SITE INSPECTION
ANALYTICAL RESULTS REPORT

BULLY BOY MILL

Piute County, Utah

UT0009114384

Utah Department of Environmental Quality
Division of Environmental Response and Remediation
Prepared by: Alan V. Jones

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Draft - Date: 11/22/2004 Initials: AVJ
Revisions - Date: _____ Initials: _____
Final - Date: 12/9/04 Initials: A.C.

REMEDIAL SITE ASSESSMENT DECISION - EPA REGION VIII

EPA ID: UT0009114384 Site Name: BULLY BOY MILL State ID:

Alias Site Names:

City: MARYSVALE County or Parish: PIUTE State: UT

Refer to Report Dated: 12/09/2004 Report Type: SITE INSPECTION 001

Report Developed by: STATE

DECISION:

- [ ] 1. Further Remedial Site Assessment under CERCLA (Superfund) is not required because:
  - [ ] 1a. Site does not qualify for further remedial site assessment under CERCLA (No Further Remedial Action Planned - NFRAP)
  - [ ] 1b. Site may qualify for action, but is deferred to:
- [X] 2. Further Assessment Needed Under CERCLA:
  - 2a. Priority: [ ] Higher [X] Lower
  - 2b. Other: (recommended action) Low

DISCUSSION/RATIONALE:

The Bully Boy Mill is located in Bullion Canyon, near Marysvale, Utah. The mill replaced the Dalton mill in the canybn after it had burned down. The Bully Boy mill produced gold ore during it's time of production.

The mill sits in disrepair with the main building in danger of collapse. THe site is unsecured and poses a physical danger to the public.

Based on laboratory analysis, arsenic and antimony are present in onsite soils. Other contaminants such as barium, cadmium, copper, lead and mercury were also documented.

Given that this site is located close to Miner's Park and next to the Piute ATV trail and is a stop on a local driving tour, this site will be given the disposition of Lower priority for further investigation under the Superfund Site Assessment program.

Site Decision Made by: SAM

Signature: _____ Date: 12/09/2004

EPA Form # 9100-3

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1.0 INTRODUCTION

The Bully Boy Mill was constructed in Bullion Canyon, near Marysvale, Utah, in 1922. The Bully Boy Mine had consistently produced good ore since the early days of the district but there had been no mills in the canyon since the Dalton Mill bumed down in 1914. The Bully Boy Mill and Mine continued to operate until 1938, when President Roosevelt lowered the price of gold to $35 per ounce, as allowed under the 1919 Walsh-Pittman Act, making further mining in the canyon unprofitable. The Bully Boy Mill has stood inactive since. However, because of its proximity to the Miners' Park (an outdoor museum) and the Paiute ATV trail, and the fact that it is unsecured, it poses a physical danger to the public as well as possible threats to human health and the environment by contaminants from past operations.

The purpose of this Site Inspection is to gather information to determine if further action is warranted at the Bully Boy Mill site. The Site Inspection was conducted under the authorities of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act (SARA) of 1986, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and through a Cooperative Agreement between the U.S. Environmental Protection Agency, Region VIII (EPA), and the Utah Department of Environmental Quality (UDEQ), Division of Environmental Response and Remediation (DERR). The purpose of this report is to document field procedures and to present the results from the sampling and data collection procedures. Samples were submitted to and analyzed through the Contract Laboratory Program (CLP) of the EPA. A Site Inspection Data Summary is included as Appendix A

2.0 OBJECTIVES

The scope of sampling involved the collection of 4 surface-water samples, 2 sediment samples, and 10 soil samples. The soil samples were collected from 0-6 inches below ground surface (bgs), using hand tools (i.e spoons, scoops, auger, and/or shovels). The purpose of the sampling event was to confirm that hazardous constituents are present on-site and to determine if these constituents have migrated, or are migrating, and if they pose a threat to human health and the environment.

The sampling event included the following objectives:

- To determine if contamination can be attributed to the tailings remaining on site.
- Assessment and quantization of sources of potentially hazardous materials.
- The evaluation of human and environmental targets in the vicinity of the site.

The field team consisted of:

Alan V. Jones	Project Manager/Environmental Scientist
Al M. Jones	Environmental Scientist

3.0 SITE DESCRIPTION

3.1 Site Location and Description

The Bully Boy Mill is located about 6½ miles west of Marysvale, Piute County, Utah (Figure 1). The site sits at an elevation of 8520 feet above mean sea level (Figure 1) (U.S.G.S., 1980). It is in the northeast quarter, of the northeast quarter, of the northeast quarter, of Section 5, Township 28S, Range 4W of the Salt Lake Base Line and Meridian (Figure 1). The geographic coordinates of the mill, as listed on the CERCLIS list, are 38°24'46" north latitude and 112°19'37" west longitude.

To reach the site from U.S. Highway 89 in Marysvale, travel westbound on Bullion Avenue (a.k.a. Center Street) for approximately 1 mile. Now follow Bullion Canyon Road to the southwest. After about 4 miles, the trailhead for the "Bullion Canyon: Canyon of Gold Driving Tour" is reached. The Bully Boy Mill is stop 8 on this tour and is approximately another 2½ miles southwest on Bullion Canyon Road. It is located south of Bullion Canyon Road just after crossing the bridge and before reaching Miners' Park.

3.2 Site History

Not a great deal is recorded about the Bully Boy Mill. The first discovery of gold in Utah occurred at the confluence of Pine Creek and the Sevier River. By 1865, the placer deposits had been traced up to their origins in Bullion Canyon (Newell, 1999).

It should be noted at this point that Bullion Canyon was originally known as Pine Canyon. The stream that flowed in Pine Canyon was known as Pine Creek. Sometime after gold was discovered there, the names of Pine Canyon and Pine Creek were changed to Bullion Canyon and Bullion Creek. Both names, Pine and Bullion, are used interchangeably to refer to the canyon and the creek. The U.S. Geological Survey 7.5-minute map, titled Mt. Brigham, uses the name Bullion Canyon for the canyon and Pine Creek for the creek (U.S.G.S., 1980). This report will use the nomenclature used by the U.S. Geological Survey.

By 1869, The Ohio Mining District had been formed and the camps of Bullion City, Webster City, and Virginia City had been formed in Bullion Canyon (Newell, 1999). The Bully Boy Mine was one of the first mines located in Bullion Canyon (Newell, 1999). A mill was constructed in the canyon in 1869 (Elder, 1970). This mill was located on the Halderman Mill Site (which is being investigated as part of the Bullion Canyon Mills site, CERCLIS ID# UT0012605880) and had limited success (Elder, 1970). By 1882, a ten-stamp mill (probably the Sylvester-Soderberg Mill, built on the nearby Dalton Mill site (being investigated under the Dalton Mill, CERCLIS ID #UT0009122400) was operating in the canyon (Elder, 1970). The ore from the Bully Boy Mine was sent to these mills and others that existed in the canyon.

By 1914, the Dalton Mill was the only mill operating in the canyon and it burned down that year (Newell, 1999). The Bully Boy Mine was still operating and in 1922, the manager of the mine, Michael Bamett, constructed the Bully Boy Mill (Elder, 1970). The Bully Boy Mill and Mine continued to operate until 1938, when President Roosevelt lowered the price of gold to $35 per ounce, as allowed under the 1919 Walsh-Pittman Act, making further mining in the canyon unprofitable (Elder, 1970). The Bully Boy Mill has stood inactive since.

Today, the Bully Boy Mill stands in a state of disrepair. The building measures 238 feet long and 45 feet wide but is in danger of collapsing (U.S. Forest Service, no date). The brochure for the "Bullion Canyon: Canyon of Gold Driving Tour" states that " . . . the Bully Boy Mill is privately owned by Crown Mines, Inc. Please respect private property" (U.S. Forest Service, no date). However because of its proximity to the Miners' Park (Miners' Park is an outdoor museum and has displays of mining artifacts) and the fact that it is unsecured, it poses a physical danger to the public because of the unstable condition of the structure.

In recent years, a company named Crown Mines, LLC, or Fehrprop, Inc., has acquired many of the old mining claims in the canyon. These properties are then being tumed into cabin lots and sold on the open market (Fredrick, 2003).

The tailings distributed throughout the immediate area are unavoidable to visitors of Miners' Park. As individuals make there way to the mill building, which is one of the features of "Bullion Canyon: Canyon of Gold Driving Tour", and/or to Miner's Park, they cross the tailings. The fact that the mill building is in such close proximity to the park and is unsecured leads to the conclusion that it is frequented by people (Figure 2). The structure of the building is very suspect and appears ready to collapse, but undoubtedly, some people probably go inside the building anyway. Also a fire pit and possible campsite was observed in the area.

In the 1990s, the Paiute ATV (All-Terrain Vehicle) Trail was established in the area. The main trail forms a 275-mile loop that begins at Salina on the north, travels along the Pahvant and Tushar Mountains on the west, through Circleville on the south and along the Monroe Mountains on the east (Trails Illustrated, 1999). Side trails account for an additional 800 miles of the trail system. Most of the trail is on Forest Service and Bureau of Land Management property (Trails Illustrated, 1999).

One of 2 major loops on the Paiute ATV Trail is the Marysvale Loop, which departs from the main trail in the Tushar Mountains, comes down Beaver Creek into Marysvale, and continues up Dry Creek to the east into the Monroe Mountains, where it again connects with the main trail (Uzelac et al., 1997). One of the side trails from the Marysvale Loop is "Spur 77, Revenue Canyon", which sends riders up Bullion Canyon to the "Bullion Canyon: Canyon of Gold Driving Tour" and the Miners' Park (Uzelac et al., 1997).

4.0 FIELD ACTIVITIES

Mr. Frederick gave verbal permission for the field crew to access the site. Photos were taken of each of the sample sites, at the time of sampling. A log of these photos is included as Appendix B.

Sampling was conducted on May 29 and 30, 2003. A Marysvale resident visited the site with the field crew and provided additional site information prior to the commencement of sampling activities (Frederick, 2003). A summary of field activities are included as Appendix C.

4.1 Deviations from the Work Plan

No deviations were made from the Work Plan but some items that the Work Plan left to be determined in the field were addressed (Jones, 2003). One opportunity sample was collected. During the initial site visit with a resident of Marysvale, a former tailings pond was pointed out to the field crew. All of the field determinations were based around this tailings pond.

- The Work Plan called for the locations of samples BB-SF-14, BB-SF-15, BB-SF-16, BB-SF-17, and BB-SF-18 to be determined in the field.
- Soil samples BB-SF-14 and BB-SF-15 were collected from the former tailings dam.
- Soil sample BB-SF-16 was collected from the area where the tailings pond would have been.
- Soil sample BB-SF-17 and BB-SF-18 were collected from areas just downgradient from the tailings dam that were void of vegetation.
- The opportunity sample, a surface-water sample (BB-SW-04), was collected from an ephemeral pond of standing water in the area where the pond would have been.

4.2 Quality Assurance/Quality Control

During the sampling trip, documentation procedures included the completion of all CLP forms, tags, and sample seals as required for routine analytical services (RAS) using Forms II Lite, an EPA developed software package. Strict chain-of-custody was maintained and chain-of-custody forms were filled out completely and accompanied shipments to the laboratory. Copies of these forms are included as Appendix D. The organic samples were submitted to Liberty Analytical in Cary, North Carolina, via FedEx, as per CLP instmctions. The inorganic samples were submitted to Sentinel, Inc., in Huntsville, Alabama, via FedEx, as per CLP instmctions.

As specified in the Work Plan, a duplicate surface-water sample, BB-SW-03 (a duplicate of BB-SW-02), was collected (Jones, 2003). The results of these 2 samples and are shown on Table 1. A linear regression was run to compare these two samples. The linear regression indicates that these two samples are 99.99% the same.

A double volume of surface-water sample BB-SW-02 was collected. Surface-water sample BB-SW-02 and soil sample BB-SF-12 were submitted for intemal laboratory quality control.

As per CLP protocol, the results of the sample analyses were validated by URS Operating Services, Inc. The validated data is included as Appendix E.

5.0 WASTE/SOURCE CHARACTERISTICS

A study of the mining in the Tushar Mountains was conducted in the early part of the 20th century (Butler et al., 1920). At that time, mining had been occurring in that area for in excess of 40 years. Butler divided the ores being mined into 4 main groups: 1) gold-silver veins (primarily in the Kimberly area on the north slope of the Tushar Mountains), 2) lead-copper-zinc (primarily in Bullion Canyon), 3) lead replacement deposits (in the Cottonwood Creek area to the south of Marysvale), and 4) quicksilver deposits (located throughout the area). Butler also noted deposits of iron, alunite veins, replacement bodies of alunized rock, antimony as stibnite in sedimentary rocks, and the occurrence of tungsten in the area (Butler et al., 1920). The only ore that has been mined in the Tushar Mountains that Butler did not touch upon was uranium. The mining of uranium in the region post-dates Butler's work and the Dalton Mill by 4 decades.

The Bully Boy Mine was by far the most productive mine in Bullion Canyon, and the Bully Boy Mill was built to mill ore from this mine (Callaghan, 1973). While it is possible that any of the ores mentioned in the preceding paragraph (with the exception of uranium) were processed in the nearby Dalton Mill, the vast majority of it would have been of the lead-copper-zinc variety found in the immediate area.

Wastes at the site include heavy metals remaining from the milling processes. Obviously, lead, copper and zinc are the metals of primary concem but other associated metals may be present. Mercury is likely also present due to the widespread presence of quicksilver in the district; furthermore, mercury may have been used in the milling process to concentrate gold. Other wastes associated with milling and concentrating ore, mainly cyanide and acids, may also be present.

6.0 SURFACE WATER PATHWAY

6.1 Hydrology

The Bully Boy Mill site is located along Pine Creek. Portions of the site may be inundated by Pine Creek, but the mill and most of the tailings materials are on the south side of the canyon, significantly above the stream. However, the effects of gravity undoubtedly bring some of this material into contact with the stream. Runoff, from precipitation events and/or snbwmelt, also moves tailings materials to Pine Creek by erosion processes. Also, the former tailmgs pond that was pointed out to the field crew, is located in the flood plain of Pine Creek.

Pine Creek is a perennial stream that begins in the Tushar Mountains west of the site and flows east into the Sevier River. The Sevier River is a perennial stream that originates in the Markagunt and Paunsaugunt Plateaus to the south and terminates in the Sevier Lake, west of Delta, Utah. The average annual stream flow for the Sevier River is 249 cubic feet per second (cfs) (Lambert et al., 1995). Pine Creek is not gauged, but probably has an average annual stream flow in the range of 5-10 cfs.

Piute Reservoir is located approximately 10 miles southeast and upgradient of the site on the Sevier River and regulates flow of the Sevier River through the Marysvale and Sevier Valleys.

6.2 Targets

There are no municipal surface-water intakes within 15-miles downstream of the site. There are 26 points-of-diversion within that distance, some of which do indicate that they may be used for domestic purposes. Also, Pine Creek is diverted for irrigation and likely for stock watering. Threatened and endangered species common to the area are the bald eagle, peregrine falcon, and Utah prairie dog.

The Sevier River is used for numerous recreation purposes such as fishing and canoeing. Pine Creek and the Sevier River have a general bag limit of 4 trout. Marshy areas are abundant along the Sevier River and are within 15 downstream miles of the site.

Surface-water targets for the Bully Boy Mill consist of irrigators and recreation seekers who may contact surface waters during daily activities. Other surface-water targets likely consist of threatened and endangered species, irrigated cropland, sensitive environments associated with marshy areas, and stock.

6.3 Sample Locations

Surface water and sediment samples were collected, upgradient and downgradient of the mill site, from Pine Creek. Pine Creek was at near peak runoff at the time of sampling. This high flow rate created some safety issues regarding sample collection.

The upgradient samples (surface-water sample BB-SW-01 and sediment sample BB-SD-06) were collected from the south side of Pine Creek at the Miner's Park picnic area. The downgradient samples (surface-water sample BB-SW-02, sediment sample DM-SD-07, and surface-water duplicate sample BB-SW-03) were collected from the south side of Pine Creek about 150 feet upgradient of the bridge.

The high flow may have affected the samples that were collected but that effect is unknown.

An opportunity surface-water sample (sample BB-SW-04) was collected from an ephemeral pond located on the site of the former tailings pond. This water appeared to be pooled here due to spring runoff.

6.4 Analytical Results

The analytical results for the Surface-Water Pathway are summarized on Tables 1 and 2. Table 1 summarizes the total metal analyses for surface water and Table 2 summarizes the total metal analyses for sediment samples. The validated data reports are included as Appendix E.

As specified by the Hazard Ranking System (HRS), analytical results from field samples were compared to analytical results from the background sample(s) and to sample qaantitation limits (SQL) for determining an observed release. The criteria for determining an observed release in surface water is as follows:

1. If the background concentration is not detected, an observed release is established when the sample concentration equals or exceeds the sample quantitation limit; or

2. If the background concentration equals or exceeds the detection limit, an observed contamination is established when the sample concentration "significantly exceeds" the background concentration. Generally, "significantly exceeds" is defined to be situations where the sample concentration exceeds the background concentration by 3 times (U.S. EPA, 1990).

Analytical results from the field samples were also compared to screening standards. The benchmark data from the Superfund Chemical Data Matrix (SCDM) are the accepted benchmark values and they are also included in Table 1. There are no SCDM values for sediments and therefore, no SCDM values are included on Table 2.

6.4.1 Surface Water

There was one observed release in surface water that was collected from Pine Creek. This occurred in the downgradient sample (BB-SW-02) for cobalt, however this sample was duplicated and the duplicate sample (BB-SW-03) did not have an observed release. Also this observed release was exactly 3 times the concentration observed in the background sample (BB-SW-01). Cobalt has no SCDM values for surface water.

The respective SCDM values for the Environmental Fresh Water Criteria Continuous Concentrations for aluminum, iron, and lead were exceeded in all 3 surface-water samples collected from Pine Creek. The SCDM value for aluminum is 87 µg/ℓ and the concentrations in the three samples were 3,610 µg/ℓ (in the upgradient sample, BB-SW-01), 5,140 µg/ℓ (in the downgradient sample, BB-SW-02), and 4,840 µg/ℓ (in the duplicate sample, BB-SW-03). The SCDM value for iron is 1,000 µg/ℓ and the concentrations in the three samples were 2,890 µg/ℓ (in the upgradient sample, BB-SW-01), 4,400 µg/ℓ (in the downgradient sample, BB-SW-02), and 4,250 µg/ℓ (in the duplicate sample, BB-SW-03). The SCDM value for lead is 2.5 µg/ℓ and the concentrations in the three samples were 3.8 µg/ℓ (in the upgradient sample, BB-SW-01), 5.8 µg/ℓ (in the downgradient sample, BB-SW-02), and 6.8 µg/ℓ (in the duplicate sample, BB-SW-03).

Several of the constituents increased in the downgradient samples. For example:

- Aluminum increased from 3,610 µg/ℓ in the upgradient sample to 5,140 µg/ℓ in the downgradient sample and 4,840 µg/ℓ in the duplicate sample.
- Barium increased from 72.8 µg/ℓ in the upgradient sample to 95.8 µg/ℓ in the downgradient sample and 82.6 µg/ℓ in the duplicate sample.
- Chromium increased from 2.5 µg/ℓ in the upgradient sample to 4.8 µg/ℓ in the downgradient sample and 4.0 µg/ℓ in the duplicate sample.
- Cobalt increased from 1.0 µg/ℓ in the upgradient sample to 3.0 µg/ℓ in the downgradient sample and 1.8 µg/ℓ in the duplicate sample.
- Copper increased from 3.6 µg/ℓ in the upgradient sample to 6.9 µg/ℓ in the downgradient sample and 5.2 µg/ℓ in the duplicate sample.
- Iron increased from 2,890 µg/ℓ in the upgradient sample to 4,400 µg/ℓ in the downgradient sample and 4,250 µg/ℓ in the duplicate sample.
- Lead increased from 3.8 µg/ℓ in the upgradient sample to 5.8 µg/ℓ in the downgradient sample and 6.8 µg/ℓ in the duplicate sample.
- Manganese increased from 183 µg/ℓ in the upgradient sample to 240 µg/ℓ in the downgradient sample and 218 µg/ℓ in the duplicate sample.
- Selenium increased from 2.3 µg/ℓ in the upgradient sample to 3.9 µg/ℓ in the downgradient sample and 3.4 µg/ℓ in the duplicate sample.
- Vanadium increased from 6.8 µg/ℓ in the upgradient sample to 10.9 µg/ℓ in the downgradient sample and 9.3 µg/ℓ in the duplicate sample.
- And zinc increased from 6.3 µg/ℓ in the upgradient sample to 10.1 µg/ℓ in the downgradient sample and 9.2 µg/ℓ in the duplicate sample.

The arsenic concentration in the 3 samples was 2.2 µg/ℓ in the upgradient sample, 2.3 µg/ℓ in the downgradient sample, and 2.5 µg/ℓ in the duplicate sample. The SCDM gives a Drinking Water Benchmark for Cancer Risk of 0.057 µg/ℓ for arsenic. It should be noted however that Pine Creek is not used as a drinking water source.

The opportunity sample (BB-SW-04) that was collected from the ephemeral pond in the area of the former tailings pond was the most contaminated of the four samples. When this opportunity sample is compared to the background surface-water sample taken from Pine Creek, BB-SW-01,

the concentrations for antimony, cadmium, copper, lead, silver, and zinc were all high enough to constitute observed releases. The concentrations of cadmium, copper, lead and zinc also exceeded SCDM environmental benchmarks.

The arsenic concentration in the opportunity sample was "U" qualified, which indicates that arsenic was not detected and the 6.1 $\mu g/\ell$ value reported is the detection limit. This detection limit is nearly 3 times the concentration observed in the background sample.

Also, the concentrations of antimony and lead, observed in the opportunity sample exceeded SCDM drinking water benchmarks. This water source however is not used for drinking water.

6.4.2 Sediment

There are no observed releases in the sediment samples. Actually, the sediment samples were virtually identical. The mercury concentration in both sediment samples was rejected because the laboratory matrix spike recovery was below 30%. Because of this problem, the mercury concentrations in both sediment samples are not valid.

6.5 Conclusions

Outside of the opportunity sample (sample BB-SW-04, collected from the ephemeral pond in the area of the former tailings pond), the surface water and sediment samples collected during this Site Inspection documented only one observed release. This observed release was cobalt in the downgradient sample (Sample BB-SW-02) and the duplicate sample from this same location (sample BB-SW-03) did not reflect this observed release.

The concentrations of several of the constituents increased in the downgradient samples. This indicates that the tailings do contribute metals to Pine Creek but the contributions were not significant enough, as defined by the HRS, to constitute observed releases.

The SCDM value for the Environmental Fresh Water Criteria Continuous Concentrations was exceeded in all 3 samples for aluminum, iron, and lead. Since these values were exceeded in the background sample however, it is not possible to attribute these exceedences exclusively to the Bully Boy Miil site.

The arsenic concentrations in all 3 samples exceeded the SCDM Drinking Water Cancer Risk benchmark and all 3 samples had thallium concentrations that exceeded the SCDM Drinking Water Benchmark Maximum Contaminant Levels. These observations raise concern, but since Pine Creek is not used for drinking water, the effect is limited.

The opportunity sample (BB-SW-04) had concentrations that were significantly greater than the other samples. When this opportunity sample is compared to the background surface-water sample taken from Pine Creek, BB-SW-01, the concentrations for antimony, cadmium, copper, lead, silver, and zinc were all high enough to constitute observed releases. The concentrations of cadmium, copper, lead and zinc also exceeded their respective SCDM environmental benchmarks. The opportunity sample was collected from an ephemeral pond in the area where

the former tailings pond was and was likely meteoric water that had been in contact with this tailings pond material.

There are no observed releases in the sediment samples. Actually, the sediment samples were virtually identical which indicates that the Bully Boy Mill site is likely not impacting the sediment. The high mnoff may have affected the results of the sediment results. Due to the high mn off, sediment was likely being scoured from the streambed rather than being deposited during the time of sampling.

7.0 SOIL EXPOSURE PATHWAY

7.1 Geology

The Bully Boy Mill is located in the Marysvale Volcanic Field and High Plateaus of west-central Utah. The High Plateaus are defined as a transition between the Colorado Plateau and Basin-range physiographic provinces (Beatty et al., 1986). The High Plateaus consist of flat-lying sedimentary and volcanic rocks that have been broken by late Cenozoic extensional faulting into elongate north trending mountains separated by narrow alluviated stmctural troughs (Beatty et al., 1986).

The Bully Boy Mill site is located west of the Tushar fault zone, which is a range front fault separating Paleozoic and Mesozoic sedimentary rocks from Tertiary and Quatemary basin fill deposits. Paleozoic and Mesozoic sedimentary rocks consist mainly of limestone and sandstone (quartzite) rocks that are resistant to erosion and form a steep frontal face. The Paleozoic and Mesozoic sedimentary rocks are overlain by two assemblages of middle Tertiary volcanic rocks (Beatty et al., 1986). The Oligocene and early Miocene Bullion Canyon Volcanic deposits consist of intermediate calc-alkaline lava flows, pyroclastic breccia, and volcanic mud-flow breccias. The Mount Belknap Volcanics, located in the northem portion of the Tushar Mountains, overlie the Bullion Canyon Volcanics and consist of alkali rhyolite lava flows and ash-flow tuff units (Beatty et al., 1986).

7.2 Targets

The census data indicate that no one lives within 1 mile of the site and a total of 26 people live within 4 miles of the site (Jones, 2002). Because of the proximity to Miners' Park and the Paiute ATV Trail, and it being a stop on the "Canyon of Gold" driving tour, people may periodically be exposed to contaminants at the site. Furthermore in recent years, cabins have begun to be built in the canyon and if this trend continues, more individuals will be exposed in the future.

7.3 Sample Locations

Ten soil samples (including 1 background sample) were collected as part of this Site Inspection (Figure 2). These samples were collected as specified in the Work Plan. A background sample (BB-SF-11) was collected from native material south of Miner's Park.

The location of Miner's Park was not located correctly on Figure 2 in the Work Plan so soil sample BB-SF-13 was collected from a different location than represented on that figure but it was collected from the entrance to Miner's Park as specified by the Work Plan (Jones, 2003).

The Work Plan specified that the exact location of 5 soil samples (BB-SF-14, BB-SF-15, BB-SF-16, BB-SF-17, and BB-SF-18) would be determined in the field. These 5 samples were located around the former tailings pond. Samples BB-SF-14 and BB-SF-15 were collected from the eroded tailings dam, sample BB-SF-16 was collected from the bed of the former tailings pond, and samples BB-SF-17 and BB-SF-18 were collected from the dry wash immediately down gradient of the tailings dam. The locations of all soil samples are shown on Figure 2.

7.4 Analytical Results

The analytical results for the soil samples are summarized on Table3. The validated data reports are included as Appendix E.

As specified by the Hazard Ranking System (HRS), analytical results from field samples were compared to analytical results from the background sample(s) and to sample quantitation limits (SQL) for determining samples, which qualify as observed contamination. The criteria for determining observed contamination in soil is as follows:

1. If the background concentration is not detected, observed contamination is established when the sample concentration equals or exceeds the sample quantitation limit; or

2. If the background concentration equals or exceeds the detection limit, observed contamination is established when the sample concentration "significantly exceeds" the background concentration. Generally, "significantly exceeds" is defined to be situations where the sample concentration exceeds the background concentration by 3 times (U.S. EPA, 1990).

Analytical results from the field samples were also compared to screening standards. The benchmark data from the Superfund Chemical Data Matrix (SCDM) are the accepted benchmark values and they are also included on Table 3.

Certain sample results are highlighted if they are observed contamination (exceed background by 3 times). Analyses where the SCDM value is exceeded are bolded on Table 3.

Soil samples BB-SF-11 and BB-SF-13 had few observed releases when compared to the other 7 samples (the background sample, BB-SF-09, excluded). These 2 samples were collected from areas that were likely not impacted by mining activities (BB-SF-11 from the side of the mill and BB-SF-13 from the entrance to Miner's Park).

All soil samples, including the background soil sample, had arsenic concentrations that exceeded the SCDM Screening Concentration for Cancer Risk due to Oral Exposure benchmark of 0.43 mg/kg. The arsenic concentration in the background sample (BB-SF-09) was 13.8 mg/kg. In sample BB-SF-13 the arsenic concentration was 9.2 mg/kg and in sample BB-SF-13 it was 22.6 mg/kg. The SCDM Screening for Non-Cancer Toxicological Responses benchmark for arsenic

is 23 mg/kg; the remaining 7 samples exceeded this benchmark, ranging from 42.6 mg/kg (in sample BB-SF-17) to 123 mg/kg (in sample BB-SF-18).

Additionally, sample BB-SF-11 had observed releases of lead and calcium, but calcium is not considered hazardous. Sample BB-SF-13 had an observed release of potassium, which is not considered hazardous.

The mercury concentration in the background sample was rejected because the laboratory matrix spike recovery was below 30%. This also resulted in all other mercury analyses being "J" qualified. Because of this problem, mercury concentration in the background sample is not valid. In order to make a comparison, the mercury concentration from sample BB-SF-13, will be substituted and used as background.

The mercury concentration of sample BB-SF-13 (background) is 0.14 mg/kg. There were 5 observed releases of mercury. These observed releases ranged from 0.44 mg/kg (in sample BB-SF-15) to 2.5 mg/kg (in sample BB-SF-10). All of the sample results for mercury were below the SCDM Screening for Non-Cancer Toxicological Responses benchmark for mercury of 23 mg/kg.

Antimony concentrations, in the remaining 7 samples (soil samples BB-SF-10, BB-SF-12, BB-SF-14, BB-SF-15, BB-SF-16, BB-SF-17, and BB-SF-18 will collectively be referred to as the "remaining 7 samples" throughout the remainder of this section) ranged from 14.4 mg/kg (in sample BB-SF-10) to 306 mg/kg (in sample DM-SF-18), while the background concentration of antimony was 2.1 mg/kg. All of the remaining 7 samples had observed contamination for antimony. The SCDM Screening Level for Non-Cancer Toxicological Responses benchmark for antimony is 31 mg/kg. Six of the remaining 7 samples (sample BB-SF-10 being the exception) exceed this benchmark.

No other SCDM benchmarks were exceeded, however several other observed releases were documented in the remaining 7 samples:

- The background concentration for barium was 116 mg/kg. Concentrations of barium ranged from 376 mg/kg (in sample BB-SF-10) to 1,940 mg/kg (in sample BB-SF-18), constituting 7 observed releases. The SCDM Screening for Non-Cancer Toxicological Responses benchmark for barium is 5,500 mg/kg.

- The background concentration for cadmium was 0.088 mg/kg. Concentrations of cadmium ranged from 2.2 mg/kg (in sample BB-SF-10) to 31.8 mg/kg (in sample BB-SF-12), constituting 7 observed releases. The SCDM Screening for Non-Cancer Toxicological Responses benchmark for cadmium is 39 mg/kg.

- The background concentration for copper was 20.4 mg/kg. Concentrations of copper ranged from 111 mg/kg (in sample BB-SF-10) to 570 mg/kg (in sample BB-SF-18), constituting 7 observed releases. There is no SCDM benchmark for copper in soil.

- The background concentration for lead was 90.4 mg/kg. Concentrations of lead ranged from 1,620 mg/kg (in sample BB-SF-10) to 19,600 mg/kg (in sample BB-SF-18), constituting 8 observed releases (as mentioned previously, sample BB-SF-11 had an observed release as well as the remaining 7 samples). There is no SCDM benchmark for lead in soil.

- The background concentration of manganese was 663 mg/kg. Sample BB-SF-12 had a concentration of 2,020 mg/kg. This constitutes 1 observed release of manganese. The SCDM Screening for Non-Cancer Toxicological Responses benchmark for manganese is 11,000 mg/kg.

- The background concentration for selenium was 1.0 mg/kg. Concentrations of selenium ranged from 8.2 mg/kg (in sample BB-SF-17) to 23.5 mg/kg (in sample BB-SF-18), constituting 6 observed releases. Of the remaining 7 samples, only sample BB-SF-10 with a concentration of 2.8 mg/kg did not have an observed release. The SCDM Screening for Non-Cancer Toxicological Responses benchmark for selenium is 390 mg/kg.

- The background concentration for silver was 0.86 mg/kg. Concentrations of silver ranged from 9.6 mg/kg (in sample BB-SF-10) to 90.5 mg/kg (in sample BB-SF-18), constituting 7 observed releases in the remaining 7 samples. The SCDM Screening for Non-Cancer Toxicological Responses benchmark for silver is 390 mg/kg.

- And the background concentration for zinc was 92.2 mg/kg. Concentrations of zinc ranged from 680 mg/kg (in sample BB-SF-10) to 6,230 mg/kg (in sample BB-SF-12), constituting 7 observed releases. The SCDM Screening for Non-Cancer Toxicological Responses benchmark for zinc is 23,000 mg/kg.

7.5 Conclusions

Based on the laboratory analyses, arsenic and antimony are present on the site in concentrations significant enough to affect human health. The concentrations of these 2 constituents are significant enough to exceed SCDM Benchmarks and to meet the HRS criteria as observed releases.

Observed releases for barium, cadmium, copper, lead, manganese, mercury, selenium, silver, and zinc, that did not exceed SCDM benchmarks were also documented. Of particular concern is the presence of lead. Lead does not have a SCDM Benchmark for the soil exposure pathway (neither does copper). Historically in Utah, sites where the soil is contaminated with lead are cleaned up using site-specific, risk-based criteria. Typically, residential properties contaminated with lead are cleaned up to lead concentrations in the range of 400-500 mg/kg. Recently, a lead clean up level of 237 mg/kg was used for residential properties at a National Priority Listed site contaminated with mine wastes within the state. Concentrations of lead at the Bully Boy Mill site ranged from 445 mg/kg to 19,600 mg/kg. The greatest lead concentration was observed at the most downgradient sample, which might also indicate a second source in this area.

8.0 GROUND-WATER PATHWAY

The city of Marysvale obtains its culinary water for a population of 400 from a spring located approximately 1.8 mile downgradient from the site. It is possible that the Bully Boy Mill site has affected this spring. However, the spring is located on the north side of Pine Creek where it flows from consolidated bedrock; the site is located on the south side of Pine Creek and has most likely only affected the shallow alluvial ground-water aquifer. No attempt was made to sample the ground water.

9.0 AIR EXPOSURE PATHWAY

Individuals who visit the site for recreation or other purposes are at risk but these exposures are probably minimal. No attempt was made to sample the air-exposure pathway.

10.0 SUMMARY AND CONCLUSIONS

Mining in Bullion Canyon, west of Marysvale, Piute County, Utah, began in 1869. The Bully Boy Mill was constmcted in Bullion Canyon in 1922. The Bully Boy Mine had consistently produced good ore since the early days of the district but there had been no mills in the canyon since the Dalton Mill bumed down in 1914. The Bully Boy Mill and Mine continued to operate until 1938, when President Roosevelt lowered the price of gold to $35 per ounce, as allowed under the 1919 Walsh-Pittman Act, making further mining in the canyon unprofitable. The Bully Boy Mill has stood inactive since. However, because of its proximity to the Miners' Park (an outdoor museum) and the Paiute ATV trail, and the fact that it is unsecured, site contaminants pose a risk to human health and the environment.

Sampling was conducted on May 29 and 30, 2003. The sampling included the collection of 4 surface-water samples (including one opportunity sample and one field duplicate), 2 sediment samples (co-located with two of the surface-water samples), and 10 soil samples. At the time of sampling, Pine Creek was flowing at near peak mnoff and this may have affected the results that were observed.

The samples collected from the surface-water pathway (i.e. surface water and sediment) during this Site Inspection only document one observed release in Pine Creek. The concentrations of several of the constituents increased in the downgradient surface-water samples. This indicates that the tailings do contribute metals to Pine Creek. The SCDM value for the Environmental Fresh Water Criteria Continuous Concentrations was exceeded in all 3 samples for aluminum, iron, and lead. Since these values were exceeded in the background sample however, it is not possible to attribute these exceedences to the Bully Boy Mill site.

The opportunity sample was collected from an ephemeral pond where the former tailings pond was located. The opportunity sample had concentrations of cadmium, copper, lead, and zinc that exceeded SCDM environmental benchmarks. If the opportunity sample is compared to the

background sample (which was collected from Pine Creek upgradient of the site) then observed releases of antimony, cadmium, copper, lead, silver, and zinc can be documented. The concentrations of several of the constituents increased in the downgradient surface-water samples.

There were no observed releases in the sediment samples. Actually, the sediment samples were virtually identical. Perhaps the increased flow rate at the time of sampling had erbded contaminated sediments from the upgradient streambed.

Based on the laboratory analyses, arsenic and antimony are present in the soil on the site in concentrations that exceed SCDM benchmarks and also qualify under HRS criteria as observed contamination. Observed contamination for barium, cadmium, copper, lead, manganese, mercury, selenium, silver, and zinc that did not exceed SCDM benchmarks were aiso documented. Although there are no SCDM Benchmarks for lead, lead concentrations as high as 19,600 mg/kg were documented on the site, which is significantly greater than site specific risk-based clean up concentrations at other sites within the state.

Due to the potential for additional cabin development in the canyon it may be assumed that additional individuals will be brought in contact with the tailings on this site. In recent years, a company named Crown Mines, LLC, or Fehrprop, Inc., has acquired many of the oid mining claims in the canyon. These properties are then being tumed into cabin lots and sold on the open market (Fredrick, 2003). The recreational attractions in the canyon, including this site, also increase the potential for exposure.

The presence of arsenic and antimony in concentrations above SCDM screening levels in the tailings, and the elevated concentrations of lead at the site, presents significant concem to human health.

11.0 REFERENCES

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Utah Department of Environmental Quality
Division of Environmental Response and Remediation

FIGURE 1

GENERAL AREA MAP

Bully Boy Mill
Piute County, Utah

by: Alan V. Jones

date: 10/18/2004

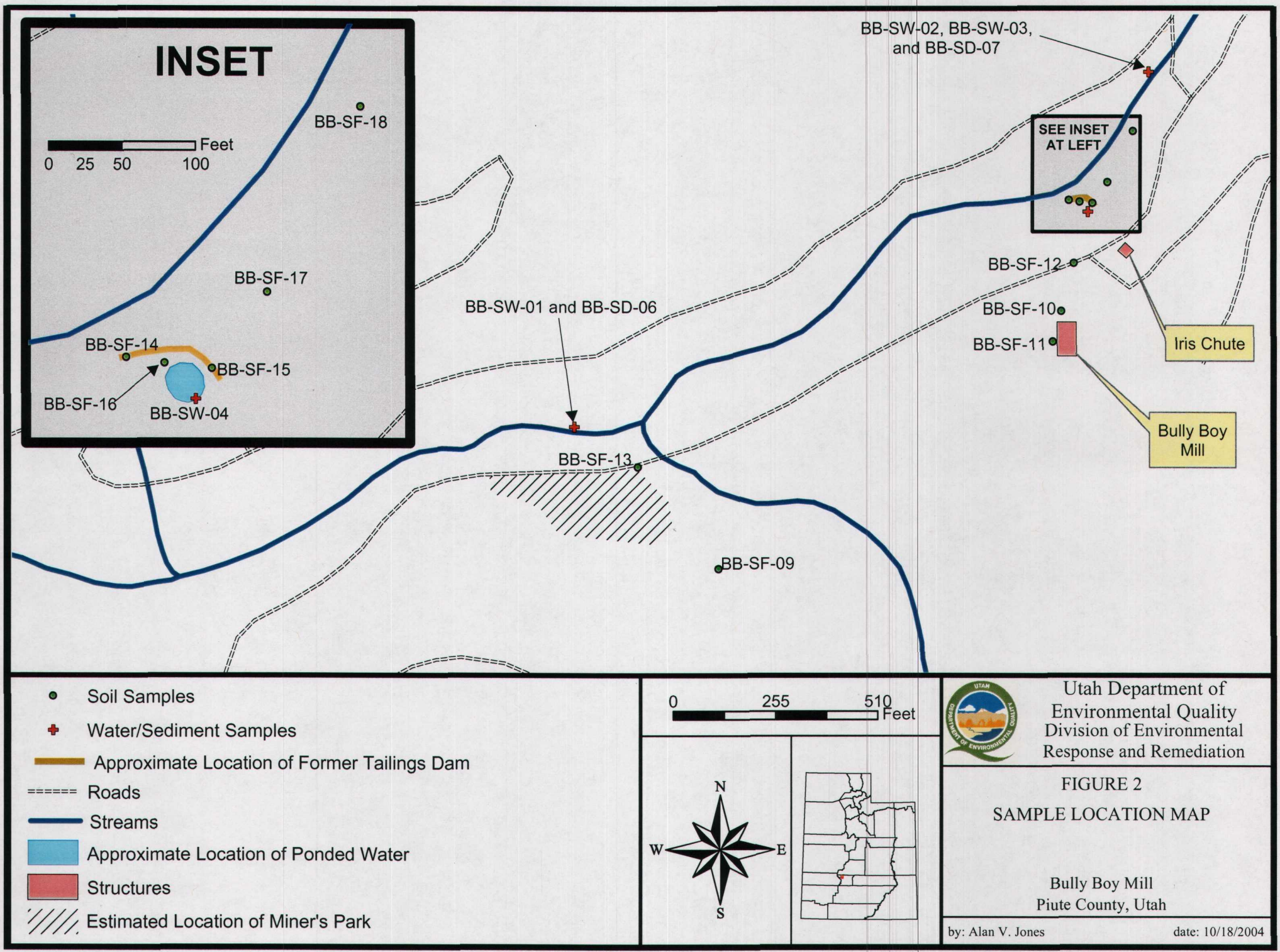

INSET
BB-SF-18
Feet
0 25 50 100
BB-SF-17
BB-SF-14
BB-SF-15
BB-SF-16
BB-SW-04
BB-SW-02, BB-SW-03,
and BB-SD-07
SEE INSET
AT LEFT
BB-SF-12
BB-SW-01 and BB-SD-06
BB-SF-10
BB-SF-11
Iris Chute
Bully Boy
Mill
BB-SF-13
BB-SF-09
Soil Samples
Water/Sediment Samples
Approximate Location of Former Tailings Dam
Roads
Streams
Approximate Location of Ponded Water
Structures
Estimated Location of Miner's Park
0 255 510
Feet
N
W
E
S
Utah Department of
Environmental Quality
Division of Environmental
Response and Remediation
FIGURE 2
SAMPLE LOCATION MAP
Bully Boy Mill
Piute County, Utah
by: Alan V. Jones
date: 10/18/2004

Table 1. Inorganic Data Results for Surface Water Collected at the Bully Boy Mill Site.

	Sample #	--	--	--	--	--	BB-SW-01		BB-SW-02			BB-SW-03			BB-SW-04		
	Traffic #	--	--	--	--	--	MH0TA2		MH0T97			MH0T98			MH0T99		
	Sample Location	Drinking Water Benchmarks			Environmental Benchmarks		Background - From Picnic Area at Miner's Park		150 feet Upgradient of Bridge			Duplicate of BB-SW-02			Opportunity Sample from Puddle in Former Tailings Pond		
	Sample Type	MCL/ MCLG	Cancer	Non-Cancer	Fresh CMC	Fresh CCC	Water		Water			Water			Water		
Cas No.	analyte	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	Q	µg/L	Q	ratio	µg/L	Q	ratio	µg/L	Q	ratio
7429-90-5	Aluminum				750	87	**3610**	J	**5140**	J	1.4	**4840**	J	1.3	267	UJ	0.1
7440-36-0	Antimony	6		15			2 .5		3 .0		1.2	2 .5		1.0	24 .0		9.6
7440-38-2	Arsenic	10	0.057	11	340	150	2 .2		2 .3		1.0	2 .5		1.1	6 .1	U	2.8
7440-39-3	Barium	2000		2600			72 .8		95 .8		1.3	82 .6		1.1	180		2.5
7440-41-7	Beryllium	4		73			0 .50	U	0 .48	U	1.0	0 .48	U	1.0	0 .38	U	0.8
7440-43-9	Cadmium	5		18	2	0.25	0 .20		0 .20		1.0	0 .20		1.0	**3 .8**		19.0
7440-70-2	Calcium						18600		20200		1.1	18800		1.0	42300		2.3
7440-47-3	Chromium	100		110			2 .5		4 .8		1.9	4 .0		1.6	0 .60		0.2
7440-48-4	Cobalt						1 .0		3 .0		3.0	1 .8		1.8	0 .70		0.7
7440-50-8	Copper	1300			13	9	3 .6		6 .9		1.9	5 .2		1.4	**38 .7**		10.8
7439-89-6	Iron					1000	**2890**		**4400**		1.5	**4250**		1.5	351		0.1
7439-92-1	Lead	15			65	2.5	**3 .8**		**5 .8**		1.5	**6 .8**		1.8	**384**		101
7439-95-4	Magnesium						3140		4140		1.3	3950		1.3	4970		1.6
7439-96-5	Manganese			5100			183		240		1.3	218		1.2	258		1.4
7439-97-6	Mercury	2		11	1.4	0.77	0 .10		0 .10		1.0	0 .10		1.0	0 .13		1.3
7440-02-0	Nickel			730	470	52	2 .1		4 .7		2.2	2 .4		1.1	1 .2		0.6
7440-09-7	Potassium						1230		1630		1.3	1510		1.2	8940		7.3
7782-49-2	Selenium	50		180		5	2 .3		3 .9	U	1.7	3 .4	U	1.5	4 .8	U	2.1
7440-22-4	Silver			180	3.2		0 .90		0 .90		1.0	0 .90		1.0	2 .7		3.0
7440-23-5	Sodium						2540	U	2660	U	1.0	2520	U	1.0	3790		1.5
7440-28-0	Thallium	0.5					2 .9	UJ	2 .9	UJ	1.0	2 .9	UJ	1.0	2 .9	UJ	1.0
7440-62-2	Vanadium			260			6 .8		10 .9		1.6	9 .3		1.4	1 .0		0.1
7440-66-2	Zinc			11000	120	120	6 .3	J	10 .1	J	1.6	9 .2	J	1.5	**819**		130

Drinking Water Benchmarks from the Superfund Chemical Data Matrix, 1/2004
MCL (Maxium Contaminant Levels)/MCLG (Maxium Contaminant Level Goals)
Cancer = Screening Concentration for Cancer Risk due to Oral Exposure
Non-Cancer = Screening for Non-Cancer Toxicological Responses
Environmental Benchmarks from the Superfund Chemical Data Matrix, 1/2004
Fresh CMC = Criteria Maximum Concentrations, corresponds to acute ecosystem toxicity in freshwater
Fresh CCC = Criteria Continuous Concentrations, corresponds to chronic ecosystem toxicity in freshwater

*ratio = the number of times the concentration of this analyte exceeds background
Q = Data Qualifier
U = Undetected. Reported value is the detection limit.
J = Reported concentration is an estimate because quality control criteria were not met.
UJ = Reported concentration is an estimate because quality control criteria were not met. Analyte was undetected.
BOLD = Values that exceed SCDM Environmental Benchmark

Value exceeds a Drinking Water Benchmark
Value constitutes an Observed Release
Value exceeds a Drinking Water Benchmark and constitutes an Observed Release.
Constiuents that exceed background by 3 times but pose no health risk

Table 2. Inorganic Data Results for Sediment Collected at the Bully Boy Mil

	Sample #	BB-SD-06		BB-SD-07		
	Traffic #	MH0TA1		MH0TA0		
	Sample Location	Background - From Picnic Area at Miner's		150 feet Upgradient of Bridge		
	Sample Type	Sediment		Sediment		
Cas No.	analyte	mg/kg	Q	mg/kg	Q	ratio
7429-90-5	Aluminum	9320		11100		1.2
7440-36-0	Antimony	1.2		1.1		0.9
7440-38-2	Arsenic	9.4		8.3		0.9
7440-39-3	Barium	59.3		61.6		1.0
7440-41-7	Beryllium	0.64		0.71		1.1
7440-43-9	Cadmium	0.11		0.10		0.9
7440-70-2	Calcium	5010		4740		0.9
7440-47-3	Chromium	14.0		13.8		1.0
7440-48-4	Cobalt	9.2		10.2		1.1
7440-50-8	Copper	18.8		17.5		0.9
7439-89-6	Iron	18200		16800		0.9
7439-92-1	Lead	10.6		12.7		1.2
7439-95-4	Magnesium	7740		9610		1.2
7439-96-5	Manganese	509		554		1.1
7439-97-6	Mercury	0.051	R	0.059	R	
7440-02-0	Nickel	12.5		13.8		1.1
7440-09-7	Potassium	831		904		1.1
7782-49-2	Selenium	0.71		0.66		0.9
7440-22-4	Silver	0.22		0.20		0.9
7440-23-5	Sodium	122		139		1.1
7440-28-0	Thallium	1.9		1.8		0.9
7440-62-2	Vanadium	20.5		19.7		1.0
7440-66-2	Zinc	47.1		55.8		1.2

Note: There are no Superfund Chemical Data Matrix Benchmark values for Sediments.

*ratio = the number of times the concentration of this analyte exceeds background

Q = Data Qualifier

R = Reported value is "rejected". Presence or absence of compound cannot be confirmed.

Table 3 (page 1 of 2). Inorganic Data Results for Soil Collected at the Bully Boy Mill Site.

	Sample #	--	--	BB-SF-09		BB-SF-10			BB-SF-11			BB-SF-12			BB-SF-13		
	Traffic #	--	--	MHOT96		MHOT88			MHOT87			MHOT89			MHOT95		
	Sample Location	Benchmark Values		Background - near Escarpment between Mill and Miner's Park		North End of Mill within Foundation Area			West End of Mill			From Overgrown Berm along Road			Entrance to Miner's Park		
	Depth	--	--	0-6 inches		0-6 inches			0-6 inches			0-6 inches			0-6 inches		
	Sample Type	Non-Cancer	Cancer	Soil		Soil			Soil			Soil			Soil		
Cas No.	analyte	mg/kg	mg/kg	mg/kg	Q	mg/kg	Q	ratio	mg/kg	Q	ratio	mg/kg	Q	ratio	mg/kg	Q	ratio
7429-90-5	Aluminum	--	--	12200		11100		0.9	7780		0.6	4190		0.3	12300		1.0
7440-36-0	Antimony	31	--	2 .1		14 .4		6.9	4 .5		2.1	**221**		105	1 .4		0.7
7440-38-2	Arsenic	23	0.43	**13 .8**		**28 .5**		2.1	**22 .6**		1.6	**109**		7.9	**9 .2**		0.7
7440-39-3	Barium	5,500	--	116		376		3.2	254		2.2	738		6.4	181		1.6
7440-41-7	Beryllium	160		0 .93		0 .89		1.0	0 .84		0.9	1 .2		1.3	1 .0		1.1
7440-43-9	Cadmium	39	--	0 .088		2 .2		25	0 .088		1.0	31 .8		361	0 .084		1.0
7440-70-2	Calcium	--	--	5700		31100		5.5	94800		17	8330		1.5	4240		0.7
7440-47-3	Chromium	230	--	20 .8		14 .3		0.7	9 .6		0.5	3 .6		0.2	15 .6		0.8
7440-48-4	Cobalt	--	--	10 .0		7 .4		0.7	6 .0		0.6	1 .5		0.2	10 .7		1.1
7440-50-8	Copper	--	--	20 .4		111		5.4	33 .3		1.6	474		23	30 .9		1.5
7439-89-6	Iron	--	--	20200		17600		0.9	13600		0.7	11100		0.5	24800		1.2
7439-92-1	Lead	--	--	90 .4		1620		17.9	445		4.9	11300		125	77 .2		0.9
7439-95-4	Magnesium	--	--	8600		6860		0.8	15800		1.8	838		0.1	7520		0.9
7439-96-5	Manganese	11,000	--	663		740		1.1	660		1.0	2020		3.0	734		1.1
7439-97-6	Mercury	23	--	0 .048	R	2 .5	J	18	0 .15	J	1.1	1 .8	J	13	0 .14	J	
7440-02-0	Nickel	27	--	18 .4		11 .6		0.6	9 .5		0.5	2 .6		0.1	14 .4		0.8
7440-09-7	Potassium	--	--	1660		1350		0.8	1370		0.8	1540		0.9	2140		1.3
7782-49-2	Selenium	390	--	1 .0		2 .8		2.8	1 .2		1.2	18 .7		19	0 .88		0.9
7440-22-4	Silver	390	--	0 .86		9 .6		11	2 .1		2.4	51 .3		60	0 .17		0.2
7440-23-5	Sodium	--	--	170		957		5.6	344		2.0	7390		43	256		1.5
7440-28-0	Thallium	--	--	1 .5		1 .4		0.9	1 .5		1.0	1 .5		1.0	1 .5		1.0
7440-62-2	Vanadium	550	--	20 .8		21 .3		1.0	18 .0		0.9	6 .6		0.3	21 .7		1.0
7440-66-2	Zinc	23,000	--	92 .2		680		7.4	175		1.9	6230		68	134		1.5

Soil Benchmarks from the Superfund Chemical Data Matrix, 1/2004

Cancer = Screening Concentration for Cancer Risk due to Oral Exposure

Non-Cancer = Screening for Non-Cancer Toxicological Responses

*ratio = the number of times the concentration of this analyte exceeds background

Q = Data Qualifier

J = Reported concentration is an estimate because quality control criteria were not met.

BOLD = Values that exceed SCDM

R	Reported value is "rejected". Presence or absence of compound cannot be confirmed
	Constiuents that exceed background by 3 times but pose no health risk
	Observed Contamination
	Observed Contamination that exceeded SCDM Benchmark
	Constiuent exceeds SCDM benchmark values but does not meet the criteria for an Observed Release.
	Substitute background value because background value was rejected

Table 3 (page 2 of 2). Inorganic Data Results for Soil Collected at the Bully Boy Mill Site.

	Sample #	--	--	BB-SF-14			BB-SF-15			BB-SF-16			BB-SF-17			BB-SF-18		
	Traffic #	--	--	MHOT90			MHOT91			MHOT92			MHOT93			MHOT94		
	Sample Location	Benchmark Values		From area around Fire Pit on NW End of Tailings			From SE End of Tailings Dam			From Middle of Tailings Pond			From Bare Spot 50' below Tailings Dam			From Bare Spot 150' below Tailings Dam		
	Depth	--	--	0-6 inches			0-6 inches			0-6 inches			0-6 inches			0-6 inches		
	Sample Type	Non-Cancer	Cancer	Soil			Soil			Soil			Soil			Soil		
Cas No.	analyte	mg/kg	mg/kg	mg/kg	Q	ratio	mg/kg	Q	ratio	mg/kg	Q	ratio	mg/kg	Q	ratio	mg/kg	Q	ratio
7429-90-5	Aluminum	--	--	3850		0.3	4350		0.4	3350		0.3	2980		0.2	5440		0.4
7440-36-0	Antimony	31	--	**259**		123	**197**		94	**183**		87	**101**		48	**306**		146
7440-38-2	Arsenic	23	0.43	**111**		8.0	**88 .8**		6.4	**94 .2**		6.8	**42 .6**		3.1	**123**		8.9
7440-39-3	Barium	5,500	--	1020		8.8	757		6.5	515		4.4	422		3.6	1940		17
7440-41-7	Beryllium	160		1 .0		1.1	0 .84		0.9	0 .80		0.9	0 .46		0.5	1 .5		1.6
7440-43-9	Cadmium	39	--	12 .9		147	8 .8		100	6 .3		72	2 .9		33	18 .2		207
7440-70-2	Calcium	--	--	11200		2.0	12900		2.3	16800		2.9	8210		1.4	8880		1.6
7440-47-3	Chromium	230	--	1 .6		0.1	2 .4		0.1	1 .8		0.1	1 .6		0.1	3 .4		0.2
7440-48-4	Cobalt	--	--	1 .0		0.1	1 .1		0.1	0 .45		0.0	0 .81		0.1	2 .5		0.3
7440-50-8	Copper	--	--	461		23	342		17	298		15	170		8.3	570		27.9
7439-89-6	Iron	--	--	8430		0.4	8390		0.4	9490		0.5	4570		0.2	10600		0.5
7439-92-1	Lead	--	--	12700		140	7760		86	7750		86	3780		42	19600		217
7439-95-4	Magnesium	--	--	570		0.1	744		0.1	631		0.1	551		0.1	1260		0.1
7439-96-5	Manganese	11,000	--	1420		2.1	1290		1.9	881		1.3	541		0.8	2880		4.3
7439-97-6	Mercury	23	--	1 .1	J	7.9	0 .44	J	3.1	0 .35	J	2.5	0 .34	J	2.4	2 .0	J	14
7440-02-0	Nickel	27	--	1 .3	U	0.1	1 .5	U	0.1	1 .2	U	0.1	0 .98	U	0.1	2 .7		0.1
7440-09-7	Potassium	--	--	1230		0.7	1500		0.9	1110		0.7	998		0.6	1810		1.1
7782-49-2	Selenium	390	--	20 .5		21	16 .1		16	15 .0		15	8 .2		8.2	23 .5		24
7440-22-4	Silver	390	--	65 .5		76	46 .4		54	49 .5		58	30 .9		36	90 .5		105
7440-23-5	Sodium	--	--	3660		22	3050		18	2380		14	1030		6.1	6700		39
7440-28-0	Thallium	--	--	1 .4		0.9	1 .4		0.9	1 .6		1.1	1 .5		1.0	1 .5		1.0
7440-62-2	Vanadium	550	--	5 .3		0.3	6 .0		0.3	4 .9		0.2	4 .4		0.2	7 .7		0.4
7440-66-2	Zinc	23,000	--	2910		32	2320		25	1800		20	783		8.5	5820		63

Soil Benchmarks from the Superfund Chemical Data Matrix, 1/2004

Cancer = Screening Concentration for Cancer Risk due to Oral Exposure

Non-Cancer = Screening for Non-Cancer Toxicological Responses

*ratio = the number of times the concentration of this analyte exceeds background

Q = Data Qualifier

J = Reported concentration is an estimate because quality control criteria were not met.

BOLD = Values that exceed SCDM

R	Reported value is "rejected". Presence or absence of compound cannot be confirmed
	Constiuents that exceed background by 3 times but pose no health risk
	Observed Contamination
	Observed Contamination that exceeded SCDM Benchmark
	Constiuent exceeds SCDM benchmark values but does not meet the criteria for an Observed Release.
	Substitute background value because background value was rejected

Appendix A

Site Inspection Data Summary

SITE INSPECTION DATA SUMMARY

Site Name: Bully Boy Mill EPA Region: VIII Date: 1/3/2005

State Office or Contractor Name and Address: Utah Division of Environmental Response and Remediation; 168 North 1950 West; Salt Lake City, Utah 84114-4840

GENERAL SITE INFORMATION

1. **CERCLIS ID Number:** UT0009211400

   Address: 2.25 Miles west of "Canyon of Gold" driving tour trailhead
   City: Marysvale

   County: Piute State: UT Zip Code: 84750 Cong. Dist.: UT02

2. **Owner Name:** Crown Mines, Inc

   Owner Address: _____ City: _____ State: UT

   Operator Name: Rell Frederick

   Operator Address: 323 S Bullion Canyon Rd City: Marysvale State: UT

3. **Type of Ownership** (check all that apply):

   ☒ Private ☐ Municipal ☐ County ☐ State

   ☐ Federal/Agency Name: _____ ☐ Other: _____

   References: Jones, 2003

4. **Approximate size of Property:** 5 acres.

   References: Jones, 2003

5. **Latitude:** 38° 26′ 46″
   Longitude: 112° 19′ 37″ References: Jones, 2002

6. **Status:** ☐ Active ☒ Inactive ☐ Unknown

   References: Jones, 2002

7. **Years of Operation:** From: 1922 To: 1938

   References: Jones, 2003

8. **Previous Investigations:**

TYPE	AGENCY/STATE/CONTRACTORS	DATE	REFERENCES
PA	State	4/12/2002	Jones, 2002
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

WASTE SOURCE INFORMATION

1. **Waste source types** (check all that apply):

- ☐ Constituent
- ☐ Landfill
- ☐ Drums
- ☐ Contaminated Soil
- ☐ Land Treatment
- ☐ Other: _____
- ☐ Wastestream (type): _____
- ☐ Tanks or non-drum containers (type):
- ☒ Pile (type):
- ☐ Surface Impoundment (buried)
- ☐ Surface Impoundment (backfilled)

References: Jones, 2003

2. **Types of wastes** (check all that apply):

- ☐ Organic Chemicals
- ☐ Pesticides/Herbicides
- ☐ Radionuclides
- ☐ Inorganic Chemicals
- ☒ Metals
- ☐ Other: _____
- ☐ Municipal Wastes
- ☐ Solvents

References: Jones, 2003

3. **Summarize history of waste disposal operations:** Milling operations from late-1800s and early-1900s. Waste disposed of on-site in a pile.

References: Jones, 2003

4. **Source characterization** (Attach pages to show quantity and calculations):

Source 1 name: Tailings Pile Source Type: Milling Tailings

Describe Source: Tailings pile left from milling operations

Ground water migration containment: none

Surface water migration containment: none

Air migration (gas and migration) containment: none

Physical State of Wastes:
☒ Solid ☐ Liquid ☐ Sludge/Slurry ☐ Gas ☐ Unknown

Constituent Quantity of Hazardous Substances: _____ (specify units).

Wastestream Quantity Containing Hazardous Substances: _____ (specify units).

Volume of Source (yd^3): _____ Area of Source (ft^2): _____

Hazardous substances associated with source 1: Arsenic, Antimony, and Lead

References: Jones, 2003

Source 2 name: Former Tailings Pond Source Type: Mill Tailings

Describe Source: Former tailings pond, some water ponds here during spring runoff but generally tailings type materials

Ground water migration containment: none

Surface water migration containment: some of dam is still intact

Air migration (gas and migration) containment: none

Physical State of Wastes:
☒ Solid ☐ Liquid ☐ Sludge/Slurry ☐ Gas ☐ Unknown

Constituent Quantity of Hazardous Substances: _____ (specify units).

Wastestream Quantity Containing Hazardous Substances: _____ (specify units).

Volume of Source (yd^3): _____ Area of Source (ft^2): _____

Hazardous substances associated with source 1: Arsenic, Antimony, and Lead

References: Jones, 2003

Source 3 name: _____ Source Type: _____

Describe Source: _____

Ground water migration containment: _____

Surface water migration containment: _____

Air migration (gas and migration) containment: _____

Physical State of Wastes:
☐ Solid ☐ Liquid ☐ Sludge/Slurry ☐ Gas ☐ Unknown

Constituent Quantity of Hazardous Substances: _____ (specify units).

Wastestream Quantity Containing Hazardous Substances: _____ (specify units).

Volume of Source (yd^3): _____ Area of Source (ft^2): _____

Hazardous substances associated with source 1: _____

References: _____

5. **Description of removal or remedial activities:**
If Removal has occurred, identify the removal authority and describe the activities. Specify the date(s) of the removal.

none known

References: _____

GROUND WATER INFORMATION

1. Ground water drinking water use within 4 miles of site sources:

☐ Municipal ☐ Private ☐ Both ☒ No Drinking Water Use

References: Jones, 2003

2. Is ground water contaminated?

☐ Yes ☐ No ☒ Uncertain but likely ☐ Uncertain but not likely

☐ Additional sampling required

Is analytical evidence available? ☐ Yes ☒ No

References: Jones, 2003

3. Is ground water contamination attributable to the site?

☐ Yes ☐ No ☒ Additional sampling required

References: Jones, 2003

4. Are drinking water wells contaminated?

☐ Yes ☒ No ☐ Uncertain but likely ☐ Uncertain but not likely

☐ Additional sampling required

Is analytical evidence available? ☐ Yes ☐ No

References: Jones, 2003

5. Net precipitation (HRS Section 3.1.2.2): 8.45 inches.

6. County average number of persons per residence: __ people.

References: _____

7. Discuss general stratigraphy underlying the site. Attach sketch of stratigraphic column.

Thin layer of alluvium underlain by bedrock

Reference: _____

8. **Using Table GW-1, summarize geology underlying the site (starting with formation #1 closest to ground surface). Indicate if formation is interconnected with overlying formation.**

TABLE GW-1: SITE GEOLOGY

NAME OF FORMATION	INTERCONNECT (YES/NO)	TYPE OF MATERIAL	AVERAGE THICKNESS (FEET)	HYDRAULIC CONDUCTIVITY (cm/sec)	USED FOR DRINKING WATER?
Alluvium	No	Alluvium	0-20		no
bedrock	No	limestone/sandstone			yes

References: _____

9. **Does a karst aquifer underlie any site source?**

☐ Yes ☒ No References: Jones, 2003

10. **Depth to top of aquifer:** _____ feet Elevation: _____ feet

References: _____

11. **In the table below, enter the number of people obtaining drinking water from wells located within 4 miles of the site.** For each aquifer, attach population calculation sheets. Key aquifer to formations listed in Table GW-1.

POPULATION SERVED BY WELLS WITHIN DISTANCE CATEGORIES BY AQUIFER

DISTANCE OF WELL(S) FROM SITE SOURCES	AQUIFER A: INCLUDES FORMATIONS bedrock	AQUIFER B: INCLUDES FORMATIONS _____	AQUIFER C: INCLUDES FORMATIONS _____
¼-mile or less	0		
>¼ to ½ mile	0		
>½ to 1 mile	0		
>1 to 2 miles	400		
>2 to 3 miles	0		
>3 to 4 miles	0		

References: Jones, 2002

12. **Is ground water from multiple wells blended prior to distribution?**

☐ Yes ☒ No References: Jones, 2003

13. **Is ground water blended with surface water?**

☐ Yes ☒ No References: Jones, 2003

14. **Distance from any incompletely contained source available to ground water to nearest drinking water well** (HRS Section 3.3.1):

11,000 feet References: Jones, 2002

15. **Briefly describe standby drinking water wells within 4 miles of sources at the site:**

none

References: _____

16. **Ground water resources within 4 miles of site sources** (HRS Section 3.3.3):

☐ Irrigation (5-acre minimum) of commercial food or commercial forage crops.

☐ Commercial livestock watering.

☐ Ingredient in commercial food preparation.

☐ Supply for commercial aquaculture.

☐ Supply for major or designated water recreation area, excluding drinking water use.

☐ Water usable for drinking water but no drinking water wells are within 4 miles.

☒ None of the above.

References: Jones, 2002

17. **Wellhead protection area (WHPA) within 4 miles of site sources** (HRS Section 3.3.4):

☐ Source with non-zero containment factor value lies within or above the WHPA.

☐ Observed ground water contamination attributable to site source(s) lies within the WHPA.

☐ WHPA lies within 4 miles of site sources.

☒ None

References: Jones, 2002

Additional ground water pathway description: Marysvale uses a Spring located 1.8 miles away to supply drinking water to 400 people. This spring is on the other side of the stream and flows from bedrock. It is unlikely that site contamination would reach this spring.

References: Jones, 2002

SURFACE WATER INFORMATION

COMPLETE A COPY OF THIS SECTION OF THE DATA SUMMARY FOR EACH WATERSHED

1. **Describe the surface water migration path from site sources to at least 15 miles downstream.** Attach a sketch of the surface water migration route.

The Bully Boy Mill site is located along Pine Creek. The former tailings pond is also in contact with Pine Creek. Pine Creek is a perennial stream that begins in the Tushar Mountains west of the site and flows east into the Sevier River. The Sevier River is a perennial stream that originates in the Markagunt and Paunsaugunt Plateaus to the south and terminates in the Sevier Lake, west of Delta, Utah.

References: Jones, 2002

2. **Is Surface Water Contaminated?**

☐ Yes ☐ No ☒ Uncertain but likely ☐ Uncertain but not likely

☒ Additional sampling is required

Is analytical evidence available? ☒ Yes ☐ No

References: Jones, 2004

3. **Is surface water contamination attributable to the site?**

☒ Yes ☐ No ☐ Additional sampling required

References: Jones, 2004

4. **Floodplain category in which site sources are located** (check all that apply):

☒ 1-year ☐ 10-year ☐ 100-year ☐ 500-year ☐ None

References: Jones, 2002

5. **Describe flood containment for each source** (HRS Section 4.1.2.1.2.2):

Source #1 tailings pile Flood Containment none

Source #2 tailings pond Flood Containment none

References: Jones, 2002

6. **Shortest overland distance to surface water from any source** (HRS Section 4.1.2.1.2.1.3):

0 feet References: Jones, 2002

7. **Size of drainage area** (HRS Section 4.4.3):

5 acres References: GIS, 2004

8. **Describe the predominant soil group within the drainage area** (HRS Section 4.1.2.1.2.1.2):

tailings

References: Jones, 2002

9. **2-year 24-hour Rainfall** (HRS Section 4.1.2.1.2.1.2): 1.5 inches

Reference: Brough et al., 1987

10. **Elevation of the bottom of nearest surface water body:** 7800 feet above sea level

References: Jones, 2002

11. **Elevation of top of uppermost aquifer:** 7800 feet above sea level

References: Jones, 2002

12. **Predominant type of water body between probable point of entry to surface water and nearest drinking water intake:**

☒ River ☐ Lake References: Jones, 2002

13. **Identify all drinking water intakes, fisheries, and sensitive environments within 15 miles downstream.**

TARGET NAME/TYPE	WATER BODY TYPE	DISTANCE FROM PPE	FLOW (CFS)	TARGET CHARACTERISTICS	TARGET SAMPLED?
Pine Creek	Stream	0	10	1 family drinking water, at cabin	yes

* If target is a drinking water intake, provide number of people served by intake. If target is a fishery, provide species and annual production of human food chain organisms (pounds per year). If target is a wetland, specify wetland frontage (in miles). Attach calculation pages.

References: Jones, 2002

14. **Is surface water drinking water blended prior to distribution?**

☐ Yes ☒ No References: Jones, 2002

15. **Describe any standby drinking water intakes within 15 miles downstream:**

none

References: Jones, 2002

16. **Surface water resources within 15 miles downstream** (HRS Section 4.1.2.3.3):

- ☐ Irrigation (5 acres minimum) of commercial food or commercial forage crops
- ☐ Commercial livestock watering
- ☐ Ingredient in commercial food preparation
- ☒ Major or designated water recreation area, excluding drinking water use
- ☒ Water designated by the state for drinking water use but is not currently used
- ☒ Water usable for drinking water but no drinking water intakes within 15 miles downstream
- ☐ None of the above

References: Jones, 2002

SOIL EVALUATION

1. **Is surficial or soil contamination present at the site?**

   ☒ Yes ☐ No ☐ Uncertain but likely ☐ Uncertain but not likely

   ☐ Additional sampling is required

   Is analytical evidence available? ☒ Yes ☐ No

   References: Jones, 2004

2. **Is surficial or soil contamination attributable to the site?**

   ☒ Yes ☐ No ☐ Additional Sampling Required

3. **Is surficial contamination on the property and within 200 feet of a residence, school, daycare center, or workplace?**

   ☒ Yes ☒ No ☐ Uncertain but likely ☐ Uncertain but not likely

   ☐ Additional sampling is required

   Is analytical evidence available? ☒ Yes ☐ No

   References: Jones, 2004

4. **Total area of surficial contamination** (HRS Section 5.2.1.2):

   36000 square feet References: GIS, 2004

5. **Attractiveness/accessibility of the areas of observed contamination** (HRS Section 5.2.1.1). Check all that apply:

   ☒ Designated recreational area

   ☒ Used regularly, or accessible and unique recreational area

   ☐ Moderately accessible with some use

   ☐ Slightly accessible with some use

   ☐ Accessible with no use

   ☐ Inaccessible with some use

   ☐ Inaccessible with no use References: Jones, 2003

6. Population within 1-mile travel distance from site.

DISTANCE FROM SITE SOURCES	POPULATION
¼ mile or less	0
¼ to ½ mile	0
½ to 1 mile	0

References: Jones, 2002

AIR INFORMATION

1. **Is air contamination present at the site?**

   ☐ Yes ☐ No ☒ Uncertain but likely ☐ Uncertain but not likely

   ☒ Additional sampling is required

   Is analytical evidence available? ☐ Yes ☒ No

   References: Jones, 2004

2. **Is air contamination attributable to the site?**

   ☐ Yes ☐ No ☒ Additional sampling required

3. **Are populations, sensitive environments, or wetlands exposed to airborne hazardous substances released from the site?**

   ☐ Yes ☐ No ☐ Uncertain but likely ☒ Uncertain but not likely

   ☐ Additional sampling is required

   Is analytical evidence available? ☐ Yes ☒ No

   References: Jones, 2004

4. **Evidence of biogas release from any of the following source types at the site:**

   ☐ Below-ground containers or tanks ☐ Landfill

   ☐ Buried surface impoundment

   References: _____

5. **Particulate migration potential factor value:** _____ (HRS Figure 6-2)

6. **Particulate mobility factor value:** _____ (HRS Figure 6-3)

7. **Distance from any incompletely contained source to nearest residence or regularly occupied area:**

   _____ miles References:

8. Population within 4 miles of site sources.

DISTANCE FROM SITE SOURCES	POPULATION
0 (within sources)	0
¼ mile or less	0
>¼ to 2 mile	0
>½ to 1 mile	0
>1 to 2 miles	1
>2 to 3 miles	8
>3 to 4 miles	17

References: Jones, 2002

9. Resources within 2 mile of site sources (HRS Section 6.3.3):

☐ Commercial agriculture

☐ Commercial silviculture

☒ Major or designated recreation area

☐ None of the above

References: Jones, 2002

10. Sensitive environments and wetlands within 4 miles of the site:

NAME/DESCRIPTION/ LOCATION OF SENSITIVE ENVIRONMENT OR WETLAND	DISTANCE FROM SITE (MILES)	TYPE OF SENSITIVE ENVIRONMENT	WETLAND SIZE (ACRES)
Pine Creek	0	wetlands	?

References: Jones, 2002

LIST OF REFERENCES

Brough, R.C., D.L. Jones, and D.J. Stevens; 1987; Utah's Comprehensive Weather Almanac; Publishers Press; Salt Lake City.

GIS (Global Information System); 2004; Analysis conducted using ArcGIS; UDEQ/DERR; April 1.

Jones, Alan V.; 2002; Preliminary Assessment for Bully Boy Mill, CERCLIS ID# UT0009114384; Utah Department of Environmental Quality, Division of Environmental Response and Remediation; Salt Lake City, Utah.

Jones, Alan V.; 2003; Site Inspection Work Plan for Bully Boy Mill, CERCLIS ID# UT0009114384; Utah Department of Environmental Quality, Division of Environmental Response and Remediation; Salt Lake City, Utah.

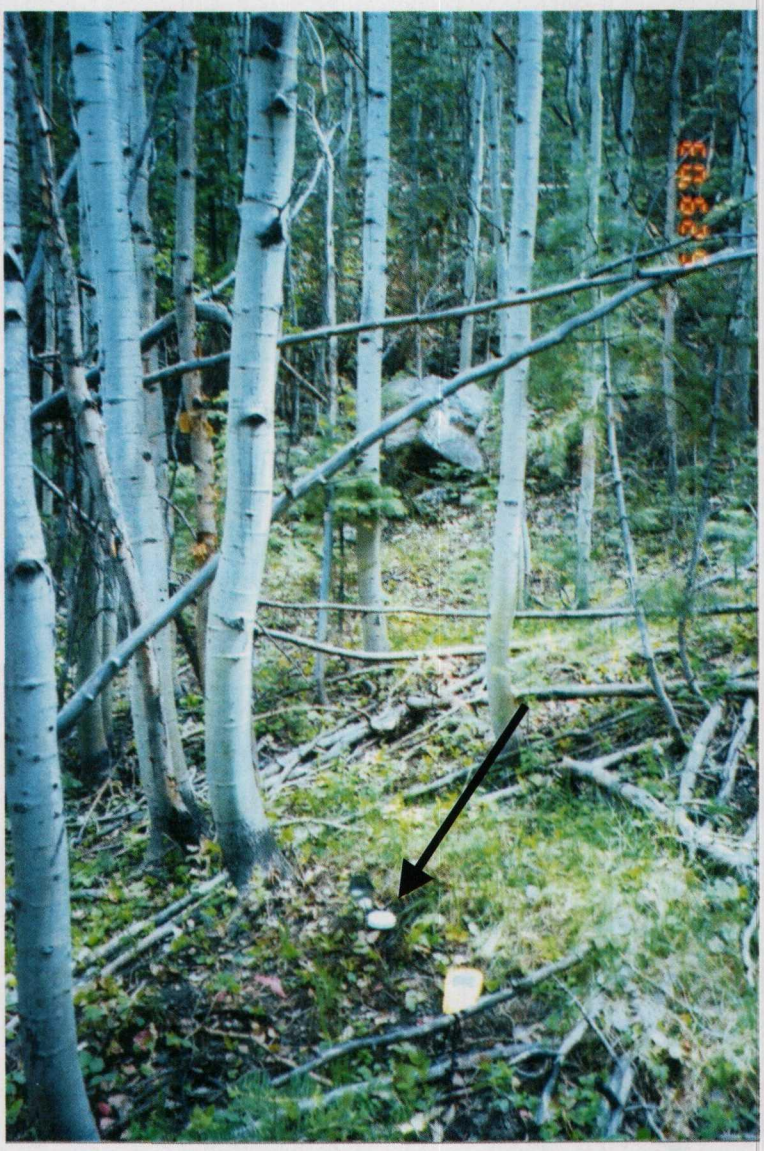
Jones, Alan V.; 2004; Site Inspection Analytical Results Report for Bully Boy Mill, CERCLIS ID# UT0009114384; Utah Department of Environmental Quality, Division of Environmental Response and Remediation; Salt Lake City, Utah.

Appendix B

Log of Photographs

Location: Bully Boy Mill View: South Date: 5/29/2003
The Bully Boy Mill.

Location: Bully Boy Mill View: South Date: 5/29/2003
The Iris Ore Chute near the Bully Boy Mill..



Location: Bully Boy Mill View: South Date: 5/29/2003
Location of Sample BB-SF-09.

Location: Bully Boy Mill View: South Date: 5/29/2003
Sample BB-SF-09.

Location: Bully Boy Mill View: South Date: 5/29/2003
Location of Sample BB-SF-10.

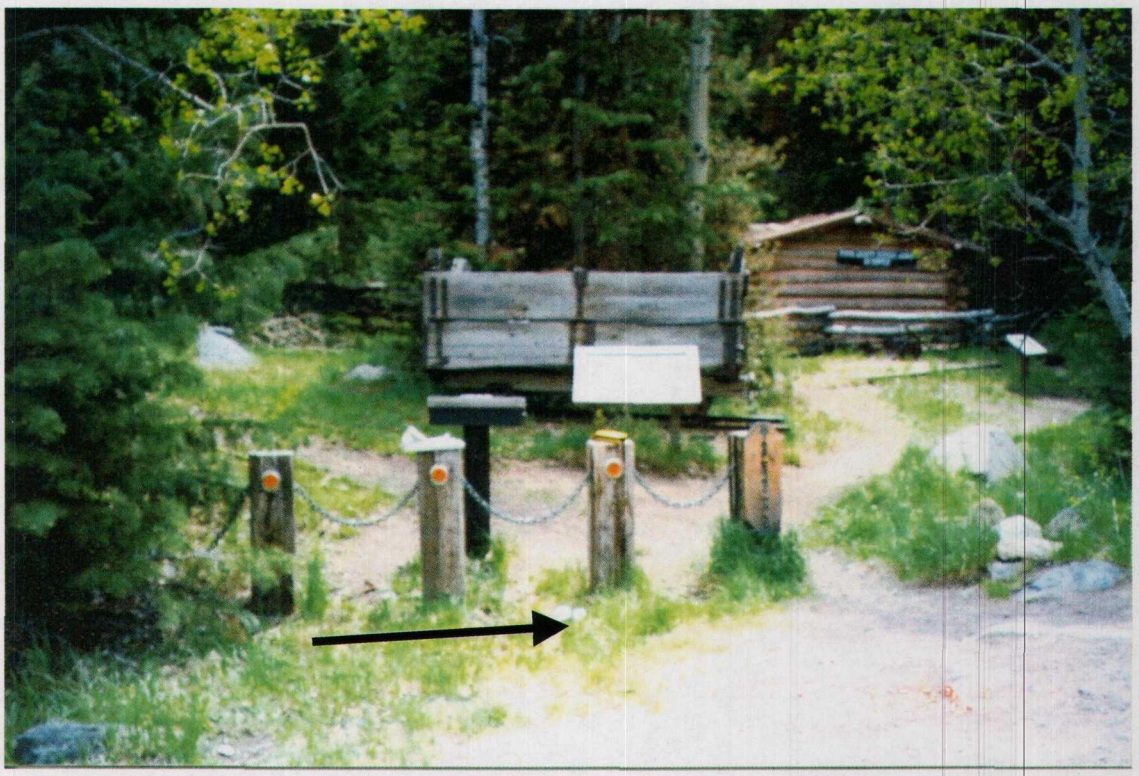
Location: Bully Boy Mill View: South Date: 5/29/2003
Sample BB-SF-10.

Location: Bully Boy Mill View: East Date: 5/29/2003
Location of Sample BB-SF-11.

Location: Bully Boy Mill View: East Date: 5/29/2003
Sample BB-SF-11.

Location: Bully Boy Mill View: Northwest Date: 5/29/2003
Location of Sample BB-SF-12.

Location: Bully Boy Mill View: Northwest Date: 5/29/2003
Sample BB-SF-12.



Location: Bully Boy Mill View: Southwest Date: 5/29/2003
Location of Sample BB-SF-13.

Location: Bully Boy Mill View: Southwest Date: 5/29/2003
Sample BB-SF-13.

Location: Bully Boy Mill View: North Date: 5/30/2003
Location of Sample BB-SF-14.

Location: Bully Boy Mill View: Southeast Date: 5/29/2003
Sample BB-SF-14.

Location: Bully Boy Mill View: West Date: 5/30/2003
Location of Sample BB-SF-15.

Location: Bully Boy Mill View: Northwest Date: 5/29/2003
Sample BB-SF-15.

Location: Bully Boy Mill View: South Date: 5/30/2003
Location of Sample BB-SF-16.

Location: Bully Boy Mill View: West Date: 5/29/2003
Sample BB-SF-16.

Location: Bully Boy Mill View: West Date: 5/30/2003
Location of Sample BB-SF-17.

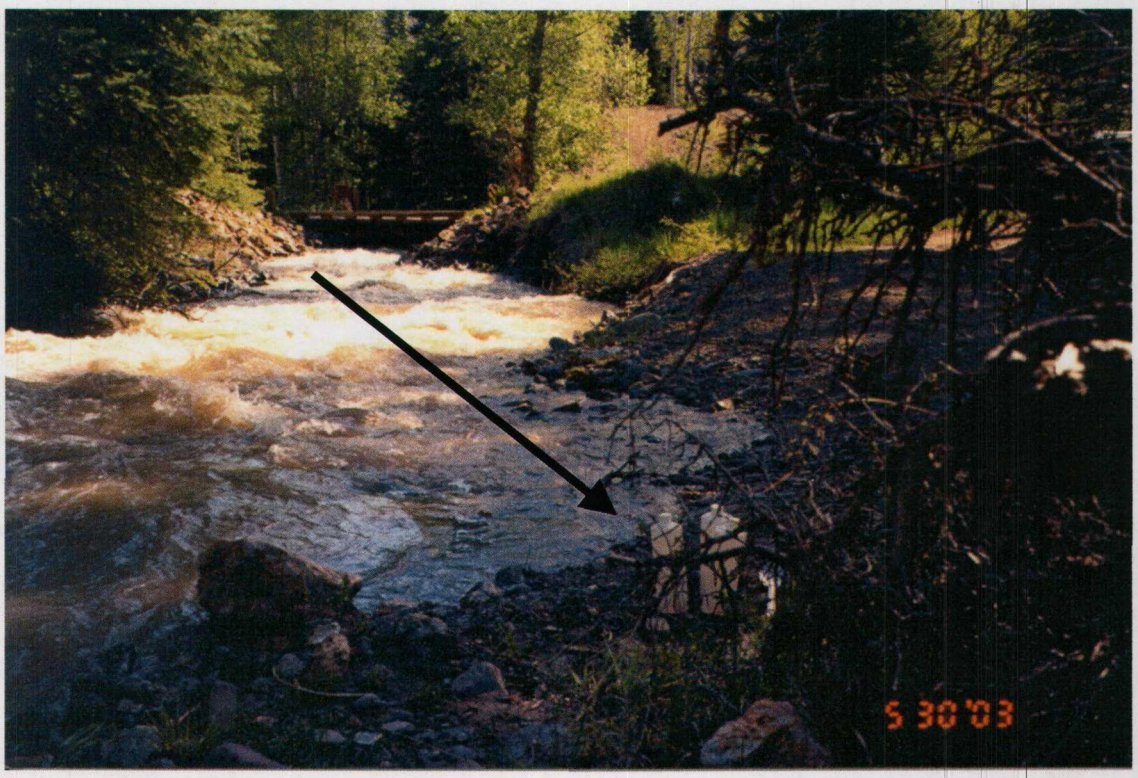
Location: Bully Boy Mill View: West Date: 5/29/2003
Sample BB-SF-17.

Location: Bully Boy Mill View: West Date: 5/30/2003
Location of Sample BB-SF-18.

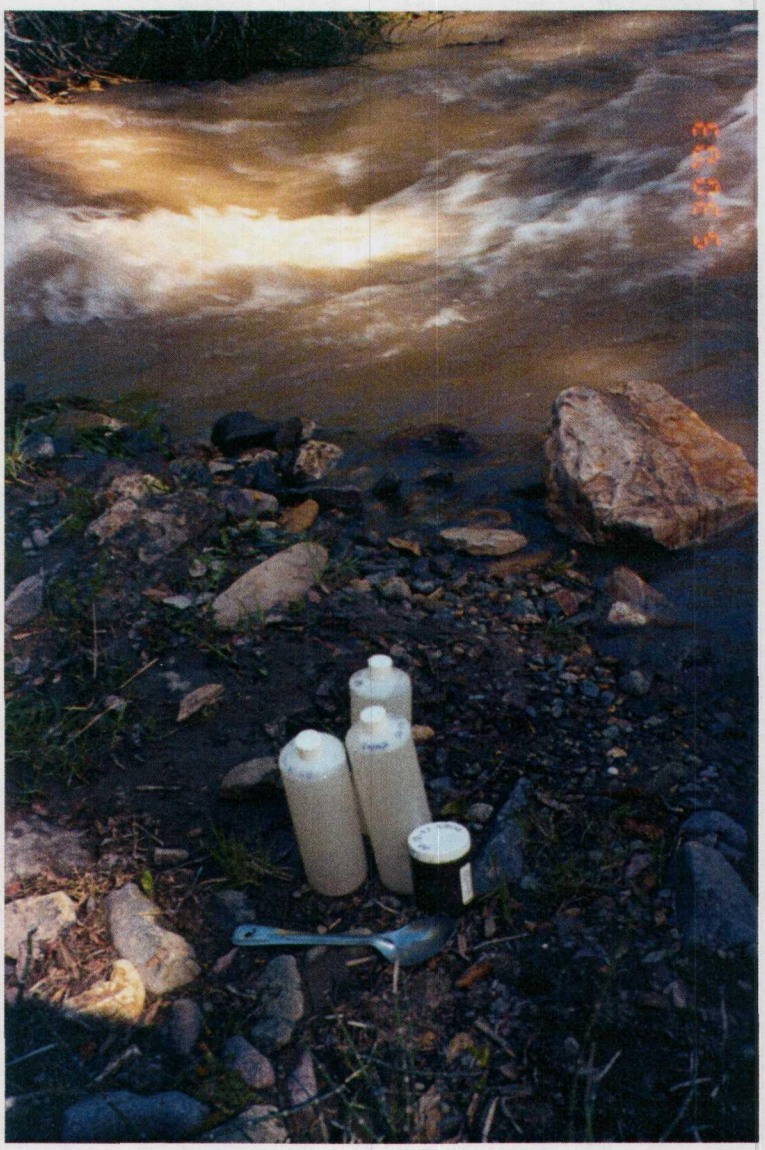
Location: Bully Boy Mill View: West Date: 5/29/2003
Sample BB-SF-18.

Location: Bully Boy Mill View: North Date: 5/30/2003
Location of Samples BB-SW-01 and BB-SD-06.

Location: Bully Boy Mill View: West Date: 5/30/2003
Samples BB-SW-01 and BB-SD-06.



Location: Bully Boy Mill View: North Date: 5/30/2003
Location of Samples BB-SW-02, BB-SW-03, and BB-SD-07.



Location: Bully Boy Mill View: East Date: 5/30/2003
Samples BB-SW-02, BB-SW-03, and BB-SD-07.

Location: Bully Boy Mill View: North Date: 5/30/2003
Location of Sample BB-SW-04.

Location: Bully Boy Mill View: West Date: 5/30/2003
Sample BB-SW-04.

Appendix C

Field Activities Summary

This site was sampled within conjunction with the Dalton Mill site due to their proximity and similarity.

Wednesday, May 28, 2003

A tour of the sites in the Marysvale was conducted by the field crew for the benefit of management personnel from UDEQ and EPA.

Field Summary for Thursday, May 29, 2003

The field crew (Alan V. Jones and Al M. Jones) left the motel in Richfield, Utah, and drove to Marysvale. After holding a safety meeting, the field crew stopped at the home of Rell Frederick. Mr. Frederick has lived in the area for most of his life and is a representative of Crown Mines. Crown Mines owns most of the mining claims in Bullion Canyon. A field reconnaissance and tour of the sites was made in preparation for the sampling with Mr. Frederick providing additional information about the sites.

After Mr. Frederick retumed to his home, the field crew had lunch and then returned to collect the soil samples from both sites. The GPS unit and laptop computer were set up. Forms II Lite was run on the laptop computer to document sample collection. Samples were collected as specified in the Work Plans. The soil samples from the Bully Boy Mill were collected first and then the Dalton Mill soil samples were collected. In the late aftemoon, the field crew left the field and headed to the motel in Richfield.

Field Summary for Friday, May 30, 2003

The field crew retumed to the site. The GPS unit and laptop computer were again set up. Pine Creek was flowing at near maximum runoff. Surface water and sediment samples were collected as specified in the Work Plans. The samples from the Dalton Mill were collected first because it is further downstream. The downgradient samples were collected first and sampling proceeded upgradient, concluding at the Bully Boy Mill site. The mid-site samples at the Dalton Mill (DM-SW-02 and DM-SSD-07) were not collected because the stream could not be safely accessed. An opportunity sample was collected from standing water in an area that Rell Frederick identified as a tailing pond at the Bully Boy Mill.

By the late moming, the sampling was complete so the field crew retumed to the office. Upon getting to the office, the samples were packed in ice and secured for the weekend.

Field Summary for Monday, June 2, 2003

The field crew repacked the samples with ice and sealed up the shipping containers. The samples were taken to the FedEx office at the Salt Lake City Airport and shipped to the laboratory.

Appendix D

Sample Documentation

USEPA Contract Laboratory Program
Inorganic Traffic Report & Chain of Custody Record

Case No: 31756
DAS No:
R

Region:	8	Date Shipped:	6/2/03	Chain of Custody Record	Sampler Signature:
Project Code:		Carrier Name:	FedEx		
Account Code:		Airbill:	829161974712		
CERCLIS ID:	UT0009114384	Shipped to:	Liberty Analytical 501 Madison Avenue Cary NC 27513 (919) 379-4080		
Spill ID:					
Site Name/State:	Sully Boy Mill/UT				
Project Leader:	Alan V. Jones				
Action:	Soreening Site Inspection				
Sampling Co:	State of Utah				

Relinquished By	(Date / Time)	Received By	(Date / Time)
1			
2			
3			
4			

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE	STATION LOCATION	SAMPLE COLLECT DATE/TIME	ORGANIC CAMPLE No.	QC Type
MH0T87	Surface Soil (0"-12")/ Al M. Jones	L/G	TM (14)	8221025 (Not preserved) (1)	BB-SF-11	S: 5/29/03 13:23		--
MH0T88	Surface Soil (0"-12")/ Al M. Jones	L/G	TM (14)	8221026 (Not preserved) (1)	BB-SF-10	S: 5/29/03 13:36		--
MH0T89	Surface Soil (0"-12")/ Al M. Jones	L/G	TM (14)	8221027 (Not preserved) (1)	BB-SF-12	S: 5/29/03 13:46		--
MH0T03	Surface Soil (0"-12")/ Al M. Jones	L/G	TM (14)	8221028 (Not preserved) (1)	SB-SF-14	S: 5/29/03 14:03		--
MH0T91	Surface Soil (0"-12")/ Al M. Jones	L/G	TM (14)	8221029 (1)	BB-SF-15	S: 5/29/03 14:11		--
MH0T92	Surface Soil (0"-12")/ Al M. Jones	L/G	TM (14)	8221030 (1)	BB-SF-16	S: 5/29/03 14:19		--
MH0T93	Surface Soil (0"-12")/ Al M. Jones	L/G	TM (14)	8221031 (1)	BB-SF-17	S: 5/29/03 14:33		--
MH0T94	Surface Soil (0"-12")/ Al M. Jones	L/G	TM (14)	8221032 (1)	BB-SF-18	S: 5/29/03 14:39		--
MH0T95	Surface Soil (0"-12")/ Al M. Jones	L/G	TM (14)	8221033 (1)	BB-SF-13	S: 5/29/03 14:54		--
MH0T96	Surface Soil (0"-12")/ Al M. Jones	L/G	TM (14)	8221034 (1)	BB-SF-09	S: 5/29/03 15:05		--

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
	MH0T89, MH0T97		
Analysis Key:	Concentration: L = Low, M = Low/Modium, H = Hig	Type/Designate: Composite = G, Grab = G	Shipment Iced? _____
TM = OLP TAL Total Metals			

TR 8-491421170-060203-0001

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Contract Laboratory Analytical Services Support, 2000 Edmund Halley Dr., Reston, VA. 20191-3436 Phone 703/264-9348 Fax 703/264-9222

USEPA Contract Laboratory Program
Inorganic Traffic Report & Chain of Custody Record

Case No: 81756
DAS No:
R

Region:	8	Date Shipped:	6/2/03	**Chain of Custody Record**	Sampler Signature:
Project Code:		Carrier Name:	FedEx	Relinquished By (Date / Time)	Received By (Date / Time)
Account Code:		Airbill:	829161974712	1	
CERCLIS ID:	UT0009114384	Shipped to:	Liberty Analytical 501 Madison Avenue Cary NC 27513 (919) 379-4080	2	
Spill ID:				3	
Site Name/State:	Bully Boy Mill/UT			4	
Project Leader:	Alan V. Jones				
Action:	Screening Site Inspection				
Sampling Co:	State of Utah				

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE	STATION LOCATION	SAMPLE COLLECT DATE/TIME	ORGANIC SAMPLE No.	QC Type
MH0T97	Surface Water/ Al M. Jones	L/G	TM (14)	S221035 (HNO3), S221036 (HNO3) (2)	BS-SW-02	S: 5/30/03 9:57		--
MH0T98	Surface Water/ Al M. Jones	L/G	TM (14)	S221037 (HNO3) (1)	BS-SW-03	S: 5/30/03 10:12		Field Duplicate
MH0T99	Surface Water/ Alan V. Jones	L/G	TM (14)	S221038 (1)	BB-SW-04	S: 5/30/03 10:17		--
MH0TA0	Sediment/ Al M. Jones	L/G	TM (14)	S221039 (1)	BB-SD-07	S: 5/30/03 10:00		--
MH0TA1	Sediment/ Al M. Jones	L/G	TM (14)	S221040 (1)	BB-SD-06	S: 5/30/03 10:30		--
MH0TA2	Surface Water	L/G	TM (14)	S221041 (1)	BB-SW-01			--

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC: MH0T89, MH0T97	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = Hig	Type/Designate: Composite = C, Grab = G	Shipment Iced? _____
TM = OLP TAL Total Metals			

TR 8-491421170-060203-0001

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Contract Laboratory Analytical Services Support, 2000 Edmund Halley Dr., Reston, VA. 20191-3436 Phone 703/264-9348 Fax 703/264-9222

FedEx Express **USA Airbill**

FedEx Tracking Number **8291 6197 4712**

0215 — Sender's Copy

Please print and press hard.

2 JUNE 03 — Sender's FedEx Account Number 1328-8775-7

Sender's Name ALAN V JONES — Phone (801) 536-4100

Company DEPT OF ENVIRONMENTAL QUALITY

Address 168 N 1950 W — Dept./Floor/Suite/Room

City SALT LAKE CITY — State UT — ZIP 84116

Internal Billing Reference (First 24 characters will appear on invoice.) 100/480/4690/NRC/KA13/M122P

Recipient's Name Alice Evans — Phone 919 379 4100

Company Liberty Analytical

Address 501 Madison Avenue — Use only at FedEx location, print FedEx address. We cannot deliver to P.O. boxes or P.O. ZIP codes.

Dept./Floor/Suite/Room

City Cary — State NC — ZIP 27513

Peel and Stick FedEx USA Airbill

See back for application instructions.

Questions? Visit our Web site at fedex.com

or call 1-800-Go-FedEx® (800)463-3339.

By using this Airbill you agree to the service conditions on the back of this Airbill and in our current Service Guide, including terms that limit our liability.

0183648659

4a Express Package Service

Packages up to 150 lbs. Delivery commitment may be later in some areas.

- [X] FedEx Priority Overnight — Next business morning
- [ ] FedEx Standard Overnight — Next business afternoon
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations
- [ ] FedEx 2Day — Second business day
- [ ] FedEx Express Saver — Third business day
- [ ] NEW FedEx Extra Hours — Later drop-off with next business afternoon delivery for select locations

FedEx Envelope rate not available. Minimum charge: One-pound rate

4b Express Freight Service

Packages over 150 lbs. Delivery commitment may be later in some areas.

- [ ] FedEx 1Day Freight* — Next business day
- [ ] FedEx 2Day Freight — Second business day
- [ ] FedEx 3Day Freight — Third business day

* Call for Confirmation: _____

5 Packaging

* Declared value limit $500

- [ ] FedEx Envelope*
- [ ] FedEx Pak* — Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak
- [ ] Other Pkg. — Includes FedEx Box, FedEx Tube, and customer pkg.

6 Special Handling

Include FedEx address in Section 3.

- [ ] SATURDAY Delivery — RESTRICTIONS: Available only for FedEx Priority Overnight and FedEx 2Day to select ZIP codes
- [ ] SUNDAY Delivery — RESTRICTIONS: Available only for FedEx Priority Overnight to select ZIP codes
- [ ] HOLD Weekday at FedEx Location — RESTRICTIONS: Not available with FedEx First Overnight
- [ ] HOLD Saturday at FedEx Location — RESTRICTIONS: Available only for FedEx Priority Overnight and FedEx 2Day to select locations

Does this shipment contain dangerous goods? One box must be checked.

- [ ] No
- [ ] Yes — As per attached Shipper's Declaration
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
- [ ] Cargo Aircraft Only

Dangerous Goods (incl. Dry Ice) cannot be shipped in FedEx packaging or with FedEx Extra Hours service.

7 Payment Bill to:

Enter FedEx Acct. No. or Credit Card No. below.

- [X] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

FedEx Acct. No. / Credit Card No. _____ Exp. Date _____

Total Packages	Total Weight	Total Declared Value†
		$ .00

†Our liability is limited to $100 unless you declare a higher value. See back for details.

FedEx Use Only

8 Release Signature

Sign to authorize delivery without obtaining signature.

By signing you authorize us to deliver this shipment without obtaining a signature and agree to indemnify and hold us harmless from any resulting claims.

406

SRP•Rev. Date 1ZA0•Part #155918$•©1994–2000 FedEx•PRINTED IN U.S.A.

Region 8 Laboratory Assignment Notification
Shipweek 05/26/03

Case # 31756

Site: BULLY BOY MILL

Sampler: Alan V. Jones, Utah Dept of Environmental Quality (Div Emerg Respon

Program	Lab Address
ILM04.1	LIBERTY ANALYTICAL (LIBRTY) 501 Madison Avenue Cary, NC 27513 (919) 379- 4100 Contact: Alice Evans

Samples Scheduled:	Turnaround Time
17 Soil TM	14
6 Water TM	14

Key

Ag - Silver	BNA - Semivoaltiles	Cu - Copper	Na - Sodium	Se - Selenium
Al - Aluminum	Ca - Calcium	Fe - Iron	Ni - Nickel	Tl - Thallium
Sb - Antimony	Cd - Cadmium	Hg - Mercury	Pb - Lead	V - Vanadium
As - Arsenic	CN - Cyanide	K - Potassium	PEST - Pesticides	VOA - Volatiles
Ba - Barium	Co - Cobalt	Mg - Magnesium	PR - Preliminary Results	Zn - Zinc
Be - Beryllium	Cr - Chromium	Mn - Manganese		

ICP Metals - TAL Metals without Mercury (Hg)
Filtered - Samples have been filtered in the field

ILM04.1 Analyses

TM - Total Metals
DM - Dissolved Metals
CN - Cyanide

Dalton
31773

Appendix E

Data Validation Summary and CLP Data Sheets

URS OPERATING SERVICES

1099 18TH STREET
SUITE 710
DENVER, COLORADO 80202-1908
TEL: (303) 296-3523
FAX: (303) 291-8296

October 1, 2003

Mr. Luke Chavez
Site Assessment Manager
U.S. Environmental Protection Agency, Region VIII
999 18th Street, Suite 500, Mail Code: 8EPR-ER
Denver, Colorado 80202-2405

SUBJECT: START2, EPA Region VIII, Contract No. 68-W-00-118, TDD No. 0307-0009, Data Validation Reports for Bully Boy Mill, Utah

Dear Luke:

Attached are copies of the Data Validation Reports for the Bully Boy Mill site in Utah. The reports are for Case Number 31756 with Sample Delivery Groups (SDG) MH0T87 and MH0T97. The data validation was performed by our subcontractor, TechLaw, Inc. Copies of the Data Validation Reports were also forwarded to Steven Thiriot with the State of Utah Department of Environmental Quality.

If you have any questions, please call me at 303-291-8209.

Very truly yours,

URS OPERATING SERVICES, INC.

Kenton J. Alexander
Senior Chemist

cc: T. F. Staible/UOS w/o attachments
Steven Thiriot State of Utah DEQ
File/UOS

REGION VIII
DATA VALIDATION REPORT
INORGANIC

TDD No. / Case No.	Site Name		Operable Unit
0307-0009 / 31756	Bully Boy Mill		
RPM/OSC Name			
Luke Chavez			
Contractor Laboratory	**Contract No.**	**SDG No.**	**Laboratory DPO/Region**
CompuChem-Liberty	68W00082	MH0T97	

Review Assigned Date July 23, 2003 Data Validator Bill Pear
Review Completion Date August 1, 2003 Report Reviewer Amy Ballow

Sample Number	Station Location	Matrix	Analysis
MH0T97	BB-SW-02	Water	CLP - Metals and Mercury
MH0T98	BB-SW-03		
MH0T99	BB-SW-04		
MH0TA2	BB-SW-01		

DATA QUALITY STATEMENT

( ) Data are ACCEPTABLE according to EPA Functional guidelines with no qualifiers (flags) added by the reviewer.
( ) Data are UNACCEPTABLE according to EPA Functional Guidelines.
(X) Data are acceptable with QUALIFICATIONS noted in review.

Telephone/Communication Logs Enclosed? Yes ____ No ___X__

TPO Attention Required? Yes_____ No__X__ If yes, list the items that require attention:

INORGANIC DATA VALIDATION REPORT

REVIEW NARRATIVE SUMMARY

This data package was reviewed according to "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," February 1994.

Raw data were reviewed for completeness and transcription accuracy onto the summary forms. Approximately 10-20% of the results reported in each of the samples, calibrations, and QC analyses were recalculated and verified. If problems were identified during the recalculation of results, a more thorough calculation check was performed.

SDG No. MH0T97, Case No. 31756 consisted of four water samples for metals including mercury analyses by CLP ILM04.1.

The following table lists the data qualifiers added to the sample analyses. Please see Data Qualifier Definitions, attached to the end of this report.

Sample ID	Elements	Qualifiers	Reason for Qualification	Review Section
MH0T99	Aluminum Arsenic	U	Blank contamination	VII
All Samples	Beryllium			
MH0T97, MH0T98, MH0T99	Selenium			
MH0T97, MH0T98, MH0TA2	Sodium			
	Zinc	J	Negative blank contamination	
All samples	Aluminum	J	Matrix spike recovery greater than QC limits	IX
	Thallium	UJ	Matrix spike recovery less than QC limits	
	Aluminum	J	Serial dilution %D greater than 10% and original sample value at least 50*IDL	XV

Method/SOW Number ILM04.1
Revision 0.0

Inorganic Deliverables Completeness Checklist

P Inorganic Cover Page
P Inorganic Analysis Data Sheets
P Initial Calibration and Calibration Verification Results
P Continuing Calibration Verification Results
P CRDL Standard for ICP and AA
P Blank Analysis Results
P ICP Interference Check Sample Results
P Spiked Sample Results
F Post-digest Spiked Sample Analysis
P Duplicate Sample Results
P Instrument Detection Limits
P Laboratory Control Sample results
NA Standard Addition Results
P ICP Serial Dilution Results
NA Holding Times Summary Sheet
P ICP Interelement Correction Factors
P ICP Linear Ranges
P Raw Data

P Samples	P Calibration Standards	P Blanks	P Spikes
P Duplicates	P ICP QC (ICS and Serial Dilution)	P LCS	
NA Fumace AA	P Mercury Analysis	NA Cyanide Analysis	

NA Percent Solids Calculations - Solids Only
P Sample Prep/Digestion Logs (Form XIII)
P Analysis Run Log (Form XIV)
P Chain-of-Custody
P Sample Description
P Case Narrative
P Method References

KEY:
P = Provided in original data package, as required by the SOW
R = Provided as Resubmission
NP = Not provided in original data package or as resubmission
NR = Not required under the SOW
NA = Not applicable to this data package or analysis

I. DELIVERABLES

All deliverables were present.

Yes_X_ No___

Comments: None.

II. HOLDING TIMES AND PRESERVATION CRITERIA

All holding times and preservation criteria were met.

Yes_X_ No___

Comments: The samples were analyzed within required holding times. Chain-of-custody (COC), summary forms, and raw data were evaluated. Samples were received at 3.2°C. No shipping or receiving problems were noted.

III. INSTRUMENT CALIBRATIONS: STANDARDS AND BLANKS

Initial instrument calibrations were performed according to method requirements.

Yes_X_ No___

Comments: None.

The instruments were calibrated daily and each time an analysis run was performed.

Yes_X_ No___

Comments: None.

The instruments were calibrated using one blank and the appropriate number of standards.

Yes_X_ No___

Comments: The calibration correlation coefficient for mercury was greater than 0.995.

IV. FORM 1 - SAMPLE ANALYSIS RESULTS

Sample analyses were entered correctly on Form Is.

Yes_X_ No___

Comments: None.

V. FORM 2A - INITIAL AND CONTINUING CALIBRATION VERIFICATION

The initial and continuing calibration verification standards (ICV and CCV, respectively) met method requirements.

Yes_X_ No___

Comments: None.

The calibration verification results were within 90-110% recovery for metals, 85-115% for cyanide, and 80-120% for mercury.

Yes_X_ No___

Comments: None.

The continuing calibration standards were run at 10% frequency.

Yes_X_ No___

Comments: None.

VI. FORM 2B - CRDL STANDARD FOR ICP AND AA

ICP Analysis: Standards (CRI) at two times the CRDL or the IDL (whichever were greater) were analyzed at the beginning and the end of each sample run, or at a minimum of twice per eight hours, whichever was more frequent.

Yes_X_ No___

Comments: None.

GFAA Analysis: Standards (CRA) at two times CRDL were analyzed at the beginning of each sample run.

Yes___ No___ NA_X_

Comments: Samples were not analyzed by GFAA.

The CRI and/or the CRA were analyzed after the ICV.

Yes_X_ No___

Comments: None.

VII. FORM 3 - BLANKS

The initial and continuing calibration blanks (ICB and CCB, respectively) met method requirements.

Yes_X_ No___

Comments: None.

The continuing calibration blanks were run at 10% frequency.

Yes_X_ No___

Comments: None.

A laboratory/preparation blank was run at the frequency of one per twenty samples, or per sample delivery group (whichever is more frequent), and for each matrix analyzed.

Yes_X_ No___

Comments: None.

All analyzed blanks were free of contamination.

Yes___ No_X_

Comments: The following table lists the blanks with contamination that resulted in sample qualification, elements present, affected samples, and data qualifiers:

Blank Contaminants

Blank ID	Contaminant	Concentration Found in Blank (ug/L)	IDL (ug/L)	Associated Samples	Concentration Found in Sample (ug/L)	Qualifier/ Adjustment
CCB5	Arsenic	3.3	2.2	MH0T99	6.1	U
	Aluminum	87.7	40.9	MH0T99	267	
CCB4	Beryllium	0.5	0.2	MH0T97 MH0T98 MH0T99 MH0TA2	0.48 0.48 0.38 0.50	
PBW	Selenium	3.322	2.3	MH0T97 MH0T98 MH0T99	3.9 3.4 4.8	
	Sodium	619.1	304.0	MH0T97 MH0T98 MH0TA2	2660 2520 2540	
ICB	Zinc	-4.8	1.5	MH0T97 MH0T98 MH0TA2	10.1 9.2 6.3	J

VIII. FORM 4 - ICP INTERFERENCE CHECK SAMPLE

The ICP interference check sample (ICS) was run twice per eight hour shift and/or at the begimming and end of each sample set analysis sequence (whichever is more frequent).

Yes_X_ No___

Comments: None.

Percent recovery of the analytes in solution ICSAB were within the range of 80-120%.

Yes_X_ No___

Comments: None.

Sample results for aluminum, calcium, iron, and magnesium were less than the ICSA values.

Yes_X_ No___

Comments: None.

IX. FORM 5A - MATRIX SPIKE SAMPLE ANALYSIS

A matrix spike sample was analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes_X_ No___

Comments: None.

The percent recoveries (%R) were calculated correctly.

Yes_X_ No___

Comments: None.

Spike recoveries were within 75-125% (an exception is granted where the sample concentration is four times the spike concentration).

Yes___ No_X_

Comments: The following table lists the spike recoveries outside control limits, matrix, samples affected, and data qualifiers:

Element	Spike Recovery	Matrix	Samples Affected	Qualifiers
Aluminum	132.9	Water	All samples	J
Thallium	73.7			UJ

X. FORM 5B - POST DIGEST SPIKE RECOVERY

A post-digest spike was performed for those elements that did not meet the specified criteria (i.e., pre-digestion/pre-distillation spike recovery falls outside of control limits and sample result is less than four times the spike amount added, exception: Ag, Hg).

Yes_X_ No___ NA___

Comments: The post digestion spike recovery for aluminum was within QC limit; however, the recovery for thallium at 138% exceeded the QC limits. Post digestion spike results do not effect sample qualifications.

XI. FORM 6 - DUPLICATE SAMPLE ANALYSIS

Duplicate sample analysis was performed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes_X_ No___

Comments: None.

The RPDs were calculated correctly.

Yes_X_ No___

Comments: None.

For sample concentrations greater than five times the CRDL, RPDs were within ±20% (limits of ±35% apply for soil/sediments/tailings samples).

Yes_X_ No___

Comments: None.

For sample concentrations less than five times the CRDL, duplicate analysis results were within the control window of ± CRDL (two times CRDL for soils).

Yes_X_ No___

Comments: None.

XII. GFAA QC

Duplicate injections were performed on all GFAA samples and the RSD was within ± 20%.

Yes___ No___ NA_X_

Comments: Samples were not analyzed by GFAA.

Analytical spikes were performed on all GFAA samples and the percent recovery was 85 - 115%.

Yes___ No___ NA_X_

Comments: Samples were not analyzed by GFAA.

MSAs were analyzed when required and the correlation coefficient was > 0.995.

Yes___ No___ NA_X_

Comments: None.

XIII. FORM 7 - LABORATORY CONTROL SAMPLE

The laboratory control sample (LCS) was prepared and analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes_X_ No___

Comments: None.

All results were within control limits.

Yes_X_ No___

Comments: All LCS recoveries were within the QC limits of 80-120%.

XIV. FORM 8 - STANDARD ADDITION RESULTS

Results from graphite furnace standard additions were entered on Form VIII as directed in the SOW.

Yes___ No___ NA_X_

Comments: Samples were not analyzed by GFAA.

XV. FORM 9 - ICP QC

A serial dilution was performed for ICP analysis with every twenty or fewer samples of a similar matrix, or one per sample delivery group, whichever is more frequent.

Yes_X_ No___

Comments: None.

The serial dilution was without interference problems as defined by the method.

Yes___ No_X_

Comments: The following serial dilution %D was greater than 10% and the original sample result was at least 50* the IDL:

Element	% Difference	Samples Affected	Qualifiers
Aluminum	14.0	All samples	J

XVI. FORM 10 - QUARTERLY INSTRUMENT DETECTION LIMITS (IDL)

IDLs were provided for all elements on the target analyte list.

Yes_X_ No___

Comments: None.

XVII. FORM 11 - INTERELEMENT CORRECTION FACTORS FOR ICP

Interelement corrections for ICP were reported.

Yes_X_ No___

Comments: None.

XVIII. FORM 12 - ICP LINEAR RANGES

ICP linear ranges were reported.

Yes_X_ No___

Comments: None.

XIX. LINEAR RANGE VERIFICATION ANALYSIS

Linear Range Verification Analysis (LRA) was performed and results were within control limits of 5% of the true value.

Yes___ No___ NA_X_

Comments: None.

XX. FORM 13 - PREPARATION LOG

Information on the preparation of samples for analysis was reported.

Yes X No___

Comments: None.

XXI. FORM 14 - ANALYSIS RUN LOG

The required information was filled out for each analysis run in the data package.

Yes X No___

Comments: None.

XXII. Additional Comments or Problems/Resolutions Not Addressed Above

Yes___ No X

Comments: None.

INORGANIC DATA QUALITY ASSURANCE REVIEW

Region VIII

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following code letters and associated definitions are provided for use by the data validator to summarize the data quality. Use of additional qualifiers should be carefully considered. Definitions for all qualifiers used should be provided with each report.

GENERAL QUALIFIERS for use with both **INORGANIC** and **ORGANIC DATA**

R - Reported value is "rejected." Resampling or reanalysis may be necessary to verify the presence or absence of the compound.

J - The associated numerical value is an estimated quantity because the Quality Control criteria were not met.

U J - The reported amount is estimated because Quality Control criteria were not met. Element or compound was not detected.

N J - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.

U - The material was analyzed for, but was not-detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

ACRONYMS

AA	Atomic Absorption
Ag	Silver
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CRA	CRDL standard required for AA
CRDL	Contract Required Detection Limit
CRI	CRDL standard required for ICP
CV	Cold Vapor
EPA	U.S. Environmental Protection Agency
GFAA	Graphite Furnace Atomic Absorption
Hg	Mercury
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma
ICS	Interference Check Sample
ICSA	Interference Check Sample (Solution A)
ICSAB	Interference Check Sample (Solution AB)
ICV	Initial Calibration Verification
IDL	Instrument Detection Limit
LCS	Laboratory Control Sample
LRA	Linear Range Verification Analysis
MSA	Method of Standard Additions
PDS	Post Digestion Spike
QC	Quality Control
RPD	Relative Percent Difference
RPM	Regional Project Manager
RSD	Percent Relative Standard Deviation
SA	Spike Added
SAS	Special Analytical Services
SDG	Sample Delivery Group
SOW	Statement of Work
SR	Sample Result
SSR	Spiked Sample Result
TPO	Technical Project Officer

U. S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MH0T97

Lab Name: COMPUCHEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MH0T97

Matrix (soil/water): WATER Lab Sample ID: MH0T97-1

Level (low/med): LOW Date Received: 06/03/03

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	5140		NE	P	J
7440-36-0	Antimony	3.0	B		P	
7440-38-2	Arsenic	2.3	B		P	
7440-39-3	Barium	95.8	B		P	
7440-41-7	Beryllium	0.48	B		P	U
7440-43-9	Cadmium	0.20	U		P	
7440-70-2	Calcium	20200			P	
7440-47-3	Chromium	4.8	B		P	
7440-48-4	Cobalt	3.0	B		P	
7440-50-8	Copper	6.9	B		R	
7439-89-6	Iron	4400			P	
7439-92-1	Lead	5.8			P	
7439-95-4	Magnesium	4140	B		P	
7439-96-5	Manganese	240			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	4.7	B		P	
7440-09-7	Potassium	1630	B		P	
7782-49-2	Selenium	3.9	B		P	U
7440-22-4	Silver	0.90	U		P	
7440-23-5	Sodium	2660	B		P	U
7440-28-0	Thallium	2.9	U	N	P	UJ
7440-62-2	Vanadium	10.9	B		P	
7440-66-6	Zinc	10.1	B		P	J

RF 7/21-3

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLOUDY Artifacts:

Comments:

U. S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MH0T98

Lab Name: COMPUCHEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MH0T97

Matrix (soil/water): WATER Lab Sample ID: MH0T97-2

Level (low/med): LOW Date Received: 06/03/03

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	4840		NE	P	J
7440-36-0	Antimony	2.5	U		P	
7440-38-2	Arsenic	2.5	B		P	
7440-39-3	Barium	82.6	B		P	
7440-41-7	Beryllium	0.48	B		P	U
7440-43-9	Cadmium	0.20	U		P	
7440-70-2	Calcium	18800			P	
7440-47-3	Chromium	4.0	B		P	
7440-48-4	Cobalt	1.8	B		P	
7440-50-8	Copper	5.2	B		P	
7439-89-6	Iron	4250			P	
7439-92-1	Lead	6.8			P	
7439-95-4	Magnesium	3950	B		P	
7439-96-5	Manganese	218			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	2.4	B		P	
7440-09-7	Potassium	1510	B		P	
7782-49-2	Selenium	3.4	B		P	U
7440-22-4	Silver	0.90	U		P	
7440-23-5	Sodium	2520	B		P	U
7440-28-0	Thallium	2.9	U	N	P	UJ
7440-62-2	Vanadium	9.3	B		P	
7440-66-6	Zinc	9.2	B		P	J

RK 7/21-3

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLOUDY Artifacts:

Comments:

U. S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MH0T99

Lab Name: COMPUCHEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MH0T97

Matrix (soil/water): WATER Lab Sample ID: MH0T97-3

Level (low/med): LOW Date Received: 06/03/03

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	267		NE	P	UJ
7440-36-0	Antimony	24.0	B		P	
7440-38-2	Arsenic	6.1	B		P	U
7440-39-3	Barium	180	B		P	
7440-41-7	Beryllium	0.38	B		P	U
7440-43-9	Cadmium	3.8	B		P	
7440-70-2	Calcium	42300			P	
7440-47-3	Chromium	0.60	U		P	
7440-48-4	Cobalt	0.70	U		P	
7440-50-8	Copper	38.7			P	
7439-89-6	Iron	351			P	
7439-92-1	Lead	384			P	
7439-95-4	Magnesium	4970	B		P	
7439-96-5	Manganese	258			P	
7439-97-6	Mercury	0.13	B		CV	
7440-02-0	Nickel	1.2	U		P	
7440-09-7	Potassium	8940			P	
7782-49-2	Selenium	4.8	B		P	U
7440-22-4	Silver	2.7	B		P	
7440-23-5	Sodium	3790	B		P	
7440-28-0	Thallium	2.9	U	N	P	UJ
7440-62-2	Vanadium	1.0	B		P	
7440-66-6	Zinc	819			P	

TF 7/30/03

TF 7/30/03

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLOUDY Artifacts:

Comments:

U. S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MH0TA2

Lab Name: COMPUCHEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MH0T97

Matrix (soil/water): WATER Lab Sample ID: MH0T97-4

Level (low/med): LOW Date Received: 06/03/03

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	3610		NE	P	J
7440-36-0	Antimony	2.5	U		P	
7440-38-2	Arsenic	2.2	U		P	
7440-39-3	Barium	72.8	B		P	
7440-41-7	Beryllium	0.50	B		P	U
7440-43-9	Cadmium	0.20	U		P	
7440-70-2	Calcium	18600			P	
7440-47-3	Chromium	2.5	B		P	
7440-48-4	Cobalt	1.0	B		P	
7440-50-8	Copper	3.6	B		P	
7439-89-6	Iron	2890			P	
7439-92-1	Lead	3.8			P	
7439-95-4	Magnesium	3140	B		P	
7439-96-5	Manganese	183			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	2.1	B		P	
7440-09-7	Potassium	1230	B		P	
7782-49-2	Selenium	2.3	U		P	
7440-22-4	Silver	0.90	U		P	
7440-23-5	Sodium	2540	B		P	U
7440-28-0	Thallium	2.9	U	N	P	UJ
7440-62-2	Vanadium	6.8	B		P	
7440-66-6	Zinc	6.3	B		P	J

7/21/03

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLOUDY Artifacts:

Comments:

REGION VIII
DATA VALIDATION REPORT
INORGANIC

TDD No. / Case No.	Site Name		Operable Unit
0307-0009 / 31756	Bully Boy Mill		
RPM/OSC Name			
Luke Chavez			
Contractor Laboratory	**Contract No.**	**SDG No.**	**Laboratory DPO/Region**
CompuChem-Liberty	68W00082	MH0T87	

Review Assigned Date July 23, 2003 Data Validator Bill Fear
Review Completion Date August 1, 2003 Report Reviewer Amy Ballow

Sample Number	Station Location	Matrix	Analysis
MH0T87	BB-SF-11	Soil	CLP - Metals and Mercury
MH0T88	BB-SF-10		
MH0T89	BB-SF-12		
MH0T90	BB-SF-14		
MH0T91	BB-SF-15		
MH0T92	BB-SF-16		
MH0T93	BB-SF-17		
MH0T94	BB-SF-18		
MH0T95	BB-SF-13		
MH0T96	BB-SF-09		
MH0TA0	BB-SD-07		
MH0TA1	BB-SD-06		

DATA QUALITY STATEMENT

( ) Data are ACCEPTABLE according to EPA Functional guidelines with no qualifiers (flags) added by the reviewer.
( ) Data are UNACCEPTABLE according to EPA Functional Guidelines.
(X) Data are acceptable with QUALIFICATIONS noted in review.

Telephone/Communication Logs Enclosed? Yes ____ No ___X__

TPO Attention Required? Yes_____ No__X__ If yes, list the items that require attention:

INORGANIC DATA VALIDATION REPORT

REVIEW NARRATIVE SUMMARY

This data package was reviewed according to "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," February 1994.

Raw data were reviewed for completeness and transcription accuracy onto the summary forms. Approximately 10-20% of the results reported in each of the samples, calibrations, and QC analyses were recalculated and verified. If problems were identified during the recalculation of results, a more thorough calculation check was performed.

SDG No. MH0T87, Case No. 31756 consisted of 12 soil samples for metals including mercury analyses by CLP ILM04.1.

The following table lists the data qualifiers added to the sample analyses. Please see Data Qualifier Definitions, attached to the end of this report.

Sample ID	Elements	Qualifiers	Reason for Qualification	Review Section
MH0T90, MH0T91, MH0T92, MH0T93	Nickel	U	Blank contamination	VII
All samples	Mercury	J/R	Matrix spike recovery below 30%	IX
MH0T87, MH0T88, MH0T89, MH0T90, MH0T91, MH0T92, MH0T93, MH0T94, MH0T95		J	Matrix duplicate criteria not met	XI

Method/SOW Number ILM04.1
Revision 0.0

Inorganic Deliverables Completeness Checklist

P Inorganic Cover Page
P Inorganic Analysis Data Sheets
P Initial Calibration and Calibration Verification Results
P Continuing Calibration Verification Results
P CRDL Standard for ICP and AA
P Blank Analysis Results
P ICP Interference Check Sample Results
P Spiked Sample Results
NA Post-digest Spiked Sample Analysis
P Duplicate Sample Results
P Instrument Detection Limits
P Laboratory Control Sample results
NA Standard Addition Results
P ICP Serial Dilution Results
NA Holding Times Summary Sheet
P ICP Interelement Correction Factors
P ICP Linear Ranges
P Raw Data

P Samples	P Calibration Standards	P Blanks	P Spikes
P Duplicates	P ICP QC (ICS and Serial Dilution)	P LCS	
NA Fumace AA	P Mercury Analysis	NA Cyanide Analysis	

P Percent Solids Calculations - Solids Only
P Sample Prep/Digestion Logs (Form XIII)
P Analysis Run Log (Form XIV)
P Chain-of-Custody
P Sample Description
P Case Narrative
P Method References

KEY:
P = Provided in original data package, as required by the SOW
R = Provided as Resubmission
NP = Not provided in original data package or as resubmission
NR = Not required under the SOW
NA = Not applicable to this data package or analysis

I. DELIVERABLES

All deliverables were present.

Yes_X_ No___

Comments: None.

II. HOLDING TIMES AND PRESERVATION CRITERIA

All holding times and preservation criteria were met.

Yes_X_ No___

Comments: The samples were analyzed within required holding times. Chain-of-custody (COC), summary forms, and raw data were evaluated. Samples were received at 3.2°C. No shipping or receiving problems were noted.

III. INSTRUMENT CALIBRATIONS: STANDARDS AND BLANKS

Initial instrument calibrations were performed according to method requirements.

Yes_X_ No___

Comments: None.

The instruments were calibrated daily and each time an analysis run was performed.

Yes_X_ No___

Comments: None.

The instruments were calibrated using one blank and the appropriate number of standards.

Yes_X_ No___

Comments: The calibration correlation coefficient for mercury was greater than 0.995.

IV. FORM 1 - SAMPLE ANALYSIS RESULTS

Sample analyses were entered correctly on Form Is.

Yes_X_ No___

Comments: None.

V. FORM 2A - INITIAL AND CONTINUING CALIBRATION VERIFICATION

The initial and continuing calibration verification standards (ICV and CCV, respectively) met method requirements.

Yes_X_ No___

Comments: None.

The calibration verification results were within 90-110% recovery for metals, 85-115% for cyanide, and 80-120% for mercury.

Yes_X_ No___

Comments: None.

The continuing calibration standards were run at 10% frequency.

Yes_X_ No___

Comments: None.

VI. FORM 2B - CRDL STANDARD FOR ICP AND AA

ICP Analysis: Standards (CRI) at two times the CRDL or the IDL (whichever were greater) were analyzed at the beginning and the end of each sample run, or at a minimum of twice per eight hours, whichever was more frequent.

Yes_X_ No___

Comments: None.

GFAA Analysis: Standards (CRA) at two times CRDL were analyzed at the beginning of each sample run.

Yes___ No___ NA_X_

Comments: Samples were not analyzed by GFAA.

The CRI and/or the CRA were analyzed after the ICV.

Yes_X_ No___

Comments: None.

VII. FORM 3 - BLANKS

The initial and continuing calibration blanks (ICB and CCB, respectively) met method requirements.

Yes_X_ No___

Comments: None.

The continuing calibration blanks were run at 10% frequency.

Yes_X_ No___

Comments: None.

A laboratory/preparation blank was run at the frequency of one per twenty samples, or per sample delivery group (whichever is more frequent), and for each matrix analyzed.

Yes_X_ No___

Comments: None.

All analyzed blanks were free of contamination.

Yes___ No_X_

Comments: The following table lists the blanks with contamination that resulted in sample qualification, elements present, affected samples, and data qualifiers:

Blank Contaminants

Blank ID	Contaminant	Coocintration Found in Blank	IDL (ug/L)	Associated Samples	Concentration Found in Sample (mg/Kg)	Qualifier/ Adjustment
PBS	Nickel	0.355 mg/Kg	1.3	MH0T90 MH0T91 MH0T92 MH0T93	1.3 1.5 1.2 0.98	U

VIII. FORM 4 - ICP INTERFERENCE CHECK SAMPLE

The ICP interference check sample (ICS) was run twice per eight hour shift and/or at the beginning and end of each sample set analysis sequence (whichever is more frequent).

Yes_X_ No___

Comments: None.

Percent recovery of the analytes in solution ICSAB were within the range of 80-120%.

Yes_X_ No___

Comments: None.

Sample results for aluminum, calcium, iron, and magnesium were less than the ICSA values.

Yes_X_ No___

Comments: None.

IX. FORM 5A - MATRIX SPIKE SAMPLE ANALYSIS

A matrix spike sample was analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes_X_ No___

Comments: None.

The percent recoveries (%R) were calculated correctly.

Yes_X_ No___

Comments: None.

Spike recoveries were within 75-125% (an exception is granted where the sample concentration is four times the spike concentration).

Yes___ No_X_

Comments: The following table lists the spike recovery outside control limits, matrix, samples affected, and data qualifiers:

Element	Spike Recovery	Matrix	Samples Affected	Qualifiers
Mercury	(-25) 0%	Soil	MH0T87, MH0T88, MH0T89, MH0T90, MH0T91, MH0T92, MH0T93, MH0T94, MH0T95	J
			MHT096, MHT0A0, MHT0A1	R

X. FORM 5B - POST DIGEST SPIKE RECOVERY

A post-digest spike was performed for those elements that did not meet the specified criteria (i.e., pre-digestion/pre-distillation spike recovery falls outside of control limits and sample result is less than four times the spike amount added, exception: Ag, Hg).

Yes___ No___ NA_X_

Comments: None.

XI. FORM 6 - DUPLICATE SAMPLE ANALYSIS

Duplicate sample analysis was perfonned with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more trequent).

Yes_X_ No___

Comments: None.

The RPDs were calculated correctly.

Yes_X_ No___

Comments: None.

For sample concentrations greater than five times the CRDL, RPDs were within ±20% (limits of ±35% apply for soil/sediments/tailings samples).

Yes___ No_X_

Comments: The following table lists the duplicate RPD outside control limits, matrix, samples affected, and data qualifiers:

Element	Duplicate RPD	Matrix	Samples Affected	Qualifiers
Mercury	48.8	Soil	MH0T87, MH0T88, MH0T89, MH0T90, MH0T91, MH0T92, MH0T93, MH0T94, MH0T95	J

Note: The non-detected results for mercury were ultimately qualified as rejected for matrix spike recoveries.

For sample concentrations less than five times the CRDL, duplicate analysis results were within the control window of ± CRDL (two times CRDL for soils).

Yes_X_ No___

Comments: None.

XII. GFAA QC

Duplicate injections were performed on all GFAA samples and the RSD was within ± 20%.

Yes___ No___ NA_X_

Comments: Samples were not analyzed by GFAA.

Analytical spikes were performed on all GFAA samples and the percent recpvery was 85 - 115%.

Yes___ No___ NA_X_

Comments: Samples were not analyzed by GFAA.

MSAs were analyzed when required and the correlation coefficient was > 0.995.

Yes___ No___ NA_X_

Comments: None.

XIII. FORM 7 - LABORATORY CONTROL SAMPLE

The laboratory control sample (LCS) was prepared and analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes_X_ No___

Comments: None.

All results were within control limits.

Yes_X_ No___

Comments: All LCS recoveries were within the laboratory QC limits.

XIV. FORM 8 - STANDARD ADDITION RESULTS

Results from graphite furnace standard additions were entered on Form VIII as directed in the SOW.

Yes___ No___ NA_X_

Comments: Samples were not analyzed by GFAA.

XV. FORM 9 - ICP QC

A serial dilution was performed for ICP analysis with every twenty or fewer samples of a similar matrix, or one per sample delivery group, whichever is more frequent.

Yes_X_ No___

Comments: None.

The serial dilution was without interference problems as defined by the method.

Yes_X_ No___

Comments: None.

XVI. FORM 10 - QUARTERLY INSTRUMENT DETECTION LIMITS (IDL)

IDLs were provided for all elements on the target analyte list.

Yes_X_ No___

Comments: None.

XVII. FORM 11 - INTERELEMENT CORRECTION FACTORS FOR ICP

Interelement corrections for ICP were reported.

Yes_X_ No___

Comments: None.

XVIII. FORM 12 - ICP LINEAR RANGES

ICP linear ranges were reported.

Yes_X_ No___

Comments: None.

XIX. LINEAR RANGE VERIFICATION ANALYSIS

Linear Range Verification Analysis (LRA) was performed and results were within control limits of 5% of the true value.

Yes___ No___ NA_X_

Comments: None.

XX. FORM 13 - PREPARATION LOG

Information on the preparation of samples for analysis was reported.

Yes_X_ No___

Comments: None.

XXI. FORM 14 - ANALYSIS RUN LOG

The required information was filled out for each analysis run in the data package.

Yes_X_ No___

Comments: None.

XXII. Additional Comments or Problems/Resolutions Not Addressed Above

Yes___ No_X_

Comments: None.

INORGANIC DATA QUALITY ASSURANCE REVIEW

Region VIII

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following code letters and associated definitions are provided for use by the data validator to summarize the data quality. Use of additional qualifiers should be carefully considered. Definitions for all qualifiers used should be provided with each report.

GENERAL QUALIFIERS for use with both **INORGANIC** and **ORGANIC DATA**

R - Reported value is "rejected." Resampling or reanalysis may be necessary to verify the presence or absence of the compound.

J - The associated numerical value is an estimated quantity because the Quality Control criteria were not met.

U J - The reported amount is estimated because Quality Control criteria were not met. Element or compound was not detected.

N J - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.

U - The material was analyzed for, but was not-detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

ACRONYMS

AA	Atomic Absorption
Ag	Silver
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CRA	CRDL standard required for AA
CRDL	Contract Required Detection Limit
CRI	CRDL standard required for ICP
CV	Cold Vapor
EPA	U.S. Environmental Protection Agency
GFAA	Graphite Furnace Atomic Absorption
Hg	Mercury
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma
ICS	Interference Check Sample
ICSA	Interference Check Sample (Solution A)
ICSAB	Interference Check Sample (Solution AB)
ICV	Initial Calibration Verification
IDL	Instrument Detection Limit
LCS	Laboratory Control Sample
LRA	Linear Range Verification Analysis
MSA	Method of Standard Additions
PDS	Post Digestion Spike
QC	Quality Control
RPD	Relative Percent Difference
RPM	Regional Project Manager
RSD	Percent Relative Standard Deviation
SA	Spike Added
SAS	Special Analytical Services
SDG	Sample Delivery Group
SOW	Statement of Work
SR	Sample Result
SSR	Spiked Sample Result
TPO	Technical Project Officer

U. S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MH0T87

Lab Name: COMPUCHEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MH0T87

Matrix (soil/water): SOIL Lab Sample ID: MH0T87-1

Level (low/med): LOW Date Received: 06/03/03

% Solids: 84.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7780			P
7440-36-0	Antimony	4.5	B		P
7440-38-2	Arsenic	22.6			P
7440-39-3	Barium	254			P
7440-41-7	Beryllium	0.84	B		P
7440-43-9	Cadmium	0.088	U		P
7440-70-2	Calcium	94800			P
7440-47-3	Chromium	9.6			P
7440-48-4	Cobalt	6.0	B		P
7440-50-8	Copper	33.3			P
7439-89-6	Iron	13600			P
7439-92-1	Lead	445			P
7439-95-4	Magnesium	15800			P
7439-96-5	Manganese	660			P
7439-97-6	Mercury	0.15		N*	CV
7440-02-0	Nickel	9.5			P
7440-09-7	Potassium	1370			P
7782-49-2	Selenium	1.2			P
7440-22-4	Silver	2.1	B		P
7440-23-5	Sodium	344	B		P
7440-28-0	Thallium	1.5	U		P
7440-62-2	Vanadium	18.0			P
7440-66-6	Zinc	175			P

J

RF 7/29/03

Color Before: BROWN Clarity Before: Texture: COARSE

Color After: YELLOW Clarity After: Artifacts:

Comments:

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U. S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MH0T88

Lab Name: COMPUCHEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MH0T87

Matrix (soil/water): SOIL Lab Sanple ID: MH0T87-2

Level (low/med): LOW Date Received: 06/03/03

% Solids: 98.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11100			P
7440-36-0	Antimony	14.4			P
7440-38-2	Arsenic	28.5			P
7440-39-3	Barium	276			P
7440-41-7	Beryllium	0.89	B		P
7440-43-9	Cadmium	2.2			P
7440-70-2	Calcium	31100			P
7440-47-3	Chromium	14.3			P
7440-48-4	Cobalt	7.4	B		P
7440-50-8	Copper	111			P
7439-89-6	Iron	17600			P
7439-92-1	Lead	1620			P
7439-95-4	Magnesium	6860			P
7439-96-5	Manganese	740			P
7439-97-6	Mercury	2.5		N*	CV
7440-02-0	Nickel	11.6			P
7440-09-7	Potassium	1350			P
7782-49-2	Selenium	2.8			P
7440-22-4	Silver	9.6			P
7440-23-5	Sodium	957	B		P
7440-28-0	Thallium	1.4	U		P
7440-62-2	Vanadium	21.3			P
7440-66-6	Zinc	680			P

J

Color Before: BROWN Clarity Before: Texture: COARSE

Color After: YELLOW Clarity After: Artifacts:

Comments:

12

U. S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MH0T89

Lab Name: COMPUCHEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MH0T87

Matrix (soil/water): SOIL Lab Sample ID: MH0T87-3

Level (low/med): LOW Date Received: 06/03/03

% Solids: 95.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	4190			P
7440-36-0	Antimony	221			P
7440-38-2	Arsenic	109			P
7440-39-3	Barium	738			P
7440-41-7	Beryllium	1.2			P
7440-43-9	Cadmium	31.8			P
7440-70-2	Calcium	8330			P
7440-47-3	Chromium	3.6			P
7440-48-4	Cobalt	1.5	B		P
7440-50-8	Copper	474			P
7439-89-6	Iron	11100			P
7439-92-1	Lead	11300			P
7439-95-4	Magnesium	838	B		P
7439-96-5	Manganese	2020			P
7439-97-6	Mercury	1.8		N*	CV
7440-02-0	Nickel	2.6	B		P
7440-09-7	Potassium	1540			P
7782-49-2	Selenium	18.7			P
7440-22-4	Silver	51.3			P
7440-23-5	Sodium	7390			P
7440-28-0	Thallium	1.5	U		P
7440-62-2	Vanadium	6.6	B		P
7440-66-6	Zinc	6230			P

J

RF 7/29/03

Color Before: BROWN Clarity Before: Texture: FINE

Color After: YELLOW Clarity After: Artifacts:

Comments:

U. S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SANPLE NO.

MNOT90

Lab Name: COMPUCNEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MN0T87

Matrix (soil/water): SOIL Lab Sample ID: MN0T87-4

Level (low/med): LOW Date Received: 06/03/03

% Solids: 94.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	3850			P	
7440-36-0	Antimony	259			P	
7440-38-2	Arsenic	111			P	
7440-39-3	Barium	1020			P	
7440-41-7	Beryllium	1.0			P	
7440-43-9	Cadmium	12.9			P	
7440-70-2	Calcium	11200			P	
7440-47-3	Chromium	1.6	B		P	
7440-48-4	Cobalt	1.0	B		P	
7440-50-8	Copper	461			P	
7439-89-6	Iron	8430			P	
7439-92-1	Lead	12700			P	
7439-95-4	Magnesium	570	B		P	
7439-96-5	Manganese	1420			P	
7439-97-6	Mercury	1.1		N*	CV	J
7440-02-0	Nickel	1.3	B		P	U
7440-09-7	Potassium	1230			P	
7782-49-2	Selenium	20.5			P	
7440-22-4	Silver	65.5			P	
7440-23-5	Sodium	3660			P	
7440-28-0	Thallium	1.4	U		P	
7440-62-2	Vanadium	5.3	B		P	
7440-66-6	Zinc	2910			P	

Color Before: BROWN Clarity Before: Texture: COARSE

Color After: YELLOW Clarity After: Artifacts:

Comments: 7/24/03

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ENORGANIC ANALYSIS DATA SHEET

EPA SANPLE NO.

MN0T91

Lab Name: COMPUCNEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MN0T87

Matrix (soil/water): SOIL Lab Sample ID: MN0T87-5

Level (low/med): LOW Date Received: 06/03/03

% Solids: 99.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	N	
7429-90-5	Aluminum	4350			P	
7440-36-0	Antimony	197			P	
7440-38-2	Arsenic	88.8			P	
7440-39-3	Barium	757			P	
7440-41-7	Beryllium	0.84	B		P	
7440-43-9	Cadmium	8.8			P	
7440-70-2	Calcium	12900			P	
7440-47-3	Chromium	2.4			P	
7440-48-4	Cobalt	1.1	B		P	
7440-50-8	Copper	342			P	
7439-89-6	Iron	8390			P	
7439-92-1	Lead	7760			P	
7439-95-4	Magnesium	744	B		P	
7439-96-5	Manganese	1290			P	
7439-97-6	Mercury	0.44		N*	CV	J U
7440-02-0	Nickel	1.5	B		P	
7440-09-7	Potassium	1500			P	
7782-49-2	Selenium	16.1			P	
7440-22-4	Silver	46.4			P	
7440-23-5	Sodium	3050			P	
7440-28-0	Thallium	1.4	U		P	
7440-62-2	Vanadium	6.0	B		P	
7440-66-6	Zinc	2320			P	

Color Before: BROWN Clarity Before: Texture: COARSE

Color After: YELLOW Clarity After: Artifacts:

Comments: RF 7/28/03

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MN0T92

Lab Name: COMPUCHEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: _____ SDG No.: MN0T87

Matrix (soil/water): SOIL Lab Sample ID: MN0T87-6

Level (low/med): LOW Date Received: 06/03/03

% Solids: 83.1

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	3350			P	
7440-36-0	Antimony	183			P	
7440-38-2	Arsenic	94.2			P	
7440-39-3	Barium	515			P	
7440-41-7	Beryllium	0.80	B		P	
7440-43-9	Cadmium	6.3			P	
7440-70-2	Calcium	16800			P	
7440-47-3	Chromium	1.8	B		P	
7440-48-4	Cobalt	0.45	B		P	
7440-50-8	Copper	298			P	
7439-89-6	Iron	9490			P	
7439-92-1	Lead	7750			P	
7439-95-4	Magnesium	631	B		P	
7439-96-5	Manganese	881			P	
7439-97-6	Mercury	0.35		N*	CV	J
7440-02-0	Nickel	1.2	B		P	U
7440-09-7	Potassium	1110	B		P	
7782-49-2	Selenium	15.0			P	
7440-22-4	Silver	49.5			P	
7440-23-5	Sodium	2380			P	
7440-28-0	Thallium	1.6	U		P	
7440-62-2	Vanadium	4.9	B		P	
7440-66-6	Zinc	1800			P	

Color Before: BROWN Clarity Before: _____ Texture: COARSE

Color After: YELLOW Clarity After: _____ Artifacts: _____

Comments: _____ 7/24/03

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MH0T93

Lab Name: COMPUCHEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MH0T87

Matrix (soil/water): SOIL Lab Sample ID: MH0T87-7

Level (low/med): LOW Date Received: 06/03/03

% Solids: 91.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	2980			P
7440-36-0	Antimony	101			P
7440-38-2	Arsenic	42.6			P
7440-39-3	Barium	422			P
7440-41-7	Beryllium	0.46	B		P
7440-43-9	Cadmium	2.9			P
7440-70-2	Calcium	8210			P
7440-47-3	Chromium	1.6	B		P
7440-48-4	Cobalt	0.81	B		P
7440-50-8	Copper	170			P
7439-89-6	Iron	4570			P
7439-92-1	Lead	3780			P
7439-95-4	Magnesium	551	B		P
7439-96-5	Manganese	541			P
7439-97-6	Mercury	0.34		N*	CV
7440-02-0	Nickel	0.98	B		P
7440-09-7	Potassium	998	B		P
7782-49-2	Selenium	8.2			P
7440-22-4	Silver	30.9			P
7440-23-5	Sodium	1030	B		P
7440-28-0	Thallium	1.5	U		P
7440-62-2	Vanadium	4.4	B		P
7440-66-6	Zinc	783			P

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Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

BF 7/20/03

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MH0T94

Lab Name: COMPUCHEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MH0T87

Matrix (soil/water): SOIL Lab Sample ID: MH0T87-8

Level (low/med): LOW Date Received: 06/03/03

% Solids: 87.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	5440			P
7440-36-0	Antimony	306			P
7440-38-2	Arsenic	123			P
7440-39-3	Barium	1940			P
7440-41-7	Beryllium	1.5			P
7440-43-9	Cadmium	18.2			P
7440-70-2	Calcium	8880			P
7440-47-3	Chromium	3.4			P
7440-48-4	Cobalt	2.5	B		P
7440-50-8	Copper	570			P
7439-89-6	Iron	10600			P
7439-92-1	Lead	19600			P
7439-95-4	Magnesium	1260			P
7439-96-5	Manganese	2880			P
7439-97-6	Mercury	2.0		N*	CV
7440-02-0	Nickel	2.7	B		P
7440-09-7	Potassium	1810			P
7782-49-2	Selenium	23.5			P
7440-22-4	Silver	90.5			P
7440-23-5	Sodium	6700			P
7440-28-0	Thallium	1.5	U		P
7440-62-2	Vanadium	7.7	B		P
7440-66-6	Zinc	5820			P

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Color Before: BROWN Clarity Before: Texture: COARSE

Color After: YELLOW Clarity After: Artifacts: 8/12/03

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MN0T95

Lab Name: COMPUCNEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MN0T87

Matrix (soil/water): SOIL Lab Sample ID: MN0T87-9

Level (low/med): LOW Date Received: 06/03/03

% Solids: 93.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12300			P
7440-36-0	Antimony	1.4	B		P
7440-38-2	Arsenic	9.2			P
7440-39-3	Barium	181			P
7440-41-7	Beryllium	1.0			P
7440-43-9	Cadmium	0.084	U		P
7440-70-2	Calcium	4240			P
7440-47-3	Chromium	15.6			P
7440-48-4	Cobalt	10.7			P
7440-50-8	Copper	30.9			P
7439-89-6	Iron	24800			P
7439-92-1	Lead	77.2			P
7439-95-4	Magnesium	7520			P
7439-96-5	Manganese	734			P
7439-97-6	Mercury	0.14		N*	GV
7440-02-0	Nickel	14.4			P
7440-09-7	Potassium	2140			P
7782-49-2	Selenium	0.88	B		P
7440-22-4	Silver	0.17	U		P
7440-23-5	Sodium	256	B		P
7440-28-0	Thallium	1.5	U		P
7440-62-2	Vanadium	21.7			P
7440-66-6	Zinc	134			P

J

Color Before: BROWN Clarity Before: Texture: COARSE

Color After: YELLOW Clarity After: Artifacts:

Comments: 0.7126h3

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MN0T96

Lab Name: COMPUCNEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MN0T87

Matrix (soil/water): SOIL Lab Sample ID: MN0T87-10

Level (low/med): LOW Oate Received: 06/03/03

% Solids: 85.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12200			P
7440-36-0	Antimony	2.1	B		P
7440-38-2	Arsenic	13.8			P
7440-39-3	Barium	116			P
7440-41-7	Beryllium	0.93	B		P
7440-43-9	Cadmium	0.088	U		P
7440-70-2	Calcium	5700			P
7440-47-3	Chromium	20.8			P
7440-48-4	Cobalt	10.0	B		P
7440-50-8	Copper	20.4			P
7439-89-6	Iron	20200			P
7439-92-1	Lead	90.4			P
7439-95-4	Magnesium	8600			P
7439-96-5	Manganese	663			P
7439-97-6	Mercury	0.048	U	N*	CV
7440-02-0	Nickel	18.4			P
7440-09-7	Potassium	1660			P
7782-49-2	Selenium	1.0	B		P
7440-22-4	Silver	0.86	B		P
7440-23-5	Sodium	170	B		P
7440-28-0	Thallium	1.5	U		P
7440-62-2	Vanadium	20.8			P
7440-66-6	Zinc	92.2			P

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Color Before: BLACK Clarity Before: Texture: COARSE

Color After: YELLOW Clarity After: Artifacts:

Comments:

AT 7/29/03

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MN0TA0

Lab Name: COMPUCNEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: SDG No.: MN0T87

Matrix (soil/water): SOIL Lab Sample ID: MH0T87-11

Level (low/med): LOW Date Received: 06/03/03

% Solids: 76.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	11100			P	
7440-36-0	Antimony	1.1	U		P	
7440-38-2	Arsenic	8.3			P	
7440-39-3	Barium	61.6			P	
7440-41-7	Beryllium	0.71	B		P	
7440-43-9	Cadmium	0.10	U		P	
7440-70-2	Calcium	4740			P	
7440-47-3	Chromium	13.8			P	
7440-48-4	Cobalt	10.2	B		P	
7440-50-8	Copper	17.5			P	
7439-89-6	Iron	16800			P	
7439-92-1	Lead	12.7			P	
7439-95-4	Magnesium	9610			P	
7439-96-5	Manganese	554			P	
7439-97-6	Mercury	0.059	U	N*	CV	R
7440-02-0	Nickel	13.8			P	
7440-09-7	Potassium	904	B		P	
7782-49-2	Selenium	0.66	U		P	
7440-22-4	Silver	0.20	U		P	
7440-23-5	Sodium	139	B		P	
7440-28-0	Thallium	1.8	U		P	
7440-62-2	Vanadium	19.7			P	
7440-66-6	Zinc	55.8			P	

Color Before: BROWN Clarity Before: Texture: COARSE

Color After: YELLOW Clarity After: Artifacts:

Comments: Af 7/29/07

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MM0TA1

Lab Name: COMPUCMEM Contract: 68W00082

Lab Code: LIBRTY Case No.: 31756 SAS No.: _____ SDG No.: MM0T87

Matrix (soil/water): SOIL Lab Sample ID: MM0T87-12

Level (low/med): LOW Date Received: 06/03/03

% Solids: 69.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	9320			P	
7440-36-0	Antimony	1.2	U		P	
7440-38-2	Arsenic	9.4			P	
7440-39-3	Barium	59.3			P	
7440-41-7	Beryllium	0.64	B		P	
7440-43-9	Cadmium	0.11	U		P	
7440-70-2	Calcium	5010			P	
7440-47-3	Chromium	14.0			P	
7440-48-4	Cobalt	9.2	B		P	
7440-50-8	Copper	18.8			P	
7439-89-6	Iron	18200			P	
7439-92-1	Lead	10.6			P	
7439-95-4	Magnesium	7740			P	
7439-96-5	Manganese	509			P	
7439-97-6	Mercury	0.051	U	N*	CV	R
7440-02-0	Nickel	12.5			P	
7440-09-7	Potassium	831	B		P	
7782-49-2	Selenium	0.71	U		P	
7440-22-4	Silver	0.22	U		P	
7440-23-5	Sodium	122	B		P	
7440-28-0	Thallium	1.9	U		P	
7440-62-2	Vanadium	20.5			P	
7440-66-6	Zinc	47.1			P	

Color Before: BROWN Clarity Before: _____ Texture: COARSE

Color After: YELLOW Clarity After: _____ Artifacts: _____

Comments: _____

RF 7/24