

LIBERTY GEM MINE AND MILL SITE

**AKA: Liberty Gem #1, #2, #3, #7, #8, #9; Badger #1, #2, #3; Cash #1, #2, #4, #7, #10;
Ornament; Trade Dollar; Mike's Birthday**

PRELIMINARY ASSESSMENT AND SITE INSPECTION REPORT

Blaine County
State of Idaho



Department of Environmental Quality

January 2011

Submitted to:
U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, WA 98101



STATE OF IDAHO

DEPARTMENT OF
ENVIRONMENTAL QUALITY

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C.L. "Butch" Otter, Governor
Toni Hardesty, Director

January 24, 2011

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Bureau of Land Management
Attn: Tom Askew
400 W F Street
Shoshone, ID 83352-5284

Subject: Preliminary Assessment and Site Inspection (PA/SI) Report for the Liberty Gem
Mine and Mill Site

Dear Ms. Barnes and Mr. Matthews:

The Department of Environmental Quality (DEQ) is contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines on private or state lands. This mine and mill site is located on federally administered patented lands. DEQ completed field inspections and site assessment work in the summer of 2010. Attached you will find the PA/SI for the Liberty Gem mine and mill site. Below is a summary of the conclusions and recommendations for the agencies involved and current unpatented claim holders.

Samples from the waste dumps exceeded the Initial Default Target Levels (IDTLs) for most of the contaminants tested. The soil samples also exceeded the Human Health Screening Levels (HHSLs) for arsenic. There is evidence that elevated levels of contaminants in the waste dumps are a potential risk for site workers because the samples exceeded the background concentration by three times for arsenic and lead. Samples LGWD1SS-1 and LGWD2SS-1 exceeded background soils concentrations for mercury by three times.

The concentrations of arsenic and lead also exceeded ecological risk benchmarks for a majority of listed animal receptors. However, the ecological risk is relatively low for certain receptors (grazing animals, wolves) because they cover a large range and the mine and mill site is concentrated in a small area.

Sediment sample LGPPESD-1 exceeded IDTLs for arsenic, cadmium, chromium, lead, manganese, silver, mercury, and zinc. The sample exceeded the HHSLs for arsenic. LGPPESD-1 exceeded the background soils concentrations by three times for arsenic, cadmium, lead, manganese, silver, and zinc. The PPE shows the contaminants are traveling from the waste dumps into Liberty Gulch Creek and then to Croy Creek. Therefore, these wastes should be isolated, reclaimed, or removed.

Human health risks to local residents are di minimus. However, most health risks to site workers associated with this site should be addressed during mining operations or remedial activities by a site safety and health plan.

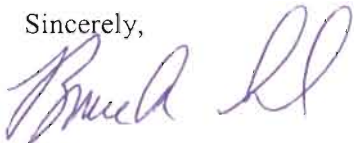
Ms. Carla J. Barnes
Mr. Thomas Askew
January 24, 2011
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Although it does not appear that pathways are complete to downstream water users, BLM or the owners should improve water management systems and reclaim mine waste dumps. If a plan of operations is submitted on the site, a formal water quality monitoring and evaluation plan should be required.

The dust from Waste Dump #5 may pose a risk to recreationists, if they are in the area for long periods of time. Access controls may manage some of those risks, particularly for Off Road Vehicle users. If access is to remain unrestricted, DEQ recommends reclamation and/or fugitive dust management of mine dumps.

Risks can be managed at the site with appropriate provisions in site safety plans and an operating and maintenance plan. However, DEQ is recommending EPA generate a Hazard Ranking Score for the Liberty Gem mine and mill site. DEQ is willing to assist you if you are interested in developing such plans. Please contact us with any questions or comments you may have.

Sincerely,

A handwritten signature in blue ink, appearing to read "Bruce A. Schuld".

Bruce A. Schuld
Mine Waste Projects Coordinator

attachment

cc: Bill Allred – DEQ Twin Falls Regional Office
Mike Browne – USDOJ Bureau of Land Management 1387 Vinnell Way Boise, Idaho 83709
Ken Marcy – U.S. EPA, Region 10
PA Program File

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List of Acronyms

amsl	above mean sea level
bgs	below ground surface
BLM	Bureau of Land Management
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DEQ	Idaho Department of Environmental Quality
EPA	United States Environmental Protection Agency
E & E	Environment & Ecology, Inc.
GIS	Geographic Information System
gpm	gallons per minute
HHSLs	Human Health Medium-Specific Screening Levels
HRS	Hazard Ranking Score
IDTLs	Initial Default Target Levels
IGS	Idaho Geological Survey
MCL	Maximum Concentration Limit
MSHA	Mine Safety and Health Administration
NAIP	National Agriculture Imagery Program
NRAP	No Remedial Action Planned
ORV	off road vehicle
PA	Preliminary Assessment
PPE	probable point of entry
ppm, mg/kg, mg/L	parts per million, milligrams per kilograms, milligrams per Liter
RCRA	Resource Conservation Recovery Act

RMP	Risk Management Plan
SI	Site Inspection
SQAP	Sampling and Quality Assurance Plan
TAL	Target Analyte List
TDL	Target Distance Limit
TMDL	Total Maximum Daily Load
USGS	U.S. Geological Survey
VCP	Voluntary Cleanup Program

Section 1. Introduction

This document presents the results of the Preliminary Assessment (PA) and Site Inspection (SI) for the Liberty Gem mine and mill site. The Department of Environmental Quality (DEQ) is contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines on private or state lands. This mine and mill site is located on federally administered patented lands. However, while contacting a number of private property owners in 2006 regarding access and other issues related to nearby private patented mine properties, DEQ was asked to investigate suspected illegal drug operations at the site. Because of the type of suspected illicit activities, DEQ passed these concerns on to its counterparts at the U.S. Department of Interior Bureau of Land Management (BLM). Subsequently, BLM investigated and evicted the transients living at the site and then cleaned up solid and other deleterious wastes at the site.

Following actions by the BLM, the current unpatented claim owners requested a site inspection by DEQ as a prelude to their planning and submittal of a plan of operations to the BLM. Specifically, the request was to determine if substantial hazardous waste or water quality issues might persist, and whether or not they might hinder reasonable and lawful re-development of the mineral resources of the site.

As a result of the recent history and the requests for inspections by the current owners, DEQ completed field inspections and site assessment work in the summer of 2010.

DEQ often receives complaints or information about sites that may be contaminated with hazardous waste. These sites include abandoned mines, rural airfields that have served as bases for aerial spraying, old landfills, illegal dumps, and abandoned industrial facilities that have known or suspected releases.

In February 2002, DEQ initiated a Preliminary Assessment Program to evaluate and prioritize assessment of such potentially contaminated sites. Due to accessibility and funding considerations, priority is given to sites where potential contamination poses the most substantial threat to human health or the environment. Priority is also given to mining districts where groups or clusters of sites can be assessed on a watershed basis.

For additional information about the Preliminary Assessment Program, see the following:

http://www.deq.idaho.gov/waste/prog_issues/mining/pa_program.cfm

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Section 2. Ownership

DEQ does not warrant the ownership research or location of property boundaries contained in this report. The information regarding ownership and property boundaries was obtained from the Blaine County tax assessor's office in Hailey, Idaho. The poor juxtaposition of the claims' boundaries observed in this report's figures are plotted according to the Blaine County tax assessor's database and are indicative of errors that may exist in the recorded surveys of the properties.

Within the following ownership descriptions the “**Partial Determination**” is meant to convey a very brief summary of DEQ's assessment of individual claims and parcels relative to human health and ecological risk factors associated with toxicological responses to mine wastes. A determination of No Remedial Action Planned or “**NRAP**” means based on current conditions at the site, DEQ did not find any significant evidence that would indicate the potential of adverse toxicological effects to human or ecological receptors on the parcel of land and, therefore no additional work is necessary to manage those potential affects. This determination says nothing about risks associated with physical hazards such as open adits, open shafts, high walls, or unstable ground. Partial Determination of “**calculate HRS**” indicates DEQ has determined there is sufficient evidence to warrant calculation of a **Hazard Ranking Score** (HRS) by EPA's contractors. It also indicates DEQ has made significant conclusions and recommendations that additional site assessment and/or remedial actions are necessary to prevent adverse affects to human or ecological receptors. These conclusions and recommendations are contained in the final section of this report.

The Liberty Gem mine and mill site consists of 22 unpatented mining claims located on federally administered patented lands.

Owner	Claims	Parcel Number	Partial Determination
Bureau of Land Management 400 W F Street Shoshone, ID 83352-5284	Liberty Gem #1, #2, #3, #7, #8, #9; Badger #1, #2, #3; Cash #1, #2, #4, #7, #10; Ornament; Trade Dollar; Mike's Birthday	RPO2N170330000	Calculate HRS

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Section 3. Overview and Location

3.1 Location

The Liberty Gem mine and mill site is located at an altitude of 5,770 feet in Liberty Gulch, a tributary to the Croy Creek sub-drainage, approximately 8.5 miles southwest of Hailey, Idaho, in Section 33 of Township 2 North, Range 17 East of the Boise Meridian, at Latitude 43.45667° N, Longitude 114.43881° W. The mine and mill site lies within surrounding land uses (urban and agriculture). The adjacent private property (Deheeya Ranch) to the west is considering the possibility of subdividing its property for residential development. The mine and mill site location is illustrated in Figures 1 and 2.

3.2 Directions to the Mine

The most direct route to the Liberty Gem mine and mill site is obtained by taking the improved dirt road that starts from Highway 75 in Hailey onto Bullion Street and going west to the site. At the Big Wood River bridge the road name changes to Croy Creek Road. Croy Creek Road continues west for approximately eight miles to the junction of Liberty Gulch Road. Follow the road to the right going north up Liberty Gulch. Although not maintained, the road is in good condition and does not require high clearance vehicles to access the mine and mill site.

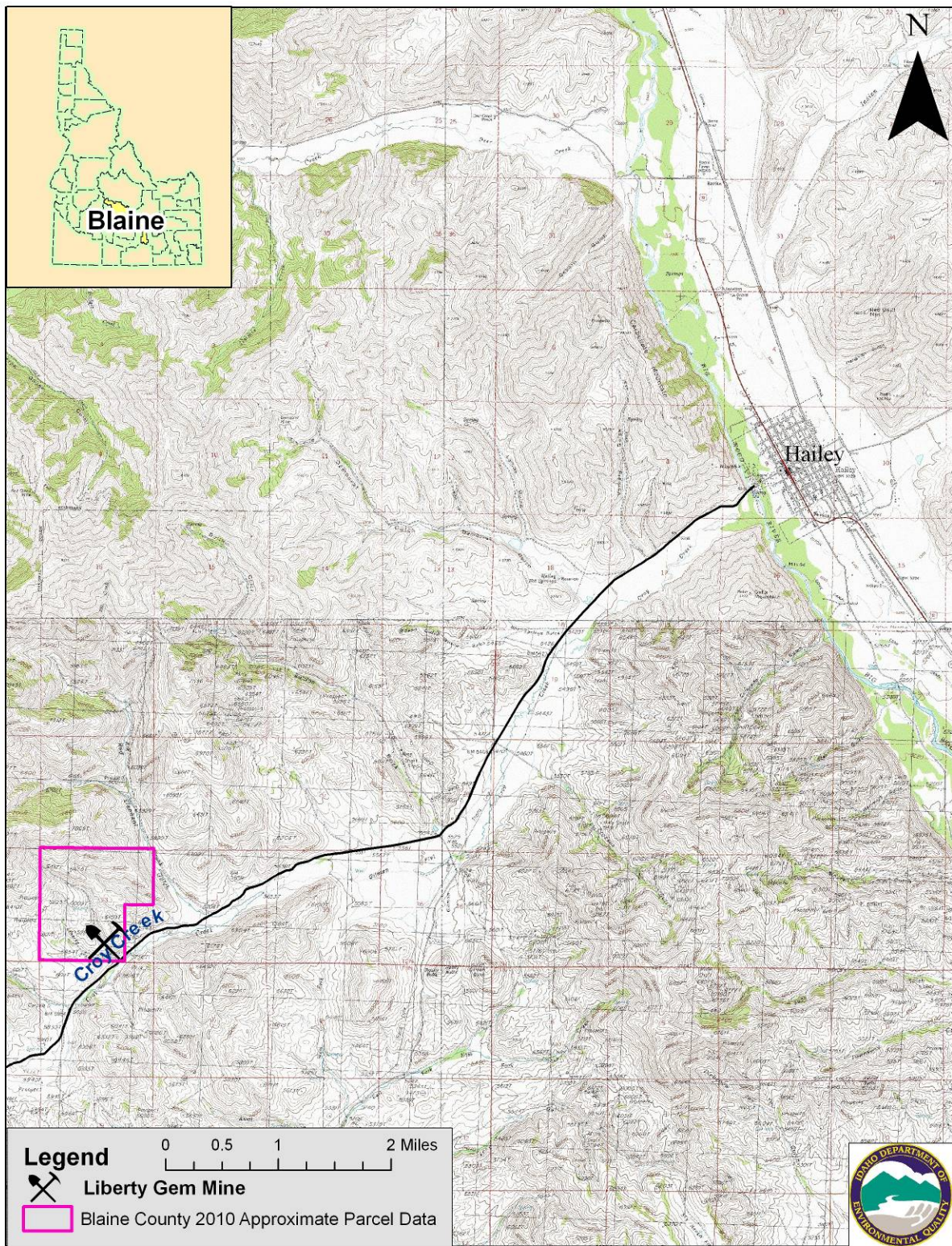


Figure 1. Topographical overview map of the Liberty Gem mine and mill site within the BLM parcel boundary in Blaine County, Idaho. (Map source: USGS 24k)

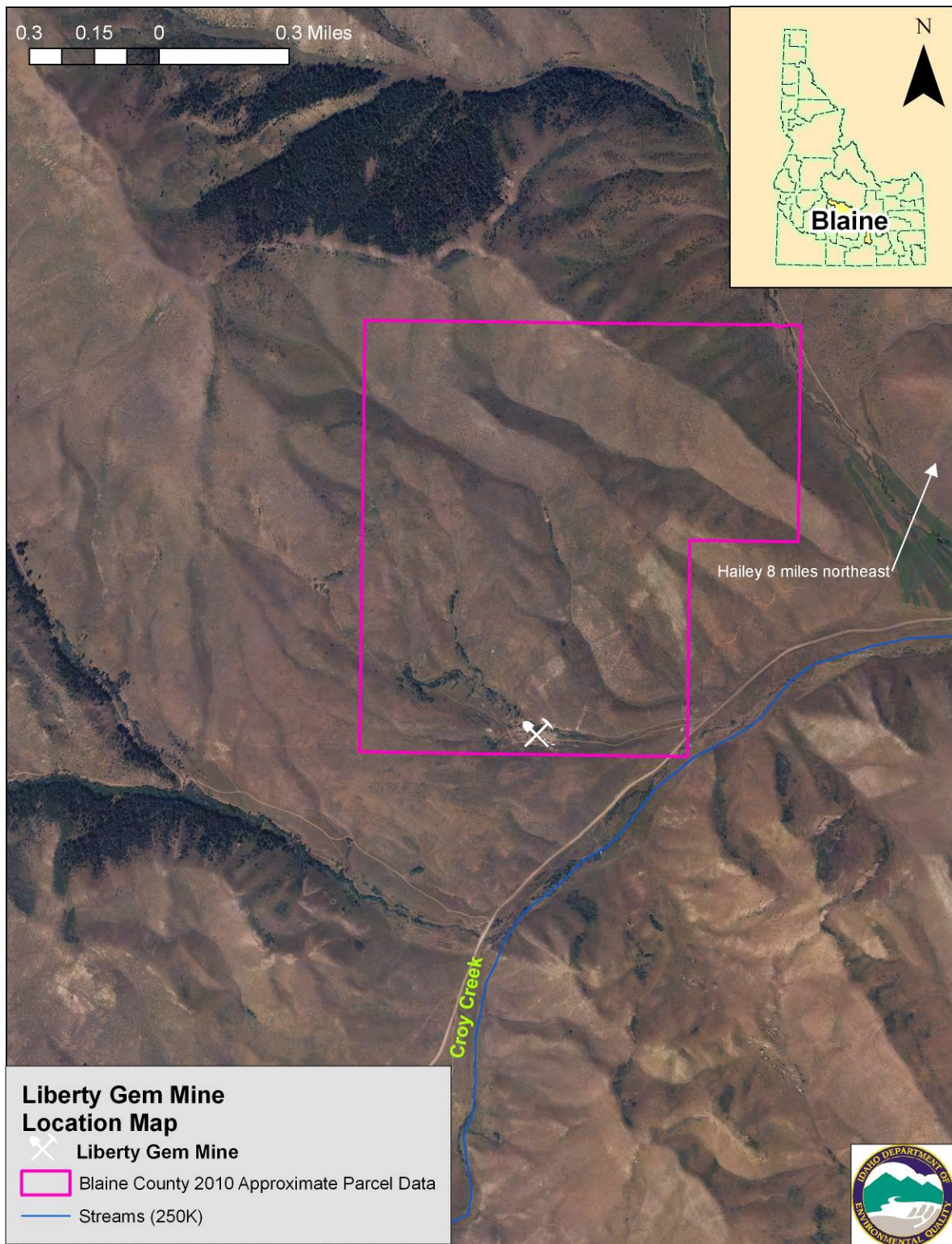


Figure 2. Aerial overview map of the Liberty Gem mine and mill site within the BLM parcel boundary in Blaine County, Idaho. (Map source: NAIP 2004)

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Section 4. Mine Site History

Very little historical references were found regarding activities that took place at the Liberty Gem mine and mill site after 1939. However, a brief early history of the site was compiled by A.L. Anderson, T.H. Kiilsgaard, and V.C. Fryklund in the Idaho Bureau of Mines and Geology Pamphlet No. 90 “*Detailed Geology of Certain Areas in the Mineral Hill and Warm Springs Mining Districts – Blaine County, Idaho*” (October, 1950). With the exception of some very brief additions, DEQ found no reason to alter the following excerpts taken directly from the Bureau of Mine and Geology Report. Anderson, Kiilsgaard, and Fryklund wrote:

The Liberty Gem is 8.5 miles southwest of Hailey, and about one-half mile northeast of the junction of Kelly Gulch and Croy Cree. The property comprises 22 unpatented claims, owned by the National Milling and Mining Corporation. There are several exploration workings on the property, but development has been principally by two shafts; the Bernie 230 feet deep; and the Main Shaft, 210 feet deep. Both Shafts are now caved at the surface. The deposits were discovered in 1927 by Newton Mathews and have been worked intermittently since that time.

Three veins are reported to occur on the property, although only one was examined. This vein is exposed in an open pit a few feet from the Main shaft. It is 30 inches thick, strikes N 15° W, and dips 48° SW. The vein is essentially a shear zone containing irregular masses of lead ore distributed throughout the fault gouge.

The country rock is part of the Wood River formation, although it is reported that on the 100 – foot level from the main shaft the vein passed into granitic rock, presumably a part of the large granitic mass outcropping nearby to the southwest in the Hailey Gold Belt area.

In 1939 a shipment of crude ore from the property assayed .015 ounces of gold per ton, 18.4 ounces of silver per ton, 18.9 per cent lead, and 3.3 per cent zinc. The production record of the mine was not obtained but is believed to be small.

This mine and mill site is located on federally administered patented lands. However, while contacting a number of private property owners in 2006 through 2008 regarding access and other issues related to nearby private patented mine properties, DEQ was asked to investigate suspected illegal drug operations at site. Because of the type of suspected illicit activities, DEQ passed these concerns on to its counterparts at the U.S. Department of Interior Bureau of Land Management (BLM). Subsequently, BLM investigated and evicted the transients living at the site, and then clean up solid and other deleterious wastes at the site.

Following actions by the BLM, the current unpatented claim owners requested a site inspection by DEQ as a prelude to their planning and submittal of a plan of operations to the BLM.

Specifically, the request was to determine if substantial hazardous waste or water quality issues might persist, and whether or not they might hinder reasonable and lawful re-development of the mineral resources of the site.

As a result of the recent history and the requests for inspections by the current owners, DEQ completed field inspections and site assessment work in the summer of 2010.

Currently the unpatented claim holders; Guy Matthews and Carla J. Barnes (Guy Matthew's daughter) have submitted a new Notice of Intent (NOI) and reclamation bond, case file # IDI-36602. The claim holders live on the west coast and Johnny Garth (BLM) said in a phone interview he doubts they will do much work on the property.

Mr. Garth said the site was rehabilitated. BLM removed two metal buildings and HAZMAT removed a truckload of refuse from one of the buildings. They also removed some of the vehicles on the site.

Section 5. Climatology

Climate information provided in this section is based on a climatological summary for Hailey, Idaho which was obtained from the National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center. The climatological data collected at the Hailey Airport (elevation 5,328 amsl), is for the period of 1951 through 1980. Each site for which this data is used is subject to more localized meteorological conditions that result from difference in elevation, orientation of slopes in watershed, vegetation, and other factors.

The region is characterized by short cool dry summers and very cold winters. The total annual precipitation measured at the Hailey Airport averages 16.2 inches. The majority of precipitation occurs as snow. Total annual snowfall averages 78.2 inches with most snowfall occurring in December and January. The driest months are July, August and September.

Based on records from 1951 to 1980, the average annual temperature measured at the Hailey Airport is 43° Fahrenheit (F). The lowest temperature recorded for this period was -28°F in 1962. The highest temperature for this period of record was 100°F in 1953. January is the coldest month with an average temperature of 19.5°F. July is the hottest month with an average temperature of 67°F.

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Section 6. General Geology

There have been numerous geology and mineral resource studies of the Wood River and adjacent areas. Geologic studies have been conducted to investigate mineral deposits (Lindgren, 1900 & 1933; Umpleby et al, 1930; Anderson and Wagner, 1946; Anderson et al, 1950; Hall et al, 1978; Wavra and Hall, 1989; Link and Worl, 2001; Worl and Lewis, 2001); individual formations and units (Hall et al, 1974; Sandberg et al, 1975; Wavra and Hall, 1986; Worl and Johnson, 1995); quadrangles (Batchelder and Hall, 1978; Mitchell et al, 1991; Kiislgaard et al, 2001); and to compile regional information (Rember and Bennett, 1979). Preliminary and environmental assessment investigations have been conducted to assess current and potential impacts from historic mining in the region (Mitchell and Gillerman, 2005; DEQ, 2002 & 2008; E & E, 2007).

The following description taken from Anderson, Kiislgaard, and Fryklund's 1950 report "*Detailed Geology of Certain Areas in the Mineral Hill and Warm Springs mining districts, Blaine County, Idaho*" illustrates the geology of the area:

The Hailey-Bellevue mineral belt is underlain by a varied assemblage of sedimentary and igneous rocks, which, except for volcanics of mid-Tertiary age and some still younger unconsolidated sedimentary rocks, are all older than the ore deposits. The earlier rocks include fairly wide exposures of the Milligen and Wood River formations that host many of the ore deposits in the Wood River region. They also host rather large intrusive bodies of diorite and quartz monzonitic rock which are regarded as outliers of the Idaho batholith. There is a younger group of intrusive rocks which are of more pertinent interest because of their close association with the mineralization....In addition to the Milligen formation (Mississippian age) and the Wood River formation (Pennsylvanian age), the area contains some strata in and beneath a series of Tertiary volcanics (Oligocene) and much poorly consolidated and unconsolidated slope wash, terrace gravels, and stream alluvium of Quaternary age.

Anderson, 1950, p. 2.

The Liberty Gem mine and mill site is located in primarily argillaceous limestone of the Pennsylvanian Wood River Formation. Previously, Umpleby (1930) wrote:

The rocks to which the name Wood River formation is here restricted occupy a larger part of the region than any other formation, either sedimentary or igneous. If they were not covered by lava flows they would occupy probably not less than two-thirds of the total area... The Wood River Formation consists of calcareous and quartzitic beds but contains also conglomerate, shale, and dolomite.

Umpleby, 1930, p. 29.

6.1 Structure

Umpleby (1930, pp. IX-X) noted the following in regards to the general structure of the rocks in the Wood River region:

During and shortly after the batholithic intrusions orogenic movements took place and produced the dominant structural features of the region. Forces acting from the southwest formed a series of overturned folds, which in places pass into overthrust faults.

There are also numerous normal faults, both parallel and transverse to the strikes of the folds and thrust faults. Some are clearly later than the Tertiary volcanism, but others are probably related to the thrust faulting and folding, and still others can not be definitely dated. Two of the granitic masses are rimmed with faults at and beyond the contact with the surrounding sedimentary beds. These faults are probably closely related to the intrusion of the granite.

Umpleby, 1930, pp. IX-X.

Figure 3 shows the major lithology of the Liberty Gem mine and mill site and surrounding area.

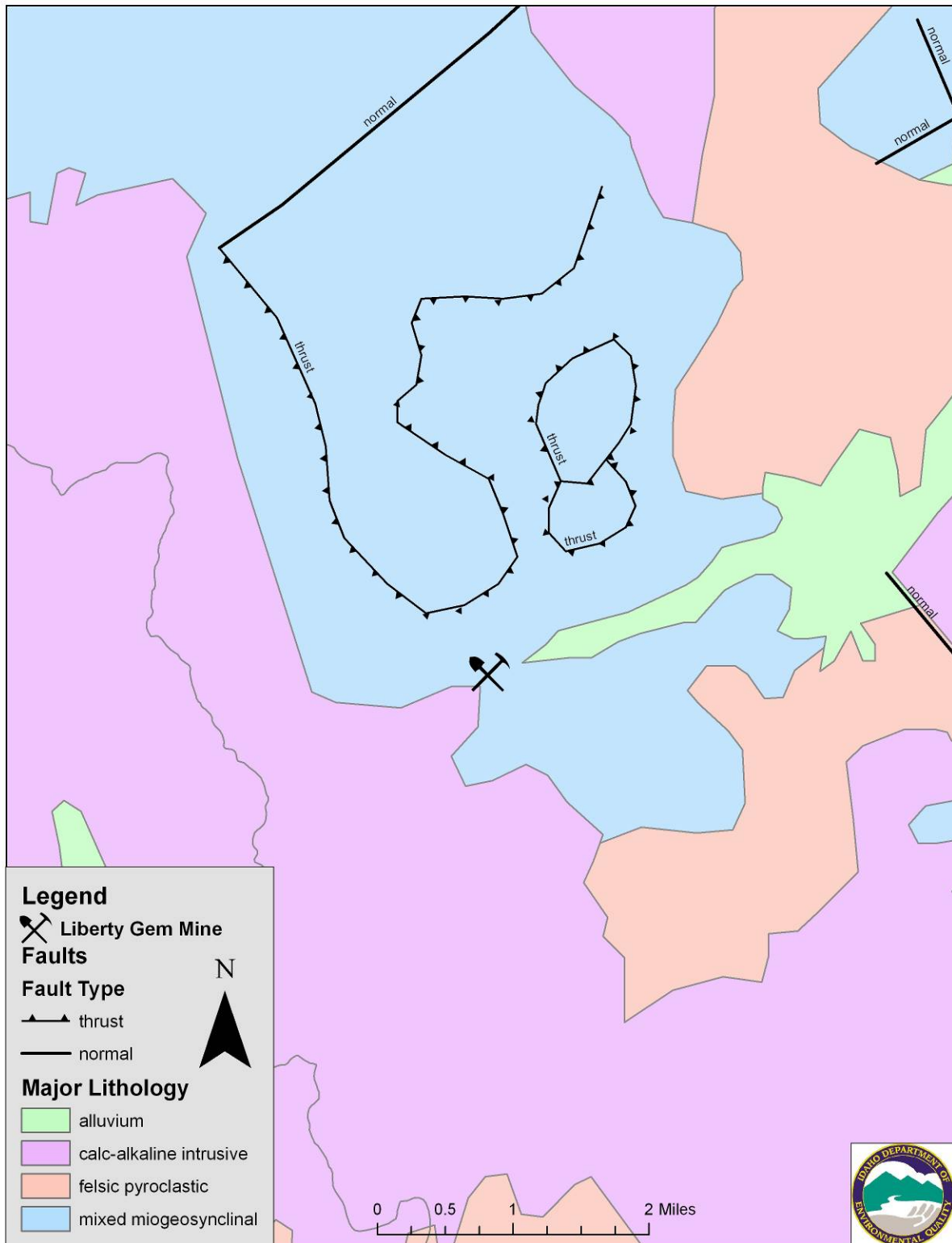


Figure 3. Major Lithology of the Liberty Gem mine and mill site and surrounding area.
(Map source: Idaho DEQ GIS ArcSDE 9.3.1 Geodatabase)

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Section 7. Current and Potential Future Land Uses

7.1 Current Land Uses

Current land uses in the Croy Creek sub-drainage and adjacent tributary areas include residential housing and recreational activities such as biking, hiking, hunting, horseback riding, and off-road vehicle (ORV) touring. Other land uses involve mining which can include; potential re-processing of mine wastes and re-opening the mine for production. Cattle and sheep grazing and alfalfa production are other current land uses in the area.

Public access to the Liberty Gem mine and mill site is unrestricted. People on motorcycles were observed riding on waste dump #5 during two DEQ visits to the adjacent property and the Liberty Gem mine and mill site.

7.2 Future Land Uses

Current uses are likely to continue well into the future, and mining activities may increase on unpatented lands. However, the local intentions to subdivide adjoining private properties may be the most significant future beneficial use when assessing human health and ecological risks of this site.

The BLM is also planning on doing some rehabilitation work as funding permits; this may include removal of two standing head frames (Phone interview with Johnny Garth, BLM).

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Section 8. Mine and Mill Site Conditions

The Idaho Geologic Survey (IGS) visited the site in 1998 as part of completing the report “Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Bureau of Land Management Property in the Hailey Bellevue Area: Miscellaneous Sites, Blaine County, Idaho” (IGS, 2000).

At the time of the IGS visit there was a full time caretaker living on the site. The area was posted with “No Trespassing” signs at the time of the IGS visit, but there were no signs posted at the entrance to Liberty Gulch when DEQ performed this assessment.

IGS noted in the report, “*The predominant hazard at all three sites is physical.*” However, IGS also wrote in the report, “*There is a potential environmental hazard where areas of pyritic waste rock are in close proximity to a creek and ponds. These should be moved to minimize potential acid drainage.*” (IGS, 2000). These statements indicate IGS did have some concerns regarding the potential impacts of heavy metals to surface and ground water.

DEQ performed the site assessment for the Liberty Gem mine and mill site on May 10, 2010. The claims cover most of Liberty Gulch and the mill site is in the center of the claims.

The investigation team noted three (possibly four) shafts. Two of the shafts were partially open and two were completely collapsed shut. There were also at least six waste dumps. Samples were collected from three of the waste dumps (LGWD1SS-1, LGWD2SS-1, and LGWD6SS-1). Figure 4 is the site map for Liberty Gem mine and mill site and shows the sample locations.

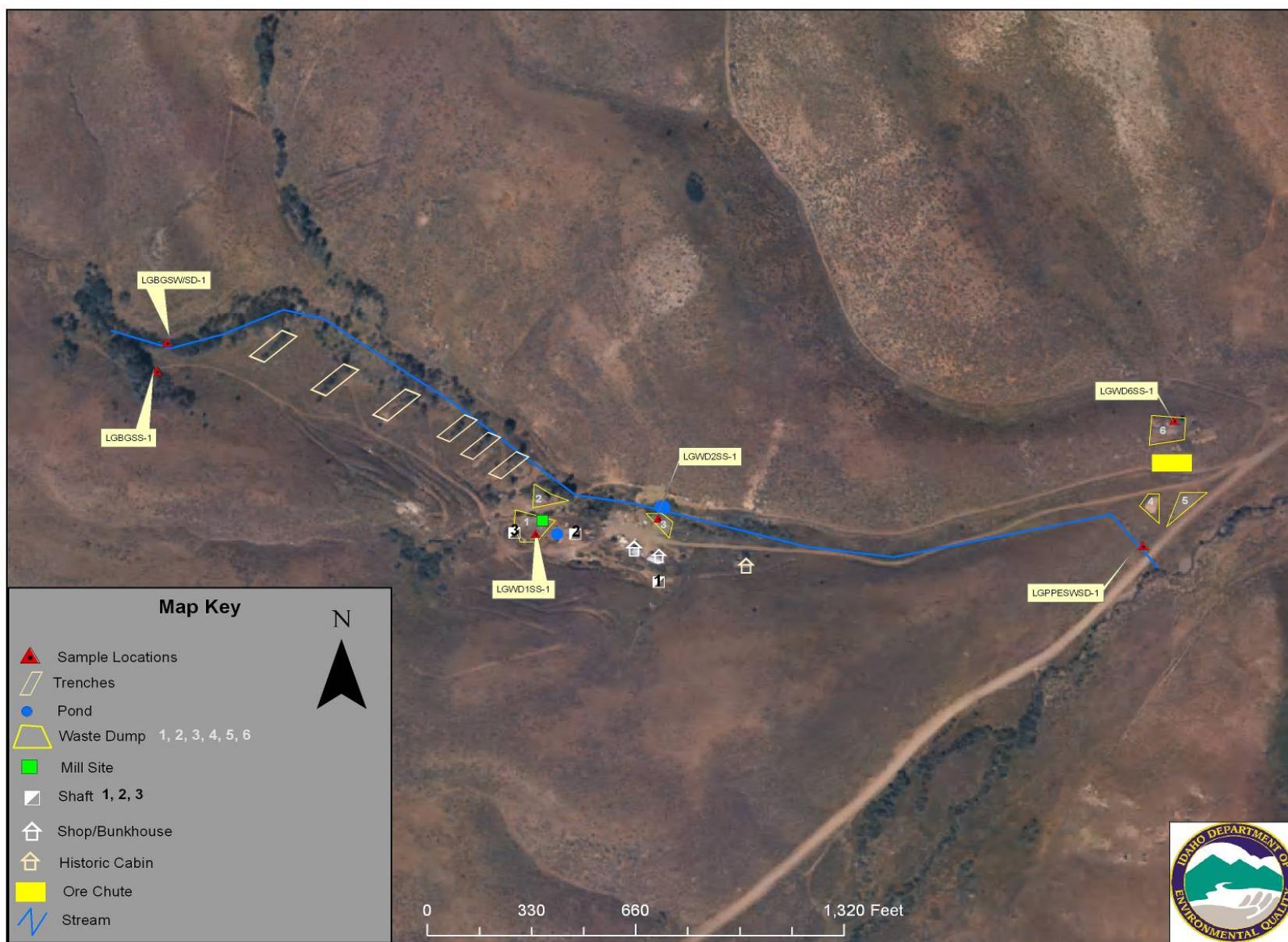


Figure 4. Site map for Liberty Gem mine workings and mill site; sample locations identified. (Map source: NAIP 2004).

The following site conditions and photographs are divided into two sections. The first section describes the physical features of the site, shafts, buildings, and ponds. The second section focuses on the waste dumps. The rock has been moved around extensively, probably due to exploration activities, and it is difficult to connect waste dumps to specific workings.

8.1 Physical Features

Background samples were collected approximately 1/3 mile upstream from the mine and mill site in Liberty Gulch. Samples LBGGSW1 and LBGSD1 were collected from Liberty Gulch Creek.



Photo 1. Upstream background station on Liberty Gem Gulch Creek. Samples LBGGSW1 and LBGSD1 were collected in the stream channel. (Photo by Schuld 5/10/10)

Sample LGBGSS1 was collected from above the cut bank of the roadway approximately ¼ mile upgradient in Liberty Gulch Creek drainage.



*Photo 2. Liberty Gem background soil sample LGBGSS1 was collected above the cut bank from the roadway.
(Photo by Schuld 5/10/10)*

DEQ observed perhaps six trenches and berms above the main workings that were constructed perpendicular to the flows of Liberty Gulch Creek, presumably to store water. These trenches may have been intended for exploration. None of the dumps are significant in size and are well vegetated and stable.



Photo 3. Trenches and berms constructed perpendicular to the flows of Liberty Gulch Creek. (Photo by Schuld 5/10/10)

Liberty Gem Shaft #3 is partially open and is considered a dangerous opening which should be closed or restricted.



*Photo 4. Residual wreckage of head frame above Liberty Gem Shaft #3.
(Photo by Schuld 5/10/10)*

Liberty Gem Shaft #2 is partially open and may be a dangerous opening that should be permanently closed or restricted.



Photo 5. Headframe above Liberty Gem Shaft #2. (Photo by Schuld 5/10/10)

According to Johnny Garth (BLM) in a phone interview, the head frames for the shafts may be removed by the BLM if future funding permits. Fencing around the shafts could provide some protection against trespassing.



Photo 6. From right to left, shop building, Shaft #2 and Shaft #3 in the distance. (Photo by Schuld 5/10/10)

DEQ observed the shop and bunkhouse remaining on the site. Both buildings have access restricted and are posted against trespass.



Photo 7. Liberty Gem shop and bunkhouse. (Photo by Schuld 5/10/10)

DEQ observed a historic mine shack or bunkhouse approximately 300 yards downhill from the main mine and mill facilities.



Photo 8. Historic mine shack or bunkhouse. (Photo by Schuld 5/10/10)

There is a cat cut behind and west of the mine shop and bunkhouse. There is a collapsed structure in the center of this cat cut that resembles the surface expression of another shaft. This could possibly be the Shaft #1.



*Photo 9. Cat cut behind and west of the mine shop and bunkhouse.
(Photo by Schuld 5/10/10)*



Photo 10. View of Liberty Gem Gulch where it joins with the Croy Creek drainage. (Photo by Schuld 5/10/10)

There are two ponds on the mine and mill site. The first pond is located northwest of the shop and bunkhouse and has a hoist drum and foundation platform at the pond's edge. This depression may either be the actual location of Shaft #3 depicted on topographic maps or it may be the location for a fourth Shaft. The perimeter of the pond is well vegetated.



Photo 11. A small pond containing water. (Photo by Schuld 5/10/10)

The second pond is on Liberty Gulch Creek. There is a man-made dam on the south end of the creek. The pond is heavily vegetated. IGS observed ducks nesting on their site inspection. DEQ observed macro invertebrates in the pond. This pond is approximately 50 ft in diameter and may be a jurisdictional wetland. During inspection of the second pond, DEQ noticed refuse in the pond.



Photo 12. Pond on Liberty Gulch Creek adjacent to the mine shop and mill facilities. (Photo by Schuld 5/10/10)



Photo 13. Looking over the back of the shop and bunkhouse to the second pond in the background. (Photo by Schuld 5/10/10)

8.2 Waste Dump Characterization

DEQ observed approximately six waste dumps on the Liberty Gem mine and mill site property. The dumps were numbered according to their location downgradient from the background sampling area.

Waste Dump #1 appears to contain less than 700 yards of grey/buff colored oxidized ores and approximately less than 100 cubic yards of low grade ore. Soil sample LGWD1SS-1 was collected from Waste Dump #1.



*Photo 14. Stockpile of perhaps 10 cubic yards of mineralized waste rock on Waste Dump #1. Sample LGWD1SS1 was collected here.
(Photo by Schuld 5/10/10)*

Waste Dump #2 probably contains less than 1,000 cubic yards of waste of mostly non-metaliferous country rock. Approximately 50 cubic yards of material appeared to be low-grade ore.



Photo 15. Waste Dump #2 is located in the foreground of the picture, on the left side. Shaft #2 head frame and Waste Dump #3 are in the background. (Photo by Schuld 5/10/10)

Waste Dump #3 is located adjacent to the second pond on the site. Sample LGWD2SS-1 was collected at this location. The sample designation is incorrect and should be LGWD3SS-1. Sample LGWD2SS-1 is designated this way in the sample analysis. Like the previously mentioned waste dumps, the material was a mixture of grey/buff colored oxidized ores. Approximately 50 percent of the material passed through a +9 mesh and was coarse.



Photo 16. Low grade ore stockpile on Waste Dump #3. (Photo by Schuld 5/10/10)

The toe of a low grade ore stockpile on Waste Dump #3 is in the adjacent flows and riparian area of Liberty Gulch Creek.



*Photo 17. The toe of a low grade ore stockpile on Waste Dump #3.
(Photo by Schuld 5/10/10)*

At the junction of Liberty Gem Gulch Road and Croy Creek Road there was a large area that appears to have been utilized to stockpile and load ores for shipment. At this intersection there is

the main stockpile and loading area (not pictured) and the two thinly dispersed stockpiles photographed here. Combined there probably isn't 30 cubic yards of mine wastes present. The larger stockpile was designated as Waste Dump #4. Waste Dump #4 contains approximately 20 cubic yards of buff/tan altered rock with iron staining.



Photo 18. One of the thinly dispersed stockpiles designated as Waste Dump #4. (Photo by Schuld 5/10/10)

The small low grade stockpile pictured below was designated as Waste Dump #5. This dump contained less than 30 cubic yards of waste rock, mostly grey in color from the Milligen formation which consists of limestone and slate.



Photo 19. Small low grade stockpile designated as Waste Dump #5. (Photo by Schuld 5/10/10)

The picture below illustrates the view from the ore chute (loading bin area) and the size of Waste Dump #4 and Waste Dump #5. Waste Dump #5 showed signs of recreational use; motorcycle tracks can be seen above the truck. This dump is the closest to the road and most accessible to recreationists.



*Photo 20. Waste Dumps #4 (buff/tan colored) and #5 (grey).
(Photo by Schuld 5/10/10)*

On a small ridge overlooking the intersection of Croy Creek Road and Liberty Gem Gulch Road there is another stockpile of ore and loading chutes which contain less than 1,000 cubic yards of ore. This area was designated Waste Dump #6. Sample LGWD6SS-1 was collected from Waste Dump #6.



Photo 21. Waste Dump #6. (Photo by Schuld 5/10/10)

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Section 9. Sample Collection and Analysis

A total of four soil, two sediment, and two unfiltered water samples were collected from the Liberty Gem mine.

A matrix identifying sample number, location, and sampling rationale is provided in Tables 1 through 4. Table 2 provides information about wildlife and livestock risk management criteria for metals found in soils. Sample locations are indicated on Figure 4.

**Table 1. Soil and Waste Sample Analysis
Liberty Gem Mine and Mill Site**

Metals	IDTLs (mg/kg)	HHSLs (mg/kg)	Liberty Gem Background (Soils) LGBGSS-1 (mg/kg)	Liberty Gem Waste Dump 1 (Soils) LGWD1SS-1 (mg/kg)	Liberty Gem Waste Dump 3 (Soils) LGWD2SS-1 (mg/kg)	Liberty Gem Waste Dump 6 (Soils) LGWD6SS-1 (mg/kg)
Antimony	4.77	31	<2.0	26.3	9.7	8.9
Arsenic	0.391	23	10.3	2630	8570	277
Barium	896	1600	160	18.4	39.6	8.80
Cadmium	1.35	39	1.48	0.89	2.95	10.1
Chromium	7.9	210	47.4	20.9	44.6	44.1
Copper	921	2900	30.6	340	195	81.8
Iron		55000	21400	47600	68400	38300
Lead	49.6		19.1	8420	2260	787
Manganese	223	3600	489	47.0	493	336
Selenium	2.03	23	<4.0	8.7	6.1	8.2
Silver	0.189	390	.53	55.7	16.5	9.63
Zinc	886	390	143	339	1400	907
Mercury	0.00509	23	<0.033	0.267	0.052	0.080

BOLD* indicates metals concentrations in soils exceed the BLM Ecological Risk Benchmarks.

Light Yellow = exceeds Idaho Initial Default Target Levels.

Bright Yellow = exceeds Human Health Screening Levels.

Red Font = exceeds Background Levels by greater than three times.

Table 2. Wildlife and Livestock Risk Management Criteria for Metals in Soils (mg/kg)
BLM Technical Note 390 Rev. “Risk Management Criteria for Metals at BLM Mining Sites”

Liberty Gem Mine and Mill Site

Metals	Elk	Mule Deer	Big Horn Sheep	Deer Mice	Cottontail Rabbits	Canada Goose	Mallard	Robin	Cattle	Sheep	Median Values
Antimony											
Arsenic	328	200	387	230	438	61	116	4	419	275	275
Barium											
Cadmium	3	3	9	7	6	2	1	0.3	15	12	8
Chromium											
Copper	131	102	64	640	358	161	141	7	413	136	136
Iron											
Lead	127	106	152	142	172	34	59	6	244	125	125
Manganese											
Selenium											
Silver											
Zinc	275	222	369	419	373	271	196	43	1082	545	307
Mercury	11	11	6	2	15	6	4	1	45	8	8

**Table 3. Sediment Sample Analysis
Liberty Gem Mine and Mill Site**

Metals	IDTLs (mg/kg)	HHSLS (mg/kg)	Liberty Gulch Creek Background Sediment Sample LGBGSD-1 (mg/kg)	Liberty Gulch Creek Site PPE Sediment Sample LGPPESD-1 (mg/kg)
Antimony	4.77	31	<2.0	3.0
Arsenic	0.391	23	12.6	166
Barium	896	1600	58.8	71.1
Cadmium	1.35	39	0.81	10.1
Chromium	7.9	210	72.3	33.9
Copper	921	2900	22.5	56.8
Iron		55000	19100	19300
Lead	49.6		15.2	237
Manganese	223	3600	495	500
Selenium	2.03	23	<4.0	<4.0
Silver	0.189	390	<0.50	2.97
Zinc	886	390	70.8	1910
Mercury	0.00509	23	<0.033	0.058

Light Yellow = exceeds Idaho Initial Default Target Levels.

Bright Yellow = exceeds Human Health Screening Levels.

Red Font = exceeds Background Levels by greater than three times.

Table 4. Total Recoverable Metals Analysis (mg/L)
(Concentrations expressed in mg/l unless otherwise stated)

Liberty Gem Mine and Mill Site

	DEQ Ground Water Standard	DEQ Drinking Water Standard	DEQ Cold Water Biota Standard	DEQ Cold Water Biota Standard	Liberty Gulch Creek Background Surface Water Sample	Liberty Gulch PPE Surface Water Sample
Description	(T)	MCL	Acute	Chronic	LGBGSW-1	LGPPEW-1
Antimony					<0.020	<0.020
Arsenic	0.05	0.01	0.36	0.19	<0.025	0.055
Barium	2	2			0.0186	0.0328
Cadmium	0.005	0.005	0.00082 (H)	0.00037 (H)	<0.0020	<0.0020
Chromium (Total)	0.1	0.1			<0.0060	<0.0060
Copper	1.3		0.0046 (H)	0.0035 (H)	<0.010	<0.010
Iron	0.3*				0.223	<0.060
Lead	0.015	0.015	0.014 (H)	0.00054 (H)	<0.0075	<0.0075
Manganese	0.05				0.0104	<0.0040
Selenium	0.05	0.05	0.018 (T)	0.005 (T)	<0.040	<0.040
Silver	0.1*		0.00032 (H)		<0.0050	<0.0050
Zinc	5*		0.035 (H)	0.032 (H)	<0.0100	0.125
pH				6.5 - 9.0	7.85 su	8.02 su
Conductivity					2.89 µs/cm	.353 µs/cm
Turbidity				<50	30 NTU	8 NTU
Dissolved Oxygen				<6	10.96 mg/l	9.00 mg/l
Temperature				>19	9.1° C	14.9°C
Salinity					0.01 mg/l	0.01 mg/l

* secondary MCL (T) – Standard in Total (H) – Hardness dependent * 25 mg/L

The soil samples were sieved prior to shipping to the laboratory. Material passing through the No. 9 mesh was retained for laboratory analysis. Soil sample equipment that came into direct contact with the samples was decontaminated with distilled water and a solution containing Alconox before the next sample was collected and screened.

The soil and surface water samples were submitted in accordance with EPA Chain-of-Custody procedures to Silver Valley Laboratories, Inc. in Kellogg, Idaho for analysis of RCRA 8 Suite (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) + copper, iron, manganese, antimony, and zinc. A copy of the laboratory report is included as Appendix A.

A brief narrative of the sample locations and pertinent observations is included in the following section.

One background soil sample was collected from above the Liberty Gem mine and mill site (LGBGSS1). This sample was light brown to buff in color and was a mixture of silt and organic debris. The soil sample contained approximately 90 percent soil and less than 10 percent organics.

Two background samples were taken for water and sediment above the pond in the creek north of the Liberty Gem mine and mill site (LGBGSW-1 and LGBGSD-1). The water appeared clear and was flowing in Liberty Gulch Creek at approximately 20 gallons per minute (gpm). Sediment sample LGBGSD-1 consisted of dark brown to buff gravels, fine grains, and silt. Approximately 10 percent of the collected material passed through No. 9 mesh and there was approximately less than two percent organic detritus.

The remaining samples were collected from Liberty Gulch Creek and waste dumps on the site.

DEQ collected an unfiltered surface water sample (LGPPESW-1) and a sediment sample (LGPPESD-1) from the probable point of entry (PPE) in Liberty Gulch Creek. LGPPESD-1 had too much clay content and wasn't sieved on-site. The sample was allowed to settle in its container, residual water was decanted, and the sample was then dried prior to screening. The sediment was dark brown in color and had greater than five percent organic matter.

The next soil (waste) samples were collected from Waste Dumps #1, #3, and #6. Sample LGWD1SS-1 contained mostly non-metaliferous country rock with a small percentage of low-grade ore. The sample was grey and buff colored. Approximately 90 percent of the material passed through 9 mesh. Sample LGWD2SS-1 (from Waste Dump #3) consisted of low-grade ore. The material was grey to buff colored and 50 percent passed through 9 mesh. The material was coarse and varied from small particles to four inches in diameter. LGWD6SS-1 consisted of a mixture of grey and orange rock, and approximately 50 percent of the material passed through 9 mesh.

9.1 Soils Analysis

Soil samples were analyzed at SVL utilizing EPA 6000/7000 method 6010B for all metals except mercury where method 7471A was utilized. Laboratory analytical results have been compared to and will be discussed below relative to Idaho's *Initial Default Target Levels* (IDTLs), EPA

Region 6 Human Health Screening Levels (HHSLs), and the U.S. Department of Interior-Bureau of Land Management Wildlife and Livestock Risk Management Criteria for Metals in Soils (Technical Note 390 rev.2004). Analytical data will also be discussed relative to background concentrations found in soil sample LGBGSS-1.

The IDTLs are risk-based target levels for certain chemicals that have been developed by DEQ using conservative input parameters, a target acceptable risk of 10^{-5} , and a *Hazard Quotient* of 1. These numbers, although used for comparison even at remote locations, are more applicable to sites where “unrestricted uses” such as residential development are expected. Similarly, the EPA Region 6 HHSLs are human health based risk derived for screening where residents are at risk for exposure. These concentrations are not unusual for a location or facility in a historic mining district such as the Hailey and Ketchum area.

Table 1 summarizes laboratory analytical results for soil samples collected. The background soil sample LGBGSS-1 exceeded the IDTLs for arsenic, cadmium, chromium, manganese, and silver.

Sample LGWD1SS-1 exceeded the IDTLs for antimony, arsenic, chromium, lead, selenium, silver, mercury, and zinc. The sample also exceeded levels above the HHSLs for arsenic. LGWD1SS-1 exceeded the background sample by three times for antimony, arsenic, copper, lead, silver, and mercury.

Sample LGWD2SS-1 exceeded IDTLs for antimony, arsenic, cadmium, chromium, iron, lead, manganese, selenium, silver, mercury, and zinc. The sample exceeded the HHSLs for arsenic and iron. LGWD2SS-1 exceeded the background sample by three times for antimony, arsenic, copper, iron, lead, and mercury.

Sample LGWD6SS-1 exceeded IDTLs for antimony, arsenic, cadmium, chromium, iron, lead, manganese, selenium, silver, mercury, and zinc. The sample exceeded the HHSLs for arsenic and iron. LGWD6SS-1 exceeded the background sample by three times for arsenic, cadmium, iron, lead, and zinc.

9.2 Sediment Analysis

Table 3 summarizes laboratory analytical results for sediment samples collected. The background sediment sample LGBGSD-1 exceeded the IDTLs for arsenic, chromium, and manganese.

Sample LGPPESD-1 exceeded IDTLs for arsenic, cadmium, chromium, lead, manganese, silver, mercury, and zinc. The sample exceeded the HHSLs for arsenic. LGPPESD-1 exceeded the background sample by three times for arsenic, cadmium, lead, manganese, silver, and zinc.

9.3 Surface Water Analysis

Table 4 summarizes laboratory analytical results for surface water samples collected including: a background sample collected from Liberty Gulch Creek above the PPE; and the PPE along Liberty Gulch Creek below the waste dumps before it flows into Croy Creek.

Sample LGBGSW-1 was collected from Liberty Gulch Creek above the pond and waste dumps. The water was clear. An unfiltered sample was collected and nitric acid was used as a preservative that was added to the sample containers.

Sample LGPPESW-1 was collected from Liberty Gulch Creek below the waste dumps before Croy Creek. An unfiltered sample was collected and nitric acid was used as a preservative that was added to the sample containers.

The background water sample shows no elevated levels of constituents. Sample analyses indicate levels of arsenic, barium, and zinc increase in Liberty Gulch Creek from the background to the PPE. The level of zinc in sample LGPPESW-1 exceeds the DEQ cold water biota standards for acute and chronic criteria.

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Section 10. Pathways and Environmental Hazards

10.1 Ground Water Pathways

During the cleanup activities of the nearby mines, specifically the Minnie Moore and Triumph mines, some of the first concerns were related to potential human health risks as a result of contamination of public and private drinking water supplies. Generally speaking, contamination of drinking water systems was thought likely to occur from two types of sources (ore bodies and waste dumps) and along three pathways, as illustrated by the following three scenarios. First, heavy metals are leached from tailings piles and waste rock dumps, enter ephemeral or perennial drains and then contaminate the area's shallow ground water system. Second, heavy metals leach from the local ore bodies and are transported through the geologic structure to the shallow ground water. Third, heavy metals could leach out of the ore bodies, and be discharged from the underground workings as adit water, that is then conveyed through ephemeral and perennial drains to the shallow ground water systems.

For the purposes of completing Preliminary Assessments, Source Water Assessments (completed for local public drinking water supplies) were used to identify any known affects to those systems. Although DEQ's Source Water Assessments were used to evaluate potential effects of this mine on public drinking water supplies, no inferences can be made about the effects that this and adjoining mines have on local private wells.

Source water assessments provide information on the potential contaminant threats to public drinking water sources. In the Big Wood River Valley of Idaho, most of those sources (>95 percent) are ground water (DEQ 2000). Each source water assessment:

- Defines the zone of contribution, which is that portion of the watershed or subsurface area contributing water to the well or surface water intake (**source area delineation**).
- Identifies the significant potential sources of drinking water contamination in those areas (**contaminant source inventory**).
- Determines the likelihood that the water supply will become contaminated (**susceptibility analysis**).

Each assessment is summarized in a report that describes the above information and provides maps of the location of the public water system, the source area delineation, and the locations of potential contaminant sources. Idaho began developing source water assessments in 1999, and in May 2003 met its obligation under the amendments of the Safe Drinking Water Act by completing delineations for all 2100+ public water systems that were active in Idaho as of August 1999 (DEQ 2000). Source water assessments for new public drinking water systems are being developed as those systems come online. Each public water system is provided with two copies of its final assessment report.

Four source water assessments for drinking water supplies have been used in this Preliminary Assessment Process to evaluate the potential impacts to both public and private drinking water supplies in and around Sun Valley, Ketchum, Hailey, and Bellevue, Idaho.

The information extrapolated from these source water assessment reports is based on data that existed at the time of their writing, and the professional judgment of DEQ. Although reasonable efforts were made to present accurate information, no guarantees, including expressed or implied warranties of any kind are made with respect to these reports or this Preliminary Assessment by the State of Idaho or any of its agents who also assume no legal responsibility for accuracy of presentation, comments or other information in these publications or this Preliminary Assessment report. The results should not be used as an absolute measure of risk, and they should not be used to undermine public confidence in public drinking water systems.

The Source Area delineation process establishes the physical area around a well or surface water intake that becomes the focal point of the source water assessment. The process includes mapping the boundaries of the zone of contribution (the area contributing water to the well or to the surface water intake) into time of travel zones (TOT) indicating the number of years necessary for a particle of water to reach a well or surface water intake (DEQ 2000). The size and shape of the source water assessment area depend on the delineation method used, local hydrogeology, and volume of water pumped from the well or surface water intake.

DEQ used a refined computer model approved by EPA to determine the 3-year (Zone 1B), 6-year (Zone 2), and 10 year (Zone 3) time of travel associated with the Big Wood River Aquifer and its sources (DEQ 2000). This information is illustrated in Figure 5.

This process involves collecting, recording, and mapping existing data and geographical information system (GIS) coverage to determine potential contaminant sources (e.g., gas stations) within the delineated source water assessment area. The potential contaminant source inventory is one of three factors used in the susceptibility analysis to evaluate the overall potential risk to the drinking water supply (DEQ 2000). The inventory process goal is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water or surface water contamination.

This analytical process determines the susceptibility of each public water system well or surface water intake to potential contamination within the delineated source water assessment area. It considers hydrogeologic characteristics, land use characteristics, potentially significant contaminant sources, and the physical integrity of the well or surface water intake. The outcome of the process is a relative ranking into one of three susceptibility categories: high, moderate, and low. The rankings can be used to set priorities for drinking water protection efforts (DEQ 2000).

There are numerous public and private drinking water supplies in the Big Wood River Valley. The Sun Valley Water and Sewer District operates and maintains nine wells in two groupings (DEQ 2000). The City of Ketchum drinking water system consists of seven wells in two groupings. The City of Hailey's drinking water system consists of six wells and a spring (DEQ 2000). The City of Bellevue drinking water system consists of two wells and three springs (DEQ 2000).

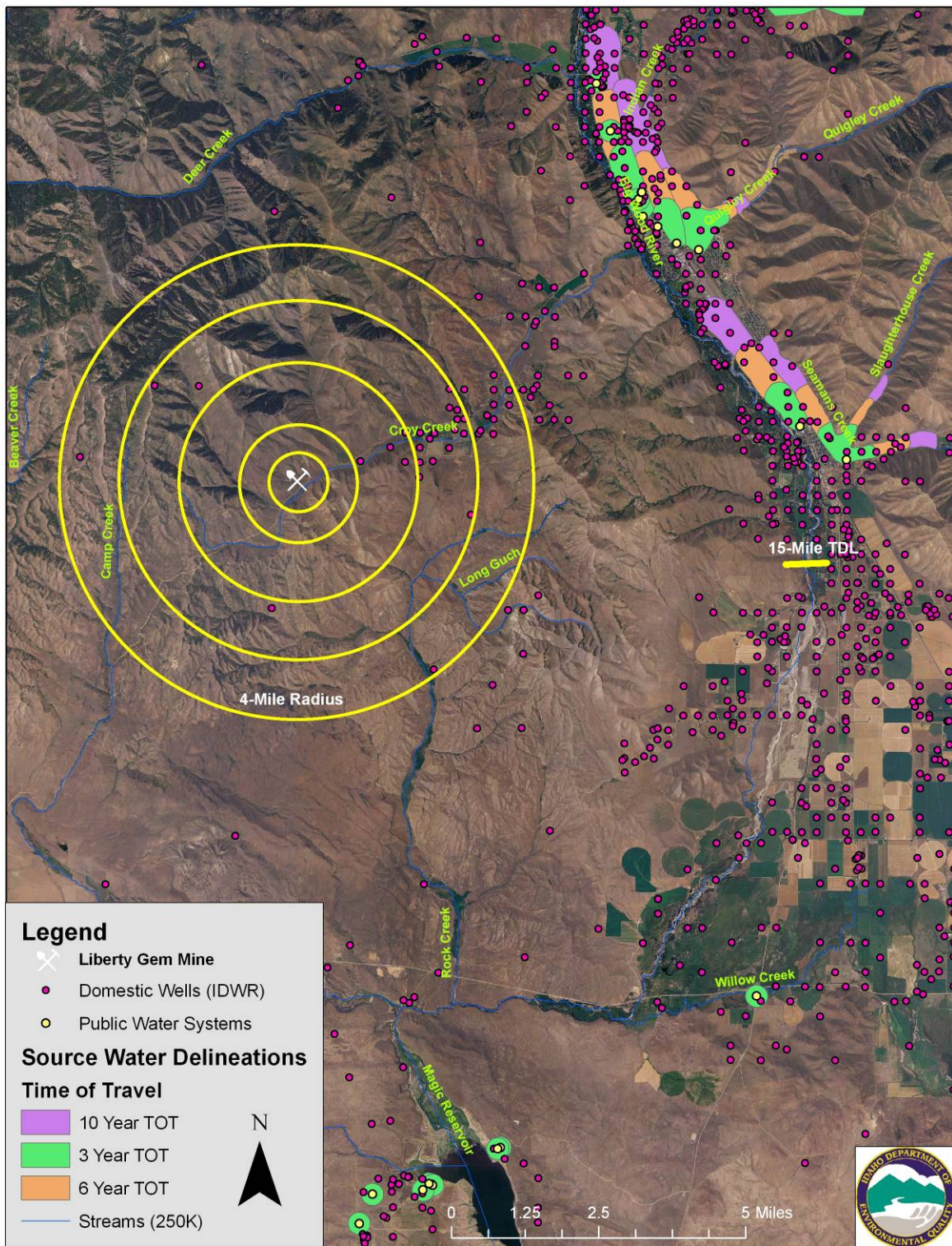


Figure 5. Domestic wells and public water system wells located near the Liberty Gem mine and mill site (Map source NAIP 2004).

Generally speaking, public drinking water systems in the Big Wood River Valley are rated as moderate to high (DEQ 2000). Multiple factors affect the likelihood of movement of contaminants from the sources to the aquifer, which lead to this moderate to high score. Soils in the area are poorly to moderately drained. The vadose zone is predominantly gravel, which increases the score. On the valley floors the average depth to ground water is twenty to fifty feet.

To date, routine water quality monitoring of public drinking water indicates that there are no significant volumes of heavy metals migrating through the regional or localized ground water systems. There is no current, long term or recurring water chemistry problems in the City of Ketchum's drinking water sources. Arsenic, nickel, antimony, barium, selenium, chromium, cyanide and nitrate have been detected in Ketchum's wells, but all were well below MCLs (DEQ 2000). There is no long term or recurring water chemistry problems in the City of Hailey's drinking water sources. Manganese, zinc, chromium, and mercury have been detected in Hailey's wells, but all were well below MCLs (DEQ 2001). Currently, there are no data that indicate any metal concentrations have exceeded MCLs in the Bellevue drinking water systems (DEQ 2000).

10.2 Surface Water Pathways

The surface water migration pathway target distance limit (TDL) begins at the probable point of entry of surface water runoff from a site to a surface water body and extends downstream for 15 miles. The surface water TDL for the Liberty Gulch sub-drainage is presented in Figure 6.

Liberty Gulch Creek is an ephemeral drain through most of its reach. Liberty Gulch Creek drains toward the south-southeast from a spring at the head of the gulch. The distance from the background sample location on Liberty Gulch Creek to where it joins Croy Creek is approximately 0.7 miles. Croy Creek runs for approximately 8 miles before it enters the Big Wood River. The Big Wood River is an EPA CWA §303(d) listed stream.

The PPE of mine and mill runoff into Croy Creek is approximately 0.7 miles to the south where Liberty Gulch Creek enters Croy Creek. The 15-mile target distance limit (TDL) is approximately 2 miles south of Bellevue on the Big Wood River. The city of Hailey is situated at about mile 8.5 of the TDL. There are no surface water intakes for public drinking water systems within the 15-mile TDL.

10.3 Domestic Wells and Public Water Supplies

There are approximately 36 domestic, commercial, and municipal water wells within a four mile radius of the Liberty Gem mine and mill site. All of these wells are located down gradient of the mine. No public water system wells or their zones of capture are located within a 4-mile radius of the Liberty Gem mine and mill site (Figure 5). The nearest domestic well is located approximately 1.3 miles down hydraulic gradient from the site near the mouth of Red Elephant Gulch. The nearest public water system within the 15 mile target distance limit is the City of Bellevue's Chantrelle well (PWS ID 507004).

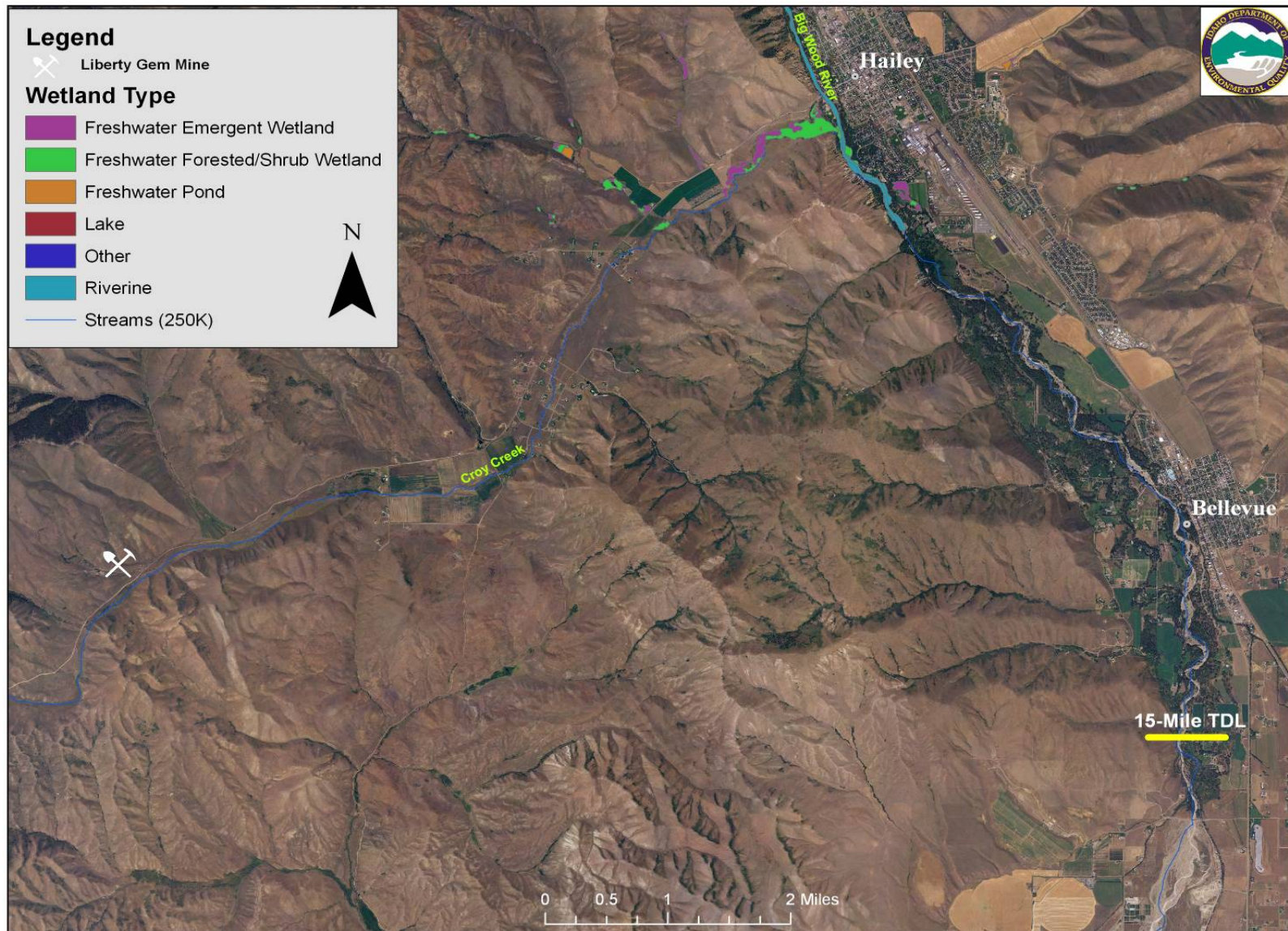


Figure 6. 15-Mile Target Distance Limit (TDL) with wetlands data. (Map source: NAIP 2004).

The City of Bellevue is a community of approximately 1,265 people with 540 connections, located in Blaine County, south of the City of Hailey, near the confluence of Slaughterhouse Creek and Big Wood River. The public drinking water system for the City of Bellevue is comprised of two wells and three springs.

The primary water quality issue currently facing the City of Bellevue is microbial contamination, possible inorganic chemical (IOC) contamination from the local mining operations, and possible volatile organic chemical (VOC) contamination from various sources, and the problems associated with managing this contamination. In recent years, total coliform has been detected at various sampling locations in the Bellevue area including the well house, City Hall, City Shop, General Store, and others.

10.4 Air Quality Pathways

Access is unrestricted to off-road vehicles (ORVs). DEQ witnessed people riding on Waste Dump #5 on two occasions when they were conducting preliminary assessments in the area. This dump is close to Croy Creek Road and there are no barriers to public access. The most likely air pathway is contact between recreationists and site workers to fugitive dust emissions. The delivery of significant dust from the mine site to local residents is not likely because of the distance (>1 mile) to those residents.

Site workers performing mine operations or remedial actions on the site are likely to receive appreciable exposures via air pathways. Although this is an inherent risk of the job, a mine site safety and health plan required by the Mine Safety and Health Administration (MSHA) should account for management of these risks for these receptors.

10.5 Soil Exposure

According to DEQ's Risk Evaluation Manual, if pathways are determined to be "complete" or if pathways are anticipated to become complete as a result of future uses, and the IDTLs are exceeded for any constituents, two options should be considered:

1. Adopt the IDTLs as the cleanup levels and develop a *Risk Management Plan* (RMP).
2. Perform a more detailed, site-specific evaluation, which includes developing site-specific background concentrations for comparative purposes.

The soil exposure pathways are not complete for full-time residents. The unpatented claim holders live on the west coast, and it is unlikely they will be exposed continuously for long periods of time.

As witnessed on multiple occasions by DEQ, infrequent recreational exposures may occur but are not deemed to be of concern for recreational scenarios.

10.6 Residences, Schools, and Day Care Facilities

The nearest residence is approximately 1.2 miles east of the Liberty Gem mine and mill site. There are no schools or day care facilities within 200 feet of this mine site.

10.7 Wetlands

There are no significant wetlands (>500 feet wide) located in the immediate area of the Liberty Gem mine and mill site (Figure 6). However, the second pond on the mine and mill site may be a jurisdictional wetland.

Significant wetlands exist along Croy Creek 5-6 miles downstream of the mine and mill site to the 15-mile TDL on the Big Wood River (Figure 6). These wetlands are characterized as freshwater emergent and forested shrub wetlands. The first freshwater forested/shrub wetland encountered on Croy Creek is approximately 8.14434 acres in size (USFWS, 2010).

10.8 Sensitive Species (Plant and Animal)

Most of the sensitive species have large ranges which overlap the Liberty Gem mine and mill site. Due to the size of those ranges, these species may not receive significant exposure time or doses to heavy metals.

Although they are likely to exist locally, no sensitive plant species have been documented to exist within the 4-mile radius of the Liberty Gem mine and mill site. (Figure 7).

The site is located within a defined range and habitat for Nez Perce and gray wolves. However, the size of the tailings impoundments relative to the total range is very small and, therefore, unlikely to be a significant source for exposure.

The Big Wood River is a wintering area for Bald Eagles (*Haliaeetus leucocephalus*) which are listed as a sensitive species.

Endangered Species Act List (Non-Game Species and Plants) (Figure 7):

Listed Threatened Species (non-game) within 4-mile radius:

None

Listed Threatened Species (non-game) outside of 4-mile radius:

Lynx (*Lynx canadensis*)

Bald Eagle (*Haliaeetus leucocephalus*)

No Status Species within 4-mile radius:

Potential wolf range (Nez Perce)
Gray wolf habitat (Soldier Mountain)
North American wolverine (*Gulo gulo luscus*)
Long toed salamander (*Ambystoma macrodactylum*)

No Status Species outside of 4-mile radius:

Potential wolf range (Nez Perce)
Gray wolf habitat (Soldier Mountain)
A mayfly (*Ameletus sparsatus*) (*Parameletus columbiae*)
Prairie Rattlesnake (*Crotalus viridis*)
Racer (*Coluber constrictor*)
Columbia spotted frog (*Rana luteiventris*)
Rubber Boa (*Charina bottae*)
Gopher Snake (*Pituophis catenifer*)
Pygmy Rabbit (*Brachylagus idahoensis*)
Long Legged Myotis (*Myotis volans*)
Unclassified Bat (*Chiroptera*)
Western Terrestrial Garter Snake (*Thamnophis elegans*)
Northern Goshawk (*Accipiter gentilis*)
Snowshoe hare (*Lepus americanus*)
Striped skunk (*Mephitis mephitis*)
Northern pocket gopher (*Thomomys talpoides*)
American Badger (*Taxidea taxus*)
American Beaver (*Castor canadensis*)
Yellow-pine chipmunk (*Tamias amoenus*)
Pacific Chorus Frog (*Pseudacris regilla*)
Merlin (*Falco columbarius*)
White-tailed Jack Rabbit (*Lepus townsendii*)
House Mouse (*Mus musculus*)
Mink (*Mustela vison*)
Brewer's Sparrow (*Spizella breweri*)
Common Loon (*Gavia immer*)
Yellow-billed Cuckoo (*Coccyzus americanus*) Candidate Species
Great Basin Spadefoot (*Spea intermontana*)
Trumpeter Swan (*Cygnus buccinator*)

Rare Plants (No Status):

No Status Species within 4-mile radius:

Bugleg Goldenweed (*Pyrrocoma insecticruris*)

No Status Species outside of 4-mile radius:

Bugleg Goldenweed (*Pyrrocoma insecticruris*)
Mourning Milkvetch (*Astragalus atratus* var. *inseptus*)

10.9 Fisheries

Redband rainbow trout (*Oncorhynchus mykiss gairdneri*), mountain white fish (*Prosopium williamsoni*), Wood River sculpin (*Cottus leiopomus*), and brook trout (*Salvelinus fontinalis*) are present within the Big Wood River (IDFG, 2000) (Figure 8). Fish were not noted in Liberty Gulch Creek.

10.10 Sensitive Waterways

Croy Creek and the Big Wood River are both Clean Water Act 303(d) listed streams down gradient from the Liberty Gem mine and mill site, which might be adversely affected by contaminant delivery from the site. Croy Creek is listed in the EPA CWA 305(b) from mouth to source as not supporting. Beneficial uses for Croy Creek include; secondary contact recreation (fully supporting), cold water aquatic life (not supporting), and salmonid spawning (not supporting) (Figure 8).

10.11 Livestock Receptors

There were numerous indications the area is used for livestock grazing. The Liberty Gem mine and mill site is located within the BLM's Croy Creek grazing allotment, which covers 15,260.004745 acres, indicating the potential for grazing to occur on the property.

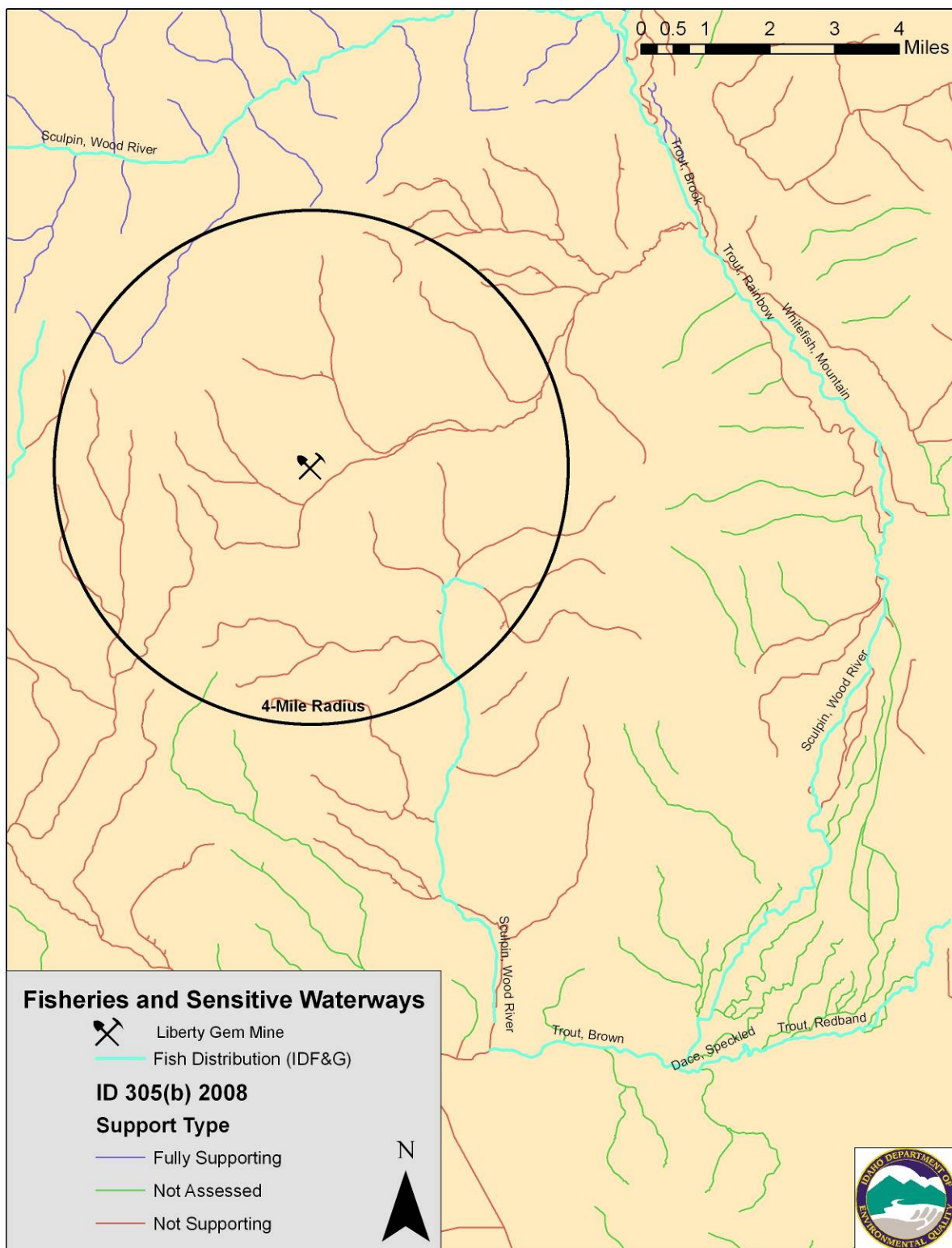


Figure 8. Fisheries and Sensitive Waterways within 4-mile radius and in the vicinity of the Liberty Gem mine and mill site. (Map source: Idaho DEQ GIS ArcSDE 9.3.1 Geodatabase)

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Section 11. Summary and Conclusions

Generally speaking, toxicological risks to human and ecological receptors are limited to exposures in the soils and sediment. Surface and ground water quality at the Liberty Gem mine and mill site appears to be within acceptable ranges.

Samples from the waste dumps exceeded the IDTLs for most of the contaminants tested. The soil samples also exceeded the HHSLs for arsenic. There is evidence that elevated levels of contaminants in the waste dumps are a potential risk for site workers because the samples exceeded the background concentration by three times for arsenic and lead. Samples LGWD1SS-1 and LGWD2SS-1 exceeded background levels for mercury by three times.

The concentrations of arsenic and lead also exceeded ecological risk benchmarks for a majority of listed animal receptors. However, the ecological risk is relatively low for certain receptors (grazing animals, wolves) because they cover a large range and the mine and mill site is concentrated in a small area.

Sample LGPPESD-1 exceeded IDTLs for arsenic, cadmium, chromium, lead, manganese, silver, mercury, and zinc. The sample exceeded the HHSLs for arsenic. LGPPESD-1 exceeded the background sample by three times for arsenic, cadmium, lead, manganese, silver, and zinc. The PPE shows the contaminants are traveling from the waste dumps into Liberty Gulch Creek and then to Croy Creek. Therefore, these wastes should be isolated, reclaimed, or removed.

DEQ is recommending EPA generate a HRS for the Liberty Gem mine and mill site under CERCLA. **Human health risks to local residents is di minimus.** However, most human health risks to site workers associated with this site could be addressed during mining operations or remedial activities by a site safety and health plan. BLM or the owners should improve water management systems and reclaim mine waste dumps. If a plan of operations is submitted on the site, a formal water quality monitoring and evaluation plan should be required.

The dust from Waste Dump #5 may pose a risk to recreationists, if they are in the area for long periods of time. Access controls may manage some of those risks, particularly for Off Road Vehicle users. Therefore, DEQ recommends reclamation or fugitive dust management on these dumps.

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Section 12. References

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Appendix A. Laboratory Sample Reports



SVL Analytical, Inc. • One Government Gulch • Kellogg, ID 83837 • (208) 784-1258 • FAX: (208) 783-0891

Table 1. -- Matrix Type

1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other

Project Name: Liberty Bell
Teacher's Signature: Jana G. Day

Sampler's Signature:

Indicate State of sample origination:

USACE? ☐ Yes ☒ No

Sample ID	Collection	Misc.	Preservative(s)	Rush Instructions (Days)	
	Date Time	Matrix Type (From Table 1)	Unpreserved HNO ₃ Filtered HNO ₃ Unfiltered HCl H ₂ SO ₄ NaOH Other (Specify)		
1 and I					
2 and Z					
5 and S					
0 and O					
Thanks!					
1 LAPRES-1	5/10/10 15:35 TE	3	X		Unsilicified
2 LAPBS-1	5/10/10 11:30 TE	3	X		of wash
3 LAPBS-1	5/10/10 11:25 TE	3	X		"
4 LAPWD1SS-1	5/10/10 12:00 TE	3	X		"
5 LAPWD2SS-1	5/10/10 12:20 TE	3	X		"
6 LAPWD6SS-1	5/10/10 15:45 TE	3	X		"
7 LAPBSW-1	5/10/10 11:30 TE	1	X		Total metals
8 LAPBSW-1	5/10/10 15:30 TE	1	X		Total metals
9					
10					

Relinquished by: Shiva Chandra
 Relinquished by:

Received by: 832
 Received by:

Date: 5/17/10
 Date:

Time: 11:10
 Time:

Restating

SVI-COC 9/05

White: LAB COPY	Yellow: CUSTOMER COPY
-----------------	-----------------------

☐ Store (30 Days)

~~Return~~

* Sample Reject:



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: Boise
Work Order: **W0E0413**
Reported: 02-Jun-10 11:10

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received
LGPPESD-1	W0E0413-01	Soil	10-May-10 15:35	TE	19-May-2010
LGBGSD-1	W0E0413-02	Soil	10-May-10 11:30	TE	19-May-2010
LGBGSS-1	W0E0413-03	Soil	10-May-10 11:25	TE	19-May-2010
LGWD1SS-1	W0E0413-04	Soil	10-May-10 12:00	TE	19-May-2010
LGWD2SS-1	W0E0413-05	Soil	10-May-10 12:20	TE	19-May-2010
LGWD6SS-1	W0E0413-06	Soil	10-May-10 15:45	TE	19-May-2010
LGBGSW-1	W0E0413-07	Surface Water	10-May-10 11:30	TE	19-May-2010
LGPPESW-1	W0E0413-08	Surface Water	10-May-10 15:30	TE	19-May-2010

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested.

Sample preparation is defined by the client as per their Data Quality Objectives.

This report supercedes any previous reports for this Work Order. The complete report includes pages for each sample, a full QC report, and a notes section.

The results presented in this report relate only to the samples, and meet all requirements of the NELAC Standards unless otherwise noted.



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: Boise
Work Order: **W0E0413**
Reported: 02-Jun-10 11:10

Client Sample ID: **LGPESD-1**SVL Sample ID: **W0E0413-01 (Soil)**

Sample Report Page 1 of 1

Sampled: 10-May-10 15:35
Received: 19-May-10
Sampled By: TE

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Antimony	3.0	mg/kg	2.0	0.4		W021291	FEH	05/26/10 20:04	
EPA 6010B	Arsenic	166	mg/kg	2.5	0.6		W021291	FEH	05/26/10 20:04	
EPA 6010B	Barium	71.1	mg/kg	0.20	0.02		W021291	FEH	05/26/10 20:04	
EPA 6010B	Cadmium	10.1	mg/kg	0.20	0.03		W021291	FEH	05/26/10 20:04	
EPA 6010B	Chromium	33.9	mg/kg	0.60	0.06		W021291	FEH	05/26/10 20:04	
EPA 6010B	Copper	56.8	mg/kg	1.00	0.21		W021291	FEH	05/26/10 20:04	
EPA 6010B	Iron	19300	mg/kg	6.0	1.0		W021291	FEH	05/26/10 20:03	
EPA 6010B	Lead	237	mg/kg	0.75	0.50		W021291	FEH	05/26/10 20:04	
EPA 6010B	Manganese	500	mg/kg	0.40	0.06		W021291	FEH	05/26/10 20:03	
EPA 6010B	Selenium	< 4.0	mg/kg	4.0	1.4		W021291	FEH	05/26/10 20:04	
EPA 6010B	Silver	2.97	mg/kg	0.50	0.05		W021291	FEH	05/26/10 20:04	
EPA 6010B	Zinc	1910	mg/kg	1.00	0.22		W021291	FEH	05/26/10 20:04	
EPA 7471A	Mercury	0.058	mg/kg	0.033	0.010		W021237	JAA	05/25/10 12:20	

Percent Solids

Percent Solids	% Solids	77.8	%	0.1		W021290	DP	05/24/10 08:50
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This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Nan Wilson
Laboratory Director



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: Boise
Work Order: **W0E0413**
Reported: 02-Jun-10 11:10

Client Sample ID: **LGBGSD-1**SVL Sample ID: **W0E0413-02 (Soil)**

Sample Report Page 1 of 1

Sampled: 10-May-10 11:30
Received: 19-May-10
Sampled By: TE

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Antimony	< 2.0	mg/kg	2.0	0.4		W021291	FEH	05/26/10 20:09	
EPA 6010B	Arsenic	12.6	mg/kg	2.5	0.6		W021291	FEH	05/26/10 20:09	
EPA 6010B	Barium	58.8	mg/kg	0.20	0.02		W021291	FEH	05/26/10 20:09	
EPA 6010B	Cadmium	0.81	mg/kg	0.20	0.03		W021291	FEH	05/26/10 20:09	
EPA 6010B	Chromium	72.3	mg/kg	0.60	0.06		W021291	FEH	05/26/10 20:09	
EPA 6010B	Copper	22.5	mg/kg	1.00	0.21		W021291	FEH	05/26/10 20:09	
EPA 6010B	Iron	19100	mg/kg	6.0	1.0		W021291	FEH	05/26/10 20:08	
EPA 6010B	Lead	15.2	mg/kg	0.75	0.50		W021291	FEH	05/26/10 20:09	
EPA 6010B	Manganese	495	mg/kg	0.40	0.06		W021291	FEH	05/26/10 20:08	
EPA 6010B	Selenium	< 4.0	mg/kg	4.0	1.4		W021291	FEH	05/26/10 20:09	
EPA 6010B	Silver	< 0.50	mg/kg	0.50	0.05		W021291	FEH	05/26/10 20:09	
EPA 6010B	Zinc	70.8	mg/kg	1.00	0.22		W021291	FEH	05/26/10 20:09	
EPA 7471A	Mercury	< 0.033	mg/kg	0.033	0.010		W021237	JAA	05/25/10 12:22	

Percent Solids

Percent Solids	% Solids	56.9	%	0.1			W021290	DP	05/24/10 08:50	
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Nan Wilson
Laboratory Director



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: Boise
Work Order: **W0E0413**
Reported: 02-Jun-10 11:10

Client Sample ID: **LGBGSS-1**SVL Sample ID: **W0E0413-03 (Soil)**

Sample Report Page 1 of 1

Sampled: 10-May-10 11:25
Received: 19-May-10
Sampled By: TE

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Antimony	< 2.0	mg/kg	2.0	0.4		W021291	FEH	05/26/10 20:15	
EPA 6010B	Arsenic	10.3	mg/kg	2.5	0.6		W021291	FEH	05/26/10 20:15	
EPA 6010B	Barium	160	mg/kg	0.20	0.02		W021291	FEH	05/26/10 20:14	
EPA 6010B	Cadmium	1.48	mg/kg	0.20	0.03		W021291	FEH	05/26/10 20:15	
EPA 6010B	Chromium	47.4	mg/kg	0.60	0.06		W021291	FEH	05/26/10 20:14	
EPA 6010B	Copper	30.6	mg/kg	1.00	0.21		W021291	FEH	05/26/10 20:14	
EPA 6010B	Iron	21400	mg/kg	6.0	1.0		W021291	FEH	05/26/10 20:13	
EPA 6010B	Lead	19.1	mg/kg	0.75	0.50		W021291	FEH	05/26/10 20:15	
EPA 6010B	Manganese	489	mg/kg	0.40	0.06		W021291	FEH	05/26/10 20:13	
EPA 6010B	Selenium	< 4.0	mg/kg	4.0	1.4		W021291	FEH	05/26/10 20:15	
EPA 6010B	Silver	0.53	mg/kg	0.50	0.05		W021291	FEH	05/26/10 20:14	
EPA 6010B	Zinc	143	mg/kg	1.00	0.22		W021291	FEH	05/26/10 20:14	
EPA 7471A	Mercury	< 0.033	mg/kg	0.033	0.010		W021237	JAA	05/25/10 12:24	

Percent Solids

Percent Solids	% Solids	78.0	%	0.1			W021290	DP	05/24/10 08:50	
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One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: Boise
Work Order: **W0E0413**
Reported: 02-Jun-10 11:10

Client Sample ID: **LGWD1SS-1**SVL Sample ID: **W0E0413-04 (Soil)**

Sample Report Page 1 of 1

Sampled: 10-May-10 12:00
Received: 19-May-10
Sampled By: TE

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Antimony	26.3	mg/kg	2.0	0.4		W021291	FEH	05/26/10 20:20	
EPA 6010B	Arsenic	2630	mg/kg	2.5	0.6		W021291	FEH	05/26/10 20:20	
EPA 6010B	Barium	18.4	mg/kg	0.20	0.02		W021291	FEH	05/26/10 20:20	
EPA 6010B	Cadmium	0.89	mg/kg	0.20	0.03		W021291	FEH	05/26/10 20:20	
EPA 6010B	Chromium	20.9	mg/kg	0.60	0.06		W021291	FEH	05/26/10 20:20	
EPA 6010B	Copper	340	mg/kg	1.00	0.21		W021291	FEH	05/26/10 20:20	
EPA 6010B	Iron	47600	mg/kg	6.0	1.0		W021291	FEH	05/26/10 20:19	
EPA 6010B	Lead	8420	mg/kg	0.75	0.50		W021291	FEH	05/26/10 20:20	
EPA 6010B	Manganese	47.0	mg/kg	0.40	0.06		W021291	FEH	05/26/10 20:19	
EPA 6010B	Selenium	8.7	mg/kg	4.0	1.4		W021291	FEH	05/26/10 20:20	
EPA 6010B	Silver	55.7	mg/kg	0.50	0.05		W021291	FEH	05/26/10 20:20	
EPA 6010B	Zinc	339	mg/kg	1.00	0.22		W021291	FEH	05/26/10 20:20	
EPA 7471A	Mercury	0.267	mg/kg	0.033	0.010		W021237	JAA	05/25/10 12:25	

Percent Solids

Percent Solids	% Solids	90.9	%	0.1			W021290	DP	05/24/10 08:50	
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Nan Wilson
Laboratory Director



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: Boise
Work Order: **W0E0413**
Reported: 02-Jun-10 11:10

Client Sample ID: **LGWD2SS-1**SVL Sample ID: **W0E0413-05 (Soil)**

Sample Report Page 1 of 1

Sampled: 10-May-10 12:20
Received: 19-May-10
Sampled By: TE

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Antimony	9.7	mg/kg	2.0	0.4		W021291	FEH	05/26/10 20:42	
EPA 6010B	Arsenic	8570	mg/kg	25.0	6.2	10	W021291	FEH	05/26/10 20:25	D2
EPA 6010B	Barium	39.6	mg/kg	0.20	0.02		W021291	FEH	05/26/10 20:42	
EPA 6010B	Cadmium	2.95	mg/kg	0.20	0.03		W021291	FEH	05/26/10 20:42	
EPA 6010B	Chromium	44.6	mg/kg	0.60	0.06		W021291	FEH	05/26/10 20:42	
EPA 6010B	Copper	195	mg/kg	1.00	0.21		W021291	FEH	05/26/10 20:42	
EPA 6010B	Iron	68400	mg/kg	6.0	1.0		W021291	FEH	05/26/10 20:40	
EPA 6010B	Lead	2260	mg/kg	0.75	0.50		W021291	FEH	05/26/10 20:42	
EPA 6010B	Manganese	493	mg/kg	0.40	0.06		W021291	FEH	05/26/10 20:40	
EPA 6010B	Selenium	6.1	mg/kg	4.0	1.4		W021291	FEH	05/26/10 20:42	
EPA 6010B	Silver	16.5	mg/kg	0.50	0.05		W021291	FEH	05/26/10 20:42	
EPA 6010B	Zinc	1400	mg/kg	1.00	0.22		W021291	FEH	05/26/10 20:42	
EPA 7471A	Mercury	0.052	mg/kg	0.033	0.010		W021237	JAA	05/25/10 12:27	

Percent Solids

Percent Solids	% Solids	91.3	%	0.1			W021290	DP	05/24/10 08:50	
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This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Nan Wilson
Laboratory Director



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: Boise
Work Order: **W0E0413**
Reported: 02-Jun-10 11:10

Client Sample ID: **LGWD6SS-1**SVL Sample ID: **W0E0413-06 (Soil)**

Sample Report Page 1 of 1

Sampled: 10-May-10 15:45
Received: 19-May-10
Sampled By: TE

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Antimony	8.9	mg/kg	2.0	0.4		W021291	FEH	05/26/10 20:47	
EPA 6010B	Arsenic	277	mg/kg	2.5	0.6		W021291	FEH	05/26/10 20:47	
EPA 6010B	Barium	8.80	mg/kg	0.20	0.02		W021291	FEH	05/26/10 20:47	
EPA 6010B	Cadmium	10.1	mg/kg	0.20	0.03		W021291	FEH	05/26/10 20:47	
EPA 6010B	Chromium	44.1	mg/kg	0.60	0.06		W021291	FEH	05/26/10 20:47	
EPA 6010B	Copper	81.8	mg/kg	1.00	0.21		W021291	FEH	05/26/10 20:47	
EPA 6010B	Iron	38300	mg/kg	6.0	1.0		W021291	FEH	05/26/10 20:46	
EPA 6010B	Lead	787	mg/kg	0.75	0.50		W021291	FEH	05/26/10 20:47	
EPA 6010B	Manganese	336	mg/kg	0.40	0.06		W021291	FEH	05/26/10 20:46	
EPA 6010B	Selenium	8.2	mg/kg	4.0	1.4		W021291	FEH	05/26/10 20:47	
EPA 6010B	Silver	9.63	mg/kg	0.50	0.05		W021291	FEH	05/26/10 20:47	
EPA 6010B	Zinc	907	mg/kg	1.00	0.22		W021291	FEH	05/26/10 20:47	
EPA 7471A	Mercury	0.080	mg/kg	0.033	0.010		W021237	JAA	05/25/10 12:28	

Percent Solids

Percent Solids	% Solids	94.5	%	0.1			W021290	DP	05/24/10 08:50	
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This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Nan Wilson
Laboratory Director



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: Boise
Work Order: **W0E0413**
Reported: 02-Jun-10 11:10

Client Sample ID: **LGBGSW-1**SVL Sample ID: **W0E0413-07 (Surface Water)**

Sample Report Page 1 of 1

Sampled: 10-May-10 11:30
Received: 19-May-10
Sampled By: TE

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
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Metals (Total)

EPA 7470A	Mercury	< 0.00020	mg/L	0.00020	0.000065		W021328	JAA	05/25/10 13:51	
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Metals (Total Recoverable)

EPA 6010B	Antimony	< 0.020	mg/L	0.020	0.005		W021284	DG	05/27/10 14:07	
EPA 6010B	Arsenic	< 0.025	mg/L	0.025	0.006		W021284	DG	05/27/10 14:07	
EPA 6010B	Barium	0.0186	mg/L	0.0020	0.0007		W021284	DG	05/27/10 14:07	
EPA 6010B	Cadmium	< 0.0020	mg/L	0.0020	0.0005		W021284	DG	05/27/10 14:07	
EPA 6010B	Chromium	< 0.0060	mg/L	0.0060	0.0008		W021284	DG	05/27/10 14:07	
EPA 6010B	Copper	< 0.010	mg/L	0.010	0.005		W021284	DG	05/27/10 14:07	
EPA 6010B	Iron	0.223	mg/L	0.060	0.018		W021284	DG	05/27/10 14:06	
EPA 6010B	Lead	< 0.0075	mg/L	0.0075	0.0023		W021284	DG	05/27/10 14:07	
EPA 6010B	Manganese	0.0104	mg/L	0.0040	0.0019		W021284	DG	05/27/10 14:06	
EPA 6010B	Selenium	< 0.040	mg/L	0.040	0.012		W021284	DG	05/27/10 14:07	
EPA 6010B	Silver	< 0.0050	mg/L	0.0050	0.0005		W021284	DG	05/27/10 14:07	
EPA 6010B	Zinc	< 0.0100	mg/L	0.0100	0.0026		W021284	DG	05/27/10 14:07	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Nan Wilson
Laboratory Director



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IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: Boise
Work Order: **W0E0413**
Reported: 02-Jun-10 11:10

Client Sample ID: **LGPPEWSW-1**SVL Sample ID: **W0E0413-08 (Surface Water)**

Sample Report Page 1 of 1

Sampled: 10-May-10 15:30
Received: 19-May-10
Sampled By: TE

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
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Metals (Total)

EPA 7470A	Mercury	< 0.00020	mg/L	0.00020	0.000065		W021328	JAA	05/25/10 13:56	
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Metals (Total Recoverable)

EPA 6010B	Antimony	< 0.020	mg/L	0.020	0.005		W021284	DG	05/27/10 14:13	
EPA 6010B	Arsenic	0.055	mg/L	0.025	0.006		W021284	DG	05/27/10 14:13	
EPA 6010B	Barium	0.0328	mg/L	0.0020	0.0007		W021284	DG	05/27/10 14:13	
EPA 6010B	Cadmium	< 0.0020	mg/L	0.0020	0.0005		W021284	DG	05/27/10 14:13	
EPA 6010B	Chromium	< 0.0060	mg/L	0.0060	0.0008		W021284	DG	05/27/10 14:13	
EPA 6010B	Copper	< 0.010	mg/L	0.010	0.005		W021284	DG	05/27/10 14:13	
EPA 6010B	Iron	< 0.060	mg/L	0.060	0.018		W021284	DG	05/27/10 14:12	
EPA 6010B	Lead	< 0.0075	mg/L	0.0075	0.0023		W021284	DG	05/27/10 14:13	
EPA 6010B	Manganese	< 0.0040	mg/L	0.0040	0.0019		W021284	DG	05/27/10 14:12	
EPA 6010B	Selenium	< 0.040	mg/L	0.040	0.012		W021284	DG	05/27/10 14:13	
EPA 6010B	Silver	< 0.0050	mg/L	0.0050	0.0005		W021284	DG	05/27/10 14:13	
EPA 6010B	Zinc	0.125	mg/L	0.0100	0.0026		W021284	DG	05/27/10 14:13	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Nan Wilson
Laboratory Director



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IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706**Project Name: Boise**
Work Order: **W0E0413**
Reported: 02-Jun-10 11:10**Quality Control - BLANK Data**

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
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Metals (Total)

EPA 7470A	Mercury	mg/L	<0.00020	0.000065	0.00020	W021328	25-May-10	
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Metals (Total) by EPA 6000/7000 Methods

EPA 6010B	Antimony	mg/kg	<2.0	0.4	2.0	W021291	26-May-10	
EPA 6010B	Arsenic	mg/kg	<2.5	0.6	2.5	W021291	26-May-10	
EPA 6010B	Barium	mg/kg	<0.20	0.02	0.20	W021291	26-May-10	
EPA 6010B	Cadmium	mg/kg	<0.20	0.03	0.20	W021291	26-May-10	
EPA 6010B	Chromium	mg/kg	<0.60	0.06	0.60	W021291	26-May-10	
EPA 6010B	Copper	mg/kg	<1.00	0.21	1.00	W021291	26-May-10	
EPA 6010B	Iron	mg/kg	<6.0	1.0	6.0	W021291	26-May-10	
EPA 6010B	Lead	mg/kg	<0.75	0.50	0.75	W021291	26-May-10	
EPA 6010B	Manganese	mg/kg	<0.40	0.06	0.40	W021291	26-May-10	
EPA 6010B	Selenium	mg/kg	<4.0	1.4	4.0	W021291	26-May-10	
EPA 6010B	Silver	mg/kg	<0.50	0.05	0.50	W021291	26-May-10	
EPA 6010B	Zinc	mg/kg	<1.00	0.22	1.00	W021291	26-May-10	
EPA 7471A	Mercury	mg/kg	<0.033	0.010	0.033	W021237	25-May-10	

Metals (Total Recoverable)

EPA 6010B	Antimony	mg/L	<0.020	0.005	0.020	W021284	27-May-10	
EPA 6010B	Arsenic	mg/L	<0.025	0.006	0.025	W021284	27-May-10	
EPA 6010B	Barium	mg/L	<0.0020	0.0007	0.0020	W021284	27-May-10	
EPA 6010B	Cadmium	mg/L	<0.0020	0.0005	0.0020	W021284	27-May-10	
EPA 6010B	Chromium	mg/L	<0.0060	0.0008	0.0060	W021284	27-May-10	
EPA 6010B	Copper	mg/L	<0.010	0.005	0.010	W021284	27-May-10	
EPA 6010B	Iron	mg/L	<0.060	0.018	0.060	W021284	27-May-10	
EPA 6010B	Lead	mg/L	<0.0075	0.0023	0.0075	W021284	27-May-10	
EPA 6010B	Manganese	mg/L	<0.0040	0.0019	0.0040	W021284	27-May-10	
EPA 6010B	Selenium	mg/L	<0.040	0.012	0.040	W021284	27-May-10	
EPA 6010B	Silver	mg/L	<0.0050	0.0005	0.0050	W021284	27-May-10	
EPA 6010B	Zinc	mg/L	<0.0100	0.0026	0.0100	W021284	27-May-10	

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
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Metals (Total)

EPA 7470A	Mercury	mg/L	0.00502	0.00500	100	80 - 120	W021328	25-May-10	
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Metals (Total) by EPA 6000/7000 Methods

EPA 6010B	Antimony	mg/kg	94.8	100	94.8	80 - 120	W021291	26-May-10	
EPA 6010B	Arsenic	mg/kg	96.0	100	96.0	80 - 120	W021291	26-May-10	
EPA 6010B	Barium	mg/kg	101	100	101	80 - 120	W021291	26-May-10	
EPA 6010B	Cadmium	mg/kg	94.4	100	94.4	80 - 120	W021291	26-May-10	
EPA 6010B	Chromium	mg/kg	96.6	100	96.6	80 - 120	W021291	26-May-10	
EPA 6010B	Copper	mg/kg	94.9	100	94.9	80 - 120	W021291	26-May-10	
EPA 6010B	Iron	mg/kg	970	1000	97.0	80 - 120	W021291	26-May-10	
EPA 6010B	Lead	mg/kg	93.1	100	93.1	80 - 120	W021291	26-May-10	
EPA 6010B	Manganese	mg/kg	97.0	100	97.0	80 - 120	W021291	26-May-10	
EPA 6010B	Selenium	mg/kg	88.1	100	88.1	80 - 120	W021291	26-May-10	
EPA 6010B	Silver	mg/kg	4.68	5.00	93.6	80 - 120	W021291	26-May-10	
EPA 6010B	Zinc	mg/kg	94.5	100	94.5	80 - 120	W021291	26-May-10	
EPA 7471A	Mercury	mg/kg	0.828	0.833	99.4	80 - 120	W021237	25-May-10	

Metals (Total Recoverable)

EPA 6010B	Antimony	mg/L	0.955	1.00	95.5	80 - 120	W021284	27-May-10	
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SVL holds the following certifications: AZ:0538, CA:2080, CO:ID00019, FL(NELAC):E87993, ID:ID00019 & ID00965 (Microbiology),

NV:ID000192007A, WA:1268, WY:ID00019



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Kellogg ID 83837-0929

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IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706**Project Name: Boise**
Work Order: **W0E0413**
Reported: 02-Jun-10 11:10**Quality Control - LABORATORY CONTROL SAMPLE Data (Continued)**

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total Recoverable) (Continued)									
EPA 6010B	Arsenic	mg/L	0.976	1.00	97.6	80 - 120	W021284	27-May-10	
EPA 6010B	Barium	mg/L	0.978	1.00	97.8	80 - 120	W021284	27-May-10	
EPA 6010B	Cadmium	mg/L	0.958	1.00	95.8	80 - 120	W021284	27-May-10	
EPA 6010B	Chromium	mg/L	0.942	1.00	94.2	80 - 120	W021284	27-May-10	
EPA 6010B	Copper	mg/L	0.911	1.00	91.1	80 - 120	W021284	27-May-10	
EPA 6010B	Iron	mg/L	9.34	10.0	93.4	80 - 120	W021284	27-May-10	
EPA 6010B	Lead	mg/L	0.942	1.00	94.2	80 - 120	W021284	27-May-10	
EPA 6010B	Manganese	mg/L	0.939	1.00	93.9	80 - 120	W021284	27-May-10	
EPA 6010B	Selenium	mg/L	0.981	1.00	98.1	80 - 120	W021284	27-May-10	
EPA 6010B	Silver	mg/L	0.0459	0.0500	91.9	80 - 120	W021284	27-May-10	
EPA 6010B	Zinc	mg/L	0.981	1.00	98.1	80 - 120	W021284	27-May-10	

Quality Control - MATRIX SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total)										
EPA 7470A	Mercury	mg/L	0.00090	<0.00020	0.00100	90.0	75 - 125	W021328	25-May-10	
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Antimony	mg/kg	130	40.9	100	89.1	75 - 125	W021291	26-May-10	
EPA 6010B	Arsenic	mg/kg	94.7	<2.5	100	94.7	75 - 125	W021291	26-May-10	
EPA 6010B	Barium	mg/kg	192	112	100	80.1	75 - 125	W021291	26-May-10	
EPA 6010B	Cadmium	mg/kg	93.6	8.26	100	85.4	75 - 125	W021291	26-May-10	
EPA 6010B	Chromium	mg/kg	112	16.8	100	95.4	75 - 125	W021291	26-May-10	
EPA 6010B	Copper	mg/kg	507	396	100	111	75 - 125	W021291	26-May-10	
EPA 6010B	Iron	mg/kg	343000	392000	1000	R > 4S	75 - 125	W021291	26-May-10	D2
EPA 6010B	Lead	mg/kg	91.4	9.15	100	82.3	75 - 125	W021291	26-May-10	
EPA 6010B	Manganese	mg/kg	479	399	100	79.8	75 - 125	W021291	26-May-10	
EPA 6010B	Selenium	mg/kg	112	21.9	100	90.1	75 - 125	W021291	26-May-10	
EPA 6010B	Silver	mg/kg	5.19	<0.50	5.00	104	75 - 125	W021291	26-May-10	
EPA 6010B	Zinc	mg/kg	1690	1880	100	R > 4S	75 - 125	W021291	26-May-10	M3
EPA 7471A	Mercury	mg/kg	4.72	4.12	0.167	R > 4S	75 - 125	W021237	25-May-10	D2,M3

Metals (Total Recoverable)

EPA 6010B	Antimony	mg/L	0.982	<0.020	1.00	98.2	75 - 125	W021284	27-May-10
EPA 6010B	Arsenic	mg/L	1.07	0.055	1.00	101	75 - 125	W021284	27-May-10
EPA 6010B	Barium	mg/L	1.02	0.0328	1.00	99.2	75 - 125	W021284	27-May-10
EPA 6010B	Cadmium	mg/L	0.970	<0.0020	1.00	96.9	75 - 125	W021284	27-May-10
EPA 6010B	Chromium	mg/L	0.963	<0.0060	1.00	96.3	75 - 125	W021284	27-May-10
EPA 6010B	Copper	mg/L	0.944	<0.010	1.00	94.4	75 - 125	W021284	27-May-10
EPA 6010B	Iron	mg/L	9.33	<0.060	10.0	93.3	75 - 125	W021284	27-May-10
EPA 6010B	Lead	mg/L	0.955	<0.0075	1.00	95.5	75 - 125	W021284	27-May-10
EPA 6010B	Manganese	mg/L	0.939	<0.0040	1.00	93.6	75 - 125	W021284	27-May-10
EPA 6010B	Selenium	mg/L	0.992	<0.040	1.00	99.2	75 - 125	W021284	27-May-10
EPA 6010B	Silver	mg/L	0.0472	<0.0050	0.0500	94.4	75 - 125	W021284	27-May-10
EPA 6010B	Zinc	mg/L	1.12	0.125	1.00	99.1	75 - 125	W021284	27-May-10



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Kellogg ID 83837-0929

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IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706**Project Name: Boise**
Work Order: **W0E0413**
Reported: 02-Jun-10 11:10**Quality Control - MATRIX SPIKE DUPLICATE Data**

Method	Analyte	Units	MSD Result	Spike Result	Spike Level	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Total)										
EPA 7470A	Mercury	mg/L	0.00100	0.00090	0.00100	10.5	20	W021328	25-May-10	
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Antimony	mg/kg	129	130	100	1.0	20	W021291	26-May-10	
EPA 6010B	Arsenic	mg/kg	92.1	94.7	100	2.7	20	W021291	26-May-10	
EPA 6010B	Barium	mg/kg	225	192	100	15.9	20	W021291	26-May-10	
EPA 6010B	Cadmium	mg/kg	91.8	93.6	100	1.9	20	W021291	26-May-10	
EPA 6010B	Chromium	mg/kg	98.8	112	100	12.7	20	W021291	26-May-10	
EPA 6010B	Copper	mg/kg	547	507	100	7.6	20	W021291	26-May-10	
EPA 6010B	Iron	mg/kg	342000	343000	1000	0.2	20	W021291	26-May-10	D2
EPA 6010B	Lead	mg/kg	91.2	91.4	100	0.3	20	W021291	26-May-10	
EPA 6010B	Manganese	mg/kg	522	479	100	8.7	20	W021291	26-May-10	
EPA 6010B	Selenium	mg/kg	109	112	100	3.0	20	W021291	26-May-10	
EPA 6010B	Silver	mg/kg	5.23	5.19	5.00	0.7	20	W021291	26-May-10	
EPA 6010B	Zinc	mg/kg	2020	1690	100	17.7	20	W021291	26-May-10	
EPA 7471A	Mercury	mg/kg	4.20	4.72	0.167	11.6	20	W021237	25-May-10	D2,M3
Metals (Total Recoverable)										
EPA 6010B	Antimony	mg/L	0.951	0.982	1.00	3.2	20	W021284	27-May-10	
EPA 6010B	Arsenic	mg/L	1.03	1.07	1.00	3.7	20	W021284	27-May-10	
EPA 6010B	Barium	mg/L	0.995	1.02	1.00	2.9	20	W021284	27-May-10	
EPA 6010B	Cadmium	mg/L	0.934	0.970	1.00	3.8	20	W021284	27-May-10	
EPA 6010B	Chromium	mg/L	0.925	0.963	1.00	4.1	20	W021284	27-May-10	
EPA 6010B	Copper	mg/L	0.909	0.944	1.00	3.9	20	W021284	27-May-10	
EPA 6010B	Iron	mg/L	9.16	9.33	10.0	1.8	20	W021284	27-May-10	
EPA 6010B	Lead	mg/L	0.925	0.955	1.00	3.3	20	W021284	27-May-10	
EPA 6010B	Manganese	mg/L	0.924	0.939	1.00	1.6	20	W021284	27-May-10	
EPA 6010B	Selenium	mg/L	0.964	0.992	1.00	2.9	20	W021284	27-May-10	
EPA 6010B	Silver	mg/L	0.0457	0.0472	0.0500	3.2	20	W021284	27-May-10	
EPA 6010B	Zinc	mg/L	1.07	1.12	1.00	4.6	20	W021284	27-May-10	

Notes and Definitions

D2	Sample required dilution due to high concentration of target analyte.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to spike level. The LCS was acceptable.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
R > 4S	% recovery not applicable, sample concentration more than four times greater than spike level
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable