--	--	--	--	--	--	--
SW-6	5/20/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
SW-6	9/18/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0032	< 0.0020
SW-13	5/20/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
SW-13	9/17/2008	< 0.000041	< 0.000038	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0039	< 0.0020
SW-EPA-OP-1	8/5/1988	< 0.005	< 0.005	--	--	--	--	--	< 0.01	< 0.005 B	--

Table 5.1-4
Surface Water Quality - VOCs
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		Acrylonitrile	Benzene	Bromobenzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Butyl benzene	Butylbenzene sec	Butylbenzene tert-	Carbon disulfide	Carbon tetrachloride
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances			0.005										
Background, Maximum Upsteam Concentration Exceedances Boxed		0.00031	0.000045	0.000027	0.000091	0.000036	0.000080	0.000072	0.000056	0.000036	0.000038	0.000050	0.000068
Location ID	**Sample Date**												
SW-20	5/23/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068
SW-20	9/21/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068
SW-8	5/23/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	< 0.000036	< 0.000038	0.000050 J	< 0.000068
SW-8	9/20/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068
SW-1	11/5/1997	--	< 0.0010	--	--	--	--	--	--	--	--	--	--
SW-1	5/22/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072 J	< 0.000056	< 0.000036	< 0.000038	0.000050 J	< 0.000068
SW-1	9/20/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068
SW-3	11/6/1997	--	< 0.0010	--	--	--	--	--	--	--	--	--	--
SW-3	5/22/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072 J	< 0.000056	< 0.000036	< 0.000038	< 0.000045 J	< 0.000068
SW-3	9/19/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068
SW-4	5/21/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068
SW-4	9/19/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068
SW-10	5/21/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068
SW-10	9/18/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068
SW-5	11/5/1997	--	< 0.0010	--	--	--	--	--	--	--	--	--	--
SW-5	5/20/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.00011	< 0.000068
SW-5	9/18/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068
SW-12	5/21/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	< 0.000036	< 0.000038	0.000090 J	< 0.000068
SW-12	9/19/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056	< 0.000036	< 0.000038	0.000050 J	< 0.000068
SW-11	5/21/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	< 0.000036	< 0.000038	0.00010 J	< 0.000068
SW-11	9/19/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056	< 0.000036	< 0.000038	0.00013 J	< 0.000068
SW-6	11/5/1997	--	< 0.0010	--	--	--	--	--	--	--	--	--	--
SW-6	5/20/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000070	< 0.000068
SW-6	9/18/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056	< 0.000036	< 0.000038	0.000050 J	< 0.000068
SW-13	5/20/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000060	< 0.000068
SW-13	9/17/2008	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068
SW-EPA-OP-1	8/5/1988	--	< 0.005	--	--	< 0.005	< 0.005	< 0.01	--	--	--	< 0.005	< 0.005

Table 5.1-4
Surface Water Quality - VOCs
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		Chlorobenzene	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	Chlorotoluene o-	Chlorotoluene p-	Cumene (isopropyl benzene)	Cymene p- (Toluene isopropyl p-)	Dibromomethane (methylene bromide)
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances											
Background, Maximum Upsteam Concentration Exceedances Boxed		0.000045	0.000057	0.00013	0.000042	0.000053	0.000035	0.000025	0.000031	0.000044	0.000089
Location ID	**Sample Date**										
SW-20	5/23/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-20	9/21/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-8	5/23/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-8	9/20/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-1	11/5/1997	--	--	--	--	--	--	--	--	--	--
SW-1	5/22/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-1	9/20/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-3	11/6/1997	--	--	--	--	--	--	--	--	--	--
SW-3	5/22/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-3	9/19/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-4	5/21/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-4	9/19/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-10	5/21/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-10	9/18/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-5	11/5/1997	--	--	--	--	--	--	--	--	--	--
SW-5	5/20/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-5	9/18/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-12	5/21/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-12	9/19/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-11	5/21/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-11	9/19/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-6	11/5/1997	--	--	--	--	--	--	--	--	--	--
SW-6	5/20/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-6	9/18/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-13	5/20/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-13	9/17/2008	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089
SW-EPA-OP-1	8/5/1988	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	--	--	--	--	--

Table 5.1-4
Surface Water Quality - VOCs
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		Dichlorodifluoromethane (CFC-12)	Ethyl benzene	Hexachlorobutadiene	Iodomethane	Methyl ethyl ketone	Methyl isobutyl ketone	Methyl tertiary butyl ether (MTBE)	Methylene chloride	Naphthalene	Propylbenzene
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances			0.53								
Background, Maximum Upsteam Concentration Exceedances Boxed		0.000083	0.000042	0.00019	0.00027	0.0038	0.0030	0.000070	0.00023	0.00077	0.000037
Location ID	**Sample Date**										
SW-20	5/23/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-20	9/21/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-8	5/23/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	0.00077 J	< 0.000037
SW-8	9/20/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-1	11/5/1997	--	< 0.0010	--	--	--	--	--	--	--	--
SW-1	5/22/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	0.00035 J	< 0.000037
SW-1	9/20/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-3	11/6/1997	--	< 0.0010	--	--	--	--	--	--	--	--
SW-3	5/22/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-3	9/19/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-4	5/21/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-4	9/19/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-10	5/21/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-10	9/18/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-5	11/5/1997	--	< 0.0010	--	--	--	--	--	--	--	--
SW-5	5/20/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-5	9/18/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-12	5/21/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-12	9/19/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-11	5/21/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-11	9/19/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-6	11/5/1997	--	< 0.0010	--	--	--	--	--	--	--	--
SW-6	5/20/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-6	9/18/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-13	5/20/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-13	9/17/2008	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037
SW-EPA-OP-1	8/5/1988	--	< 0.005	--	--	< 0.01	< 0.01	--	< 0.004 J	--	--

Table 5.1-4
Surface Water Quality - VOCs
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		Styrene	Tetrachloroethylene	Toluene	Trichloroethylene	Trichlorofluoromethane	Vinyl acetate	Vinyl chloride	Xylene m & p	Xylene, o-	Xylenes, total
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances				1					10	10	10
Background, Maximum Upsteam Concentration Exceedances Boxed		0.000039	0.000077	0.00027	0.000061	0.000086	0.00091	0.000071	0.000078	0.000037	--
Location ID	**Sample Date**										
SW-20	5/23/2008	< 0.000039	< 0.000077	0.000050 J	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-20	9/21/2008	< 0.000039	< 0.000077	< 0.00015	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-8	5/23/2008	< 0.000039	< 0.000077	0.000080 J	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-8	9/20/2008	< 0.000039	< 0.000077	< 0.00027	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-1	11/5/1997	--	--	< 0.0010	--	--	--	--	< 0.0010	< 0.0010	--
SW-1	5/22/2008	< 0.000039	< 0.000077	0.00019 J	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-1	9/20/2008	< 0.000039	< 0.000077	< 0.00026	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-3	11/6/1997	--	--	< 0.0010	--	--	--	--	< 0.0010	< 0.0010	--
SW-3	5/22/2008	< 0.000039	< 0.000077	< 0.00051	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-3	9/19/2008	< 0.000039	< 0.000077	< 0.00023	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-4	5/21/2008	< 0.000039	< 0.000077	0.00016 J	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-4	9/19/2008	< 0.000039	< 0.000077	< 0.00040	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-10	5/21/2008	< 0.000039	< 0.000077	0.00026 J	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-10	9/18/2008	< 0.000039	< 0.000077	< 0.00021	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-5	11/5/1997	--	--	< 0.0010	--	--	--	--	< 0.0010	< 0.0010	--
SW-5	5/20/2008	< 0.000039	< 0.000077	< 0.00026	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-5	9/18/2008	< 0.000039	< 0.000077	< 0.00040	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-12	5/21/2008	< 0.000039	< 0.000077	0.00040 J	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-12	9/19/2008	< 0.000039	< 0.000077	< 0.00021	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-11	5/21/2008	< 0.000039	< 0.000077	0.00030 J	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-11	9/19/2008	< 0.000039	< 0.000077	< 0.00039	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-6	11/5/1997	--	--	< 0.0010	--	--	--	--	< 0.0010	< 0.0010	--
SW-6	5/20/2008	< 0.000039	< 0.000077	< 0.00020	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-6	9/18/2008	< 0.000039	< 0.000077	< 0.00018	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-13	5/20/2008	< 0.000039	< 0.000077	< 0.00022	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-13	9/17/2008	< 0.000039	< 0.000077	< 0.00018	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-EPA-OP-1	8/5/1988	< 0.005	< 0.005	< 0.005	< 0.005	--	< 0.01	< 0.01	--	--	< 0.005

Table 5.1-5
Surface Water Quality - SVOCs
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	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
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances													
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances													
Background, Maximum Upsteam Concentration No Exceedances		0.000016	0.000022	0.000021	0.000029	0.000031	0.000058	0.000047	0.0022	0.00017	0.000018	0.000033	0.000041
Location ID	**Sample Date**												
SW-20	5/23/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022 R	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-20	9/21/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-8	5/23/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022 R	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-8	9/20/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-1	5/22/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022 R	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-1	9/20/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-3	5/22/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022 R	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-3	9/19/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-4	5/21/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022 R	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-4	5/21/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022 R	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-4	9/19/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-10	5/21/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022 R	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-10	9/18/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-5	5/20/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022 R	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-5	9/18/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-12	5/21/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022 R	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-12	9/19/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-11	5/21/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047 R	< 0.0022 R	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-11	9/19/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-EPA-OP-1	8/5/1988	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	--	--	< 0.02	< 0.02
SW-6	5/20/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022 R	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-6	9/18/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-13	5/20/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022 R	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-13	9/17/2008	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041

Table 5.1-5
Surface Water Quality - SVOCs
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		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
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances															
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances															
Background, Maximum Upsteam Concentration No Exceedances		0.000054	0.000025	0.000026	0.000024	0.000063	0.00043	0.000029	0.000026	0.000037	0.000025	0.000027	0.000019	0.00028	0.000026
Location ID	**Sample Date**														
SW-20	5/23/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-20	9/21/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-8	5/23/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-8	9/20/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-1	5/22/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-1	9/20/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-3	5/22/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-3	9/19/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-4	5/21/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-4	5/21/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-4	9/19/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-10	5/21/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-10	9/18/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-5	5/20/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-5	9/18/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-12	5/21/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-12	9/19/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-11	5/21/2008	< 0.000054 R	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037 R	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-11	9/19/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-EPA-OP-1	8/5/1988	< 0.02	--	< 0.02	< 0.1	< 0.02	--	--	--	< 0.02	< 0.02	--	--	--	--
SW-6	5/20/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-6	9/18/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-13	5/20/2008	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-13	9/17/2008	< 0.000054	< 0.000025 R	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.000026

Table 5.1-5
Surface Water Quality - SVOCs
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		Acenaphthylene	Anthracene	Azobenzene	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
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances													
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances													
Background, Maximum Upsteam Concentration No Exceedances		0.000015	0.000024	0.000021	0.000018	0.000031	0.000017	0.000019	0.000024	0.0011	0.000073	0.000024	0.000035
Location ID	**Sample Date**												
SW-20	5/23/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-20	9/21/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-8	5/23/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-8	9/20/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-1	5/22/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-1	9/20/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.00012	< 0.000024	< 0.000035
SW-3	5/22/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-3	9/19/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-4	5/21/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-4	5/21/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-4	9/19/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000077	< 0.000024	< 0.000035
SW-10	5/21/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-10	9/18/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-5	5/20/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000078	< 0.000024	< 0.000035
SW-5	9/18/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-12	5/21/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-12	9/19/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-11	5/21/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-11	9/19/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	0.0015 R	< 0.000073	< 0.000024	< 0.000035
SW-EPA-OP-1	8/5/1988	< 0.02	--	--	--	--	--	--	--	< 0.1	< 0.02	< 0.02	< 0.02
SW-6	5/20/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-6	9/18/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	0.0015 R	< 0.000073	< 0.000024	< 0.000035
SW-13	5/20/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-13	9/17/2008	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035

Table 5.1-5
Surface Water Quality - SVOCs
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		Bis(2-chloroisopropyl)ether	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Carbazole	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Diethyl phthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances																
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances																
Background, Maximum Upsteam Concentration No Exceedances		0.000026	0.0004	0.000077	0.000018	0.000028	0.000017	0.000018	0.000032	0.000021	0.00015	0.000056	0.000020	0.000027	0.000022	0.000027
Location ID	**Sample Date**															
SW-20	5/23/2008	< 0.000026	< 0.00015	< 0.000070	< 0.000018	< 0.000028	< 0.000017	< 0.000018	0.000032 J	< 0.000021	< 0.00014	0.000048 J	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-20	9/21/2008	< 0.000026	< 0.00040	< 0.000018	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000019	< 0.000021	< 0.000071	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-8	5/23/2008	< 0.000026	< 0.00017	< 0.000077	< 0.000018	< 0.000028	< 0.000017	< 0.000018	0.000029 J	< 0.000021	< 0.00015	0.000056 J	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-8	9/20/2008	< 0.000026	< 0.00013	< 0.000032	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000022	< 0.000021	< 0.000073	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-1	5/22/2008	< 0.000026	< 0.00014	< 0.000057	< 0.000018	< 0.000028	< 0.000017	< 0.000018	0.000032 J	< 0.000021	< 0.00011	0.000055 J	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-1	9/20/2008	< 0.000026	< 0.00028	< 0.000018	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000028	< 0.000021	< 0.000053	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-3	5/22/2008	< 0.000026	< 0.00013	< 0.000021	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000025	< 0.000021	< 0.00011	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-3	9/19/2008	< 0.000026	< 0.00013	< 0.000018	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000022	< 0.000021	< 0.000055	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-4	5/21/2008	< 0.000026	< 0.00013	< 0.000032	< 0.000018	< 0.000028	< 0.000017	< 0.000018	0.000027 J	< 0.000021	< 0.000077	0.000042 J	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-4	5/21/2008	< 0.000026	< 0.00013	< 0.000044	< 0.000018	< 0.000028	< 0.000017	< 0.000018	0.000028 J	< 0.000021	< 0.000093	0.000048 J	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-4	9/19/2008	< 0.000026	< 0.00013	< 0.000018	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000039	< 0.000021	< 0.000075	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-10	5/21/2008	< 0.000026	< 0.00031	< 0.000060	< 0.000018	< 0.000028	< 0.000017	< 0.000018	0.000058 J	< 0.000021	< 0.000099	0.000052 J	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-10	9/18/2008	< 0.000026	< 0.00030	< 0.000018	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000026	< 0.000021	< 0.000077	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-5	5/20/2008	< 0.000026	< 0.00015	< 0.000037	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000036	< 0.000021	< 0.000096	< 0.000018	< 0.000021	< 0.000027	< 0.000022	< 0.000027 R
SW-5	9/18/2008	< 0.000026	< 0.00088	< 0.000042	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000038	< 0.000021	< 0.000076	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-12	5/21/2008	< 0.000026	< 0.00016	< 0.000044	< 0.000018	< 0.000028	< 0.000017	< 0.000018	0.000027 J	< 0.000021	< 0.000098	0.000042 J	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-12	9/19/2008	< 0.000026	< 0.00015	< 0.000032	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000030	< 0.000021	< 0.000070	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-11	5/21/2008	< 0.000026	< 0.00015	< 0.000072	< 0.000018	< 0.000028	< 0.000017	< 0.000018	0.000028 J	< 0.000021	< 0.00010	0.000054 J	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-11	9/19/2008	< 0.000026	< 0.00013	< 0.000018	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000031	< 0.000021	< 0.000077	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-EPA-OP-1	8/5/1988	< 0.02	--	--	--	--	--	--	--	< 0.02	--	--	--	--	--	< 0.02
SW-6	5/20/2008	< 0.000026	< 0.00013	< 0.000040	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000043	< 0.000021	< 0.00014	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-6	9/18/2008	< 0.000026	< 0.00016	< 0.000018	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000024	< 0.000021	< 0.000064	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-13	5/20/2008	< 0.000026	< 0.00013	< 0.000031	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000030	< 0.000021	< 0.000099	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R
SW-13	9/17/2008	< 0.000026	< 0.00014	< 0.000049	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000026	< 0.000066	< 0.000083	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R

Table 5.1-5
Surface Water Quality - SVOCs
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		Hexachlorocyclopentadiene	Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone	Naphthalene	Nitrobenzene	N-Nitrosodimethylamine	N-Nitrosodi-n-propylamine	N-Nitrosodiphenylamine	o-Cresol	p-Cresol	Pentachlorophenol
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances													0.0053 (14)
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances													0.004 (14)
Background, Maximum Upsteam Concentration No Exceedances		0.00019	0.000024	0.000021	0.000016	0.000036	0.000028	0.00042	0.000037	0.000048	0.00011	0.00012	0.00034
Location ID	**Sample Date**												
SW-20	5/23/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000036	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-20	9/21/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-8	5/23/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-8	9/20/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-1	5/22/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-1	9/20/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-3	5/22/2008	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-3	9/19/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-4	5/21/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-4	5/21/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-4	9/19/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-10	5/21/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000068	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-10	9/18/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-5	5/20/2008	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-5	9/18/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-12	5/21/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-12	9/19/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-11	5/21/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.00012	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-11	9/19/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-EPA-OP-1	8/5/1988	< 0.02	< 0.02	--	< 0.02	< 0.02	< 0.02	--	< 0.02	--	< 0.02	< 0.02	--
SW-6	5/20/2008	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	< 0.000040	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-6	9/18/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-13	5/20/2008	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034
SW-13	9/17/2008	< 0.00019 R	< 0.000024 R	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012	< 0.00034 R

Table 5.1-5
Surface Water Quality - SVOCs
Sheep Gulch
Rhodia Silver Bow
[concentration in mg/l]

		Phenanthrene	Phenol	Pyrene	Pyridine
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances					
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances					
Background, Maximum Upsteam Concentration No Exceedances		0.000022	0.00012	0.000019	0.0014
Location ID	**Sample Date**				
SW-20	5/23/2008	< 0.000022	< 0.000063	< 0.000019	--
SW-20	9/21/2008	< 0.000022	< 0.000081	< 0.000019	< 0.0014 R
SW-8	5/23/2008	< 0.000022	< 0.000063	< 0.000019	--
SW-8	9/20/2008	< 0.000022	< 0.000063	< 0.000019	< 0.0014 R
SW-1	5/22/2008	< 0.000022	< 0.00012	< 0.000019	--
SW-1	9/20/2008	< 0.000022	< 0.000097	< 0.000019	< 0.0014 R
SW-3	5/22/2008	< 0.000022	< 0.000076	< 0.000019	--
SW-3	9/19/2008	< 0.000022	< 0.000063	< 0.000019	< 0.0014 R
SW-4	5/21/2008	< 0.000022	< 0.000063	< 0.000019	--
SW-4	5/21/2008	< 0.000022	< 0.000063	< 0.000019	--
SW-4	9/19/2008	< 0.000022	< 0.000063	< 0.000019	< 0.0014 R
SW-10	5/21/2008	< 0.000022	< 0.000063	< 0.000019	--
SW-10	9/18/2008	< 0.000022	< 0.000063	< 0.000019	< 0.0014 R
SW-5	5/20/2008	< 0.000022	< 0.00018	< 0.000019	--
SW-5	9/18/2008	< 0.000022	< 0.000063	< 0.000019	< 0.0014 R
SW-12	5/21/2008	< 0.000022	< 0.000063	< 0.000019	--
SW-12	9/19/2008	< 0.000022	< 0.000063	< 0.000019	< 0.0014 R
SW-11	5/21/2008	< 0.000022	< 0.000063	< 0.000019	--
SW-11	9/19/2008	< 0.000022	< 0.000063	< 0.000019	< 0.0014 R
SW-EPA-OP-1	8/5/1988	--	< 0.02	--	--
SW-6	5/20/2008	< 0.000022	< 0.000071	< 0.000019	--
SW-6	9/18/2008	< 0.000022	< 0.000063	< 0.000019	< 0.0014 R
SW-13	5/20/2008	< 0.000022	< 0.000068	< 0.000019	--
SW-13	9/17/2008	< 0.000022	< 0.000063	< 0.000019	< 0.0014 R

Table 5.1-6
Surface Water Quality - Radionuclides
Sheep Gulch
Rhodia Silver Bow
[concentration in pCi/l]

		Cesium 137	Gross Alpha (radiation)	Gross Beta (radiation)	Radium 226	Radium 228	Strontium 90
MT DEQ-7 Human Health Stds, Aug 2010 Exceedances **Bold**			**1.5**		5	5	4
Background, Maximum Upsteam Concentration Exceedances Boxed			2.1	4.2	0.54	3.7	
Location ID	**Sample Date**						
SW-20	5/23/2008	--	< 1.6	< 2.9	< 0.23	< 3.7	--
SW-20	9/21/2008	--	< 2	< 4.2	< 0.33	1.1 +/- 0.27	--
SW-8	5/23/2008	--	**2.1 +/- 1.8**	**< 3.5**	**< 0.17**	**< 1.4**	**--**
SW-8	9/20/2008	--	< 1.5	< 2.9	< 0.54	< 0.71	--
SW-1	11/5/1997	--	< 1.0	--	< 0.2	< 1.0	< 2.0
SW-1	7/15/2003	< 56.5	< 4.42	6.86 +/- 18.8	< 2.21 J	--	--
SW-1	5/22/2008	--	< 5.5	< 11 R	< 0.16	< 1.3	--
SW-1	9/20/2008	--	< 1.5	< 3	< 0.2	< 0.72	--
SW-3	11/6/1997	--	< 1.0	--	< 0.2	< 1.0	< 2.0
SW-3	5/22/2008	--	< 5.5	12 +/- 7.6	< 0.2	< 2.1	--
SW-3	9/19/2008	--	**5.9 +/- 5.6**	< 9.5	< 0.33	0.95 +/- 0.27	--
SW-4	5/21/2008	--	**3.8 +/- 3.2**	< 5.5	< 0.16	< 2.1	--
SW-4	9/19/2008	--	< 4.2	< 8.8	< 0.31	< 0.71	--
SW-10	5/21/2008	--	**7.8 +/- 4.3**	21 +/- 5.9	< 0.31	< 5.7	--
SW-10	9/18/2008	--	**7.3 +/- 3.9**	17 +/- 5.1	< 0.26	< 0.71	--
SW-5	11/5/1997	--	< 1.0	--	< 0.2	< 1.0	< 2.0
SW-5	7/16/2003	< 49.1	**5.75 +/- 3.30**	16.2 +/- 9.92	< 2.58 J	--	--
SW-5	5/20/2008	--	**14 +/- 6**	24 +/- 6.3	< 0.15	< 1	--
SW-5	9/18/2008	--	**5.7 +/- 3.7**	21 +/- 5.1	< 0.22	< 0.71	--
SW-12	5/21/2008	--	**17 +/- 6.4**	19 +/- 5.8	< 0.14	< 2.4	--
SW-12	9/19/2008	--	**4.2 +/- 4.2**	21 +/- 5.7	< 0.29	< 0.69	--
SW-11	5/21/2008	--	**9.3 +/- 5.6**	16 +/- 6.1	< 0.13	< 2.9	--
SW-11	9/19/2008	--	< 3.1	17 +/- 5.9	< 0.31	< 0.72	--
SW-6	11/5/1997	--	< 1.0	--	< 0.2	2.1 +/- 0.5	< 2.0
SW-6	5/20/2008	--	< 3.9 J	17 +/- 6	< 0.21	< 0.7	--
SW-6	9/18/2008	--	< 3.8	9.3 +/- 5.8	< 0.23	< 0.73	--
SW-13	5/20/2008	--	**3.6 +/- 3.9**	17 +/- 6.4	< 0.21	< 0.7	--
SW-13	9/17/2008	--	**4.7 +/- 4.4**	13 +/- 5.3	< 0.26	0.9 +/- 0.27	--
ESI-SG-3	7/16/2003	< 49.0	< 5.91	14.0 +/- 23.6	< 2.34 J	--	--

Table 5.1-7
Surface Water Quality - General and Site-Specific Parameters
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			Alkalinity, bicarbonate as CaCO3	Alkalinity, carbonate as CaCO3	Chloride	Fluoride	Nitrate + Nitrite	Nitrogen, ammonia (NH3) as N	Phosphate as P	Phosphorus, elemental (white)	Phosphorus, total	Sulfate
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances						4		0.6				
Background, Maximum Upsteam Concentration Exceedances Boxed			100	2	30.6	0.5	2.80	0.53		0.0000234	0.53	115
Location ID	**Sample Date**	**Sample Type**										
ESI-SBC-1	7/15/2003	N	--	--	--	0.74	--	--	1.0	< 0.0001	0.43	--
ESI-SBC-2	7/18/2003	N	--	--	--	--	--	--	--	< 0.0001	0.61	--
ESI-SBC-2	7/23/2003	N	--	--	--	1.0	--	--	< 0.76 J	--	--	--
ESI-SBC-3	7/18/2003	N	--	--	--	--	--	--	--	< 0.0001	0.51	--
ESI-SBC-3	7/22/2003	N	--	--	--	1.0	--	--	< 0.69 J	--	--	--
ESI-SBC-4	7/18/2003	N	--	--	--	--	--	--	--	< 0.0001	0.46	--
ESI-SBC-4	7/22/2003	N	--	--	--	1.0	--	--	< 0.7 J	--	--	--
ESI-SBC-5	7/22/2003	N	--	--	--	1.1	--	--	< 0.85 J	< 0.0001	0.34	--
ESI-SBC-5	7/22/2003	FD	--	--	--	1.1	--	--	< 0.78 J	< 0.0001	0.41	--
ESI-SBC-6	7/18/2003	N	--	--	--	--	--	--	--	< 0.0001	0.58	--
ESI-SBC-6	7/22/2003	N	--	--	--	1.0	--	--	1.0	--	--	--
SW-14	5/19/2008	N	92	< 2	21.2	0.4	1.91	0.53	--	< 0.0000234	0.53	68.7
SW-14	9/17/2008	N	100	< 2	30.6	0.5	2.80	0.34	--	< 0.0000234	0.45	115
SW-16	5/19/2008	N	91	< 2	21.5	0.4	1.84	0.43	--	< 0.0000234	0.47	70.5
SW-16	9/16/2008	N	100	< 2	26.0	0.5	3.23	0.28	--	< 0.0000234	0.51	110
SW-17	5/19/2008	N	14	68	124	0.6	< 0.05	< 0.05	--	< 0.0000234	0.19	407
SW-17	9/17/2008	N	105	< 2	90	0.6	< 0.05	< 0.05	--	< 0.0000234	0.18	365
SW-15	5/19/2008	N	92	< 2	27.7	0.4	1.44	0.18	--	< 0.0000234	0.36	91.9
SW-15	9/16/2008	N	111	< 2	33.8	0.5	2.62	0.32	--	< 0.0000234	0.44	127
SW-15	9/16/2008	FD	110	< 2	33.6	0.5	2.62	0.32	--	< 0.0000234	0.45	126

Table 5.1-8
Surface Water Quality - Metals
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			Aluminum Total	Antimony Dissolved	Antimony Total	Arsenic Dissolved	Arsenic Total	Barium Dissolved	Barium Total	Beryllium Dissolved	Beryllium Total	Cadmium Dissolved	Cadmium Total	Calcium Dissolved	Calcium Total	Chromium Dissolved	Chromium Total	Cobalt Dissolved	Cobalt Total	Copper Dissolved	Copper Total
MT DEQ-7 Human Health Stds, 8/1/2010 Exceedances **Bold**				0.0056	0.0056	**0.010 (29)**	**0.010 (29)**	1	1	0.004	0.004	0.005	0.005			0.1	0.1			1.3	1.3
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances						0.34	0.34					2.68 (12)	2.68 (12)							17.27 (12)	17.27 (12)
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances						0.150	0.150					0.32 (12)	0.32 (12)							11.29 (12)	11.29 (12)
Background, Maximum Upsteam Concentration Exceedances Boxed				0.00036	0.00036	0.0068	0.0078	0.03971	0.04565	0.00002	0.00002	0.00015	0.00033	54.8	54.9	0.0003	0.0006	0.00036	0.00042	0.0152	0.0252
Location ID	**Sample Date**	**Sample Type**																			
SW-14	5/19/2008	N	--	0.00036	0.00036	0.0068	0.0078	0.0289	0.0344	< 0.00002	< 0.00002	0.00011	0.00029	40.4	39	< 0.0002	0.0004	0.00034	0.00038	0.0152	0.0252
SW-14	9/17/2008	N	--	0.00032	0.00034	0.0059	0.0066	0.03971	0.04565	< 0.00002	< 0.00002	0.00015	0.00033	54.8	54.9	< 0.0003	< 0.0006	0.00036	0.00042	0.0094	0.0193
SW-16	5/19/2008	N	--	0.00035	0.00036	0.0066	0.0078	0.0283	0.0342	< 0.00002	< 0.00002	0.00013	0.00032	40.7	40.5	0.0002	0.0005	0.00029	0.00043	0.0150	0.0252
SW-16	9/16/2008	N	--	0.00035	0.00037	0.0066	0.0070	0.03867	0.04479	< 0.00002	< 0.00002	0.00017	0.00034	52.7	53.5	< 0.0003	< 0.0005	0.00038	0.00041	0.0111	0.0205
SW-17	5/19/2008	N	--	0.00047	0.00044	**0.0215**	**0.0229**	0.0508	0.0507	< 0.00002	< 0.00002	0.00174	0.00246	163	156	0.0002	< 0.0002	0.00141	0.00142	0.1	0.159
SW-17	9/17/2008	N	--	0.00047	0.00045	**0.0258**	**0.0268**	0.05362	0.05096	< 0.00002	< 0.00002	0.00079	0.00112	138	144	< 0.0003	< 0.0004	0.00137	0.00116	0.0446	0.1035
SW-EPA-2	8/3/1988	N	0.229	--	< 0.029	--	< 0.0203	--	< 0.0248 J	--	< 0.001	--	< 0.005	--	47.9	--	< 0.0055 B	--	< 0.0051 B	--	0.17
SW-15	5/19/2008	N	--	0.00033	0.00033	0.0066	0.0077	0.0300	0.0341	< 0.00002	< 0.00002	0.00017	0.00039	47.9	46.3	< 0.0002	0.0003	0.00029	0.00035	0.0130	0.0235
SW-15	9/16/2008	N	--	0.00031	0.00034	0.0076	0.0079	0.03881	0.04257	< 0.00002	< 0.00002	0.00021	0.00040	58.3	57.8	< 0.0003	< 0.0005	0.00027 J	0.00036	0.0112	0.0205
SW-15	9/16/2008	FD	--	0.00035	0.00032	0.0074	0.0077	0.03833	0.04209	< 0.00002	< 0.00002	0.00023	0.00038	57.6	57.8	< 0.0003	< 0.0004	0.00065 J	0.00036	0.0107	0.0199

Table 5.1-8
Surface Water Quality - Metals
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			Iron Dissolved	Iron Total	Lead Dissolved	Lead Total	Magnesium Dissolved	Magnesium Total	Manganese Dissolved	Manganese Total	Mercury Dissolved	Mercury Total	Nickel Dissolved	Nickel Total	Potassium Dissolved	Potassium Total	Selenium Dissolved	Selenium Total	Silver Dissolved	Silver Total	Sodium Dissolved
MT DEQ-7 Human Health Stds, 8/1/2010 Exceedances **Bold**			(23)	(23)	0.015	0.015			(24)	(24)	0.00005	0.00005	0.1	0.1			0.05	0.05	0.1	0.1	
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances					108.47 (12)	108.47 (12)					0.0017	0.0017	566.66 (12)	566.66 (12)			0.02	0.02	5.96 (12)	5.96 (12)	
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances			1	1	4.23 (12)	4.23 (12)					0.00091	0.00091	63.00 (12)	63.00 (12)			0.005	0.005			
Background, Maximum Upsteam Concentration Exceedances Boxed			0.134	0.609	0.00036	0.00224	12.8	12.9	0.135	0.27160	0.0002	0.0002	0.0024	0.0022	5.7	5.7	0.001	0.001	0.00002	0.00005	31.2
Location ID	**Sample Date**	**Sample Type**																			
SW-14	5/19/2008	N	0.134	0.609	0.00036	0.00224	9.64	9.39	0.135	0.209	< 0.0002	< 0.0002	0.0010	0.0011	5.28	5.06	< 0.0010	< 0.0010	< 0.00002	0.00005	25
SW-14	9/17/2008	N	0.02	0.330	0.00014	0.00222	12.8	12.9	0.10290	0.27160	< 0.0002	< 0.0002	0.0024	0.0022	5.7	5.7	< 0.001	< 0.001	< 0.00002	0.00005	31.2
SW-16	5/19/2008	N	0.12	0.637	0.00037	0.00247	9.72	9.74	0.175	0.262	< 0.0002	< 0.0002	0.0010	0.0012	5.24	5.16	< 0.0010	< 0.0010	< 0.00002	0.00005	24.6
SW-16	9/16/2008	N	0.02	0.340	0.00017	0.00211	12.3	12.5	0.11790	0.28280	< 0.0002	< 0.0002	0.0024	0.0022	6.1	6.2	< 0.001	< 0.001	< 0.00002	0.00003	31.5
SW-17	5/19/2008	N	0.026	0.053	0.00050	0.00101	34.3	33.1	1.41	1.53	< 0.0002	< 0.0002	0.0043	0.0042	16	15.3	0.0019	0.0022	0.00003	0.00007	48.4
SW-17	9/17/2008	N	< 0.02	0.06	0.00010	0.00056	29.3	30.5	0.46840	0.54810	< 0.0002	< 0.0002	0.0074	0.0067	13.2	13.9	0.004	0.004	< 0.00002	0.00003	41.5
SW-EPA-2	8/3/1988	N	--	0.819	--	< 0.0209 BQQ	--	11.6	--	0.543	--	0.0002	--	< 0.009	--	5.38	--	< 0.002 J	--	< 0.004	--
SW-15	5/19/2008	N	0.077	0.5	0.00017	0.00145	11.3	11	0.233	0.299	< 0.0002	< 0.0002	0.0011	0.0011	4.9	4.69	< 0.0010	< 0.0010	< 0.00002	0.00005	28.6
SW-15	9/16/2008	N	< 0.02	0.24	0.00013	0.00150	13.5	13.4	0.12390	0.24820	< 0.0002	< 0.0002	0.0027	0.0024	6.2	6.3	< 0.001	< 0.001	< 0.00002	0.00004	39.3
SW-15	9/16/2008	FD	< 0.02	0.25	0.00012	0.00152	13.4	13.5	0.12100	0.25150	< 0.0002	< 0.0002	0.0026	0.0025	6.2	6.3	< 0.001	< 0.001	< 0.00002	< 0.00002	39.3

Table 5.1-8
Surface Water Quality - Metals
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			Sodium Total	Thallium Dissolved	Thallium Total	Uranium Dissolved	Uranium Total	Vanadium Dissolved	Vanadium Total	Zinc Dissolved	Zinc Total
MT DEQ-7 Human Health Stds, 8/1/2010 Exceedances **Bold**				0.00024	0.00024	0.03	0.03			2	2
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances										144.75 (12)	144.75 (12)
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances										144.75 (12)	144.75 (12)
Background, Maximum Upsteam Concentration Exceedances Boxed			30.9	0.00002	0.00002	0.00553	0.00584	0.0025	0.0030	0.0405	0.0775
Location ID	**Sample Date**	**Sample Type**									
SW-14	5/19/2008	N	24	< 0.00002	< 0.00002	0.0035	0.0035	0.0025	0.0030	0.0244	0.0561
SW-14	9/17/2008	N	30.9	< 0.00002	< 0.00002	0.00553	0.00584	0.0022	0.0028	0.0405	0.0775
SW-16	5/19/2008	N	23.8	< 0.00002	< 0.00002	0.0037	0.0038	0.0024	0.0030	0.0390	0.0823
SW-16	9/16/2008	N	31.6	< 0.00002	< 0.00002	0.00503	0.00513	0.0027	0.0033	0.0559	0.0966
SW-17	5/19/2008	N	46.6	0.00003	0.00003	0.0119	0.0118	0.0043	0.0043	0.380	0.752
SW-17	9/17/2008	N	43.1	< 0.00002	< 0.00002	0.00984	0.00977	0.0044	0.0048	0.1602	0.4828
SW-EPA-2	8/3/1988	N	31.2	--	< 0.002	--	--	--	< 0.0063 J	--	0.470
SW-15	5/19/2008	N	27.6	< 0.00002	< 0.00002	0.0046	0.0046	0.0021	0.0026	0.0427	0.0932
SW-15	9/16/2008	N	39.0	< 0.00002	< 0.00002	0.00569	0.00546	0.0025	0.0031	0.0590	0.1008
SW-15	9/16/2008	FD	39.0	< 0.00002	< 0.00002	0.00528	0.00544	0.0025	0.0029	0.0590	0.0986

Table 5.1-9
Surface Water Quality - VOCs
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-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
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances														
Background, Maximum Upsteam Concentration Exceedances Boxed			0.000047	0.00005	0.000064	0.000061	0.000051	0.000042	0.0001	0.0001	0.00014	0.00013	0.000037	0.00022
Location ID	**Sample Date**	**Sample Type**												
SW-EPA-1	8/5/1988	N	--	< 0.005	< 0.005	< 0.005	--	< 0.005	< 0.005	--	--	--	--	--
SW-EPA-2	8/3/1988	N	--	< 0.005	< 0.005	< 0.005	--	< 0.005	< 0.005	--	--	--	--	--
SW-EPA-3	8/6/1988	N	--	< 0.005	< 0.005	< 0.005	--	< 0.005	< 0.005	--	--	--	--	--
SW-14	5/19/2008	N	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013	< 0.000037	< 0.00022
SW-14	9/17/2008	N	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013	< 0.000037	< 0.00022
SW-16	5/19/2008	N	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013	< 0.000037	< 0.00022
SW-16	9/16/2008	N	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013	< 0.000037	< 0.00022
SW-17	5/19/2008	N	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013	< 0.000037	< 0.00022
SW-17	9/17/2008	N	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013	< 0.000037	< 0.00022
SW-15	5/19/2008	N	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013	< 0.000037	< 0.00022
SW-15	9/16/2008	N	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013	< 0.000037	< 0.00022
SW-15	9/16/2008	FD	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013	< 0.000037	< 0.00022

Table 5.1-9
Surface Water Quality - VOCs
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloroethylene	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
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances														
Background, Maximum Upsteam Concentration Exceedances Boxed			0.000084	0.000044	0.000073		0.000045	0.000048	0.000042	0.000042	0.000041	0.000038	0.000041	0.000032
Location ID	**Sample Date**	**Sample Type**												
SW-EPA-1	8/5/1988	N	--	--	< 0.005	< 0.005	--	--	< 0.005	--	< 0.005	< 0.005	--	--
SW-EPA-2	8/3/1988	N	--	--	< 0.005	< 0.005	--	--	< 0.005	--	< 0.005	< 0.005	--	--
SW-EPA-3	8/6/1988	N	--	--	< 0.005	< 0.005	--	--	< 0.005	--	< 0.005	< 0.005	--	--
SW-14	5/19/2008	N	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000041	< 0.000038	< 0.000041	< 0.000032
SW-14	9/17/2008	N	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000041	< 0.000038	< 0.000041	< 0.000032
SW-16	5/19/2008	N	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000041	< 0.000038	< 0.000041	< 0.000032
SW-16	9/16/2008	N	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000041	< 0.000038	< 0.000041	< 0.000032
SW-17	5/19/2008	N	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000041	< 0.000038	< 0.000041	< 0.000032
SW-17	9/17/2008	N	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000041	< 0.000038	< 0.000041	< 0.000032
SW-15	5/19/2008	N	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000041	< 0.000038	< 0.000041	< 0.000032
SW-15	9/16/2008	N	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000041	< 0.000038	< 0.000041	< 0.000032
SW-15	9/16/2008	FD	< 0.000084	< 0.000044	< 0.000073	--	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000041	< 0.000038	< 0.000041	< 0.000032

Table 5.1-9
Surface Water Quality - VOCs
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			1,4-Dichlorobenzene	2,2-Dichloropropane	2-Chloroethyl Vinyl Ether	2-Hexanone	Acetone	Acrolein	Acrylonitrile	Benzene	Bromobenzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Butyl benzene
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances										0.005						
Background, Maximum Upsteam Concentration Exceedances Boxed			0.000054	0.00005		0.0029	0.007	0.002	0.00031	0.000045	0.000027	0.000091	0.000036	0.00008	0.000072	0.000056
Location ID	**Sample Date**	**Sample Type**														
SW-EPA-1	8/5/1988	N	--	--	--	< 0.01	< 0.005 J	--	--	< 0.005	--	--	< 0.005	< 0.005	< 0.01	--
SW-EPA-2	8/3/1988	N	--	--	--	< 0.01	< 0.004 J	--	--	< 0.005	--	--	< 0.005	< 0.005	< 0.01	--
SW-EPA-3	8/6/1988	N	--	--	--	< 0.01	< 0.005 J	--	--	< 0.005	--	--	< 0.005	< 0.005	< 0.01	--
SW-14	5/19/2008	N	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	0.0041 J	< 0.0020	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056
SW-14	9/17/2008	N	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0070	< 0.0020	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056
SW-16	5/19/2008	N	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	0.0043 J	< 0.0020	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056
SW-16	9/16/2008	N	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0083	< 0.0020	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056
SW-17	5/19/2008	N	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	0.0029 J	< 0.0020	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056
SW-17	9/17/2008	N	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0058	< 0.0020	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056
SW-15	5/19/2008	N	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	0.0029 J	< 0.0020	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056
SW-15	9/16/2008	N	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0053	< 0.0020	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056
SW-15	9/16/2008	FD	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0052	< 0.0020	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056

Table 5.1-9
Surface Water Quality - VOCs
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			Butylbenzene sec	Butylbenzene tert-	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	Chlorotoluene o-	Chlorotoluene p-	Cumene (isopropyl benzene)	Cymene p- (Toluene isopropyl p-)
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances															
Background, Maximum Upsteam Concentration Exceedances Boxed			0.000036	0.000038	0.00007	0.000068	0.000045	0.000057	0.00013	0.00037	0.00006	0.000035	0.000025	0.000031	0.000044
Location ID	**Sample Date**	**Sample Type**													
SW-EPA-1	8/5/1988	N	--	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	--	--	--	--
SW-EPA-2	8/3/1988	N	--	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	--	--	--	--
SW-EPA-3	8/6/1988	N	--	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	--	--	--	--
SW-14	5/19/2008	N	< 0.000036	< 0.000038	< 0.000070	< 0.000068	< 0.000045	< 0.000057	< 0.00013	0.00037 J	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044
SW-14	9/17/2008	N	< 0.000036	< 0.000038	< 0.000060	< 0.000068	< 0.000045	< 0.000057	< 0.00013	< 0.00012	< 0.000060	< 0.000035	< 0.000025	< 0.000031	< 0.000044
SW-16	5/19/2008	N	< 0.000036	< 0.000038	< 0.000080	< 0.000068	< 0.000045	< 0.000057	< 0.00013	0.00040 J	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044
SW-16	9/16/2008	N	< 0.000036	< 0.000038	< 0.000050	< 0.000068	< 0.000045	< 0.000057	< 0.00013	< 0.00018	< 0.000060	< 0.000035	< 0.000025	< 0.000031	< 0.000044
SW-17	5/19/2008	N	< 0.000036	< 0.000038	< 0.00018	< 0.000068	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044
SW-17	9/17/2008	N	< 0.000036	< 0.000038	< 0.00020	< 0.000068	< 0.000045	< 0.000057	< 0.00013	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044
SW-15	5/19/2008	N	< 0.000036	< 0.000038	< 0.000050	< 0.000068	< 0.000045	< 0.000057	< 0.00013	< 0.00014	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044
SW-15	9/16/2008	N	< 0.000036	< 0.000038	< 0.000070	< 0.000068	< 0.000045	< 0.000057	< 0.00013	< 0.00012	< 0.000060	< 0.000035	< 0.000025	< 0.000031	< 0.000044
SW-15	9/16/2008	FD	< 0.000036	< 0.000038	< 0.000080	< 0.000068	< 0.000045	< 0.000057	< 0.00013	< 0.00014	< 0.000060	< 0.000035	< 0.000025	< 0.000031	< 0.000044

Table 5.1-9
Surface Water Quality - VOCs
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			Dibromomethane (methylene bromide)	Dichlorodifluoromethane (CFC-12)	Ethyl benzene	Hexachlorobutadiene	Iodomethane	Methyl ethyl ketone	Methyl isobutyl ketone	Methyl tertiary butyl ether (MTBE)	Methylene chloride	Naphthalene	Propylbenzene	Styrene	Tetrachloroethylene
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances					0.53										
Background, Maximum Upsteam Concentration Exceedances Boxed			0.000089	0.000083	0.000042	0.00019	0.00027	0.0038	0.003	0.00007	0.00023	0.0001	0.000037	0.000039	0.000077
Location ID	**Sample Date**	**Sample Type**													
SW-EPA-1	8/5/1988	N	--	--	< 0.005	--	--	< 0.01	< 0.01	--	< 0.014 J	--	--	< 0.005	< 0.005
SW-EPA-2	8/3/1988	N	--	--	< 0.005	--	--	< 0.01	< 0.01	--	< 0.004 J	--	--	< 0.005	< 0.005
SW-EPA-3	8/6/1988	N	--	--	< 0.005	--	--	< 0.01	< 0.01	--	< 0.005 J	--	--	< 0.005	< 0.005
SW-14	5/19/2008	N	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	< 0.000077
SW-14	9/17/2008	N	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	< 0.000077
SW-16	5/19/2008	N	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	< 0.000077
SW-16	9/16/2008	N	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	< 0.000077
SW-17	5/19/2008	N	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	< 0.000077
SW-17	9/17/2008	N	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	< 0.000077
SW-15	5/19/2008	N	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	< 0.000077
SW-15	9/16/2008	N	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	< 0.000077
SW-15	9/16/2008	FD	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	< 0.0038	< 0.0030	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	< 0.000077

Table 5.1-9
Surface Water Quality - VOCs
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			Toluene	Trichloroethylene	Trichlorofluoromethane	Vinyl acetate	Vinyl chloride	Xylene m & p	Xylene, o-	Xylenes, total
MT DEQ-7 Human Health Stds, Aug 2010 No Exceedances			1					10	10	10
Background, Maximum Upsteam Concentration Exceedances Boxed			0.00029	0.000061	0.000086	0.00091	0.000071	0.000078	0.000037	
Location ID	**Sample Date**	**Sample Type**								
SW-EPA-1	8/5/1988	N	0.011	< 0.005	--	< 0.01	< 0.01	--	--	< 0.005
SW-EPA-2	8/3/1988	N	0.012	< 0.005	--	< 0.01	< 0.01	--	--	< 0.005
SW-EPA-3	8/6/1988	N	< 0.005	< 0.005	--	< 0.01	< 0.01	--	--	< 0.005
SW-14	5/19/2008	N	< 0.00029	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-14	9/17/2008	N	< 0.00023	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-16	5/19/2008	N	< 0.00033	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-16	9/16/2008	N	< 0.00039	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-17	5/19/2008	N	< 0.00033	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-17	9/17/2008	N	< 0.00031	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-15	5/19/2008	N	< 0.00037	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-15	9/16/2008	N	< 0.00026	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
SW-15	9/16/2008	FD	< 0.00032	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--

Table 5.1-10
Surface Water Quality - SVOCs
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	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
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances														
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances														
Background, Maximum Upsteam Concentration Exceedances Boxed			0.000016	0.000022	0.000021	0.000029	0.000031	0.000058	0.000047	0.0022	0.00017	0.000018	0.000033	0.000041
Location ID	**Sample Date**	**Sample Type**												
SW-EPA-1	8/5/1988	N	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	--	--	< 0.02	< 0.02
SW-EPA-2	8/3/1988	N	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	--	--	< 0.02	< 0.02
SW-EPA-3	8/6/1988	N	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	--	--	< 0.02	< 0.02
SW-14	5/19/2008	N	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-14	9/17/2008	N	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-16	5/19/2008	N	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-16	9/16/2008	N	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-17	5/19/2008	N	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-17	9/17/2008	N	< 0.000016 R	< 0.000022	< 0.000021	< 0.000029 R	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-15	5/19/2008	N	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017	< 0.000018	< 0.000033	< 0.000041
SW-15	9/16/2008	N	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041
SW-15	9/16/2008	FD	< 0.000016	< 0.000022	< 0.000021	< 0.000029	< 0.000031	< 0.000058	< 0.000047	< 0.0022	< 0.00017 R	< 0.000018	< 0.000033	< 0.000041

Table 5.1-10
Surface Water Quality - SVOCs
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			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
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances																
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances																
Background, Maximum Upsteam Concentration Exceedances Boxed			0.000054	0.000025	0.000026	0.000024	0.000063	0.00043	0.000029	0.000026	0.000037	0.000025	0.000027	0.000019	0.00028	0.000026
Location ID	**Sample Date**	**Sample Type**														
SW-EPA-1	8/5/1988	N	< 0.02	--	< 0.02	< 0.1	< 0.02	--	--	--	< 0.02	< 0.02	--	--	--	--
SW-EPA-2	8/3/1988	N	< 0.02	--	< 0.02	< 0.1	< 0.02	--	--	--	< 0.02	< 0.02	--	--	--	--
SW-EPA-3	8/6/1988	N	< 0.02	--	< 0.02	< 0.1	< 0.02	--	--	--	< 0.02	< 0.02	--	--	--	--
SW-14	5/19/2008	N	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043 R	< 0.000029	< 0.000026	< 0.000037	< 0.000025 R	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-14	9/17/2008	N	< 0.000054	< 0.000025 R	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.0000044
SW-16	5/19/2008	N	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043 R	< 0.000029	< 0.000026	< 0.000037	< 0.000025 R	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-16	9/16/2008	N	< 0.000054	< 0.000025 R	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.0000044
SW-17	5/19/2008	N	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043 R	< 0.000029	< 0.000026	< 0.000037	< 0.000025 R	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-17	9/17/2008	N	< 0.000054	< 0.000025 R	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	< 0.0000044 < 0.000026
SW-15	5/19/2008	N	< 0.000054	< 0.000025	< 0.000026	< 0.000024	< 0.000063	< 0.00043 R	< 0.000029	< 0.000026	< 0.000037	< 0.000025 R	< 0.000027	< 0.000019	< 0.00028	< 0.000026
SW-15	9/16/2008	N	< 0.000054	< 0.000025 R	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	0.0000047 J
SW-15	9/16/2008	FD	< 0.000054	< 0.000025 R	< 0.000026	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	< 0.000027	< 0.000019	< 0.00028	0.0000049 J

Table 5.1-10
Surface Water Quality - SVOCs
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			Acenaphthylene	Anthracene	Azobenzene	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
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances														
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances														
Background, Maximum Upsteam Concentration Exceedances Boxed			0.000015	0.000024	0.000021	0.000018	0.000031	0.000017	0.000019	0.000024		0.000073	0.000024	0.000035
Location ID	**Sample Date**	**Sample Type**												
SW-EPA-1	8/5/1988	N	< 0.02	--	--	--	--	--	--	--	< 0.1	< 0.02	< 0.02	< 0.02
SW-EPA-2	8/3/1988	N	< 0.02	--	--	--	--	--	--	--	< 0.1	< 0.02	< 0.02	< 0.02
SW-EPA-3	8/6/1988	N	< 0.02	--	--	--	--	--	--	--	< 0.1	< 0.02	< 0.02	< 0.02
SW-14	5/19/2008	N	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-14	9/17/2008	N	< 0.0000034	< 0.0000036	< 0.000021	0.0000033 J	< 0.0000043	< 0.0000023	< 0.0000029	< 0.0000025	0.0016 R	< 0.000073	< 0.000024	< 0.000035
SW-16	5/19/2008	N	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-16	9/16/2008	N	< 0.0000034	< 0.0000036	< 0.000021	< 0.0000026	< 0.0000043	< 0.0000023	< 0.0000029	< 0.0000025	0.0016 R	< 0.000073	< 0.000024	< 0.000035
SW-17	5/19/2008	N	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-17	9/17/2008	N	< 0.0000034 < 0.000015	< 0.0000036 < 0.000024	< 0.000021	< 0.0000026 < 0.000018	< 0.0000043 < 0.000031	< 0.0000023 < 0.000017	0.0000035 J < 0.000019	< 0.0000025 < 0.000024	0.0016 R	< 0.000073	< 0.000024	< 0.000035
SW-15	5/19/2008	N	< 0.000015	< 0.000024	< 0.000021	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035
SW-15	9/16/2008	N	0.0000044 J	< 0.0000036	< 0.000021	< 0.0000026	< 0.0000043	< 0.0000023	< 0.0000029	< 0.0000025	0.0017 R	< 0.000073	< 0.000024	< 0.000035
SW-15	9/16/2008	FD	< 0.0000034	< 0.0000036	< 0.000021	< 0.0000026	< 0.0000043	< 0.0000023	< 0.0000029	< 0.0000025	0.0016 R	< 0.000073	< 0.000024	< 0.000035

Table 5.1-10
Surface Water Quality - SVOCs
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			Bis(2-chloroisopropyl)ether	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Carbazole	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Diethyl phthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances																
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances																
Background, Maximum Upsteam Concentration Exceedances Boxed			0.000026	0.001	0.000085	0.000018	0.000028	0.000017	0.000018	0.000041	0.000021	0.000076	0.000018	0.00002	0.000027	0.000022
Location ID	**Sample Date**	**Sample Type**														
SW-EPA-1	8/5/1988	N	< 0.02	--	--	--	--	--	--	--	< 0.02	--	--	--	--	--
SW-EPA-2	8/3/1988	N	< 0.02	--	--	--	--	--	--	--	< 0.02	--	--	--	--	--
SW-EPA-3	8/6/1988	N	< 0.02	--	--	--	--	--	--	--	< 0.02	--	--	--	--	--
SW-14	5/19/2008	N	< 0.000026	< 0.00043	< 0.000085	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000040	< 0.000021	< 0.000076	< 0.000018	< 0.000020	< 0.000027	< 0.000022
SW-14	9/17/2008	N	< 0.000026	< 0.0010	< 0.000039	< 0.000018	< 0.0000034	< 0.0000025	< 0.000018	< 0.000041	< 0.000021	< 0.000073	< 0.000018	< 0.0000044	< 0.0000038	< 0.000022
SW-16	5/19/2008	N	< 0.000026	< 0.00024	< 0.000093	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000043	< 0.000021	< 0.000057	< 0.000018	< 0.000020	< 0.000027	< 0.000022
SW-16	9/16/2008	N	< 0.000026	< 0.00035	< 0.000018	< 0.000018	< 0.0000034	< 0.0000025	< 0.000018	< 0.000051	< 0.00025	< 0.000093	< 0.000018	0.0000061 J	< 0.0000038	< 0.000022
SW-17	5/19/2008	N	< 0.000026	< 0.00018	< 0.000066	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000035	< 0.000021	< 0.000060	< 0.000018	< 0.000020	< 0.000027	< 0.000022
SW-17	9/17/2008	N	< 0.000026	< 0.00014	< 0.000018	< 0.000018	< 0.0000034 < 0.000028	< 0.0000025 < 0.000017	< 0.000018	< 0.000034	< 0.000022	< 0.000078	< 0.000018	< 0.0000044 < 0.000020	< 0.0000038 < 0.000027	< 0.000022
SW-15	5/19/2008	N	< 0.000026	< 0.00022	< 0.000055	< 0.000018	< 0.000028	< 0.000017	< 0.000018	< 0.000029	< 0.000021	< 0.000051	< 0.000018	0.000031 J	< 0.000027	< 0.000022
SW-15	9/16/2008	N	< 0.000026	< 0.00049	< 0.000018	< 0.000018	< 0.0000034	< 0.0000025	< 0.000018	< 0.000043	< 0.00012	< 0.000082	< 0.000018	< 0.0000044	< 0.0000038	< 0.000022
SW-15	9/16/2008	FD	< 0.000026	< 0.00040	< 0.000018	0.000023 J	< 0.0000034	< 0.0000025	< 0.000018	< 0.000060	< 0.000021	< 0.000068	< 0.000018	< 0.0000044	< 0.0000038	< 0.000022

Table 5.1-10
Surface Water Quality - SVOCs
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone	Naphthalene	Nitrobenzene	N-Nitrosodimethylamine	N-Nitrosodi-n-propylamine	N-Nitrosodiphenylamine	o-Cresol	p-Cresol
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances														
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances														
Background, Maximum Upsteam Concentration Exceedances Boxed					0.000024	0.000021	0.000016	0.000022	0.000028	0.00042	0.000037	0.000048	0.00011	0.00012
Location ID	**Sample Date**	**Sample Type**												
SW-EPA-1	8/5/1988	N	< 0.02	< 0.02	< 0.02	--	< 0.02	< 0.02	< 0.02	--	< 0.02	--	< 0.02	< 0.02
SW-EPA-2	8/3/1988	N	< 0.02	< 0.02	< 0.02	--	< 0.02	< 0.02	< 0.02	--	< 0.02	--	< 0.02	< 0.02
SW-EPA-3	8/6/1988	N	< 0.02	< 0.02	< 0.02	--	< 0.02	< 0.02	< 0.02	--	< 0.02	--	< 0.02	< 0.02
SW-14	5/19/2008	N	< 0.000027 R	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012
SW-14	9/17/2008	N	< 0.000027 R	< 0.00019 R	< 0.000024 R	< 0.0000026	< 0.000016	< 0.000016	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012
SW-16	5/19/2008	N	< 0.000027 R	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	< 0.000029	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012
SW-16	9/16/2008	N	< 0.000027 R	< 0.00019 R	< 0.000024 R	< 0.0000026	< 0.000016	0.00035	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012
SW-17	5/19/2008	N	< 0.000027 R	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	< 0.000024	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012
SW-17	9/17/2008	N	< 0.000027 R	< 0.00019 R	< 0.000024 R	0.0000031 J < 0.000021	< 0.000016	< 0.000010 < 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012
SW-15	5/19/2008	N	< 0.000027 R	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	< 0.000022	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012
SW-15	9/16/2008	N	< 0.000027 R	< 0.00019 R	< 0.000024 R	< 0.0000026	< 0.000016	< 0.000019	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012
SW-15	9/16/2008	FD	< 0.000027 R	< 0.00019 R	< 0.000024 R	< 0.0000026	< 0.000016	< 0.000020	< 0.000028	< 0.00042	< 0.000037	< 0.000048	< 0.00011	< 0.00012

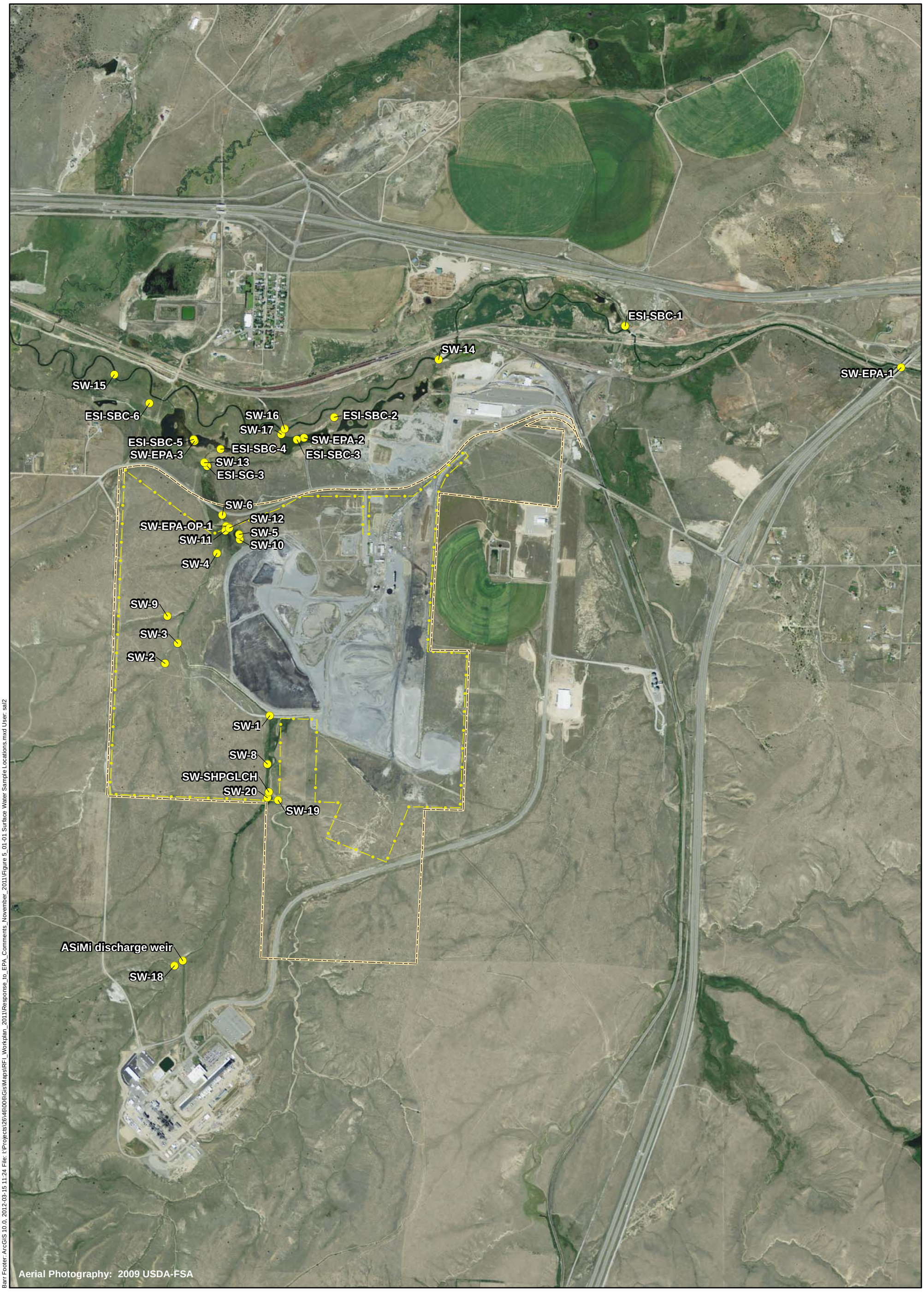
Table 5.1-10
Surface Water Quality - SVOCs
Silver Bow Creek
Rhodia Silver Bow
[concentration in mg/l]

			Pentachlorophenol	Phenanthrene	Phenol	Pyrene	Pyridine
MT DEQ-7 Aquatic Life Stds, Acute, 8/1/2010 No Exceedances			0.0053 (14)				
MT DEQ-7 Aquatic Life Stds, Chronic, 8/1/2010 No Exceedances			0.004 (14)				
Background, Maximum Upsteam Concentration Exceedances Boxed			0.00034	0.000022	0.000072	0.000026	
Location ID	**Sample Date**	**Sample Type**					
SW-EPA-1	8/5/1988	N	--	--	< 0.02	--	--
SW-EPA-2	8/3/1988	N	--	--	< 0.02	--	--
SW-EPA-3	8/6/1988	N	--	--	< 0.02	--	--
SW-14	5/19/2008	N	< 0.00034	< 0.000022	< 0.000072	0.000026 J	--
SW-14	9/17/2008	N	< 0.00034 R	0.0000064 J	< 0.000063	< 0.0000035	< 0.0014 R
SW-16	5/19/2008	N	< 0.00034	< 0.000022	< 0.00011	0.000024 J	--
SW-16	9/16/2008	N	< 0.00034 R	0.0000093 J	< 0.000063	0.0000041 J	< 0.0014 R
SW-17	5/19/2008	N	< 0.00034	< 0.000022	< 0.000063	0.000024 J	--
SW-17	9/17/2008	N	< 0.00034 R	< 0.0000050 < 0.000022	< 0.000063	< 0.0000035 < 0.000019	< 0.0014 R
SW-15	5/19/2008	N	< 0.00034	< 0.000022	< 0.00010	0.000033 J	--
SW-15	9/16/2008	N	< 0.00034 R	0.0000093 J	< 0.000063	< 0.0000035	< 0.0014 R
SW-15	9/16/2008	FD	< 0.00034 R	0.0000066 J	< 0.000063	< 0.0000035	< 0.0014 R

Table 5.1-11
Surface Water Quality - Radionuclides
Silver Bow Creek
Rhodia Silver Bow
[concentration in pCi/l]

			Cesium 137	Gross Alpha (radiation)	Gross Beta (radiation)	Radium 226	Radium 228
MT DEQ-7 Human Health Stds, Aug 2010 Exceedances **Bold**				**1.5**		5	5
Background, Maximum Upsteam Concentration Exceedances Boxed				2.7	9.2	0.34	0.74
Location ID	**Sample Date**	**Sample Type**					
ESI-SBC-1	7/15/2003	N	< 56.5	3.49 +/- 0.987 J	6.68 +/- 1.59	< 2.71 J	--
ESI-SBC-2	7/16/2003	N	< 62.9	4.69 +/- 1.32	7.15 +/- 1.86	< 2.10 J	--
ESI-SBC-3	7/16/2003	N	< 62.9	3.85 +/- 1.32 J	7.00 +/- 2.29	< 2.50 J	--
ESI-SBC-4	7/16/2003	N	< 59.8	2.61 +/- 1.31 J	6.33 +/- 3.35	< 2.13 J	--
ESI-SBC-5	7/17/2003	N	< 62.9	4.28 +/- 2.03	7.70 +/- 3.46	1.68 +/- 0.675 J	--
ESI-SBC-5	7/17/2003	FD	< 44.8	5.49 +/- 2.10	10.1 +/- 4.20	0.844 +/- 0.672 J	--
ESI-SBC-6	7/16/2003	N	< 53.0	4.32 +/- 1.41	7.78 +/- 2.32	< 2.12 J	--
SW-14	5/19/2008	N	--	**2.5 +/- 2**	7.2 +/- 2.3	< 0.14	< 0.74
SW-14	9/17/2008	N	--	**2.7 +/- 2**	9.2 +/- 2.7	< 0.34	< 0.71
SW-16	5/19/2008	N	--	**7.4 +/- 4**	19 +/- 4.7	< 0.23	< 0.74
SW-16	9/16/2008	N	--	**7.6 +/- 2.9**	6.3 +/- 2.3	< 0.14	< 0.71
SW-17	5/19/2008	N	--	**2.2 +/- 1.8**	7.1 +/- 2.6	< 0.38	< 0.8
SW-17	9/17/2008	N	--	< 1.5	7.5 +/- 2.5	< 0.22	< 0.73
SW-15	5/19/2008	N	--	**10 +/- 3.1**	9.7 +/- 2.5	< 0.17	< 0.7
SW-15	9/16/2008	N	--	**1.9 +/- 1.9**	7.1 +/- 2.6	0.34 +/- 0.11	< 0.73
SW-15	9/16/2008	FD	--	**9.7 +/- 4**	19 +/- 4.3	< 0.17	< 0.72

Figures



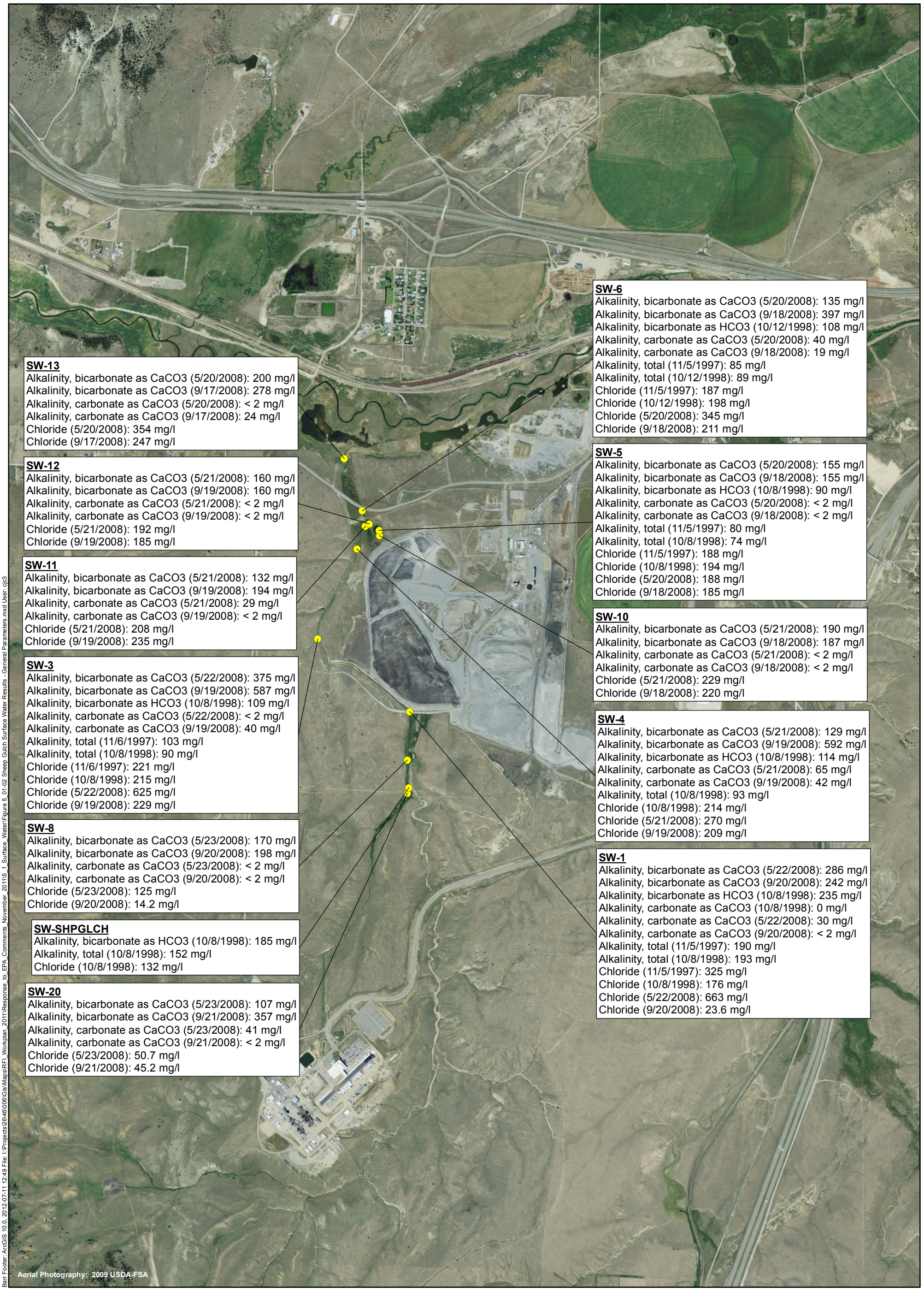
Surface Water Sample
Property Boundary
Fence Line

N

Feet
1,500 0 1,500

Figure 5.1-1

SURFACE WATER SAMPLE LOCATIONS
Rhodia Silver Bow Plant
Montana



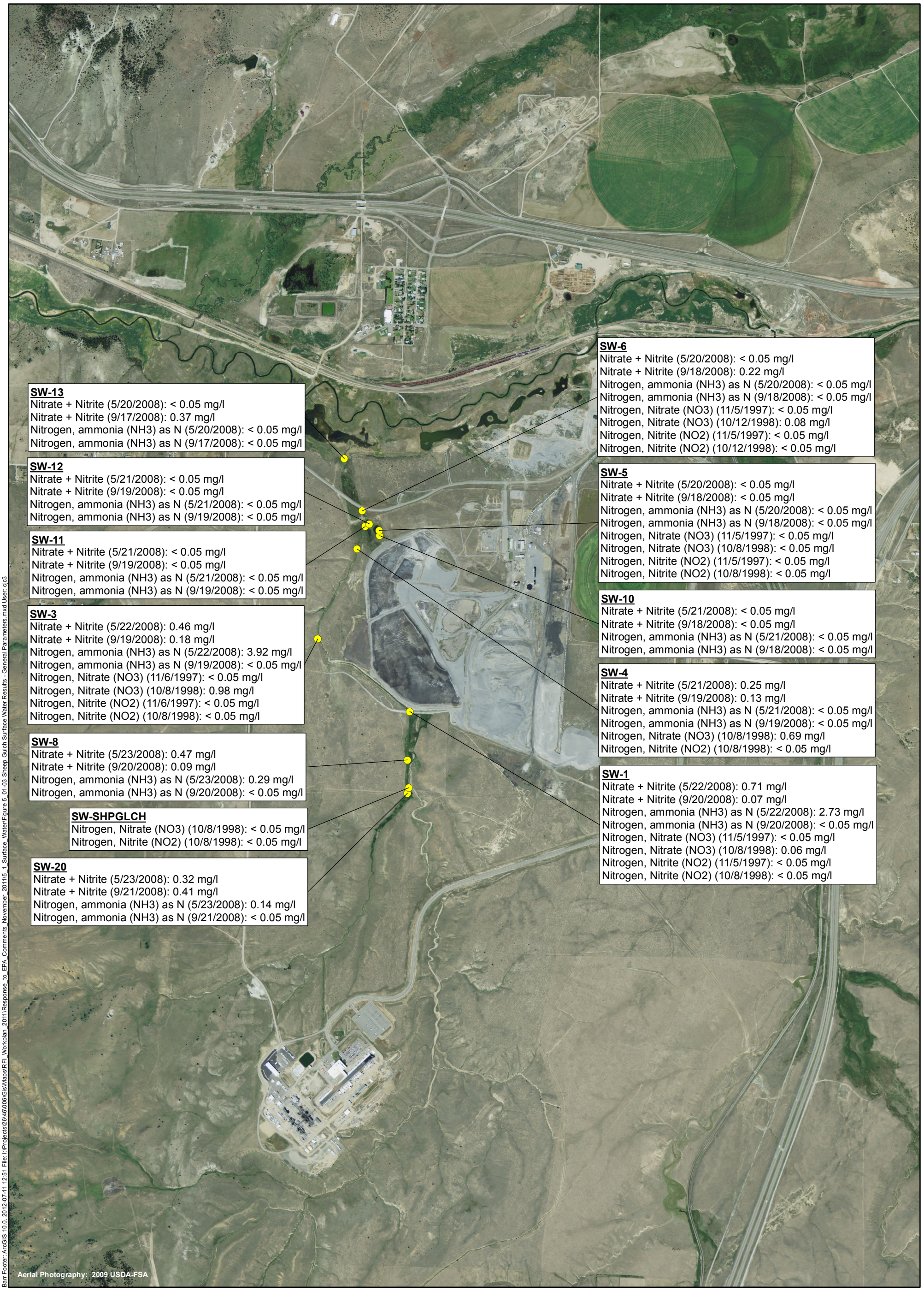
Barr Footer: ArcGIS 10.0, 2012-07-11 12:49 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-02 Sheep Gulch Surface Water Results - General Parameters.mxd User: cjc3

● Sample Location

Feet
1,500 0 1,500

Figure 5.1-2

SHEEP GULCH SURFACE WATER RESULTS MAP - GENERAL PARAMETERS
Rhodia Silver Bow Plant
Montana



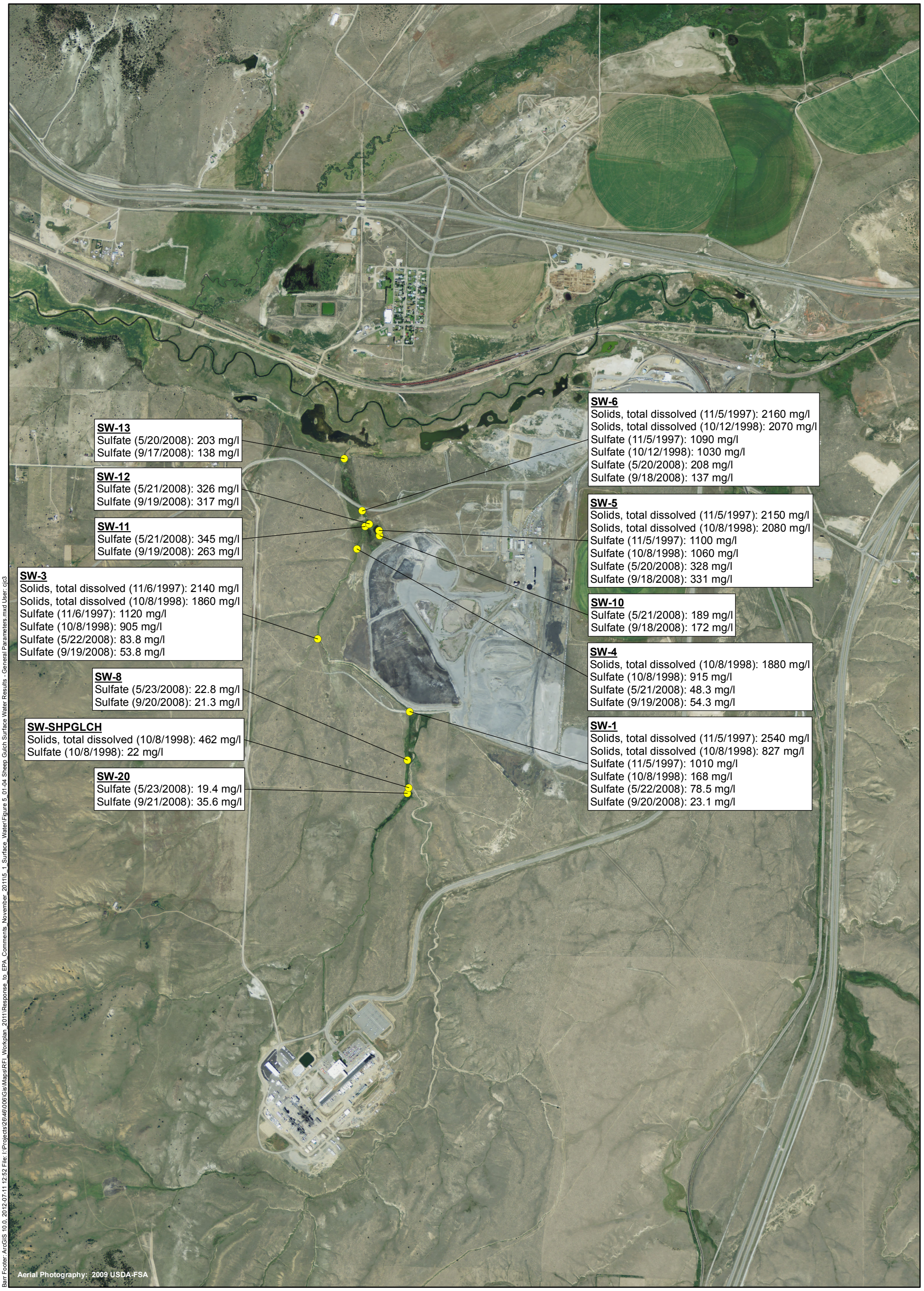
Barr Footer: ArcGIS 10.0, 2012-07-11 12:51 File: I:\Projects\2646\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-03 Sheep Gulch Surface Water Results - General Parameters.mxd User: cjc3

● Sample Location

Feet
1,500 0 1,500

Figure 5.1-3

SHEEP GULCH SURFACE WATER RESULTS MAP - GENERAL PARAMETERS
Rhodia Silver Bow Plant
Montana



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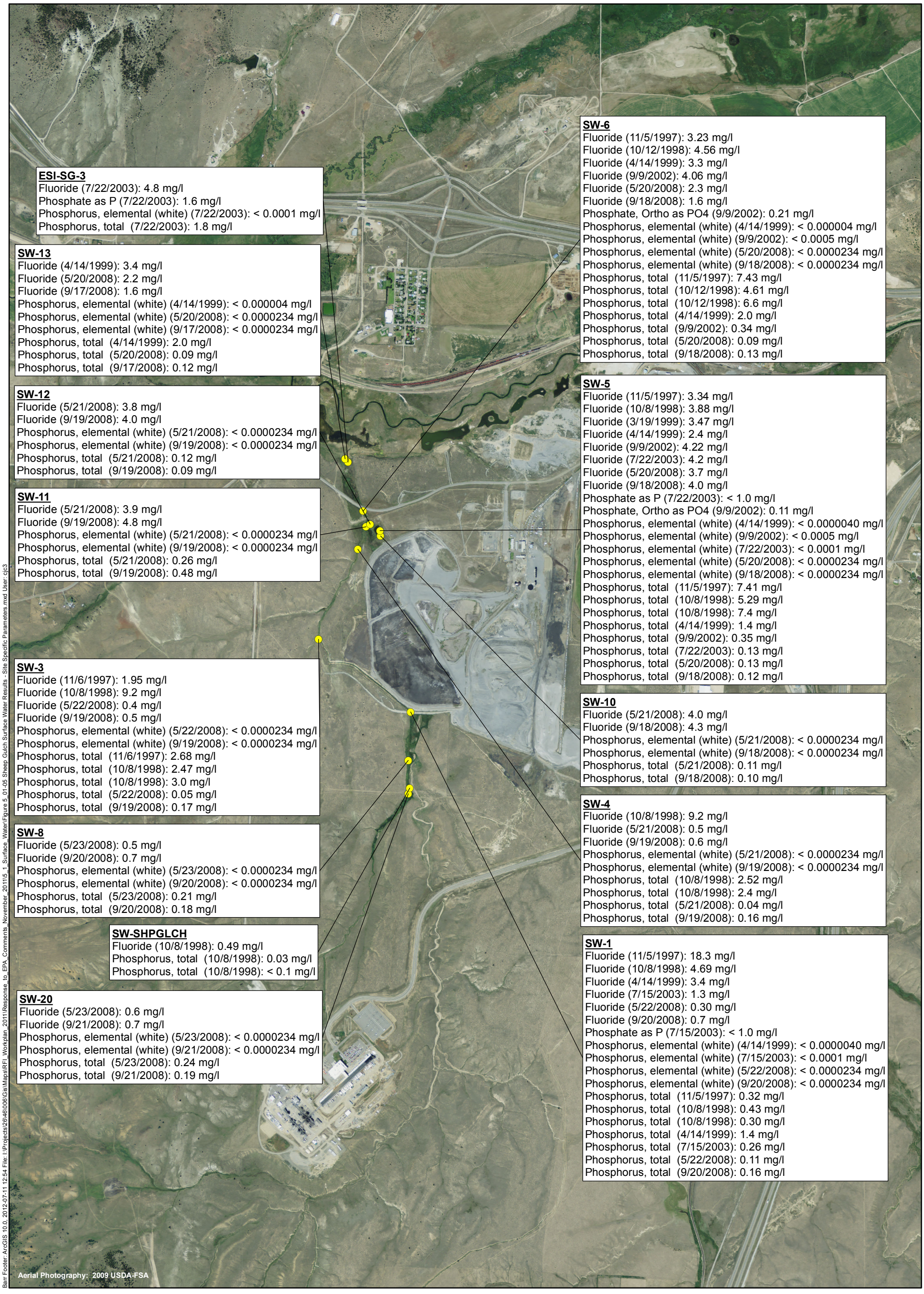
● Sample Location

Feet
1,500 0 1,500

Figure 5.1-4

SHEEP GULCH SURFACE WATER RESULTS MAP - GENERAL PARAMETERS
Rhodia Silver Bow Plant
Montana

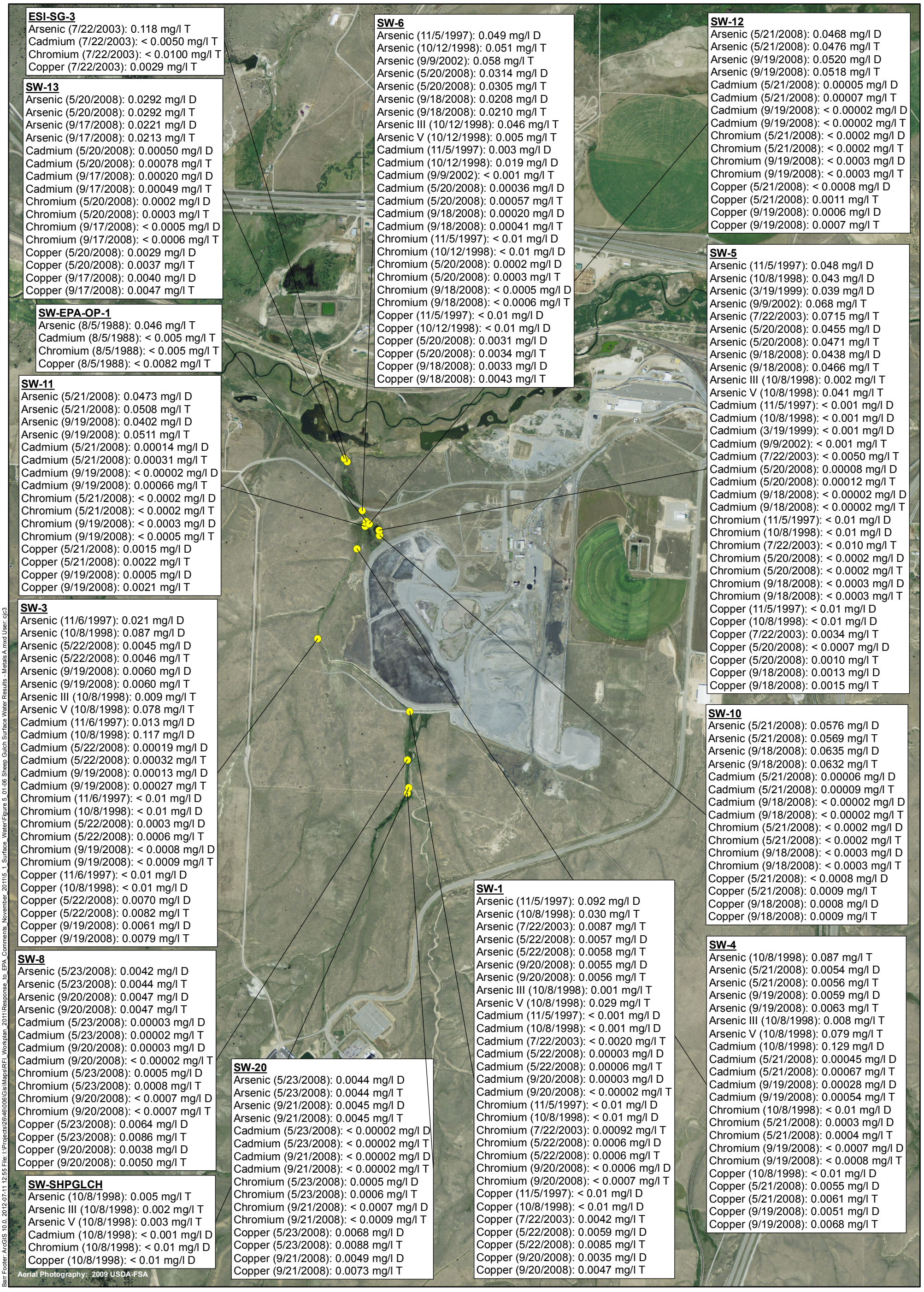


Sample Location

Feet
1,500 0 1,500

Figure 5.1-5

SHEEP GULCH SURFACE WATER RESULTS MAP - SITE-SPECIFIC PARAMETERS
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-07-11 12:55 File: I:\Projects\26\46\006\Gis\Maps\RFL_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-06 Sheep Gulch Surface Water Results - Metals A.mxd User: cjc3

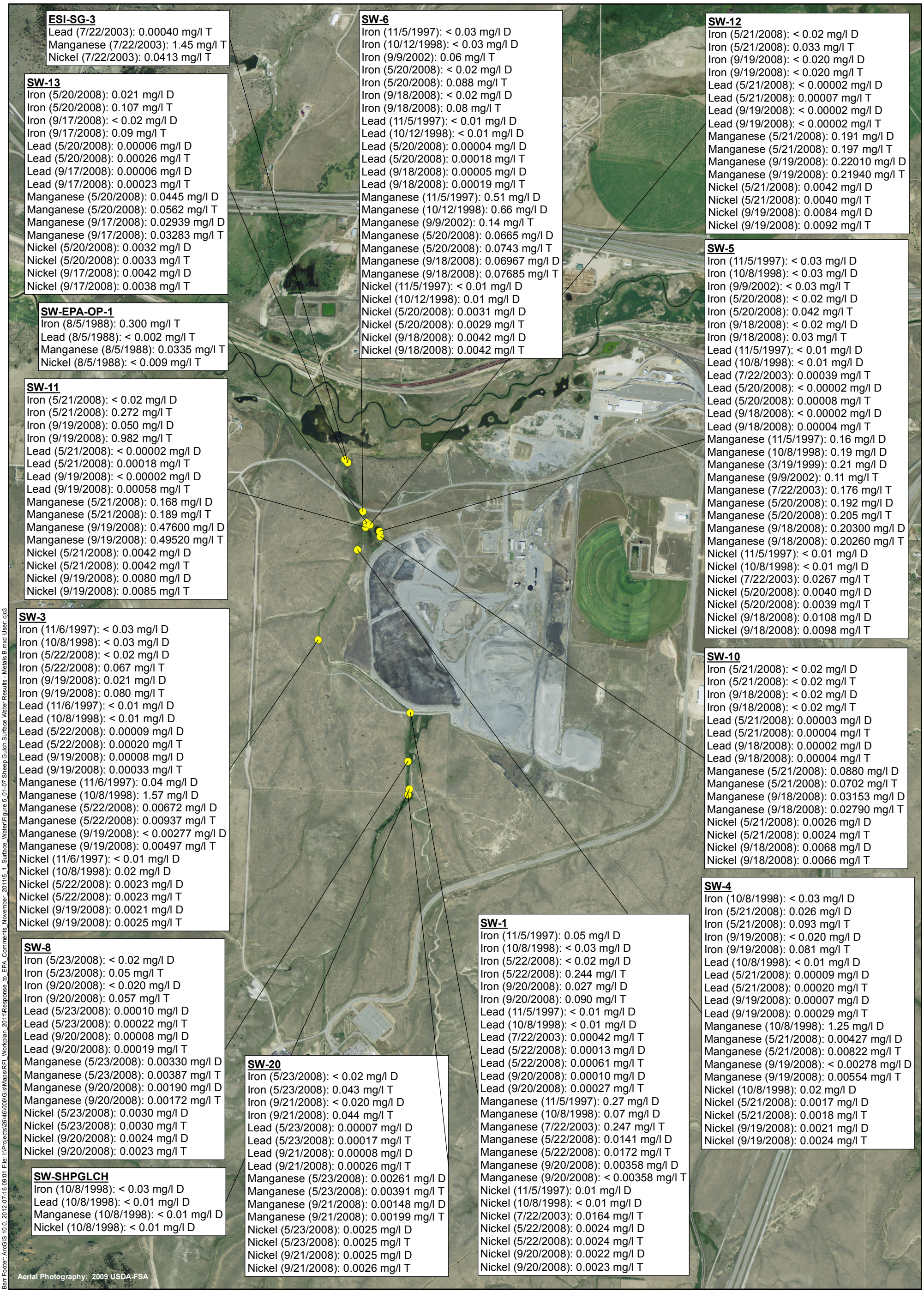
● Sample Location

Figure 5.1-6

SHEEP GULCH SURFACE WATER RESULTS MAP - METALS A
Rhodia Silver Bow Plant
Montana

N

Feet
1,500 0 1,500



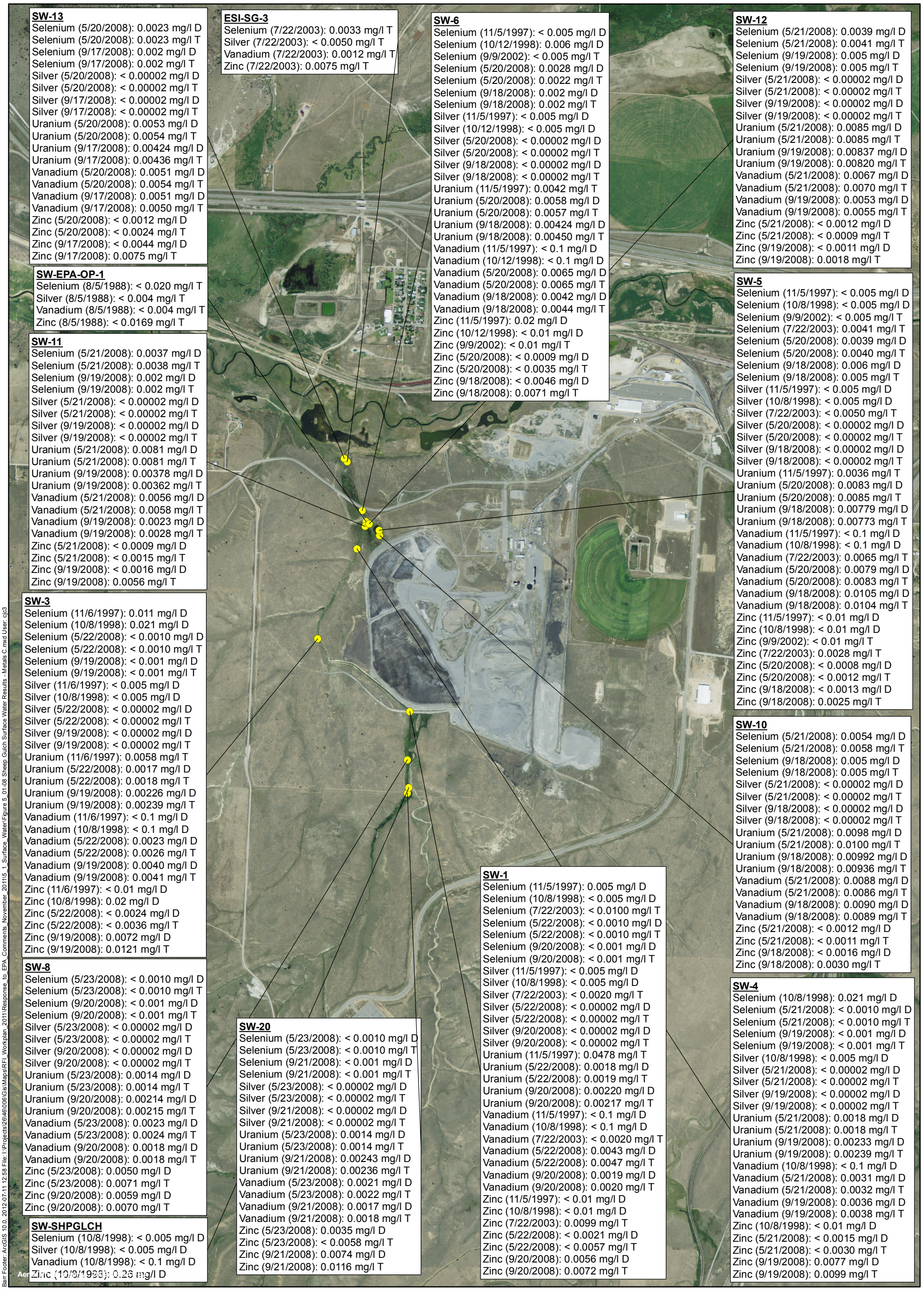
Sample Location

Figure 5.1-7

SHEEP GULCH SURFACE WATER RESULTS MAP - METALS B
Rhodia Silver Bow Plant
Montana

N

Feet
1,500 0 1,500



Sample Location

Figure 5.1-8

SHEEP GULCH SURFACE WATER RESULTS MAP - METALS C
Rhodia Silver Bow Plant
Montana

N

Feet
1,500 0 1,500

ESI-SG-3
Antimony (7/22/2003): < 0.010 mg/l T
Barium (7/22/2003): 0.0439 mg/l T
Beryllium (7/22/2003): < 0.0050 mg/l T
Cobalt (7/22/2003): 0.0041 mg/l T

SW-13
Antimony (5/20/2008): 0.00040 mg/l D
Antimony (5/20/2008): 0.00041 mg/l T
Antimony (9/17/2008): 0.00037 mg/l D
Antimony (9/17/2008): 0.00036 mg/l T
Barium (5/20/2008): 0.0318 mg/l D
Barium (5/20/2008): 0.0340 mg/l T
Barium (9/17/2008): 0.03199 mg/l D
Barium (9/17/2008): 0.03271 mg/l T
Beryllium (5/20/2008): < 0.00002 mg/l D
Beryllium (5/20/2008): < 0.00002 mg/l T
Beryllium (9/17/2008): < 0.00002 mg/l D
Beryllium (9/17/2008): < 0.00002 mg/l T
Cobalt (5/20/2008): 0.00047 mg/l D
Cobalt (5/20/2008): 0.00048 mg/l T
Cobalt (9/17/2008): 0.00045 mg/l D
Cobalt (9/17/2008): 0.00034 mg/l T

SW-EPA-OP-1
Antimony (8/5/1988): < 0.029 mg/l T
Barium (8/5/1988): < 0.0489 mg/l T
Beryllium (8/5/1988): < 0.001 mg/l T
Cobalt (8/5/1988): < 0.0051 mg/l T

SW-11
Antimony (5/21/2008): 0.00046 mg/l D
Antimony (5/21/2008): 0.00048 mg/l T
Antimony (9/19/2008): 0.00043 mg/l D
Antimony (9/19/2008): 0.00043 mg/l T
Barium (5/21/2008): 0.0204 mg/l D
Barium (5/21/2008): 0.0220 mg/l T
Barium (9/19/2008): 0.03574 mg/l D
Barium (9/19/2008): 0.04229 mg/l T
Beryllium (5/21/2008): < 0.00002 mg/l D
Beryllium (5/21/2008): < 0.00002 mg/l T
Beryllium (9/19/2008): < 0.00002 mg/l D
Beryllium (9/19/2008): < 0.00002 mg/l T
Cobalt (5/21/2008): 0.00076 mg/l D
Cobalt (5/21/2008): 0.00072 mg/l T
Cobalt (9/19/2008): 0.00132 mg/l D
Cobalt (9/19/2008): 0.00085 mg/l T

SW-3
Antimony (11/6/1997): < 0.05 mg/l D
Antimony (10/8/1998): < 0.003 mg/l D
Antimony (5/22/2008): 0.00033 mg/l D
Antimony (5/22/2008): 0.00033 mg/l T
Antimony (9/19/2008): 0.00033 mg/l D
Antimony (9/19/2008): 0.00030 mg/l T
Barium (11/6/1997): < 0.1 mg/l D
Barium (10/8/1998): < 0.1 mg/l D
Barium (5/22/2008): 0.0492 mg/l D
Barium (5/22/2008): 0.0517 mg/l T
Barium (9/19/2008): 0.03373 mg/l D
Barium (9/19/2008): 0.04207 mg/l T
Beryllium (11/6/1997): < 0.001 mg/l D
Beryllium (10/8/1998): < 0.001 mg/l D
Beryllium (5/22/2008): < 0.00002 mg/l D
Beryllium (5/22/2008): < 0.00002 mg/l T
Beryllium (9/19/2008): < 0.00002 mg/l D
Beryllium (9/19/2008): < 0.00002 mg/l T
Cobalt (11/6/1997): < 0.01 mg/l D
Cobalt (10/8/1998): < 0.01 mg/l D
Cobalt (5/22/2008): 0.00026 mg/l D
Cobalt (5/22/2008): 0.00016 mg/l T
Cobalt (9/19/2008): 0.00029 mg/l D
Cobalt (9/19/2008): 0.00015 mg/l T

SW-8
Antimony (5/23/2008): 0.00033 mg/l D
Antimony (5/23/2008): 0.00030 mg/l T
Antimony (9/20/2008): 0.00030 mg/l D
Antimony (9/20/2008): 0.00024 mg/l T
Barium (5/23/2008): 0.0141 mg/l D
Barium (5/23/2008): 0.0155 mg/l T
Barium (9/20/2008): 0.01551 mg/l D
Barium (9/20/2008): 0.01592 mg/l T
Beryllium (5/23/2008): < 0.00002 mg/l D
Beryllium (5/23/2008): < 0.00002 mg/l T
Beryllium (9/20/2008): < 0.00002 mg/l D
Beryllium (9/20/2008): < 0.00002 mg/l T
Cobalt (5/23/2008): 0.00040 mg/l D
Cobalt (5/23/2008): 0.00012 mg/l T
Cobalt (9/20/2008): 0.00060 mg/l D
Cobalt (9/20/2008): 0.00012 mg/l T

SW-SHPGLCH
Antimony (10/8/1998): < 0.003 mg/l D
Barium (10/8/1998): < 0.1 mg/l D
Beryllium (10/8/1998): < 0.001 mg/l D
Cobalt (10/8/1998): < 0.01 mg/l D

SW-6
Antimony (11/5/1997): < 0.05 mg/l D
Antimony (10/12/1998): < 0.003 mg/l D
Antimony (5/20/2008): 0.00043 mg/l D
Antimony (5/20/2008): 0.00043 mg/l T
Antimony (9/18/2008): 0.00036 mg/l D
Antimony (9/18/2008): 0.00034 mg/l T
Barium (11/5/1997): < 0.1 mg/l D
Barium (10/12/1998): < 0.1 mg/l D
Barium (9/9/2002): < 0.1 mg/l T
Barium (5/20/2008): 0.0295 mg/l D
Barium (5/20/2008): 0.0310 mg/l T
Barium (9/18/2008): 0.03282 mg/l D
Barium (9/18/2008): 0.03483 mg/l T
Beryllium (11/5/1997): < 0.001 mg/l D
Beryllium (10/12/1998): < 0.001 mg/l D
Beryllium (5/20/2008): < 0.00002 mg/l D
Beryllium (5/20/2008): < 0.00002 mg/l T
Beryllium (9/18/2008): < 0.00002 mg/l D
Beryllium (9/18/2008): < 0.00002 mg/l T
Cobalt (11/5/1997): < 0.01 mg/l D
Cobalt (10/12/1998): < 0.01 mg/l D
Cobalt (5/20/2008): 0.00049 mg/l D
Cobalt (5/20/2008): 0.00045 mg/l T
Cobalt (9/18/2008): 0.00059 mg/l D
Cobalt (9/18/2008): 0.00034 mg/l T

SW-20
Antimony (5/23/2008): 0.00031 mg/l D
Antimony (5/23/2008): 0.00029 mg/l T
Antimony (9/21/2008): 0.00025 mg/l D
Antimony (9/21/2008): 0.00021 mg/l T
Barium (5/23/2008): 0.00940 mg/l D
Barium (5/23/2008): 0.0110 mg/l T
Barium (9/21/2008): 0.03011 mg/l D
Barium (9/21/2008): 0.03654 mg/l T
Beryllium (5/23/2008): < 0.00002 mg/l D
Beryllium (5/23/2008): < 0.00002 mg/l T
Beryllium (9/21/2008): < 0.00002 mg/l D
Beryllium (9/21/2008): < 0.00002 mg/l T
Cobalt (5/23/2008): 0.00015 mg/l D
Cobalt (5/23/2008): 0.00011 mg/l T
Cobalt (9/21/2008): 0.00043 mg/l D
Cobalt (9/21/2008): 0.00012 mg/l T

SW-1
Antimony (11/5/1997): < 0.05 mg/l D
Antimony (10/8/1998): < 0.003 mg/l D
Antimony (7/22/2003): < 0.0040 mg/l T
Antimony (5/22/2008): 0.00042 mg/l D
Antimony (5/22/2008): 0.00040 mg/l T
Antimony (9/20/2008): 0.00030 mg/l D
Antimony (9/20/2008): 0.00027 mg/l T
Barium (11/5/1997): 0.1 mg/l D
Barium (10/8/1998): < 0.1 mg/l D
Barium (7/22/2003): 0.0479 mg/l T
Barium (5/22/2008): 0.0514 mg/l D
Barium (5/22/2008): 0.0545 mg/l T
Barium (9/20/2008): 0.01831 mg/l D
Barium (9/20/2008): 0.02062 mg/l T
Beryllium (11/5/1997): < 0.001 mg/l D
Beryllium (10/8/1998): < 0.001 mg/l D
Beryllium (7/22/2003): < 0.0020 mg/l T
Beryllium (5/22/2008): < 0.00002 mg/l D
Beryllium (5/22/2008): < 0.00002 mg/l T
Beryllium (9/20/2008): < 0.00002 mg/l D
Beryllium (9/20/2008): < 0.00002 mg/l T
Cobalt (11/5/1997): < 0.01 mg/l D
Cobalt (10/8/1998): < 0.01 mg/l D
Cobalt (7/22/2003): 0.00046 mg/l T
Cobalt (5/22/2008): 0.00055 mg/l D
Cobalt (5/22/2008): 0.00027 mg/l T
Cobalt (9/20/2008): 0.00054 mg/l D
Cobalt (9/20/2008): 0.00013 mg/l T

SW-12
Antimony (5/21/2008): 0.00042 mg/l D
Antimony (5/21/2008): 0.00041 mg/l T
Antimony (9/19/2008): 0.00036 mg/l D
Antimony (9/19/2008): 0.00035 mg/l T
Barium (5/21/2008): 0.0296 mg/l D
Barium (5/21/2008): 0.0306 mg/l T
Barium (9/19/2008): 0.02797 mg/l D
Barium (9/19/2008): 0.02875 mg/l T
Beryllium (5/21/2008): < 0.00002 mg/l D
Beryllium (5/21/2008): < 0.00002 mg/l T
Beryllium (9/19/2008): < 0.00002 mg/l D
Beryllium (9/19/2008): < 0.00002 mg/l T
Cobalt (5/21/2008): 0.00073 mg/l D
Cobalt (5/21/2008): 0.00069 mg/l T
Cobalt (9/19/2008): 0.00101 mg/l D
Cobalt (9/19/2008): 0.00078 mg/l T

SW-5
Antimony (11/5/1997): < 0.05 mg/l D
Antimony (10/8/1998): < 0.003 mg/l D
Antimony (7/22/2003): < 0.0100 mg/l T
Antimony (5/20/2008): 0.00044 mg/l D
Antimony (5/20/2008): 0.00044 mg/l T
Antimony (9/18/2008): 0.00050 mg/l D
Antimony (9/18/2008): 0.00046 mg/l T
Barium (11/5/1997): < 0.1 mg/l D
Barium (10/8/1998): < 0.1 mg/l D
Barium (9/9/2002): < 0.1 mg/l T
Barium (7/22/2003): 0.0259 mg/l T
Barium (5/20/2008): 0.0316 mg/l D
Barium (5/20/2008): 0.0326 mg/l T
Barium (9/18/2008): 0.01794 mg/l D
Barium (9/18/2008): 0.02251 mg/l T
Beryllium (11/5/1997): < 0.001 mg/l D
Beryllium (10/8/1998): < 0.001 mg/l D
Beryllium (7/22/2003): < 0.0050 mg/l T
Beryllium (5/20/2008): < 0.00002 mg/l D
Beryllium (5/20/2008): < 0.00002 mg/l T
Beryllium (9/18/2008): < 0.00002 mg/l D
Beryllium (9/18/2008): < 0.00002 mg/l T
Cobalt (11/5/1997): < 0.01 mg/l D
Cobalt (10/8/1998): < 0.01 mg/l D
Cobalt (7/22/2003): 0.00090 mg/l T
Cobalt (5/20/2008): 0.00082 mg/l D
Cobalt (5/20/2008): 0.00070 mg/l T
Cobalt (9/18/2008): 0.00145 mg/l D
Cobalt (9/18/2008): 0.00099 mg/l T

SW-10
Antimony (5/21/2008): 0.00042 mg/l D
Antimony (5/21/2008): 0.00041 mg/l T
Antimony (9/18/2008): 0.00042 mg/l D
Antimony (9/18/2008): 0.00038 mg/l T
Barium (5/21/2008): 0.0359 mg/l D
Barium (5/21/2008): 0.0371 mg/l T
Barium (9/18/2008): 0.04301 mg/l D
Barium (9/18/2008): 0.04357 mg/l T
Beryllium (5/21/2008): < 0.00002 mg/l D
Beryllium (5/21/2008): < 0.00002 mg/l T
Beryllium (9/18/2008): < 0.00002 mg/l D
Beryllium (9/18/2008): < 0.00002 mg/l T
Cobalt (5/21/2008): 0.00042 mg/l D
Cobalt (5/21/2008): 0.00035 mg/l T
Cobalt (9/18/2008): 0.00110 mg/l D
Cobalt (9/18/2008): 0.00043 mg/l T

SW-4
Antimony (10/8/1998): < 0.003 mg/l D
Antimony (5/21/2008): 0.00036 mg/l D
Antimony (5/21/2008): 0.00035 mg/l T
Antimony (9/19/2008): 0.00034 mg/l D
Antimony (9/19/2008): 0.00030 mg/l T
Barium (10/8/1998): < 0.1 mg/l D
Barium (5/21/2008): 0.0198 mg/l D
Barium (5/21/2008): 0.0212 mg/l T
Barium (9/19/2008): 0.03449 mg/l D
Barium (9/19/2008): 0.04183 mg/l T
Beryllium (10/8/1998): < 0.001 mg/l D
Beryllium (5/21/2008): < 0.00002 mg/l D
Beryllium (5/21/2008): < 0.00002 mg/l T
Beryllium (9/19/2008): < 0.00002 mg/l D
Beryllium (9/19/2008): < 0.00002 mg/l T
Cobalt (10/8/1998): < 0.01 mg/l D
Cobalt (5/21/2008): 0.00015 mg/l D
Cobalt (5/21/2008): 0.00015 mg/l T
Cobalt (9/19/2008): 0.00040 mg/l D
Cobalt (9/19/2008): 0.00016 mg/l T

Aerial Photography: 2009 USDA-FSA

Sample Location

Feet
1,500 0 1,500

Figure 5.1-9

SHEEP GULCH SURFACE WATER RESULTS MAP - METALS D
Rhodia Silver Bow Plant
Montana

SW-13
Calcium (5/20/2008): 143 mg/l D
Calcium (5/20/2008): 144 mg/l T
Calcium (9/17/2008): 81.8 mg/l D
Calcium (9/17/2008): 87.7 mg/l T
Magnesium (5/20/2008): 24 mg/l D
Magnesium (5/20/2008): 24.2 mg/l T
Magnesium (9/17/2008): 15.3 mg/l D
Magnesium (9/17/2008): 16.4 mg/l T
Potassium (5/20/2008): 11.3 mg/l D
Potassium (5/20/2008): 11.4 mg/l T
Potassium (9/17/2008): 6.4 mg/l D
Potassium (9/17/2008): 6.8 mg/l T
Sodium (5/20/2008): 194 mg/l D
Sodium (5/20/2008): 195 mg/l T
Sodium (9/17/2008): 211 mg/l D
Sodium (9/17/2008): 226 mg/l T

SW-EPA-OP-1
Calcium (8/5/1988): 348 mg/l T
Magnesium (8/5/1988): 65.3 mg/l T
Potassium (8/5/1988): 21 mg/l T
Sodium (8/5/1988): 82.4 mg/l T

SW-11
Calcium (5/21/2008): 190 mg/l D
Calcium (5/21/2008): 191 mg/l T
Calcium (9/19/2008): 186 mg/l D
Calcium (9/19/2008): 183 mg/l T
Magnesium (5/21/2008): 36.7 mg/l D
Magnesium (5/21/2008): 36.8 mg/l T
Magnesium (9/19/2008): 36.3 mg/l D
Magnesium (9/19/2008): 35.8 mg/l T
Potassium (5/21/2008): 18 mg/l D
Potassium (5/21/2008): 18.1 mg/l T
Potassium (9/19/2008): 18.0 mg/l D
Potassium (9/19/2008): 17.9 mg/l T
Sodium (5/21/2008): 78 mg/l D
Sodium (5/21/2008): 78.1 mg/l T
Sodium (9/19/2008): 80.2 mg/l D
Sodium (9/19/2008): 78.6 mg/l T

SW-3
Calcium (11/6/1997): 459 mg/l T
Calcium (10/8/1998): 360 mg/l T
Calcium (5/22/2008): 89 mg/l D
Calcium (5/22/2008): 90.6 mg/l T
Calcium (9/19/2008): 48.1 mg/l D
Calcium (9/19/2008): 49.0 mg/l T
Magnesium (11/6/1997): 40 mg/l T
Magnesium (10/8/1998): 33 mg/l T
Magnesium (5/22/2008): 11.8 mg/l D
Magnesium (5/22/2008): 12 mg/l T
Magnesium (9/19/2008): 10.5 mg/l D
Magnesium (9/19/2008): 10.4 mg/l T
Potassium (11/6/1997): 13 mg/l T
Potassium (10/8/1998): 15 mg/l T
Potassium (5/22/2008): 3.54 mg/l D
Potassium (5/22/2008): 3.66 mg/l T
Potassium (9/19/2008): 2.37 mg/l D
Potassium (9/19/2008): 2.36 mg/l T
Sodium (11/6/1997): 111 mg/l T
Sodium (10/8/1998): 129 mg/l T
Sodium (5/22/2008): 418 mg/l D
Sodium (5/22/2008): 431 mg/l T
Sodium (9/19/2008): 374 mg/l D
Sodium (9/19/2008): 376 mg/l T

SW-8
Calcium (5/23/2008): 50.4 mg/l D
Calcium (5/23/2008): 54.1 mg/l T
Calcium (9/20/2008): 49.4 mg/l D
Calcium (9/20/2008): 49.8 mg/l T
Magnesium (5/23/2008): 7.43 mg/l D
Magnesium (5/23/2008): 7.89 mg/l T
Magnesium (9/20/2008): 11.8 mg/l D
Magnesium (9/20/2008): 11.6 mg/l T
Potassium (5/23/2008): < 2 mg/l D
Potassium (5/23/2008): < 2 mg/l T
Potassium (9/20/2008): < 2.00 mg/l D
Potassium (9/20/2008): < 2.00 mg/l T
Sodium (5/23/2008): 94.2 mg/l D
Sodium (5/23/2008): 106 mg/l T
Sodium (9/20/2008): 31.0 mg/l D
Sodium (9/20/2008): 31.3 mg/l T

SW-SHPGLCH
Calcium (10/8/1998): 83 mg/l T
Magnesium (10/8/1998): 10 mg/l T
Potassium (10/8/1998): 3 mg/l T
Sodium (10/8/1998): 42 mg/l T

SW-6
Calcium (11/5/1997): 409 mg/l T
Calcium (10/12/1998): 391 mg/l T
Calcium (5/20/2008): 135 mg/l D
Calcium (5/20/2008): 131 mg/l T
Calcium (9/18/2008): 85.8 mg/l D
Calcium (9/18/2008): 88.9 mg/l T
Magnesium (11/5/1997): 73 mg/l T
Magnesium (10/12/1998): 63 mg/l T
Magnesium (5/20/2008): 24.1 mg/l D
Magnesium (5/20/2008): 23.4 mg/l T
Magnesium (9/18/2008): 16.0 mg/l D
Magnesium (9/18/2008): 16.6 mg/l T
Potassium (11/5/1997): 22 mg/l T
Potassium (10/12/1998): 21 mg/l T
Potassium (5/20/2008): 11.6 mg/l D
Potassium (5/20/2008): 11.1 mg/l T
Potassium (9/18/2008): 6.4 mg/l D
Potassium (9/18/2008): 6.7 mg/l T
Sodium (11/5/1997): 93 mg/l T
Sodium (10/12/1998): 105 mg/l T
Sodium (5/20/2008): 186 mg/l D
Sodium (5/20/2008): 180 mg/l T
Sodium (9/18/2008): 236 mg/l D
Sodium (9/18/2008): 245 mg/l T

SW-20
Calcium (5/23/2008): 42.3 mg/l D
Calcium (5/23/2008): 46 mg/l T
Calcium (9/21/2008): 53.2 mg/l D
Calcium (9/21/2008): 56.5 mg/l T
Magnesium (5/23/2008): 7.3 mg/l D
Magnesium (5/23/2008): 7.86 mg/l T
Magnesium (9/21/2008): 12.5 mg/l D
Magnesium (9/21/2008): 12.7 mg/l T
Potassium (5/23/2008): < 2 mg/l D
Potassium (5/23/2008): < 2 mg/l T
Potassium (9/21/2008): 2.03 mg/l D
Potassium (9/21/2008): 2.11 mg/l T
Sodium (5/23/2008): 43.4 mg/l D
Sodium (5/23/2008): 48.8 mg/l T
Sodium (9/21/2008): 120 mg/l D
Sodium (9/21/2008): 126 mg/l T

SW-1
Calcium (11/5/1997): 495 mg/l T
Calcium (10/8/1998): 146 mg/l T
Calcium (5/22/2008): 104 mg/l D
Calcium (5/22/2008): 111 mg/l T
Calcium (9/20/2008): 47.9 mg/l D
Calcium (9/20/2008): 48.5 mg/l T
Magnesium (11/5/1997): 31 mg/l T
Magnesium (10/8/1998): 17 mg/l T
Magnesium (5/22/2008): 11.9 mg/l D
Magnesium (5/22/2008): 12.6 mg/l T
Magnesium (9/20/2008): 11.2 mg/l D
Magnesium (9/20/2008): 11.2 mg/l T
Potassium (11/5/1997): 20 mg/l T
Potassium (10/8/1998): 14 mg/l T
Potassium (5/22/2008): 2.89 mg/l D
Potassium (5/22/2008): 3.38 mg/l T
Potassium (9/20/2008): < 2.00 mg/l D
Potassium (9/20/2008): < 2.00 mg/l T
Sodium (11/5/1997): 160 mg/l T
Sodium (10/8/1998): 68 mg/l T
Sodium (5/22/2008): 387 mg/l D
Sodium (5/22/2008): 432 mg/l T
Sodium (9/20/2008): 60.8 mg/l D
Sodium (9/20/2008): 61.7 mg/l T

SW-12
Calcium (5/21/2008): 183 mg/l D
Calcium (5/21/2008): 184 mg/l T
Calcium (9/19/2008): 182 mg/l D
Calcium (9/19/2008): 176 mg/l T
Magnesium (5/21/2008): 33.2 mg/l D
Magnesium (5/21/2008): 33.2 mg/l T
Magnesium (9/19/2008): 33.3 mg/l D
Magnesium (9/19/2008): 32.1 mg/l T
Potassium (5/21/2008): 17.9 mg/l D
Potassium (5/21/2008): 17.7 mg/l T
Potassium (9/19/2008): 16.9 mg/l D
Potassium (9/19/2008): 16.3 mg/l T
Sodium (5/21/2008): 71.2 mg/l D
Sodium (5/21/2008): 71.1 mg/l T
Sodium (9/19/2008): 67.6 mg/l D
Sodium (9/19/2008): 65.4 mg/l T

SW-5
Calcium (11/5/1997): 392 mg/l T
Calcium (10/8/1998): 380 mg/l T
Calcium (5/20/2008): 190 mg/l D
Calcium (5/20/2008): 181 mg/l T
Calcium (9/18/2008): 183 mg/l D
Calcium (9/18/2008): 175 mg/l T
Magnesium (11/5/1997): 71 mg/l T
Magnesium (10/8/1998): 69 mg/l T
Magnesium (5/20/2008): 34.5 mg/l D
Magnesium (5/20/2008): 32.9 mg/l T
Magnesium (9/18/2008): 33.6 mg/l D
Magnesium (9/18/2008): 32.0 mg/l T
Potassium (11/5/1997): 21 mg/l T
Potassium (10/8/1998): 22 mg/l T
Potassium (5/20/2008): 18.5 mg/l D
Potassium (5/20/2008): 17.2 mg/l T
Potassium (9/18/2008): 16.8 mg/l D
Potassium (9/18/2008): 16.3 mg/l T
Sodium (11/5/1997): 88 mg/l T
Sodium (10/8/1998): 86 mg/l T
Sodium (5/20/2008): 73.7 mg/l D
Sodium (5/20/2008): 68.8 mg/l T
Sodium (9/18/2008): 65.3 mg/l D
Sodium (9/18/2008): 63.2 mg/l T

SW-10
Calcium (5/21/2008): 165 mg/l D
Calcium (5/21/2008): 162 mg/l T
Calcium (9/18/2008): 150 mg/l D
Calcium (9/18/2008): 152 mg/l T
Magnesium (5/21/2008): 30.7 mg/l D
Magnesium (5/21/2008): 30.3 mg/l T
Magnesium (9/18/2008): 28.5 mg/l D
Magnesium (9/18/2008): 28.8 mg/l T
Potassium (5/21/2008): 17.3 mg/l D
Potassium (5/21/2008): 16.9 mg/l T
Potassium (9/18/2008): 15.4 mg/l D
Potassium (9/18/2008): 15.5 mg/l T
Sodium (5/21/2008): 67.7 mg/l D
Sodium (5/21/2008): 67 mg/l T
Sodium (9/18/2008): 60.7 mg/l D
Sodium (9/18/2008): 60.8 mg/l T

SW-4
Calcium (10/8/1998): 357 mg/l T
Calcium (5/21/2008): 52.1 mg/l D
Calcium (5/21/2008): 51 mg/l T
Calcium (9/19/2008): 49.1 mg/l D
Calcium (9/19/2008): 50.6 mg/l T
Magnesium (10/8/1998): 32 mg/l T
Magnesium (5/21/2008): 9.91 mg/l D
Magnesium (5/21/2008): 9.75 mg/l T
Magnesium (9/19/2008): 10.3 mg/l D
Magnesium (9/19/2008): 10.4 mg/l T
Potassium (10/8/1998): 15 mg/l T
Potassium (5/21/2008): < 2 mg/l D
Potassium (5/21/2008): < 2 mg/l T
Potassium (9/19/2008): 2.24 mg/l D
Potassium (9/19/2008): 2.28 mg/l T
Sodium (10/8/1998): 127 mg/l T
Sodium (5/21/2008): 214 mg/l D
Sodium (5/21/2008): 210 mg/l T
Sodium (9/19/2008): 356 mg/l D
Sodium (9/19/2008): 360 mg/l T

Aerial Photography: 2009 USDA-FSA

Barr Footer: ArcGIS 10.0, 2012-07-11 13:00 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-10 Sheep Gulch Surface Water Results - Metals E.mxd User: cjc3

Sample Location

Figure 5.1-10

SHEEP GULCH SURFACE WATER RESULTS MAP - METALS E
Rhodia Silver Bow Plant
Montana

N

Feet
1,500 0 1,500

SW-6
Aluminum (11/5/1997): < 0.1 mg/l D
Aluminum (10/12/1998): < 0.1 mg/l D
Mercury (11/5/1997): < 0.001 mg/l D
Mercury (10/12/1998): < 0.001 mg/l D
Mercury (5/20/2008): < 0.0002 mg/l D
Mercury (5/20/2008): < 0.0002 mg/l T
Mercury (9/18/2008): < 0.0002 mg/l D
Mercury (9/18/2008): < 0.0002 mg/l T
Strontium (11/5/1997): 2.6 mg/l D
Strontium (10/12/1998): 2.1 mg/l D
Thallium (11/5/1997): < 0.1 mg/l D
Thallium (10/12/1998): < 0.1 mg/l D
Thallium (5/20/2008): < 0.00002 mg/l D
Thallium (5/20/2008): < 0.00002 mg/l T
Thallium (9/18/2008): < 0.00002 mg/l D
Thallium (9/18/2008): < 0.00002 mg/l T

SW-13
Mercury (5/20/2008): < 0.0002 mg/l D
Mercury (5/20/2008): < 0.0002 mg/l T
Mercury (9/17/2008): < 0.0002 mg/l D
Mercury (9/17/2008): < 0.0002 mg/l T
Thallium (5/20/2008): < 0.00002 mg/l D
Thallium (5/20/2008): < 0.00002 mg/l T
Thallium (9/17/2008): < 0.00002 mg/l D
Thallium (9/17/2008): < 0.00002 mg/l T

SW-12
Mercury (5/21/2008): < 0.0002 mg/l D
Mercury (5/21/2008): < 0.0002 mg/l T
Mercury (9/19/2008): < 0.0002 mg/l D
Mercury (9/19/2008): < 0.0002 mg/l T
Thallium (5/21/2008): < 0.00002 mg/l D
Thallium (5/21/2008): < 0.00002 mg/l T
Thallium (9/19/2008): < 0.00002 mg/l D
Thallium (9/19/2008): < 0.00002 mg/l T

ESI-SG-3
Aluminum (7/22/2003): 0.0307 mg/l T
Mercury (7/22/2003): < 0.00020 mg/l T
Thallium (7/22/2003): 0.00028 mg/l T

SW-5
Aluminum (11/5/1997): < 0.1 mg/l D
Aluminum (10/8/1998): < 0.1 mg/l D
Aluminum (7/22/2003): 0.0246 mg/l T
Mercury (11/5/1997): < 0.001 mg/l D
Mercury (10/8/1998): < 0.001 mg/l D
Mercury (7/22/2003): < 0.00020 mg/l T
Mercury (5/20/2008): < 0.0002 mg/l D
Mercury (5/20/2008): < 0.0002 mg/l T
Mercury (9/18/2008): < 0.0002 mg/l D
Mercury (9/18/2008): < 0.0002 mg/l T
Strontium (11/5/1997): 2.5 mg/l D
Strontium (10/8/1998): 2.5 mg/l D
Thallium (11/5/1997): < 0.1 mg/l D
Thallium (10/8/1998): < 0.1 mg/l D
Thallium (7/22/2003): 0.00023 mg/l T
Thallium (5/20/2008): < 0.00002 mg/l D
Thallium (5/20/2008): < 0.00002 mg/l T
Thallium (9/18/2008): < 0.00002 mg/l D
Thallium (9/18/2008): < 0.00002 mg/l T

SW-EPA-OP-1
Aluminum (8/5/1988): < 0.028 mg/l T
Mercury (8/5/1988): < 0.0002 mg/l T
Thallium (8/5/1988): < 0.0026 mg/l T

SW-11
Mercury (5/21/2008): < 0.0002 mg/l D
Mercury (5/21/2008): < 0.0002 mg/l T
Mercury (9/19/2008): < 0.0002 mg/l D
Mercury (9/19/2008): < 0.0002 mg/l T
Thallium (5/21/2008): 0.00002 mg/l D
Thallium (5/21/2008): 0.00003 mg/l T
Thallium (9/19/2008): < 0.00002 mg/l D
Thallium (9/19/2008): < 0.00002 mg/l T

SW-10
Mercury (5/21/2008): < 0.0002 mg/l D
Mercury (5/21/2008): < 0.0002 mg/l T
Mercury (9/18/2008): < 0.0002 mg/l D
Mercury (9/18/2008): < 0.0002 mg/l T
Thallium (5/21/2008): < 0.00002 mg/l D
Thallium (5/21/2008): < 0.00002 mg/l T
Thallium (9/18/2008): < 0.00002 mg/l D
Thallium (9/18/2008): < 0.00002 mg/l T

SW-3
Aluminum (11/6/1997): < 0.1 mg/l D
Aluminum (10/8/1998): < 0.1 mg/l D
Mercury (11/6/1997): < 0.001 mg/l D
Mercury (10/8/1998): < 0.001 mg/l D
Mercury (5/22/2008): < 0.0002 mg/l D
Mercury (5/22/2008): < 0.0002 mg/l T
Mercury (9/19/2008): < 0.0002 mg/l D
Mercury (9/19/2008): < 0.0002 mg/l T
Strontium (11/6/1997): 1.4 mg/l D
Strontium (10/8/1998): 1.1 mg/l D
Thallium (11/6/1997): < 0.1 mg/l D
Thallium (10/8/1998): < 0.1 mg/l D
Thallium (5/22/2008): < 0.00002 mg/l D
Thallium (5/22/2008): < 0.00002 mg/l T
Thallium (9/19/2008): < 0.00002 mg/l D
Thallium (9/19/2008): < 0.00002 mg/l T

SW-4
Aluminum (10/8/1998): < 0.1 mg/l D
Mercury (10/8/1998): < 0.001 mg/l D
Mercury (5/21/2008): < 0.0002 mg/l D
Mercury (5/21/2008): < 0.0002 mg/l T
Mercury (9/19/2008): < 0.0002 mg/l D
Mercury (9/19/2008): < 0.0002 mg/l T
Strontium (10/8/1998): 1.1 mg/l D
Thallium (10/8/1998): < 0.1 mg/l D
Thallium (5/21/2008): < 0.00002 mg/l D
Thallium (5/21/2008): < 0.00002 mg/l T
Thallium (9/19/2008): < 0.00002 mg/l D
Thallium (9/19/2008): < 0.00002 mg/l T

SW-8
Mercury (5/23/2008): < 0.0002 mg/l D
Mercury (5/23/2008): < 0.0002 mg/l T
Mercury (9/20/2008): < 0.0002 mg/l D
Mercury (9/20/2008): < 0.0002 mg/l T
Thallium (5/23/2008): < 0.00002 mg/l D
Thallium (5/23/2008): < 0.00002 mg/l T
Thallium (9/20/2008): < 0.00002 mg/l D
Thallium (9/20/2008): < 0.00002 mg/l T

SW-1
Aluminum (11/5/1997): < 0.1 mg/l D
Aluminum (10/8/1998): < 0.1 mg/l D
Aluminum (7/22/2003): 0.0926 mg/l T
Mercury (11/5/1997): < 0.001 mg/l D
Mercury (10/8/1998): < 0.001 mg/l D
Mercury (7/22/2003): < 0.00020 mg/l T
Mercury (5/22/2008): < 0.0002 mg/l D
Mercury (5/22/2008): < 0.0002 mg/l T
Mercury (9/20/2008): < 0.0002 mg/l D
Mercury (9/20/2008): < 0.0002 mg/l T
Strontium (11/5/1997): 2.5 mg/l D
Strontium (10/8/1998): 0.6 mg/l D
Thallium (11/5/1997): < 0.1 mg/l D
Thallium (10/8/1998): < 0.1 mg/l D
Thallium (7/22/2003): < 0.0020 mg/l T
Thallium (5/22/2008): < 0.00002 mg/l D
Thallium (5/22/2008): < 0.00002 mg/l T
Thallium (9/20/2008): < 0.00002 mg/l D
Thallium (9/20/2008): < 0.00002 mg/l T

SW-SHPGLCH
Aluminum (10/8/1998): < 0.1 mg/l D
Mercury (10/8/1998): < 0.001 mg/l D
Strontium (10/8/1998): 0.1 mg/l D
Thallium (10/8/1998): < 0.1 mg/l D

SW-20
Mercury (5/23/2008): < 0.0002 mg/l D
Mercury (5/23/2008): < 0.0002 mg/l T
Mercury (9/21/2008): < 0.0002 mg/l D
Mercury (9/21/2008): < 0.0002 mg/l T
Thallium (5/23/2008): < 0.00002 mg/l D
Thallium (5/23/2008): < 0.00002 mg/l T
Thallium (9/21/2008): < 0.00002 mg/l D
Thallium (9/21/2008): < 0.00002 mg/l T

Aerial Photography: 2009 USDA-FSA

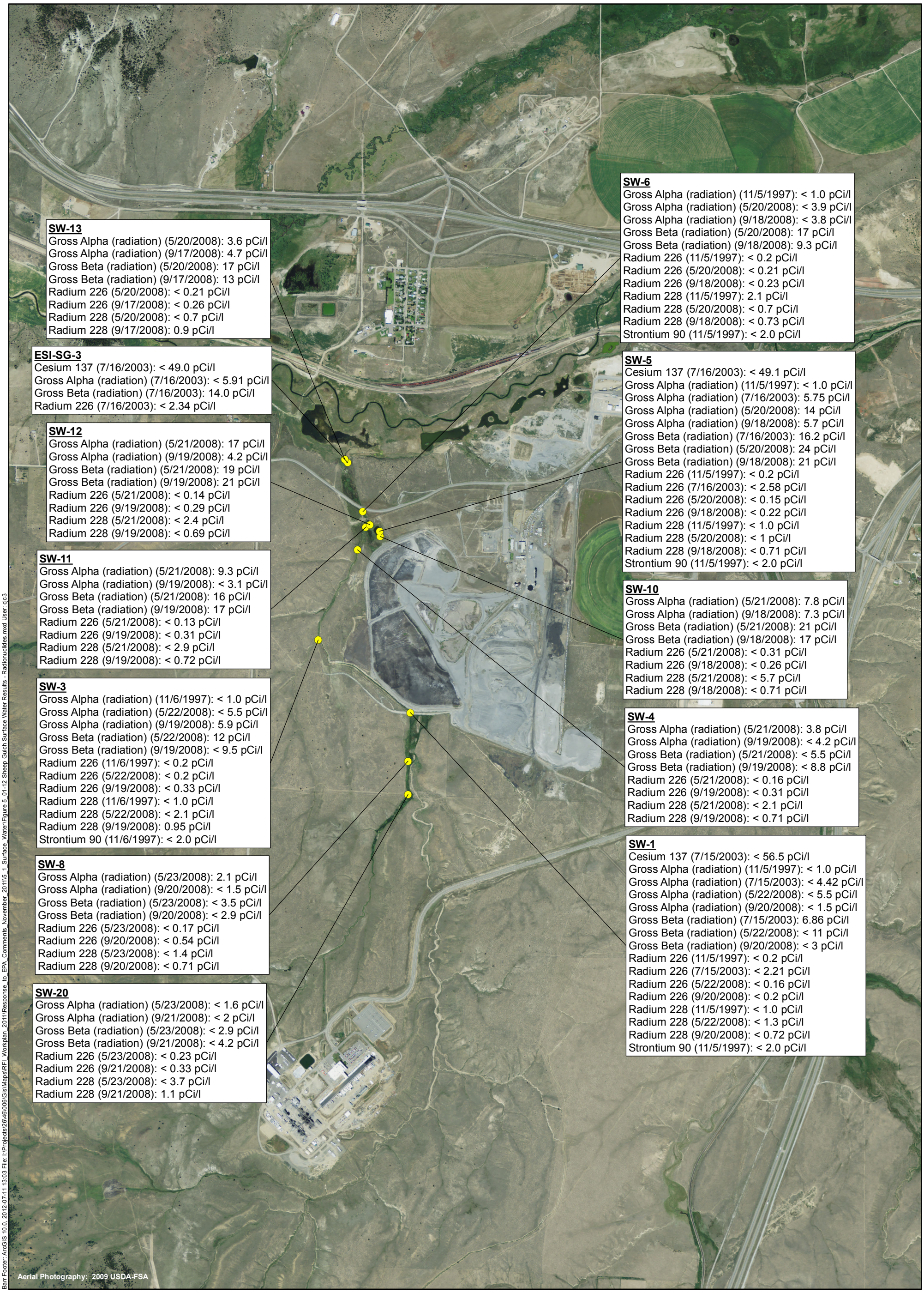
Barr Footer: ArcGIS 10.0, 2012-07-11 13:02 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-11 Sheep Gulch Surface Water Results - Metals F.mxd User: cjc3

Sample Location

Feet
1,500 0 1,500

Figure 5.1-11

SHEEP GULCH SURFACE WATER RESULTS MAP - METALS F
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-07-11 13:03 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-12 Sheep Gulch Surface Water Results - Radionuclides.mxd User: cjc3

● Sample Location

Feet
1,500 0 1,500

Figure 5.1-12

SHEEP GULCH SURFACE WATER RESULTS MAP - RADIONUCLIDES
Rhodia Silver Bow Plant
Montana

SW-14
Alkalinity, bicarbonate as CaCO3 (5/19/2008): 92 mg/l
Alkalinity, bicarbonate as CaCO3 (9/17/2008): 100 mg/l
Alkalinity, carbonate as CaCO3 (5/19/2008): < 2 mg/l
Alkalinity, carbonate as CaCO3 (9/17/2008): < 2 mg/l
Chloride (5/19/2008): 21.2 mg/l
Chloride (9/17/2008): 30.6 mg/l

SW-15
Alkalinity, bicarbonate as CaCO3 (5/19/2008): 92 mg/l
Alkalinity, bicarbonate as CaCO3 (9/16/2008): 111 mg/l
Alkalinity, carbonate as CaCO3 (5/19/2008): < 2 mg/l
Alkalinity, carbonate as CaCO3 (9/16/2008): < 2 mg/l
Chloride (5/19/2008): 27.7 mg/l
Chloride (9/16/2008): 33.8 mg/l

SW-16
Alkalinity, bicarbonate as CaCO3 (5/19/2008): 91 mg/l
Alkalinity, bicarbonate as CaCO3 (9/16/2008): 100 mg/l
Alkalinity, carbonate as CaCO3 (5/19/2008): < 2 mg/l
Alkalinity, carbonate as CaCO3 (9/16/2008): < 2 mg/l
Chloride (5/19/2008): 21.5 mg/l
Chloride (9/16/2008): 26.0 mg/l

SW-17
Alkalinity, bicarbonate as CaCO3 (5/19/2008): 14 mg/l
Alkalinity, bicarbonate as CaCO3 (9/17/2008): 105 mg/l
Alkalinity, carbonate as CaCO3 (5/19/2008): 68 mg/l
Alkalinity, carbonate as CaCO3 (9/17/2008): < 2 mg/l
Chloride (5/19/2008): 124 mg/l
Chloride (9/17/2008): 90 mg/l

Aerial Photography: 2009 USDA-FSA

Sample Location

Feet
1,500 0 1,500

Figure 5.1-13

SILVER BOW CREEK SURFACE WATER RESULTS MAP - GENERAL PARAMETERS
Rhodia Silver Bow Plant
Montana

SW-14
Nitrate + Nitrite (5/19/2008): 1.91 mg/l
Nitrate + Nitrite (9/17/2008): 2.80 mg/l
Nitrogen, ammonia (NH3) as N (5/19/2008): 0.53 mg/l
Nitrogen, ammonia (NH3) as N (9/17/2008): 0.34 mg/l

SW-15
Nitrate + Nitrite (5/19/2008): 1.44 mg/l
Nitrate + Nitrite (9/16/2008): 2.62 mg/l
Nitrogen, ammonia (NH3) as N (5/19/2008): 0.18 mg/l
Nitrogen, ammonia (NH3) as N (9/16/2008): 0.32 mg/l

SW-16
Nitrate + Nitrite (5/19/2008): 1.84 mg/l
Nitrate + Nitrite (9/16/2008): 3.23 mg/l
Nitrogen, ammonia (NH3) as N (5/19/2008): 0.43 mg/l
Nitrogen, ammonia (NH3) as N (9/16/2008): 0.28 mg/l

SW-17
Nitrate + Nitrite (5/19/2008): < 0.05 mg/l
Nitrate + Nitrite (9/17/2008): < 0.05 mg/l
Nitrogen, ammonia (NH3) as N (5/19/2008): < 0.05 mg/l
Nitrogen, ammonia (NH3) as N (9/17/2008): < 0.05 mg/l

Aerial Photography: 2009 USDA-FSA

Barr Footer: ArcGIS 10.0, 2012-07-11 13:05 File: I:\Projects\2646\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_201115_1_Surface_Water\Figure 5_01-14 Silver Bow Creek Surface Water Results - General Parameters.mxd User: cjc3

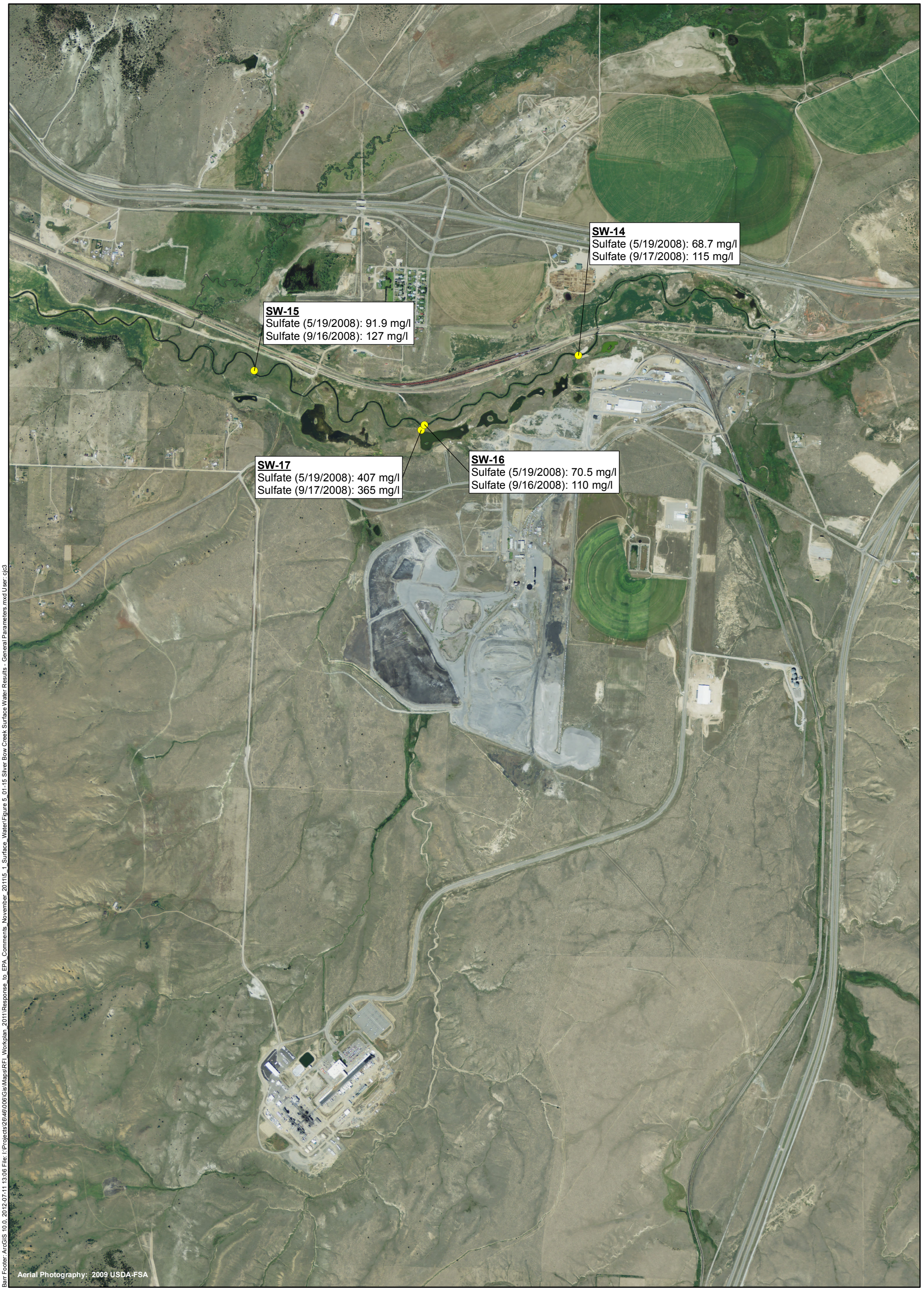
● Sample Location

N

Feet
1,500 0 1,500

Figure 5.1-14

SILVER BOW CREEK SURFACE WATER RESULTS MAP - GENERAL PARAMETERS
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-07-11 13:06 File: I:\Projects\2646\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_201115_1_Surface_Water\Figure 5_01-15 Silver Bow Creek Surface Water Results - General Parameters.mxd User: cjc3

● Sample Location

Feet
1,500 0 1,500

Figure 5.1-15

SILVER BOW CREEK SURFACE WATER RESULTS MAP - GENERAL PARAMETERS
Rhodia Silver Bow Plant
Montana

ESI-SBC-1
Fluoride (7/15/2003): 0.74 mg/l
Phosphate as P (7/15/2003): 1.0 mg/l
Phosphorus, elemental (white) (7/15/2003): < 0.0001 mg/l
Phosphorus, total (7/15/2003): 0.43 mg/l

SW-15
Fluoride (5/19/2008): 0.4 mg/l
Fluoride (9/16/2008): 0.5 mg/l
Phosphorus, elemental (white) (5/19/2008): < 0.0000234 mg/l
Phosphorus, elemental (white) (9/16/2008): < 0.0000234 mg/l
Phosphorus, total (5/19/2008): 0.36 mg/l
Phosphorus, total (9/16/2008): 0.44 mg/l

ESI-SBC-6
Fluoride (7/22/2003): 1.0 mg/l
Phosphate as P (7/22/2003): 1.0 mg/l
Phosphorus, elemental (white) (7/18/2003): < 0.0001 mg/l
Phosphorus, total (7/18/2003): 0.58 mg/l

ESI-SBC-5
Fluoride (7/22/2003): 1.1 mg/l
Phosphate as P (7/22/2003): < 0.85 mg/l
Phosphorus, elemental (white) (7/22/2003): < 0.0001 mg/l
Phosphorus, total (7/22/2003): 0.34 mg/l

ESI-SBC-4
Fluoride (7/22/2003): 1.0 mg/l
Phosphate as P (7/22/2003): < 0.7 mg/l
Phosphorus, elemental (white) (7/18/2003): < 0.0001 mg/l
Phosphorus, total (7/18/2003): 0.46 mg/l

SW-17
Fluoride (5/19/2008): 0.6 mg/l
Fluoride (9/17/2008): 0.6 mg/l
Phosphorus, elemental (white) (5/19/2008): < 0.0000234 mg/l
Phosphorus, elemental (white) (9/17/2008): < 0.0000234 mg/l
Phosphorus, total (5/19/2008): 0.19 mg/l
Phosphorus, total (9/17/2008): 0.18 mg/l

SW-14
Fluoride (5/19/2008): 0.4 mg/l
Fluoride (9/17/2008): 0.5 mg/l
Phosphorus, elemental (white) (5/19/2008): < 0.0000234 mg/l
Phosphorus, elemental (white) (9/17/2008): < 0.0000234 mg/l
Phosphorus, total (5/19/2008): 0.53 mg/l
Phosphorus, total (9/17/2008): 0.45 mg/l

ESI-SBC-2
Fluoride (7/23/2003): 1.0 mg/l
Phosphate as P (7/23/2003): < 0.76 mg/l
Phosphorus, elemental (white) (7/18/2003): < 0.0001 mg/l
Phosphorus, total (7/18/2003): 0.61 mg/l

ESI-SBC-3
Fluoride (7/22/2003): 1.0 mg/l
Phosphate as P (7/22/2003): < 0.69 mg/l
Phosphorus, elemental (white) (7/18/2003): < 0.0001 mg/l
Phosphorus, total (7/18/2003): 0.51 mg/l

SW-16
Fluoride (5/19/2008): 0.4 mg/l
Fluoride (9/16/2008): 0.5 mg/l
Phosphorus, elemental (white) (5/19/2008): < 0.0000234 mg/l
Phosphorus, elemental (white) (9/16/2008): < 0.0000234 mg/l
Phosphorus, total (5/19/2008): 0.47 mg/l
Phosphorus, total (9/16/2008): 0.51 mg/l

Aerial Photography: 2009 USDA-FSA

Barr Footer: ArcGIS 10.0, 2012-07-11 13:07 File: I:\Projects\2646\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-16 Silver Bow Creek Surface Water Results - Site Specific Parameters.mxd User: cjc3

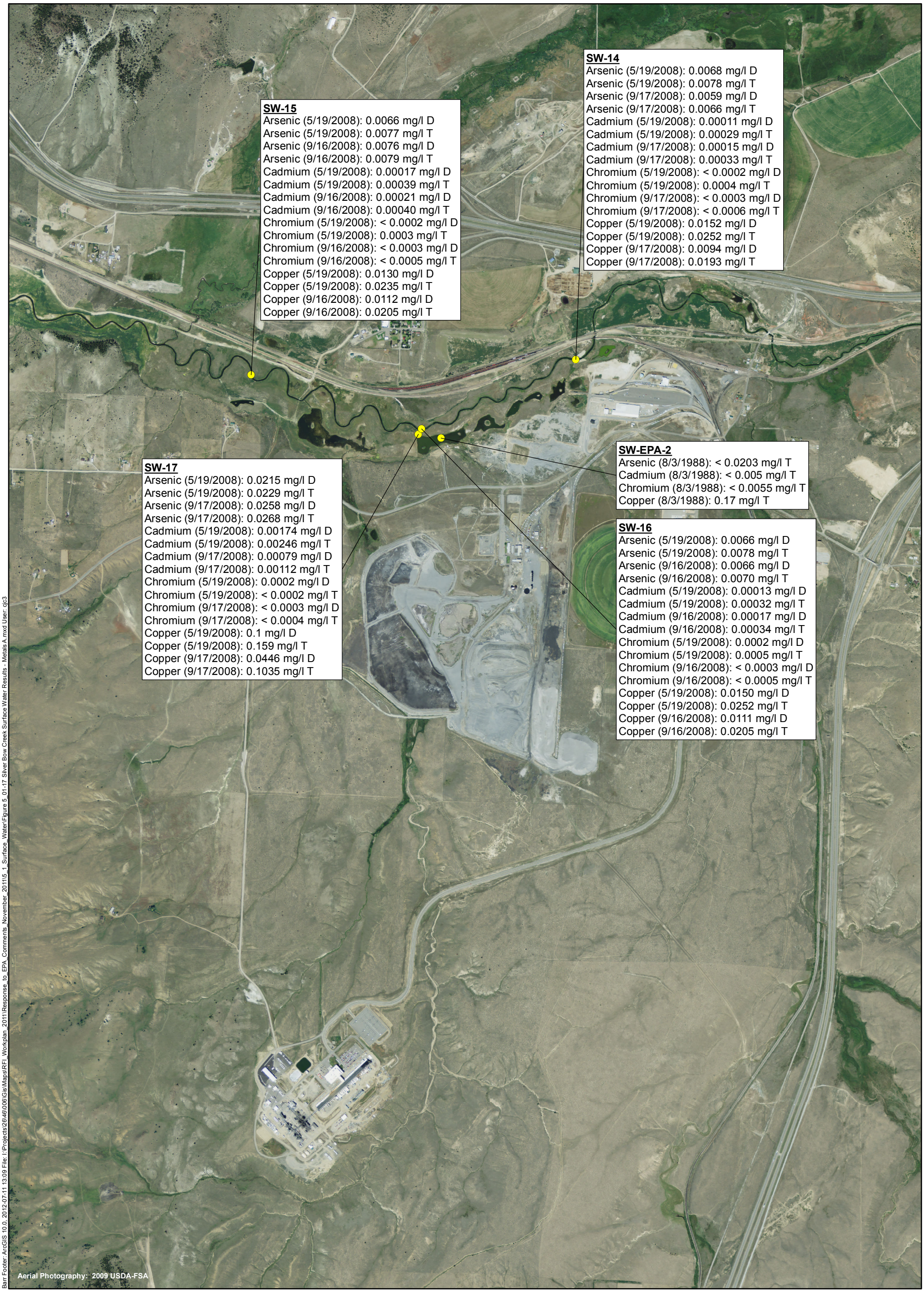
● Sample Location

N

Feet
1,500 0 1,500

Figure 5.1-16

SILVER BOW CREEK SURFACE WATER RESULTS MAP - SITE-SPECIFIC PARAMETERS
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-07-11 13:09 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-17 Silver Bow Creek Surface Water Results - Metals A.mxd User: gjc3

Sample Location

Feet
1,500 0 1,500

Figure 5.1-17

SILVER BOW CREEK SURFACE WATER RESULTS MAP - METALS A
Rhodia Silver Bow Plant
Montana

SW-15
Iron (5/19/2008): 0.077 mg/l D
Iron (5/19/2008): 0.5 mg/l T
Iron (9/16/2008): < 0.02 mg/l D
Iron (9/16/2008): 0.24 mg/l T
Lead (5/19/2008): 0.00017 mg/l D
Lead (5/19/2008): 0.00145 mg/l T
Lead (9/16/2008): 0.00013 mg/l D
Lead (9/16/2008): 0.00150 mg/l T
Manganese (5/19/2008): 0.233 mg/l D
Manganese (5/19/2008): 0.299 mg/l T
Manganese (9/16/2008): 0.12390 mg/l D
Manganese (9/16/2008): 0.24820 mg/l T
Nickel (5/19/2008): 0.0011 mg/l D
Nickel (5/19/2008): 0.0011 mg/l T
Nickel (9/16/2008): 0.0027 mg/l D
Nickel (9/16/2008): 0.0024 mg/l T

SW-14
Iron (5/19/2008): 0.134 mg/l D
Iron (5/19/2008): 0.609 mg/l T
Iron (9/17/2008): 0.02 mg/l D
Iron (9/17/2008): 0.330 mg/l T
Lead (5/19/2008): 0.00036 mg/l D
Lead (5/19/2008): 0.00224 mg/l T
Lead (9/17/2008): 0.00014 mg/l D
Lead (9/17/2008): 0.00222 mg/l T
Manganese (5/19/2008): 0.135 mg/l D
Manganese (5/19/2008): 0.209 mg/l T
Manganese (9/17/2008): 0.10290 mg/l D
Manganese (9/17/2008): 0.27160 mg/l T
Nickel (5/19/2008): 0.0010 mg/l D
Nickel (5/19/2008): 0.0011 mg/l T
Nickel (9/17/2008): 0.0024 mg/l D
Nickel (9/17/2008): 0.0022 mg/l T

SW-17
Iron (5/19/2008): 0.026 mg/l D
Iron (5/19/2008): 0.053 mg/l T
Iron (9/17/2008): < 0.02 mg/l D
Iron (9/17/2008): 0.06 mg/l T
Lead (5/19/2008): 0.00050 mg/l D
Lead (5/19/2008): 0.00101 mg/l T
Lead (9/17/2008): 0.00010 mg/l D
Lead (9/17/2008): 0.00056 mg/l T
Manganese (5/19/2008): 1.41 mg/l D
Manganese (5/19/2008): 1.53 mg/l T
Manganese (9/17/2008): 0.46840 mg/l D
Manganese (9/17/2008): 0.54810 mg/l T
Nickel (5/19/2008): 0.0043 mg/l D
Nickel (5/19/2008): 0.0042 mg/l T
Nickel (9/17/2008): 0.0074 mg/l D
Nickel (9/17/2008): 0.0067 mg/l T

SW-EPA-2
Iron (8/3/1988): 0.819 mg/l T
Lead (8/3/1988): < 0.0209 mg/l T
Manganese (8/3/1988): 0.543 mg/l T
Nickel (8/3/1988): < 0.009 mg/l T

SW-16
Iron (5/19/2008): 0.12 mg/l D
Iron (5/19/2008): 0.637 mg/l T
Iron (9/16/2008): 0.02 mg/l D
Iron (9/16/2008): 0.340 mg/l T
Lead (5/19/2008): 0.00037 mg/l D
Lead (5/19/2008): 0.00247 mg/l T
Lead (9/16/2008): 0.00017 mg/l D
Lead (9/16/2008): 0.00211 mg/l T
Manganese (5/19/2008): 0.175 mg/l D
Manganese (5/19/2008): 0.262 mg/l T
Manganese (9/16/2008): 0.11790 mg/l D
Manganese (9/16/2008): 0.28280 mg/l T
Nickel (5/19/2008): 0.0010 mg/l D
Nickel (5/19/2008): 0.0012 mg/l T
Nickel (9/16/2008): 0.0024 mg/l D
Nickel (9/16/2008): 0.0022 mg/l T

Aerial Photography: 2009 USDA-FSA

Barr Footer: ArcGIS 10.0, 2012-07-11 13:10 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_201115_1_Surface_Water\Figure 5_01-18 Silver Bow Creek Surface Water Results - Metals B.mxd User: cjc3

● Sample Location

N

Feet
1,500 0 1,500

Figure 5.1-18

SILVER BOW CREEK SURFACE WATER RESULTS MAP - METALS B
Rhodia Silver Bow Plant
Montana

SW-15
Selenium (5/19/2008): < 0.0010 mg/l D
Selenium (5/19/2008): < 0.0010 mg/l T
Selenium (9/16/2008): < 0.001 mg/l D
Selenium (9/16/2008): < 0.001 mg/l T
Silver (5/19/2008): < 0.00002 mg/l D
Silver (5/19/2008): 0.00005 mg/l T
Silver (9/16/2008): < 0.00002 mg/l D
Silver (9/16/2008): 0.00004 mg/l T
Uranium (5/19/2008): 0.0046 mg/l D
Uranium (5/19/2008): 0.0046 mg/l T
Uranium (9/16/2008): 0.00569 mg/l D
Uranium (9/16/2008): 0.00546 mg/l T
Vanadium (5/19/2008): 0.0021 mg/l D
Vanadium (5/19/2008): 0.0026 mg/l T
Vanadium (9/16/2008): 0.0025 mg/l D
Vanadium (9/16/2008): 0.0031 mg/l T
Zinc (5/19/2008): 0.0427 mg/l D
Zinc (5/19/2008): 0.0932 mg/l T
Zinc (9/16/2008): 0.0590 mg/l D
Zinc (9/16/2008): 0.1008 mg/l T

SW-14
Selenium (5/19/2008): < 0.0010 mg/l D
Selenium (5/19/2008): < 0.0010 mg/l T
Selenium (9/17/2008): < 0.001 mg/l D
Selenium (9/17/2008): < 0.001 mg/l T
Silver (5/19/2008): < 0.00002 mg/l D
Silver (5/19/2008): 0.00005 mg/l T
Silver (9/17/2008): < 0.00002 mg/l D
Silver (9/17/2008): 0.00005 mg/l T
Uranium (5/19/2008): 0.0035 mg/l D
Uranium (5/19/2008): 0.0035 mg/l T
Uranium (9/17/2008): 0.00553 mg/l D
Uranium (9/17/2008): 0.00584 mg/l T
Vanadium (5/19/2008): 0.0025 mg/l D
Vanadium (5/19/2008): 0.0030 mg/l T
Vanadium (9/17/2008): 0.0022 mg/l D
Vanadium (9/17/2008): 0.0028 mg/l T
Zinc (5/19/2008): 0.0244 mg/l D
Zinc (5/19/2008): 0.0561 mg/l T
Zinc (9/17/2008): 0.0405 mg/l D
Zinc (9/17/2008): 0.0775 mg/l T

SW-EPA-2
Selenium (8/3/1988): < 0.002 mg/l T
Silver (8/3/1988): < 0.004 mg/l T
Vanadium (8/3/1988): < 0.0063 mg/l T
Zinc (8/3/1988): 0.470 mg/l T

SW-17
Selenium (5/19/2008): 0.0019 mg/l D
Selenium (5/19/2008): 0.0022 mg/l T
Selenium (9/17/2008): 0.004 mg/l D
Selenium (9/17/2008): 0.004 mg/l T
Silver (5/19/2008): 0.00003 mg/l D
Silver (5/19/2008): 0.00007 mg/l T
Silver (9/17/2008): < 0.00002 mg/l D
Silver (9/17/2008): 0.00003 mg/l T
Uranium (5/19/2008): 0.0119 mg/l D
Uranium (5/19/2008): 0.0118 mg/l T
Uranium (9/17/2008): 0.00984 mg/l D
Uranium (9/17/2008): 0.00977 mg/l T
Vanadium (5/19/2008): 0.0043 mg/l D
Vanadium (5/19/2008): 0.0043 mg/l T
Vanadium (9/17/2008): 0.0044 mg/l D
Vanadium (9/17/2008): 0.0048 mg/l T
Zinc (5/19/2008): 0.380 mg/l D
Zinc (5/19/2008): 0.752 mg/l T
Zinc (9/17/2008): 0.1602 mg/l D
Zinc (9/17/2008): 0.4828 mg/l T

SW-16
Selenium (5/19/2008): < 0.0010 mg/l D
Selenium (5/19/2008): < 0.0010 mg/l T
Selenium (9/16/2008): < 0.001 mg/l D
Selenium (9/16/2008): < 0.001 mg/l T
Silver (5/19/2008): < 0.00002 mg/l D
Silver (5/19/2008): 0.00005 mg/l T
Silver (9/16/2008): < 0.00002 mg/l D
Silver (9/16/2008): 0.00003 mg/l T
Uranium (5/19/2008): 0.0037 mg/l D
Uranium (5/19/2008): 0.0038 mg/l T
Uranium (9/16/2008): 0.00503 mg/l D
Uranium (9/16/2008): 0.00513 mg/l T
Vanadium (5/19/2008): 0.0024 mg/l D
Vanadium (5/19/2008): 0.0030 mg/l T
Vanadium (9/16/2008): 0.0027 mg/l D
Vanadium (9/16/2008): 0.0033 mg/l T
Zinc (5/19/2008): 0.0390 mg/l D
Zinc (5/19/2008): 0.0823 mg/l T
Zinc (9/16/2008): 0.0559 mg/l D
Zinc (9/16/2008): 0.0966 mg/l T

Aerial Photography: 2009 USDA-FSA

Sample Location

Figure 5.1-19

SILVER BOW CREEK SURFACE WATER RESULTS MAP - METALS C
Rhodia Silver Bow Plant
Montana

N

Feet
1,500 0 1,500

SW-15
Antimony (5/19/2008): 0.00033 mg/l D
Antimony (5/19/2008): 0.00033 mg/l T
Antimony (9/16/2008): 0.00031 mg/l D
Antimony (9/16/2008): 0.00034 mg/l T
Barium (5/19/2008): 0.0300 mg/l D
Barium (5/19/2008): 0.0341 mg/l T
Barium (9/16/2008): 0.03881 mg/l D
Barium (9/16/2008): 0.04257 mg/l T
Beryllium (5/19/2008): < 0.00002 mg/l D
Beryllium (5/19/2008): < 0.00002 mg/l T
Beryllium (9/16/2008): < 0.00002 mg/l D
Beryllium (9/16/2008): < 0.00002 mg/l T
Cobalt (5/19/2008): 0.00029 mg/l D
Cobalt (5/19/2008): 0.00035 mg/l T
Cobalt (9/16/2008): 0.00027 mg/l D
Cobalt (9/16/2008): 0.00036 mg/l T

SW-14
Antimony (5/19/2008): 0.00036 mg/l D
Antimony (5/19/2008): 0.00036 mg/l T
Antimony (9/17/2008): 0.00032 mg/l D
Antimony (9/17/2008): 0.00034 mg/l T
Barium (5/19/2008): 0.0289 mg/l D
Barium (5/19/2008): 0.0344 mg/l T
Barium (9/17/2008): 0.03971 mg/l D
Barium (9/17/2008): 0.04565 mg/l T
Beryllium (5/19/2008): < 0.00002 mg/l D
Beryllium (5/19/2008): < 0.00002 mg/l T
Beryllium (9/17/2008): < 0.00002 mg/l D
Beryllium (9/17/2008): < 0.00002 mg/l T
Cobalt (5/19/2008): 0.00034 mg/l D
Cobalt (5/19/2008): 0.00038 mg/l T
Cobalt (9/17/2008): 0.00036 mg/l D
Cobalt (9/17/2008): 0.00042 mg/l T

SW-17
Antimony (5/19/2008): 0.00047 mg/l D
Antimony (5/19/2008): 0.00044 mg/l T
Antimony (9/17/2008): 0.00047 mg/l D
Antimony (9/17/2008): 0.00045 mg/l T
Barium (5/19/2008): 0.0508 mg/l D
Barium (5/19/2008): 0.0507 mg/l T
Barium (9/17/2008): 0.05362 mg/l D
Barium (9/17/2008): 0.05096 mg/l T
Beryllium (5/19/2008): < 0.00002 mg/l D
Beryllium (5/19/2008): < 0.00002 mg/l T
Beryllium (9/17/2008): < 0.00002 mg/l D
Beryllium (9/17/2008): < 0.00002 mg/l T
Cobalt (5/19/2008): 0.00141 mg/l D
Cobalt (5/19/2008): 0.00142 mg/l T
Cobalt (9/17/2008): 0.00137 mg/l D
Cobalt (9/17/2008): 0.00116 mg/l T

SW-EPA-2
Antimony (8/3/1988): < 0.029 mg/l T
Barium (8/3/1988): < 0.0248 mg/l T
Beryllium (8/3/1988): < 0.001 mg/l T
Cobalt (8/3/1988): < 0.0051 mg/l T

SW-16
Antimony (5/19/2008): 0.00035 mg/l D
Antimony (5/19/2008): 0.00036 mg/l T
Antimony (9/16/2008): 0.00035 mg/l D
Antimony (9/16/2008): 0.00037 mg/l T
Barium (5/19/2008): 0.0283 mg/l D
Barium (5/19/2008): 0.0342 mg/l T
Barium (9/16/2008): 0.03867 mg/l D
Barium (9/16/2008): 0.04479 mg/l T
Beryllium (5/19/2008): < 0.00002 mg/l D
Beryllium (5/19/2008): < 0.00002 mg/l T
Beryllium (9/16/2008): < 0.00002 mg/l D
Beryllium (9/16/2008): < 0.00002 mg/l T
Cobalt (5/19/2008): 0.00029 mg/l D
Cobalt (5/19/2008): 0.00043 mg/l T
Cobalt (9/16/2008): 0.00038 mg/l D
Cobalt (9/16/2008): 0.00041 mg/l T

Aerial Photography: 2009 USDA-FSA

Sample Location

Feet
1,500 0 1,500

Figure 5.1-20

SILVER BOW CREEK SURFACE WATER RESULTS MAP - METALS D
Rhodia Silver Bow Plant
Montana

SW-15
Calcium (5/19/2008): 47.9 mg/l D
Calcium (5/19/2008): 46.3 mg/l T
Calcium (9/16/2008): 58.3 mg/l D
Calcium (9/16/2008): 57.8 mg/l T
Magnesium (5/19/2008): 11.3 mg/l D
Magnesium (5/19/2008): 11 mg/l T
Magnesium (9/16/2008): 13.5 mg/l D
Magnesium (9/16/2008): 13.4 mg/l T
Potassium (5/19/2008): 4.9 mg/l D
Potassium (5/19/2008): 4.69 mg/l T
Potassium (9/16/2008): 6.2 mg/l D
Potassium (9/16/2008): 6.3 mg/l T
Sodium (5/19/2008): 28.6 mg/l D
Sodium (5/19/2008): 27.6 mg/l T
Sodium (9/16/2008): 39.3 mg/l D
Sodium (9/16/2008): 39.0 mg/l T

SW-14
Calcium (5/19/2008): 40.4 mg/l D
Calcium (5/19/2008): 39 mg/l T
Calcium (9/17/2008): 54.8 mg/l D
Calcium (9/17/2008): 54.9 mg/l T
Magnesium (5/19/2008): 9.64 mg/l D
Magnesium (5/19/2008): 9.39 mg/l T
Magnesium (9/17/2008): 12.8 mg/l D
Magnesium (9/17/2008): 12.9 mg/l T
Potassium (5/19/2008): 5.28 mg/l D
Potassium (5/19/2008): 5.06 mg/l T
Potassium (9/17/2008): 5.7 mg/l D
Potassium (9/17/2008): 5.7 mg/l T
Sodium (5/19/2008): 25 mg/l D
Sodium (5/19/2008): 24 mg/l T
Sodium (9/17/2008): 31.2 mg/l D
Sodium (9/17/2008): 30.9 mg/l T

SW-17
Calcium (5/19/2008): 163 mg/l D
Calcium (5/19/2008): 156 mg/l T
Calcium (9/17/2008): 138 mg/l D
Calcium (9/17/2008): 144 mg/l T
Magnesium (5/19/2008): 34.3 mg/l D
Magnesium (5/19/2008): 33.1 mg/l T
Magnesium (9/17/2008): 29.3 mg/l D
Magnesium (9/17/2008): 30.5 mg/l T
Potassium (5/19/2008): 16 mg/l D
Potassium (5/19/2008): 15.3 mg/l T
Potassium (9/17/2008): 13.2 mg/l D
Potassium (9/17/2008): 13.9 mg/l T
Sodium (5/19/2008): 48.4 mg/l D
Sodium (5/19/2008): 46.6 mg/l T
Sodium (9/17/2008): 41.5 mg/l D
Sodium (9/17/2008): 43.1 mg/l T

SW-EPA-2
Calcium (8/3/1988): 47.9 mg/l T
Magnesium (8/3/1988): 11.6 mg/l T
Potassium (8/3/1988): 5.38 mg/l T
Sodium (8/3/1988): 31.2 mg/l T

SW-16
Calcium (5/19/2008): 40.7 mg/l D
Calcium (5/19/2008): 40.5 mg/l T
Calcium (9/16/2008): 52.7 mg/l D
Calcium (9/16/2008): 53.5 mg/l T
Magnesium (5/19/2008): 9.72 mg/l D
Magnesium (5/19/2008): 9.74 mg/l T
Magnesium (9/16/2008): 12.3 mg/l D
Magnesium (9/16/2008): 12.5 mg/l T
Potassium (5/19/2008): 5.24 mg/l D
Potassium (5/19/2008): 5.16 mg/l T
Potassium (9/16/2008): 6.1 mg/l D
Potassium (9/16/2008): 6.2 mg/l T
Sodium (5/19/2008): 24.6 mg/l D
Sodium (5/19/2008): 23.8 mg/l T
Sodium (9/16/2008): 31.5 mg/l D
Sodium (9/16/2008): 31.6 mg/l T

Aerial Photography: 2009 USDA-FSA

Barr Footer: ArcGIS 10.0, 2012-07-11 13:16 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-21 Silver Bow Creek Surface Water Results - Metals E.mxd User: cjc3

Sample Location

Feet
1,500 0 1,500

Figure 5.1-21

SILVER BOW CREEK SURFACE WATER RESULTS MAP - METALS E
Rhodia Silver Bow Plant
Montana

SW-14
Mercury (5/19/2008): < 0.0002 mg/l D
Mercury (5/19/2008): < 0.0002 mg/l T
Mercury (9/17/2008): < 0.0002 mg/l D
Mercury (9/17/2008): < 0.0002 mg/l T
Thallium (5/19/2008): < 0.00002 mg/l D
Thallium (5/19/2008): < 0.00002 mg/l T
Thallium (9/17/2008): < 0.00002 mg/l D
Thallium (9/17/2008): < 0.00002 mg/l T

SW-15
Mercury (5/19/2008): < 0.0002 mg/l D
Mercury (5/19/2008): < 0.0002 mg/l T
Mercury (9/16/2008): < 0.0002 mg/l D
Mercury (9/16/2008): < 0.0002 mg/l T
Thallium (5/19/2008): < 0.00002 mg/l D
Thallium (5/19/2008): < 0.00002 mg/l T
Thallium (9/16/2008): < 0.00002 mg/l D
Thallium (9/16/2008): < 0.00002 mg/l T

SW-EPA-2
Aluminum (8/3/1988): 0.229 mg/l T
Mercury (8/3/1988): 0.0002 mg/l T
Thallium (8/3/1988): < 0.002 mg/l T

SW-16
Mercury (5/19/2008): < 0.0002 mg/l D
Mercury (5/19/2008): < 0.0002 mg/l T
Mercury (9/16/2008): < 0.0002 mg/l D
Mercury (9/16/2008): < 0.0002 mg/l T
Thallium (5/19/2008): < 0.00002 mg/l D
Thallium (5/19/2008): < 0.00002 mg/l T
Thallium (9/16/2008): < 0.00002 mg/l D
Thallium (9/16/2008): < 0.00002 mg/l T

SW-17
Mercury (5/19/2008): < 0.0002 mg/l D
Mercury (5/19/2008): < 0.0002 mg/l T
Mercury (9/17/2008): < 0.0002 mg/l D
Mercury (9/17/2008): < 0.0002 mg/l T
Thallium (5/19/2008): 0.00003 mg/l D
Thallium (5/19/2008): 0.00003 mg/l T
Thallium (9/17/2008): < 0.00002 mg/l D
Thallium (9/17/2008): < 0.00002 mg/l T

Aerial Photography: 2009 USDA-FSA

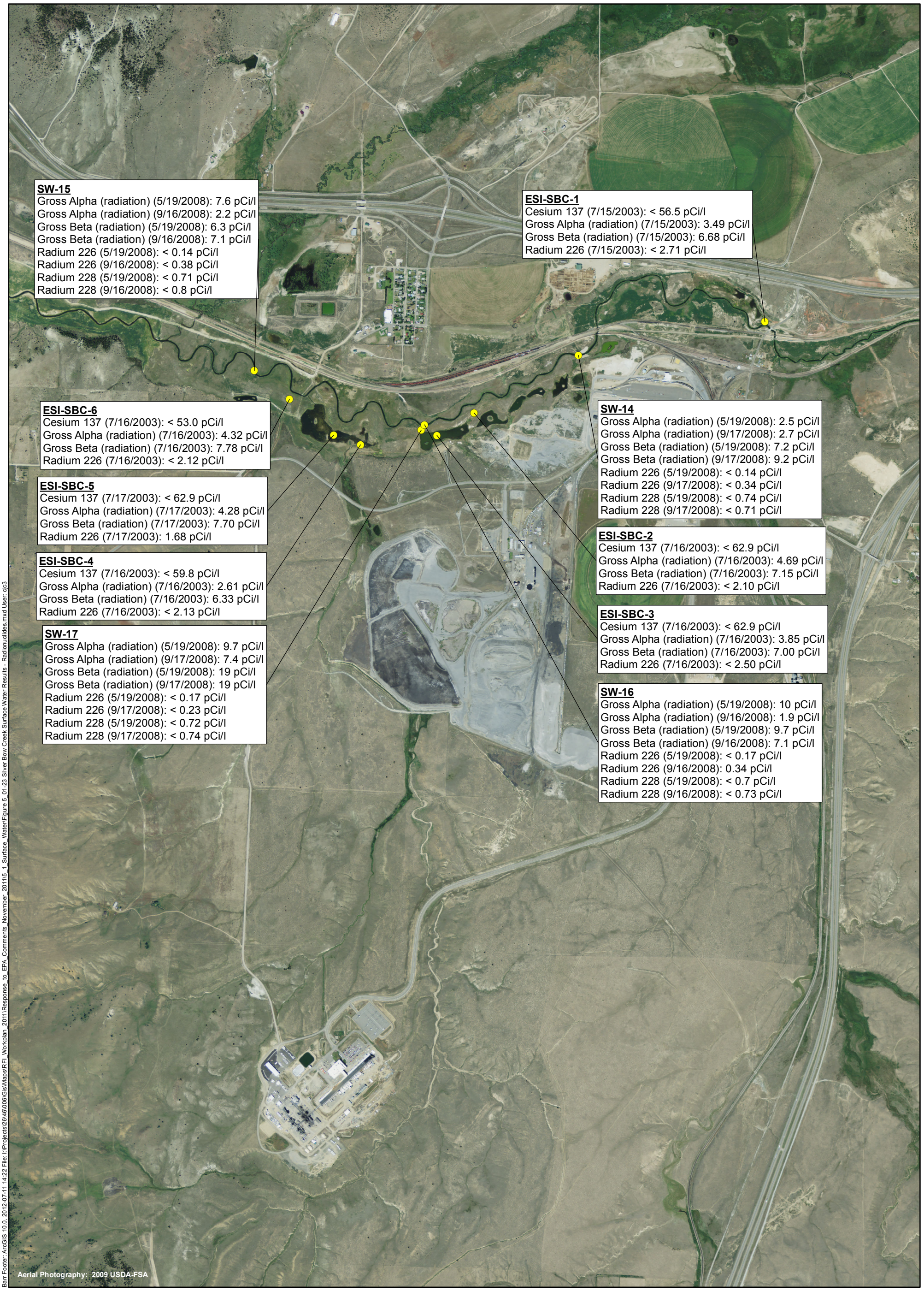
Barr Footer: ArcGIS 10.0, 2012-07-11 13:17 File: I:\Projects\2646\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-22 Silver Bow Creek Surface Water Results - Metals F.mxd User: cjc3

● Sample Location

Feet
1,500 0 1,500

Figure 5.1-22

SILVER BOW CREEK SURFACE WATER RESULTS MAP - METALS F
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-07-11 14:22 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-23 Silver Bow Creek Surface Water Results - Radionuclides.mxd User: cjc3

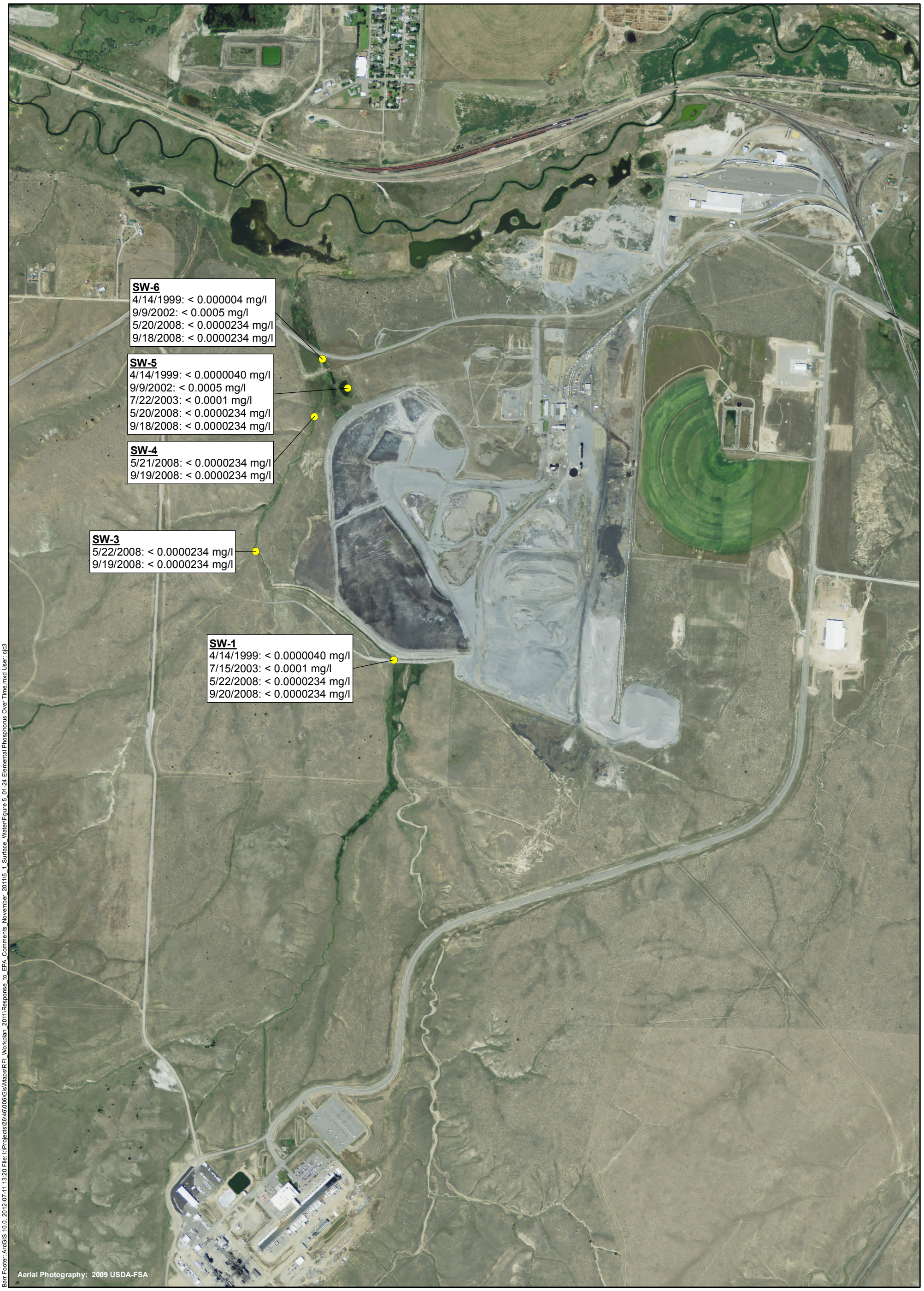
Sample Location

Figure 5.1-23

SILVER BOW CREEK SURFACE WATER RESULTS MAP - RADIONUCLIDES
Rhodia Silver Bow Plant
Montana

N

Feet
1,500 0 1,500



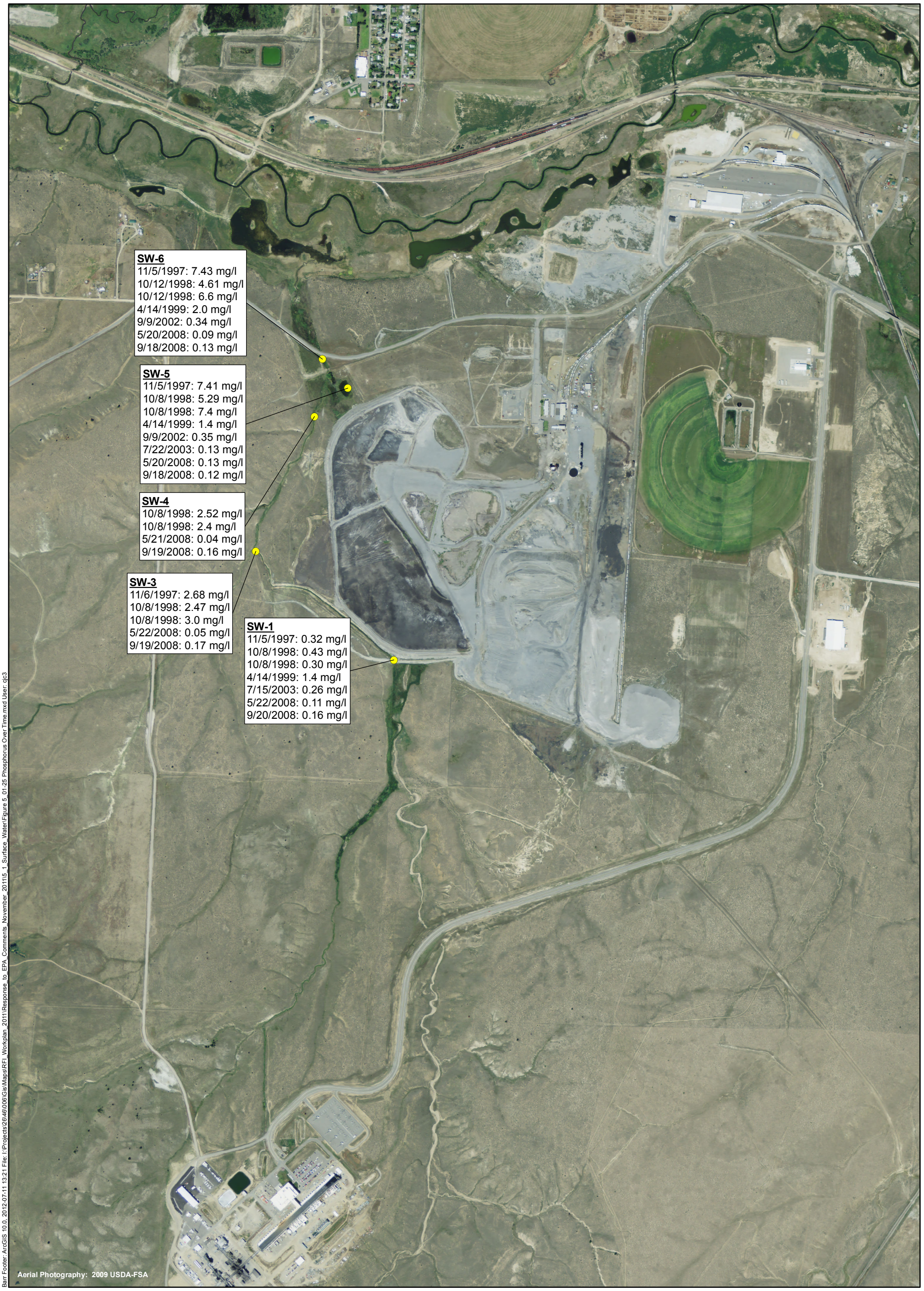
Barr Footer: ArcGIS 10.0, 2012-07-11 13:20 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-24 Elemental Phosphorus Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-24

ANALYTICAL SURFACE WATER DATA OVER TIME: ELEMENTAL PHOSPHORUS
Rhodia Silver Bow Plant
Montana



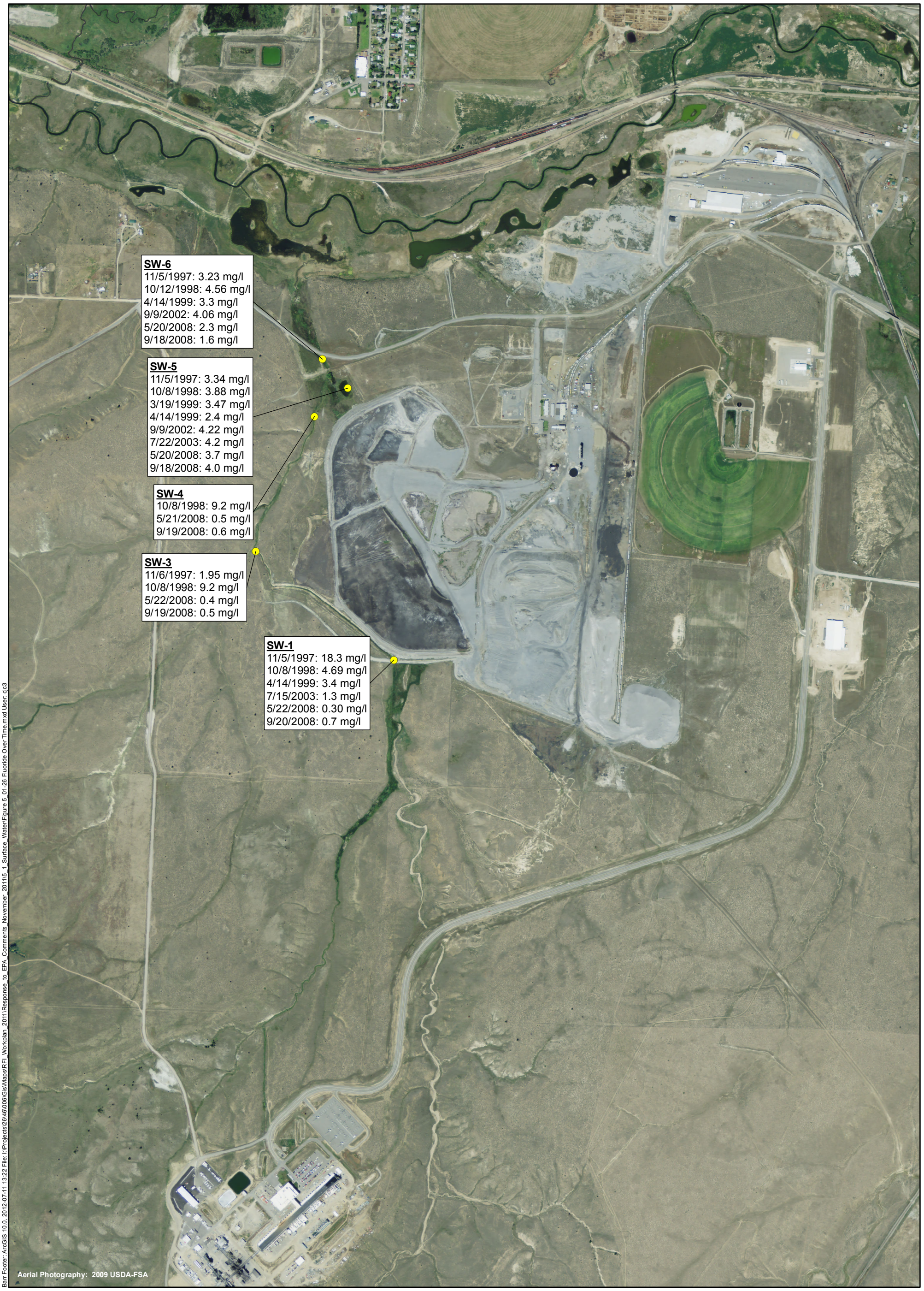
Barr Footer: ArcGIS 10.0, 2012-07-11 13:21 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-25 Phosphorus Over Time.mxd User: cjc3

Sample Location

Feet
1,000 0 1,000

Figure 5.1-25

ANALYTICAL SURFACE WATER DATA OVER TIME: PHOSPHORUS, TOTAL
Rhodia Silver Bow Plant
Montana



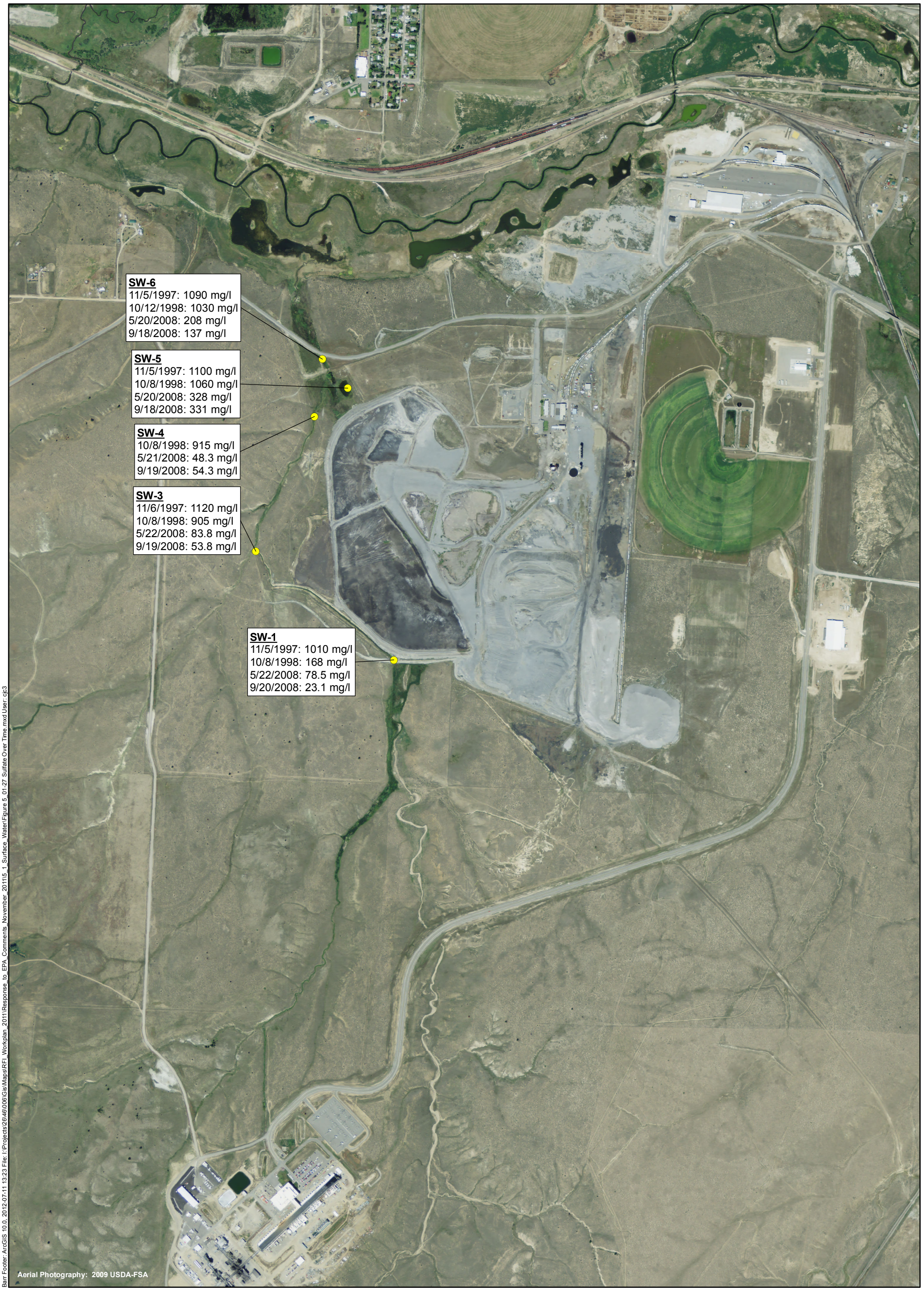
Barr Footer: ArcGIS 10.0, 2012-07-11 13:22 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-26 Fluoride Over Time.mxd User: djc3

Sample Location

Feet
1,000 0 1,000

Figure 5.1-26

ANALYTICAL SURFACE WATER DATA OVER TIME: FLUORIDE
Rhodia Silver Bow Plant
Montana



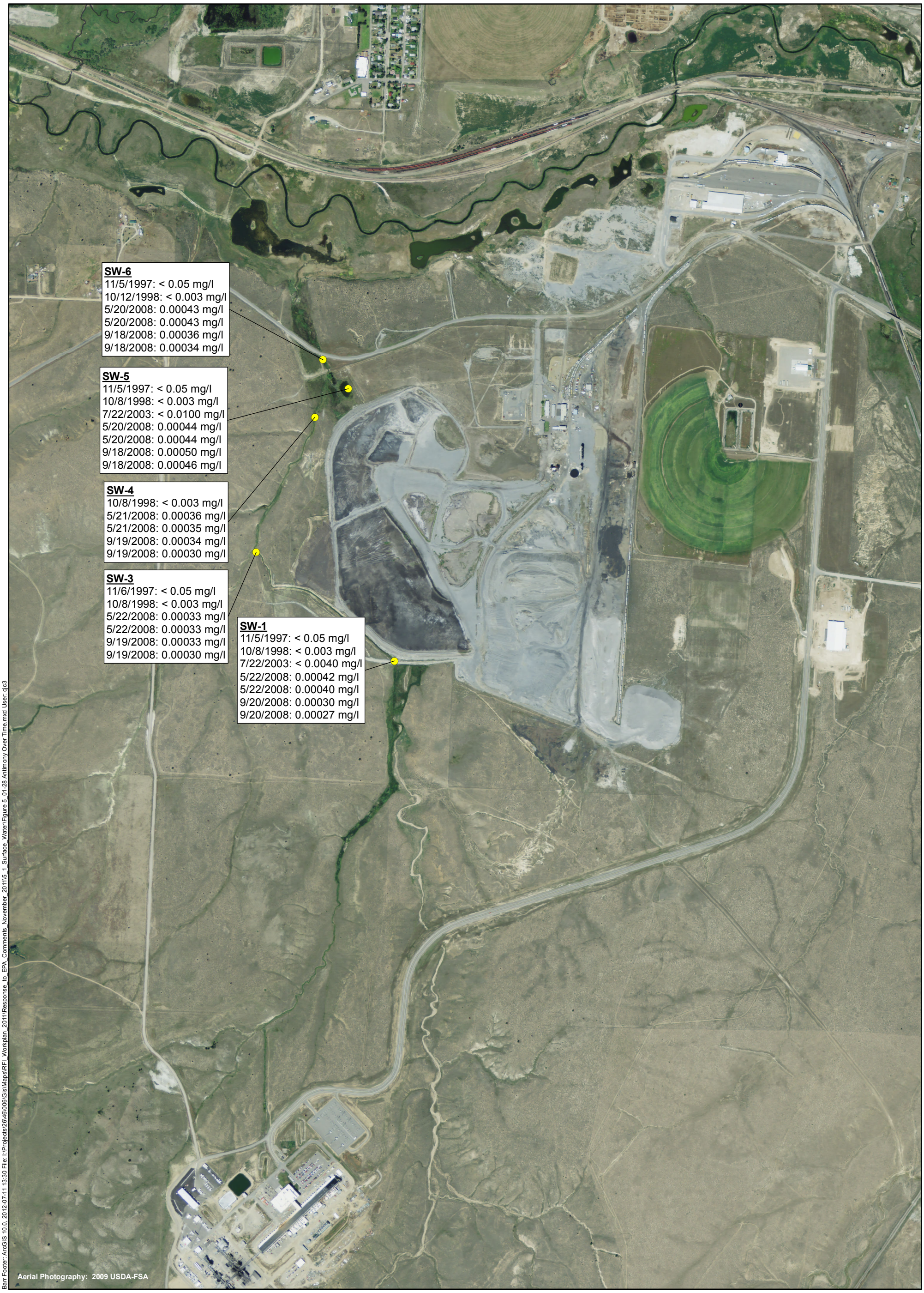
Barr Footer: ArcGIS 10.0, 2012-07-11 13:23 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-27 Sulfate Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-27

ANALYTICAL SURFACE WATER DATA OVER TIME: SULFATE
Rhodia Silver Bow Plant
Montana



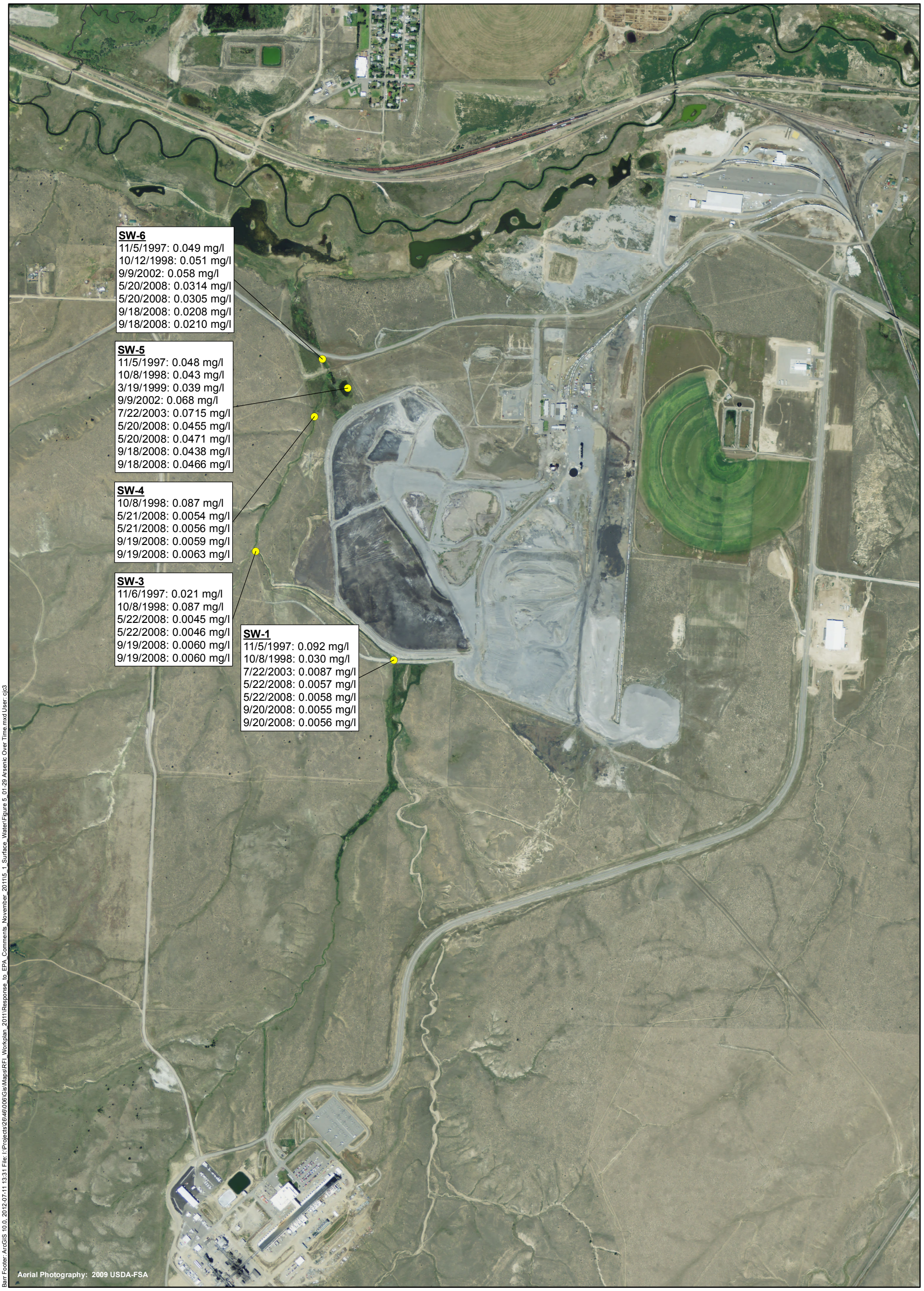
Barr Footer: ArcGIS 10.0, 2012-07-11 13:30 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-28 Antimony Over Time.mxd User: gjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-28

ANALYTICAL SURFACE WATER DATA OVER TIME: ANTIMONY
Rhodia Silver Bow Plant
Montana



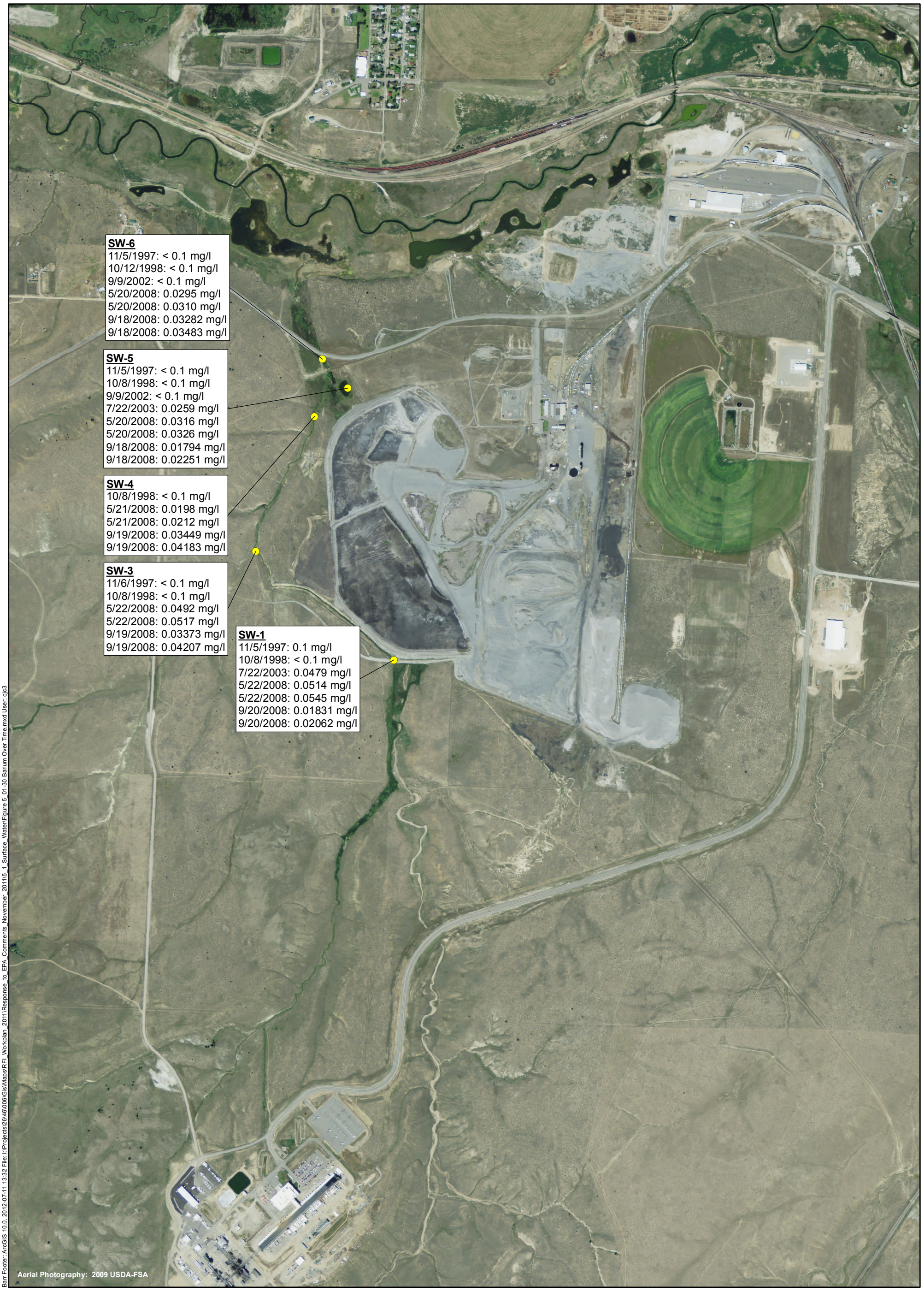
Barr Footer: ArcGIS 10.0, 2012-07-11 13:31 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_201115_1_Surface_Water\Figure 5_01-29 Arsenic Over Time.mxd User: cjc3

Sample Location

Feet
1,000 0 1,000

Figure 5.1-29

ANALYTICAL SURFACE WATER DATA OVER TIME: ARSENIC
Rhodia Silver Bow Plant
Montana



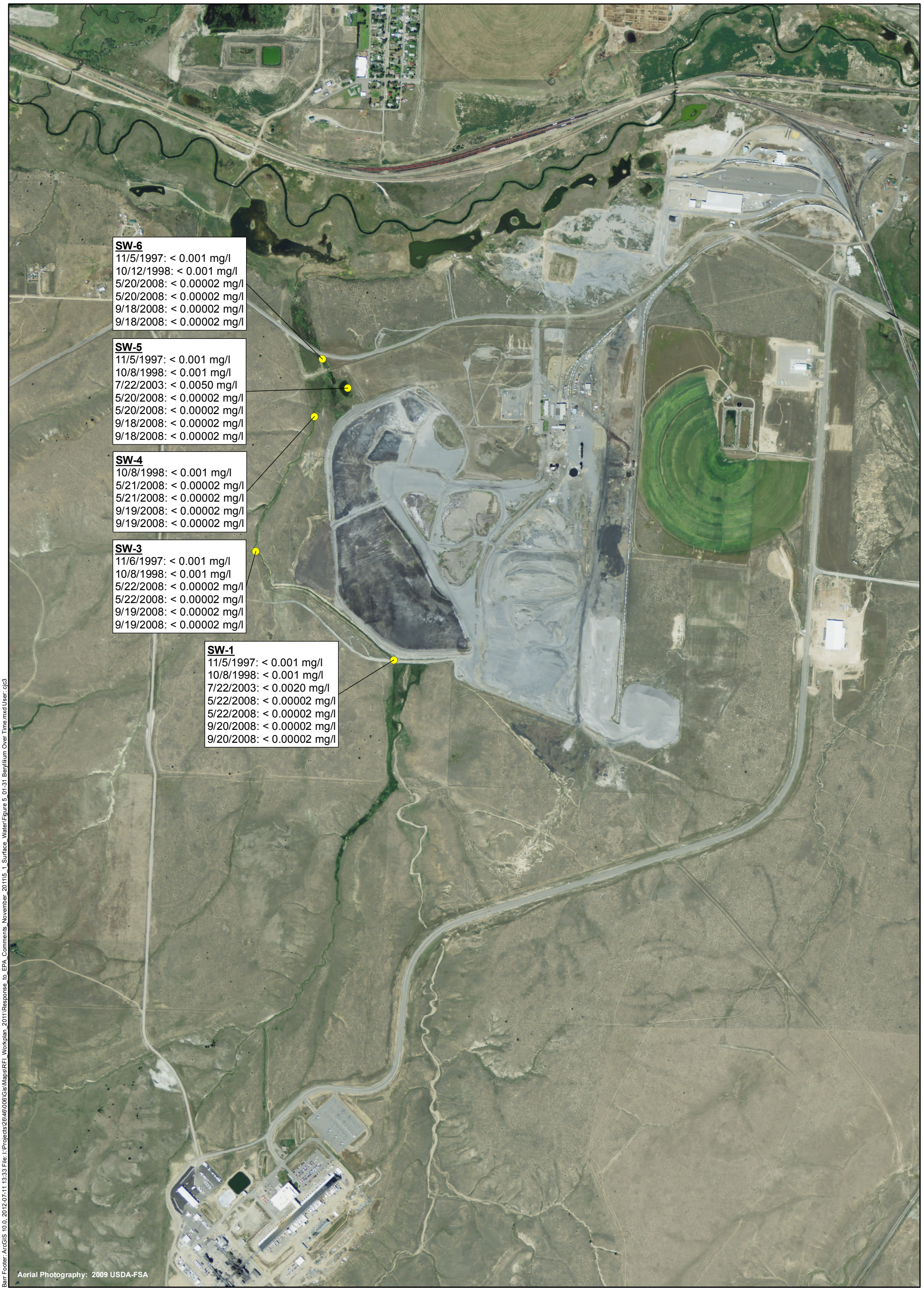
Barr Footer: ArcGIS 10.0, 2012-07-11 13:32 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-30 Barium Over Time.mxd User: cjc3

Sample Location

Feet
1,000 0 1,000

Figure 5.1-30

ANALYTICAL SURFACE WATER DATA OVER TIME: BARIUM
Rhodia Silver Bow Plant
Montana



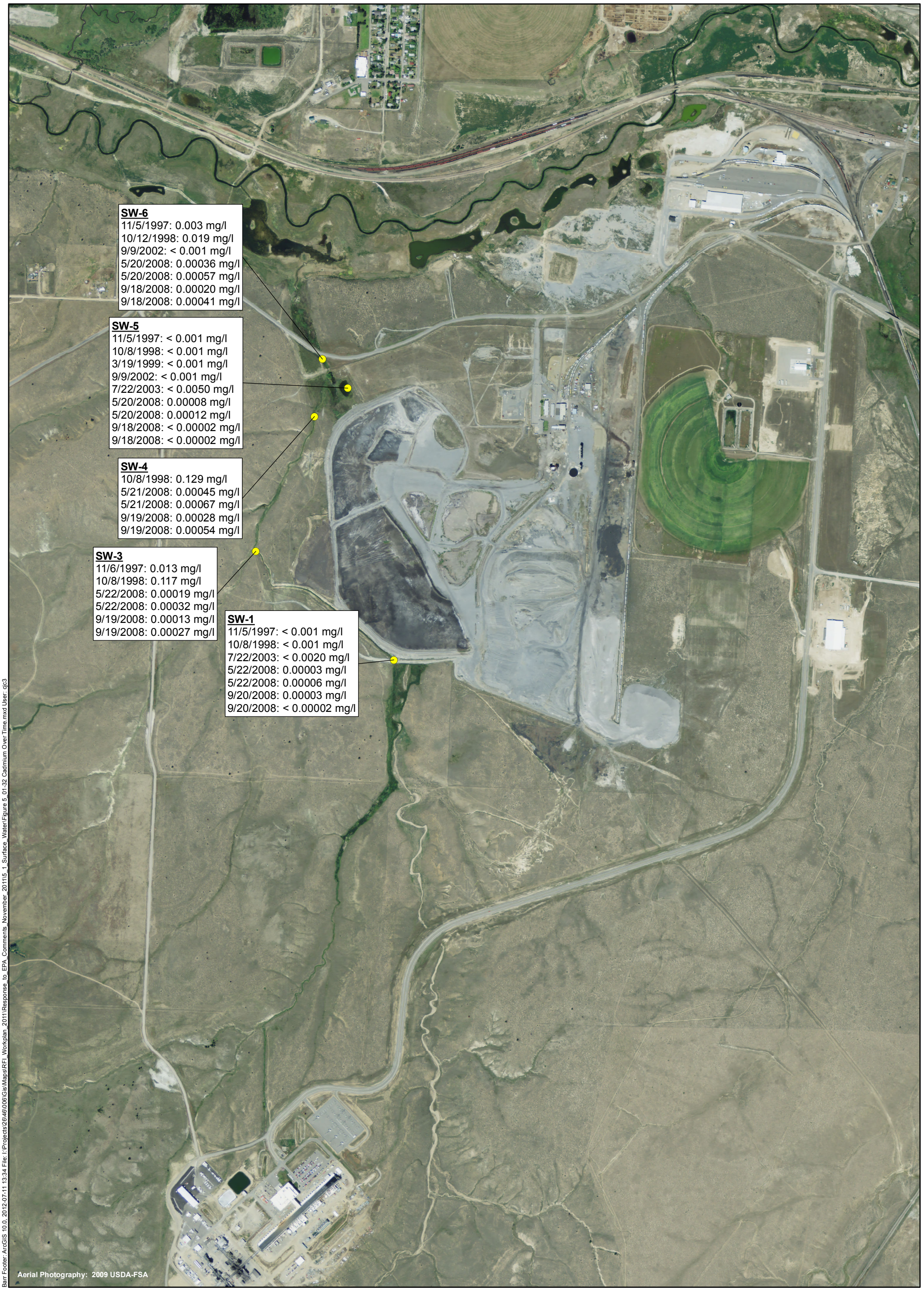
Barr Footer: ArcGIS 10.0, 2012-07-11 13:33 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_20115_1_Surface_Water\Figure 5_01-31 Beryllium Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-31

ANALYTICAL SURFACE WATER DATA OVER TIME: BERYLLIUM
Rhodia Silver Bow Plant
Montana



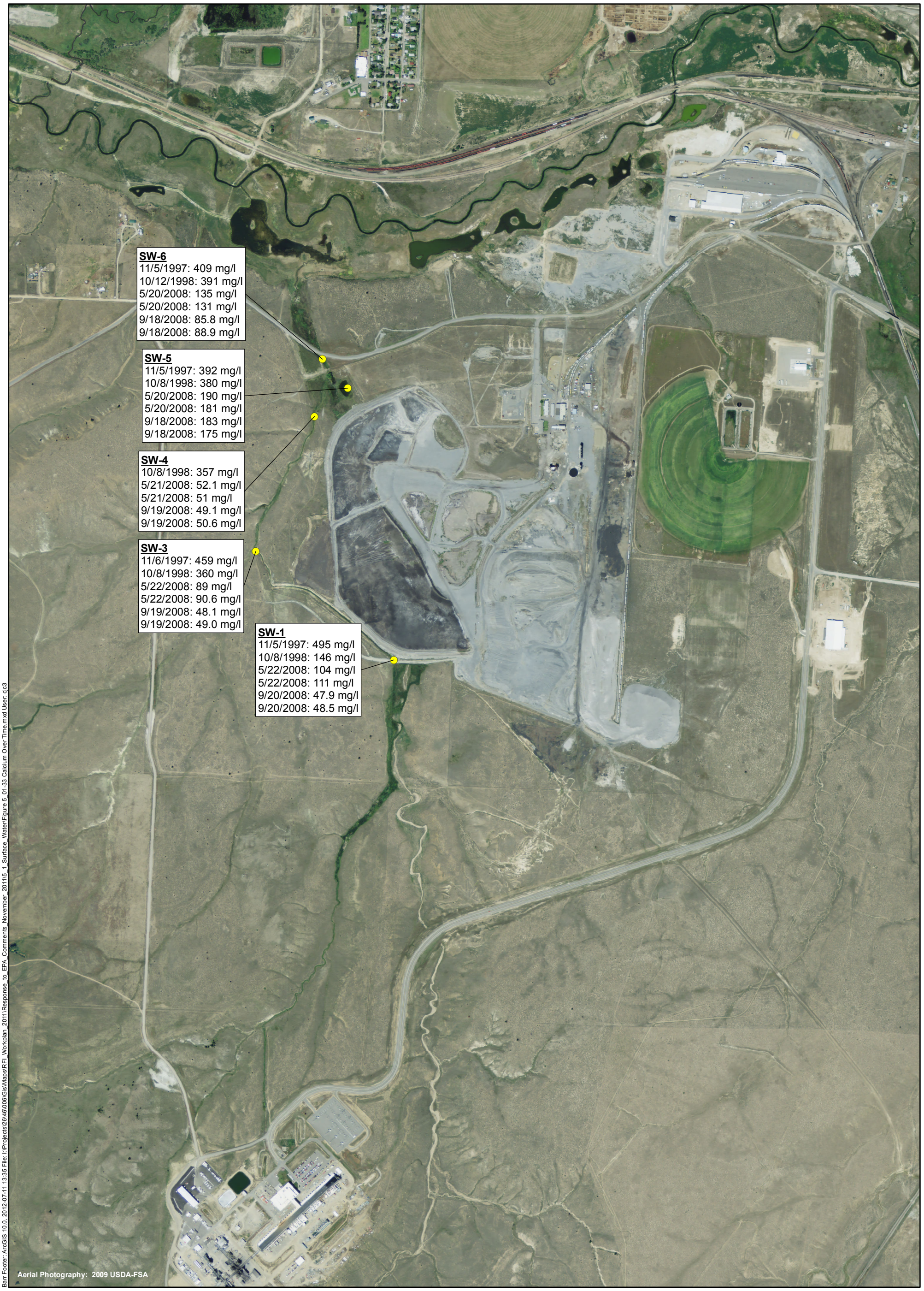
Barr Footer: ArcGIS 10.0, 2012-07-11 13:34 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-32 Cadmium Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-32

ANALYTICAL SURFACE WATER DATA OVER TIME: CADMIUM
Rhodia Silver Bow Plant
Montana



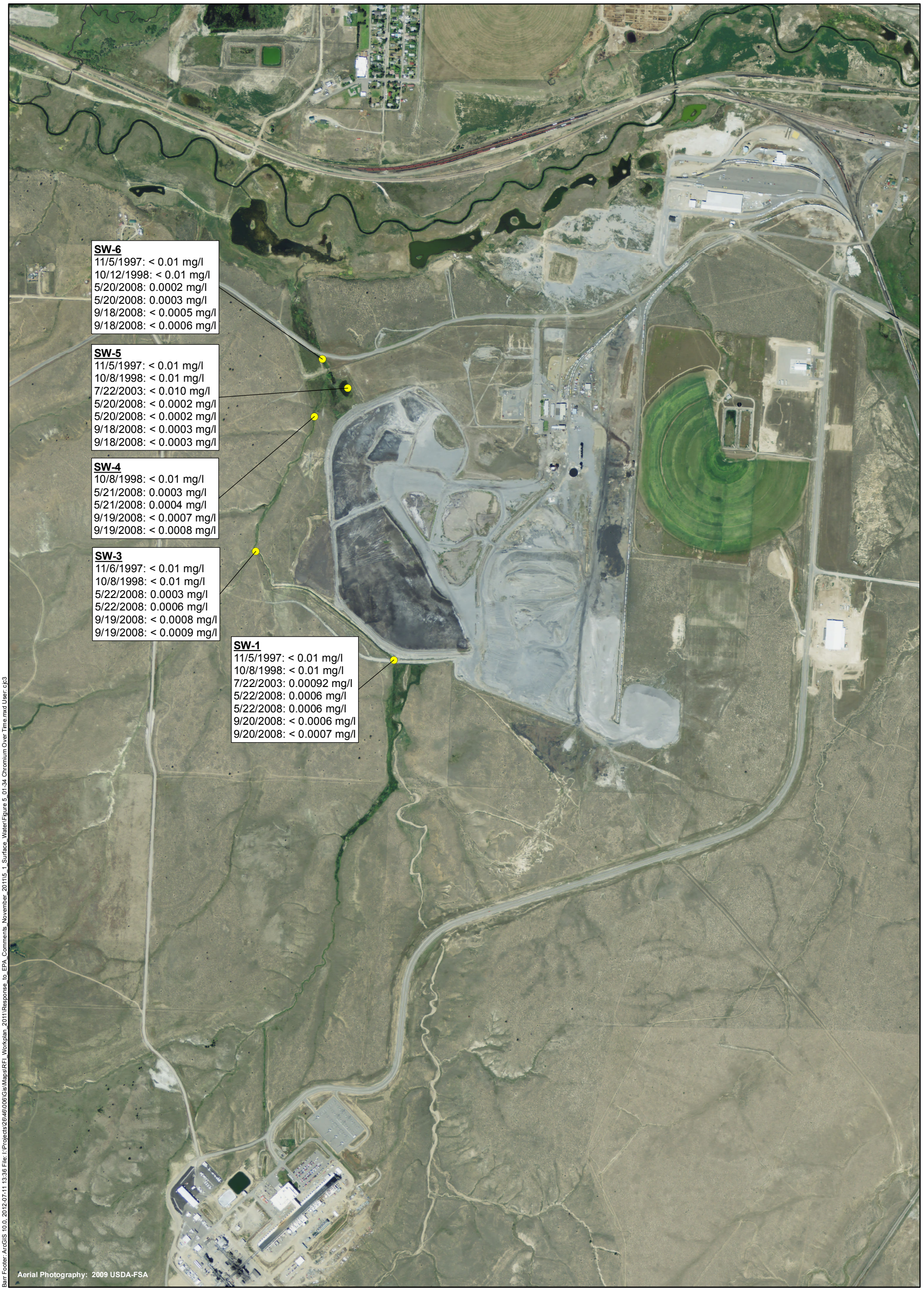
Barr Footer: ArcGIS 10.0, 2012-07-11 13:35 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-33 Calcium Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-33

ANALYTICAL SURFACE WATER DATA OVER TIME: CALCIUM
Rhodia Silver Bow Plant
Montana



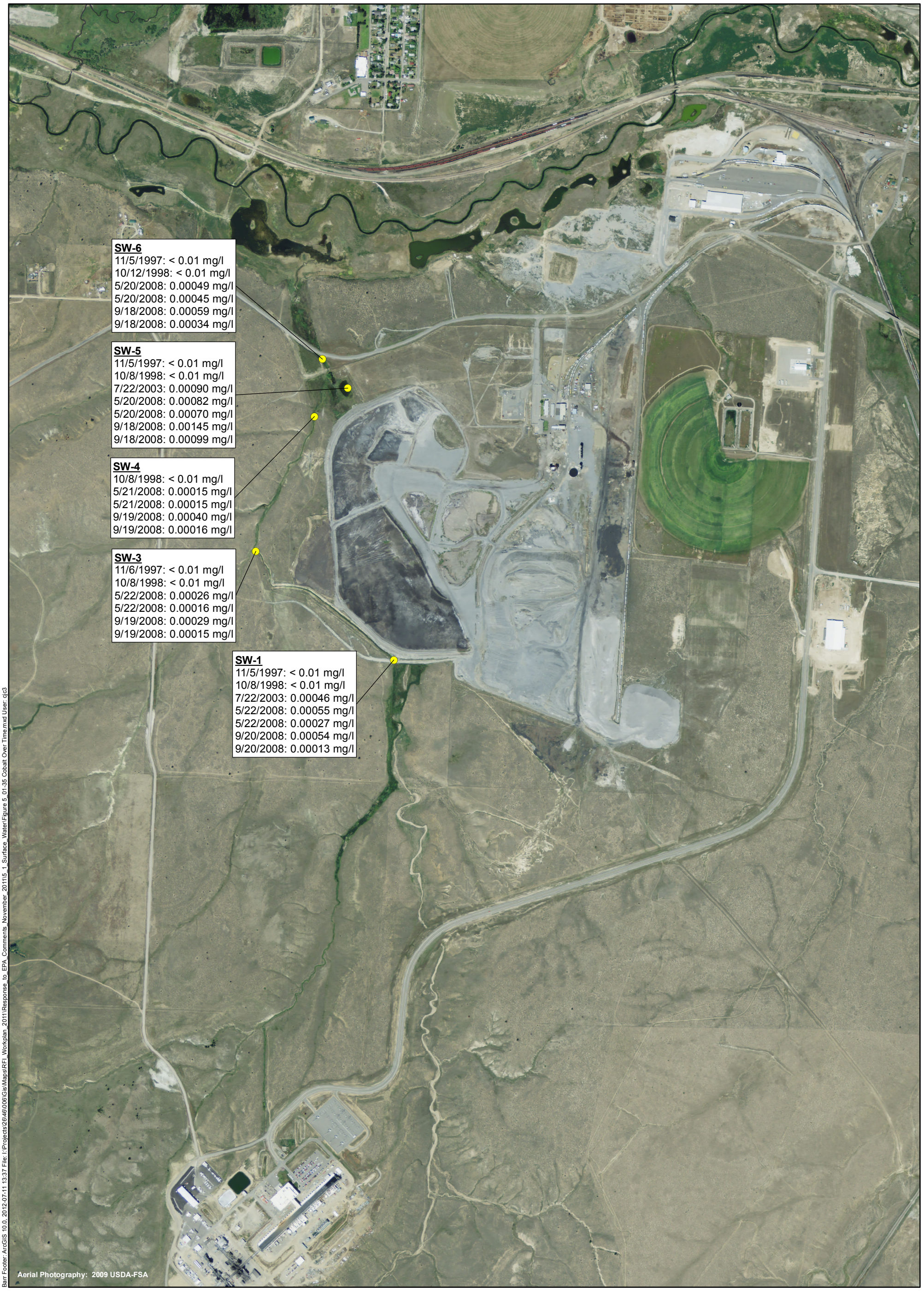
Barr Footer: ArcGIS 10.0, 2012-07-11 13:36 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-34 Chromium Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-34

ANALYTICAL SURFACE WATER DATA OVER TIME: CHROMIUM
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-07-11 13:37 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-35 Cobalt Over Time.mxd User: gjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-35

ANALYTICAL SURFACE WATER DATA OVER TIME: COBALT
Rhodia Silver Bow Plant
Montana

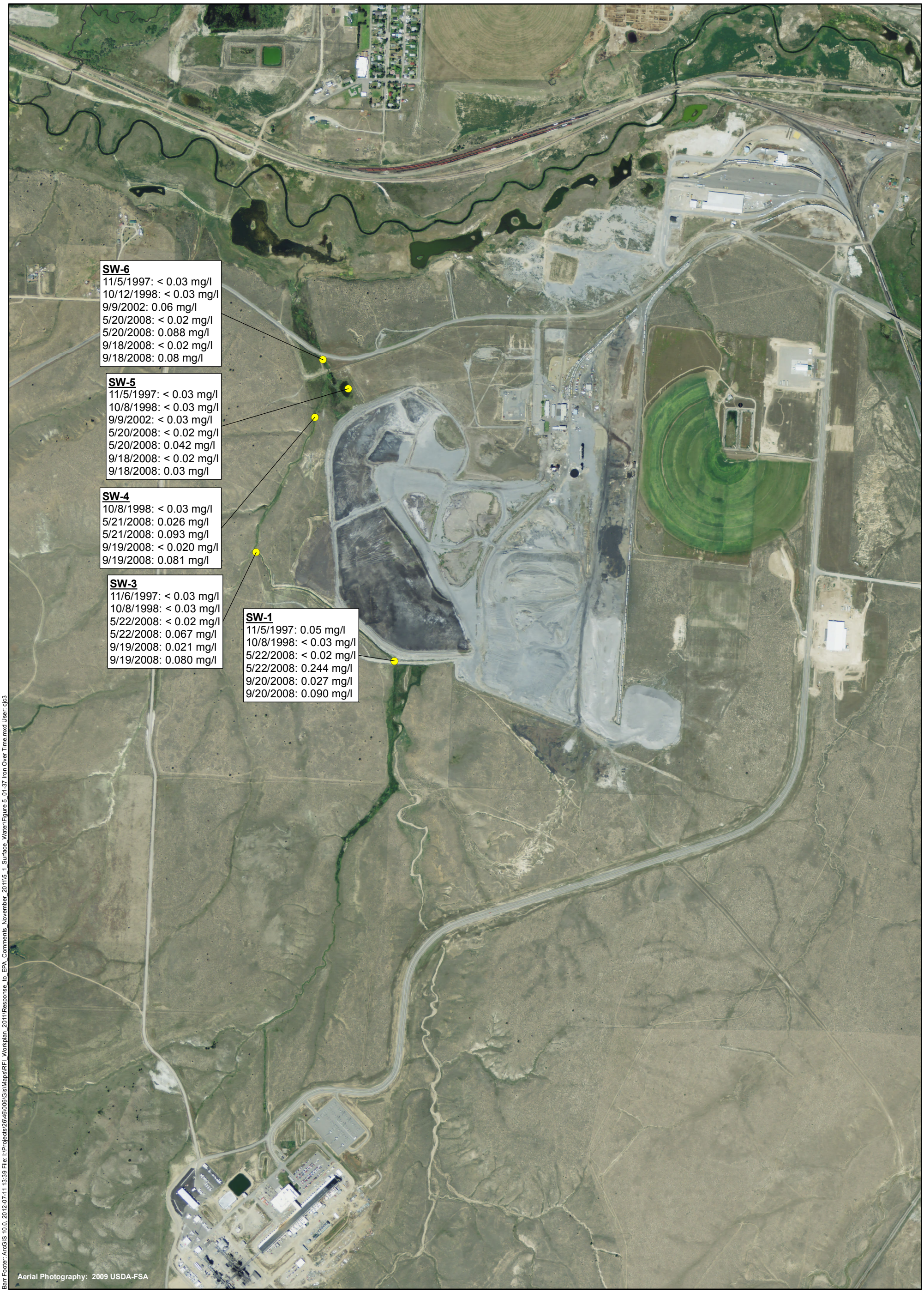
Barr Footer: ArcGIS 10.0, 2012-07-11 13:38 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-36 Copper Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-36

ANALYTICAL SURFACE WATER DATA OVER TIME: COPPER
Rhodia Silver Bow Plant
Montana



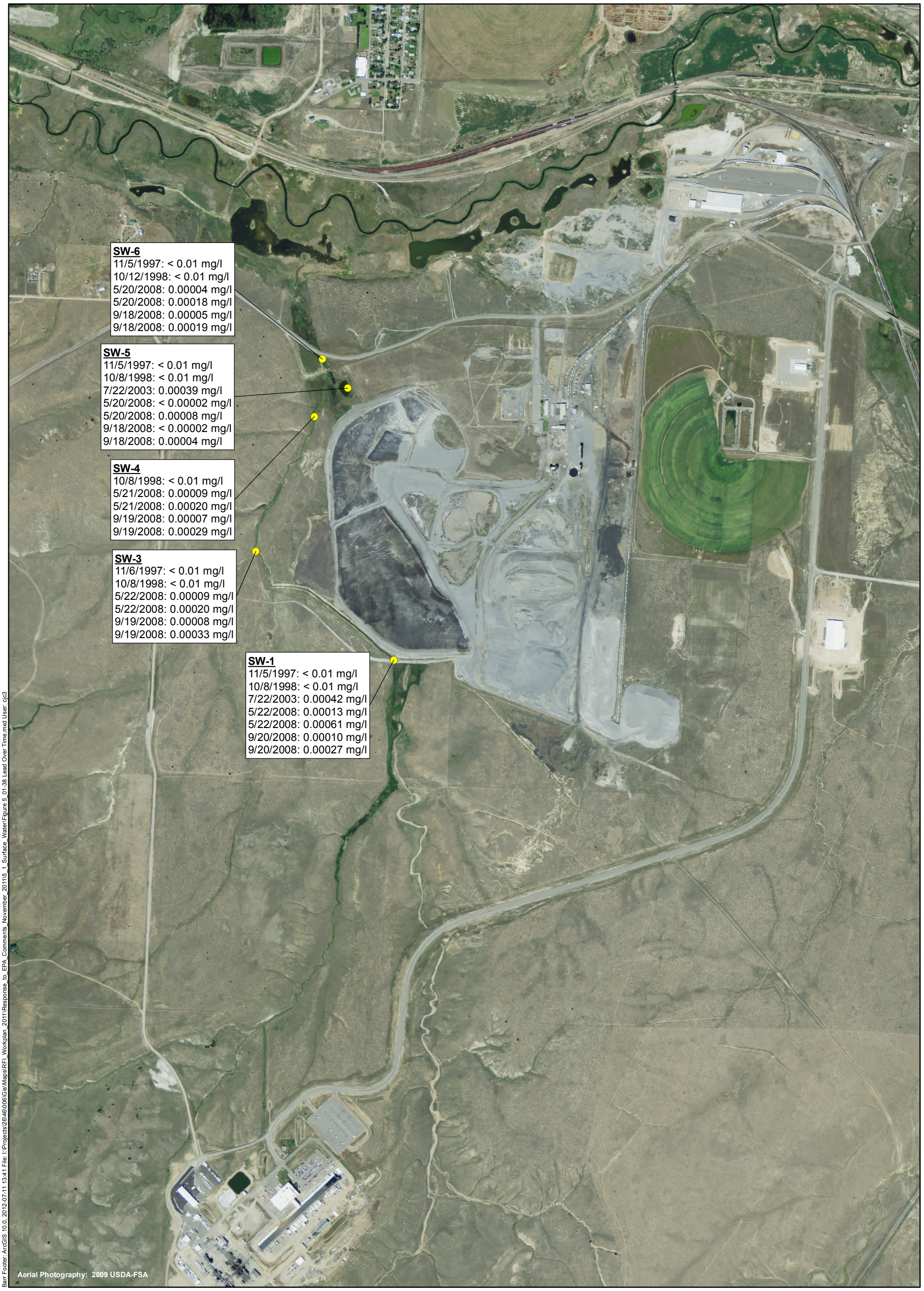
Barr Footer: ArcGIS 10.0, 2012-07-11 13:39 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-37 Iron Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-37

ANALYTICAL SURFACE WATER DATA OVER TIME: IRON
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-07-11 13:41 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-38 Lead Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-38

ANALYTICAL SURFACE WATER DATA OVER TIME: LEAD
Rhodia Silver Bow Plant
Montana

Barr Footer: ArcGIS 10.0, 2012-07-11 13:42 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-39 Magnesium Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-39

ANALYTICAL SURFACE WATER DATA OVER TIME: MAGNESIUM
Rhodia Silver Bow Plant
Montana

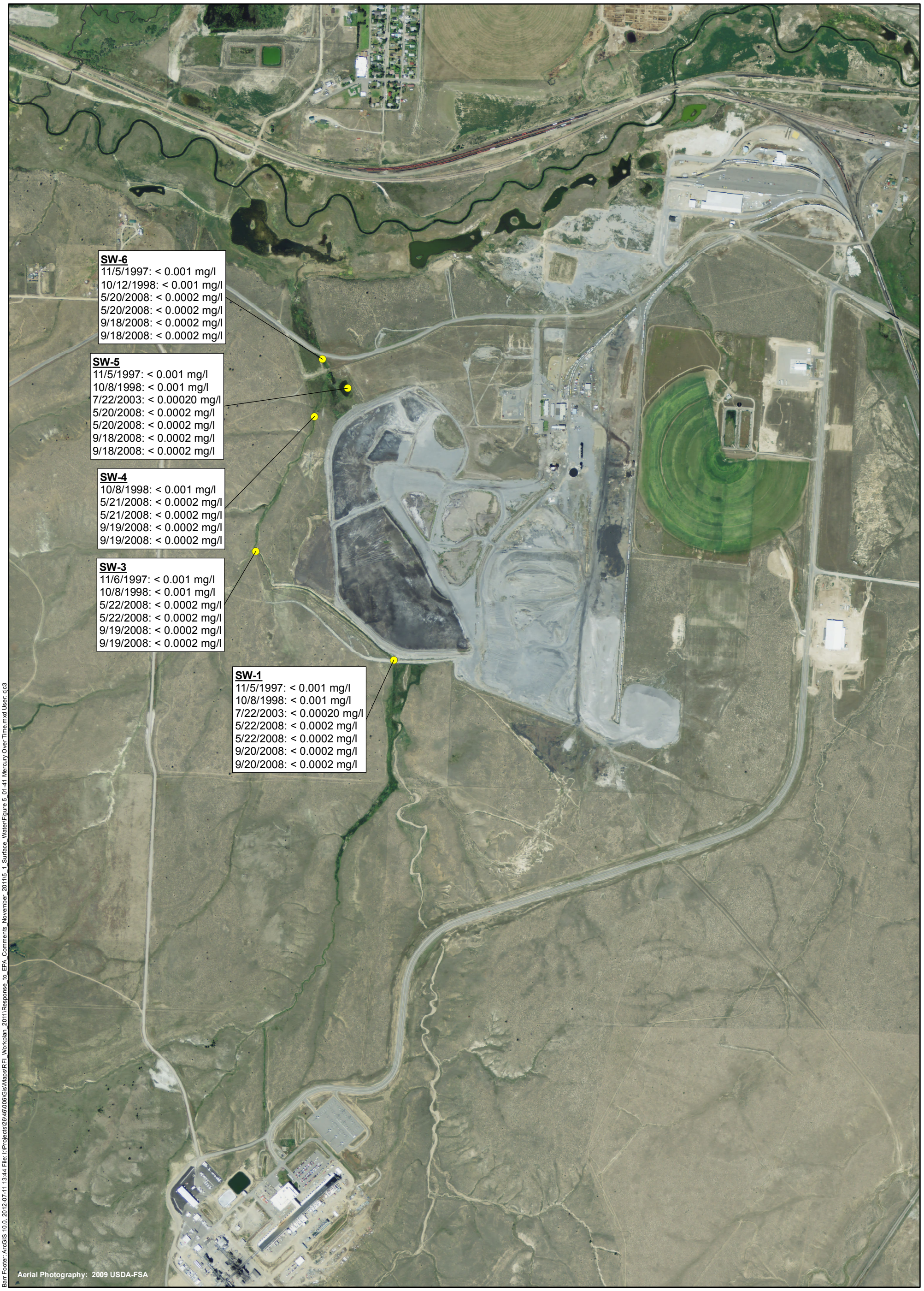
Barr Footer: ArcGIS 10.0, 2012-07-11 13:43 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-40 Manganese Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-40

ANALYTICAL SURFACE WATER DATA OVER TIME: MANGANESE
Rhodia Silver Bow Plant
Montana



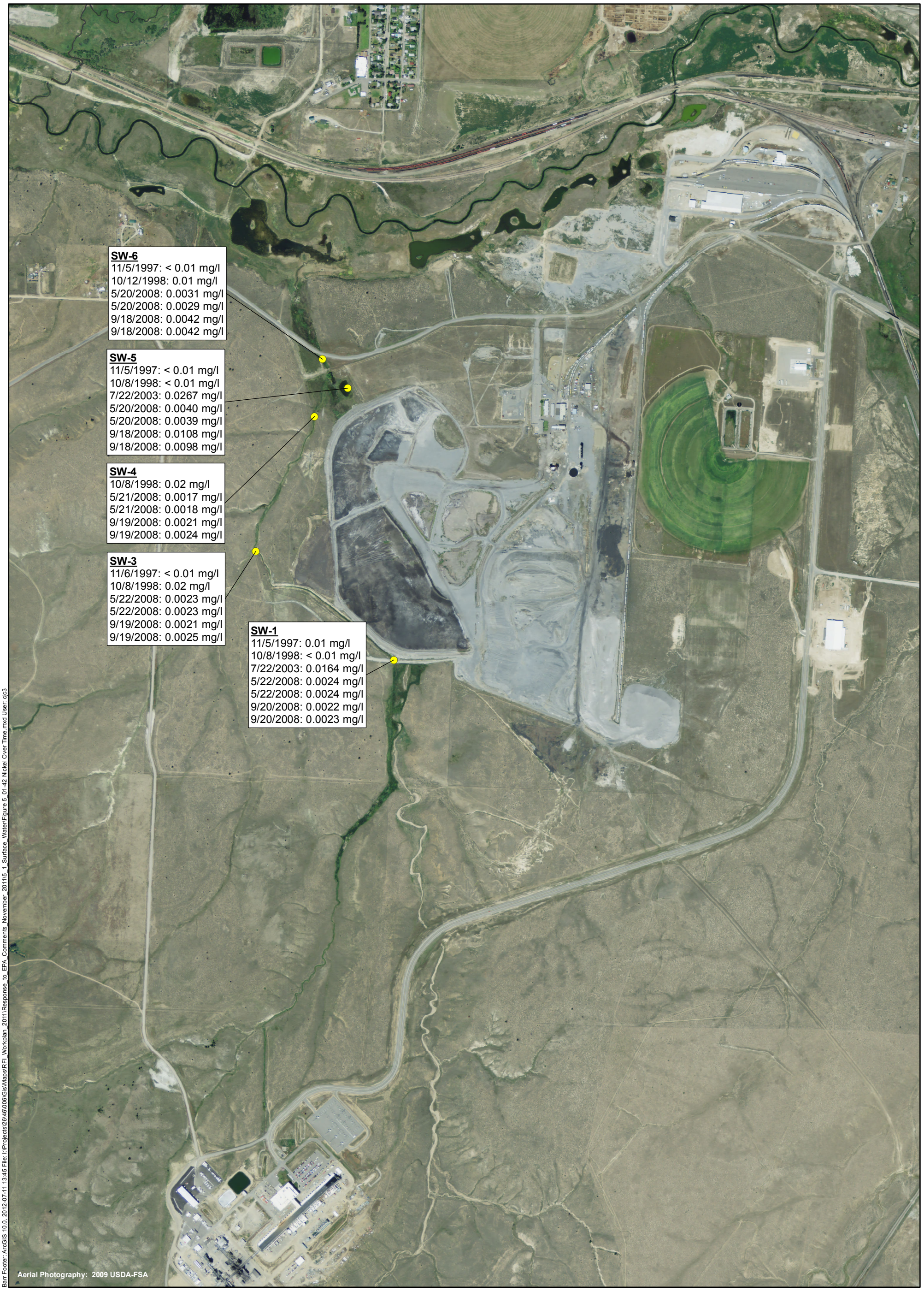
Barr Footer: ArcGIS 10.0, 2012-07-11 13:44 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-41 Mercury Over Time.mxd User: djc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-41

ANALYTICAL SURFACE WATER DATA OVER TIME: MERCURY
Rhodia Silver Bow Plant
Montana



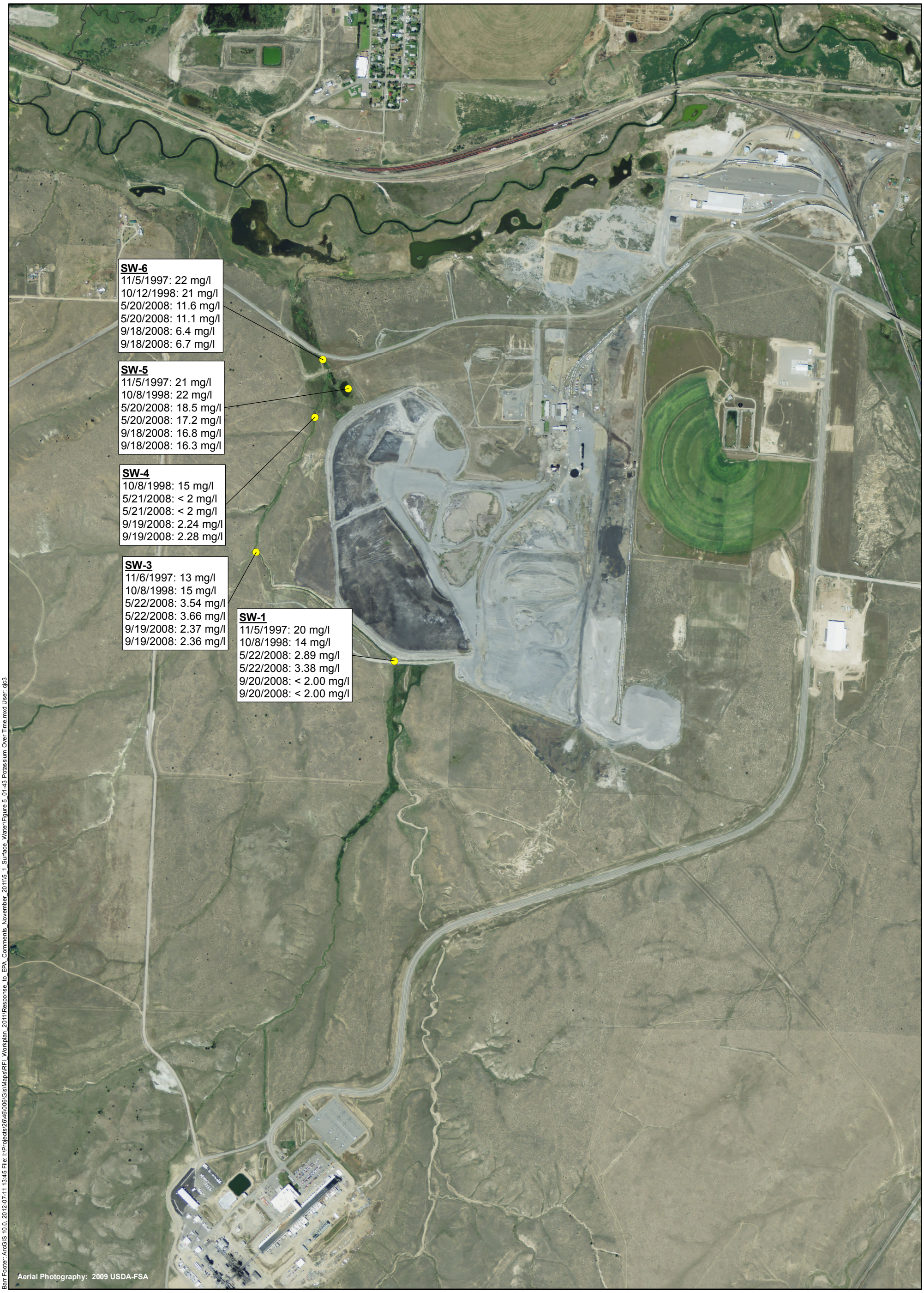
Barr Footer: ArcGIS 10.0, 2012-07-11 13:45 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-42 Nickel Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-42

ANALYTICAL SURFACE WATER DATA OVER TIME: NICKEL
Rhodia Silver Bow Plant
Montana



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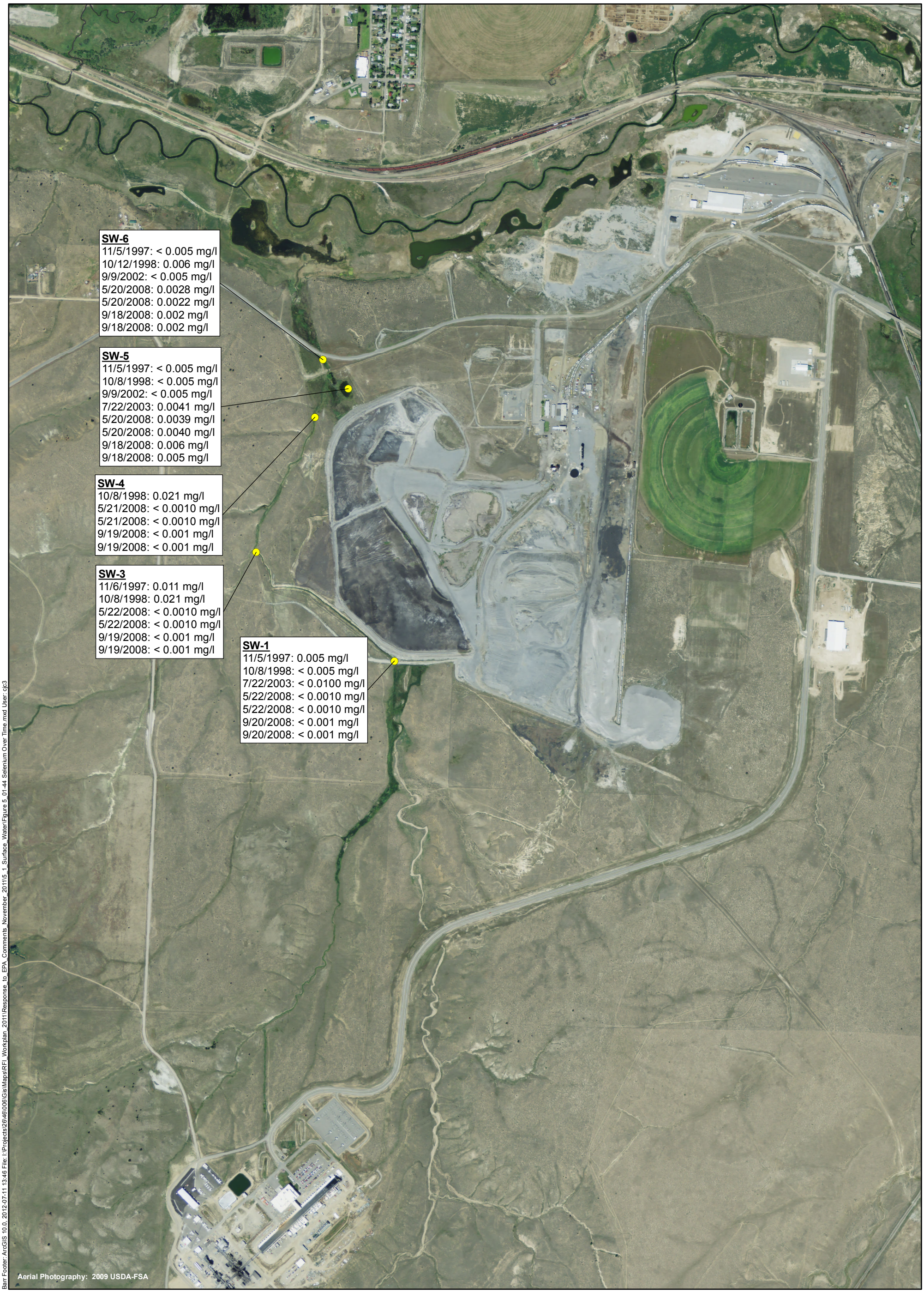
● Sample Location

Feet
1,000 0 1,000

Figure 5.1-43

ANALYTICAL SURFACE WATER DATA OVER TIME: POTASSIUM
Rhodia Silver Bow Plant
Montana



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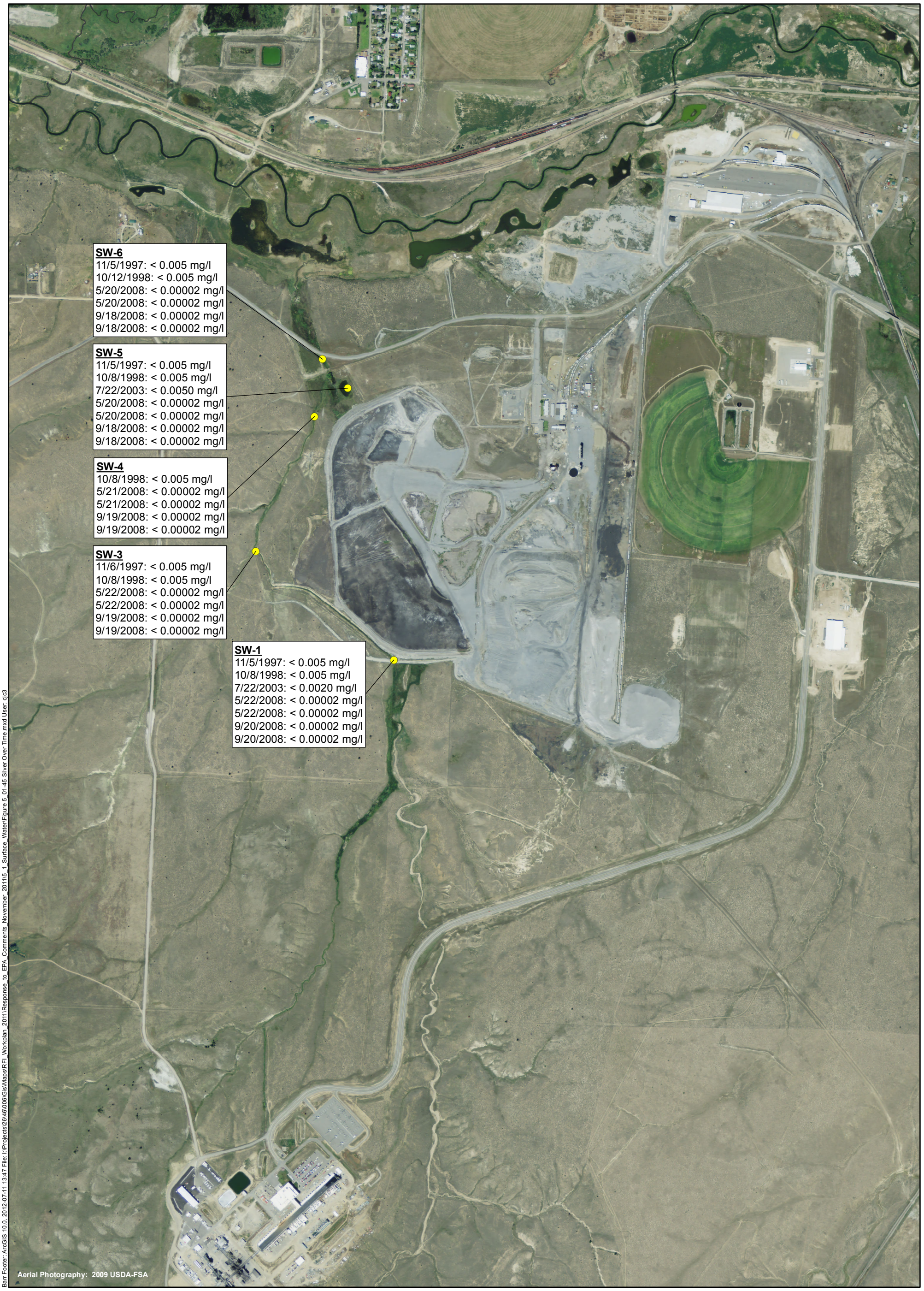
Sample Location

Feet
1,000 0 1,000

Figure 5.1-44

ANALYTICAL SURFACE WATER DATA OVER TIME: SELENIUM
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-07-11 13:47 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-45 Silver Over Time.mxd User: gjc3

Sample Location

Feet
1,000 0 1,000

Figure 5.1-45

ANALYTICAL SURFACE WATER DATA OVER TIME: SILVER
Rhodia Silver Bow Plant
Montana

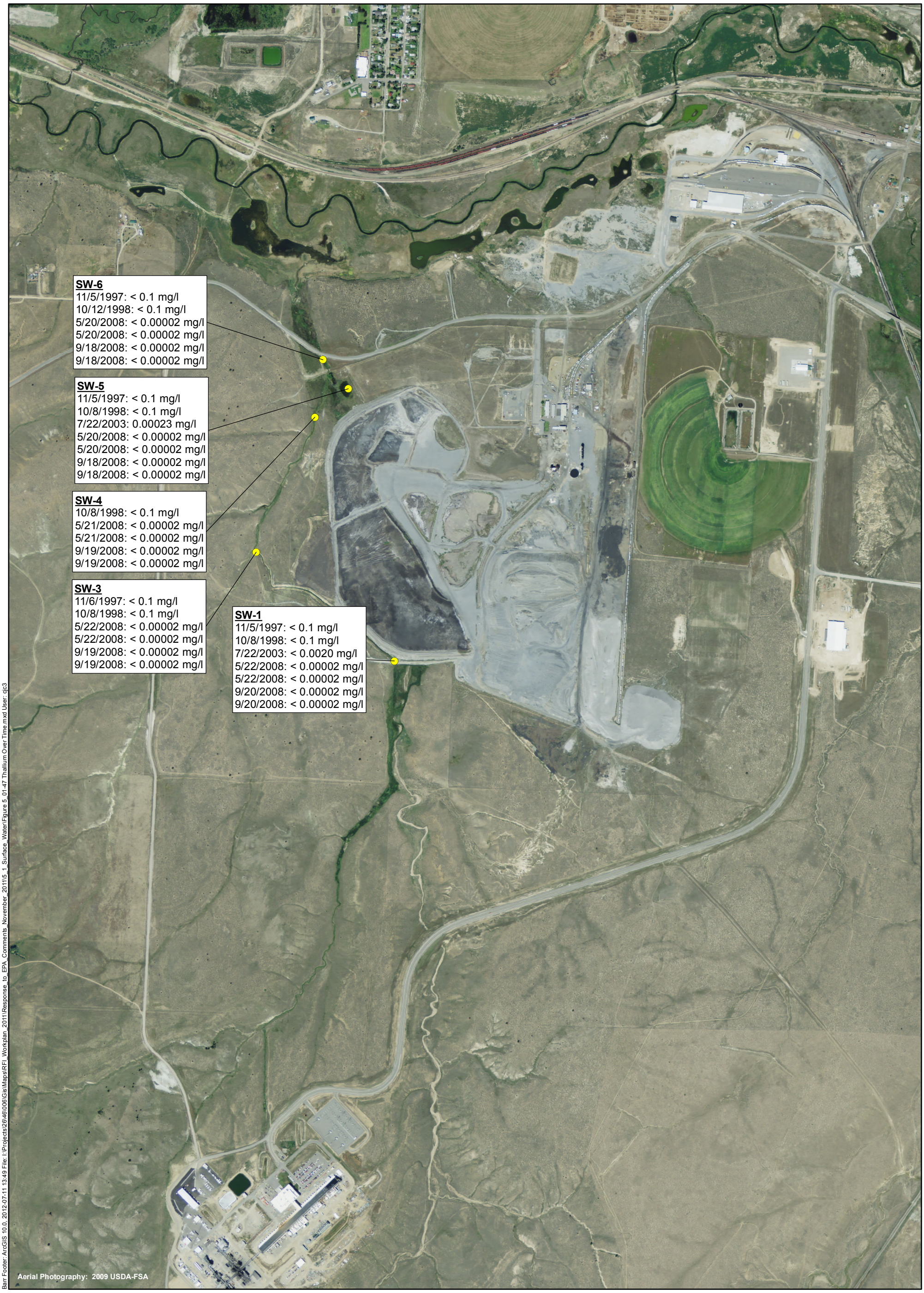
Barr Footer: ArcGIS 10.0, 2012-07-11 13:47 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-46 Sodium Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-46

ANALYTICAL SURFACE WATER DATA OVER TIME: SODIUM
Rhodia Silver Bow Plant
Montana



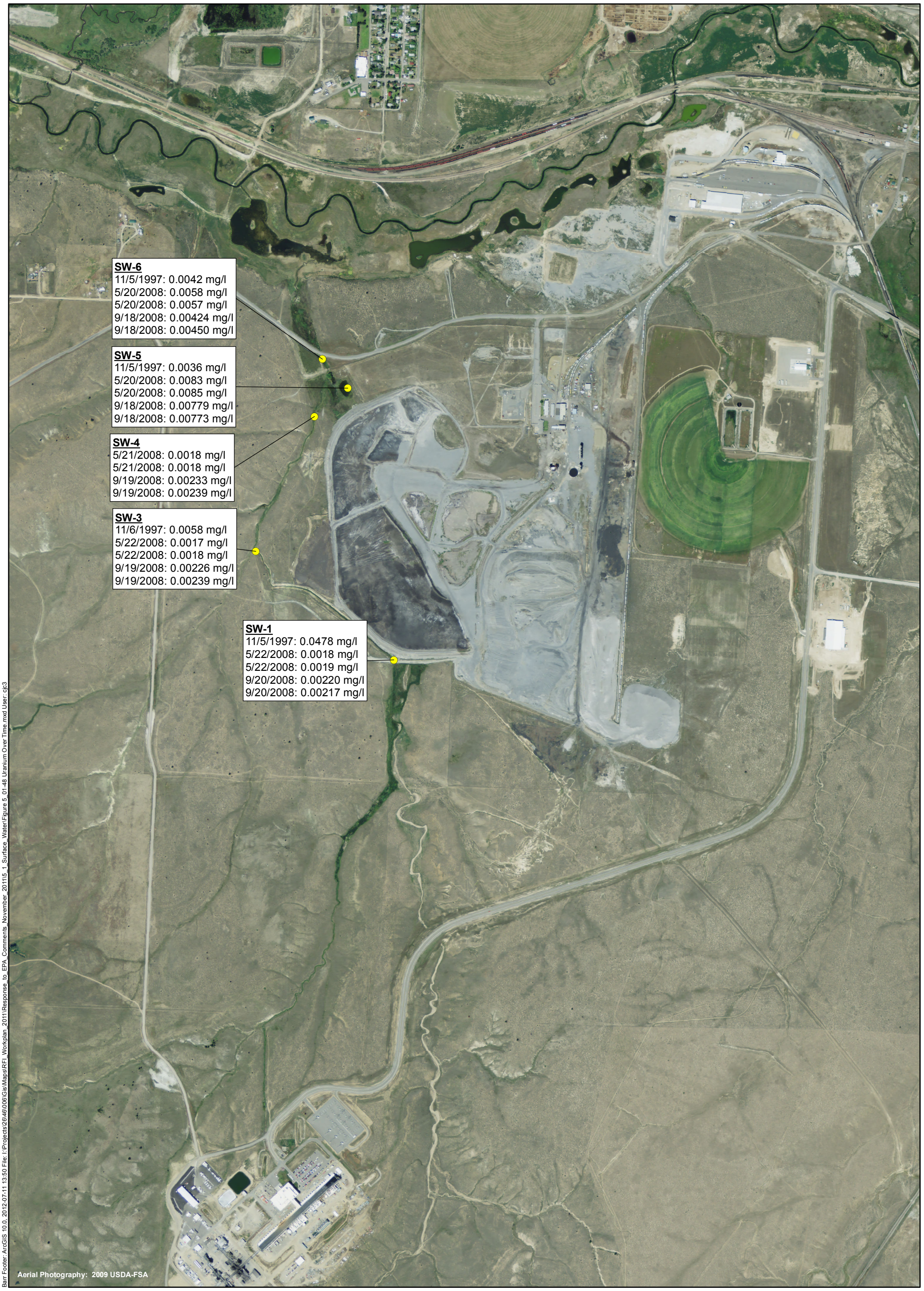
Barr Footer: ArcGIS 10.0, 2012-07-11 13:49 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-47 Thallium Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-47

ANALYTICAL SURFACE WATER DATA OVER TIME: THALLIUM
Rhodia Silver Bow Plant
Montana



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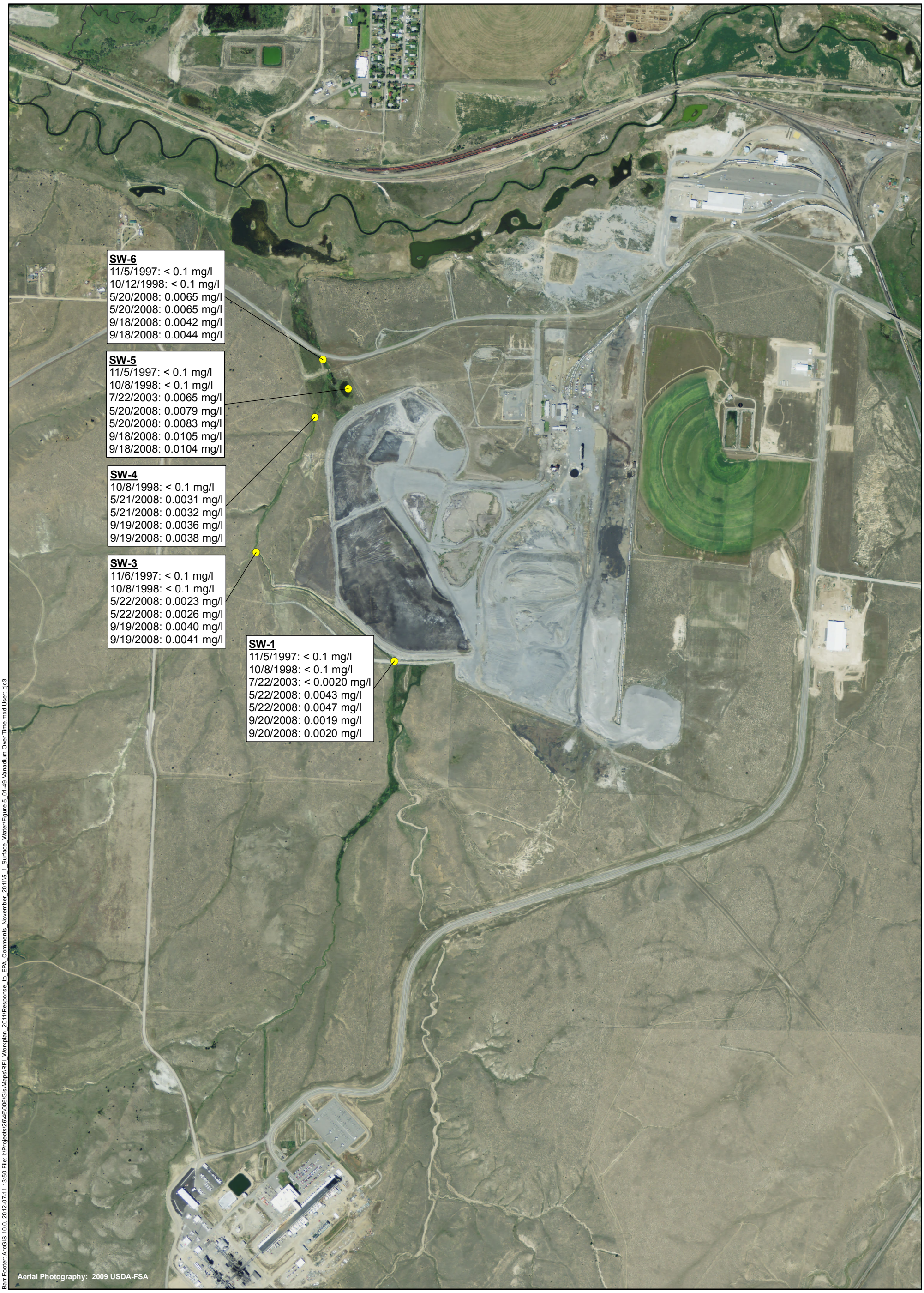
● Sample Location

Figure 5.1-48

ANALYTICAL SURFACE WATER DATA OVER TIME: URANIUM
Rhodia Silver Bow Plant
Montana

N

Feet
1,000 0 1,000



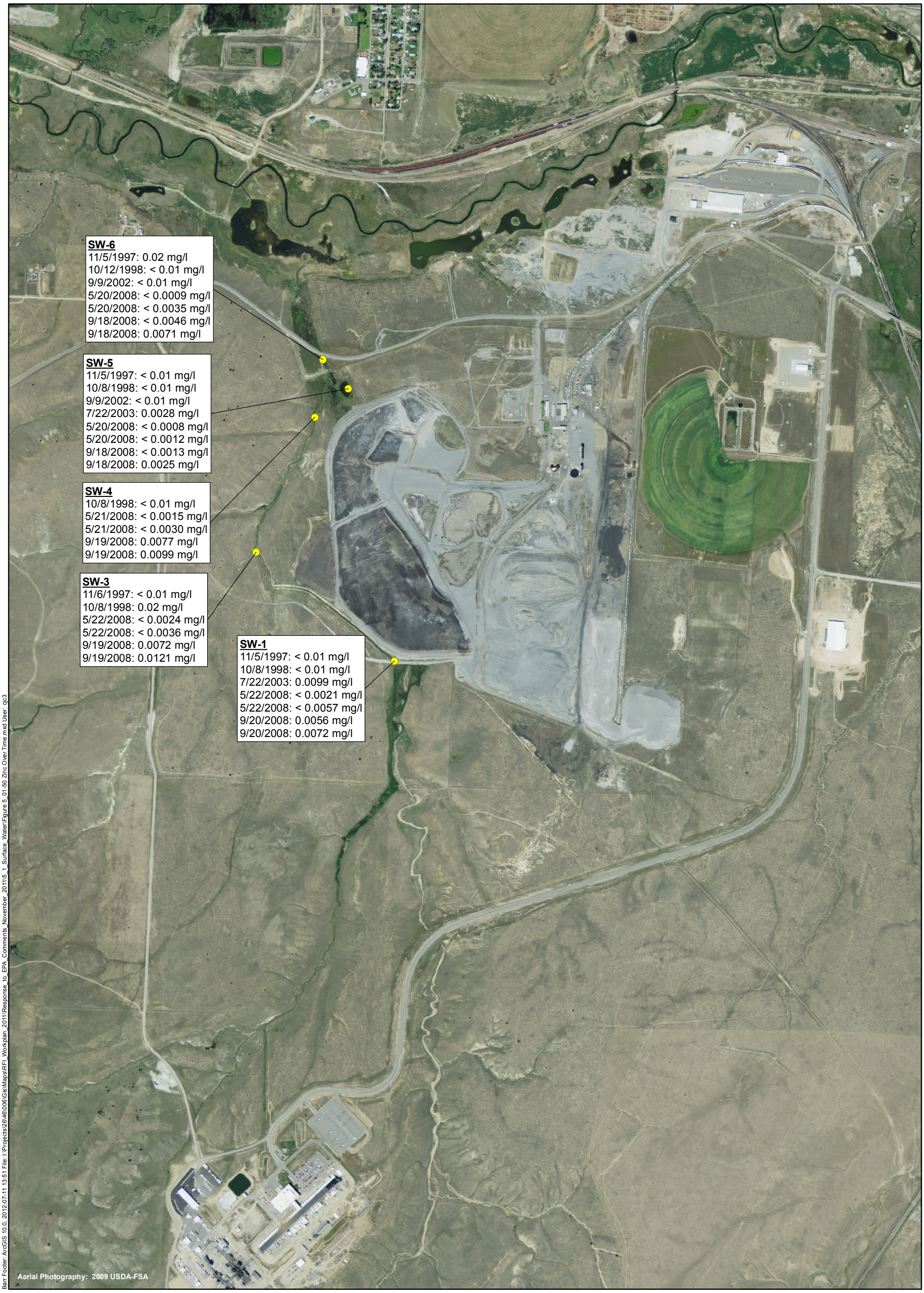
Barr Footer: ArcGIS 10.0, 2012-07-11 13:50 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-49 Vanadium Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-49

ANALYTICAL SURFACE WATER DATA OVER TIME: VANADIUM
Rhodia Silver Bow Plant
Montana



Barr Footer: ArcGIS 10.0, 2012-07-11 13:51 File: I:\Projects\26\46\006\Gis\Maps\RFI_Workplan_2011\Response_to_EPA_Comments_November_2011\5_1_Surface_Water\Figure 5_01-50 Zinc Over Time.mxd User: cjc3

● Sample Location

Feet
1,000 0 1,000

Figure 5.1-50

ANALYTICAL SURFACE WATER DATA OVER TIME: ZINC
Rhodia Silver Bow Plant
Montana

Appendices

Appendix 5.1-A

Analytical Results Report, Stauffer Chemicals Company
Silver Bow, Montana, January 1989
(Appendix G of CCRA Report)

Appendix G

Analytical Results Report, Stauffer Chemicals Company, Silver Bow, Montana

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII, MONTANA OFFICE
FEDERAL BUILDING, 301 S. PARK, DRAWER 10096
HELENA, MONTANA 59626-0096

Ref: 8MO

February 28, 1989

Mr. Cam Balentine
Stauffer Chemical Company
P. O. Box 3146
Butte, MT. 59702

Dear Mr. Balentine:

On August 1-8, 1988, representatives of the EPA conducted a CERCLA site investigation at your facility. Enclosed for your information as operator of the facility from which samples were taken is a summary of the analyses of samples collected during that investigation.

If you have any questions regarding this report, please contact me at (406)449-5414.

Sincerely,

Ronald A. Bertram

Ronald A. Bertram
Environmental Scientist

Enclosure

cc: Paul S. Pruett, Stauffer Chemical Co.
Duane Robertson, MDHES, SHWB

ANALYTICAL RESULTS REPORT

STAUFFER CHEMICAL COMPANY

SILVER BOW, MONTANA

TDD F08-8810-15

CERCLIS ID: MTD980502785

EPA SITE PROJECT OFFICER: RON BERTRAM

E & E PROJECT OFFICER: ROBERT EDDY

REVIEWED BY: KAM FORD

SUBMITTED TO: LES SPRENGER, FIT-DPO
DAVE SCHALLER, SITE EVALUATION CHIEF
RON BERTRAM, EPA SITE P.O.

DATE SUBMITTED: JANUARY 10, 1989

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ANALYTICAL RESULTS REPORT
STAUFFER CHEMICAL COMPANY
SILVER BOW, MONTANA
TDD# F08-8810-15
PAN FMT0062SCA
CERCLIS ID MTD980502785

1.0 INTRODUCTION AND OBJECTIVES

This report is submitted in fulfillment of the requirements of Technical Directive Document (TDD) #F08-8810-15, issued to the Ecology and Environment, Inc.'s, Field Investigation Team (FIT) by the U.S. Environmental Protection Agency (EPA) Region VIII. This report provides the analytical results data for the sampling effort and site inspection conducted by the FIT at the Stauffer Chemical Company plant in Silver Bow, Montana. The investigation was performed between August 1 and August 8, 1988, under TDD# F08-8804-10.

The overall objective of this investigation involved the collection of four soil, two subsurface soil, four surface water, three sediment and six ground water samples. One rinsate blank, two trip blank samples and one triple volume sample were also collected for organic quality assurance (QA) purposes. A special analytical services (SAS) request was submitted for gross alpha particles, radium 226, radium 228 and uranium 238. The organic fractions were shipped to Gulf South Research Institute of New Orleans, Louisiana and the inorganic fractions were shipped to Enseco (RMAL) of Arvada, Colorado under Case #10163. The SAS fractions were shipped to Metatrace Inc., of Earth City, Missouri. For more details the reader should refer to Appendix A.

The objectives of this report are to:

- Summarize the analytical results obtained from sampling.

- o Determine whether or not potentially hazardous substances at the site may have been released to the environment utilizing Hazard Ranking System (HRS) criteria.

2.0 BACKGROUND

2.1 SITE LOCATION AND DESCRIPTION

The Stauffer Chemical Company site (Figure 1) is located in the northeast 1/4 of the southeast 1/4 of Section 23, Township 3N, Range 9 W, of Silver Bow County, Montana. The site is approximately seven miles west of Butte and 1.4 miles west of the Silver Bow exit on I-15.

The site consists of approximately 860 acres, 300 of which are considered developed. At present approximately 180 persons are employed onsite. The active plant is engaged in the production of phosphorus products using the "TVA process".

The FIT was very concerned prior to the site visit about measuring waste quantities and the possibility of a connection between the alluvial aquifer and the process water in the 75 acre settling pond which is located southwest of the plant. There was also some information that indicated that two onsite landfills accepted chemical components which might have included acid solutions (with pH <3) base solutions (pH>12), heavy metals, organics, inorganics and miscellaneous waste materials. During the actual site visit, the FIT learned that there were actually five landfills or burial sites on the property (Figure 2). The process water flows to the pond via a fiber-glass drainage to the settling pond. The settling pond is diked in areas to facilitate the settling process. The process water is then recycled. The pond was constructed in 1971 with a clay liner and a dam located to the west of the plant to prevent flow into the Silver Bow Creek drainage.

2.2 SITE HISTORY

The Stauffer Chemical Company began operation in 1952 and is still active. The facility was originally owned by Stauffer Chemical Company of Westport, Connecticut. It was sold to a French concern (the Rhône Poulenc Group) in January, 1988. The plant is engaged in the production of elemental phosphorus for the food industry.

The phosphate ore is obtained from Wooly Valley, Idaho and transported by rail to Silver Bow, Montana. The ore contains about 20% water which must be reduced to about 5% before the actual enrichment process begins. This enrichment is accomplished by the TVA process. The TVA process is a thermal reduction process based on smelting of the ore with carbon and a siliceous mix in electric or blast furnaces. The products are elemental phosphorus, ferrophosphorus, carbon monoxide and and a calcium silicate slag. The phosphate is volatilized, condensed and collected under hot water as a liquid. The silicate and ferrophosphorus are tapped periodically from the furnace. Carbon monoxide is used as a fuel in preparing the furnace charge.

The plant obtains its process water from 5 onsite wells completed in the alluvial aquifer (see Figure 2). Potable water is provided by a bottled water distributor from Butte.

The 860 acre site has about 7.5 million cubic yards of slightly radioactive slag. The slag is stockpiled in two forms. Most of it is kept as a huge pile with individual cobble-sized pieces. Two other smaller piles contain granulated slag (coarse sand size) which is used for construction. However, because of its slightly radioactive nature, MDHES has sought to restrict its use as road base construction material in residential areas.

Documentation examined by the FIT prior to the site visit indicated the presence of only two landfills. During the site investigation FIT learned there were five landfills, one of which contained construction and plant debris (#5 burial site), another contained pure phosphorus (#1

burial site). Burial sites #2, 3 and 4 contained precipitator dust from the plant's air scrubbers.

The only other prominent feature was the 75 acre settling pond which is diked in places to facilitate the settling of process water which contains about 20% solids as it leaves the plant. This pond must be dredged every 45 to 60 days to prevent the whole system from being silted in. The dredge spoils are used to maintain the dikes within the ponded area.

2.3 PREVIOUS WORK

A Preliminary Assessment of this site was conducted and prepared by the Montana Department of Health and Environmental Sciences (MDHES) in 1979. The report concluded that the site was not considered a hazard to the environment or population at that time. However in the past, the Montana Air Quality Bureau has cited the plant for violations of visible air emissions standards. The emissions from the tap hole scrubber exceeded 40% opacity. Last autumn an independent consultant was contracted to provide a complete survey of violations relating to this site. At present the state and Stauffer are negotiating an agreement on penalties for air emissions violations. The EPA has contracted for two studies involving this facility. They were:

Evaluation of Radon Sources and Phosphate Slag in Butte, Montana by MDHES. EPA Contract #68-01-6100. June, 1983.

Emissions of Naturally Occurring Radioactivity
Stauffer Elemental Phosphorus Plant EPA-520/6-82-09. November, 1982
Office of Radiation Programs - Las Vegas Facility
P.O. Box 18416

2.4 SITE GEOLOGY

The principal water bearing formation in the area of investigation is the unconsolidated alluvium. Extensive alluvium along Silver Bow

Creek merges into alluvial deposits consisting of valley fill, landslide bris, talus and fan gravels. The valley fill is heterogeneous, consisting of unconsolidated and discontinuous layers and lenses composed of mixtures of sand, silt, clay and fine gravel. Logs can be correlated only over short distances owing to the discontinuous nature of the alluvial strata (Botz, 1969).

The lithology in the area immediately surrounding the plant agrees with the comments set forth by Botz. The lithologies encountered were mainly sandy silts, fine grained sands interspersed with thin layers of clay. Correlation was difficult because of the discontinuous nature of the layers which gave credence to the above mentioned comment on logs by Botz. Alluvial depths in the area of the site were in excess of 300 feet in thickness. Geophysical surveys have indicated bedrock depths of between 600 and 880 feet in parts of the valley (Botz, 1969).

2.5 HYDROGEOLOGY

Ground water in the area is recharged from precipitation and snowmelt runoff. Blacktail and Silver Bow Creeks are both gaining water in their lower reaches which indicates discharge from the adjacent aquifer. Water levels at the flood plain level of Silver Bow Creek were at about 29 feet below GSL (ground surface level). This measurement should be treated with caution however, because of the extremely low precipitation during the winter and spring and the drawdown created by nearby high capacity pumps. Hydrologic data garnered from the Hydrology Division of the Montana Bureau of Mines and Geology indicates that transmissivities (T) in the area ranged between 110 gal/day/ft and 1646 gal/day/ft. Areal ground water flow direction is to the north (Botz, 1969, Plate 2).

Surface water onsite consists of two ponds, the settling pond and another in front of the dam face which flows to the north and drains into Silver Bow Creek near the western boundary of the site (see Figure 2). The settlement pond is by far the most significant surface water body in the area and it may be some cause for concern because of the

high pH of the standing water observed at the dammed north end of the settling pond which be a source of recharge for the aquifer . Surface drainage in this area of the valley trends to the north where it enters the pond just north of the dam. The pond drains to the northwest where it joins Silver Bow Creek northwest of the site.

3.0 ANALYTICAL RESULTS

The results of the organic and inorganic analyses are shown in Tables 2 through 10. Sampling locations are shown in Figure 2 and sampling location rationale are provided in Table 1. Appendix A contains the organic and inorganic quality assurance analysis of Case# 10163/SAS# 4055H.

4.0 QUALITY ASSURANCE

Both the organic and inorganic data analyses were examined thoroughly by FIT chemists for compliance with the EPA Functional Guidelines for Evaluating Inorganic and Organic Data and the approved Region VIII FIT Contract Laboratory Program (CLP) Quality Assurance Standard Operating Procedures (SOP). The pertinent Quality Assurance reports and data sheets are attached in Appendix A. The data packages were judged acceptable with the following qualifications.

4.1 ORGANICS

The organic data results for nine soils (including sediment samples) and twelve waters have been reviewed. The data were deemed acceptable with the following minor method performance problems. Data qualifiers were attached to the samples which indicated the presence of blank contamination. All samples were extracted and analyzed within the contracted holding times. Initial calibration data met all contract requirements. Due to sufficient sensitivity and lack of associated target compound hits in the sample data no reviewer action because of calibration was necessary.

All surrogate recoveries were not within the contractual limits. Of 96 BNA soil surrogate recoveries were outside QC limits. 2,4,6-tribromophenol recoveries were low for sample HF449 and HF449RE.

The matrix spike (MS) and matrix spike duplicate (MSD) data did not meet all contractual requirements, however, no data review flags were necessary.

Phenols mostly related to 4-methylphenol (target hit) were within acceptable limits: Relative Percent Differences (RPD) were all acceptable.

4.2 INORGANICS

All calibrations and verification values fell within the 89% to 111% QA/QC limits required by EPA guidelines for the Contract Laboratory Program. All concentrations in all blanks were below the CRDL (Contract Required Detection Limits) or the MDL (Minimum Detection Limits) and elemental concentrations fell within the plus or minus 20% contract required control limit from the true concentrations in the check samples.

Three matrix spike values in the soil sample were out of the plus or minus 25% control limit. They were Pb (%R=143.9 when quantitated by ICP), Se (%R=46.2) and Ag (%R=60.2). The appropriate soil samples were flagged as follows:

1. If the element was undetected in the sample:
   - o 30%< %R < 75% - results flagged "uj" (possible false negative result).
   - o %R >125% - results not flagged (unlikely to get false negative results since spike recovery was so high).

2. If the elements were detected in the sample and

   o 30%< R < 75% or %R > 125% - results were flagged "jr" (results were considered questionable due to unusually high or low spike recoveries.

All other % recovery values which were outside QC control limits were "qualified" (i.e. the samples analyte were greater then 4x the spike level). Lead (Pb) was quantitated in soil samples using both ICP and AA methods. Only Pb values quantitated using ICP methods were flagged since the AA analyzed matrix spike was within control limits. Elements found to have RPD values outside the control limits were flagged "j" to indicate that there was a problem with the analysis results. Selenium samples MHL1000, MHL998, MHL999, MHQ450, MHQ451 and MHQ461 were flagged "uj" because of low spike recovery.

4.3 RADIONUCLIDES

Eight water samples were also submitted to Metatrace Inc., of Earth City, Missouri for gross alpha, total uranium, radium 226 and radium 228 analyses. All samples were analyzed for gross alpha according to EPA 600/4-80-032, Method 900.0. Upon inspection of the initial data, some samples were recounted to achieve an MDA (Minimum Detectable Activities) value of <1, as required by the Scope of Work. All results that are not reported as positive values are <1 pCi/L. All instruments parameters and Quality Assurance samples were in control; no anomalies were observed. Samples reported as "less than" a given value are MDA. The MDA is equivalent to the Lower Limit of Detection (LLD) as defined in the U.S. Nuclear Regulatory Commission Regulatory Guide 4.1, Appendix A.

All samples were analyzed for total uranium according to EPA 600/4-80-032, Method 908.0. Due to the large amount of suspended matter present, the samples were filtered prior to beginning analysis using a qualitative fast filtering apparatus. Upon calculation, it was observed that some of the samples had an MDA of <2, higher than the <1 required in the Scope of Work. This was caused by a high alpha background (1.06 CPM), which was attributed to residual contamination from a previous

ample in an anion exchange column . No reanalysis was possible due to insufficient sample. Results reported as "Less Than" a given value are MDAs, as described under Gross Alpha above.

Radium 226 analyses were performed in accordance with EPA 600/4-80-032, Method 903.1. Sample SCC-IW-4 would not yield a BaSO4 precipitate upon two analyses, due to what appeared to be a matrix related problem. No data are available for this sample. All other Quality Control parameters were in control. Samples reported as "Less Than" a given value are MDAs, as described under Gross Alpha above.

Radium 228 analyses were performed in accordance with EPA 600/4-80-032, Method 904.0. The BaSO4:EDTA solution from the Ra-226 procedure was used as detailed in the method. The spiked blank recovery for these was unacceptably low (19%), and they were reanalyzed starting with the BaSO4 as before. This time all parameters were in control; no anomalies were observed. Samples reported as "Less Than" a given value are MDAs, as described under Gross Alpha above. The data was deemed usable with qualifications.

4.4 FIELD BLANKS AND DUPLICATES

The FIT prepared two trip blanks, one rinsate blank and one duplicate sample in the field during the course of the site investigation.

The trip blanks, SCC-TB-1 and SCC-TB-2 were prepared by decanting "organics free" water directly into two 40 ml vials and accompanied each organics shipment. These samples were submitted in order to determine whether or not contamination had been introduced after the lab cleaning or during field handling. Results indicated some contamination of both samples by acetone and methylene chloride. SCC-TB-1 contained 30 µg/l of methylene chloride and 11 µg/l of acetone. SCC-TB-2 contained 31 µg/l of methylene chloride and 8 µg/l of acetone. These results were qualified "ub" which indicate the sample contained less than 10x the laboratory blank concentration.

The organic fraction of the rinsate blank was obtained by pouring "organics free" water over decontaminated sampling equipment then collected in the appropriate containers (an 80 ounce amber and 2 40 ml vials). 2-Butanone (8 µg/l) was detected along with methylene chloride (4 µg/l) and acetone (7 µg/l). The acetone and methylene chloride were qualified "ub" for the same reasons mentioned above. 2-Butanone, which is commonly associated with acetone was qualified with a "j" because the concentration was below the CRDL.

The inorganic blank sample was prepared by pouring "metals free" water over the aforementioned sampling equipment and then collected in 1 liter poly bottles. The inorganic analyses indicate a relatively clean rinsate sample. Most of the metal concentrations were at or below the concentrations detected in the background sample.

SCC-MW-7 was collected as a duplicate of SCC-MW-4. Toluene was detected in the SCC-IW-4 but the concentration was below the required limits. Acetone and methylene chloride (qualified "ub" as found in the laboratory blank) were common to both samples although the concentrations in SCC-IW-4 were higher (respectively). The inorganic analyses showed good relative agreement.

Eight water samples were analyzed for gross alpha, total uranium and radium isotopes 226 and 228. All gross alpha results were flagged "j" due to low spike recovery. Gross alpha spike recovery was 72%. Reported values may be low and were flagged "j", estimated. No defined holding times exist, however, counting times are specified within the respective methods and these were met. Calibration was done by an NBS Standard daily at a frequency of 10%. There were no contaminants detected in any blank.

5.0 DISCUSSION OF ANALYTICAL RESULTS

5.1 GROUND WATER SAMPLES

The organic analyses for ground water contains the laboratory contaminants, acetone and methylene chloride. Bis(2-ethylhexyl)-phthalate was also detected below CRDL in SCC-MW-4. This compound is a common contaminant which is usually the result of samples coming in contact with plastic or plastic liners including PVC well casing materials. SCC-MW-10, SCC-IW-6 and SCC-IW-4 also showed the presence of toluene below the CRDL. 2-butanone was detected below CRDL in SCC-MW-5 (rinsate blank).

The inorganic analyses indicated an aluminum concentration over 20x the background concentration in SCC-MW-4. Arsenic concentrations in SCC-IW-6 and SCC-IW-4 were also elevated 4x to 5x above the background but due to high mineralization of local soils, these figures may not reflect any significant difference from those surrounding areas within the county. Manganese, magnesium, calcium and potassium also showed some significant increases when compared to the background.

5.2 SURFACE WATER SAMPLES

Organic compounds detected in the surface water samples included acetone, methylene chloride and toluene (SW-1 and SW-2). Both methylene chloride and acetone were qualified "ub." These compounds are classified as common laboratory contaminants. Bis(2ethylhexyl)phthalate was also detected in a downstream sample (SCC-SW-3). The concentrations of toluene in the upstream (SCC-SW-1) and one downstream sample (SCC-SW-2) are almost equal. Since toluene was detected in both samples, the source of the toluene in the surface water is undetermined.

The concentration of lead in SCC-SW-2 (20.9 µg/l) is greater than 5 times the background upstream sample and may be considered a release.

5.3 SEDIMENT SAMPLES

Organic compounds detected in sediment sample SCC-SE-3 indicate a significant concentration of toluene (680 µg/kg) in the downstream sediments of Silver Bow Creek. An examination of Figure 2 indicates that the plant may be a possible source of contamination but conclusive evidence would require a more detailed investigation of surface water and sediment routes between the plant and the location of SE-3. The presence of acetone and methylene chloride is attributed to laboratory contamination because these compounds were also detected in the laboratory blank. A significant concentration of 4-methylphenol (5500 µg/kg) was detected in SCC-SE-3. Bis(2-ethylhexyl)phthalate another common laboratory and environmental contaminant was found in both the background sample (SCC-SE-1) and in a downgradient sample (SCC-SE-3).

Barium, copper, magnesium, manganese and zinc results were all significantly elevated above background sediment results. Barium and copper were approximately 4x over the background. Lead, although qualified "jr" was 13 times above background. Manganese and magnesium were also approximately 4x above the levels detected in SCC-SE-1. High sediment arsenic levels (148 mg/kg to 214 mg/kg) are found both upstream and downstream of the site. It is important to again reiterate that this area of Silver Bow County is highly mineralized and the water of Silver Bow Creek flows past many tailings piles associated with mining operations upstream. Further study may be necessary to determine if an observed release of metals is attributable to the site.

5.4 SOIL SAMPLES

Organic compounds detected in the soils included methylene chloride, acetone, toluene and Aroclor-1254. With the exception of Aroclor 1254, the aforementioned compounds were common to all soil samples.

Soil samples collected from the dredged pond sediments (SCC-SO-5) revealed PAH contamination including phenanthrene, anthracene,

uoranthene, pyrene, benzo(a)anthracene, benzo(b)fluoranthene, nzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene in concentration above instrument detection limits but below the CRDL. These PAH results were qualified with a "j" to indicate that these concentrations were estimated. The presence of these compounds may be attributable to the addition of carbon in the "TVA process" used at the Stauffer facility.

SCC-SO-1 was obtained about one mile east of the chemical plant and it contained a comparatively high concentration of toluene. The presence of toluene as a persistent contaminant of the environment around this site does not appear directly attributable to the Stauffer Chemical Plant. Toluene was detected in the background soil sample and upstream of this site in Silver Bow Creek surface water samples.

Aroclor-1254 (a PCB) was detected at 130 ppb, which is below the contract required detection limit (CRDL) for soils. The finding is important, however, because the sample was taken within 100 feet of an electrical substation located southeast of Ramsay and may indicate a possible problem in the area with PCB contaminated transformer oil.

Inorganic data analyses indicate that soil samples obtained from burial sites #2 and #4 (SCC-SS-2 and SCC-SS-4 respectively) and SCC-SO-5 (sediment dredged from the settling pond) all contained very high concentrations of chromium when compared with the background and other surface soils 97.2 mg/kg, 103 mg/kg and 430 mg/kg respectively. The mercury, cadmium, vanadium, zinc, selenium, thallium and nickel results for SCC-SO-5 are also outside the normal range for soils in the western U.S. (Shacklette) and this value may have something to do with the manufacturing process for elemental phosphorus or the ore itself. The same comments may be extended to selenium results. It is also interesting to note that the offsite soils (SCC-SO-1, SCC-SO-2 and SCC-SO-3) show higher arsenic concentrations than those on-site and these values, although estimated, are well outside the range for the western U.S. Previous EPA investigations have established that arsenic levels for Silver Bow county and especially Butte are abnormally high.

5.5 RADIONUCLIDE SAMPLES

While these results are for monitoring and industrial wells sampled at the site, there are numerous domestic wells in the vicinity that are sources of untreated drinking water. Analytical results for gross alpha and for total uranium show that the total uranium concentrations obtained from the monitoring wells were noticeably higher than those of existing industrial and community wells. Downgradient monitoring wells SCC-MW-3 and SCC-MW-4 show 2x to 3x the levels in upgradient monitoring well SCC-MW-1. The MCL for combined radium 226 and radium 228 is 5 pCi/L and the gross alpha MCL is 15 pCi/L. None of the results exceed the radium MCL, but monitoring wells SCC-MW-3 and SCC-MW-4 appear to exceed the gross alpha MCL.

6.0 CONCLUSIONS

The analytical results of this site investigation indicate the presence of contaminants in area soils, surface water and sediment. Onsite waste samples especially SCC-SO-5, a dredged pond sample, contained high concentrations of cadmium, chromium, nickel, selenium, thallium, vanadium and zinc and based on field instrumentation, higher levels of radioactivity than the background soils.

Potential releases to ground water include arsenic, manganese, gross alpha and uranium. Arsenic and manganese exceeded background concentrations in the deeper industrial wells. Manganese exceeded background in SCC-MW-4. Two to three-fold releases of gross alpha and uranium occurred in SCC-MW-3 and SCC-MW-4. Based on the waste samples SCC-SO-5 and SCC-SS-4, only the gross alpha and uranium releases appear to be attributable to the site.

Toluene was detected in all media sampled. Of most importance was the concentration of toluene in the downstream sediment sample SCC-SE-3. The concentration of toluene in this was 680 µg/kg. This concentration is 170 times the background concentration. These data are significant, however it may not document an observed release to surface water without

a better understanding of what it may be attributed to. All soil samples, including the background sample, had detectable levels of toluene.

Lead, copper, manganese, magnesium and potassium concentrations in the downstream sediment samples were significantly elevated above upstream sample concentrations. These results are inconclusive due to the highly mineralized soils that are indigenous to the area.

This site investigation has identified significant concentrations of several organic and inorganic compounds. However, further information on the source of these contaminants could assist the FIT in determining if releases of materials to the ground water or surface water have occurred.

7.0 REFERENCES

Mineral Facts and Problems, Bull. 630 Bureau of Mines, 1965.

Botz, M.K. Hydrogeology of the Upper Silver Bow Creek Drainage Area, Montana, Montana Bureau of Mines and Geology Bull. #75. September, 1969.

Duaine, T.E. and Moore, H.R. Final Report: Baseline Monitoring Butte - Silver Bow's Metro Sewer Sludge Injection Site Silver Bow, Montana, Montana Bureau of Mines and geology, May, 1985.

National Interim Primary Drinking Water Regulations. U.S. EPA Office of Water Supply. EPA - 570/9-76-003.

Shacklette, H.T., and Boerugen, J.G.; 1984 Element Concentration in Soils and other Surficial Material of the Conterminous United States. U.S. Geol. Survey, Prof. Paper 1270. 105 pp.

1980 Census of Population, Montana PC80-1-A28.

TABLE 1
SAMPLE RATIONALE

SAMPLE MATRIX	SAMPLE #	LOCATION	RATIONALE
Ground Water	SCC-MW-1	Upgradient, south of the pond	Background ground water sample for this site
	SCC-MW-3	North of plant	Downgradient
	SCC-MW-4	North of settlement pond	"
	SCC-IW-4	North of settlement pond	"
	SCC-IW-7	Duplicate of SCC-IW-4	Duplicate
	SCC-IW-5	Rinsate blank	Blank
	SCC-MW-10	North of I-90	Comparison sample
Surface water	SCC-SW-1	West of bridge, beneath I-15	Upstream
	SCC-SW-2	North of plant	Downstream
	SCC-SW-3	Northwest of Silver Bow	Downstream to sample for surface water contamination
	SCC-OP-1	North of dam (see map)	Sample for release from pond.
Soils	SCC-SO-1	Rocker Township	Offsite soil downwind
	SCC-SO-2	Ramsay	Offsite soil downwind
	SCC-SO-3	Silver Bow Community	Offsite soil upwind
	SCC-SO-5	Battlement Pond sediment (see map)	To determine contaminant in onsite soil
Sediment	SCC-SE-1	Upstream north bank of creek near SW-1	Upstream sediment
	SCC-SE-2	Downstream near SW-2	To determine sediment contaminants
	SCC-SE-3	Downstream near SW-3	"
Borings	SCC-SS-2	Burial site #2	To determine nature of buried waste
	SCC-SS-4		

TABLE 2
ORGANIC ANALYTICAL DATA FOR GROUND WATER SAMPLES
AT STAUFFER CHEMICAL COMPANY
SILVER BOW, MONTANA (Values in µg/l)
CASE #10163

SAMPLE LOCATION	SCC-MW-1	SCC-MW-3	SCC-MW-4	SCC-IW-5	SCC-MW-10
TRAFFIC REPORT	HF-457	HF-459	HF-458	HF-436	HF-453
SITE LOCATION	DNGRDNT	DNGRDNT	DNGRDNT	BLANK	DNGRDNT
Methylene chloride	9ub	11ub	11ub	4ub	4ub
Acetone	36ub	55ub	78ub	7ub	10ub
Toluene					2j
2-butanone				8j	
bis(2-ethylhexyl)-phthalate			3j		

ub - Estimated sample quantitation limit increased. Amount found in sample reported. Compound detected at <5x the amount in blank (<10x for methylene chloride, acetone, toluene and phthalates).

j - The associated numerical value is an estimated quantity because the amount detected is below the required limits or because quality control criteria were not met.

TABLE 2 Cont.
ORGANIC ANALYTICAL DATA FOR GROUND WATER SAMPLES
AT STAUFFER CHEMICAL COMPANY
SILVER BOW, MONTANA (Values in µg/l)
CASE #10163

SAMPLE LOCATION TRAFFIC REPORT SITE LOCATION	SCC-IW-6 HF-451 DNGRDNT	SCC-IW-7 HF-452 DNGRDNT	SCC-IW-4 HF-450 DUP IW-7	SCC-TB-1 HR-454 TRIP BLK	SCC-TB-2 HF-455 TRIP BLK
Methylene chloride	10ub	5ub	9ub	30ub	31ub
Acetone	15ub	4ub	18ub	11ub	8ub
Toluene	5u		3j		

ub - Estimated sample quantitation limit increased. Amount found in sample reported. Compound detected at <5x the amount in blank (<10x for methylene chloride, acetone, toluene and phthalates).

j - The associated numerical value is an estimated quantity because the amount detected is below the required limits or because quality control criteria were not met.

u - The material was analyzed for, but was not detected. The associated numerical value is the estimated sample quantitation limit.

TABLE 3
INORGANIC ANALYTICAL DATA FOR GROUND WATER SAMPLES
AT STAUFFER CHEMICAL COMPANY
SILVER BOW, MONTANA (Values in µg/l)
CASE #10163

SAMPLE LOCATION	SCC-MW-1	SCC-MW-3	SCC-MW-4	SCC-MW-5
TRAFFIC REPORT	MHQ-458	MHQ-460	MHQ-459	MHQ-457
SITE LOCATION	UPGRDNT	DNGRDNT	DNGRDNT	BLANK
Aluminum	29.6	28.0	665	28.0
Antimony	29.0	29.0	29.0	29.0
Arsenic	10.0	[3.8]	2.0uj	2.0
Barium	[7.6]	[56.7]	[166]	3.0
Beryllium	1.0	1.0	1.0	1.0
Cadmium	5.0	5.0	5.0	5.0
Calcium	39,100	69,900	85,100	[230]
Chromium	5.0	5.0	12.9	5.0
Cobalt	5.0	[6.0]	5.0	5.0
Copper	[7.7]	[7.7]	[8.2]	[8.1]
Iron	[36.0]	20.0	564	[42.0]
Lead	[4.1]	5.9	[2.1]j	[2.0]
Magnesium	[3810]	14200	16800	72.0
Manganese	5.0	5.0	68.3	5.0
Mercury	0.2	0.2	0.2	0.2
Nickel	9.0	9.0	9.0	9.0
Potassium	5570	10900	10400	151
Selenium	20.0	2.0uj	2.0j	2.0
Silver	4.0	4.0	4.0	4.0
Sodium	35300	29700	30300	1520
Thallium	[2.9]j	[2.9]j	[2.9]j	[2.9]
Vanadium	[9.4]	[8.4]	[6.5]	[4.6]
Zinc	[17.9]	[15.5]	37.1	[18.4]

uj - Detection limit is estimated because quality control criteria were not met.

j - The associated numerical value is an estimated quantity because the amount detected is below the required limits or because quality control criteria were not met.

[] - Compound is present and was detected. However, the quantity is below the contract required detection limit (inorganic data only).

TABLE 3 Cont.
INORGANIC ANALYTICAL DATA FOR GROUND WATER SAMPLES
AT STAUFFER CHEMICAL COMPANY
SILVER BOW, MONTANA (Values in µg/l)
CASE #10163

SAMPLE LOCATION	SCC-MW-10	SCC-IW-6	SCC-IW-7	SCC-IW-4
TRAFFIC REPORT	MHQ-456	MHQ-454	MHQ-455	MHQ-453
SITE LOCATION	RAMSAY		DUP IW-4	DUP-IW-7
Aluminum	28.0	28.0	28.0	28.0
Antimony	29.0	29.0	29.0	29.0
Arsenic	[5.9]	50.0	38.5	43.6
Barium	[70.3]	[43.1]	[36.6]	[38.8]
Beryllium	1.0	1.0	1.0	1.0
Cadmium	5.0	5.0	5.0	5.0
Calcium	48000	419000	379000	390000
Chromium	5.0	5.0	5.0	5.0
Copper	[11.6]	[9.4]	[8.6]	[6.4]
Iron	20.0	20.0	20.0	20.0
Lead	6.0	2.0uj	2.0uj	2.0uj
Magnesium	11600	79900	73300	76300
Manganese	5.0	3116	416	422
Mercury	0.2	0.2	0.2	0.2
Nickel	[13.2]	9.0	9.0	9.0
Potassium	5370	20600	16900	20000
Selenium	20.0	20.0uj	20.0	20.0uj
Silver	4.0	4.0	4.0	4.0
Sodium	30600	77300	67400	71700
Thallium	[2.7]j	[2.8]j	[2.8]j	[2.8]j
Vanadium	[10.6]	[5.8]	[7.0]	[5.3]
Zinc	[32.9]	[17.2]	23.6	47.0

[] - Compound is present and was detected. However, the quantity is below the contract required detection limit (inorganic data only).

uj - Detection limit is estimated because quality control criteria were not met.

j - The associated numerical value is an estimated quantity because the amount detected is below the required limits or because quality control criteria were not met.

TABLE 4
ORGANIC ANALYTICAL DATA FOR SURFACE WATER SAMPLES
AT STAUFFER CHEMICAL COMPANY
SILVER BOW, MONTANA (Values in µg/l)
CASE #10163

SAMPLE LOCATION TRAFFIC REPORT SITE LOCATION	SCC-SW-1 HF-438 UPSTRM	SCC-SW-2 HF-439 DNSTRM	SCC-SW-3 HF-440 DNSTRM	SCC-OP-1 HF-445 DAM
Methylene chloride	4ub	4ub	5ub	4ub
Acetone	5ub	4ub	4ub	5ub
Toluene	11	12	--	--
bis(2-ethylhexyl)-phthalate			6	--

1080

ub - Estimated sample quantitation limit increased. Amount found in sample reported. Compound detected at <5x the amount in blank (<10x for methylene chloride, acetone, toluene and phthalates).

TABLE 5
INORGANIC ANALYTICAL DATA FOR SURFACE WATER SAMPLES
AT STAUFFER CHEMICAL COMPANY
SILVER BOW, MONTANA (Values in µg/l)
CASE #10163

SAMPLE LOCATION	SCC-SW-1	SCC-SW-2	SCC-SW-3	SCC-OP-1
TRAFFIC REPORT	MHL-995	MHL-996	MHL-997	MHQ-449
SITE LOCATION	UPSTRM	DNSTRM	DNSTRM	ONSITE
Aluminum	[92.9]	229	[114]	28.0
Antimony	29.0	29.0	29.0	29.0
Arsenic	19.9	20.3	21.5	46.4
Barium	[24.4]	[24.8]	[26.7]	[48.9]
Beryllium	1.0	1.0	1.0	1.0
Cadmium	5.0	5.0	5.0	5.0
Calcium	47500	47900	50400	34800
Chromium	[6.9]	[5.5]	5.0	5.0
Cobalt	5.0	[5.1]	5.0	[5.1]
Copper	151	170	157	[8.2]
Iron	556	819	681	300
Lead	[3.2]j	20.9	6.7	2.0uj
Magnesium	11800	11600	11900	65300
Manganese	720	543	482	33.5
Mercury	0.2	0.2	0.2	0.2
Nickel	9.0	9.0	9.0	9.0
Potassium	5380	5380	6290	[21000]
Selenium	2.0uj	2.0uj	2.0uj	2.0uj
Silver	4.0	4.0	4.0	4.0
Sodium	31000	31200	33000	82400
Thallium	2.0uj	2.0	[2.4]	[2.6]j
Vanadium	[4.9]	[6.3]	[5.3]	[4.0]
Zinc	578	470	434	[16.9]

[] - Compound is present and was detected. However, the quantity is below the contract required detection limit (inorganic data only).

uj - Detection limit is estimated because quality control criteria were not met.

j - The associated numerical value is an estimated quantity because the amount detected is below the required limits or because quality control criteria were not met.

TABLE 6
ORGANIC ANALYTICAL DATA FOR SEDIMENT SAMPLES
AT STAUFFER CHEMICAL COMPANY
SILVER BOW, MONTANA (Values in µg/kg)
CASE #10163

SAMPLE LOCATION	SCC-SE-1	SCC-SE-2	SCC-SE-3
TRAFFIC REPORT	HR-441	HR-442	HF-443
SITE LOCATION	UPSTRM	DNSTRM	DNSTRM
Acetone	26ub	35ub	12ub
Methylene chloride	14ub	69ub	190jb
Toluene	4	--	~~680~~
bis(2-ethylhexyl)-phthalate	~~860~~		790j
4-methyl phenol			~~5500~~

ub - Estimated sample quantitation limit increased. Amount found in sample reported. Compound detected at <5x the amount in blank (<10x for methylene chloride, acetone, toluene and phthalates).

jb - The value is an estimated amount detected below required limits and also detected in the blank.

j - The associated numerical value is an estimated quantity because the amount detected is below the required limits or because quality control criteria were not met.

TABLE 7
INORGANIC ANALYTICAL DATA FOR SEDIMENT SAMPLES
AT STAUFFER CHEMICAL COMPANY
SILVER BOW, MONTANA (Values in mg/kg)
CASE #10163

SAMPLE LOCATION	SCC-SE-1	SCC-SE-2	SCC-SE-3
TRAFFIC REPORT	MHL-998	MHL-999	MHL-1000
SITE LOCATION	UPSTREAM	DNSTRM	DNSTRM
Aluminum	2490j	7450j	5610j
Antimony	7.4	12.6	8.6
Arsenic	148j	214j	205j
Barium	52.3	223	200
Beryllium	[0.51]	[0.99]	[0.89]
Cadmium	4.9	10.9j	6.4j
Calcium	1710	4390j	3400j
Chromium	4.9	10.2	8.8
Cobalt	[4.2]	[5.4]	[5.1]
Copper	738	3360	2410
Iron	18200	20300	19100
Lead	155jr	2150jr	980jr
Magnesium	[861]	3140	2510
Manganese	566	2630	1270
Mercury	0.1	0.1	0.1
Nickel	[3.6]	[6.1]	[4.8]
Potassium	[593]	2330	2070
Selenium	0.51uj	0.67uj	0.60uj
Silver	6.2jr	19.9jr	11.6jr
Sodium	389	506	452
Thallium	0.51	0.67	0.60
Vanadium	13.3	29.4	24.3
Zinc	1550	4710	3010j

j - The associated numerical value is an estimated quantity because the amount detected is below the required limits or because quality control criteria were not met.

[] - Compound is present and was detected. However, the quantity is below the contract required detection limit (inorganic data only).

jr - Indicates spike recovery is not within control limits. Indicates the value reported is an estimation (inorganic data only).

uj - Detection limit is estimated because quality control criteria were not met.

TABLE 8
ORGANIC ANALYTICAL DATA FOR SOIL SAMPLES
AT STAUFFER CHEMICAL COMPANY
SILVER BOW, MONTANA (Values in µg/kg)
CASE #10163

SAMPLE LOCATION	SCC-SO-1	SCC-SO-2	SCC-SO-3	SCC-SO-5	SCC-SS-2	SCC-SS-4
TRAFFIC REPORT	HF-446	HF-447	HF-448	HF-449	HF-460	HF-461
SITE LOCATION	OFFSITE	RAMSAY	SILVERBOW	ONSITE	SUBSRFC	SUBSRFC
Methylene chloride	92jb	44jb	70ub	44ub	49ub	39ub
acetone	75ub	71ub	47ub	39ub	2ub	30ub
Toluene	35	30	10	25	8	8
Aroclor-1254		130j				
Phenanthrene				240j		
Anthracene				41j		
Fluoranthene				290j		
Pyrene				210j		
Benzo(a)anthracene				110j		
bis(2-ethylhexyl)-phthalate				87j	~~580~~	170j
Benzo(b)fluoranthene				160j		
Benzo(k)fluoranthene				100j		
Benzo(a)pyrene				160j		
Indeno(1,2,3-cd)-pyrene				100j		
Benzo(g,h,i)-perylene				140j		
Diethylphthalate					120j	

j - The associated numerical value is an estimated quantity because the amount detected is below the required limits or because quality control criteria were not met.

ub - Estimated sample quantitation limit increased. Amount found in sample reported. Compound detected at <5x the amount in blank (<10x for methylene chloride, acetone, toluene and phthalates).

jb - The value is an estimated amount detected below required limits and also detected in the blank.

MT Dpt Soil 52 PAH 4,200 µg/kg
gw .2 µg/L
sw "

TABLE 9
INORGANIC ANALYTICAL DATA FOR SOIL SAMPLES
AT STAUFFER CHEMICAL COMPANY
SILVER BOW, MONTANA (Values in mg/kg)
CASE #10163

SAMPLE LOCATION	SCC-SO-1	SCC-SO-2	SCC-SO-3	SCC-SO-5	SCC-SS-2	SCC-SS-4
TRAFFIC REPORT	MHQ-450	MHQ-499	MHQ-451	MHQ-452	MHQ-461	MHQ-462
SITE LOCATION	OFFSITE	RAMSAY	SILVERBOW	ONSITE	S U B S U R F A C E	
Aluminum	9010j	850j	8160j	9830j	20500j	21700j
Antimony	6.0	[5.9]	[7.3]	12.2	6.0	6.0
Arsenic	92.4j	83.5j	95.2j	10.7j	10.6j	11.6j
Barium	177	199	146	124	171	172
Beryllium	[0.54]	[0.45]	0.39	1.6	1.4	1.9
Cadmium	2.5j	10.3j	1.5j	199j	7.0j	3.2j
Calcium	2650j	7100j	3760j	92400j	57000j	102000j
Chromium	7.8	14.3	8.1	430	97.2	103
Cobalt	[8.2]	[5.9]	[5.8]	2.1	[5.6]	[5.2]
Copper	121	238	143	73.2	23.9	23.2
Iron	8660	12400	9370	6200	10100	7410
Lead	21.4	177jr	50.3jr	65.4jr	8.3	6.4jr
Magnesium	2350	2670	1890	3480	6440	7450
Manganese	1060	500	555	98.5	223	208
Mercury	0.1	0.1	0.1	0.3	0.1	0.1
Nickel	[4.2]	93	[4.2]	60.5	[5.9]	[7.2]
Potassium	2640	3000	1930	3730	5050	5660
Selenium	0.41uj	0.41uj	0.41uj	4.2	4.2uj	1.2jr
Silver	0.82uj	2.2jr	[1.2]jr	9.6jr	[1.9]jr	2.2jr
Sodium	313	310	309	2790	1450	2270
Thallium	0.41	0.41	0.41	4.5	0.42uj	0.41uj
Vanadium	16.4	23.6	19.5	577	123	125
Zinc	119	430j	105j	1270j	193j	144j

j - The associated numerical value is an estimated quantity because the amount detected is below the required limits or because quality control criteria were not met.

[] - Compound is present and was detected. However, the quantity is below the contract required detection limit (inorganic data only).

jr - Indicates spike recovery is not within control limits. Indicates the value reported is an estimation (inorganic data only).

u - The material was analyzed for, but was not detected. The associated numerical value is the estimated sample quantitation limit.

uj - Detection limit is estimated because quality control criteria were not met.

TABLE 10
ANALYTICAL DATA RESULTS FOR
STAUFFER CHEMICAL CO.
FOR RADIONUCLIDES (Values in picocuries per liter)
CASE #10163 - SAS 4055H

WELL #	LOCATION	GROSS ALPHA	RADIUM 226	RADIUM 228	TOTAL URANIUM
SCC-IW-4	dngrdnt	<4j	<1	no data	<5
SCC-IW-7	dngrdnt	11±3j	<1	<1	<2
SCC-IW-6	dngrdnt	<4j	<1	<2	<2
SCC-MW-1	upgrdnt	7.7±1.7j	<1	2.0±0.8	7.9±1.3
SCC-MW-3	dngrdnt	16±2j	<1	1.3±0.9	14±2
SCC-MW-4	dngrdnt	16±4j	<1	<3	20±2
SCC-MW-10	dngrdnt	8.5±1.7j	<1	1.2±0.6	3.7±1.3
SCC-MW-5	blank	<1j	<1	<2	<3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2405

SITE INSPECTION DECISION SHEET

DATE 11/7/89 CERCLIS I.D. # MTD980502785

SITE NAME Stauffer Chem Co

STATE Montana

EPA REVIEWER Ron Bertram STATE REVIEWER Carol Fox

DATE(S) OF SITE INSPECTION 1/10/89

The purpose of this sheet is to document the decision made at the conclusion of a CERCLA Site Inspection with respect to future actions to be taken at the site. If, as a result of this evaluation, the site is likely to score above 28.5 on the Hazard Ranking System (HRS), a Listing Site Inspection (LSI) will be scheduled. If the site is unlikely to score above 28.5, it will be designated "No Further Remedial Action Planned" and the entry NFRAP will be made on CERCLIS. A site will be scheduled for a revised Screening Site Inspection (SSI) if insufficient data exist to determine the likelihood of an HRS score above 28.5. In a revised SSI, key receptor, waste, or release information may be collected, with field efforts aimed at establishing the clear likelihood of receptors being exposed.

As a result of the CERCLA Site Inspection conducted at this site, the following conditions are believed to be present at the site. Check any that apply.

I. WASTE TYPE

- ✓ A. Known Hazardous Substance(s)
- ___ B. CERCLA-exempt Waste(s)
- ___ C. None/Not Found
- ___ D. No Longer On Site
- ___ E. Non-Hazardous Substance
- ___ F. Unknown

II. NATURE OF RELEASE

- ___ A. Observed
- ___ B. Observed but Below HRS Release Threshold
- ✓ Undetermined
- ___ None

III. EXPOSURE/RECEPTOR

___ A. Known

1. Human
__ inhalation
__ drinking water
__ food chain
__ direct contact

2. Environmental
__ sensitive habitat
__ irrigation
__ recreational

___ B. Potential (Route Characteristics)

1. Human
__ inhalation
__ drinking water
__ food chain
__ direct contact

2. Environmental
__ sensitive habitat
__ irrigation
__ recreational

✓ C. ~~Not~~ Eligible

✓ 1. Insufficient population within HRS proximity (distance) for release pathway(s) of concern

__ 2. Receptor population not in physical pathway(s) for exposure to occur

Based on the above findings, a decision can be made as to future action at the site within the Superfund preremedial program.

This site should be designated a candidate for a Listing Site Inspection (LSI) if the following responses were provided: Known Hazardous Substance (IA), Observed Release (IIA), and Known Human Exposure (IIIA-1)

This site should be designated No Further Remedial Action Planned (NFRAP) if the Waste Type was Exempt (IB), None/NotFound (IC), No Longer on Site (IC), or Non-Hazardous (IE), or if the Nature of Release was Below HRS Threshold (IIB) or None (IID), or if the Exposure/Receptor was Not Eligible (IIIC1-2).

This site should be scheduled for a revised SSI if, as a result of the initial SI, there are known hazardous substances (IA), potential exposure/receptors (IIIB), and an undetermined release (IIC). A revised SSI should not be done unless there is evidence to support the actual or potential exposure of an HRS-qualifying receptor, whether or not there is a "release" occurring at the site.

SITE DISPOSITION (circle one)

Disposition LSI (NFRAP) Revised SSI

Comments Referred to RCRA. Less than 1,000 population. Cannot assume a release. Nearest well 1 mile

(Use additional sheets as needed to document decision/status)

CERCLIS File
Stauffer Chemical

DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES

STAN STEPHENS, GOVERNOR

COGSWELL BUILDING

STATE OF MONTANA

FAX # (406) 444-2606

HELENA, MONTANA 59620

Solid & Hazardous Waste Bureau
406-444-2821

December 12, 1989

Ms. Nicki Leiss
702 HWY 10 A West, #5
Anaconda, MT 59711

Dear Ms. Leiss,

Thank you for your concerns involving the Anaconda Smelter Superfund site. Your continued interest in Superfund activities is encouraged.

In response to your question about why the Rhone Poulenc phosphorus plant is not included in the Superfund studies, I have reviewed Department of Health and Environmental Sciences (DHES) files. I also discussed the current status of investigations at the plant with Carol Fox, State Program Manager for state hazardous waste sites.

One of the steps that is taken before a site is considered for Superfund is a site investigation (SI). It is a brief investigation consisting of a very limited field inspection and sampling. The SI is designed to give EPA and DHES a quick look at potential problems.

The EPA conducted a SI at the phosphorus plant in 1988 and released a final report in January 1989. Based on the results of that report, EPA and DHES have determined that contamination problems at the plant do not indicate the need to consider it for Superfund status.

Nevertheless, the plant will be further investigated by DHES. DHES will use the EPA report, some additional information, and prepare a site ranking. The DHES process will rank the plant with other state sites already ranked. Depending on the priority of the ranking, the site will be subject to continued investigation, and remedial cleanup, if required.

At this time, DHES work at the Rhone Poulenc plant is not scheduled. When work is scheduled for the plant, DHES would be happy to inform you of its status.

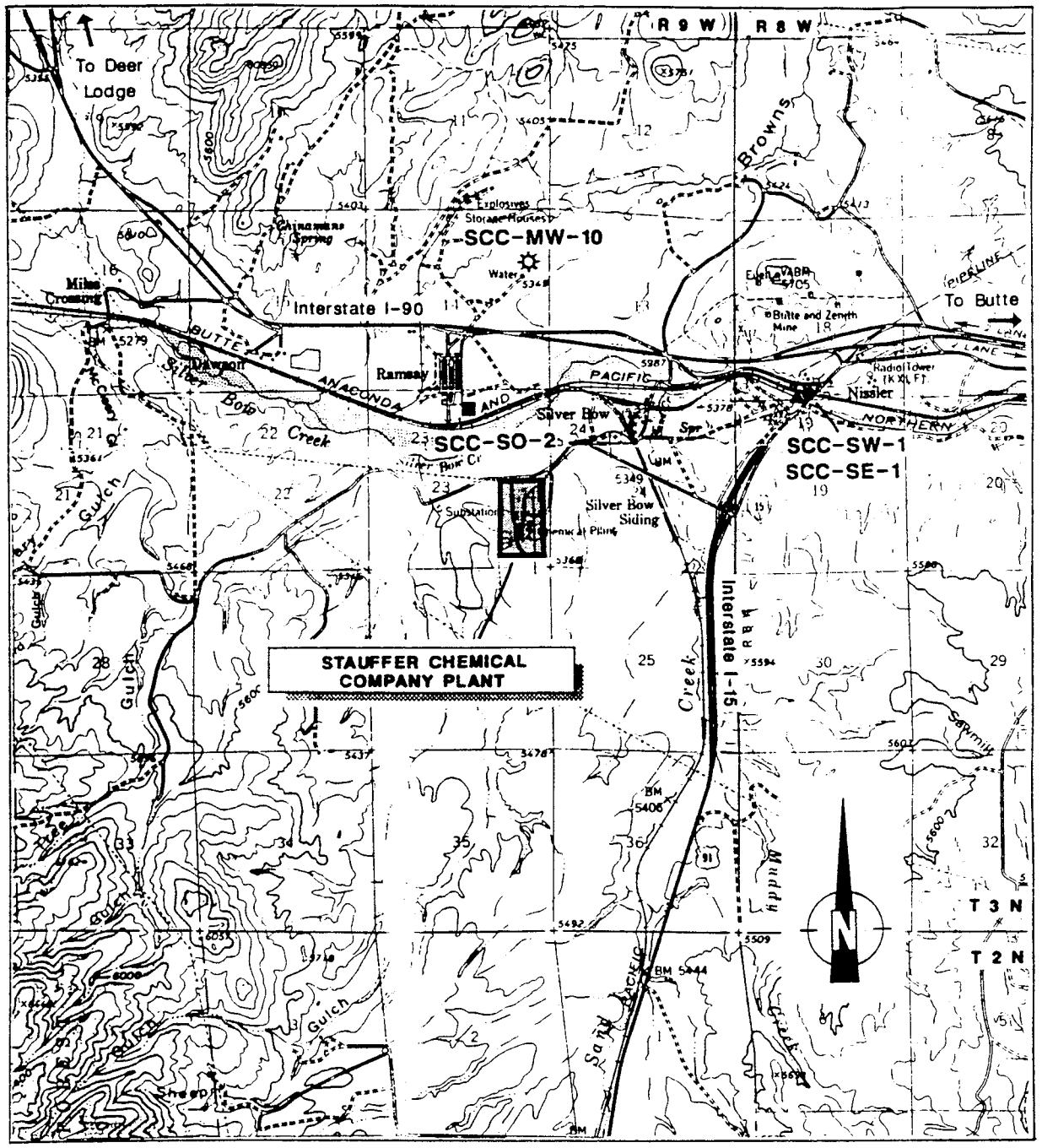
Should you have further questions about the plant or about the state hazardous waste program, please call me or Carol Fox.

Sincerely,

Kevin Kirley

Kevin Kirley, State Project Officer

cc: Carol Fox



Source: Butte South Quadrangle, Montana, USGS, 1961

0 1/2 1 2 Miles

LOCATION MAP

MONTANA

Ramsay

Butte

LEGEND

- Site location
- Existing monitoring well
- Soil sample location
- Surface water sample
- Sediment sample

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

TITLE:

STAUFFER CHEMICAL COMPANY PLANT
Ramsay, Montana

SITE LOCATION MAP

T.D.D. F08-8804-10

ecology & environment, inc.
DENVER, COLORADO

FIG. 1

Date: 01/89 Drawn by: RSM Scale:

Figure 2 missing – See Figure 2 in Appendix H

Appendix 5.1-B

Site Inspection Prioritization, Stauffer Chemical Company, September 24, 1992

(Appendix H of CCRA Report)

Appendix H

Site Inspection Prioritization, Stauffer Chemical Company, September 24, 1992

URS
A PROFESSIONAL SERVICES ORGAN

URS CONSULTANTS
5251 DTC PARKWAY, SUITE 800
ENGLEWOOD, COLORADO 80111-2737
TEL: (303) 796-9700

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PITTSBURGH

September 24, 1992

PRIVILEGED AND CONFIDENTIAL

Prepared at the request of the Rhône-Poulenc Inc. Legal Department for the Purpose of Rendering Legal Advice to Rhône-Poulenc Senior Management

Mr. Robert Heise
Work Assignment Manager
U.S. Environmental Protection Agency
Region VIII, Mail Code (8HWM-SM)
999 18th Street, Suite 500
Denver, CO 80202-2405

Subject: **ARCS VI, VII and VIII, Contract No. 68-W9-0053, WA# 21-8JZZ**
Site Inspection Prioritization and PREscore
Stauffer Chemical Company, Ramsey, Montana

Dear Mr. Heise:

Attached please find a copy of the Final Site Inspection Prioritization Report for Stauffer Chemical Company in Ramsey, Montana. This package includes a PREscore analysis incorporating comments from the State of Montana Department of Health and Environmental Sciences.

The original PREscore, submitted with the Draft SIP, attributed toluene in the Ramsey municipal well (SCC-MW-10) to the SCC site. However, toluene is a contaminant found in many samples including:

- All soil samples (the background had the highest toluene concentration);
- One on-site groundwater sample (SCC-IW-4);
- Both the background and downgradient surface water samples;
- Both the background and downgradient sediment samples (SCC-SE-3 reported a very high concentration of 680 mg/kg).

The attribution of toluene to the SCC site is now identified as a data gap. The toluene found in SCC-MW-10 (2 ug/l, j) was not included in this version of PREscore which dropped the score from 41.42 to 12.92.

This final report is submitted for your review and comments. If you should have any questions concerning this report, please don't hesitate to contact me at (303) 796-9700.

Very truly yours,

URS CONSULTANTS, INC.

John I. Coats
Program Manager

cc: [redacted]
T.F. Staible/URS/Denver w/attachments
Kevin Mackey/URS/Denver w/o attachments
Michael V. Carr/URS/Denver w/attachments
Kathy Weinel/URS/Denver w/attachments
ARCS File/URS/Denver w/attachments

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ARCS

**Remedial Planning Activities
At Selected Uncontrolled
Hazardous Substance Disposal Sites
In The Zone of Regions VI, VII and VIII**

Environmental Protection Agency

Contract No. 68-W9-0053

SITE INSPECTION PRIORITIZATION

STAUFFER CHEMICAL COMPANY
RAMSEY, MONTANA

Work Assignment No. 21-8JZZ

September 24, 1992

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Harza Environmental Services, Inc.
Shannon & Wilson, Inc.
Western Research Institute

SITE INSPECTION PRIORITIZATION

Stauffer Chemical Company
Ramsey, Montana

U.S. EPA Contract No. 68-W9-0053
Work Assignment No. 21-8JZZ

CERCLIS ID #MTD980502785

Prepared By:
Michael V. Carr

URS Consultants, Inc.
5251 DTC Parkway, Suite 800
Englewood, CO 80111-2737

URS DOCUMENT CONTROL NO. 41881.00.67.A3661

Approved: _____ Date: 29 Sep 92
John I. Coats, Program Manager, URS

Approved: _____ Date: 9/29/92
Kevin Mackey, Project Manager, URS

Approved: _____ Date: _____
Ron Bertram, Site Assessment Manager, EPA

RECEIVED
OCT 06 1992
Montana Department of Health
and Environmental Sciences

DISTRIBUTION LIST

ENVIRONMENTAL PROTECTION AGENCY

Robert Heise	Work Assignment Manager, ARCS, EPA Region VIII, WA #21-8JZZ
Ron Bertram (3 copies)	Site Assessment Manager, ARCS, EPA Region VIII, WA #21-8JZZ

URS CONSULTANTS, INC.

Kevin Mackey	Project Manager, ARCS, EPA Region VIII, WA #21-8JZZ
Kathy Weinel	Quality Assurance Coordinator/Analytical Support Coordinator, ARCS, EPA Region VIII, WA #21-8JZZ
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SITE INSPECTION PRIORITIZATION

Stauffer Chemical Company
Ramsey, Montana

TABLE OF CONTENTS

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1.0 INTRODUCTION

URS Consultants, Inc. (URS) has been tasked by the U.S. Environmental Protection Agency (EPA) under the Alternative Remedial Contracts Strategy (ARCS) Contract Number 68-W9-0053 to conduct a Site Inspection Prioritization (SIP) (Work Assignment Number 21-8JZZ) for the Stauffer Chemical Company (SCC), CERCLIS ID Number MTD980502785. The Site Inspection (SI) was conducted for this site from August 1 through August 8, 1988, by the Ecology and Environment, Inc. Field Investigation Team (E&E FIT) and was completed on January 10, 1989. This SIP was assigned on June 9, 1992.

2.0 OBJECTIVES

The purpose of this SIP is to review existing data and identify whether data gaps exist with regard to the Hazard Ranking System (HRS) at the SCC facility and to provide sufficient documentation for the EPA to determine the human health and environmental impacts posed by the SCC site, thus determining the appropriate future course of action.

The results of the SIP will enable the EPA to determine if a site has the potential to qualify for eventual listing on the National Priorities List (NPL).

The specific objectives of the SIP are to:

- Identify, quantify (if possible) and characterize wastes attributable to this site;
- Identify waste availability to each migration pathway;
- Identify whether there is a potential for, or an actual impact on receptor targets; and
- Identify specific data gaps for each migration pathway.

3.0 BACKGROUND

3.1 SITE LOCATION

The SCC site is located in Silver Bow County, Montana, near the city of Ramsey and comprises approximately 860 acres, 300 of which are considered developed (E&E 1988b; E&E 1989). The legal description for the SCC facility is the SE 1/4 of Section 23, Township 3 N, Range 9 W of Silver Bow County, Montana. The SCC facility coordinates are approximately 45° 51' 12" north latitude and 112° 40' 37" longitude. The site is bounded on the south, east and west by rangelands and agricultural lands. Silver Bow Creek and a railroad line form the north boundary (see Figure 1).

3.2 SITE DESCRIPTION

The SCC facility is located on property that is moderately vegetated and slopes gently to the north. At present, the facility is active and is used for the production of phosphorous products. Major features of the SCC facility include four buildings, a 75-acre settling pond, three slag piles, and five buried disposal pits. The facility is enclosed by a security fence.

3.3 SITE HISTORY AND PREVIOUS WORK

The SCC site began operation in 1952 and is an active facility. The facility was originally owned by SCC of Westport, Connecticut. It was sold to a French concern (the Rhône Poulenc Group) in January 1988. The plant is engaged in the production of elemental phosphorous for the food industry.

The phosphate ore is obtained from Wooly Valley, Idaho, and is transported by rail to Silver Bow, Montana. The ore is tested for P_2O_5, silica, and moisture content, and contains approximately 20 percent water that must be reduced to about 5 percent water before the actual enrichment process begins. This enrichment is accomplished by the TVA process. The TVA process is a thermal reduction process based on smelting the ore with carbon and a siliceous mix in electric or blast furnaces. The resultant products are elemental phosphorous, ferrophosphorous, carbon monoxide and a calcium silicate slag. The phosphorous is volatilized, condensed and collected under hot water as a liquid. The ferrophosphorous and calcium silicate slag are tapped periodically from the furnace. Carbon monoxide is used as a fuel in preparing the furnace charge.

The plant obtains process water from five on-site wells completed in the alluvial aquifer. Potable water for workers is provided by a bottled water distributor from Butte, Montana. Water from the production wells on-site has a bacteria content which renders it unsuitable for use as drinking water (SCC 1992).

The 860-acre site contains about 3.5 million cubic yards of slightly radioactive slag (SCC 1992). The slag is stockpiled in two forms. Cobble-sized pieces comprise the bulk of the slag which is piled in a large mound. Two other smaller piles contain granulated slag (coarse sand size) that is used for construction. However, because of the slightly radioactive nature of the slag, the State of Montana, Department of Health and Environmental Sciences (MDHES), has sought to restrict its use as road base construction material in residential areas (E&E 1988a). The slag is apparently exempt from hazardous waste regulation under the mining waste exclusion although the company does hold a small quantity generator status under RCRA for solvents used

in laboratory procedures (SCC 1992). There is a total of 7,500,000 tons of slag and residue stored in piles on the site (E&E 1989).

Drilling and sampling activities were conducted at the SCC facility from August 1 to August 8, 1988. Documentation examined by the E&E FIT prior to the site visit indicated the presence of only two landfills. During the site investigation, the E&E FIT learned there were five landfills. Burial Pit #1 contains phosphorous sludge; Pit #2 and Pit #3 contain precipitator dust from the plant's air scrubbers; Pit #4 contains phosphorous contaminated iron; and Pit #5 contains construction and plant debris. Precipitator dust was not analyzed before burial. However, precipitator dust may not contain phosphorous if the precipitators were performing efficiently. In the past, some precipitator dust was sold as fertilizer (SCC 1992).

Early documentation discusses a landfill that accepted chemical components including acid solutions (pH less than 3), base solutions (pH greater than 12), heavy metals (bonded organically and inorganically), organics, inorganics and miscellaneous waste materials (Ecology and Environment, Inc. (E&E) 1988a; E&E 1989). It is not clear into which of the five landfills this waste was deposited.

The 75-acre on-site settling pond is diked in places to facilitate the settling of process water (including calcium phosphate waste) which contains about 20 percent solids as it leaves the plant. This pond must be dredged every 45 to 60 days to prevent the pond system from becoming filled with silt. Approximately 2,500,000 tons of particulates have been dredged into dikes and piles (E&E 1989). The dredge spoils are used to maintain the dikes within the pond area. The pond was constructed in 1971 with a clay liner and included a dam located on the north side of the pond which was composed of slag facing with a clay core (E&E 1988b).

A Preliminary Assessment of this site was conducted and prepared by the MDHES in 1979 and updated in 1983 (MDHES 1983). The report concluded that the site was not considered a hazard to either the environment or to the population at that time. However, in the past, the State of Montana Air Quality Bureau has cited the plant for violations of visible air emissions standards. The emissions from the tap hole scrubber exceeded 40 percent opacity. Particulates in the emissions may have been phosphorous pentoxide (P_2O_5) (EPA 1992a). The State and SCC negotiated an agreement on penalties for air emissions violations. The EPA penalized SCC for over $200,000 in fines (EPA 1992a) and contracted for two studies involving this facility, including:

- "Evaluation of Radon Sources and Phosphate Slag in Butte, Montana", by MDHES. EPA Contract Number 68-01-6100. June 1983.

- "Emissions of Naturally Occurring Radioactivity, Stauffer Elemental Phosphorus Plant" EPA-520/6-82-09. November 1982. Office of Radiation Programs/Las Vegas.

Field sampling was conducted August 1 through August 8, 1988, by the E&E FIT, with a Report of Sampling Activities generated on September 23, 1988 (E&E 1988b). An Analytical Results Report (ARR) was completed in 1989 (E&E 1989). This investigation involved the collection of six groundwater samples, four surface water samples, four soil samples, three sediment samples and two borings into on-site burial areas (see Figures 1 and 2).

The analytical results of this site investigation indicate the presence of contaminants in area groundwater, soils, surface water and sediment. On-site waste samples, particularly SCC-SO-5, which is a dredged pond sample, contain high concentrations of cadmium, chromium, nickel,

selenium, thallium, vanadium and zinc. This sample also contained polyaromatic hydrocarbon (PAH) contamination in concentrations above the detection limits but below the contract required detection limit (CRDL) (E&E 1989). In addition, field instrumentation indicated higher levels of radioactivity in sample SCC-SO-5 than levels found in surrounding background soils.

Potential releases to groundwater include arsenic, manganese, gross alpha and total uranium. Arsenic and manganese exceeded background concentrations in the deep industrial wells. Manganese exceeded background concentrations in SCC-MW-4. A two-fold increase of gross alpha and total uranium occurred in downgradient wells SCC-MW-3 and SCC-MW-4 when compared to upgradient well SCC-MW-1.

Toluene was detected in all media sampled. The concentration of toluene in the downstream sediment sample SCC-SE-3 was significant. The concentration of toluene detected in this sample was 680 μg/kg which is 170 times the background concentration. These data are significant; however, attribution of toluene to the SCC facility is difficult. A better understanding of contaminant source areas near the facility may assist in verifying the presence of toluene releases from the SCC site.

Lead, copper, manganese, magnesium and potassium concentrations in the downstream sediment samples were significantly elevated above upstream sample concentrations. These results are inconclusive due to the highly mineralized soils that are indigenous to the area. However, these results are indicative of contaminant contribution to nearby drainages.

3.4 SITE GEOLOGY

The extensive alluvium along Silver Bow Creek merges into the alluvium deposited in the Silver Bow Basin and adjacent valleys. These deposits include valley fill, landslide debris, talus and fan gravels. The valley fill consists of heterogeneous, unconsolidated and discontinuous layers and lenses composed of mixtures of sand, silt, clay and fine gravel. Logs of wells in the alluvium can be correlated only over short distances owing to the discontinuous nature of the alluvial layers (State of Montana, Bureau of Mines and Geology 1969).

Rocks of quartz monzonite composition and texture are exposed throughout the basin. The Butte quartz monzonite is the most widespread of the granitic rocks. The monzonite is composed of equal amounts of plagioclase and K-feldspar and is relatively dark with an equigranular to porphyritic texture. There are several other granitic rock types present. The rock types include granodiorite, granite, porphyritic quartz latite and alaskite cut by small intrusions of alaskite, aplite and pegmatite.

All of the granitic rocks in the basin are conspicuously fractured and jointed where exposed in outcrops. Deep weathering occurs along the fractures. The extensive fracturing makes these rocks capable of storing and transmitting water. Groundwater is known to be available from the alluvium and most granitic rocks in the area will yield water from the fractures (State of Montana, Bureau of Mines and Geology 1969).

3.5 SITE HYDROGEOLOGY

The principal water-bearing formation in the area of investigation is the unconsolidated alluvium. The extensive alluvium along Silver Bow Creek merges into alluvial deposits consisting of valley fill, landslide debris, talus and fan gravels. The valley fill is heterogeneous, consisting of unconsolidated and discontinuous layers and lenses composed of mixtures of sand, silt, clay and fine gravel. Drillers' logs of wells in the alluvium can be correlated only over short distances due to the discontinuous nature of the alluvial strata. The alluvial fill in the area of the site was in excess of 300 feet thick. Geophysical surveys have indicated bedrock depths ranging between 600 and 880 feet below ground surface in portions of the valley (State of Montana, Bureau of Mines and Geology 1969).

Groundwater in the area is recharged from precipitation and snowmelt runoff. Blacktail Creek and Silver Bow Creek are both gaining water in their lower reaches which indicates discharge from the adjacent aquifer. Water levels at the floodplain level of Silver Bow Creek were approximately 29 feet below ground surface. This water level measurement may not be representative of average conditions because of the extremely low precipitation during the winter and spring. Hydrologic data compiled from the Hydrology Division of the State of Montana, Bureau of Mines and Geology, indicate that transmissivity in the area ranged between 110 gallons per day (gpd)/ft and 1,646 gpd/ft. Areal groundwater flow direction is to the north (State of Montana, Bureau of Mines and Geology 1969).

The effective porosity of the alluvial aquifer is estimated at 15 percent, with a calculated transmissivity of between 16,000 gpd/ft to 54,000 gpd/ft (State of Montana, Bureau of Mines and Geology 1969). Recovery of much of the water is not economical because of excess pumping lift.

The water along Silver Bow Creek is severely polluted due to housing development and septic tank utilization (State of Montana, Bureau of Mines and Geology 1969). Silver Bow Creek is a listed NPL site due to historical mining practices near Butte, upstream from the SCC site (EPA 1990).

3.6 SITE HYDROLOGY

Surface water on site consists of two ponds, the clay-lined settling pond and a small pond in front of the dam face. Water flows to the north and drains into Silver Bow Creek near the northwestern boundary of the facility (see Figure 2). The settling pond is the most significant surface water body in the area and it may be of considerable concern because of the low pH (2-3) of the standing water observed at the dammed north end of the settling pond. Lime is added to the discharge water through a slaker system as it leaves the plant to bring the liquid up to a pH of approximately 6. The settling pond water may be a source of recharge for the underlying aquifer. Surface drainage in this area of the valley trends to the north to Silver Bow Creek. It is uncertain whether surface drainage feeds the small pond. Topographic maps of the area show an ephemeral stream that bypasses both ponds. However, the E&E FIT stated that the surface drainage in the area entered the small pond just north of the dam (E&E 1989). The small pond then drains to the northwest via a natural gully to its confluence with Silver Bow Creek, located approximately one quarter mile to the northwest of the facility (E&E 1989). Silver Bow Creek is a listed NPL site (EPA 1990). Silver Bow Creek flows from east to west through the heavily mineralized and mined area surrounding Butte, Montana, approximately eight miles to the east of the SCC facility. Near Butte, the average daily flow rate for Silver Bow Creek in 1988 was approximately 20 cubic feet per second (U.S. Geological Survey (USGS) 1989f).

3.7 SITE METEOROLOGY

The SCC site receives moderate precipitation. The average annual precipitation rate is 24 inches (U.S. Department of Commerce (USDOC) 1983). The mean annual lake evaporation is approximately 26 inches (USDOC 1983). These two factors yield an annual net precipitation value of -2 inches, corresponding to an HRS factor value of 1. The two-year, 24-hour rainfall for the SCC site is approximately 1.25 inches (Dunne and Leopold 1978).

4.0 PRELIMINARY PATHWAY ANALYSIS

In order to assess this facility's potential impacts on nearby ecosystems, populations and resources, URS has been tasked to perform a pathway-by-pathway assessment of the potential human health and environmental impacts posed by the SCC site. This assessment will consider potential site impacts on the air pathway, groundwater pathway, surface water pathway and soil exposure pathway utilizing HRS guidelines.

4.1 SITE WASTE QUANTITY AND CHARACTERISTICS

For the purpose of this SIP, URS has identified the following source areas on site. Specifically, URS considers the five burial pits, the 75-acre settling pond and the slag piles to be areas of concern. These sources are composed of phosphorous slag, pure phosphorous, precipitator dust, and liquids with a very low pH contaminated with heavy metals and organics. Based on E&E reports, 3.5 million cubic yards of slightly radioactive slag is stockpiled on the SCC site. This slag has toxic and ignitable characteristics. Waste quantities in burial Pits #1 through #5 are estimated to be 2,000; 60; 15,500; and 500 tons, respectively (E&E 1989). The burial pit

samples contained organics such as bis (2-ethylhexyl) phthalate and diethylphthalate and inorganics such as beryllium, calcium, chromium, magnesium, selenium, sodium and vanadium. The 75-acre settling pond sediment also contained high concentrations of chromium, and detectable concentrations of mercury, cadmium, vanadium, zinc, selenium, thallium, and nickel. This sample also indicated the presence of several PAH compounds (E&E 1989). In the following sections, URS will evaluate the containment value of these sources with regard to the air, groundwater, surface water and soil exposure pathways.

Analysis of samples collected from the site area have established the presence of arsenic, toluene and metals on site.

4.2 AIR PATHWAY

The SCC facility has been permitted for air releases from its furnace stacks (E&E 1989). No ambient air monitoring has been performed at this facility except for field observations of opacity. Failure of these field checks for opacity led to fines from EPA and the State of Montana and to the installation of new stack scrubbers (E&E 1988a; EPA 1992a; MDHES 1992a). Point source (stack) tests have been performed and the SCC facility has been in compliance with regulatory standards (MDHES 1992a). PM10 tests in Butte have shown the SCC facility is a minor contributor to the air quality problem in the Butte area and the SCC facility has been included in the State Implementation Plan for Montana (MDHES 1992a).

4.2.1 Containment

The air pathway was evaluated based on potential to release.

Wastes contained in the pond, piles and pits are available to the air pathway via particulate migration. Pond sediments may be exposed as pond liquid levels fluctuate slightly with plant process activities (SCC 1992). Analysis of pond sediments has confirmed high metal as well as PAH contamination. Inorganic data analysis for soil samples obtained from burial Pit #2 and Pit #4 indicate high concentrations of chromium. The burial pits were capped with plastic, slag material, soil and vegetation in the 1970s (SCC 1992). The slag piles contain radioactive phosphorous slag and cobble-sized and coarse sand-sized material. These piles do not have covers of any type. On-site soils may have become contaminated by migration from the pond, piles and pits. On August 6, 1988, during the E&E FIT sampling effort, the site experienced a brief period of gusty winds that blew dust throughout the site (E&E 1988b).

4.2.2 Waste Quantity and Characteristics

The slag piles contain more than 3.5 million cubic yards of phosphorous material, a portion of which is sand-sized. Elemental phosphorous has moderate toxicity and persistence in the environment with low bioaccumulation but high ecotoxicity (Superfund Chemical Data Matrix (SCDM) 1991). Sediments from the pond area were found to contain detectable concentrations of phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, benzo(b)anthracene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene. All of these compounds were

qualified with a "j" as estimated quantities because either the amount detected was below the required limits or quality control criteria were not met. These PAH compounds tend to have high gas and particulate migration potential, moderate toxicity and ecotoxicity values, and moderate persistence. The sediments were also found to contain high concentrations of chromium, mercury, cadmium, vanadium, zinc ("j" qualifier), selenium, thallium, nickel and higher than background levels of radioactivity. Lead and silver were also present at levels greater than three times background concentrations but these concentrations were qualified with a "jr" for estimated quantities due to poor spike recovery. All the metals have moderate to high levels of mobility, toxicity and persistence (SCDM 1991). The quantity of contaminated sediments is currently undetermined. The waste piles were covered in the 1970s with plastic and capped with slag material, soil and vegetation (SCC 1992).

4.2.3 Target Population

During this evaluation, URS has been able to identify approximately 200 households (USGS 1989a; USGS 1989b; USGS 1989c; USGS 1989d) with more than 500 residents living within the four-mile target distance limit (USDOC, Bureau of the Census 1990). Targets are selected based on a 4-mile radius from the facility. Data from the 1990 U.S. Census (2.39 persons per household for Silver Bow County) is compiled with a housing count taken from USGS topographic maps to gain an estimate of the population at risk to contaminant exposure via the various pathways (USDOC, Bureau of the Census 1990). Air sampling data have not been collected within this area.

4.2.4 Air Pathway Specific Data Gaps

URS has identified the following areas where site-specific data is lacking:

- Waste quantity with regard to exposed pond sediments;
- Contamination of on-site soils; and quantification of those soils;
- A more accurate evaluation of receptor targets and sensitive and human environments within the specified target distance limits would greatly assist in evaluating this site's impact upon the surrounding area;
- Records or analytical results of emission stack sampling and soil sampling would help to quantify and characterize possible contamination from facility process emissions.

4.3 GROUNDWATER PATHWAY

The groundwater pathway was evaluated based on observed release by chemical analysis. In August 1988, the E&E FIT installed three monitoring wells to sample groundwater at both upgradient and downgradient locations on site. Well SCC-MW-1 was installed southwest of the settling pond as a background location to assess hydrogeologic conditions in the aquifer. Sample results were qualified as "ub" for all organic results ("ub" qualifiers are for compounds detected at less than five times the amount in the blank). Locations SCC-MW-3 and SCC-MW-4 were installed downgradient and north of the facility between existing production wells (see Figure 2).

The SCC-MW-4 organic analysis detected 3 µg/l bis (2-ethylhexyl) pthalate, qualified with a "j." This compound is a common contaminant which is usually the result of samples coming into contact with plastic or plastic liners including PVC well casing materials (E&E 1989). Toluene was detected in SCC-MW-10 (2.0 µg/l "j") and SCC-IW-4 (3.0 µg/l "j") at Level II concentrations. The inorganic analysis indicated an aluminum concentration in SSC-MW-4 (665 parts per billion (ppb)) that was over 20 times the background value found in SSC-MW-1 (29.6 ppb). Arsenic found in two of the facility production wells (SSC-IW-4 at 43.6 ppb and SSC-IW-6 at 50.0 ppb) was four to five times background concentrations (10.0 ppb). Calcium concentrations in these wells were 10 times background levels, chromium in SSC-MW-4 was 2.5 times background concentrations, iron in SSC-MW-4 was 15 times background levels, magnesium in SSC-IW-4 and SSC-IW-6 was approximately 20 times background concentrations, manganese ranged from 13 to 600 times background levels, and potassium was up to 3.7 times background concentrations (E&E 1989). Two- to three-fold releases of gross alpha and total uranium occurred in SCC-MW-3 and SCC-MW-4. Barium was found in concentrations of more than three times background concentrations in all wells. However, these results were qualified with "[ ]" indicating that the detected quantity was below the CRDL.

4.3.1 Containment

On-site source areas for contaminant migration to the groundwater pathway consist of the 75-acre settling pond, the five burial pits and the slag piles. Wastes contained in these areas are readily susceptible to infiltration and migration through the local groundwater aquifer. The alluvial aquifer lies 25 to 30 feet below the site surface and 10 to 15 feet below the lowest point of known contaminant deposition. Geologic materials include valley fill, landslide debris, talus and fan gravels. The valley fill

consists of heterogeneous, unconsolidated and discontinuous layers and lenses of mixtures of sand, silt, clay and fine gravel (State of Montana, Bureau of Mines and Geology 1969).

The settling pond and dam have clay liners. However, a small pond below the settling pond is present, possibly created as a result of seepage through the dam (Eddy 1992). The 1989 sampling effort found that only magnesium and potassium were three times greater than background concentrations in surface water samples taken from the small pond (E&E 1989). The SCC facility claims that the small pond is a natural wetland area (SCC 1992). If the dam is leaking, the liner under the pond may also be leaking. The burial pits do not have liners under the buried material (SCC 1992).

4.3.2 Waste Quantity and Characteristics

Wastes from on-site sources are available to migration via the groundwater pathway. On-site soil samples from the pond and from two of the burial pits (SCC-SO-5, SCC-SS-2, SCC-SS-4) had high levels of chromium that were also found in monitoring well SCC-MW-4. One or more of these three on-site soil samples also had three times the background concentrations of calcium (102,000 mg/kg with a "j" qualifier), magnesium (7,450 mg/kg), and zinc (1,270 mg/kg with a "j" qualifier). These compounds were also found in at least one groundwater well at more than three times background levels. An approximate estimate of wastes in the three areas is 3.5 million cubic yards of phosphate slag, five burial pits containing approximately 1,000 square yards of facility process wastes and garbage, and the 75-acre settling pond holding 225 acre feet of low pH liquids (E&E 1988b).

4.3.3. Target Population

The population potentially impacted by groundwater contamination consists of several small communities located within a four-mile radius of the SCC facility. These communities include Rocker, Nissler, Silver Bow, Ramsey and Miles Crossing (from upgradient to downgradient respective locations along Silver Bow Creek) as well as several isolated private residences (USGS 1989a; USGS 1989b; USGS 1989d). Ramsey is the only community with a municipal well. Specific population data are unavailable but it would appear that more than 60 people live in Ramsey (USGS 1989b; USDOC, Bureau of the Census 1990). Rocker is connected to the Butte community water system that is piped from the Big Hole River (Silver Bow County Public Works 1992; E&E 1989). Silver Bow, Nissler and Miles Crossing have private well systems for drinking water as do all private residences located within the four-mile target limit. The total population potentially affected by groundwater contamination is more than 300 people (E&E 1989; USDOC, Bureau of the Census 1990; USGS 1989a; USGS 1989b; USGS 1989d) and may be as many as 500 people (E&E 1989). The nearest drinking water well is located approximately one-half mile from the SCC facility (E&E 1989).

4.3.3.1 Wellhead Protection Area

The SCC and its associated sources do not lie within a specified wellhead protection area (MDHES 1992b).

4.3.3.2 Resource Use

Groundwater within the specified four-mile target distance limit is used for irrigation and industrial purposes (E&E 1989; EPA 1992b).

4.3.4 Groundwater Pathway Specific Data Gaps

After performing an analysis of all potential site-related waste sources and associated receptor targets, URS has identified the following areas where site-specific HRS data is lacking:

- Containment integrity of pond and burial pits;
- Waste characteristics of the settling pond;
- Waste quantity and characteristics of all five burial pits; and
- Determining source attribution of toluene, aluminum, arsenic, manganese, and zinc concentrations found in the facility production wells.

4.4 SURFACE WATER PATHWAY

The 1988 sampling effort by the E&E FIT took four surface water and three co-located sediment samples. One location, SCC-SW-1 and SCC-SE-1 (see Figure 1), was placed near Nissler as a background sample. One sample was taken from the small pond below the dam (SSC-OP-1) and

the other two locations (SCC-SW-2 and SCC-SW-3) were along Silver Bow Creek, above and below the point of entry of the drainage from the small pond (see Figure 2).

The inorganic analyses detected 20.9 μg/l of lead in SCC-SW-2 which is five times the background level in SCC-SW-1 (3.2 μg/l with a "j" qualifier). Organic compounds detected in the surface water samples included acetone, methylene chloride and toluene in SCC-SW-1 and SCC-SW-2 although both methylene chloride and acetone were qualified "ub." Bis (2-ethylhexyl) phthalate was detected at 6 μg/l in SCC-SW-3; however, this compound is a common laboratory and environmental contaminant (E&E 1989). The concentrations of toluene in SCC-SW-1 (upstream) and SCC-SW-2 were almost equal.

Toluene was found in all sediment samples (including upgradient locations) with the highest concentration found downgradient at SCC-SE-3 (680 μg/kg) at 170 times the background concentration. SCC-SE-3 also contained a significant concentration of 4-methyphenol (5,500 μg/kg), but the value for the background location analysis (860 μg/kg) is qualified with a "u." Bis (2-ethylhexyl) phthalate was found at both SCC-SE-1 (background) and SCC-SE-3.

Inorganic analyses of sediment samples found barium (225 mg/kg), copper (3,360 mg/kg), magnesium (3,140 mg/kg), and manganese (2,630 mg/kg) at approximately four times the background levels at SCC-SE-1 (52.3 mg/kg, 738 mg/kg, 861 mg/kg and 566 mg/kg, respectively). Although flagged with a "j" qualifier as estimated, lead concentration at SCC-SE-2 (2,150 mg/kg) was 13.8 times background concentrations, silver (6.2 mg/kg) was 3.2 times background levels and aluminum (7,450 mg/kg) was 3 times background concentrations. Potassium (2,330 mg/kg) and zinc (4,710 mg/kg) were also found to be at least three times background concentrations.

High sediment arsenic levels (148 to 214 mg/kg) were found both upstream and downstream of the site.

4.4.1 Containment

The surface water pathway was evaluated based on observed release through chemical analysis. Source areas are the same as discussed in the previous pathways: the settling pond, five burial pits and the slag piles. Wastes contained in these sources are available to surface water migration via overland flow/flood and possibly groundwater to surface water. (Creeks in the region tend to gain water in their lower reaches (State of Montana, Bureau of Mines and Geology 1969)). Surface drainage in this area of the valley trends to the north. One ephemeral stream flows to the west of the settling pond and may enter the small pond below the dam (E&E 1989). From the small pond, it appears that surface water runs about 0.25 mile to Silver Bow Creek via a natural gully (E&E 1988b). There are no engineered and maintained surface water run-on or runoff controls on the site excluding the settling pond dam.

4.4.2 Waste Quantity and Characteristics

Wastes in the on-site source areas have not been adequately characterized although radioactive phosphorous from facility processes comprises a large portion of the waste (E&E 1988; E&E 1989). Various metals (see Section 4.4, Surface Water Pathway) and toluene were detected in samples on or near the site in low to moderate levels. These wastes are available to migration via the surface water pathway. Toluene has a low toxicity and persistence but metals generally are high in toxicity values and are very

persistent in the environment. Some of these contaminants also have high bioaccumulation values in the food chain (SCDM 1991). Source quantity was discussed in Section 4.1, Site Waste Quantity and Characteristics.

4.4.3 Drinking Water Threat

The drinking water threat is used to evaluate the threat associated with the actual or potential release of hazardous substances from a site to drinking water resources. Surface water in this region does not appear to be used as a drinking water source (Silver Bow County Public Works 1992) as Silver Bow Creek is a Superfund site currently listed on the NPL (EPA 1990). Contaminants typically found in Silver Bow Creek include metals such as lead, arsenic, cadmium, copper, and zinc. All surface water samples (SCC-SW-1, SCC-SW-2, SCC-SW-3, SCC-OP-1) exceeded the SCDM Reference Dose Screening Concentrations and Cancer Risk Screening Concentration for drinking water which would give a Level I release (SCDM 1991). However, these values were not greater than three times the background levels. Lead in SCC-SW-2 (20.9 μg/l) was more than three times background concentrations as were magnesium (65,300 μg/l) and potassium (21,000 μg/l) in SCC-OP-1 and toluene (680 μg/kg) and 4-methylphenol (5,500 μg/kg) in SCC-SE-3. The 4-methylphenol value also exceeds the SCDM Drinking Water Reference Dose Screening Concentration which results in a Level I release (SCDM 1991). Organic compounds are not usually found in creek samples (EPA 1992b). Average annual discharge of Silver Bow Creek at Blacktail Creek below Butte was 16,810 acre feet per year for 1983 to 1989 (23 cubic feet per second) (USGS 1989f), which classifies the creek as moderate in size with a low dilution factor (Office of the Federal Register 1990).

4.4.4 Human Food Chain Threat

The human food chain threat is used to evaluate the threat associated with the actual or potential release of hazardous substances to surface water containing human food chain organisms. Aquatic life forms are severely limited and many fish kills have occurred in Silver Bow Creek in the past (EPA 1990). Presently, there are no fish and only limited macro-invertebrate life is present downstream in Silver Bow Creek to at least Warm Springs Ponds near Anaconda (EPA 1992b). Surface water from Silver Bow Creek is of such poor quality that it is not generally used for stock watering (EPA 1992b).

4.4.5 Environmental Threat

The environmental threat is used to evaluate the threat associated with the actual or potential release of hazardous substances from a site to sensitive environments specified by state and federal statutes. An evaluation of the watershed has not revealed the presence of sensitive environments within the specified downstream target distance limit (EPA 1992b).

Ducks and other waterfowl have been observed on the waters of the settlement pond. A dead bird, possibly a blue heron, was seen on the service road which surrounds the pond (E&E 1989).

4.4.6 Surface Water Pathway Specific Data Gaps

After performing an analysis of all potential site-related waste sources, URS has identified the following areas where site-specific HRS data is lacking with regard to the SCC site contaminant contribution to the surface water pathway:

- Attribution of the high toluene concentration found at SCC-SE-3 and the toluene present in all media samples;
- Containment integrity of the clay core in the settling pond dam;
- Identification of all probable points of entry to Silver Bow Creek of possibly contaminated surface water (slag sold for road bed was stored north of the facility next to Silver Bow Creek, upstream of E&E's downgradient surface water and sediment sample locations);
- Definition of possible wetland boundaries along the drainage from the settling pond to Silver Bow Creek;
- More extensive characterization of background water quality; and
- Surface water drainage patterns.

4.5 SOIL EXPOSURE PATHWAY

The soil exposure pathway was evaluated based on an observed release by chemical analysis. In August 1988, the E&E FIT collected three soil samples from communities located off site (SCC-SO-1 from Rocker township, SCC-SO-2 from Ramsey and SCC-SO-3 from Silver Bow). A dredged soil/sediment sample was taken from the facility settling pond (SCC-SO-5) and two subsurface samples were taken from two of the five burial pits (SCC-SS-2 and SCC-SS-4).

Organic compounds detected in the soils included methylene chloride, acetone, toluene and Aroclor-1254. With the exception of Aroclor 1254, the aforementioned compounds were common to all soil samples. As mentioned previously, methylene chloride and acetone are probably a result of laboratory contamination (E&E 1989).

SCC-SO-1 was obtained about one mile east of the chemical plant and contained a comparatively high concentration of toluene, 35 μg/kg. The presence of toluene as a persistent contaminant of the environment around this facility does not appear to be directly attributable to the SCC plant. Toluene was detected in the background soil sample and upstream of the SCC facility in the Silver Bow Creek background surface water sample.

SCC-SO-2 also contained high levels of toluene (30 μg/kg). Aroclor-1254 (a polychlorinated biphenyl (PCB)) was detected at 130 ppb, which is below the CRDL for soils. The SCDM cancer risk screening concentration is 76 μg/kg, thus, this is a Level I release (SCDM 1991). This finding is significant because the sample was taken within 100 feet of an electrical substation located southeast of Ramsey and may indicate a possible problem with PCB-contaminated transformer oil in the area.

Soil samples collected from the dredged pond sediments (SCC-SO-5) revealed PAH contamination including phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene and benzo(g,h,i)perylene in concentrations above instrument detection limits but below the CRDL. These PAH results were qualified with a "j" to indicate that these concentrations were estimated. The presence of these compounds may be attributable to the addition of carbon in the TVA process used at the SCC facility.

Inorganic data analyses indicate that soil samples obtained from burial Pit #2 and Pit #4 (SCC-SS-2 and SCC-SS-4, respectively) and SCC-SO-5 (sediment dredged from the settling pond) contained very high concentrations of total chromium (97.2 mg/kg, 103 mg/kg and 430 mg/kg, respectively) when compared with the background level (SSC-SO-1 at 7.8 mg/kg) and other surface soils. All arsenic values were estimated ("j" qualifier). Off-site soils SCC-SO-1 (92.4 mg/kg), SCC-SO-2 (83.5 mg/kg) and SCC-SO-3 (95.2 mg/kg) were higher than on-site arsenic (SCC-SO-5 at 10.7 mg/kg). All values are higher than the mean value (5.5 ppm) for the western United States (USGS 1984). Previous EPA investigations have established that arsenic levels for Silver Bow County and especially Butte are abnormally high. All values for arsenic exceeded the SCDM Cancer Risk Screening Concentration of 0.33 mg/kg (SCDM 1991).

The mercury (0.3 mg/kg), cadmium (199 mg/kg with "j" qualifier), vanadium (577 mg/kg), zinc (1,270 mg/kg with "j" qualifier), selenium (4.2 mg/kg), thallium (4.5 mg/kg) and nickel (60.5 mg/kg) results for SCC-SO-5 are also above the mean for soils in the western United States (USGS 1984). These values may be associated with the manufacturing process for elemental phosphorous or with the ore itself. Beryllium (1.9 mg/kg), calcium (102,000 mg/kg with "j" qualifier), chromium (430 mg/kg), magnesium (7,450 mg/kg), selenium, sodium (2,790 mg/kg)

and vanadium concentrations were much higher in on-site soil samples than those taken from nearby communities (E&E 1989). Beryllium also exceeded the SCDM Cancer Risk Screening Concentration of 0.14 mg/kg (SCDM 1991).

4.5.1 Containment

The soil exposure pathway was evaluated based on the containment of on-site sources and the presence of observed contamination on both on- and off-site soils. This pathway evaluates the relative risk to people who come into direct contact with site-related soil or wastes containing hazardous substances. Some source areas evaluated with regard to the soil exposure pathway, such as the burial pits, are covered by a permanent, or maintained, essentially impermeable material (plastic, soil, and vegetation) and may not be considered accessible or available to evaluation utilizing soil exposure criteria. Other sources, such as the slag piles and the settling pond piles, do not have maintained covers and are exposed to the environment.

4.5.2 Waste Quantity and Characteristics

Source areas on the facility which appear available for evaluation using soil exposure criteria have been discussed in Sections 4.1, 4.2.2, 4.3.2 and 4.4.2. Adequate cover on the burial pits may eliminate migration of contaminants by the soil exposure pathway.

4.5.3 Target Population

4.5.3.1 Resident Population

The population potentially impacted by soil exposure consists of workers and possibly terrestrial sensitive environments potentially exposed to Level I concentrations of arsenic and beryllium and Level II concentrations of the contaminants discussed in Section 4.5, Soil Exposure Pathway (SCDM 1991).

The number of SCC facility workers varies between 150 and 250 people (SCC 1992).

4.5.3.2 Nearby Population

The number of individuals who live or attend school within a one-mile travel distance of the SCC facility is estimated to be 200 people (E&E 1989; USGS 1989a; USGS 1989b; USGS 1989d). The site is not used by the surrounding population and appears to have adequate access barriers (E&E 1988b; E&E 1989).

4.5.4 Soil Exposure Pathway Specific Data Gaps

After evaluating all potential site sources and associated resident populations and nearby population targets, URS has identified the following data gaps which need to be addressed prior to development of an accurate soil exposure pathway evaluation.

Specific elements that require further data acquisition are:

- The extent of surface soil contamination (SCC-SO-5 shows contamination is present but not the extent);

- Attribution of arsenic found in off-site soils;

- Accurate assessment of targets and the containment cover integrity of burial pits.

5.0 SUMMARY

The SCC site preliminary pathway analysis has identified several areas of environmental concern associated with this facility. The evaluation of pathways has identified the presence of documented releases of contaminants to the groundwater, surface water and soil exposure pathways. Receptor targets potentially affected by this site include 150 to 250 workers at the facility, up to 500 residents in nearby communities and isolated homes, and possible wetlands associated with surface water ponds on the site.

During this evaluation, URS has identified the following data gaps that currently exist:

- Air sampling data, particulates from stack emissions (air pathway);
- Accurate waste quantification and characterization (air pathway, groundwater pathway, surface water pathway, and soil exposure pathway);
- Attribution of high arsenic concentrations in off-site soils and in on-site production wells (groundwater pathway and soil exposure pathway);
- Attribution of toluene detected in all media sampled (air pathway, groundwater pathway, surface water pathway, and soil exposure pathway);
- Attribution of observed releases of metals to the groundwater, surface water and soil pathways (groundwater pathway, surface water pathway, and soil exposure pathway);
- Containment integrity of pond liner and dam core (groundwater pathway and surface water pathway);
- Source of liquid in small pond; i.e., natural drainage or seepage from settling pond (groundwater pathway and surface water pathway);
- Surface water drainage patterns (surface water pathway);

- Thickness and integrity of burial pit cover (air pathway, groundwater pathway, surface water pathway, and soil exposure pathway);
- Definition of all probable points of entry of site surface water runoff to Silver Bow Creek (surface water pathway);
- Further assessment and characterization of background water quality (groundwater pathway);
- Definition of all possible wetlands associated with nearby surface water bodies (surface water pathway);
- Attribution of widespread toluene contamination (groundwater pathway, surface water pathway, and soil exposure pathway); and
- The extent of soil contamination (soil exposure pathway).

6.0 LIST OF REFERENCES

Dunne, Thomas and Luna B. Leopold. 1978. "Water and Environmental Planning." W.H. Freeman and Company, San Francisco.

Ecology and Environment, Inc. (E&E). 1988a. "Sampling Plan for the Stauffer Chemical Company," prepared by Robert Eddy, April 15, 1988.

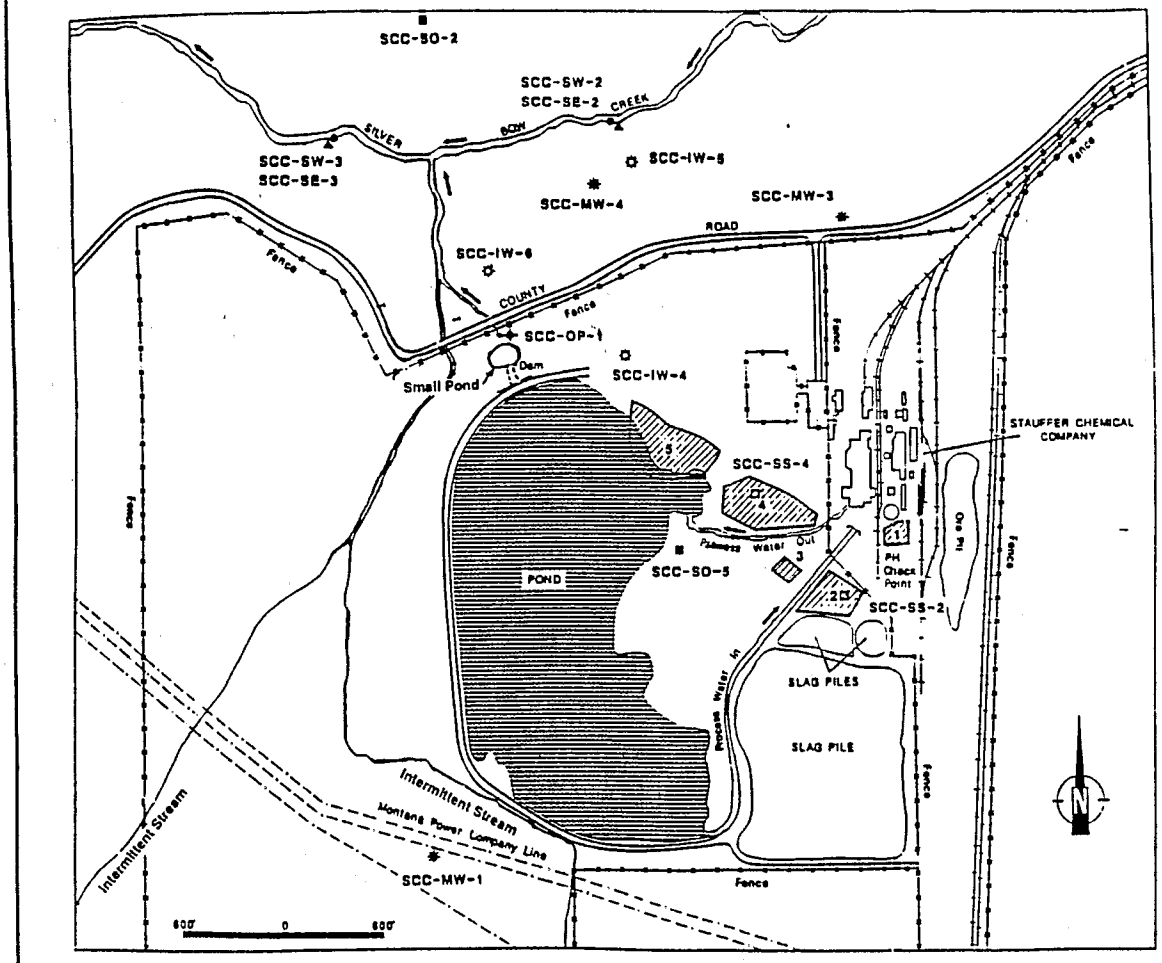
Ecology and Environment, Inc. (E&E). 1988b. "Report of Sampling Activities, Stauffer Chemical Company," prepared by Robert Eddy, September 23, 1988.

Ecology and Environment, Inc. (E&E). 1989. "Analytical Results Report, Stauffer Chemical Company," prepared by Robert Eddy, January 10, 1989.

Eddy, Robert. 1992. Personal communication, July 8, 1992. (Former E&E FIT Project Officer for SCC, responsible for Field Sampling Plan, Report of Sampling Activities and Analytical Results Report).

Office of the Federal Register. 1990. National Archives and Records Administration, December 14, 1990, Code of Federal Regulations (CFR) 40, Part 300, "Hazard Ranking System (HRS) for Uncontrolled Hazardous Substance Releases." Appendix A of the National Oil and Hazardous Substance Release Contingency Plan, Final Rule - pp. 55 FR51537-51267.

Silver Bow County Public Works. 1992. Personal communication with Dave Schultz, July 7, 1992.



Legend

- Existing monitoring well
- FIT monitoring well
- Surface water sample location
- Sediments sample location
- Soil sample location
- Sub-surface soil sample
- Opportunity surface water sample
- Burial Pits

Source: Ecology and Environment, Inc. Analytical Results Report, Stauffer Chemical Company, January 10, 1989.

Site Inspection Prioritization
URS Job No. 41881.10

Stauffer Chemical Company
Silver Bow County, Montana

Facility Map
(1988 Sample Locations)
Figure 2

September, 1992 URS CONSULTANTS

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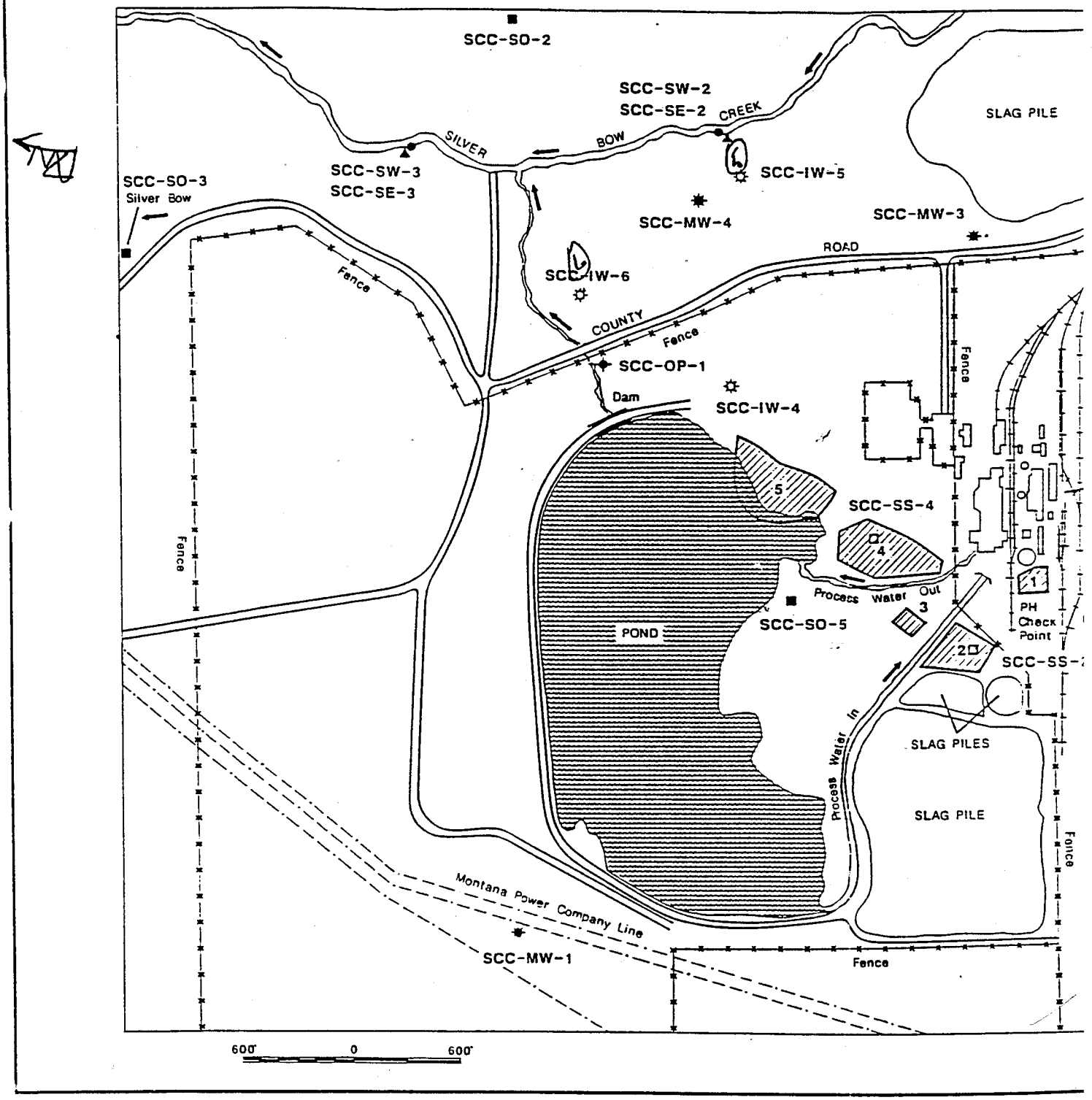
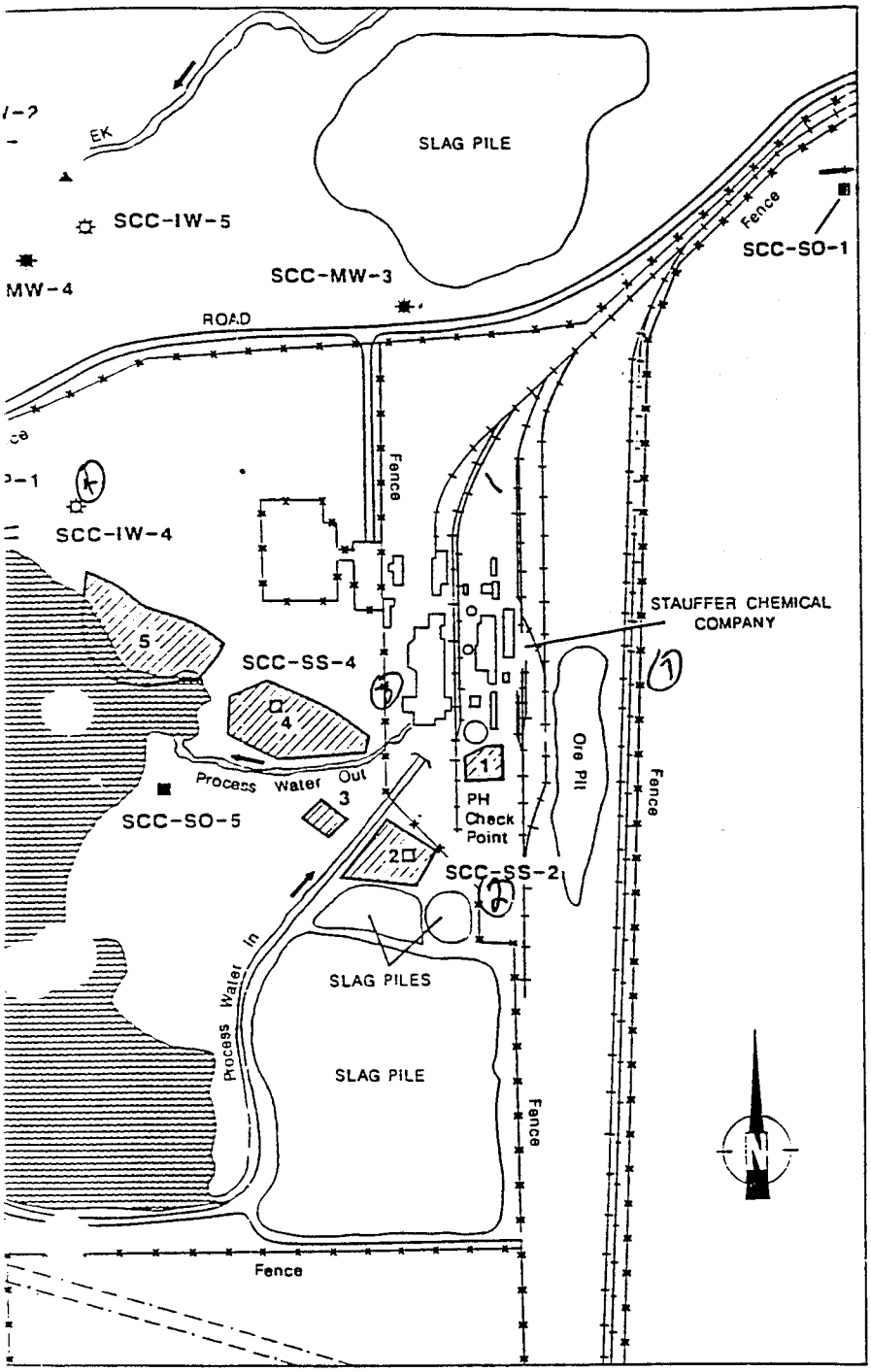
Stauffer.Txt:jm



1 phos sludge (check phosphorus)
2,3 practice dust trenches.



LEGEND

- Existing monitoring well
- Proposed monitoring well
- Soil sample location
- Sub-surface soil sample
- Opportunity well

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

TITLE:
STAUFFER CHEMICAL COMPANY
Ramsay, Montana
SAMPLE LOCATION MAP

T.D.D. F08-8801-05

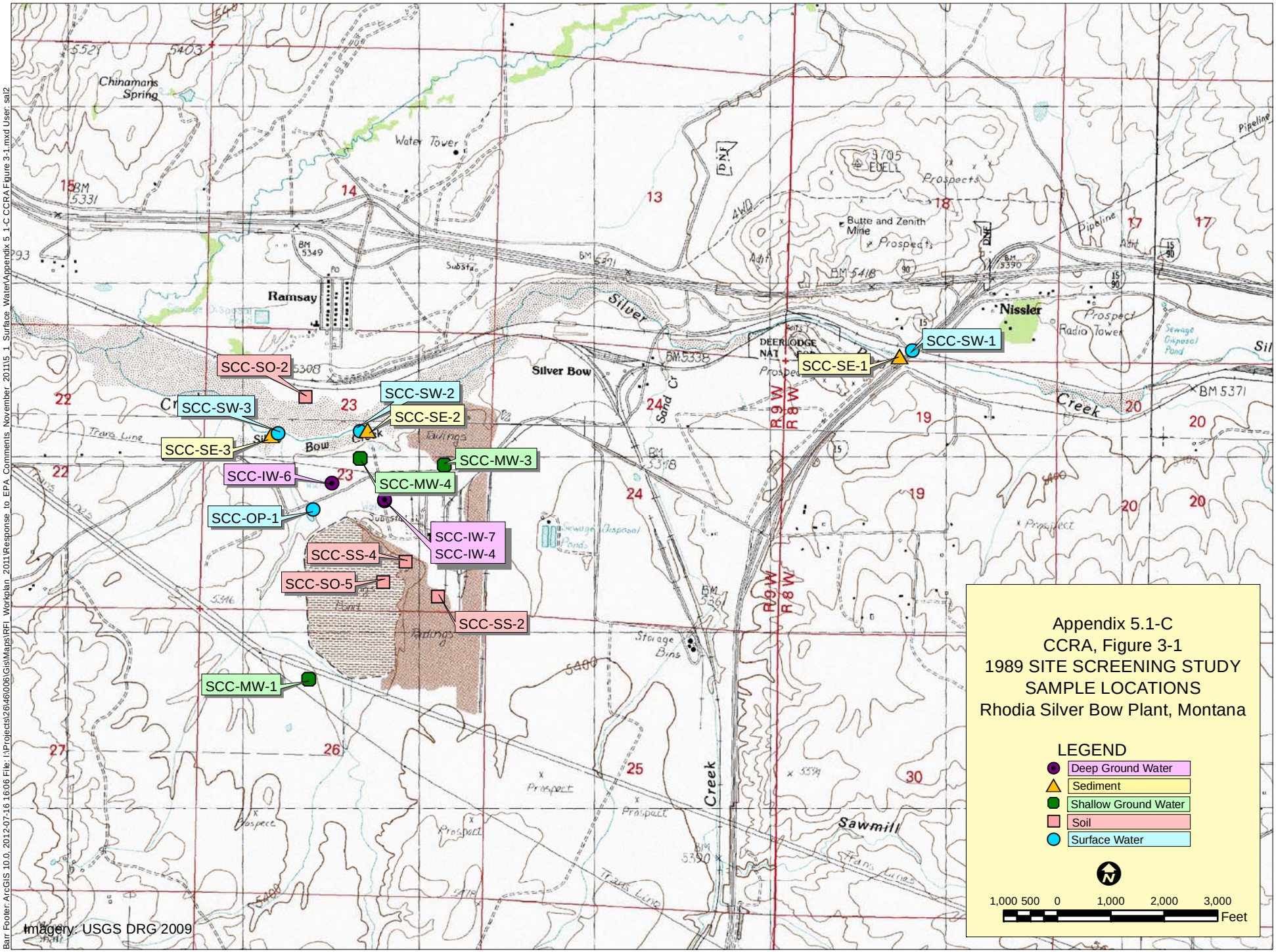
ecology & environment, inc.
DENVER, COLORADO

FIG. 2

Date: 01/89 Drawn by: RSM Scale:

Appendix 5.1-C

CCRA Figure 3-1



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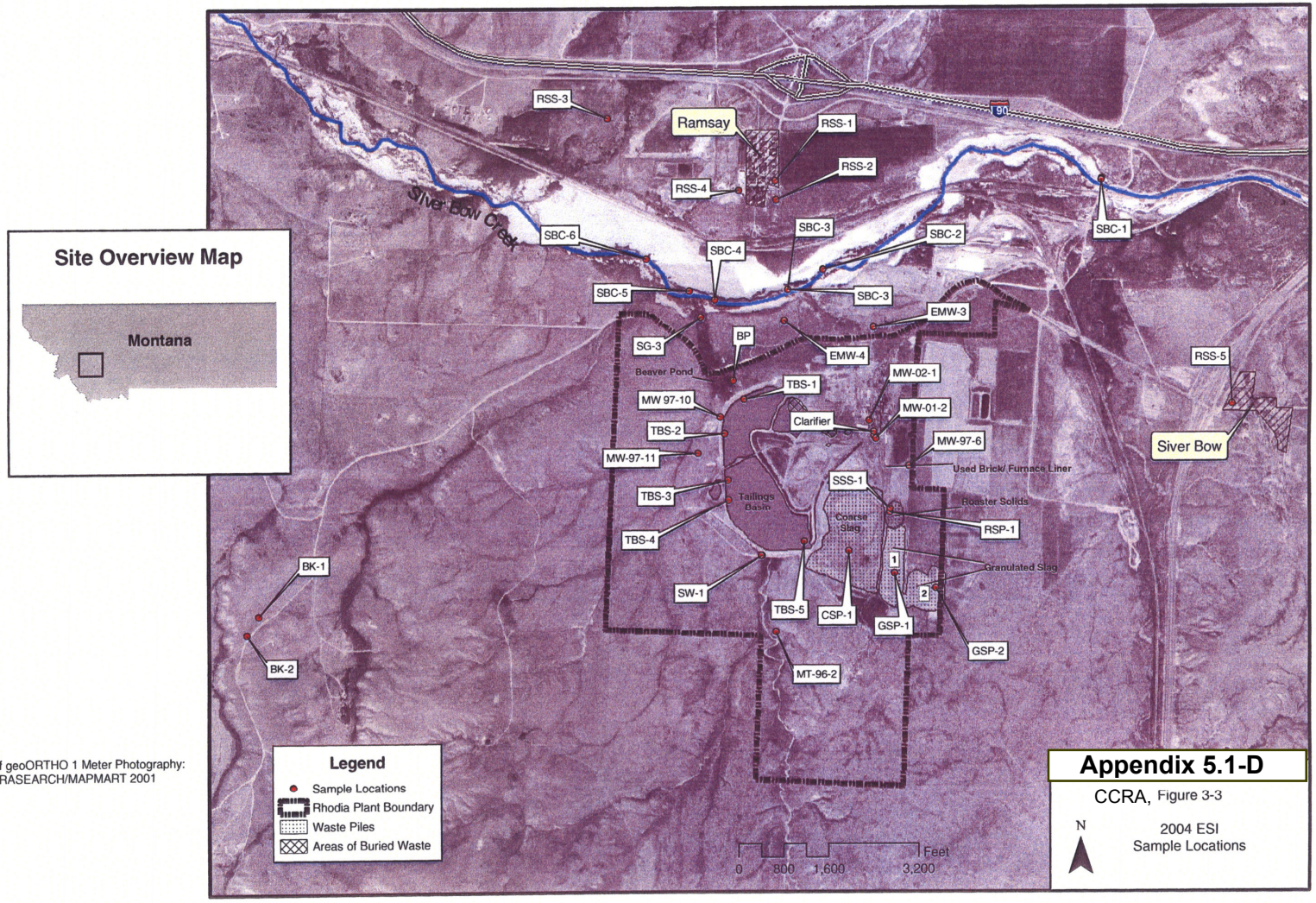
Appendix 5.1-D

CCRA Figure 3-3



Source of geoORTHO 1 Meter Photography:
INTRASEARCH/MAPMART 2001

Appendix 5.1-E

Beaver Pond Surface Water Field Parameters

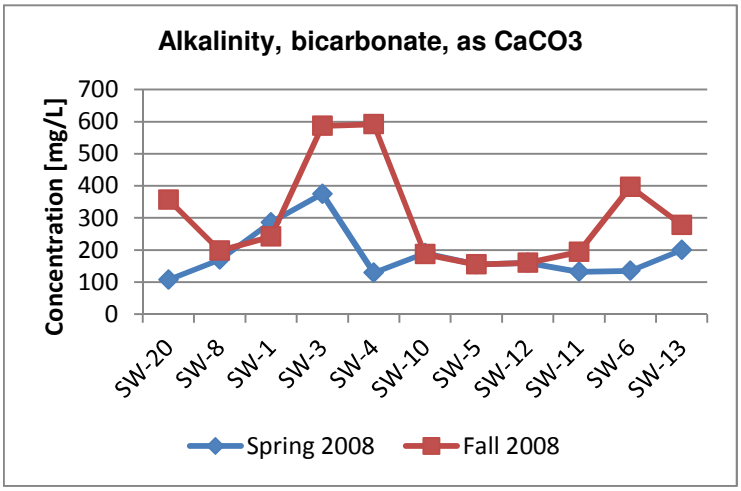
Appendix Table 5.1-E
Surface Water Field Parameters
Rhodia Silver Bow Plant
[concentrations as noted]

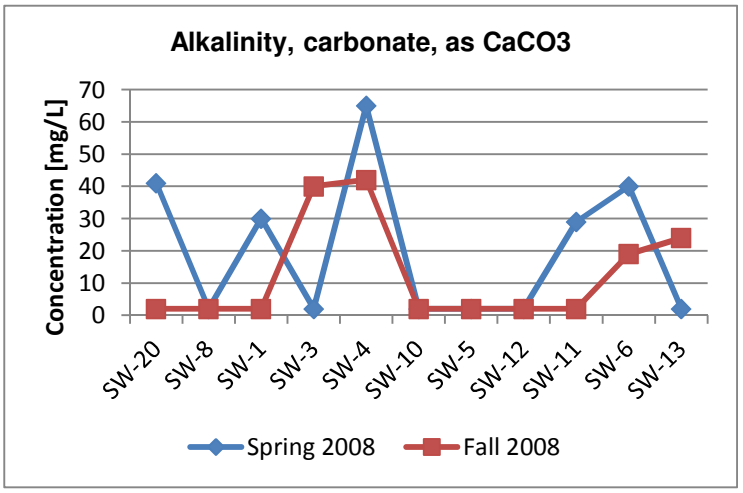
			Chemical Name	Dissolved oxygen (mg/l)	pH (standard units)	Redox (oxidation potential) (mV)	Specific Conductance @ 25oC (umhos/cm)	Temperature (degrees C)
Location ID	Sample Date	Depth	Sample Type					
SD-21	10/06/2012	0 - 10 cm	N	**6.70**	**7.21**	**-44.7**	**1409**	**9.90**
SD-22	10/07/2012	0 - 10 cm	N	**0.75**	**7.12**	**-69.1**	**1417**	**4.35**
SD-23	10/07/2012	0 - 10 cm	N	**1.80**	**7.10**	**-86.5**	**1418**	**7.79**
SD-24	10/07/2012	0 - 10 cm	N	**1.48**	**7.17**	**-48.8**	**1345**	**8.57**
SD-25	10/07/2012	0 - 10 cm	N	**3.40**	**7.24**	**11.8**	**1350**	**7.50**
SD-26	10/07/2012	0 - 10 cm	N	**7.32**	**7.45**	**24.6**	**1394**	**7.36**
SD-27	10/07/2012	0 - 10 cm	N	**9.2 BQD**	**7.63**	**-71.6**	**1386**	**7.54**
SD-28	10/07/2012	0 - 10 cm	N	**10.60 BQD**	**7.48**	**73.2**	**1405**	**9.86**
SD-29	10/07/2012	0 - 10 cm	N	**10.65 BQD**	**7.57**	**70.9**	**1380**	**11.17**

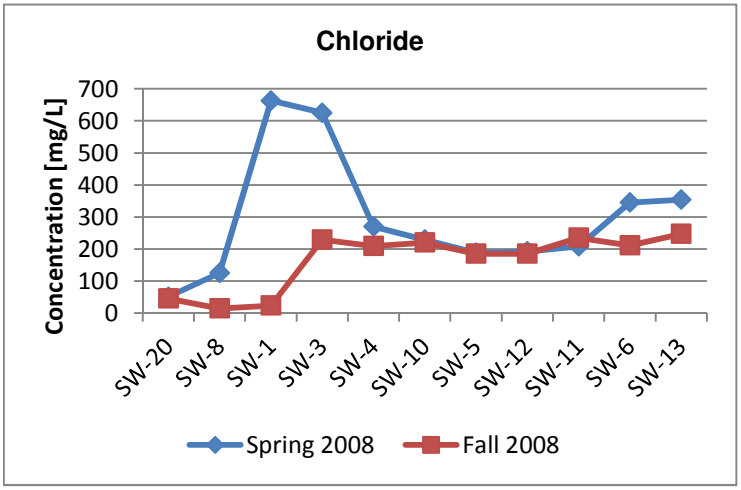
Appendix 5.1-F

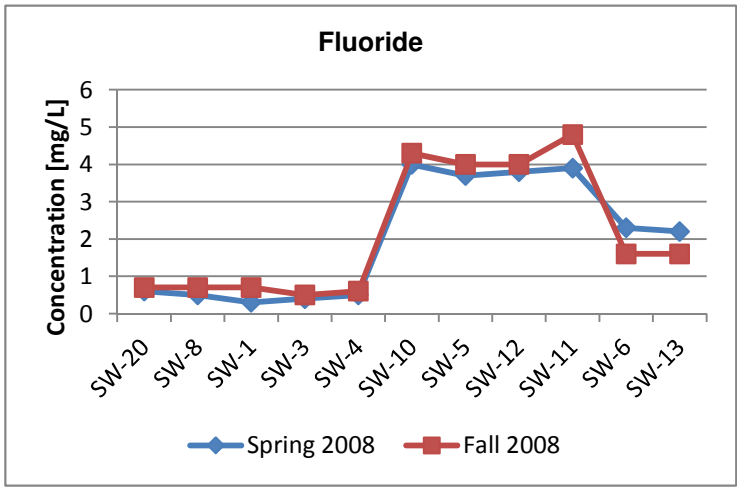
Surface Water Quality Spatial Distribution Charts

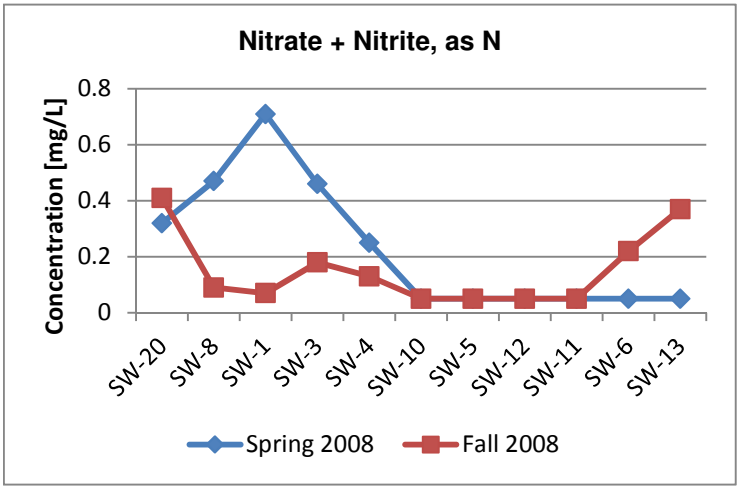
Appendix 5.1-F: Surface Water Quality Spatial Distribution Charts
General and Site Specific Parameters
Rhodia Silver Bow Plant

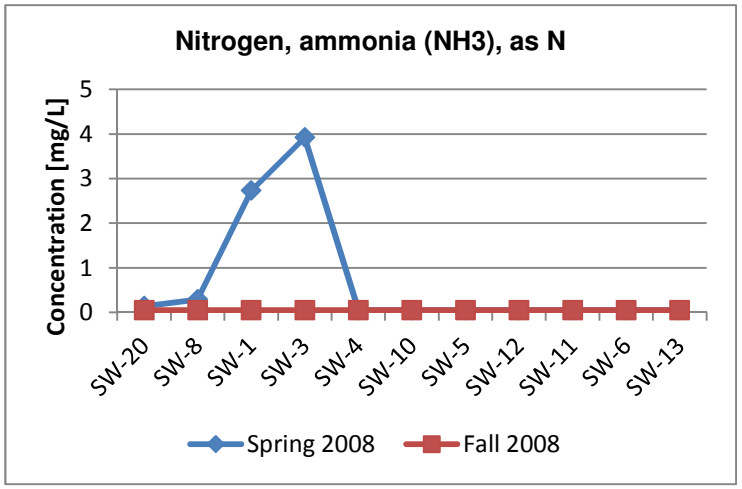


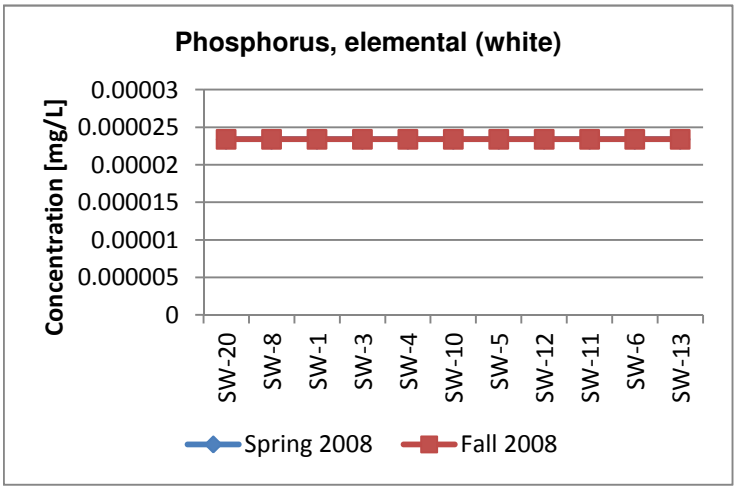


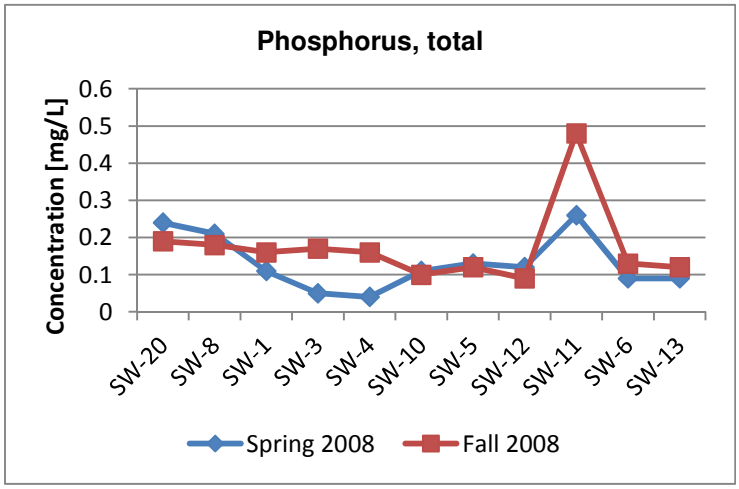


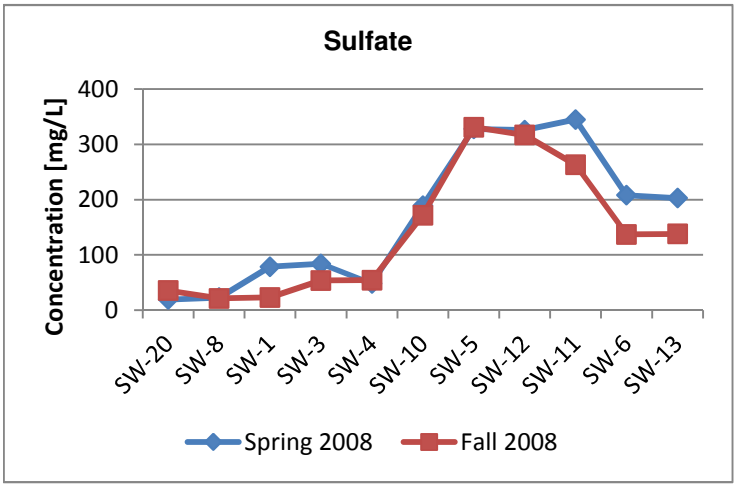


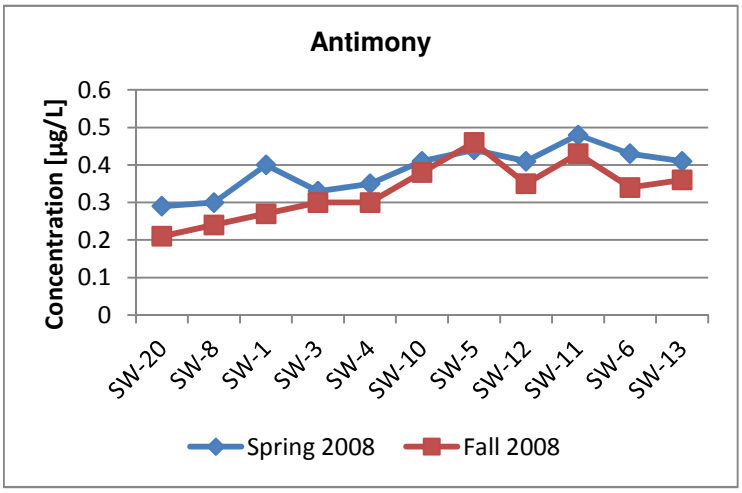


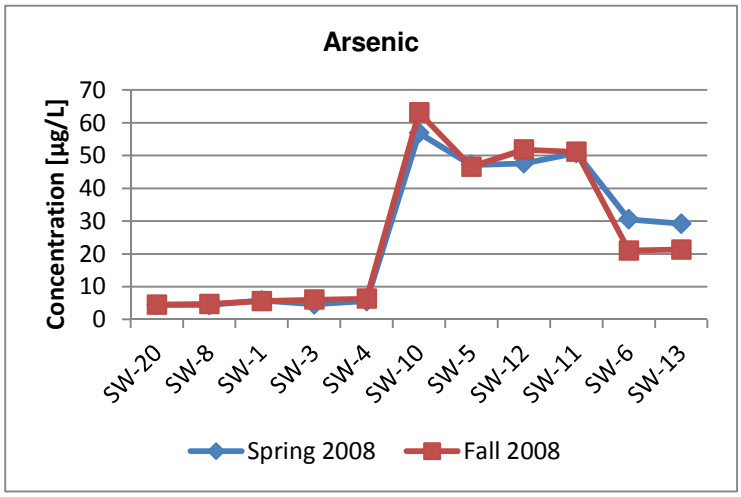


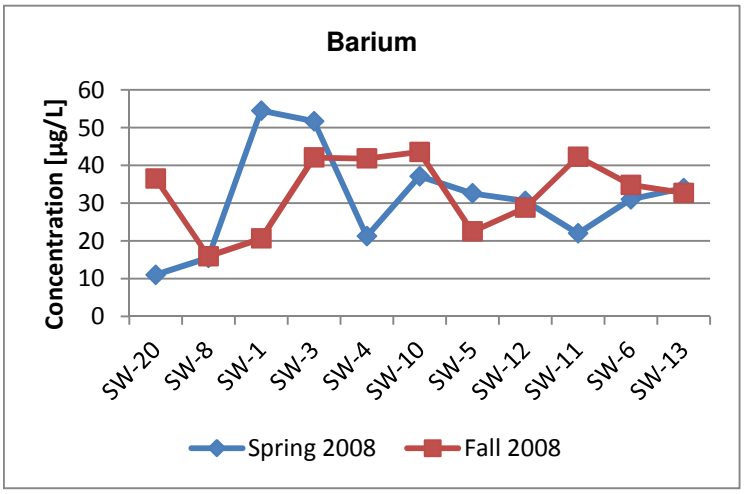

Phosphorus, elemental (white)
Concentration [mg/L]
0.00003
0.000025
0.00002
0.000015
0.00001
0.000005
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

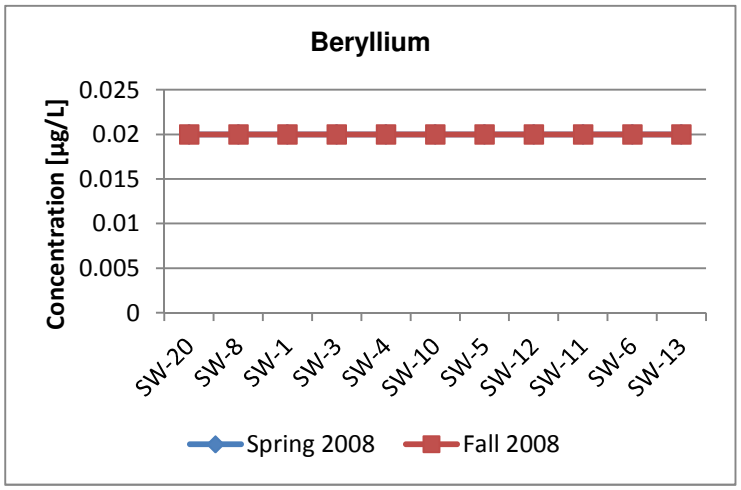

Phosphorus, total
Concentration [mg/L]
0.6
0.5
0.4
0.3
0.2
0.1
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

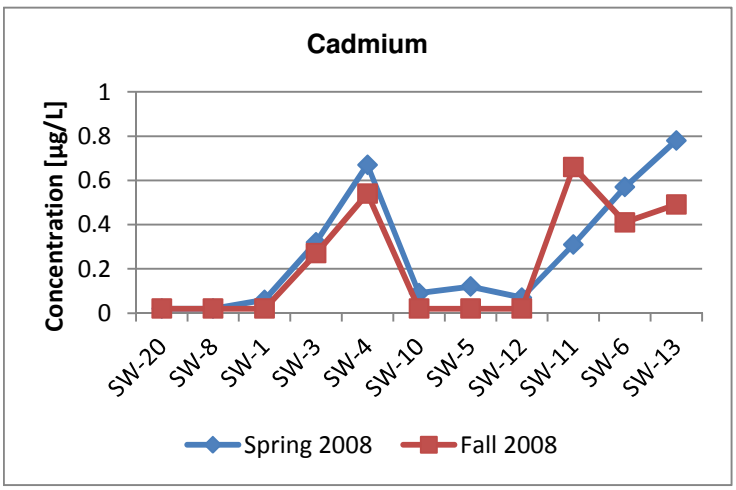

Sulfate
Concentration [mg/L]
400
300
200
100
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

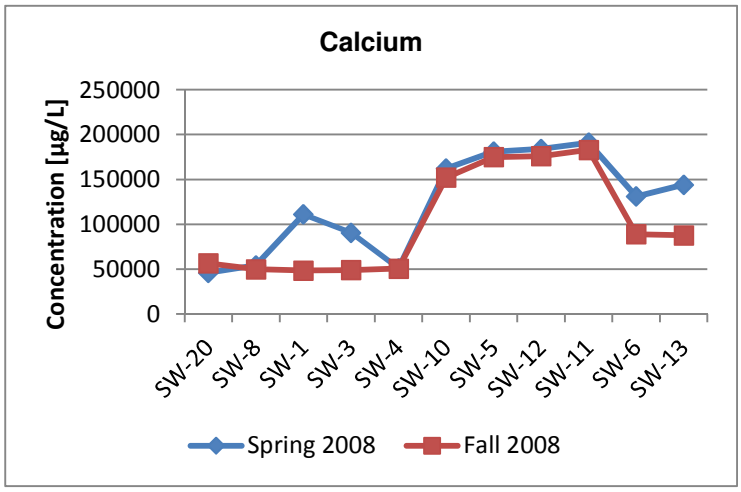

Antimony
Concentration [µg/L]
0.6
0.5
0.4
0.3
0.2
0.1
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

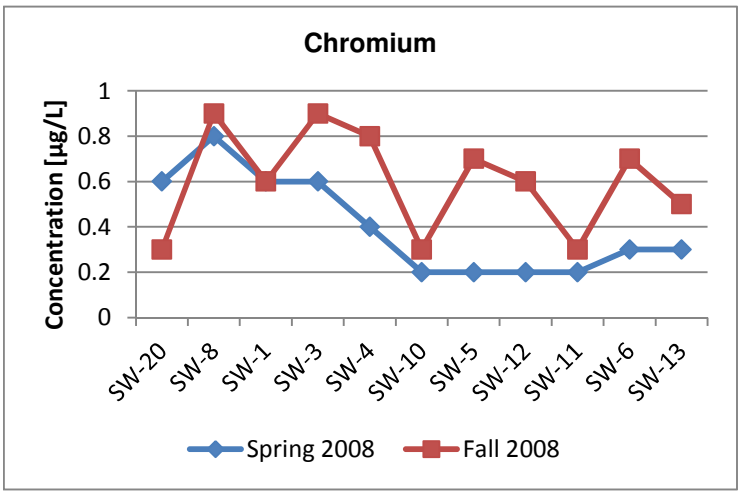

Arsenic
Concentration [µg/L]
70
60
50
40
30
20
10
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

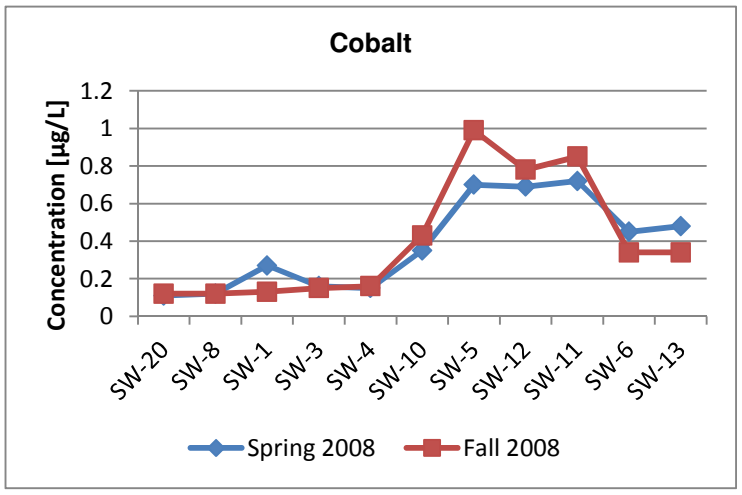

Barium
Concentration [µg/L]
60
50
40
30
20
10
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

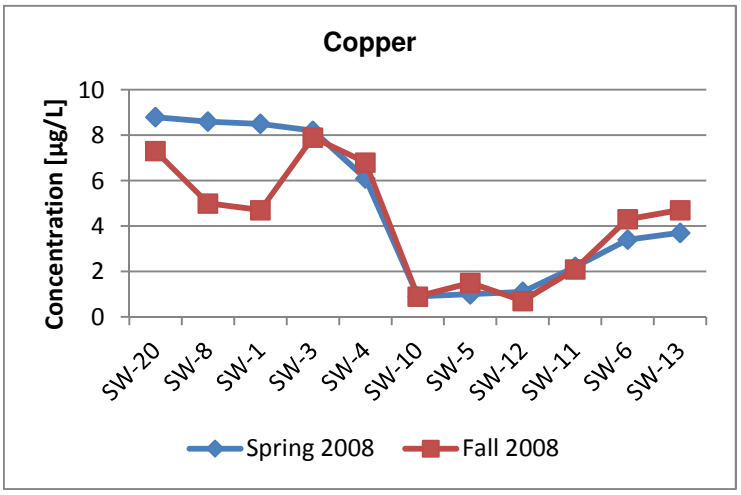

Beryllium
Concentration [µg/L]
0.025
0.02
0.015
0.01
0.005
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

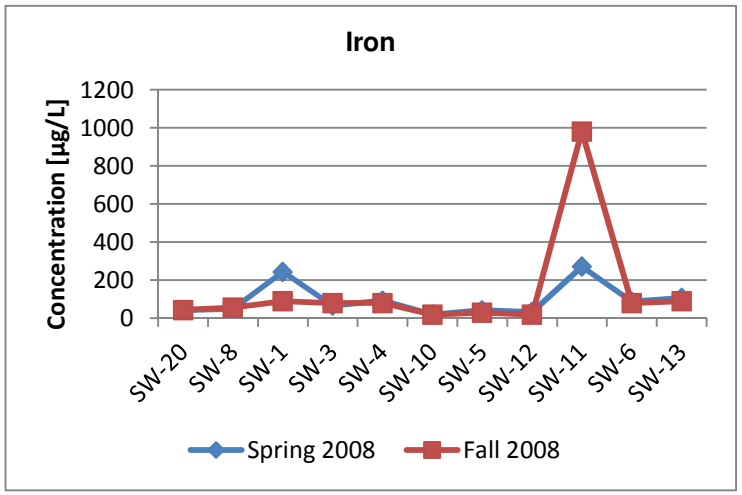

Cadmium
Concentration [µg/L]
1
0.8
0.6
0.4
0.2
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

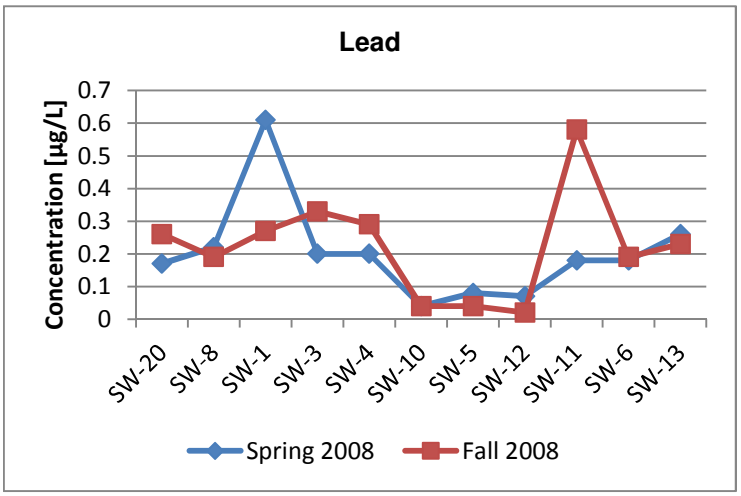

Calcium
Concentration [µg/L]
250000
200000
150000
100000
50000
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

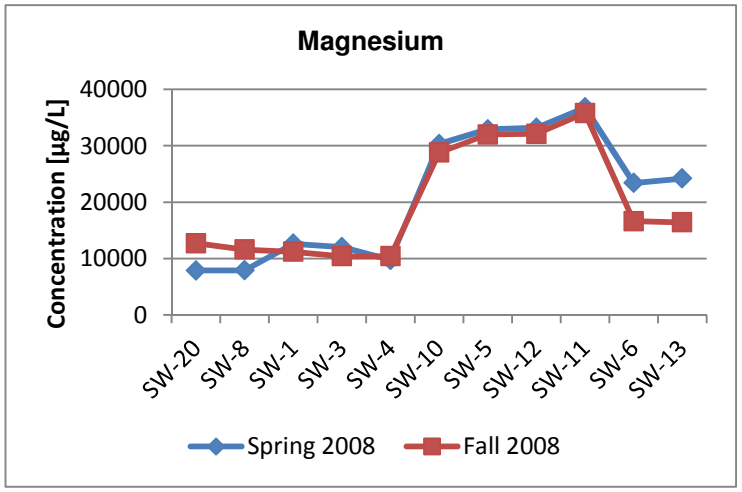

Chromium
Concentration [µg/L]
1
0.8
0.6
0.4
0.2
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

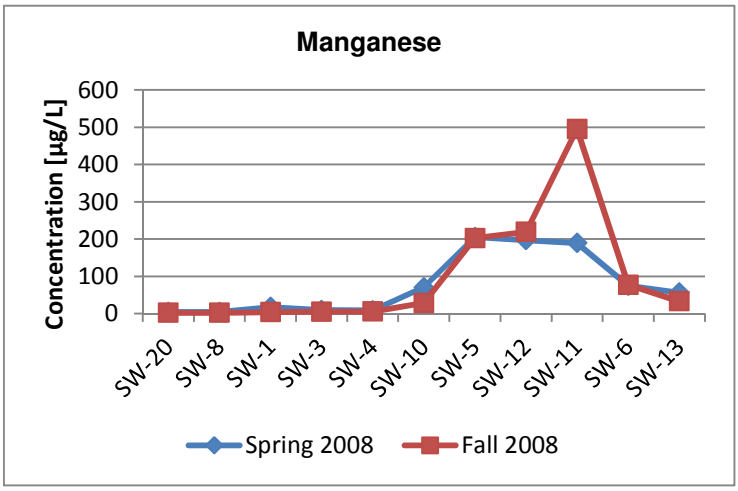

Cobalt
Concentration [µg/L]
1.2
1
0.8
0.6
0.4
0.2
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

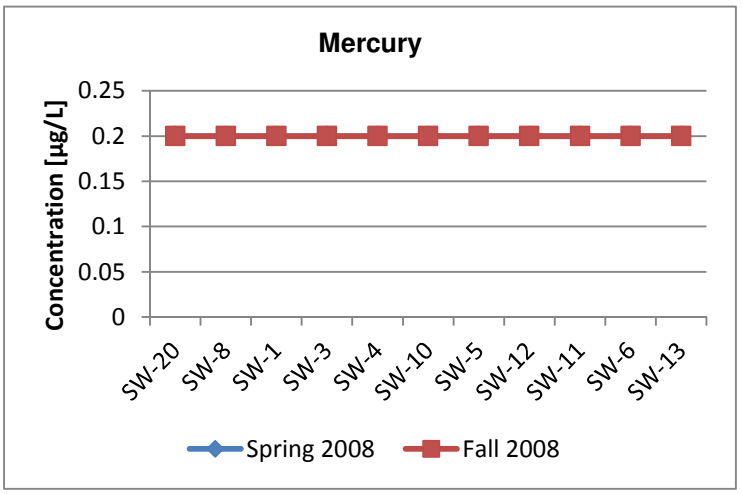

Copper
Concentration [µg/L]
10
8
6
4
2
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

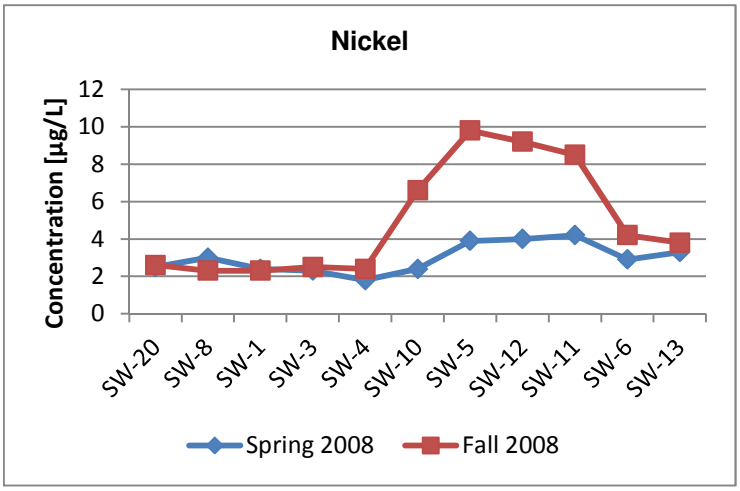

Iron
Concentration [µg/L]
1200
1000
800
600
400
200
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

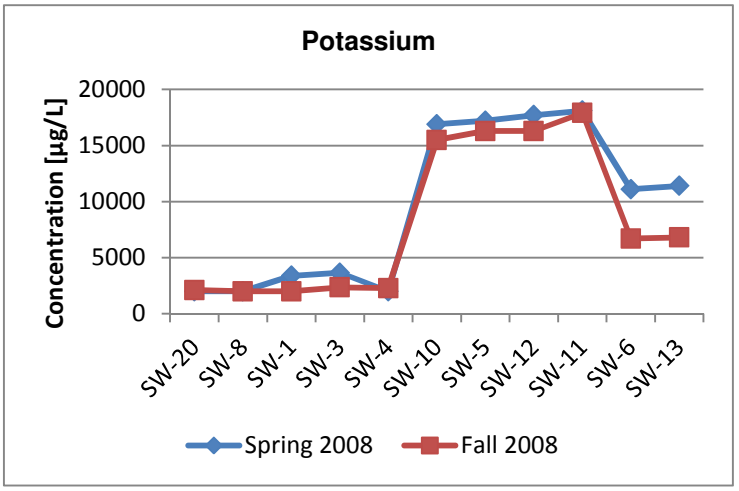

Lead
Concentration [µg/L]
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

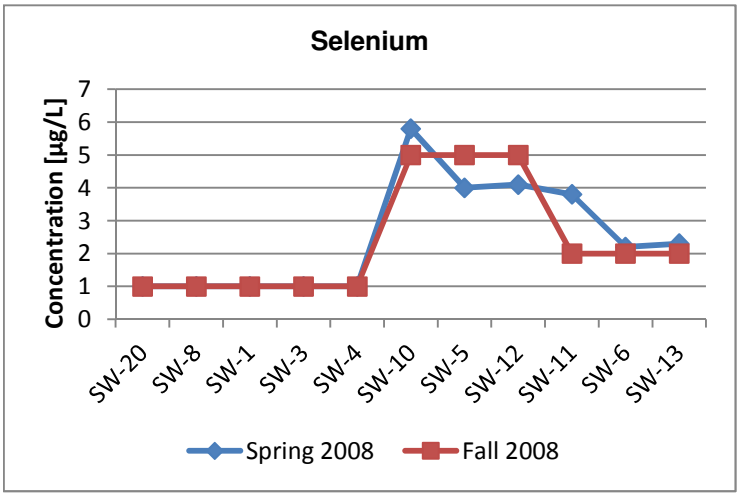

Magnesium
Concentration [µg/L]
40000
30000
20000
10000
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

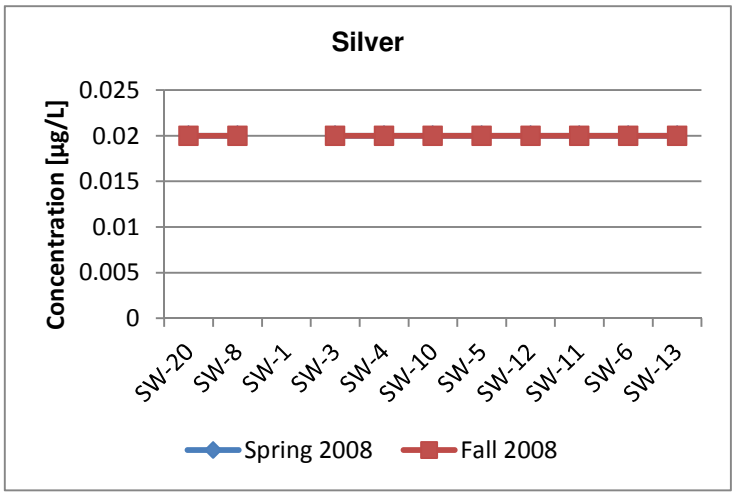

Manganese
Concentration [µg/L]
600
500
400
300
200
100
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

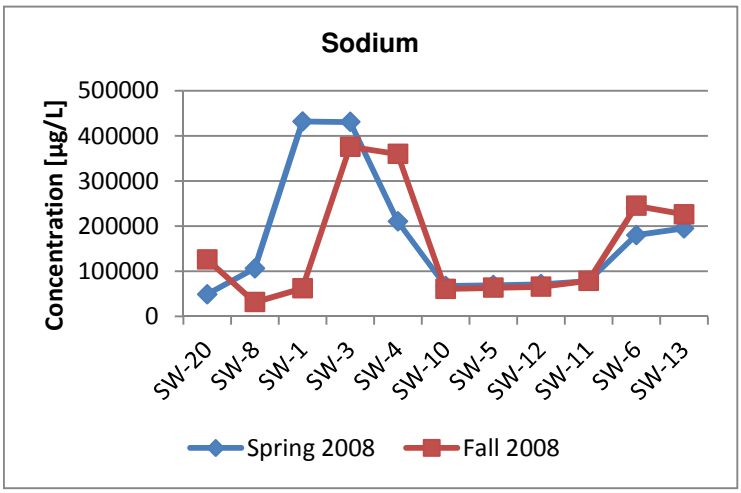

Mercury
Concentration [µg/L]
0.25
0.2
0.15
0.1
0.05
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

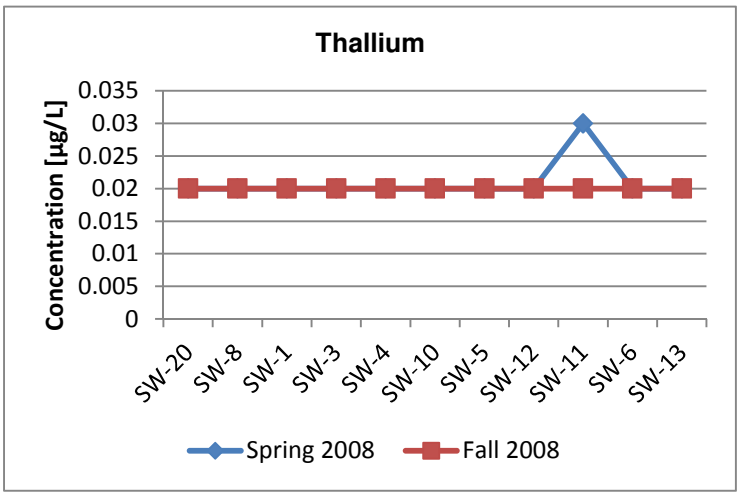

Nickel
Concentration [µg/L]
12
10
8
6
4
2
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

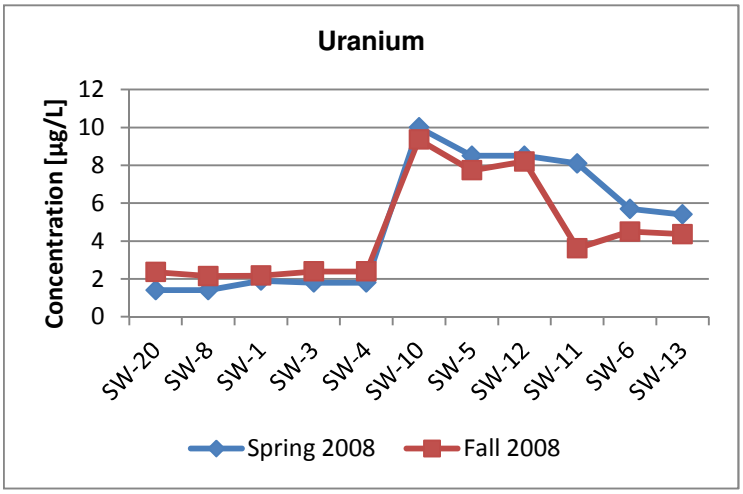

Potassium
Concentration [µg/L]
20000
15000
10000
5000
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

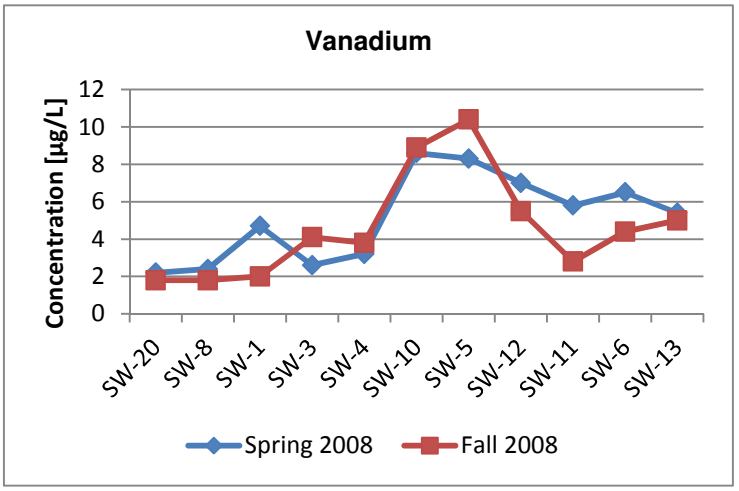

Selenium
Concentration [µg/L]
7
6
5
4
3
2
1
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008

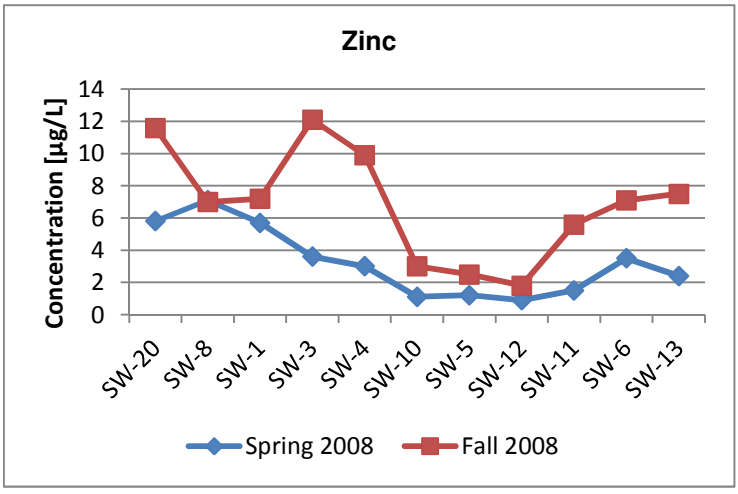

Silver
Concentration [µg/L]
0.025
0.02
0.015
0.01
0.005
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008


Sodium
Concentration [µg/L]
500000
400000
300000
200000
100000
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008


Thallium
Concentration [µg/L]
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008


Uranium
Concentration [µg/L]
12
10
8
6
4
2
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008


Vanadium
Concentration [µg/L]
12
10
8
6
4
2
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008


Zinc
Concentration [µg/L]
14
12
10
8
6
4
2
0
SW-20
SW-8
SW-1
SW-3
SW-4
SW-10
SW-5
SW-12
SW-11
SW-6
SW-13
Spring 2008
Fall 2008