SWMU 2 – Clarifier

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5.5.2 SWMU 2 - Clarifier

The location of Solid Waste Management Unit (SWMU) 2 is shown on Figure 5.5.2-1a and SWMU 2 monitoring stations and sample locations are provided on Figure 5.5.2-1b. The clarifier is a 100-foot diameter concrete unit partially recessed in the ground that contains approximately 500,000 gallons of crude phosphorus covered by a water cap. Crude phosphorus is the filter cake from the filtration operations used to purify the elemental phosphorus. The crude phosphorus consists of elemental phosphorus (about 20% volume/volume [v/v]); water (about 30% v/v); and solids (about 50% v/v) such as phosphate dust, coke dust and silica dust. Until March 1997, the crude phosphorus was further processed in the Plant's roaster to produce P4 product.

5.5.2.1 RCRA 7003 Order

During an inspection at the Silver Bow Plant in May 2000, the EPA inspectors collected samples of crude phosphorus and placed the material in separate metal pans. As the material in the pans dried, it began smoking and spontaneously ignited. EPA Region 8 issued an Administrative Order (7003 Order), Docket No. RCRA-8-2000-07, under § 7003 of the Solid Waste Disposal Act, as amended (42 U.S.C. § 6973). This Order was issued on June 12, 2000 and amended on December 27, 2000 and required Rhodia to undertake immediate and interim measures to protect public health and the environment, including wildlife. The immediate and interim measures included fencing the clarifier area, installing a wind sock, installing Bird Balls™ to camouflage its surface and eliminate wildlife contact with the clarifier contents, installing a float valve to maintain the water cap over the crude phosphorus and installing a continuous phosphine gas monitoring system. These immediate and interim measures were completed before the respective deadlines under the 7003 Order.

Elemental phosphorus may generate some phosphine gas when it is in contact with water at high pH, temperature and agitation conditions. Rhodia installed the continuous phosphine monitoring system around the clarifier as required by the RCRA § 7003 Order and submits annual phosphine monitoring reports[1] to EPA. The time-weighted average values reported from the continuous monitoring for phosphine are typically 0.0 parts per million by volume (ppmv), below the EPA-approved action levels of 0.3 ppmv (8-hour time-weighted average) or 1.0 ppmv (15-minute short-term exposure limit). The detection limit is around 0.03 ppmv.

[1] Monthly reports were submitted to U.S. EPA until the submittal schedule was changed to annual reporting as provided in the U.S. EPA's March 14, 2009 letter to Rhodia.

Phosphine has only been detected in these monitors on two occasions. The first event occurred when drums of soil cuttings containing elemental phosphorus were located near the northwest phosphine monitor immediately after installing monitoring well MW-01-3 in 2001. The second event occurred when crude phosphorus was being excavated from the clarifier for use in the pilot scale testing in 2011. The excavation operations were stopped and the phosphine concentrations decreased immediately.

The 7003 Order remains in effect, since, as stated in Section VI.B. of the 3008(h) Order, the 7003 Order is the mechanism to address investigation and closure matters regarding the clarifier. As such, this RFI Report will summarize the corrective measures that were completed and the environmental data that was collected under the 7003 Order, as well as the plan for follow-up data collection as part of the RFI.

5.5.2.2 Corrective Measures

The 7003 Order required Rhodia to develop a Waste Plan that evaluated alternatives for the lawful disposition of the contents of the clarifier, and at least one alternative that evaluated the lawful removal and disposal of the clarifier contents. The final Waste Plan was submitted to EPA on November 16, 2001 (Barr, 2001b). The Waste Plan identified three options that were considered feasible and were fully evaluated in the Waste Plan. The feasible options were: (1) a soil cap; (2) an enhanced cap with a multi-layer and multi-material cover; and (3) off-site incineration. The Waste Plan also identified processes that had been used to process similar materials at other elemental phosphorus production facilities, but the process equipment was not available. The production facilities had been shut down and the process equipment was demolished.

Rhodia and EPA agreed to further evaluate management options for the crude phosphorus through a multi-step treatability study process. The first step involved gathering all existing information for treatment of crude phosphorus solids. The second step involved developing a short list of technologies from Step 1 that are potentially feasible and merit further evaluation. The third step involved evaluation of the selected technology.

Rhodia submitted the report titled “Clarifier Waste Treatability Study, Phase 1 – Information Gathering” (Franklin Engineering Group, 2007) to EPA in October 2007. The report described several treatment and disposal options for the management of crude phosphorus, many of which were evaluated in the Waste Plan. Based on this report Rhodia, the Montana State Department of Environmental Quality (MDEQ), and the EPA agreed to further evaluate batch still technology

similar to that developed by Albright and Wilson for evaporation and subsequent recovery of the elemental phosphorus. This technology was chosen because it:

- Has proven to be effective in processing similar materials
- Allows Rhodia to recover the elemental phosphorus contained in the clarifier
- Could be evaluated with pilot-scale equipment
- Reduces total volume of waste

The Clarifier Waste Treatability Study, Phase 2 Report, Pilot Plant Design and Testing describes the design of the pilot plant, and initial testing that was conducted to evaluate whether the system could volatilize the elemental phosphorus from the crude phosphorus and render the solids free of elemental phosphorus (Franklin Engineering Group, 2011a).

The initial testing conducted in 2010 demonstrated that the basic process, as designed, demonstrated a capability to safely vaporize and condense the elemental phosphorus contained in the clarifier material. Visually good elemental phosphorus was recovered from all three batches. The non-ignitable residue produced by one batch (run #2) remained hazardous due to leachable cadmium present in the still residue. The report concluded that additional evaluation was needed to evaluate whether the process can render the crude phosphorus residue to be non-hazardous.

Additional testing was conducted in 2011 as detailed in the report titled Clarifier Material Treatability Study, Phase 3 Report, Pilot Plant Operations describes the improvements to the system and the testing protocols that were conducted (Franklin Engineering Group, 2011b). The pilot plant demonstrated the ability to treat clarifier material and recover elemental phosphorus of useful quality from a variety of feed compositions. However, the solid residue in eight of the twelve tests was determined to be hazardous for cadmium. Therefore, additional treatment would be needed to render the solid residue non-hazardous for final disposal.

The next step in the process is to evaluate the overall feasibility of the distillation process including cost effectiveness of the process system. This information will be incorporated into a revised Waste Plan which will be submitted to EPA by the end of 2013.

5.5.2.3 Crude Phosphorus Characteristics

Crude phosphorus consists of elemental phosphorus (about 20% volume/volume [v/v]); water (about 30% [v/v]); and solids (about 50% [v/v]) such as phosphate dust, coke dust and silica dust. Two samples of crude phosphorus were analyzed for TCLP metals in February 1997. The analytical

results are summarized in Table 5.5.2-1. The TCLP results indicate that the bulk crude phosphorus is not a characteristic waste for metals.

A sample of crude phosphorus was collected by EPA's contractor in 2003 and analyzed for metals, fluoride, elemental phosphorus, phosphorus (ortho and total), and gross alpha and beta. The analytical data is summarized in Tables 5.5.2-2 through 5.5.2-4 and the data is plotted on Figures 5.5.2-2 through 5.5.2-4. Data from SWMU 2 were compared to the background/reference area concentrations. Concentrations above the 95% upper confidence limit of the mean background/reference area concentrations are highlighted on the constituent delineation figures presented in this section. Where a 95% upper limit could not be calculated, the maximum detected concentration or the maximum detection limit was selected.

The crude phosphorus sample contained approximately 6.4% elemental phosphorus. This concentration is lower than Rhodia's estimated concentration likely because the sample was obtained from the upper level material overlying the solidified crude phosphorus in the clarifier. The concentration of elemental phosphorus is expected to be higher in the solidified portion of the clarifier. Gross alpha and gross beta were found at 720 pCi/g and 570 pCi/g, respectively (*see* Figure 5.5.2-3). Metals were also detected in the crude phosphorus sample (*see* Figure 5.5.2-4). Cadmium, chromium, lead and selenium were found at concentrations in excess of 20 times the respective hazardous characteristic standard.

The EPA also collected a sample of the water covering the crude phosphorus and analyzed this water sample for metals, fluoride, elemental phosphorus, phosphorus (ortho and total), and gross alpha and beta. The analytical data is summarized in Tables 5.5.2-5 through 5.5.2-7.

Phosphorus compounds including elemental phosphorus were reported in the water cap sample. Metals and radionuclides were present, but the concentrations are below drinking water levels.

5.5.2.4 Groundwater Monitoring Results

There is a documented release of water from the clarifier. The 7003 Order described a "leaking clarifier" based on an observation that water from the clarifier infiltrated into a hole dug in a wet area adjacent to the clarifier. After plant operations ceased in the late 1990s, groundwater has been added to maintain the water cap.

EPA required Rhodia to conduct pre-closure groundwater monitoring of the area near the clarifier under the 7003 Order. A Field Sampling Plan and Quality Assurance Project Plan (Sampling Plan)

(Barr, 2001a) for pre-closure groundwater monitoring at the clarifier was approved by EPA in a letter dated September 6, 2001. Three water table monitoring wells were installed at the clarifier in accordance with the Sampling Plan. MW-01-2 was installed upgradient (i.e., south) of SWMU 2, and MW-01-3 and MW-01-6 were installed downgradient of SWMU 2. Two additional wells (MW-02-1 and MW-02-2) were installed further downgradient of the clarifier to evaluate the potential transport of elemental phosphorus via groundwater. The monitoring well locations are shown in Figure 5.5.2-1b and the Monitoring Well Construction Logs are provided in Appendix 5.5.2-A. The Final Pre-closure Groundwater Monitoring Report (Barr 2002) provides the details of the groundwater monitoring program and the analytical laboratory reports prior to the RFI.

Three rounds of groundwater samples were collected during the pre-closure groundwater monitoring program and analyzed for general and site-specific parameters, metals, VOCs, SVOCs, and radionuclides. The results were summarized in the Final Pre-Closure Groundwater Monitoring Report (Barr 2002) and are also summarized in this report.

The SWMU 2 monitoring wells were included in the site-wide groundwater quality monitoring program included in the RFI Work Plan (Barr, 2009). A detailed and comprehensive discussion of site-wide groundwater quality is discussed in the Groundwater Quality Section (Section 5.3). Constituents of interest were outlined in Section 5.3 and only those with a potential source as the clarifier or TBWR areas will be discussed in this SWMU. The analytical results for the groundwater samples from SWMU 2 monitoring wells are summarized in Tables 5.5.2-8 through 5.5.2-13. Additionally, Figures 5.5.2-6 through 5.5.2-41 display the groundwater quality time-series plots for the general and site-specific parameters, metals and radionuclides. These parameters will be discussed in detail below.

5.5.2.4.1 General and Site-Specific Parameters

Fluoride

Non-detect values were recorded at two of the five wells, MW-01-6 and MW-02-1, surrounding SWMU 2. At all of the wells, except for MW-02-1, concentrations of fluoride have increased with time (*see* Figure 5.5.2-6). At MW-01-2, fluoride increased from 4.06 mg/L in 2001 to 7.8 mg/L in 2008. At MW-01-3, fluoride increased from 0.75 mg/L in 2001 to 1.2 mg/L in 2008. At MW-01-6, fluoride increased from 0.73 mg/L in 2001 to 2.2 mg/L in 2008. At MW-02-2, fluoride increased from 5.14 mg/L in 2002 to 7.6 mg/L in 2008. SWMU 2 may be an ongoing source of fluoride to groundwater, or it is possible that increasing fluoride concentrations may be a function of the dissolution of soluble fluoride complexes, as discussed in Section 5.3.2.2.1.

Elemental Phosphorus

Elemental phosphorus was not detected in MW-01-2, MW-02-1, and MW-02-2, except in September of 2002, when concentrations of 0.00045 J mg/L and 0.00019 J mg/L were reported at MW-02-1 and MW-02-2, respectively. These data points were "J"-qualified, indicating that the value is less than the stated laboratory quantification limit and are considered estimated values. Elemental phosphorus was detected at MW-01-3 and MW-01-6 with average concentrations of 0.791 mg/L and 0.002 mg/L, respectively. The highest elemental phosphorus concentration (i.e., 1.6 mg/L) was found in a sample collected from MW-01-3 in 2002 (*see* Figure 5.5.2-7). Elemental phosphorus concentrations MW-01-6 do not indicate increasing or decreasing trend, however elemental phosphorus concentrations at MW-01-3 are strongly decreasing with time.

Total Phosphorus

Total phosphorus was detected in groundwater sampled from all of the wells around SWMU 2. Of those, four wells indicate decreasing concentrations with time. At MW-01-2, total phosphorus decreased from 25.3 mg/L in 2001 to 17.0 mg/L in 2008. At MW-01-3, total phosphorus decreased from 128 mg/L in 2001 to 68.6 mg/L in 2008. At MW-01-6, total phosphorus decreased from 234 mg/L in 2001 to 91.4 mg/L in 2008. At MW-02-1, total phosphorus decreased from 17.6 mg/L in 2002 to 1.3 mg/L in 2008. Concentrations of total phosphorus at MW-02-2 are generally stable from 2002 to 2008 (*see* Figure 5.5.2-8). SWMU 2 is a likely source of total phosphorus to the groundwater: total phosphorus concentrations are higher downgradient of the clarifier and the total phosphorus analysis of groundwater samples likely detects the presence of phosphates resulting from the attenuation of elemental phosphorus in groundwater (*see* Appendix 5.3-C).

Sulfate

Sulfate concentrations were detected in all of the samples collected at SWMU 2. Sulfate concentrations in groundwater are slightly higher in the downgradient wells (MW-01-03, MW-01-6, and MW-02-2) than the upgradient well (MW-01-2). Sulfate concentrations are decreasing in four of the wells. At MW-01-2, sulfate decreased from 403 mg/L in 2001 to 238 mg/L in 2008. At MW-01-3, sulfate decreased from 486 mg/L in 2001 to 246 mg/L in 2008. At MW-01-6, sulfate decreased from 482 mg/L in 2001 to 271 mg/L in 2008. At MW-02-2, sulfate decreased from 392 mg/L in 2002 to 240 mg/L in 2008. However, sulfate concentrations increased at MW-02-1 from 984 mg/L in 2002 to 1350 mg/L in 2008 (*see* Figure 5.5.2-9). As MW-02-1 is located farther downgradient of SWMU-2, this increase in sulfate may be to another source within the phosphorus production area, rather than SWMU 2.

5.5.2.4.2 Metals

Antimony

Total antimony was detected in nine of the 17 samples with concentrations ranging from not detected at 0.0005 mg/L to 0.003 mg/L. The detection limits from the 2001 and 2002 analyses are much higher than the more recent detected concentrations, making time series evaluation of the data difficult (*see* Figures 5.5.2-10 and 5.5.2-11).

Arsenic

Total and dissolved arsenic were detected in groundwater samples from the five wells surrounding SWMU 2. Generally, intra-well total and dissolved arsenic concentrations appear stable (*see* Figures 5.5.2-12 and 5.5.2-13). It is possible that the clarifier has impacted downgradient arsenic concentrations; however, the groundwater data do not indicate attenuation of impacted groundwater.

Barium

Total and dissolved barium were detected in groundwater from all five wells. The highest detected concentration for dissolved barium was 0.082 mg/L at MW-02-1. The highest total concentration was 0.0425 mg/L at MW-02-1, as well. Both total and dissolved barium concentrations appear to be stable or decreasing with time (*see* Figures 5.5.2-14 and 5.5.2-15).

Beryllium

Total beryllium was detected in groundwater samples from all five wells. Of the 10 dissolved and 15 total samples analyzed, beryllium was not detected in eight of the dissolved samples and four of the total samples. The highest dissolved concentration was 0.002 mg/L and the highest total concentration was 0.03 mg/L, both from MW-01-3. No trend is visible for dissolved or total beryllium due to limited detected concentrations (*see* Figures 5.5.2-16 and 5.5.2-17).

Cadmium

Total and dissolved cadmium were detected in groundwater samples from the five wells. Concentrations were below the limits of detection in 15 of the 27 samples. Generally, intra-well total and dissolved cadmium concentrations appear to be stable (*see* Figures 5.5.2-18 and 5.5.2-19).

Chromium

Total and dissolved chromium were detected in groundwater samples from all five wells. Chromium was not detected in seven of ten samples analyzed for the dissolved fraction and six of fifteen samples analyzed for total concentrations. The highest dissolved chromium concentration was 0.005 mg/L and the highest total chromium concentration was 0.008 mg/L, both at MW-01-3. Total chromium concentrations at MW-01-2 and MW-01-6 appear to be decreasing or stable, while it is

difficult to discern trends in chromium concentrations at the other wells due to limited detected concentrations (*see* Figures 5.5.2-20 and 5.5.2-21).

Cobalt

Total cobalt was detected in groundwater samples from all five wells. Dissolved cobalt was detected in groundwater samples MW-01-3 and MW-01-6. Although the total cobalt concentration increased from the upgradient well (MW-01-2) to the wells immediately downgradient of the clarifier (MW-01-6, MW-01-3, and MW-02-2), the intra-well total cobalt concentrations are decreasing over time, most notably in the downgradient wells MW-01-6 and MW-01-3 (*see* Figures 5.5.2-22 and 5.5.2-23).

Manganese

Total and dissolved manganese were detected in groundwater samples from all five wells. Manganese concentrations are higher in wells downgradient of SWMU 2 than in the upgradient well. The highest dissolved concentration was 12.5 mg/L and the highest total concentration was 13.1 mg/L, both at MW-01-3. These concentrations are generally an order of magnitude higher than the other wells at SWMU 2. In general, both total and dissolved manganese concentrations have decreased in time at the SWMU 2 wells (*see* Figures 5.5.2-24 and 5.5.2-25).

Nickel

Total and dissolved nickel was detected in groundwater samples from all five wells. The highest dissolved nickel concentration was 0.0436 mg/L at MW-02-1, which was a "BQQ"–qualified value. The next highest dissolved concentration without a BQQ qualification was 0.02 mg/L at MW-01-6. The highest total nickel concentration was 0.0420 mg/L at MW-02-1. Samples were not analyzed for dissolved nickel in 2008, so it is difficult to assess trends in those data. However, concentrations of total nickel at MW-01-2, MW-01-3, MW-01-6, and MW-02-1 appear to be decreasing over time (*see* Figures 5.5.2-26 and 5.5.2-27).

Selenium

Total and dissolved selenium were detected in groundwater samples from all five wells. Two of 13 samples analyzed for dissolved selenium and nine of 15 samples analyzed for total selenium had concentrations below the detection limit. The highest dissolved concentration was 0.009 mg/L and the highest total concentration was 0.0149 mg/L, both at MW-02-2. Samples were not analyzed for dissolved selenium in 2008, so it is difficult to assess trends in those data. However, total selenium concentrations appear to be stable. Samples were not analyzed for dissolved selenium in 2008, so it is difficult to assess trends in those data (*see* Figures 5.5.2-28 and 5.5.2-29).

Silver

Total and dissolved silver were rarely detected in groundwater samples from these wells, and were never detected at concentrations higher than the detection limits at MW-01-3 and MW-01-6. The highest detected total silver concentration was 0.0001 mg/L at MW-02-2. Dissolved silver was not analyzed in MW-02-2. Because silver was rarely detected at concentration exceeding the detection limits, trends in the data are not apparent (*see* Figures 5.5.2-30 and 5.5.2-31).

Thallium

Total thallium was detected in groundwater sampled from all five wells, while dissolved thallium was not detected above detection limits at MW-01-3, MW-01-6, or MW-02-1 (dissolved thallium was not analyzed on samples from MW-02-2). Dissolved thallium was only detected in samples from MW-01-2 and were "J"-qualified; the highest concentration was 0.00007 mg/L. The highest detected concentration for total thallium was 0.0001 mg/L at MW-01-6. As thallium concentrations were rarely recorded above the detection limits, no trends are apparent in the data (*see* Figures 5.5.2-32 and 5.5.2-33).

Uranium

Total uranium was detected in groundwater samples from all five wells, while dissolved uranium was not detected above detection limits at MW-01-3, MW-01-6, or MW-01-2 (dissolved uranium was not analyzed on samples from MW-02-2). The highest detected concentration for dissolved uranium was 0.0047 mg/L at MW-02-1, and the highest concentration of total uranium was 0.00455 mg/L, also at MW-02-1. Trends within these data are not apparent due to limited detected concentrations (*see* Figures 5.5.2-34 and 5.5.2-35).

Vanadium

Total vanadium was detected in groundwater samples from MW-01-2, MW-01-3, MW-01-6, and MW-02-2. Dissolved vanadium concentrations were not detected above the detection limits at any wells, except at MW-01-2, where samples had "BQQ" qualified values of 0.0045 mg/L. No trends are apparent in the vanadium data set (*see* Figures 5.5.2-36 and 5.5.2-37).

Zinc

Total and dissolved zinc were detected in groundwater samples from all five wells. The highest dissolved zinc concentration was 0.99 mg/L and the highest total zinc concentration was 0.902 mg/L, both at MW-01-6. Samples were not analyzed for dissolved zinc in 2008, so it is difficult to assess trends in those data. Total zinc concentrations are variable with respect to zinc concentrations (*see* Figures 5.5.2-38 and 5.5.2-39).

5.5.2.4.3 SVOCs

The analytical results for the SVOCs included in the SWMU 2 data set are summarized in Table 5.5.3-10. The majority of SVOCs detected in the SWMU 2 groundwater samples belong to a subgroup of SVOCs known as polynuclear aromatic hydrocarbons (PAHs). These multi-benzene-ringed compounds are naturally present in coke, which was used in the furnaces to scavenge oxygen and creating the reducing environment necessary to generated elemental phosphorus. Crude phosphorus contains some fraction of coke fines. The SVOC concentrations were not plotted on maps because the SVOCs were not detected in sufficient samples to gain any insight from a graphical presentation.

PAHs compounds were routinely detected in samples collected immediately downgradient of the clarifier (i.e., MW-01-3 and MW-01-6). The detected concentrations are J-qualified indicating that the concentrations are below the method reporting limit, but above the method detection limit. PAH compounds were not detected in samples collected from the next downgradient well (i.e., MW-02-2) indicating that these PAH compounds are attenuated along the groundwater flow path.

Common lab contaminants (bis(2-ethylhexyl)phthalate and diethyl phthalate) were also detected in a few groundwater samples from SWMU 2.

O-cresol and p-cresol were detected in samples from MW-01-6 and pentachlorophenol was detected in one of two samples from MW-02-2. These parameters were not detected in the further down gradient well (MW-02-1).

Inspection of the data suggests that the detected concentrations are not above drinking water standards. The data will be evaluated in the risk assessment in order to draw conclusions whether these constituents require further evaluation.

5.5.2.4.4 VOCs

The analytical results for the VOCs included in the SWMU 2 data set are summarized in Table 5.5.2-11. The majority of the VOCs detected in the groundwater samples are J-qualified indicating that the concentrations are below the method reporting limit, but above the method detection limit. The VOC concentrations were not plotted on maps because the VOCs were not detected in sufficient samples to gain any insight from a graphical presentation.

1,2,4-trimethylbenzene was detected in two of two samples from MW-01-6. 1,2,4-trimethylbenzene was not detected in the samples collected in 2008 from the further downgradient wells (MW-02-2

and MW-01-2). 1,2,4-trimethylbenzene was reported at 0.012 mg/L in the January 2002 sample from MW-01-2, but was not detected (DL = 0.00037 mg/L) in the samples collected in 2008.

Samples from MW-02-1 contain other VOCs that are commonly associated with petroleum such as 1,3,5-trimethylbenzene, butylbenzene, sec-butylbenzene, tert-butylbenzene, isopropyl benzene, propyl benzene. These VOCs were only detected in samples from MW-02-1 and indicate a source other than the clarifier. These VOCs are related to a release from an above-ground diesel storage tank that was located north of the clarifier (*see* Section 5.5.28.1).

VOCs detected in more than one sample from the wells at the downgradient edge of the clarifier include acetone, benzene, chloromethane, ethylbenzene, toluene, and o-, m-, & p- xylenes. These compounds were not detected in samples from the further downgradient wells. These VOCs are not migrating a significant distance from the clarifier and are attenuated along the groundwater flow path. Inspection of the data suggests that the detected concentrations are not above drinking water standards. The data will be evaluated in the risk assessment in order to draw conclusions whether these constituents require further evaluation.

5.5.2.4.5 Radionuclides

Gross Alpha

Gross alpha activities were detected in 17 of the 25 groundwater samples with activities ranging from not detected at 1 pCi/L to 6.5 ± 1.9 pCi/L. Concentrations are variable at the well locations, and significant trends are not evident in the gross alpha data set (*see* Figure 5.5.2-40).

Gross Beta

In general, gross beta activities immediately downgradient of the clarifier are decreasing over time (*see* Figure 5.5.2-41). At MW-01-3, gross beta decreases from 50 ± 5.0 pCi/L in 2001 to 33 ± 4.6 pCi/L in 2008 and at MW-01-6, gross beta decreases from 63 ± 6.3 pCi/L in 2001 to 39 ± 5.6 pCi/L in 2008. Gross beta activities upgradient (MW-01-2) and further downgradient (MW-02-2 and MW-02-1) are appear to be stable.

5.5.2.4.6 PCBs

The analytical results for the PCBs included in the data set are summarized in Table 5.5.2-13. PCBs were not detected in any groundwater samples from the SWMU 2 monitoring wells.

5.5.2.5 Conclusions

The clarifier is a 100-foot diameter concrete unit partially recessed in the ground that contains approximately 500,000 gallons of crude phosphorus covered by a water cap. The crude phosphorus consists of elemental phosphorus (about 20% v/v); water (about 30% v/v); and solids (about 50% v/v) such as phosphate dust, coke dust and silica dust.

Rhodia has conducted pilot scale testing to evaluate the technical feasibility of a distillation process to volatilize the elemental phosphorus from the crude phosphorus and render the solids free of elemental phosphorus. The initial testing demonstrated that the basic process, as designed, demonstrated a capability to vaporize and condense the elemental phosphorus contained in the clarifier material. Visually good elemental phosphorus was recovered. The non-ignitable residue produced by some batches remained hazardous due to leachable cadmium present in the residue. The next step in the treatability process is to evaluate the overall feasibility of the distillation process including cost effectiveness of the process system.

Although it is clear that process water has leaked from the clarifier, no distinct trends in groundwater parameter concentrations are observed at this site over time. Only fluoride concentrations appear to be increasing over time. Alternatively, total phosphorus, sulfate, total and dissolved barium, total cobalt, total and dissolved manganese, and total nickel exhibit decreasing trends over time.

PAH compounds were routinely detected in samples collected immediately downgradient of the clarifier (i.e., MW-01-3 and MW-01-6). These compounds were not detected in samples collected from the next downgradient well (i.e., MW-02-2) indicating that these PAH compounds are attenuated along the groundwater flow path.

As with the PAH compounds, certain VOCs were detected in samples collected immediately downgradient of the clarifier (i.e., MW-01-3 and MW-01-6). These compounds were not detected in samples from the further downgradient wells. These VOCs are not migrating a significant distance from the clarifier and are attenuated along the groundwater flow path.

VOCs detected at the furthest downgradient well (MW-02-1) are related to a release from an above-ground diesel storage tank that was located north of the clarifier.

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

The dataset would be reviewed at that time and additional sampling may be necessary to inform the corrective measures study or later during the corrective measures design phase.

5.5.2.6 References

Barr Engineering Co. 2001a. Field Sampling Plan, Pre-closure Groundwater Monitoring Program. Rhodia Silver Bow Plant. Butte, Montana. August 2001

Barr Engineering Co. 2001b. Waste Plan, Rhodia Silver Bow Plant, November 16, 2001.

Barr Engineering Co. 2002. Final Pre-closure Groundwater Monitoring Report, Rhodia Silver Bow Plant. December 2002.

Barr Engineering Co. 2009. Final Phase 1 RCRA Facility Investigation Work Plan, Corrective Action Order on Consent, Docket No. RCRA-08-2004-0001 Rhodia Silver Bow Plant Butte, Montana March 25, 2009.

Franklin Engineering Group, 2007. Clarifier Waste Treatability Study, Phase 1 – Information Gathering. Prepared for Rhodia Inc., Silver Bow, Butte, Montana. October, 2007.

Franklin Engineering Group, 2011a. Clarifier Waste Treatability Study, Phase 2 Report, Pilot Plant Design and Testing. Prepared for Rhodia Inc., Silver Bow, Butte, Montana. February, 2011.

Franklin Engineering Group, 2011b. Clarifier Material Treatability Study, Phase 3 Report, Pilot Plant Operations. Prepared for Rhodia Inc., Silver Bow, Butte, Montana. December, 2011.

Tables

Table 5.5.2-1

Crude Phosphorus TCLP Data Summary
Rhodia Silver Bow Plant
[concentrations in mg/L]

Station ID: Crude P4									
Dates	Sample ID	Arsenic, TCLP	Barium, TCLP	Cadmium, TCLP	Chromium, TCLP	Lead, TCLP	Mercury, TCLP	Selenium, TCLP	Silver, TCLP
2/27/1997	Sludge #1	0.5 U	10 U	0.1 U	0.5 U	0.5 U	0.02 U	0.1 U	0.5 U
2/27/1997	Sludge #2	0.5 U	10 U	0.1 U	0.5 U	0.5 U	0.02 U	0.1 U	0.5 U

Table 5.5.2-2
Crude Phosphorus Data - General and Site-Specific Parameters
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/kg]

Chemical Name			Fluoride	Orthophosphate as P	Phosphorus, elemental (white)	Phosphorus, total
Location ID	Sample Date	Sample Type				
ESI-CLW-1	07/15/2003	N	**600**	**2300**	**6460 J**	**360000**

Table 5.5.2-3
Crude Phosphorus Data - Metals
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/kg]

		Chemical Name	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
		Analysis Location	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab	Lab
Location ID	Sample Date	Sample Type																							
ESI-CLW-1	07/15/2003	N	**445**	**201 ***	**86.2 ***	**10.4 B**	< 0.21	**271 ***	**15100 ***	**499 ***	**45.9**	**290 ***	**3900 ***	**1050 ***	**202 B**	**43.0 ***	**1.8**	**2790**	**627 B**	**29.1 ***	**275**	**284 B**	**33.0**	**98.1 ***	**16200 ***

Table 5.5.2-4
Crude Phosphorus Data - Radionuclides
SWMU 2
Rhodia Silver Bow Plant
[concentrations in pCi/g]

		Chemical Name	Gross Alpha (radiation)	Gross Beta (radiation)
Location ID	Sample Date	Sample Type		
ESI-CLW-1	07/15/2003	N	**720 +/- 20**	**570 +/- 8.9**

Table 5.5.2-5
Clarifier Water Cap Data - General and Site-Specific Parameters
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

		Chemical Name	Fluoride	Phosphate as P	Phosphorus, elemental (white)	Phosphorus, total
Location ID	Sample Date	Sample Type				
ESI-CLWC-1	07/15/2003	N	**1.7**	**1.6**	**0.0452**	**4.9**

Table 5.5.2-6
Clarifier Water Cap Data - Metals
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Chemical Name / Analysis Location			Aluminum Lab	Antimony Lab	Arsenic Lab	Barium Lab	Beryllium Lab	Cadmium Lab	Calcium Lab	Chromium Lab	Cobalt Lab	Copper Lab	Iron Lab	Lead Lab	Magnesium Lab	Manganese Lab	Mercury Lab	Nickel Lab	Potassium Lab	Selenium Lab	Silver Lab	Sodium Lab	Thallium Lab	Vanadium Lab	Zinc Lab
Location ID	**Sample Date**	**Sample Type**																							
ESI-CLWC-1	07/15/2003	N	< 0.0278	< 0.0314	**0.0058 B**	**0.0151 B**	< 0.00033	**0.0010 B**	**136**	< 0.0034	< 0.0080	**0.0087 B**	**0.0676 B**	< 0.0029	**25.7**	**0.0116 B**	< 0.00010	< 0.0108	**16**	**0.0043 B**	< 0.0043 *	**50.7**	**0.0050 BQQ**	**0.0050 B**	**0.0344**

Table 5.5.2-7
Clarifier Water Cap Data - Radionuclides
SWMU 2
Rhodia Silver Bow Plant
[concentrations in pCi/l]

		Chemical Name	Cesium 137	Gross Alpha (radiation)	Gross Beta (radiation)	Radium 226
Location ID	Sample Date	Sample Type				
ESI-CLWC-1	07/15/2003	N	< 60.1	< 3.44	**13.5 +/- 38.0**	< 1.45

Table 5.5.2-8
Groundwater Quality - General and Site Specific Parameters
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Location ID	Sample Date	Sample Type	2-Ethylhexanoic acid	Alkalinity, bicarbonate, as CaCO3	Alkalinity, carbonate, as CaCO3	Chloride	Fluoride	Nitrate + Nitrite, as N	Nitrogen, ammonia (NH3), as N	Orthophosphate, as PO4	Phosphate, as P	Phosphorus, elemental (white)	Phosphorus, total	Sulfate
MW-01-2	10/9/2001	N	--	--	--	**107**	**4.06**	**1.61**	**1.20**	**24.3 h**	--	< 0.000004	**25.3**	**403**
MW-01-2	1/16/2002	N	--	--	--	**115**	**3.74**	--	--	**29.8**	--	< 0.0000040	**26.0 h**	**417**
		SPLIT	--	--	--	--	**4.09**	**3.02**	**1.3**	**23**	--	< 0.00050	**32**	**473**
MW-01-2	9/4/2002	N	--	--	--	--	**5.56**	--	--	**15.8**	--	< 0.0005	**16.3**	**342**
MW-01-2	7/22/2003	N	--	--	--	--	**6.7**	--	--	--	**22**	< 0.0001	**13**	--
		FD	--	--	--	--	**6.7**	--	--	--	**23**	< 0.0001	**12**	--
MW-01-2	5/19/2008	N	--	**44**	< 2	**82**	**10.5**	**1.89**	**0.43**	--	--	< 0.0000234	**18.7**	**257**
MW-01-2	9/22/2008	N	--	**53**	< 2	**112**	**7.8**	**1.95**	**0.31**	--	--	**0.000441 R**	**17.0**	**238**
MW-01-2	12/16/2008	N	--	--	--	--	--	--	--	--	--	< 0.0000234	--	--
MW-01-3	10/9/2001	N	--	--	--	**126**	**0.75**	< 0.01	**1.01**	**97.4 h**	--	**0.403**	**128**	**486**
MW-01-3	1/22/2002	N	--	--	--	**133**	**0.98**	< 0.05	**1.0**	**66.3**	--	**0.250**	**54 h**	**489**
		FD	--	--	--	**131**	**0.98**	< 0.05	**1.0**	**64.3**	--	**0.3710**	**58 h**	**490**
		SPLIT	--	--	--	--	**1.09**	--	--	**36**	--	**1.600**	**71**	**524**
		FD SPLIT	--	--	--	--	**1.00**	--	--	**36**	--	**1.610**	**70**	**520**
		FDD SPLIT	**523**	--	--	--	**1.14**	--	--	**36**	--	--	**84**	--
MW-01-3	9/5/2002	N	--	--	--	--	**0.90**	--	--	**55.0**	--	**1.21**	**59**	**412**
		FD	--	--	--	--	**0.90**	--	--	**55.7**	--	**1.3**	**61**	**411**
MW-01-3	5/19/2008	N	--	**28**	< 2	**68**	**1.1**	**0.74**	**0.70**	--	--	**0.513**	**94.5**	**227**
MW-01-3	9/19/2008	N	--	**28**	< 2	**69.2**	**1.2**	**0.82**	**0.74**	--	--	**0.290**	**68.6**	**246**
MW-01-3	12/16/2008	N	--	--	--	--	--	--	--	--	--	**0.366**	--	--
MW-01-6	10/9/2001	N	--	--	--	**126**	**0.73**	< 0.01	**3.79**	**84.5 h**	--	**0.00250**	**234**	**482**
MW-01-6	1/17/2002	N	--	--	--	**134**	**1.32**	< 0.05	**3.8**	**134**	--	< 0.000660	**271 h**	**443**
		SPLIT	--	--	--	--	**1.59**	--	--	**120**	--	**0.00272**	**420**	**503**
MW-01-6	9/5/2002	N	--	--	--	--	**1.64**	--	--	**131**	--	**0.00413**	**238**	**450**
MW-01-6	5/19/2008	N	--	< 2	< 2	**77**	< 10	< 0.05	**2.85**	--	--	**0.00121**	**169**	**249**
MW-01-6	9/18/2008	N	--	**2**	< 2	**78.7**	**2.2**	< 0.05	**2.71**	--	--	< 0.0000234	**91.4**	**271**
MW-02-2	9/5/2002	N	--	--	--	--	**5.14**	--	--	**32.5**	--	**0.00019 J**	**36.0**	**392**
MW-02-2	5/19/2008	N	--	**21**	< 2	**76**	**7.9**	**1.29**	**0.06**	--	--	< 0.0000234	**42.1**	**240**
MW-02-2	9/22/2008	N	--	**21**	< 2	**83**	**7.6**	**1.48**	< 0.05	--	--	**0.000382 R**	**54.5**	**240**
MW-02-2	12/15/2008	N	--	--	--	--	--	--	--	--	--	< 0.0000234	--	--
MW-02-1	1/17/2002	N	--	--	--	**237**	**0.19**	**0.06**	< 0.1	**28.5**	--	< 0.0000040	**17.6 h**	**984**
		SPLIT	--	--	--	--	**0.24**	--	--	**17**	--	< 0.00050	**19**	**1030**
MW-02-1	9/4/2002	N	--	--	--	--	**0.20**	--	--	**17.4**	--	**0.00045 J**	**19.2**	**1020**
MW-02-1	7/22/2003	N	--	--	--	--	< 1.0	--	--	--	**4.1**	< 0.0001	**7.9**	--
MW-02-1	5/29/2008	N	--	**222**	< 2	**251**	< 1.0	< 0.05	< 0.05	--	--	< 0.0000234	**4.56**	**1200**
		FD	--	**223**	< 2	**251**	< 1.0	< 0.05	**0.05**	--	--	< 0.0000234	**4.41**	**1210**
MW-02-1	9/26/2008	N	--	**218**	< 2	**308**	< 1.0	< 0.05	< 0.05	--	--	< 0.0000234	**1.30**	**1350**

Table 5.5.2-9
Groundwater Quality - Metals
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Chemical Name			Aluminum	Aluminum	Antimony	Antimony	Arsenic	Arsenic	Barium	Barium	Beryllium	Beryllium	Cadmium	Cadmium	Calcium	Calcium	Chromium	Chromium	Cobalt	Cobalt	Copper	Copper	Iron	Iron
Analysis			Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
Location ID	Sample Date	Sample Type																						
MW-01-2	10/9/2001	N	--	--	< 0.003	< 0.003	**0.019**	**0.019**	**0.026**	**0.030**	< 0.001	< 0.001	**0.0009**	**0.0014**	**134**	**152**	**0.001**	**0.002**	< 0.01	< 0.01	**0.004**	**0.005**	< 0.01	< 0.01
MW-01-2	10/10/2001	N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-01-2	1/16/2002	N	--	--	< 0.003	--	**0.023**	--	**0.032**	--	< 0.001	--	< 0.001	--	**148**	--	< 0.001	--	< 0.01	--	**0.003**	--	< 0.03	--
		SPLIT	--	--	< 0.003	--	**0.021**	--	**0.029**	--	< 0.001	--	**0.0007**	--	--	--	< 0.001	--	< 0.01	--	< 0.001	--	< 0.01	--
MW-01-2	9/4/2002	N	--	--	--	--	**0.015**	--	< 0.1	--	--	--	< 0.001	--	--	--	--	--	--	--	--	--	< 0.03	--
MW-01-2	7/22/2003	N	**0.419 BQQ**	**0.64**	**0.00044 J**	< 0.0020	**0.0137 BQQ**	**0.0136**	**0.0204 BQQ**	**0.0256**	**0.00049 J**	**0.00062 J**	**0.0011 BQQJ**	**0.0010**	--	--	< 0.0020	**0.0014 J**	**0.0037 BQQ**	**0.0034**	**0.0026 BQQJ**	**0.0030 J**	--	--
		FD	**0.418 BQQ**	**0.715**	**0.00039 J**	< 0.0020	**0.0134 BQQ**	**0.0123**	**0.0202 BQQ**	**0.0259**	**0.00057 J**	**0.00047 J**	**0.00094 J**	**0.00081 J**	--	--	< 0.0020	**0.00062 J**	**0.0035 BQQ**	**0.0033**	**0.0026 BQQJ**	**0.0052 J**	--	--
MW-01-2	5/19/2008	N	--	--	--	**0.00036**	--	**0.0206**	--	**0.0145**	--	**0.00061**	--	**0.00101**	--	**104**	--	< 0.0002	--	**0.00261**	--	**0.0030 J**	--	**0.02**
MW-01-2	9/22/2008	N	--	--	--	**0.00026**	--	**0.0191**	--	**0.01892**	--	**0.00036**	--	**0.00138**	--	**103**	--	**0.0003**	--	**0.00217**	--	**0.0026**	--	**0.320**
MW-01-3	10/9/2001	N	--	--	< 0.003	< 0.003	**0.030**	**0.037**	**0.073**	**0.100**	**0.002**	**0.003**	**0.0009**	**0.0010**	**185**	**192**	**0.005**	**0.008**	**0.08**	**0.10**	**0.002**	**0.010**	**7.61**	**10.0**
MW-01-3	1/22/2002	N	--	--	< 0.003	--	**0.016**	--	**0.064**	--	< 0.001	--	**0.0006**	--	**174**	--	< 0.001	--	**0.05**	--	**0.001**	--	**3.30**	--
		FD	--	--	< 0.003	--	**0.016**	--	**0.065**	--	< 0.001	--	**0.0005**	--	**173**	--	< 0.001	--	**0.05**	--	**0.001**	--	**3.34**	--
		SPLIT	--	--	< 0.003	--	**0.014**	--	**0.053**	--	< 0.001	--	**0.0005**	--	--	--	< 0.001	--	**0.04**	--	< 0.001	--	**3.08**	--
		FD SPLIT	--	--	< 0.003	--	**0.014**	--	**0.055**	--	< 0.001	--	**0.0011**	--	--	--	< 0.001	--	**0.04**	--	< 0.001	--	**3.02**	--
		FDD SPLIT	--	--	< 0.003	--	**0.014**	--	**0.054**	--	< 0.001	--	**0.0006**	--	--	--	< 0.001	--	**0.04**	--	< 0.001	--	**3.03**	--
MW-01-3	9/5/2002	N	--	--	--	--	**0.015**	--	< 0.1	--	--	--	< 0.001	--	--	--	--	--	--	--	--	--	**1.97**	--
		FD	--	--	--	--	**0.015**	--	< 0.1	--	--	--	< 0.001	--	--	--	--	--	--	--	--	--	**1.96**	--
MW-01-3	5/19/2008	N	--	--	--	**0.00014**	--	**0.0166**	--	**0.0339**	--	**0.00006**	--	**0.00020**	--	**107**	--	**0.0002**	--	**0.0188**	--	**0.0034 J**	--	**1.02**
MW-01-3	9/19/2008	N	--	--	--	**0.00017**	--	**0.0177**	--	**0.0305**	--	**0.000099**	--	**0.00018**	--	**103**	--	< 0.00020	--	**0.0154**	--	**0.015536**	--	**0.67**
MW-01-6	10/9/2001	N	--	--	< 0.003	< 0.003	**0.009**	**0.009**	**0.009**	**0.017**	< 0.001	< 0.001	< 0.0006	< 0.0006	**212**	**229**	< 0.001	**0.001**	**0.04**	**0.04**	**0.004**	**0.005**	**15.9**	**18.0**
MW-01-6	10/10/2001	N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-01-6	1/17/2002	N	--	--	< 0.003	--	**0.012**	--	**0.008**	--	< 0.001	--	< 0.001	--	**231**	--	< 0.001	--	**0.02**	--	< 0.001	--	**33.7**	--
		SPLIT	--	--	< 0.003	--	**0.011**	--	**0.007**	--	< 0.001	--	< 0.0001	--	--	--	< 0.001	--	**0.02**	--	< 0.001	--	**36.6**	--
MW-01-6	9/5/2002	N	--	--	--	--	**0.009**	--	< 0.1	--	--	--	< 0.001	--	--	--	--	--	--	--	--	--	**36.0**	--
MW-01-6	5/19/2008	N	--	--	--	< 0.00005	--	**0.0112**	--	**0.00980**	--	**0.00006**	--	< 0.00002	--	**134**	--	< 0.0002	--	**0.0116**	--	**0.0086 J**	--	**23.2**
MW-01-6	9/18/2008	N	--	--	--	**0.00005**	--	**0.0115**	--	**0.0166**	--	**0.000176**	--	**0.00002**	--	**127**	--	< 0.00031	--	**0.0087**	--	**0.061445**	--	**23.4**
MW-02-2	9/5/2002	N	--	--	--	--	**0.031**	--	< 0.1	--	--	--	**0.005**	--	--	--	--	--	--	--	--	--	< 0.03	--
MW-02-2	5/19/2008	N	--	--	--	**0.00013**	--	**0.0453**	--	**0.0186**	--	**0.00039**	--	**0.00371**	--	**102**	--	**0.0003**	--	**0.00753**	--	**0.0016 J**	--	**0.527**
MW-02-2	9/22/2008	N	--	--	--	**0.00012**	--	**0.0515**	--	**0.02268**	--	**0.00034**	--	**0.00353**	--	**111**	--	**0.0003**	--	**0.00705**	--	**0.0021**	--	**0.91**
MW-02-1	1/17/2002	N	--	--	< 0.003	--	**0.008**	--	**0.082**	--	< 0.001	--	< 0.001	--	**265**	--	**0.003**	--	< 0.01	--	< 0.001	--	**0.16**	--
		SPLIT	--	--	< 0.003	--	**0.008**	--	**0.075**	--	< 0.001	--	< 0.0001	--	--	--	**0.002**	--	< 0.01	--	< 0.001	--	**0.13**	--
MW-02-1	9/4/2002	N	--	--	--	--	**0.007**	--	< 0.1	--	--	--	< 0.001	--	--	--	--	--	--	--	--	--	**0.80**	--
MW-02-1	7/22/2003	N	< 0.0300	**0.0162 J**	**0.00016 J**	< 0.0020	**0.0025 BQQ**	**0.0039**	**0.0403 BQQ**	**0.0425**	< 0.0010	< 0.0010	< 0.0010	**0.00012 J**	--	--	< 0.0020	**0.00063 J**	**0.0076 BQQ**	**0.0066**	**0.0046 BQQJ**	**0.0059 J**	--	--
MW-02-1	5/29/2008	N	--	--	--	< 0.00005	--	**0.0044**	--	**0.0293**	--	**0.00004**	--	**0.00003**	--	**324**	--	< 0.0002	--	**0.00185**	--	< 0.0030	--	**2.29**
		FD	--	--	--	**0.00005**	--	**0.0047**	--	**0.0286**	--	**0.00005**	--	< 0.00002	--	**325**	--	< 0.0002	--	**0.00194**	--	< 0.0026	--	**2.41**
MW-02-1	9/26/2008	N	--	--	--	< 0.00025	--	**0.0055**	--	**0.0339**	--	< 0.00010	--	< 0.00010	--	**376**	--	< 0.0010	--	**0.0025**	--	**0.0087**	--	**9.51**

Table 5.5.2-9
Groundwater Quality - Metals
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

		Chemical Name	Lead	Lead	Magnesium	Magnesium	Manganese	Manganese	Mercury	Mercury	Nickel	Nickel	Potassium	Potassium	Selenium	Selenium	Silver	Silver	Sodium	Sodium	Strontium	Thallium	Thallium
		Analysis	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Lab	Dissolved	Total
Location ID	Sample Date	Sample Type																					
MW-01-2	10/9/2001	N	< 0.002	< 0.002	**25**	**28**	**2.73**	**3.06**	< 0.0006	< 0.0006	< 0.01	< 0.01	**29**	**35**	**0.006**	**0.007**	< 0.003	< 0.003	**43**	**47**	--	< 0.002	< 0.002
MW-01-2	10/10/2001	N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-01-2	1/16/2002	N	< 0.002	--	**27**	--	**3.37**	--	< 0.0001	--	**0.007**	--	**34**	--	**0.006**	--	< 0.003	--	**44**	--	--	< 0.001	--
		SPLIT	< 0.002	--	--	--	**3.37**	--	< 0.0006	--	**0.01**	--	--	--	**0.007**	--	< 0.003	--	--	--	--	< 0.002	--
MW-01-2	9/4/2002	N	--	--	--	--	**2.67**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-01-2	7/22/2003	N	< 0.0010	**0.00027 J**	--	--	**2.01 BQQ**	**2.000**	< 0.00020	< 0.00020	**0.0231 BQQ**	**0.0219**	--	--	**0.0073 BQQ**	**0.0060**	**0.000020 J**	< 0.0010	--	--	--	**0.000048 J**	**0.00012 J**
		FD	< 0.0010 J	**0.00037 J**	--	--	**1.97 BQQ**	**2.01**	< 0.00020	< 0.00020	**0.0225 BQQ**	**0.0222**	--	--	**0.0059 BQQ**	**0.0058**	**0.000020 J**	< 0.0010	--	--	--	**0.000070 J**	**0.00012 J**
MW-01-2	5/19/2008	N	--	**0.00014**	--	**19 R**	--	**1.55**	--	< 0.0002	--	**0.0044**	--	**23.9**	--	**0.0121**	--	**0.00003**	--	**46.9**	--	--	**0.00004**
MW-01-2	9/22/2008	N	--	**0.00028**	--	**19.2**	--	**1.18**	--	< 0.0002	--	**0.0032**	--	**25.9**	--	**0.010**	--	< 0.00002	--	**51.8**	--	--	**0.00004**
MW-01-3	10/9/2001	N	< 0.002	< 0.002	**41**	**44**	**11.6**	**13.1**	< 0.0006	< 0.0006	**0.02**	**0.03**	**36**	**40**	**0.003**	**0.003**	< 0.003	< 0.003	**50**	**53**	--	< 0.002	< 0.002
MW-01-3	1/22/2002	N	< 0.002	--	**44**	--	**12.2**	--	< 0.0001	--	**0.012**	--	**39**	--	**0.002**	--	< 0.003	--	**51**	--	--	< 0.003	--
MW-01-3	1/22/2002	FD	< 0.002	--	**44**	--	**12.4**	--	< 0.0001	--	**0.012**	--	**39**	--	**0.002**	--	< 0.003	--	**51**	--	**0.9**	< 0.003	--
		SPLIT	< 0.002	--	--	--	**12.0**	--	< 0.0006	--	**0.01**	--	--	--	**0.004**	--	< 0.003	--	--	--	**0.9**	< 0.002	--
		FD SPLIT	**0.003**	--	--	--	**12.5**	--	< 0.0006	--	**0.01**	--	--	--	**0.004**	--	< 0.003	--	--	--	--	< 0.002	--
		FDD SPLIT	< 0.002	--	--	--	**11.4**	--	< 0.0006	--	**0.01**	--	--	--	**0.004**	--	< 0.003	--	--	--	--	< 0.002	--
MW-01-3	9/5/2002	N	--	--	--	--	**10.1**	--	--	--	--	--	--	--	< 0.005	--	--	--	--	--	--	--	--
		FD	--	--	--	--	**10.6**	--	--	--	--	--	--	--	< 0.005	--	--	--	--	--	--	--	--
MW-01-3	5/19/2008	N	--	**0.00013**	--	**29.1 R**	--	**8.47**	--	< 0.0002	--	**0.0057**	--	**33.7**	--	**0.0015**	--	< 0.00002	--	**42.7**	--	--	**0.00005**
MW-01-3	9/19/2008	N	--	**0.000423**	--	**28.3**	--	**8.36**	--	< 0.00020	--	**0.0049**	--	**34.2**	--	**0.0020**	--	< 0.000020	--	**44.0**	--	--	**0.000060**
MW-01-6	10/9/2001	N	< 0.002	< 0.002	**43**	**47**	**4.83**	**5.36**	< 0.0006	< 0.0006	**0.01**	**0.02**	**55**	**60**	**0.002**	**0.002**	< 0.003	< 0.003	**69**	**76**	--	< 0.002	< 0.002
MW-01-6	10/10/2001	N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-01-6	1/17/2002	N	< 0.002	--	**42**	--	**3.17**	--	< 0.0001	--	**0.012**	--	**54**	--	**0.003**	--	< 0.003	--	**66**	--	--	< 0.001	--
		SPLIT	< 0.002	--	--	--	**3.10**	--	< 0.0006	--	**0.02**	--	--	--	**0.005**	--	< 0.003	--	--	--	--	< 0.002	--
MW-01-6	9/5/2002	N	--	--	--	--	**2.39**	--	--	--	--	--	--	--	< 0.005	--	--	--	--	--	--	--	--
MW-01-6	5/19/2008	N	--	**0.00011**	--	**22.5 R**	--	**1.24**	--	< 0.0002	--	**0.0063**	--	**42.2**	--	**0.0012**	--	< 0.00002	--	**52.2**	--	--	**0.00010**
MW-01-6	9/18/2008	N	--	**0.000707**	--	**21.0**	--	**0.965**	--	< 0.00020	--	**0.0053**	--	**41.6**	--	**0.0029**	--	< 0.000020	--	**53.9**	--	--	**0.000098**
MW-02-2	9/5/2002	N	--	--	--	--	**1.97**	--	--	--	--	--	--	--	**0.009**	--	--	--	--	--	--	--	--
MW-02-2	5/19/2008	N	--	**0.00042**	--	**18.8 R**	--	**1.03**	--	< 0.0002	--	**0.0271**	--	**18.3**	--	**0.0149**	--	**0.00010**	--	**44.6**	--	--	**0.00003**
MW-02-2	9/22/2008	N	--	**0.00075**	--	**20.9**	--	**1.14**	--	< 0.0002	--	**0.0239**	--	**19.6**	--	**0.015**	--	**0.00005**	--	**47.8**	--	--	**0.00003**
MW-02-1	1/17/2002	N	< 0.002	--	**53**	--	**2.92**	--	< 0.0001	--	**0.008**	--	**23**	--	**0.005**	--	< 0.003	--	**236**	--	--	< 0.001	--
		SPLIT	< 0.002	--	--	--	**2.72**	--	< 0.0006	--	**0.01**	--	--	--	**0.006**	--	< 0.003	--	--	--	--	< 0.002	--
MW-02-1	9/4/2002	N	--	--	--	--	**3.17**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-02-1	7/22/2003	N	**0.000030 J**	**0.00028 J**	--	--	**1.85 BQQ**	**1.76**	< 0.00020	< 0.00020	**0.0436 BQQ**	**0.0420**	--	--	**0.00087 J**	**0.0026 J**	**0.000020 J**	< 0.0010	--	--	--	< 0.0010	**0.00044 J**
MW-02-1	5/29/2008	N	--	< 0.00030	--	**62.7**	--	**2.15**	--	< 0.0002	--	**0.0048**	--	**28.8**	--	**0.0045**	--	**0.00002**	--	**306**	--	--	< 0.00002
		FD	--	< 0.00033	--	**63.4**	--	**2.1**	--	< 0.0002	--	**0.0050**	--	**28.9**	--	**0.0054**	--	**0.00002**	--	**308**	--	--	< 0.00002
MW-02-1	9/26/2008	N	--	**0.00082**	--	**71.5**	--	**2.14000**	--	< 0.0002	--	**0.0057**	--	**30.1**	--	**0.0070**	--	< 0.00010	--	**338**	--	--	< 0.00010

Table 5.5.2-9
Groundwater Quality - Metals
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

		Chemical Name	Uranium	Uranium	Vanadium	Vanadium	Zinc	Zinc
		Analysis	Dissolved	Total	Dissolved	Total	Dissolved	Total
Location ID	Sample Date	Sample Type						
MW-01-2	10/9/2001	N	--	< 0.0003	< 0.1	< 0.1	**0.20**	**0.28**
MW-01-2	10/10/2001	N	--	--	--	--	--	--
MW-01-2	1/16/2002	N	< 0.0002	--	< 0.01	--	**0.091**	--
		SPLIT	< 0.0003	--	< 0.1	--	**0.10**	--
MW-01-2	9/4/2002	N	--	--	--	--	**0.25**	--
MW-01-2	7/22/2003	N	--	--	**0.0045 BQQ**	**0.0045**	**0.388 BQQ**	**0.327**
		FD	--	--	**0.0045 BQQ**	**0.0050**	**0.399 BQQ**	**0.321**
MW-01-2	5/19/2008	N	--	**0.000022**	--	**0.0064**	--	**0.222**
MW-01-2	9/22/2008	N	--	**0.00004**	--	**0.0062**	--	**0.2124**
MW-01-3	10/9/2001	N	--	**0.0007**	< 0.1	< 0.1	**0.47**	**0.60**
MW-01-3	1/22/2002	N	< 0.001	--	< 0.1	--	**0.09**	--
MW-01-3	1/22/2002	FD	< 0.001	--	< 0.1	--	**0.10**	--
		SPLIT	< 0.0003	--	< 0.1	--	**0.09**	--
		FD SPLIT	< 0.0003	--	< 0.1	--	**0.09**	--
		FDD SPLIT	< 0.0003	--	< 0.1	--	**0.09**	--
MW-01-3	9/5/2002	N	--	--	--	--	**0.23**	--
		FD	--	--	--	--	**0.23**	--
MW-01-3	5/19/2008	N	--	**0.000027**	--	**0.0011**	--	**0.0080**
MW-01-3	9/19/2008	N	--	**0.000036**	--	**0.000903**	--	**0.0129**
MW-01-6	10/9/2001	N	--	< 0.0003	< 0.1	< 0.1	**0.320**	**0.350**
MW-01-6	10/10/2001	N	--	--	--	--	--	--
MW-01-6	1/17/2002	N	< 0.0002	--	< 0.01	--	**0.873**	--
		SPLIT	< 0.0003	--	< 0.1	--	**0.97**	--
MW-01-6	9/5/2002	N	--	--	--	--	**0.99**	--
MW-01-6	5/19/2008	N	--	< 0.000020	--	< 0.0002	--	**0.902**
MW-01-6	9/18/2008	N	--	**0.000096**	--	**0.000500**	--	**0.6957**
MW-02-2	9/5/2002	N	--	--	--	--	**1.34**	--
MW-02-2	5/19/2008	N	--	**0.000059**	--	**0.0045**	--	**0.524**
MW-02-2	9/22/2008	N	--	**0.00008**	--	**0.0042**	--	**0.4973**
MW-02-1	1/17/2002	N	**0.0047**	--	< 0.01	--	**0.004**	--
		SPLIT	**0.0022**	--	< 0.1	--	< 0.01	--
MW-02-1	9/4/2002	N	--	--	--	--	**0.01**	--
MW-02-1	7/22/2003	N	--	--	< 0.0010	< 0.0010	**0.0030 BQQJ**	**0.0032 J**
MW-02-1	5/29/2008	N	--	**0.0035**	--	< 0.0004	--	< 0.0016
		FD	--	**0.0034**	--	< 0.0003	--	< 0.0020
MW-02-1	9/26/2008	N	--	**0.00455**	--	< 0.0010	--	**0.0143**

Table 5.5.2-10
Groundwater Quality - SVOCs
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Chemical Name			1,2,4,5-Tetrachlorobenzene	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1-Methylnaphthalene	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
Location ID	Sample Date	Sample Type														
MW-01-2	10/9/2001	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01
MW-01-2	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
MW-01-2	9/22/2008	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
MW-01-3	10/9/2001	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01
MW-01-3	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
MW-01-3	9/19/2008	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
MW-01-6	10/9/2001	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01
MW-01-6	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
MW-01-6	9/18/2008	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
MW-02-2	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
MW-02-2	9/22/2008	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
MW-02-1	1/17/2002	N	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01
		SPLIT	--	< 0.011	< 0.011	< 0.011	< 0.011	--	< 0.021	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
MW-02-1	5/29/2008	N	--	< 0.00016	< 0.00022	< 0.00021	< 0.00029	--	< 0.00031	< 0.00058	< 0.00047	< 0.022 R	< 0.0017	< 0.00018	< 0.00033	< 0.00041
		FD	--	< 0.00032	< 0.00044	< 0.00042	< 0.00058	--	< 0.00062	< 0.0012	< 0.00094	< 0.044 R	< 0.0034	< 0.00036	< 0.00066	< 0.00082
MW-02-1	9/26/2008	N	--	< 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

Table 5.5.2-10
Groundwater Quality - SVOCs
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Chemical Name			2-Chlorophenol	2-Methyl-4,6-dinitrophenol	2-Methylnaphthalene	2-Nitroaniline	2-Nitrophenol	3,3`-Dichlorobenzidine	3-Nitroaniline	4-Bromophenyl phenyl ether	4-Chloro-3-methylphenol	4-Chloroaniline	4-Chlorophenol	4-Chlorophenyl phenyl ether	4-Nitroaniline	4-Nitrophenol	Acenaphthene	Acenaphthylene
Location ID	Sample Date	Sample Type																
MW-01-2	10/9/2001	N	< 0.01	< 0.05	< 0.01	--	< 0.01	< 0.02	--	< 0.01	< 0.01	--	--	< 0.01	--	< 0.05	< 0.01	< 0.01
MW-01-2	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	< 0.000015
MW-01-2	9/22/2008	N	< 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	< 0.0000044	< 0.0000034
MW-01-3	10/9/2001	N	< 0.01	< 0.05	< 0.01	--	< 0.01	< 0.02	--	< 0.01	< 0.01	--	--	< 0.01	--	< 0.05	< 0.01	< 0.01
MW-01-3	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	**0.000032 J**	**0.000018 J**
MW-01-3	9/19/2008	N	< 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	**0.000075**	< 0.0000035
MW-01-6	10/9/2001	N	< 0.01	< 0.05	< 0.01	--	< 0.01	< 0.02	--	< 0.01	< 0.01	--	--	< 0.01	--	< 0.05	**0.0057 J**	< 0.01
MW-01-6	5/19/2008	N	< 0.000054	< 0.000025	**0.000082 J**	< 0.000024	< 0.000063	< 0.00043 R	< 0.000029	< 0.000026	< 0.000037	< 0.000025 R	--	< 0.000027	< 0.000019	< 0.00028	**0.00036**	**0.000045 J**
MW-01-6	9/18/2008	N	< 0.000054	< 0.000025	**0.000095 J**	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	--	< 0.000027	< 0.000019	< 0.00028	**0.00062**	**0.000010 J**
MW-02-2	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	< 0.000015
MW-02-2	9/22/2008	N	< 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	< 0.000015
MW-02-1	1/17/2002	N	< 0.01	< 0.05	< 0.01	--	< 0.01	< 0.02	--	< 0.01	< 0.01	--	< 0.01	< 0.01	--	< 0.05	< 0.01	< 0.01
		SPLIT	< 0.011	< 0.021	< 0.011	< 0.011	< 0.011	< 0.021	< 0.011	< 0.011	< 0.011	< 0.021	--	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
MW-02-1	5/29/2008	N	< 0.00054	< 0.00025	< 0.00026	< 0.00024	< 0.00063	< 0.0043	< 0.00029	< 0.00026	< 0.00037	< 0.00025	--	< 0.00027	< 0.00019	< 0.0028	< 0.00026	< 0.00015
		FD	< 0.0011	< 0.00050	< 0.00052	< 0.00048	< 0.0013	< 0.0086	< 0.00058	< 0.00052	< 0.00074	< 0.00050	--	< 0.00054	< 0.00038	< 0.0056	< 0.00052	< 0.00030
MW-02-1	9/26/2008	N	< 0.000054	< 0.000025	< 0.00022	< 0.000024	< 0.000063	< 0.00043	< 0.000029	< 0.000026	< 0.000037	< 0.000025	--	< 0.000027	< 0.000019	< 0.00028	**0.00046**	< 0.000015

Table 5.5.2-10
Groundwater Quality - SVOCs
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Chemical Name			Anthracene	Azobenzene	Benzidine	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(g,h,i) perylene	Benzo(k) fluoranthene	Benzoic acid	Benzyl alcohol	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl) ether	Bis(2-ethylhexyl) phthalate	Butyl benzyl phthalate	Carbazole	Chrysene
Location ID	Sample Date	Sample Type																	
MW-01-2	10/9/2001	N	< 0.01	--	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	< 0.01
MW-01-2	5/19/2008	N	< 0.000024	< 0.000021	--	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035	< 0.000026	**0.00052 J**	< 0.000018	< 0.000018	< 0.000028
MW-01-2	9/22/2008	N	< 0.0000036	< 0.000021	--	< 0.0000026	< 0.0000043	< 0.0000023	< 0.0000029	< 0.0000025	**0.0016 R**	< 0.000073	< 0.000024	< 0.000035	< 0.000026	< 0.00018	< 0.000056	< 0.000018	< 0.0000034
MW-01-3	10/9/2001	N	< 0.01	--	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	< 0.01
MW-01-3	5/19/2008	N	**0.000025 J**	< 0.000021	--	**0.000026 J**	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035	< 0.000026	**0.00079 J**	< 0.000018	**0.000019 J**	**0.000032 J**
MW-01-3	9/19/2008	N	**0.000018 J**	< 0.000021	--	**0.000021 J**	< 0.0000044	**0.0000027 J**	< 0.0000030	< 0.0000026	**0.0015 R**	< 0.000073	< 0.000024	< 0.000035	< 0.000026	< 0.00021	< 0.000037	**0.000029 J**	**0.000033**
MW-01-6	10/9/2001	N	< 0.01	--	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	< 0.01
MW-01-6	5/19/2008	N	**0.000084 J**	< 0.000021	--	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	**0.0011 R**	< 0.000073	< 0.000024	< 0.000035	< 0.000026	**0.0026**	< 0.000018	**0.00031**	< 0.000028
MW-01-6	9/18/2008	N	**0.000025**	< 0.000021	--	**0.0000049 J**	< 0.0000043	< 0.0000023	< 0.0000029	< 0.0000025	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035	< 0.000026	< 0.00025	< 0.000062	**0.00061**	< 0.0000034
MW-02-2	5/19/2008	N	< 0.000024	< 0.000021	--	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011 R	< 0.000073	< 0.000024	< 0.000035	< 0.000026	**0.0019**	< 0.000018	< 0.000018	< 0.000028
MW-02-2	9/22/2008	N	< 0.000024	< 0.000021	--	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	**0.0022 R**	< 0.000073	< 0.000024	< 0.000035	< 0.000026	< 0.00025	< 0.000018	< 0.000018	< 0.000028
MW-02-1	1/17/2002	N	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	< 0.01
		SPLIT	< 0.011	--	--	< 0.011	< 0.021	< 0.011	< 0.011	< 0.011	< 0.053	< 0.021	< 0.011	< 0.021 *	< 0.011	< 0.021	< 0.011	< 0.032	< 0.011
MW-02-1	5/29/2008	N	< 0.00024	< 0.00021	--	< 0.00018	< 0.00031	< 0.00017	< 0.00019	< 0.00024	< 0.011 R	< 0.00073	< 0.00024	< 0.00035	< 0.00026	**1.4 J**	< 0.00018	< 0.00018	< 0.00028
		FD	< 0.00048	< 0.00042	--	< 0.00036	< 0.00062	< 0.00034	< 0.00038	< 0.00048	< 0.022 R	< 0.0015	< 0.00048	< 0.00070	< 0.00052	**22 J**	< 0.00036	< 0.00036	< 0.00056
MW-02-1	9/26/2008	N	< 0.000024	< 0.000021	--	< 0.000018	< 0.000031	< 0.000017	< 0.000019	< 0.000024	< 0.0011	< 0.000073	< 0.000024	< 0.000035	< 0.000026	< 0.16	< 0.000018	< 0.000018	< 0.000028

Table 5.5.2-10
Groundwater Quality - SVOCs
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Chemical Name			Dibenz(a,h) anthracene	Dibenzofuran	Diethyl phthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(1,2,3-cd) pyrene	Isophorone	m,p-cresols	Naphthalene
Location ID	Sample Date	Sample Type																
MW-01-2	10/9/2001	N	< 0.01	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
MW-01-2	5/19/2008	N	< 0.000017	< 0.000018	< 0.000033	< 0.000021	< 0.000044	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	--	**0.000069 J**
MW-01-2	9/22/2008	N	< 0.0000025	< 0.000018	< 0.000042	< 0.000021	< 0.000088	< 0.000018	< 0.0000044	< 0.0000038	< 0.000022	< 0.000027	< 0.00019 R	< 0.000024	< 0.0000026	< 0.000016	--	< 0.000011
MW-01-3	10/9/2001	N	< 0.01	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	**0.015**
MW-01-3	5/19/2008	N	< 0.000017	< 0.000018	< 0.000055	< 0.000021	< 0.000053	< 0.000018	**0.00031**	< 0.000027	< 0.000022	< 0.000027 R	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	--	**0.000024 J**
MW-01-3	9/19/2008	N	< 0.0000026	**0.000031 J**	< 0.000069	< 0.000021	< 0.000083	< 0.000018	**0.00049**	**0.0000085 J**	< 0.000022	< 0.000027 R	< 0.00019 R	< 0.000024 R	< 0.0000027	< 0.000016	--	< 0.000036
MW-01-6	10/9/2001	N	< 0.01	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	**0.015**
MW-01-6	5/19/2008	N	< 0.000017	**0.00014 J**	**0.00020**	< 0.000021	< 0.000043	< 0.000018	**0.00019 J**	**0.00014 J**	< 0.000022	< 0.000027 R	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	--	**0.00032**
MW-01-6	9/18/2008	N	< 0.0000025	**0.00030**	< 0.00015	< 0.000021	< 0.000080	< 0.000018	**0.00031**	**0.00017**	< 0.000022	< 0.000027 R	< 0.00019 R	< 0.000024 R	< 0.0000026	< 0.000016	--	< 0.00030
MW-02-2	5/19/2008	N	< 0.000017	< 0.000018	< 0.000023	< 0.000021	< 0.000043	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027 R	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	--	< 0.000022
MW-02-2	9/22/2008	N	< 0.000017	< 0.000018	< 0.000039	< 0.000021	< 0.000090	< 0.000018	< 0.000020	< 0.000027	< 0.000022	< 0.000027	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	--	< 0.000022
MW-02-1	1/17/2002	N	< 0.01	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
		SPLIT	< 0.021	< 0.011	< 0.032	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	--	< 0.011
MW-02-1	5/29/2008	N	< 0.00017	< 0.00018	< 0.00012	< 0.00021	< 0.00023	< 0.00018	< 0.00020	< 0.00027	< 0.00022	< 0.00027 R	< 0.0019 R	< 0.00024 R	< 0.00021	< 0.00016	--	< 0.00022
		FD	< 0.00034	< 0.00036	< 0.00024	< 0.00042	< 0.00046	< 0.00036	< 0.00040	< 0.00054	< 0.00044	< 0.00054 R	< 0.0038 R	< 0.00048 R	< 0.00042	< 0.00032	--	< 0.00044
MW-02-1	9/26/2008	N	< 0.000017	**0.00070**	< 0.000012	< 0.000021	< 0.000023	< 0.000018	< 0.000020	**0.00064**	< 0.000022	< 0.000027	< 0.00019 R	< 0.000024	< 0.000021	< 0.000016	--	< 0.000022

Table 5.5.2-10
Groundwater Quality - SVOCs
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Chemical Name			Nitrobenzene	N-Nitrosodimethylamine	N-Nitrosodi-n-propylamine	N-Nitrosodiphenylamine	N-Nitrosopyrrolidine	o-Cresol	p-cresol	Pentachlorobenzene	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	Pyridine
Location ID	**Sample Date**	**Sample Type**													
MW-01-2	10/9/2001	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.02
MW-01-2	5/19/2008	N	**0.000099 J**	< 0.00042	< 0.000037	< 0.000048	--	< 0.00011	< 0.00012	--	< 0.00034	< 0.000022	**0.0017**	< 0.000019	--
MW-01-2	9/22/2008	N	< 0.000028	< 0.00042	< 0.000037	< 0.000048	--	< 0.00011	< 0.00012	--	< 0.00034	< 0.0000050	**0.00019 J**	< 0.0000035	< 0.0014 R
MW-01-3	10/9/2001	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.02
MW-01-3	5/19/2008	N	< 0.000028	< 0.00042	< 0.000037	< 0.000048	--	< 0.00011	< 0.00012	--	< 0.00034	**0.000072 J**	**0.0018**	**0.00021**	--
MW-01-3	9/19/2008	N	< 0.000028	< 0.00042	< 0.000037	< 0.000048	--	< 0.00011	< 0.00012	--	< 0.00034	**0.000074**	< 0.000063	**0.00033**	< 0.0014 R
MW-01-6	10/9/2001	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	--	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.02
MW-01-6	5/19/2008	N	< 0.000028	< 0.00042	< 0.000037	< 0.000048	--	**0.00020 J**	**0.00039 J**	--	< 0.00034	**0.00037**	**0.0062**	**0.00012 J**	--
MW-01-6	9/18/2008	N	< 0.000028	< 0.00042	< 0.000037	< 0.000048	--	**0.00011 J**	< 0.00012	--	< 0.00034	**0.00051**	< 0.000063	**0.00020**	< 0.0014 R
MW-02-2	5/19/2008	N	< 0.000028	< 0.00042	< 0.000037	< 0.000048	--	< 0.00011	< 0.00012	--	< 0.00034	< 0.000022	**0.0014**	< 0.000019	--
MW-02-2	9/22/2008	N	< 0.000028	< 0.00042	< 0.000037	< 0.000048	--	< 0.00011	< 0.00012	--	**0.00080 J**	< 0.000022	< 0.000063	< 0.000019	< 0.0014 R
MW-02-1	1/17/2002	N	< 0.01	< 0.01	< 0.01	< 0.01	--	< 0.01	--	--	< 0.05	< 0.01	< 0.01	< 0.01	< 0.02
		SPLIT	< 0.011	< 0.011 *	< 0.011	< 0.011	--	< 0.011	< 0.011	--	< 0.011	< 0.011	< 0.011 *	< 0.011	< 0.011
MW-02-1	5/29/2008	N	< 0.00028	< 0.0042	< 0.00037	< 0.00048	--	< 0.0011	< 0.0012	--	< 0.0034	< 0.00022	< 0.013	< 0.00019	--
		FD	< 0.00056	< 0.0084	< 0.00074	< 0.00096	--	< 0.0022	< 0.0024	--	< 0.0068	< 0.00044	< 0.015	< 0.00038	--
MW-02-1	9/26/2008	N	< 0.000028	< 0.00042	< 0.000037	< 0.000048	--	< 0.00011	< 0.00012	--	< 0.00034	**0.00056**	**0.0020**	< 0.000019	< 0.0014 R

Table 5.5.2-11
Groundwater Quality - VOCs
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Chemical Name			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	1,2-Dibromoethane	1,2-Dichlorobenzene
Location ID	Sample Date	Sample Type														
MW-01-2	10/9/2001	N	< 0.0010	< 0.0010	< 0.0010	< 0.0010	--	< 0.0010	< 0.0010	--	< 0.0010	--	--	< 0.0010	< 0.0010	--
MW-01-2	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	< 0.000084	< 0.000044
MW-01-2	9/22/2008	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 J	< 0.000084	< 0.000044
MW-01-3	10/9/2001	N	< 0.0010	< 0.0010	< 0.0010	< 0.0010	--	< 0.0010	< 0.0010	--	< 0.0010	--	--	< 0.0010	< 0.0010	--
MW-01-3	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	< 0.000084	< 0.000044
MW-01-3	9/19/2008	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 J	< 0.000084	< 0.000044
MW-01-6	10/9/2001	N	< 0.0010	< 0.0010	< 0.0010	< 0.0010	--	< 0.0010	< 0.0010	--	< 0.0010	--	--	< 0.0010	< 0.0010	--
MW-01-6	5/19/2008	N	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013	**0.00010 J**	< 0.00022	< 0.000084	< 0.000044
MW-01-6	9/18/2008	N	< 0.000047	< 0.000050	< 0.000064	< 0.000061	< 0.000051	< 0.000042	< 0.00010	< 0.00010	< 0.00014	< 0.00013	**0.000090 J**	< 0.00022	< 0.000084	< 0.000044
MW-02-2	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	< 0.000084	< 0.000044
MW-02-2	9/22/2008	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 J	< 0.000084	< 0.000044
MW-02-1	1/17/2002	N	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.012**	< 0.0010	< 0.0010	< 0.0010
		SPLIT	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.014**	< 0.005	< 0.001	< 0.001
MW-02-1	5/29/2008	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	< 0.000084	< 0.000044
		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	< 0.000084	< 0.000044
MW-02-1	9/26/2008	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 J	< 0.000084	< 0.000044

Table 5.5.2-11
Groundwater Quality - VOCs
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Chemical Name			1,2-Dichloroethane	1,2-Dichloroethylene, cis	1,2-Dichloroethylene, trans	1,2-Dichloropropane	1,3,5-Trimethylbenzene	1,3-Dichloro-1-propene, cis	1,3-Dichloro-1-propene, trans	1,3-Dichlorobenzene	1,3-Dichloropropane	1,4-Dichlorobenzene	2,2-Dichloropropane	2-Chloroethyl vinyl ether	2-Hexanone	Acetone	Acrolein
Location ID	Sample Date	Sample Type															
MW-01-2	10/9/2001	N	< 0.0010	< 0.0010	< 0.0010	< 0.0010	--	< 0.0010	< 0.0010	--	--	--	--	--	< 0.02	< 0.02	--
MW-01-2	5/19/2008	N	< 0.000073	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000038	< 0.000041	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
MW-01-2	9/22/2008	N	< 0.000073	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000038	< 0.000041	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0051	< 0.0020
MW-01-3	10/9/2001	N	< 0.0010	< 0.0010	< 0.0010	< 0.0010	--	< 0.0010	< 0.0010	--	--	--	--	--	< 0.02	**0.012 J**	--
MW-01-3	5/19/2008	N	< 0.000073	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000038	< 0.000041	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	**0.0084 J**	< 0.0020
MW-01-3	9/19/2008	N	< 0.000073	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000038	< 0.000041	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.023	< 0.0020
MW-01-6	10/9/2001	N	< 0.0010	< 0.0010	< 0.0010	< 0.0010	--	< 0.0010	< 0.0010	--	--	--	--	--	< 0.02	< 0.02	--
MW-01-6	5/19/2008	N	< 0.000073	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000038	< 0.000041	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
MW-01-6	9/18/2008	N	< 0.000073	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000038	< 0.000041	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.017	< 0.0020
MW-02-2	5/19/2008	N	< 0.000073	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000038	< 0.000041	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020
MW-02-2	9/22/2008	N	< 0.000073	< 0.000045	< 0.000048	< 0.000042	< 0.000042	< 0.000038	< 0.000041	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0046	< 0.0020
MW-02-1	1/17/2002	N	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0058**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.02	< 0.02	< 0.02
		SPLIT	< 0.001	< 0.001	< 0.001	< 0.001	**0.007**	--	--	< 0.001	< 0.001	< 0.001	< 0.001	--	--	--	--
MW-02-1	5/29/2008	N	< 0.000073	< 0.000045	< 0.000048	< 0.000042	**0.00078**	< 0.000038	< 0.000041	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020 J
		FD	< 0.000073	< 0.000045	< 0.000048	< 0.000042	**0.00032 J**	< 0.000038	< 0.000041	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020 J
MW-02-1	9/26/2008	N	< 0.000073	< 0.000045	< 0.000048	< 0.000042	**0.00031 J**	< 0.000038	< 0.000041	< 0.000041	< 0.000032	< 0.000054	< 0.000050	< 0.00019 R	< 0.0029	< 0.0025	< 0.0020

Table 5.5.2-11
Groundwater Quality - VOCs
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Chemical Name			Acrylonitrile	Benzene	Bromobenzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Butyl benzene	Butylbenzene, sec	Butylbenzene, tert	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chlorodibromomethane	Chloroethane
Location ID	Sample Date	Sample Type															
MW-01-2	10/9/2001	N	--	< 0.0010	--	--	< 0.0010	< 0.0010	< 0.0010	--	--	--	**0.00030 J***	< 0.0010	< 0.0010	< 0.0010	< 0.0010
MW-01-2	5/19/2008	N	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000080	< 0.000068	< 0.000045	< 0.000057	< 0.00013
MW-01-2	9/22/2008	N	< 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	< 0.000045	< 0.000057	< 0.00013
MW-01-3	10/9/2001	N	--	< 0.0010	--	--	< 0.0010	< 0.0010	< 0.0010	--	--	--	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
MW-01-3	5/19/2008	N	< 0.00031	**0.00027 J**	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068	< 0.000045	< 0.000057	< 0.00013
MW-01-3	9/19/2008	N	< 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	< 0.000045	< 0.000057	< 0.00013
MW-01-6	10/9/2001	N	--	**0.00070 J**	--	--	< 0.0010	< 0.0010	< 0.0010	--	--	--	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
MW-01-6	5/19/2008	N	< 0.00031	**0.00060**	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068	< 0.000045	< 0.000057	< 0.00013
MW-01-6	9/18/2008	N	< 0.00031	**0.00048 J**	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000045	< 0.000068	< 0.000045	< 0.000057	< 0.00013
MW-02-2	5/19/2008	N	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	< 0.000036	< 0.000038	< 0.000060	< 0.000068	< 0.000045	< 0.000057	< 0.00013
MW-02-2	9/22/2008	N	< 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	< 0.000045	< 0.000057	< 0.00013
MW-02-1	1/17/2002	N	< 0.02	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0047**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
		SPLIT	--	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.002**	**0.005**	**0.004**	--	< 0.001	< 0.001	< 0.001	< 0.001
MW-02-1	5/29/2008	N	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.00072	**0.0029**	**0.00013 J**	< 0.000045	< 0.000068	< 0.000045	< 0.000057	< 0.00013
		FD	< 0.00031	< 0.000045	< 0.000027	< 0.000091	< 0.000036	< 0.000080	< 0.000072	< 0.000056	**0.00069 J**	**0.000050 J**	< 0.000045	< 0.000068	< 0.000045	< 0.000057	**0.00022 J**
MW-02-1	9/26/2008	N	< 0.00031	**0.00012 J**	< 0.000027	< 0.000091	< 0.000036	< 0.000080 J	< 0.000072	**0.00035 J**	**0.0016 J**	**0.000060 J**	< 0.00028	< 0.000068	< 0.000045	< 0.000057	< 0.00013

Table 5.5.2-11
Groundwater Quality - VOCs
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Chemical Name			Chloroform	Chloromethane	Chlorotoluene o-	Chlorotoluene p-	Cumene (isopropyl benzene)	Cymene p- (Toluene isopropyl p-)	Dibromomethane (methylene bromide)	Dichlorodifluoromethane (CFC-12)	Ethyl benzene	Hexachlorobutadiene	Iodomethane	Isopropyl toluene	Methyl ethyl ketone	Methyl isobutyl ketone
Location ID	Sample Date	Sample Type														
MW-01-2	10/9/2001	N	< 0.0010	< 0.0010	--	--	--	--	--	< 0.0010	< 0.0010	--	< 0.0010	--	< 0.02	< 0.02
MW-01-2	5/19/2008	N	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	--	< 0.0038	< 0.0030
MW-01-2	9/22/2008	N	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	--	< 0.0038	< 0.0030
MW-01-3	10/9/2001	N	< 0.0010	< 0.0010	--	--	--	--	--	< 0.0010	< 0.0010	--	< 0.0010	--	< 0.02	< 0.02
MW-01-3	5/19/2008	N	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	--	< 0.0038	< 0.0030
MW-01-3	9/19/2008	N	< 0.000042	**0.00016 J**	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	--	< 0.0038	< 0.0030
MW-01-6	10/9/2001	N	< 0.0010	< 0.0010	--	--	--	--	--	< 0.0010	< 0.0010	--	< 0.0010	--	< 0.02	< 0.02
MW-01-6	5/19/2008	N	< 0.000042	**0.000090 J**	< 0.000035	< 0.000025	**0.000040 J**	< 0.000044	< 0.000089	< 0.000083	**0.000070 J**	< 0.00019	< 0.00027	--	< 0.0038	< 0.0030
MW-01-6	9/18/2008	N	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089	< 0.000083	**0.000060 J**	< 0.00019	< 0.00027	--	< 0.0038	< 0.0030
MW-02-2	5/19/2008	N	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	--	< 0.0038	< 0.0030
MW-02-2	9/22/2008	N	< 0.000042	< 0.000053	< 0.000035	< 0.000025	< 0.000031	< 0.000044	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	--	< 0.0038	< 0.0030
MW-02-1	1/17/2002	N	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0016**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	--	< 0.02	< 0.02
		SPLIT	< 0.001	< 0.001	< 0.001	< 0.001	**0.002**	--	< 0.001	< 0.001	< 0.001	< 0.001	--	< 0.001	--	--
MW-02-1	5/29/2008	N	< 0.000042	< 0.000053	< 0.000035	< 0.000025	**0.00034 J**	**0.0014 J**	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	--	< 0.0038	< 0.0030
		FD	< 0.000042	< 0.000053	< 0.000035	< 0.000025	**0.00016 J**	< 0.000044	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	--	< 0.0038	< 0.0030
MW-02-1	9/26/2008	N	< 0.000042	< 0.000053	< 0.000035	< 0.000025	**0.00017 J**	< 0.000044	< 0.000089	< 0.000083	< 0.000042	< 0.00019	< 0.00027	--	< 0.0038	< 0.0030

Table 5.5.2-11
Groundwater Quality - VOCs
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Chemical Name			Methyl tertiary butyl ether (MTBE)	Methylene chloride	Naphthalene	Propylbenzene	Styrene	Tetrachloroethylene	Toluene	Trichloroethylene	Trichlorofluoromethane	Vinyl acetate	Vinyl chloride	Xylene, m & p	Xylene, o	Xylenes, total
Location ID	Sample Date	Sample Type														
MW-01-2	10/9/2001	N	--	< 0.0010	--	--	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
MW-01-2	5/19/2008	N	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	**0.00030 J**	< 0.00023	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
MW-01-2	9/22/2008	N	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	**0.00030 J**	< 0.00050	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
MW-01-3	10/9/2001	N	--	< 0.0010	--	--	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
MW-01-3	5/19/2008	N	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	< 0.000077	< 0.000060	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
MW-01-3	9/19/2008	N	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	< 0.000077	< 0.00046	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
MW-01-6	10/9/2001	N	--	< 0.0010	--	--	< 0.0010	< 0.0010	**0.00020 J**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.00024 J**	< 0.0010	**0.00024 J**
MW-01-6	5/19/2008	N	< 0.000070	< 0.00023	< 0.00031	< 0.000037	< 0.000039	< 0.000077	**0.00041 J**	< 0.000061	< 0.000086	< 0.00091	< 0.000071	**0.00027 J**	**0.00011 J**	--
MW-01-6	9/18/2008	N	< 0.000070	< 0.00023	**0.00023 J**	< 0.000037	**0.000050 J**	< 0.000077	< 0.00011	< 0.000061	< 0.000086	< 0.00091	< 0.000071	**0.00015 J**	**0.000090 J**	--
MW-02-2	5/19/2008	N	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	< 0.000077	< 0.00012	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
MW-02-2	9/22/2008	N	< 0.000070	< 0.00023	< 0.00010	< 0.000037	< 0.000039	< 0.000077	< 0.000090	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
MW-02-1	1/17/2002	N	< 0.0010	< 0.0010	< 0.0010	**0.00086 J**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
		SPLIT	< 0.001	< 0.005	< 0.005	**0.001**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	--	< 0.001	--	--	< 0.002
MW-02-1	5/29/2008	N	< 0.000070	< 0.00023	< 0.00053	**0.00018 J**	< 0.000039	< 0.000077	< 0.000060	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
		FD	< 0.000070	< 0.00023	< 0.00038	**0.000070 J**	< 0.000039	< 0.000077	< 0.00020	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--
MW-02-1	9/26/2008	N	< 0.000070	< 0.00023	< 0.00010	**0.000080 J**	**0.000060 J**	< 0.000077	< 0.00015	< 0.000061	< 0.000086	< 0.00091	< 0.000071	< 0.000078	< 0.000037	--

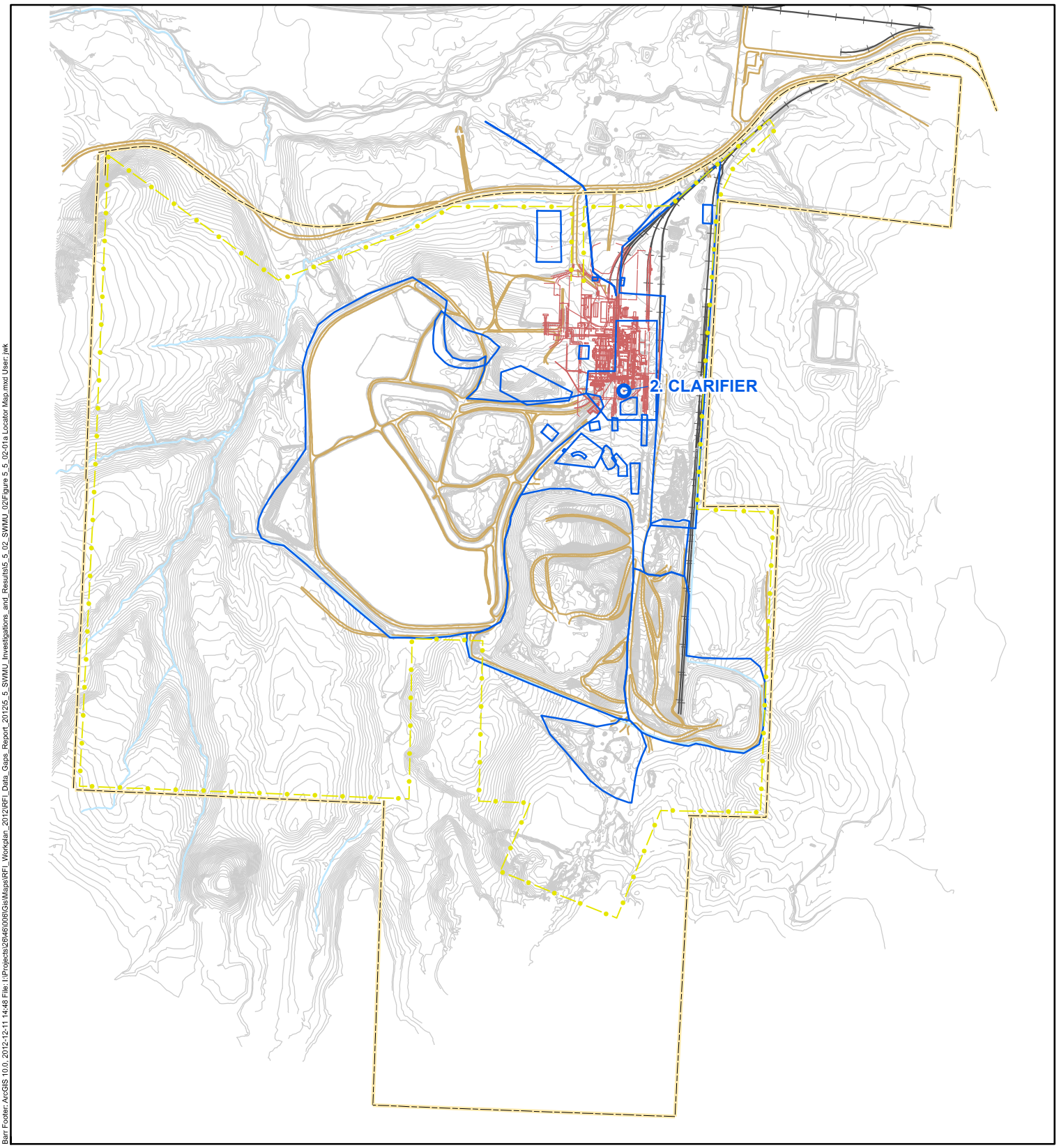
Table 5.5.2-12
Groundwater Quality - Radionuclides
SWMU 2
Rhodia Silver Bow Plant
[concentrations in pCi/l]

Chemical Name			Cesium 137	Gross Alpha (radiation)	Gross Beta (radiation)	Radium 226	Radium 228	Radium, total	Strontium 90
Location ID	Sample Date	Sample Type							
MW-01-2	10/9/2001	N	--	< 1	**31 +/- 5.0**	**0.30 +/- 0.2**	< 1	--	< 10
MW-01-2	1/16/2002	N	--	< 1.0	**33 +/- 4.5**	< 0.20	**1.5 +/- 1**	--	< 10
		SPLIT	--	**0.7**	**32**	--	**0.5**	--	--
MW-01-2	9/4/2002	N	--	**1.4 +/- 1.2**	**17.6 +/- 2.7**	< 0.2	< 1.0	< 0.2	--
MW-01-2	7/22/2003	N	< 49.1	**5.68 +/- 2.34 J**	**23.8 +/- 9.41**	< 1.56	--	--	--
		FD	< 40.1	< 3.55	**27.3 +/- 19.8**	< 1.76	--	--	--
MW-01-2	5/19/2008	N	--	< 2.3	**24 +/- 4.3**	< 0.32	< 0.71	--	--
MW-01-2	9/22/2008	N	--	**2.1 +/- 2.4**	**27 +/- 4.5**	< 0.3	**0.82 +/- 0.26**	--	--
MW-01-3	10/9/2001	N	--	**6.5 +/- 1.9**	**50 +/- 5.0**	**1.0 +/- 0.20**	< 1	--	< 10
MW-01-3	1/22/2002	N	--	**3.1 +/- 2.5**	**46 +/- 4.9**	< 0.20	< 1.0	--	< 10
		FD	--	< 1.0	**45 +/- 4.9**	< 0.20	< 1.0	--	< 10
		SPLIT	--	**4.8**	**32**	**0.2**	--	--	--
		FD SPLIT	--	**8.1**	**29**	**0.5**	--	--	--
MW-01-3	9/5/2002	N	--	< 1.0	**42.2 +/- 4.1**	< 0.2	< 1.0	< 0.2	--
		FD	--	< 1.0	**41.3 +/- 4.1**	< 0.2	< 1.0	< 0.2	--
MW-01-3	5/19/2008	N	--	**2.7 +/- 2.6**	**35 +/- 4.9**	< 0.32	< 0.73	--	--
MW-01-3	9/19/2008	N	--	< 2.1	**33 +/- 4.6**	< 0.35	< 0.72	--	--
MW-01-6	10/9/2001	N	--	**2.2 +/- 2.3**	**63 +/- 6.3**	**0.70 +/- 0.2**	< 1	--	< 10
MW-01-6	1/17/2002	N	--	< 1.0	**67 +/- 5.6**	< 0.20	**3.4 +/- 3**	--	< 10
		SPLIT	--	**5**	**29**	--	**0.5**	--	--
MW-01-6	9/5/2002	N	--	< 1.0	**49.2 +/- 6.1**	< 0.2	**2.2 +/- 1.1**	**2.2 +/- 1.1**	--
MW-01-6	5/19/2008	N	--	< 3.3	**41 +/- 6.4**	< 0.2	< 0.72	--	--
MW-01-6	9/16/2008	N	--	< 2.7	**39 +/- 5.6**	< 0.21	**2.5 +/- 0.7**	--	--
MW-02-2	9/5/2002	N	--	< 1.0	**23.5 +/- 3.5**	< 0.2	< 1.0	< 0.2	--
MW-02-2	5/19/2008	N	--	< 2	**25 +/- 4.2**	< 0.59	< 4	--	--
MW-02-2	9/22/2008	N	--	**4.9 +/- 2.9**	**21 +/- 3.9**	< 0.31	< 0.7	--	--
MW-02-1	1/17/2002	N	--	< 1.0	**22 +/- 7.5**	**0.80 +/- 0**	**1.9 +/- 1**	--	< 10
		SPLIT	--	**4**	**5**	**0.4**	**1.2**	--	**0.1**
MW-02-1	9/4/2002	N	--	**7.1 +/- 3.6**	< 2.0	**0.5**	< 1.0	**0.5 +/- 0.3**	--
MW-02-1	7/22/2003	N	< 56.5	< 9.40	**21.9 +/- 77.9**	< 1.82	--	--	--
MW-02-1	5/29/2008	N	--	< 6.3	**24 +/- 11**	< 0.17	**1.1 +/- 0.32**	--	--
		FD	--	< 6.9	**27 +/- 11**	< 0.35	**1.2 +/- 0.32**	--	--
MW-02-1	9/26/2008	N	--	< 7.6	**37 +/- 12**	**0.6 +/- 0.16**	< 1.4	--	--

Table 5.5.2-13
Groundwater Quality - PCBs
SWMU 2
Rhodia Silver Bow Plant
[concentrations in mg/l]

Chemical Name			Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268
Location ID	Sample Date	Sample Type									
MW-01-2	05/19/2008	N	< 0.0000094	< 0.000020	< 0.000023	< 0.000013	< 0.0000054	< 0.0000070	< 0.0000031	< 0.0000048	< 0.0000065
MW-01-3	05/19/2008	N	< 0.000016	< 0.000020	< 0.000047	< 0.000040	< 0.0000054	< 0.0000070	< 0.0000031	< 0.0000048	< 0.0000065
MW-01-6	05/19/2008	N	< 0.000033	< 0.000020	< 0.000023	< 0.000013	< 0.0000054	< 0.0000070	< 0.0000031	< 0.0000048	< 0.0000065
MW-02-2	05/19/2008	N	< 0.000012	< 0.000020	< 0.000023	< 0.000013	< 0.0000054	< 0.0000070	< 0.0000031	< 0.0000048	< 0.0000065
MW-02-1	01/17/2002	N	< 0.00050	< 0.0010	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050
		SPLIT	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	--	--
		FD SPLIT	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	--	--
MW-02-1	05/29/2008	N	< 0.0000094	< 0.000020	< 0.000023	< 0.000013	< 0.0000054	< 0.0000070	< 0.0000031	< 0.0000048	< 0.0000065
		FD	< 0.0000094	< 0.000020	< 0.000023	< 0.000013	< 0.0000054	< 0.0000070	< 0.0000031	< 0.0000048	< 0.0000065

Figures



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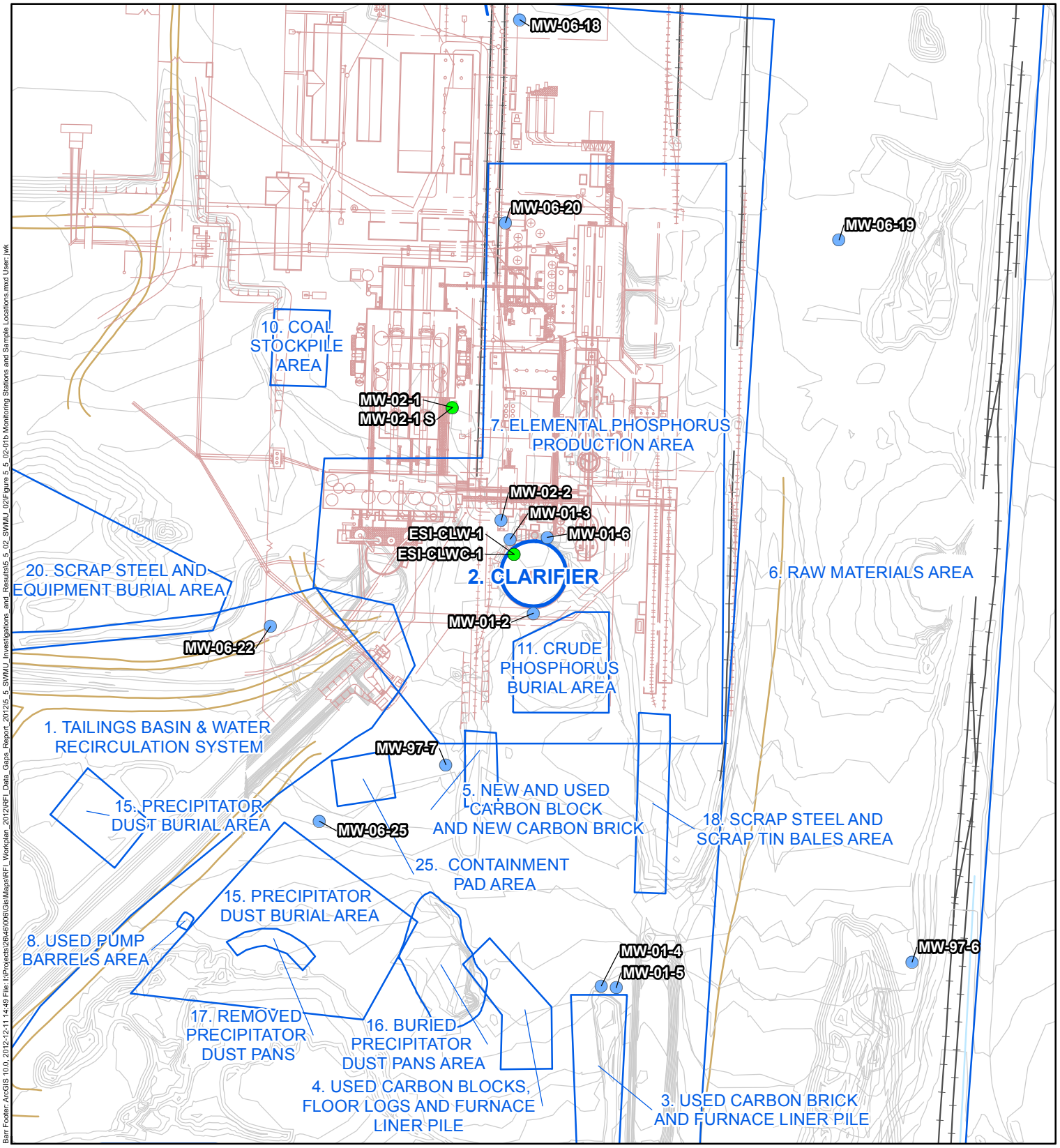
SWMU 2
Other SWMUs
Elevation Contour
Drainage
Railroad
Road
Former Plant Structures
Property Boundary
Fence Line

N

Feet
1,000 0 1,000

Figure 5.5.2-1a

SWMU 2 LOCATION
Rhodia Silver Bow Plant
Montana



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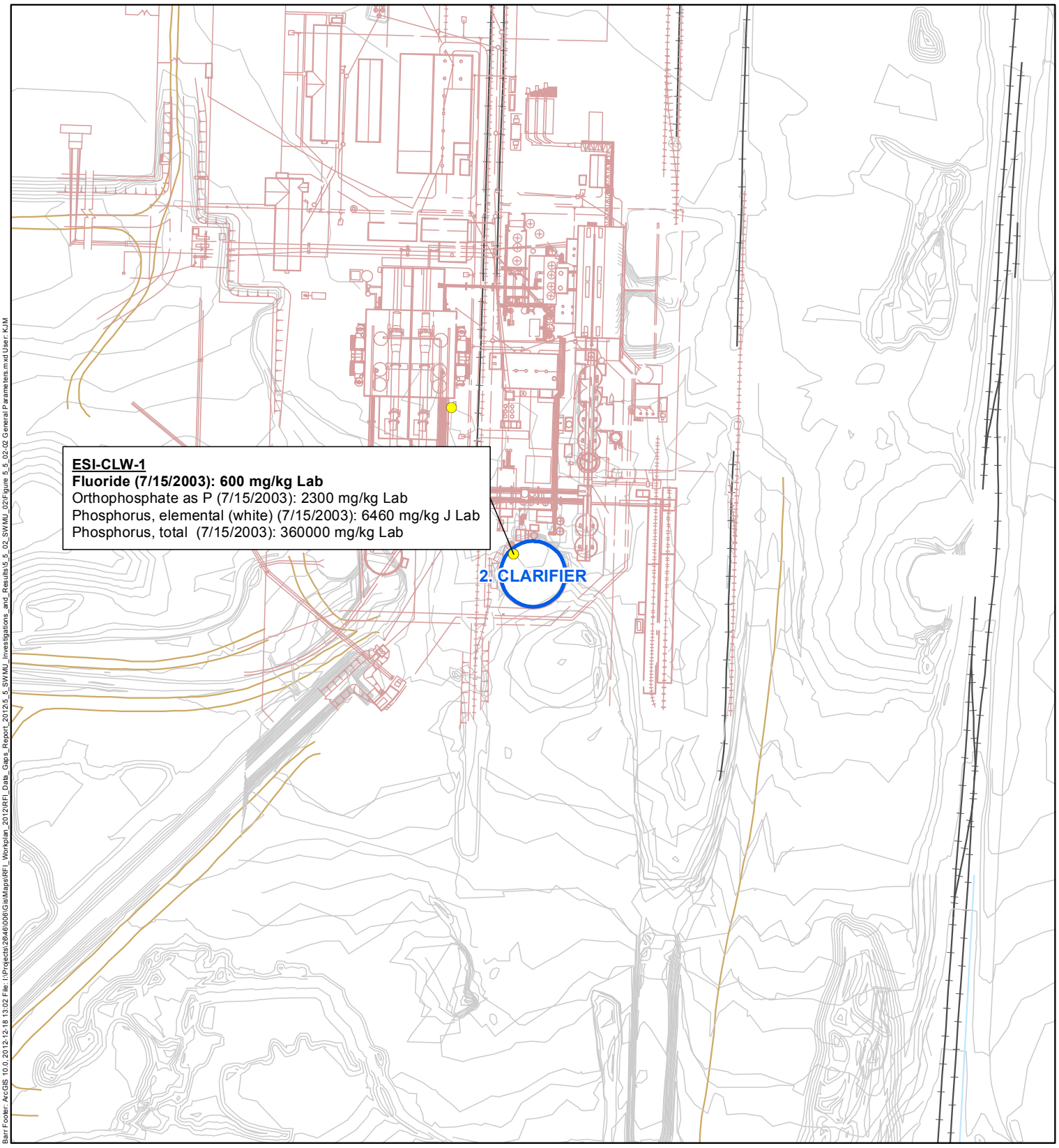
Monitoring Well
Soil Sample
SWMU 2
Other SWMUs
Elevation Contour
Drainage
Railroad
Road
Former Plant Structures

N

Feet
200 0 200

Figure 5.5.2-1b

SWMU 2
MONITORING STATIONS
AND SAMPLE LOCATIONS
Rhodia Silver Bow Plant
Montana



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- Sample Location
- SWMU 2
- Elevation Contour
- Drainage
- Railroad
- Road
- Former Plant Structures

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

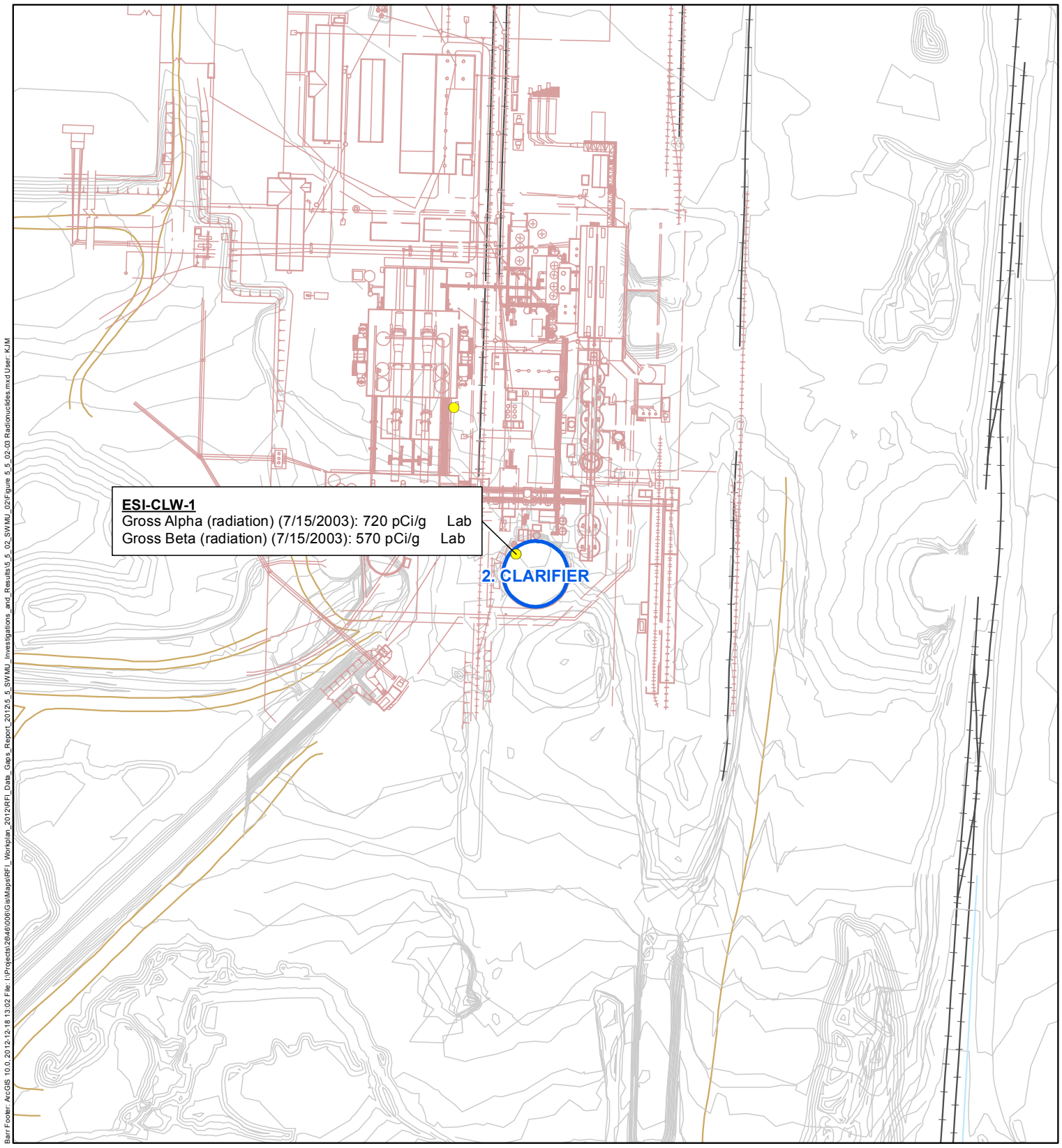
N

Feet

200 0 200

Figure 5.5.2-2

SWMU 2
GENERAL PARAMETERS
Rhodia Silver Bow Plant
Montana



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Sample Location
SWMU 2
Elevation Contour
Drainage
Railroad
Road
Former Plant Structures

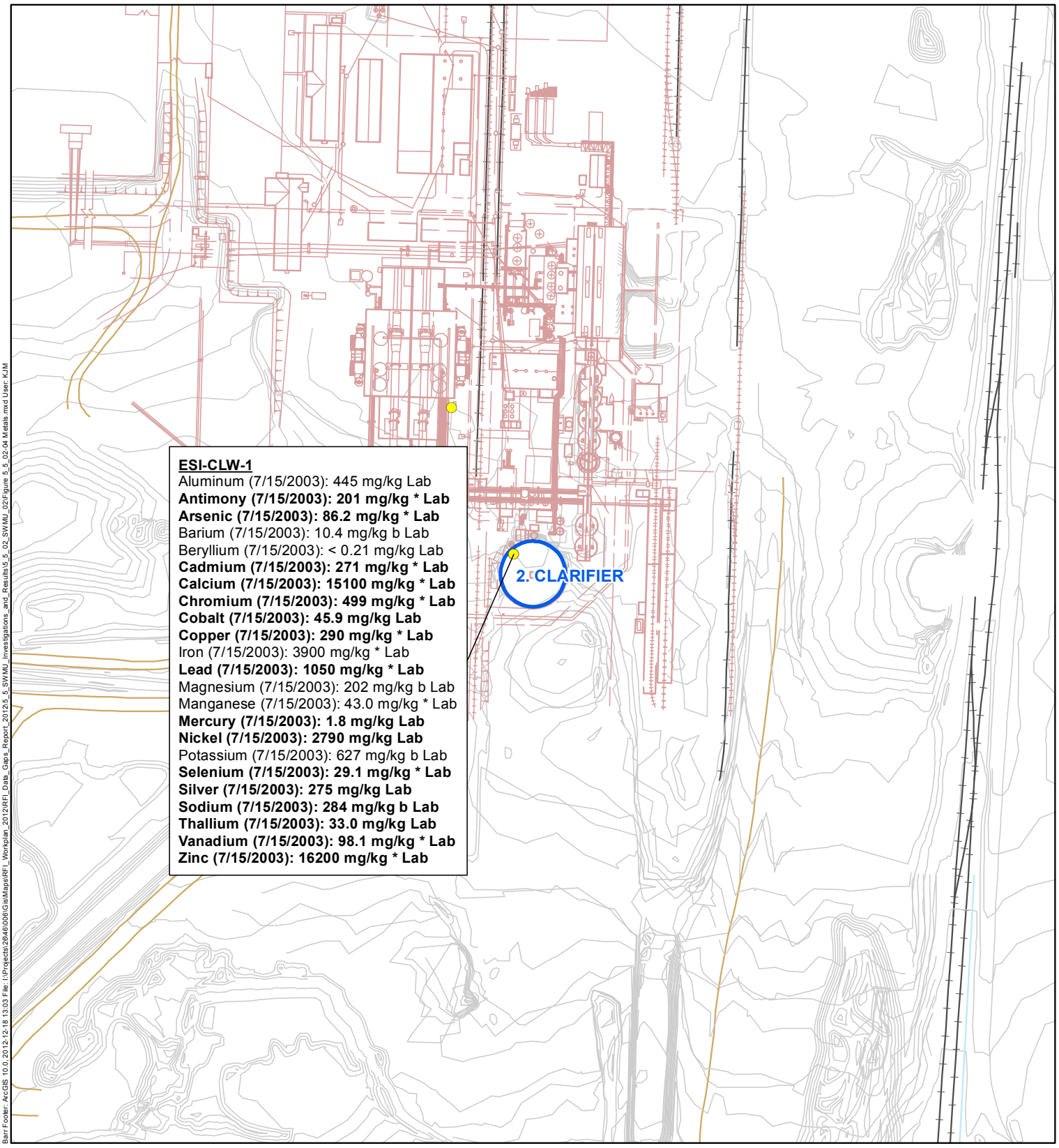
Bold font indicates that sample concentration is greater than the 95% UCL of mean Reference Area Concentration.

N

Feet
200 0 200

Figure 5.5.2-3

SWMU 2
RADIONUCLIDES
Rhodia Silver Bow Plant
Montana



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Sample Location

SWMU 2

Elevation Contour

Drainage

Railroad

Road

Former Plant Structures

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

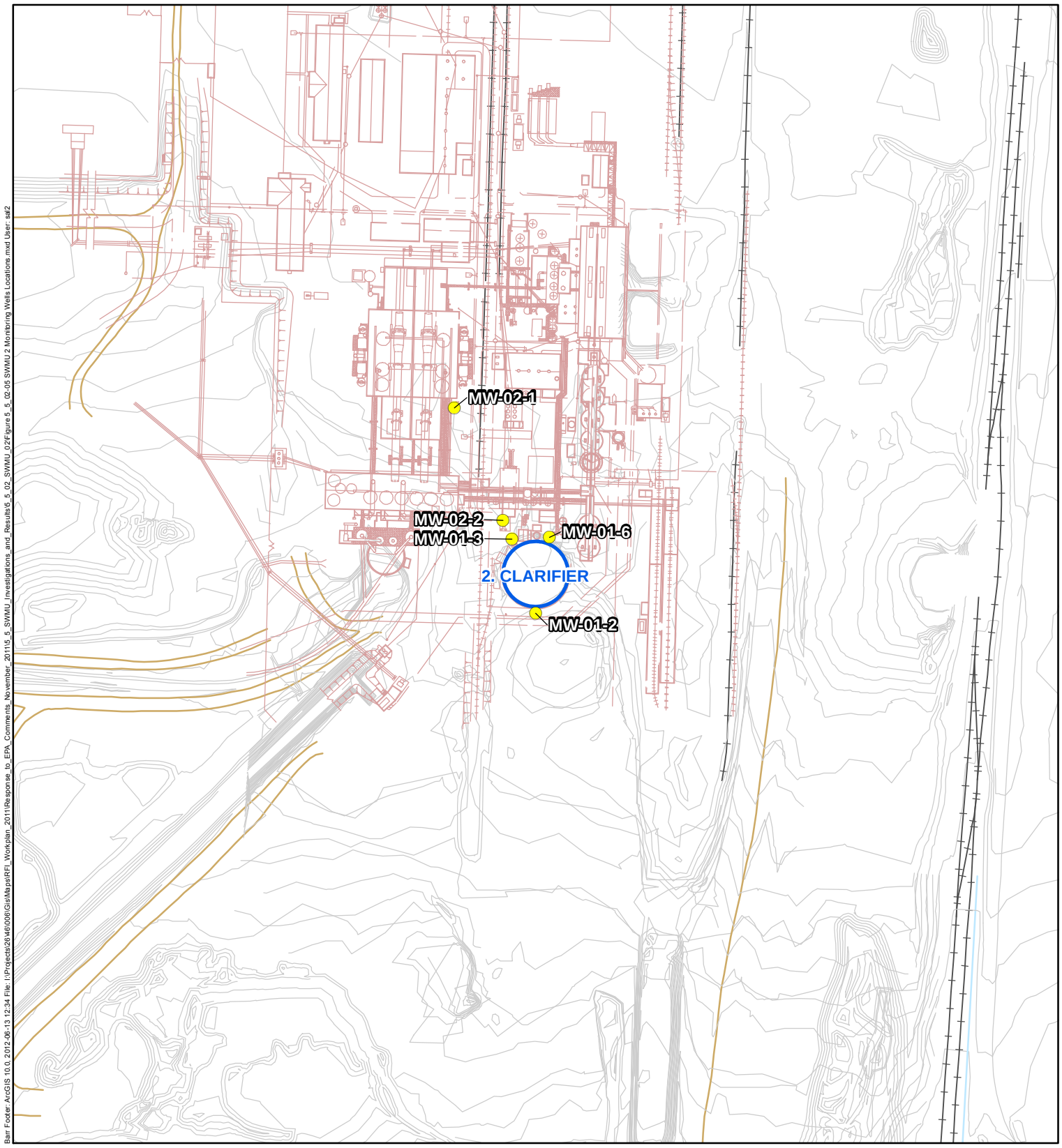
N

Feet

200 0 200

Figure 5.5.2-4

SWMU 2
METALS
Rhodia Silver Bow Plant
Montana



Monitoring Well
SWMU 2
Elevation Contour
Drainage
Railroad
Road
Former Plant Structures

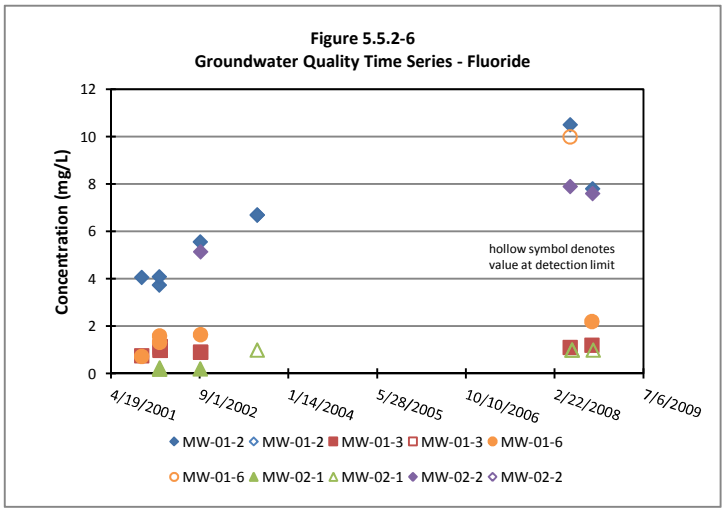
N

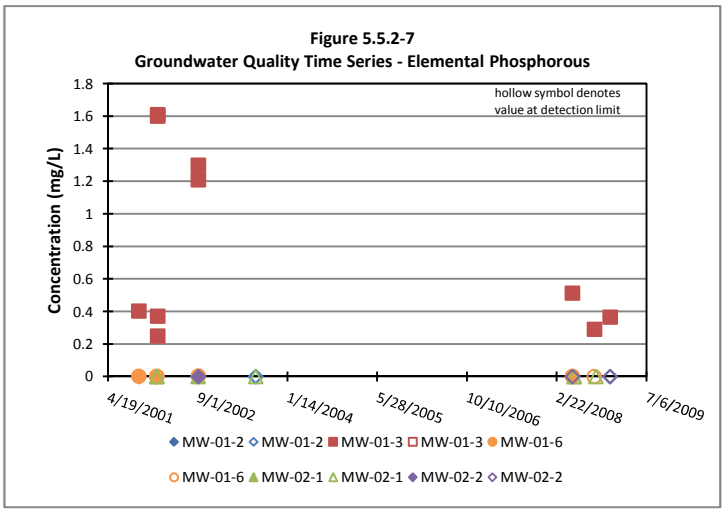
Feet
200 0 200

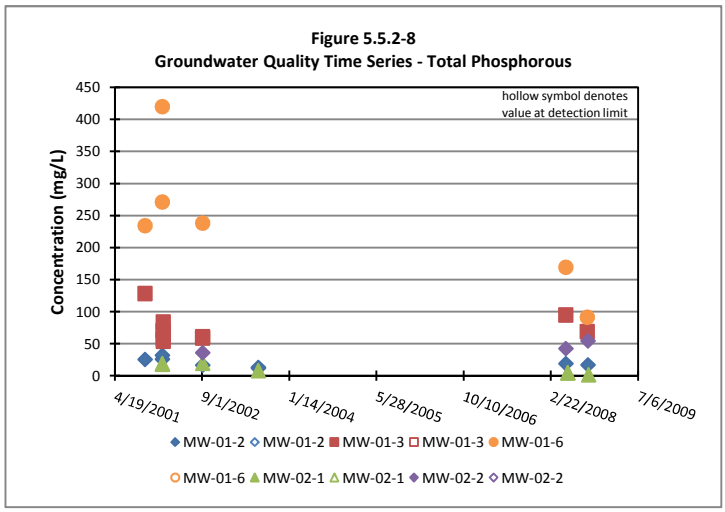
Figure 5.5.2-5

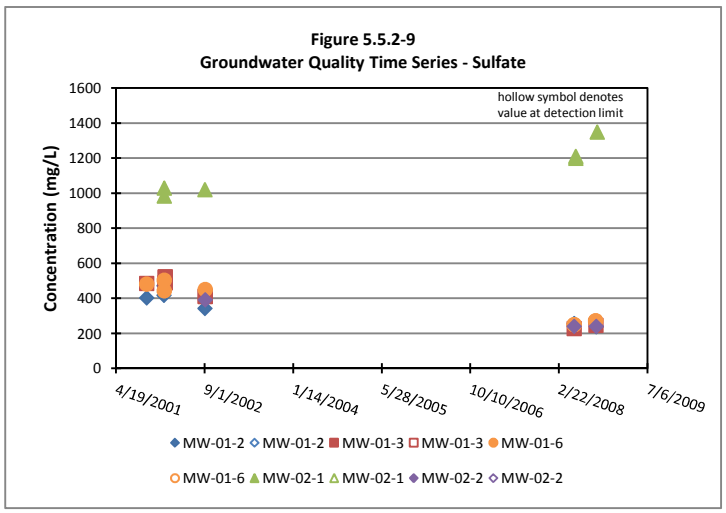
SWMU 2
MONITORING WELL
LOCATIONS
Rhodia Silver Bow Plant
Montana

Figures 5.5.2-6 - 5.5.2-9
Groundwater Quality - General and Site Specific Parameters
SWMU 2









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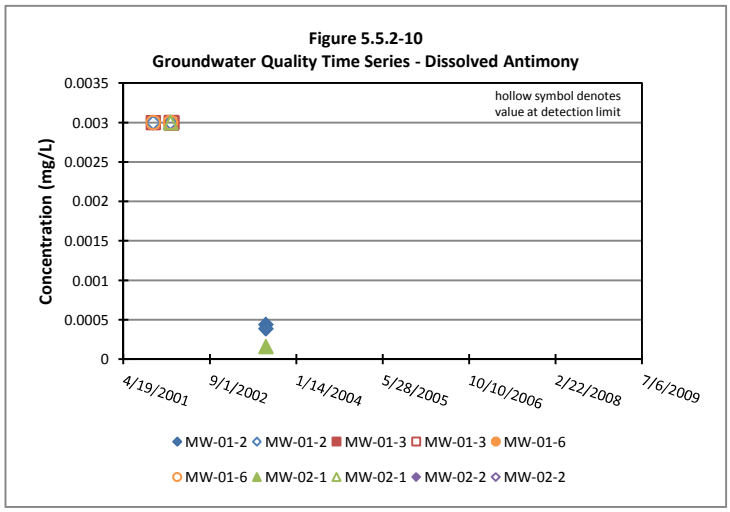
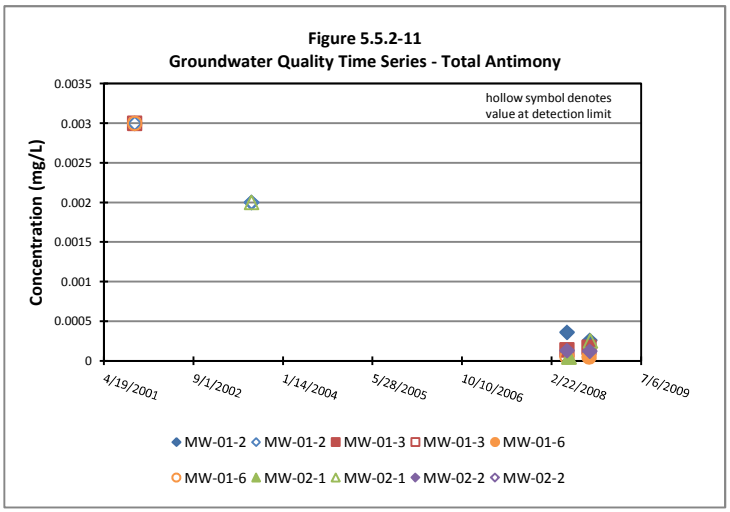
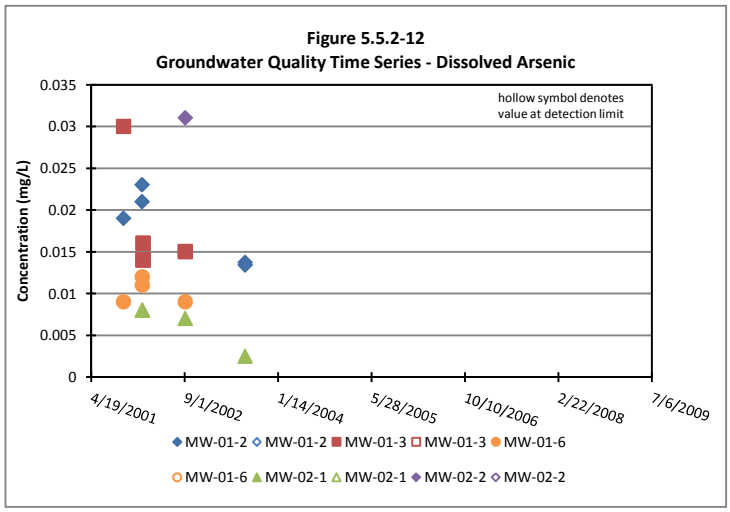
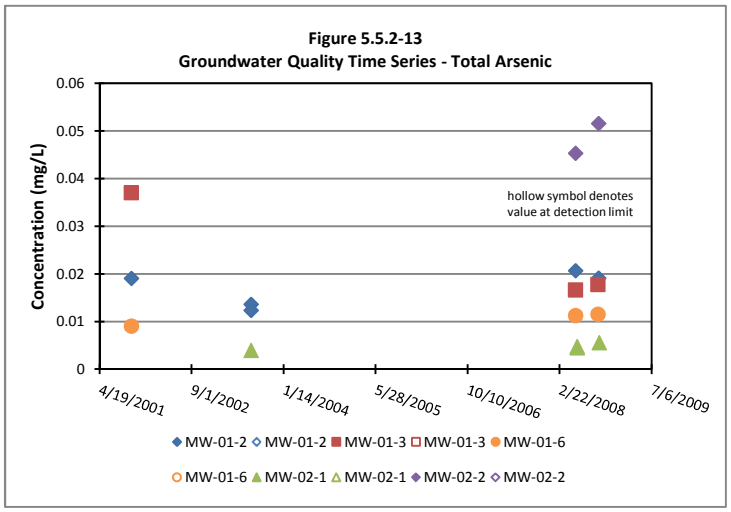
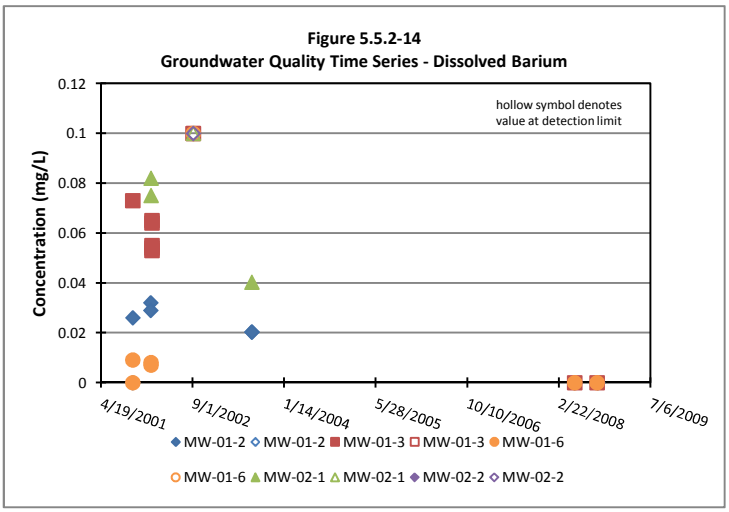
Figures 5.5.2-10 - 5.5.2-39
Groundwater Quality - Metals
SWMU 2

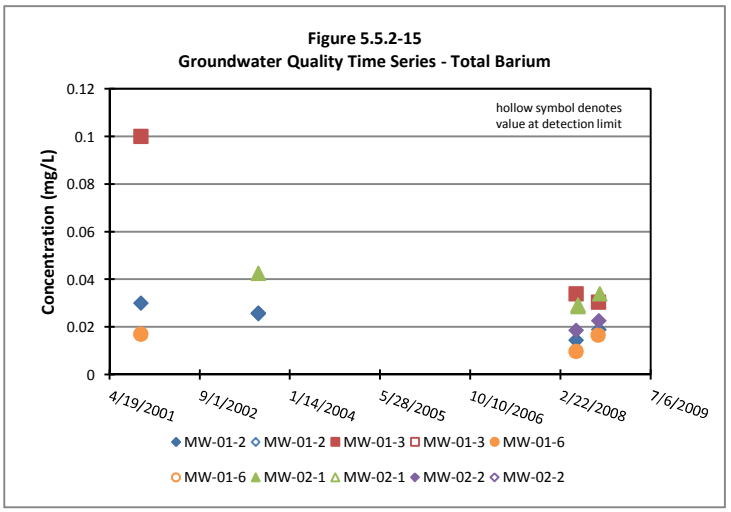












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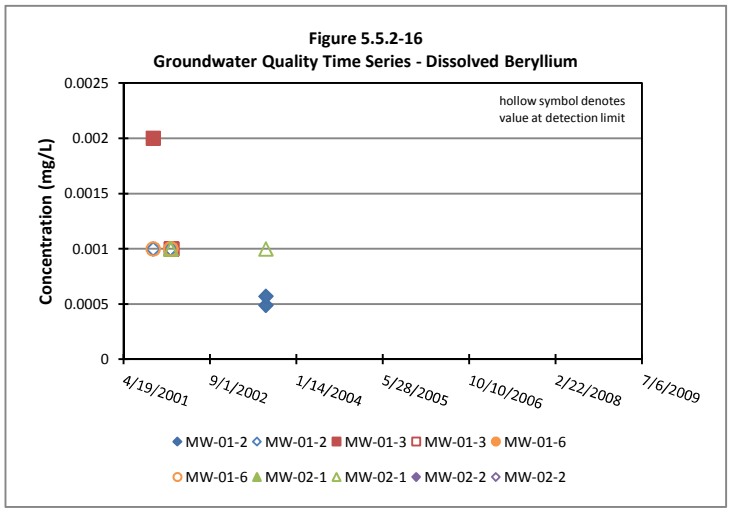
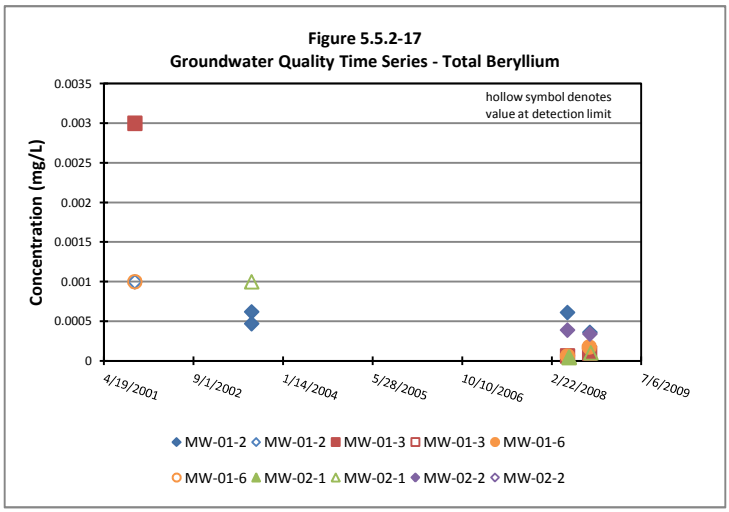
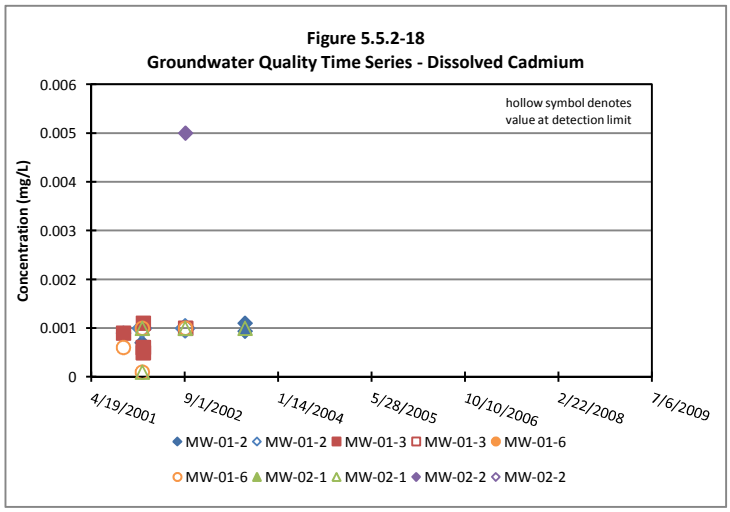
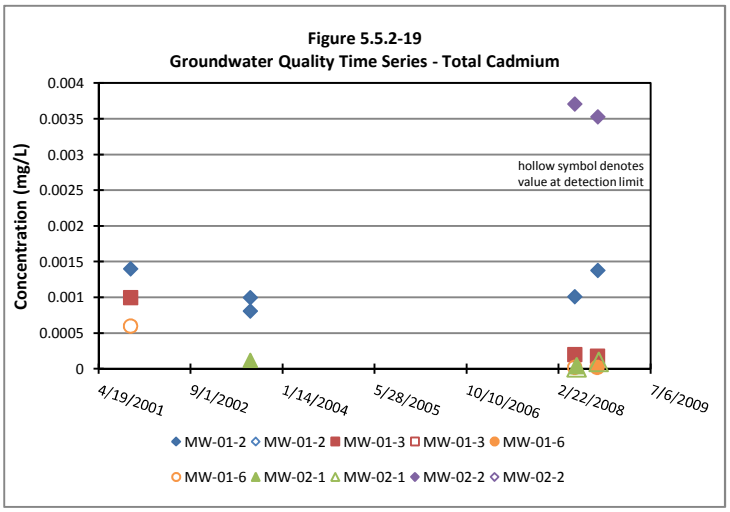
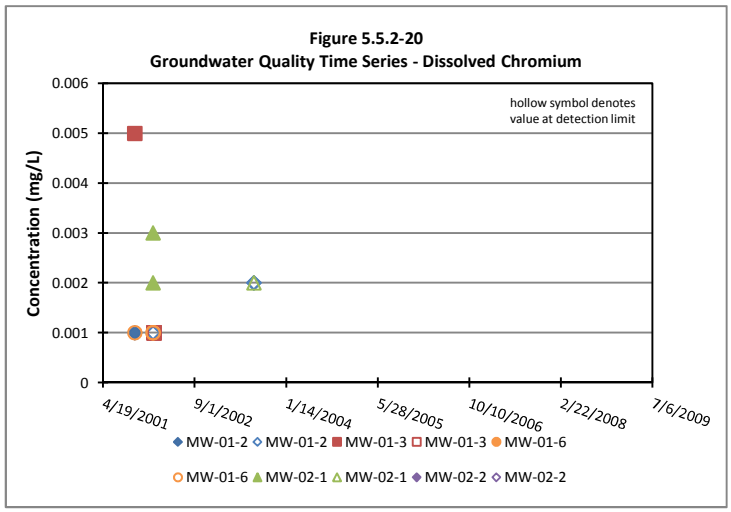
Figures 5.5.2-10 - 5.5.2-39
Groundwater Quality - Metals
SWMU 2

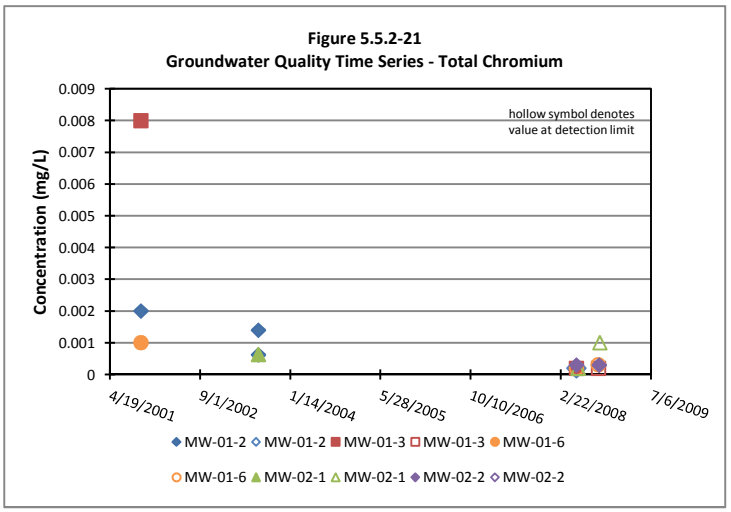












Figures 5.5.2-10 - 5.5.2-39
Groundwater Quality - Metals
SWMU 2

Figure 5.5.2-22
Groundwater Quality Time Series - Dissolved Cobalt

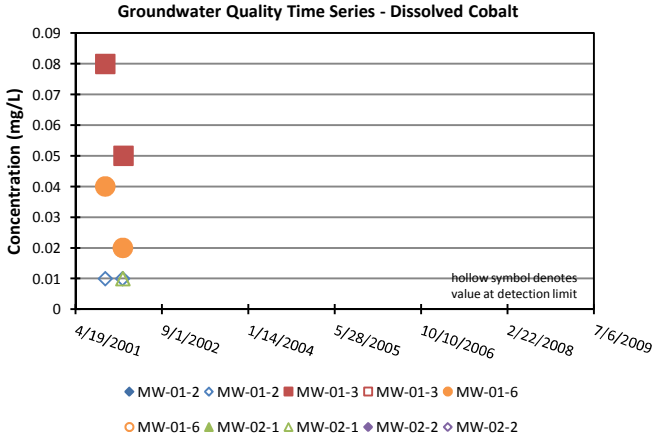


Figure 5.5.2-23
Groundwater Quality Time Series - Total Cobalt

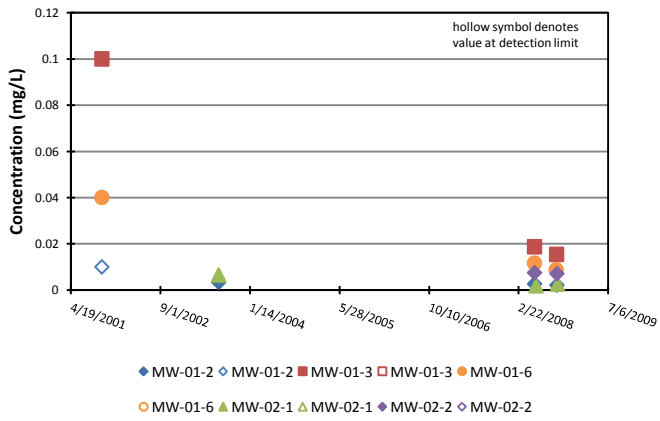


Figure 5.5.2-24
Groundwater Quality Time Series - Dissolved Manganese

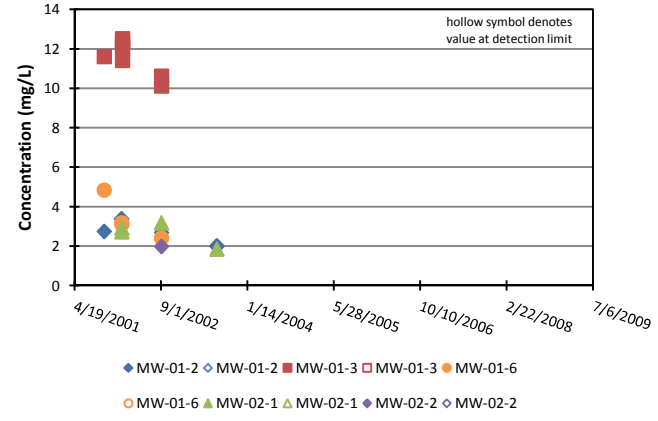


Figure 5.5.2-25
Groundwater Quality Time Series - Total Manganese

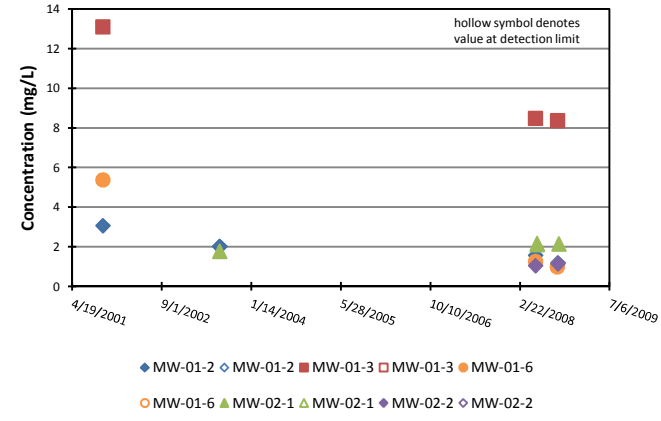


Figure 5.5.2-26
Groundwater Quality Time Series - Dissolved Nickel

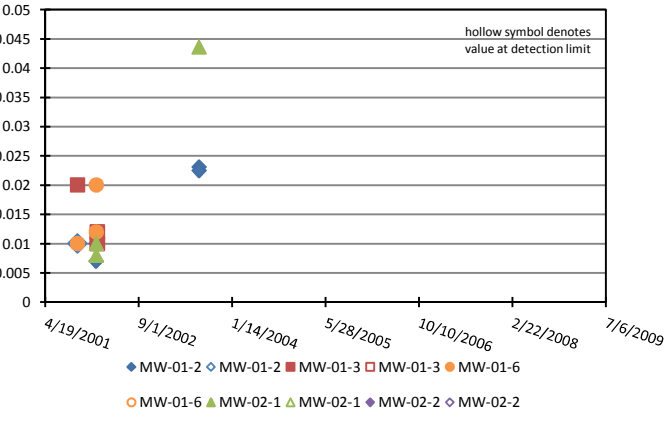
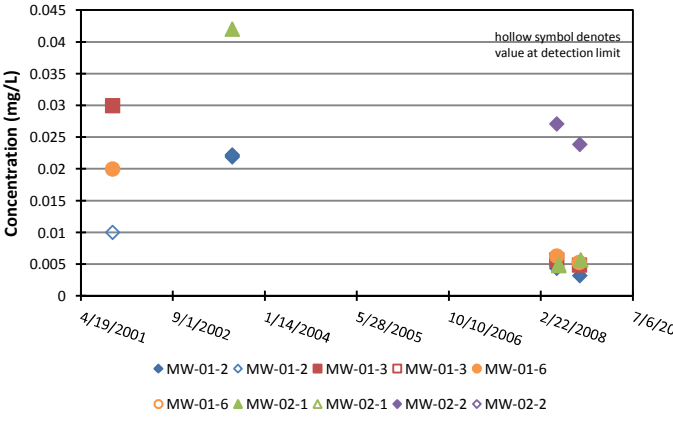
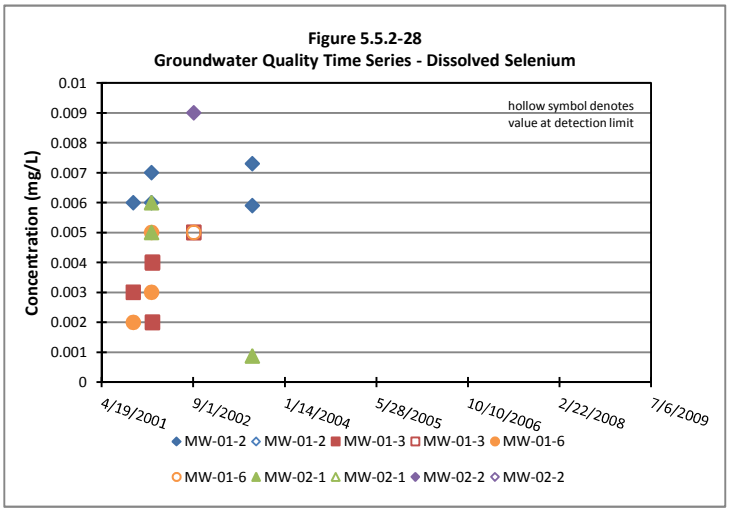
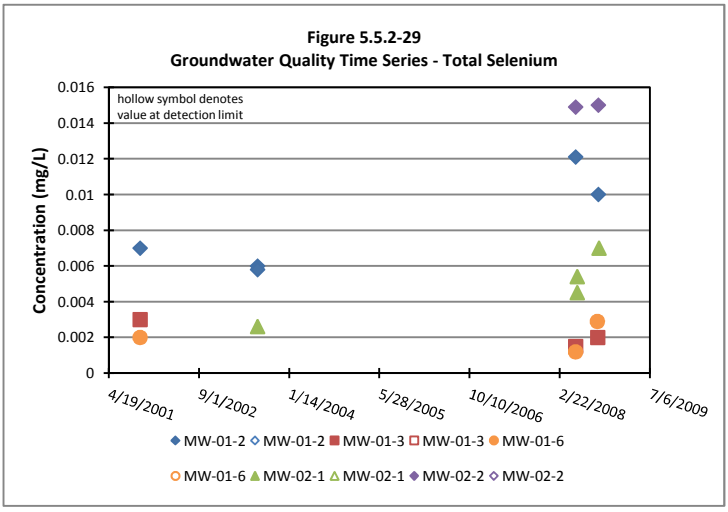


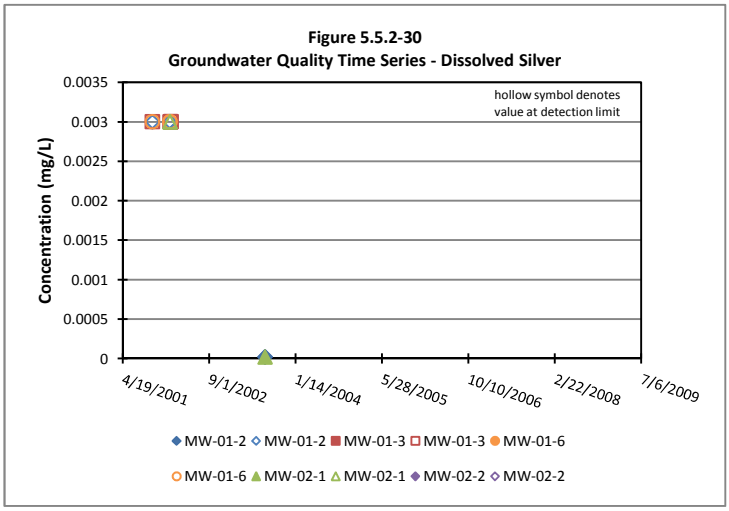
Figure 5.5.2-27
Groundwater Quality Time Series - Total Nickel

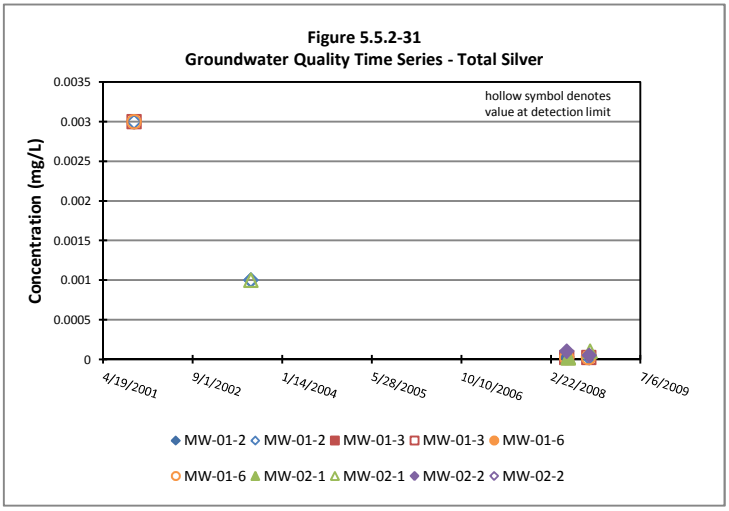


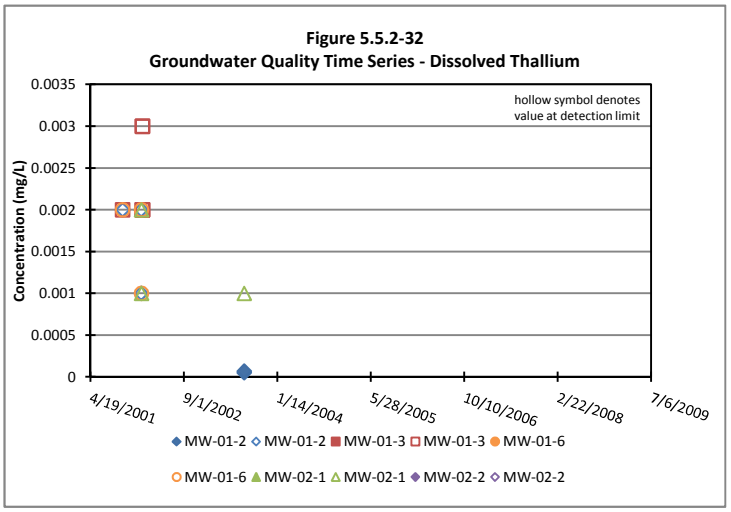
Figures 5.5.2-10 - 5.5.2-39
Groundwater Quality - Metals
SWMU 2

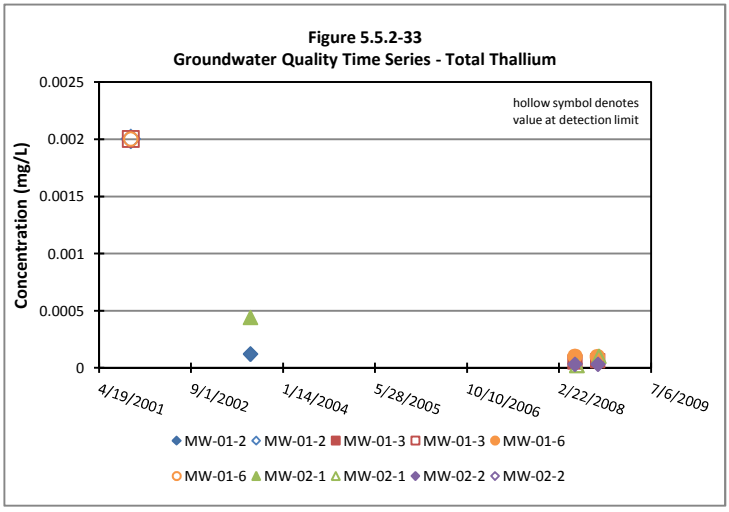












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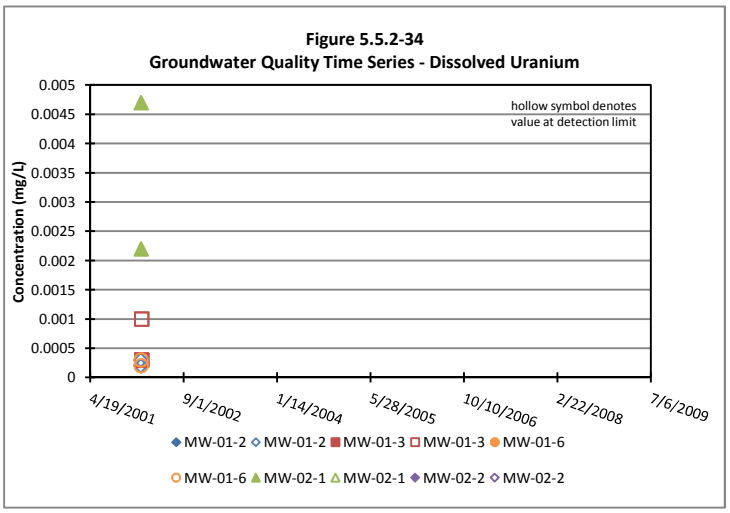
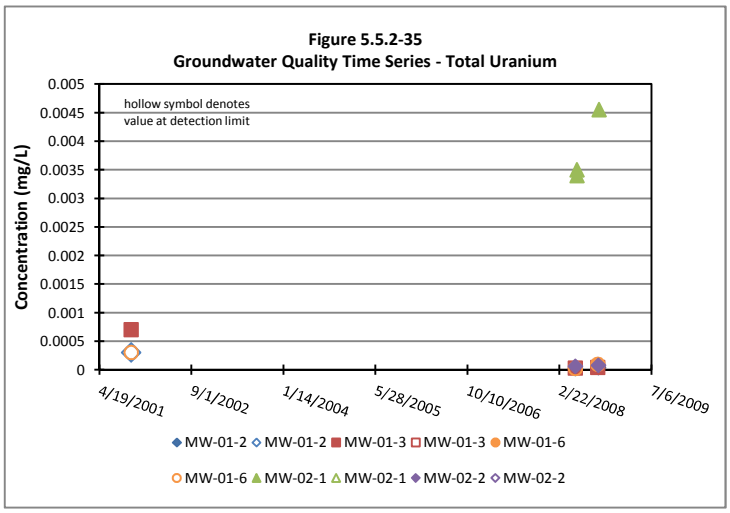
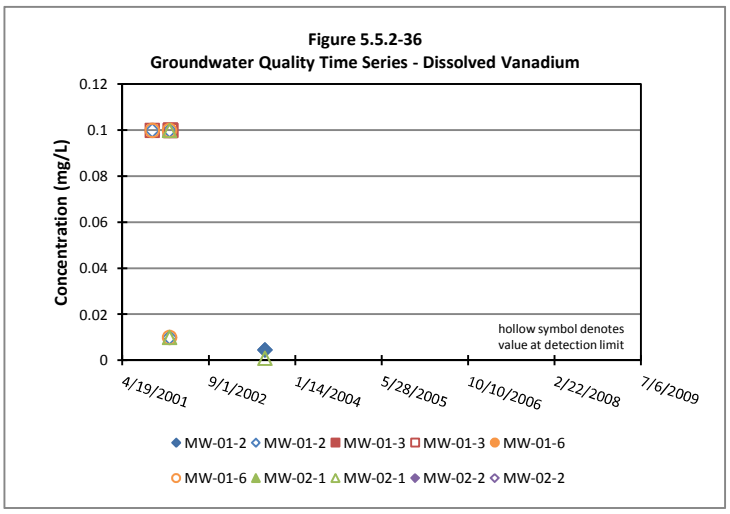
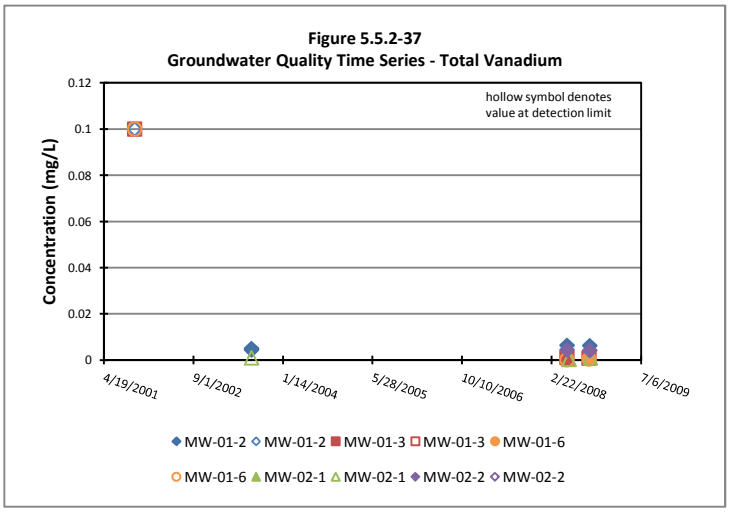
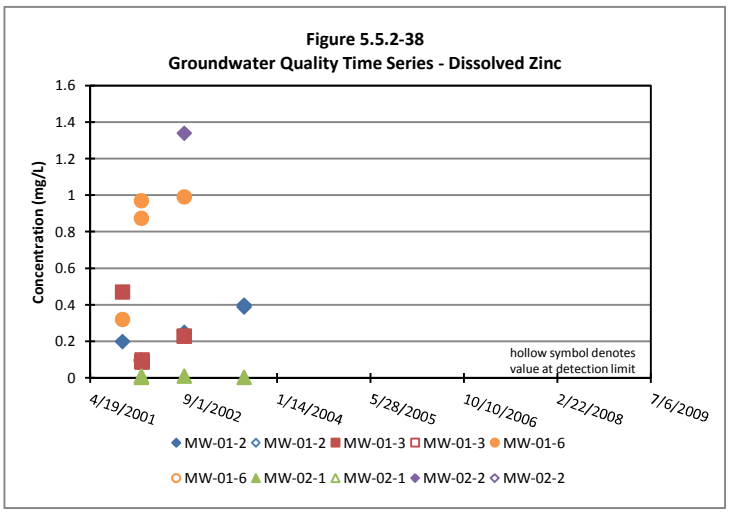
Figures 5.5.2-10 - 5.5.2-39
Groundwater Quality - Metals
SWMU 2

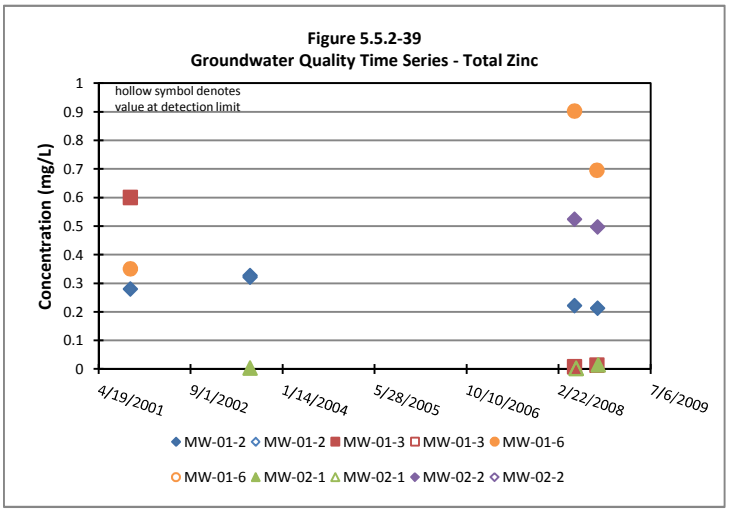












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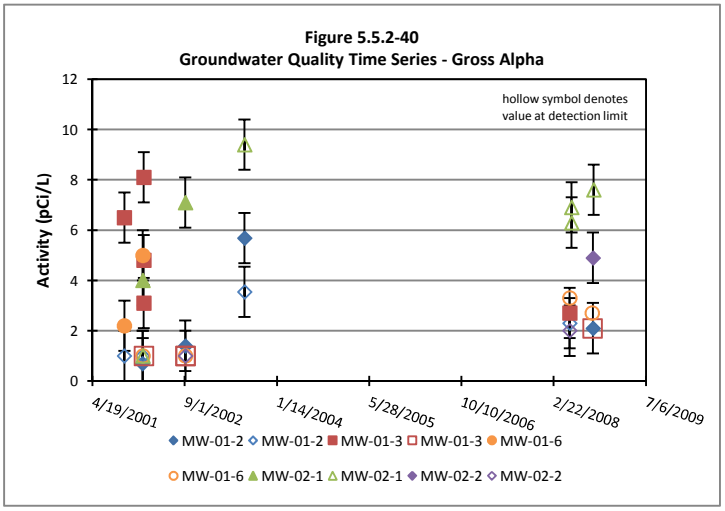
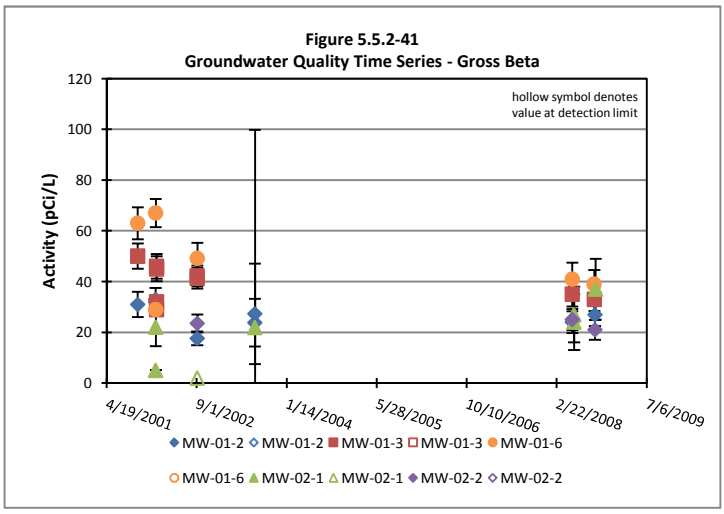
Figures 5.5.2-40 - 5.5.2-41
Groundwater Quality - Radionuclides
SWMU 2





Appendices

Appendix 5.5.2-A

Boring/Monitoring Well Logs

Barr Engineering Company

Ref. Boring # n/a

Well # MW-01-2

Project: Pre-Closure Groundwater Monitoring Program

Project Number:	26/25/001-JSL-021	**Total Drilled Depth (ft):**	43.4
Boring Location:	Rhodia Silver Bow Plant - Butte, Montana	**Ground Surface Elevation (ft):**	5361.3
Drilling Contractor:	O'Keefe Drilling	**Depth to Groundwater (ft):**	36.59
Drilling Method:	Hollow Stemmed Auger	**Riser Elevation (ft):**	5363.47
Driller:	Steve Malkovich	**Date Started:**	9/18/01
Geologist:	Sheryl Filby	**Date Completed:**	9/18/01

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Depth (ft. bgs)	Split spoon Recovery (ft)	Blow Count	Moisture/W.L.	ASTM	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
10	0.8	3/4/3/6	Moist	SM	Sand	: Split-spoon sampling began at 9.4'. SAND: Yellowish-orange (5/6/7.5YR) sand (fill) with some slag.	2" PVC Well Pipe	5362
12	1.5	3/3/2/2	Moist	SM				5360
14	1.9	5/12/16/28	Moist	SM-CL	Silty Sand with clay	SILTY SAND WITH CLAY: Homogeneous silty sand (4/6/7.5YR) with visible mica flakes. Estimated sand/silt/clay fraction is 70/20/10. Very stiff, holds the shape of the spoon. Increased sand content from 17.4-18.4. From 18.4-19.4 grades into a fine sand with increased silt (finer than the 15.4-17.4 increment).		5358
16	1.7	8/12/23/24	Moist	SM-CL				5356
18		7/10/18/27	Moist	SM-CL				5354
20	1.8	8/14/25/40	Moist	SM	Sand	SAND: Small layer (1.5") of coarse sand at 20.8'. 20.8' - 21.4' fine-medium grained sand with mica flakes. At 21.4' - 23.2', coarse sand with angular granite pebbles. Sand is mostly quartz with some visible mica. Very poorly sorted. 23.2- 23.6 fine sand and silt. 23.6 - 27.4 coarse sand and gravel with some silt (same as 21.4 - 23.2) with two thin layers of fine sand.	Neat Cement Grout	5352
22	1.5	23/30/45/50+	Moist	SM-GM				5350
24	1.7	24/27/25/26	Moist	SM-GM				5348
26	1.5	15/18/18/21	Moist	SM/GM/CL				5346
								5344
								5342
								5340
								5338
								5336

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Barr Engineering Company

Ref. Boring # n/a

Well # MW-01-2

Depth (ft. bgs)	Sample Type/ Recovery (ft.)	Blow Count	Moisture\W.L.	ASTM	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
28	1.7	12/18/33/48	Moist	SM		SILTY SAND WITH CLAY: Homogeneous silty sand. Fine grained with mica (4.6/7.5YR). Slight increase fines at 33.7. At 35.0', 1.5" layer of coarse sand. Increased clay content at 37.4 that maintains until depth.	Hole Plug	5334
30	1.8	12/18/28/34	Moist	SM			100-mesh Sand	5332
32	1.7	8/10/18/28	Moist	SM				5330
34	1.6	8/16/25/22	Moist	SM				5328
36	2.0	7/14/26/47	Moist/Sat.	SM			#6-slot 2" PVC Screen	5326
38	1.2	8/30/50+	Sat.	SM-ML	*Silty Sand with clay*		Specified Sand Pack	5324
40	1.2	17/50+	Sat.	SM-ML				5322
42	2.0	15/15/33/50+	Sat.	SM-ML				5320
								5318

Barr Engineering Company

Ref. Boring # n/a

Well # MW-01-3

Project: Pre-Closure Groundwater Monitoring Program

Project Number:	26/25/001-JSL-021	**Total Drilled Depth (ft):**	40.3
Boring Location:	Rhodia Silver Bow Plant - Butte, Montana	**Ground Surface Elevation (ft):**	5357.0
Drilling Contractor:	O'Keefe Drilling	**Depth to Groundwater (ft):**	32.74
Drilling Method:	Hollow Stemmed Auger	**Riser Elevation (ft):**	5358.99
Driller:	Steve Malkovich	**Date Started:**	9/19/01
Geologist:	Sheryl Filby	**Date Completed:**	9/21/01

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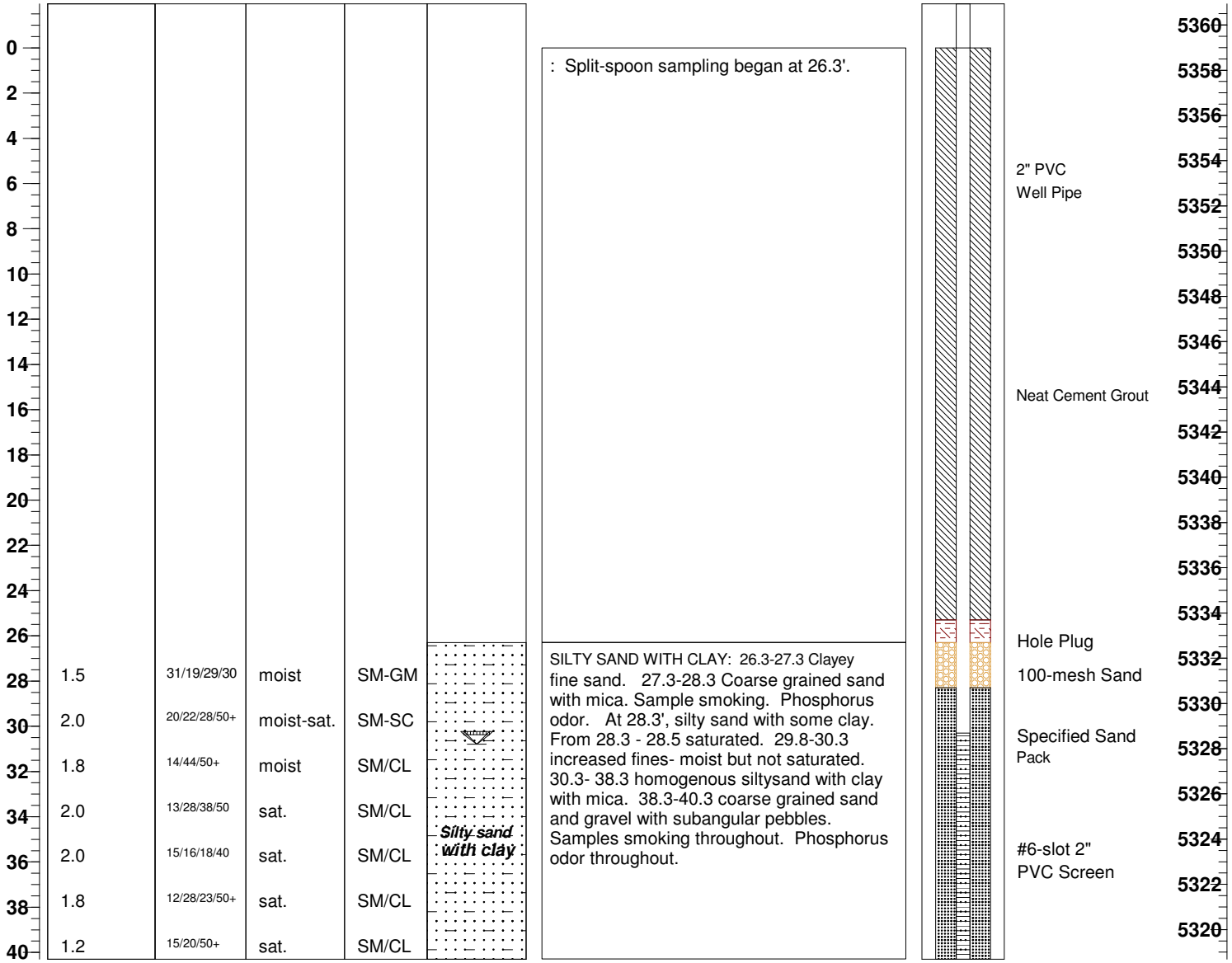
Depth (ft. bgs)	Split spoon Recovery (ft)	Blow Count	Moisture/W.L.	ASTM	Lithologic Unit	Material Descriptions and Remarks
0						: Split-spoon sampling began at 26.3'.
26	1.5	31/19/29/30	moist	SM-GM	Silty sand with clay	SILTY SAND WITH CLAY: 26.3-27.3 Clayey fine sand. 27.3-28.3 Coarse grained sand with mica. Sample smoking. Phosphorus odor. At 28.3', silty sand with some clay. From 28.3 - 28.5 saturated. 29.8-30.3 increased fines- moist but not saturated. 30.3- 38.3 homogenous siltysand with clay with mica. 38.3-40.3 coarse grained sand and gravel with subangular pebbles. Samples smoking throughout. Phosphorus odor throughout.
28	2.0	20/22/28/50+	moist-sat.	SM-SC		
30	1.8	14/44/50+	moist	SM/CL		
32	2.0	13/28/38/50	sat.	SM/CL		
34	2.0	15/16/18/40	sat.	SM/CL		
36	1.8	12/28/23/50+	sat.	SM/CL		
38	1.2	15/20/50+	sat.	SM/CL		
40						

Well Construction/ Comments	Elevation
2" PVC Well Pipe	5360
	5358
	5356
	5354
	5352
	5350
	5348
	5346
Neat Cement Grout	5344
	5342
	5340
	5338
	5336
	5334
Hole Plug	5332
100-mesh Sand	5330
Specified Sand Pack	5328
	5326
#6-slot 2" PVC Screen	5324
	5322
	5320



Barr Engineering Company

Ref. Boring # n/a

Well # MW-01-6

Project: Pre-Closure Groundwater Monitoring Program

Project Number:	26/25/001-JSL-021	**Total Drilled Depth (ft):**	40.3
Boring Location:	Rhodia Silver Bow Plant - Butte, Montana	**Ground Surface Elevation (ft):**	5356.0
Drilling Contractor:	O'Keefe Drilling	**Depth to Groundwater (ft):**	31.56
Drilling Method:	Hollow Stemmed Auger	**Riser Elevation (ft):**	5357.75
Driller:	Steve Malkovich	**Date Started:**	9/21/01
Geologist:	Sheryl Filby	**Date Completed:**	9/21/01

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Depth (ft. bgs)	Split spoon Recovery (ft)	Blow Count	Moisture/W.L.	ASTM	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
0						: Split-spoon sampling began at 29.0'.	2" PVC Well Pipe	5356
2								5354
4								5352
6								5350
8								5348
10								5346
12								5344
14								5342
16							Neat Cement Grout	5340
18								5338
20								5336
22								5334
24							Hole Plug	5332
26							100-mesh Sand	5330

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Barr Engineering Company

Ref. Boring # n/a

Well # MW-01-6

Depth (ft. bgs)	Sample Type/ Recovery (ft.)	Blow Count	Moisture\W.L.	ASTM	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
28								5328
30	1.8	11/18/32/50+	moist	SM/CL/ML		SILTY SAND WITH CLAY: Fine sand with silt and clay. Very tight. Some weathered quartz granite pebbles. Mica Flakes. 4/6/7.5YR. Some coarse grained saturated sand in lenses.	Specified Sand Pack	5326
32	1.8	12/19/32/42	moist	SM/CL/ML				5324
34	2.0	13/18/32/50+	sat.	SM/CL/ML	*Silty sand with clay.*		#6-slot 2" PVC Screen	5322
36	2.0	14/25/35/45	sat.	SM/CL/ML				5320
38	1.8	17/27/31/50+	sat.	SM/CL/ML	*Coarse sand.*	SAND AND GRAVEL: Coarse sand and gravel.		5318
40					*Medium sand.*	SAND: Dark brown medium grained sand with mica.		5316

Barr Engineering Company

Ref. Boring # n/a

Well # MW-02-2

Project: 2002 Requested Services

Project Number: 26/25/001-JSL-035
Boring Location: Rhodia Silver Bow Plant - Butte, Montana
Drilling Contractor: O'Keefe Drilling
Drilling Method: Hollow Stem Auger
Driller: Steve Malkovich
Geologist: Karma Geiger

Total Drilled Depth (ft): 38.0 (bgs)
Ground Surface Elevation (ft): 5357.10
Depth to Groundwater (ft): 34.94 (bgs)
Riser Elevation (ft): 5358.81
Date Started: 8/19/02
Date Completed: 8/20/02

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Depth (ft. bgs)	Split spoon Recovery (ft)	Blow Count	Moisture/W.L.	ASTM	Odor/PH3 Reading	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
0						Fill	FILL: Concrete and fill.		5358
2	1.6	156	dry	SM	No/0.00	Silty Sand	SILTY SAND: Yellowish-brown (7.5YR5/4), homogenous, very dense, silty sand. Sand is mostly fine grained but includes medium to coarse sand as well as trace fine gravel. Sand is predominantly golden-colored mica and subrounded to subangular quartz. Silt fraction is 30%.		5356
4	1.6	18/26/30/31	dry	SM	No/0.00				5354
6	1.9	15/24/34/38	dry	SM	No/0.00			2" PVC Well Pipe	5352
8	1.6	12/24/32/41	dry	SM	No/0.00				5350
10	1.6	16/27/41/49	dry	SM	No/0.00				5348
12	1.6	21/32/34/36	dry	SP	No/0.00	Sand	SAND: Light gray (10YR7/2), loose fine to coarse sand with trace silt.		5346
14	1.6	13/20/33/40	dry	SM	No/0.00	Silty Sand with Gravel	SILTY SAND: Homogenous, dark yellowish brown (10YR4/4), very dense silty fine sand with trace gravel. Sand includes 20% medium to coarse grained sand with fine gravel. Silt fraction is approximately 40%. Sand is golden-colored mica (possible iron pyrite), quartz and igneous.	Neat Cement Grout	5344
16	1.7	11/15/22/29	moist	SM	No/0.00				5342
18	1.9	10/19/30/50	moist	SM	No/0.00				5340
20	1.8	10/21/33/54	dry	SM	No/0.00				5338
22	1.8	11/17/36/48	dry	SM	No/0.00				5336
24	1.8	8/22/37/38	dry	SM-ML	No/0.00	Silty Sand to Silt	SILTY SAND TO SILT: Dark yellowish brown silty very fine sand.	Hole Plug	5334
26	1.8	8/21/38/45	moist	SM	No/0.00	Silty Sand with Clay	SILTY SAND: Homogenous, dark yellowish brown, homogenous silty sand. Sand is mostly very fine to fine grained but includes up to approximately 15% medium to coarse sand and trace fine gravel. Sand is quartz, mica and igneous-rich. Silt fraction is 35 to 40%.	100 Sieve Sand	5332
28	1.7	8/20/28/48	moist	SM	No/0.00				5330
30	1.8	13/42/68/91	moist	SM	No/0.00				5328
32	1.8	12/24/30/52	dry moist	SM	No/0.00			70/30 Sand Pack	5326
34	1.8	10/24/43/74	saturated	SM	No/0.00			#6-slot 2" PVC Screen	5324
36	1.9	11/24/42/63	saturated	SM	No/0.00				5322
38									5320
40									5318

Barr Engineering Company

Ref. Boring # n/a

Well # MW-02-1

Project: Pre-Closure Groundwater Monitoring Program

Project Number:	26/25/001-JSL-031	**Total Drilled Depth (ft):**	42.0
Boring Location:	Rhodia Silver Bow Plant - Butte, Montana	**Ground Surface Elevation (ft):**	5356.54
Drilling Contractor:	O'Keefe Drilling	**Depth to Groundwater (ft):**	32.8
Drilling Method:	Hollow Stemmed Auger	**Riser Elevation (ft):**	5358.70
Driller:	Steve Malkovich	**Date Started:**	1/14/02
Geologist:	Sheryl Filby	**Date Completed:**	1/15/02

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Depth (ft. bgs)	Split spoon Recovery (ft)	Blow Count	Moisture/W.L.	ASTM	Odor/PH3 Reading	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
0									5358
2	2.0	frozen	none	SM	N/0.0	Sand	SAND: 0-0.3', sand and gravel. 0.3-0.4', slag. 0.4-0.6' brown (2.5/3 7.5YR) organic-rich soil. 0.6-4'light brown (7/4 10YR) silty sand with some small angular pebbles. At 6', color grades into 6/6 10yr. 8-12', increased fines. 12-14.5, fine grained sand with some medium grained sand, sand/silt/clay 70/30/0. 14.5-14.7', pocket of medium grained sand. 14.7-16', silty sand with mica. 16-16.5', as 14.7-16' with some medium sand.		5356
4	1.5	10/10/12/14	none	SM	N/0.0				5354
6	1.7	23/30/33/46	none	SM	N/0.0			2" PVC Well Pipe	5352
8	1.7	23/44/57/58	none	SM	N/0.0				5350
10	1.6	21/38/64/71	none	SM	N/0.0				5348
12	1.6	31/51/73/90	none	SM	N/0.0				5346
14	1.6	26/37/64/78	none	SM	N/0.0				5344
16	1.6	30/46/53/57	none	SM-ML	N/0.0			Neat Cement	5342
18	1.7	22/31/50/61	none	SM-ML	N/0.0	Silty sand with clay	SILTY SAND WITH CLAY: 16.5-17.8, fine grained sand and silt with some clay. Mica and small sub-angular pebbles present. Color 5/6/7.5YR. 17.8-18.4', increased silt (55/40/5). 18.4-19.3, thin layer of medium-coarse sand. 19.3-19.5, clean fine sand with some silt (8/1 10YR). 19.5-42', silty fine grained sand with clay (65/30/5). Includes mica and small sub-angular pebbles. Reddish color (5/6/7.5 YR).		5340
20	1.7	16/19/30/46	none	SM-ML	N/0.0				5338
22	1.7	22/34/54/71	none	SM-ML	N/0.0				5336
24	1.6	32/56/87/116	moist	SM-ML	N/0.0				5334
26	1.7	30/36/62/75	moist	SM-ML	N/0.0			Hole Plug	5332
28	1.7	28/57/83/105	moist	SM-ML	N/0.0				5330
30	1.8	30/44/68/74	moist	SM-ML	N/0.0			Grout	5328
32	1.8	23/50/55/73	moist	SM-ML	N/0.0				5326
34	1.8	22/36/48/63	moist	SM-ML	N/0.0			Specified Pack	5324
36	1.8	12/32/50/67	moist-wet	SM-ML	N/0.0				5322
38	1.8	?12/22/41/52?	moist-wet	SM-ML	N/0.0		37.6-37.7', thin layer of black stained soil. No noticeable odor. Sheen observed on drill bit.	#6-slot 2" PVC Screen	5320
40	1.8	17/63/74/101	moist-wet	SM-ML	N/0.0			Sand	5318
42	2.0	31/49/73/112	moist-wet	SM-ML	SL/0.0		41.6-41.7', thin layer of black stained soil. Slight petroleum odor.		5316