1.11.8.24

LEVIATHAN MINE
PRELIMINARY ASSESSMENT REPORT
GEM COUNTY, IDAHO

STATE OF IDAHO

DEPARTMENT OF ENVIRONMENTAL QUALITY

February 2004

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

1.11.8.24

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

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MANAGEMENT & REMEDIATION DIVISION

May 25, 2004

Reply To
Attn Of: ECL-115

Joe Burkhart
5806 W. State St.
Eagle, Idaho 83616

Dear Mr. Burkhart:

The Idaho Department of Environmental Quality (DEQ) has completed a report summarizing the findings of a visit conducted at the Leviathan Mine site in June, 2003. A copy of the report, called a Preliminary Assessment, is enclosed.

Based on a review of this assessment, EPA has determined that no further action is warranted at the site. A no further action designation means that no additional steps under the Federal Superfund Program will be taken at the site unless new information warranting further Superfund consideration is discovered. EPA's no further action designation does not relieve your facility from complying with appropriate Idaho state regulations.

In accordance with EPA's decision regarding the tracking of no further action sites, the above named site will be removed from the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) data base and placed in a separate archival data base as a historical record. Archived sites may be returned to the CERCLIS site inventory if new information necessitating further Superfund consideration is discovered.

We appreciate your cooperation during the site visit. If you have any questions, please feel free to contact me at (206)553-2782.

Sincerely,

Ken Marcy
Site Assessment Manager

Enclosure

cc: Bruce Schuld, Idaho Department of Environmental Quality
Monica Lindeman, US EPA, ECL-115
Craig Conant, EPA SF Records Center, ECL-076

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LIST OF ACRONYMS

Acronym	Definition
amsl	above mean sea level
ATV	All Terrain Vehicle
BLM	United States Bureau of Land Management
DEQ	Department of Environmental Quality
EPA	United States Environmental Protection Agency
gpm	gallons per minute
PPE	Probable Point of Entry
TDL	Target Distance Limit
TMDL	Total Maximum Daily Load

1. INTRODUCTION

The Idaho Department of Environmental Quality (DEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of a preliminary assessment (PA) at the Leviathan Mine site located near Pearl, Idaho in Gem County. DEQ completed PA activities in accordance with the goals listed below.

The specific goals for the Leviathan Mine PA, identified by DEQ, are to:

- Determine the potential threat to public health or the environment posed by the site.
- Determine the potential for a release of hazardous constituents into the environment.
- Determine the potential for placement of the site on the National Priorities List.

Completion of the PA included reviewing existing site information, collecting receptor information within the site's range of influence, determining regional characteristics, and conducting a site visit. This document includes a discussion of site background information (Section 2), a discussion of migration/exposure pathways and potential targets (Section 3), a summary and conclusions (Section 4), and a list of pertinent references. Photographic documentation is included as Appendix A and sample lab results are included in Appendix B.

2. SITE BACKGROUND

2.1. SITE LOCATION

Site Name:	Leviathan Mine
CERCLIS ID No.:	NA
Location:	Gem County, Idaho
Latitude:	43 51 13N
Longitude:	116 18 56W
Legal Description:	Section 15, Township 6N, Range 1E, Boise Meridian
Congressional District:	Idaho
Site Owner:	Joe Burkhart 5806 W. State St. Eagle, Idaho 83616
Site Contact:	Joe Burkhart 5806 W. State St. Eagle, Idaho 83616

2.2. SITE DESCRIPTION/OWNERSHIP HISTORY

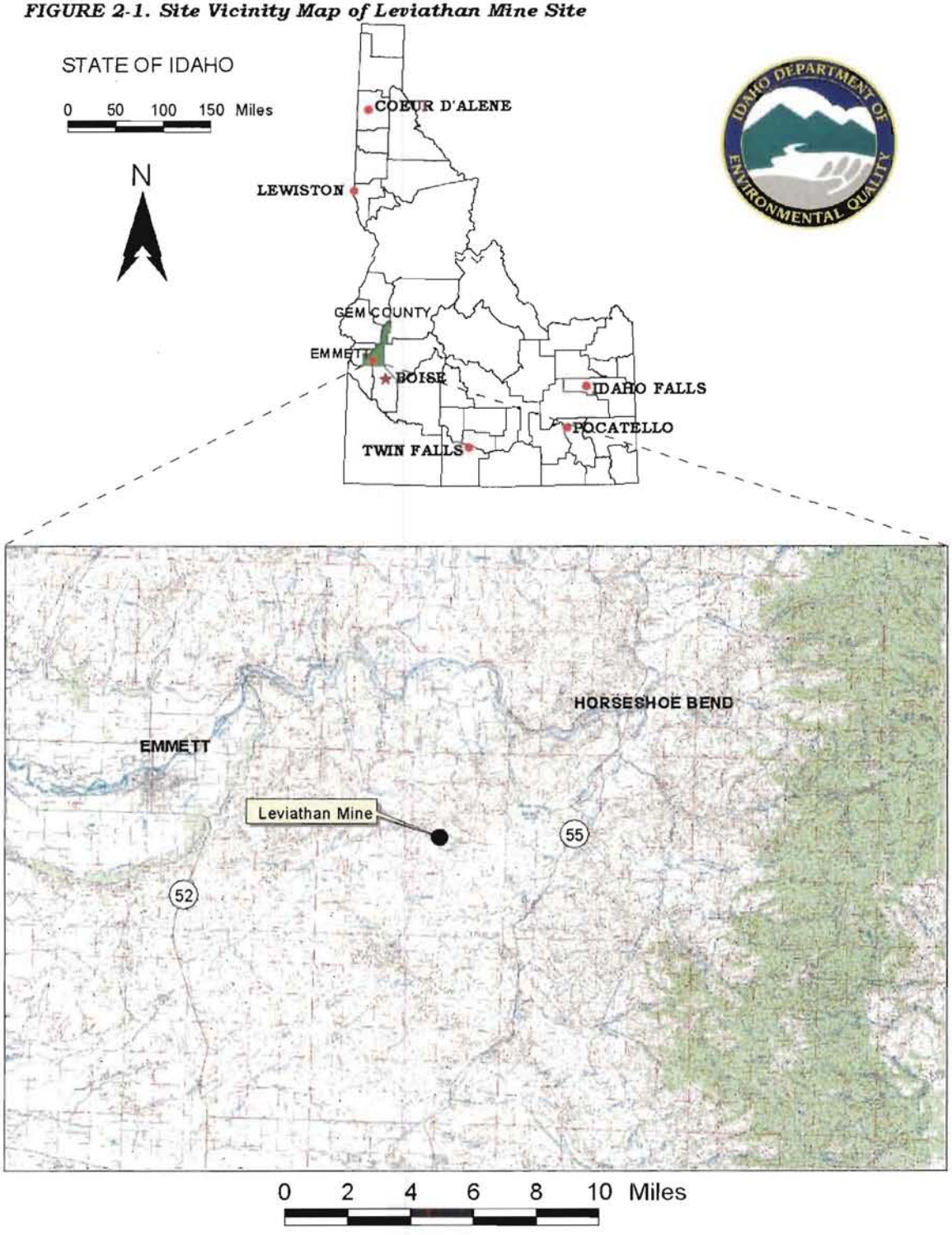
The Leviathan Mine (also referred to as Whitman Mine in literature) exists on private property approximately 0.25 miles upstream (east-southeast) of the Pearl townsite in Gem County, Idaho in the headwaters of North Fork Willow Creek at approximately 4,240 feet amsl. The mine exists directly across North Fork Willow Creek from Pearl Road and most features can be observed from the road.

Geologically, Leviathan Mine is situated near the southwest end of a gold belt that stretches from Pearl, Idaho to Horseshoe Bend, Idaho in Gem and Boise Counties (Figure 2-1). Leviathan Mine was developed to access a gold-bearing lode in the granitic country-rock that developed from gold-bearing ore solutions filling fissures caused by recurring movements along zones of weakness during and after dike intrusions. Mineralized fissures in the Pearl Mining District can be deep, complex, and long. Since the lodes were formed under moderate conditions at perhaps thousands of feet below the surface, the lodes may be quite extensive (Anderson, 1934). The lodes are generally composed of closely spaced parallel slippage planes with broken or fractured rock between them or along their border. Some fissures have been mined over 1000 feet in length, and been measured up to 30 feet wide, although they average 8 to 10 feet (Anderson, 1934). Throughout the district, lodes generally strike northwest and dip in a northerly direction.

Not much is known about the Leviathan Mine after 1910. Anderson (1934) noted that prior to 1910 the mine was owned by Whitman Mining Company who sunk two shafts (90 feet and 152 feet) and followed drifts 1300 feet to the east, eventually reaching a depth of approximately 400 feet. Development totaled 2,500 feet by 1906 (Bell, 1906). The Leviathan lode was one of the most pronounced mineralized fissure zones in the district (Anderson, 1934) whose average thickness was 3 feet, and ranged from 1 to 7 feet.

FIGURE 2-1

FIGURE 2-1. Site Vicinity Map of Leviathan Mine Site



2.3 SITE OPERATIONS AND WASTE CHARACTERISTICS

The mine deposits of the Pearl-Horseshoe Bend gold belt consist predominantly of sulfides. Arsenopyrite and pyrite were the main constituents; however, sphalerite and galena, as well as traces of chalcopyrite and tetrahedrite were also present (Anderson, 1934). The ore at Leviathan Mine was reported to be rich in arsenopyrite and pyrite, with lesser amounts of sphalerite and galena.

The Leviathan was one of the most pronounced mineralized fissures in the Pearl District. The lode extended across the property with a strike slightly north of east and dip of 50 degrees north (Anderson, 1934). The ore zone averaged 3 feet thick and ranged from 1 to 7 feet thick. Accessing the ore body was first done through a 152-foot deep shaft, and later through a 90-foot deep shaft near the property's western boundary. Drifts were followed from the second shaft eastward approximately 1,300 feet to the property's eastern boundary, reaching depths up to 400 feet in places. It is unknown if any ore was processed on-site.

The mine site is located on the south side of a relatively small east-west trending draw (Figure 3-3). From a vantage point on Pearl Road, which is directly across the draw from the mine, a tailings pile and waste rock dump are visible. Not visible from the road are a few metal pipe sections and wooden timbers, and remnants of a building foundation near the fine-grained tailings pile.

The fine-grained tailings pile, which is 15 yards wide and extends approximately 10 yards up the hillside, is adjacent to the North Fork Willow Creek on the mine site's western end (Figure 2-2). The fine-grained whitish to yellowish colored clayey material is encrusted to a depth of approximately 0.5 inches and emits a strong sulfur-like odor. Soil sample "Leviathan 2" was collected at a representative location on the tailings pile, and water sample "Leviathan 1" was collected directly downstream where the tailings pile sloughs into the stream.

The waste rock pile is located approximately 20 yards upstream (east) of the tailings pile. The angular cobble-sized rock pile is approximately 20 yards wide and extends from the stream up the steep hillside approximately 25 yards.

2.4 DEQ ACTIONS

DEQ conducted a site visit on June 26, 2003, which included a visual inspection of the property and collection of one (1) soil sample and one (1) surface water sample.

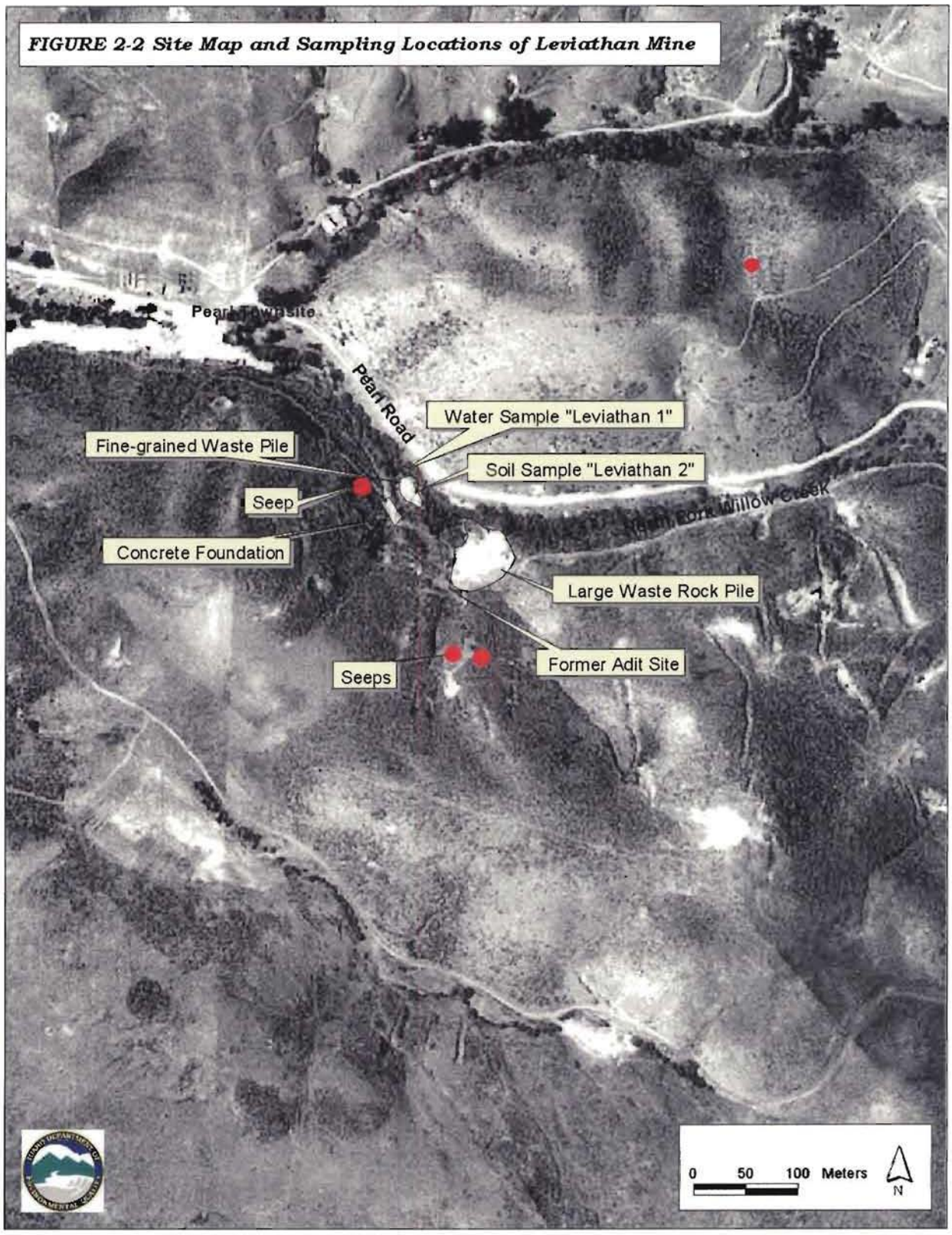
Leviathan mine can easily be accessed on public roads by traversing westward approximately 4.5 miles on Pearl Road from Highway 55. Pearl Road is a two-lane dirt road which begins at the top of "Horseshoe Bend Hill", a hillcrest on Highway 55 between Horseshoe Bend and Boise, Idaho.

The mine is located approximately 0.25 miles upstream of the historic Pearl townsite and across North Fork Willow Creek from Pearl Road. Access to the former mine site is accomplished by crossing a dilapidated barbed wire cattle fence and the creek which parallels Pearl Road.

Almost all structures associated with the mine have been removed or burned and both adits are caved. Portions of a concrete building foundation remain, as do a few metal pipes and boards, all of which are very weathered. One pipe has nearly disintegrated completely, leaving only a line of rust on the ground, illustrating the length of time since it's placement. The native vegetation and noxious cheat grass have naturally grown over the whole area except the fine-grained tailings pile adjacent to the creek (Photo 1).

North Fork Willow Creek is a relatively small perennial stream, 3-4 feet wide, averaging 3-4 inches deep near Leviathan mine. The creek becomes perennial downstream approximately 2.5 miles when it enters flatter, agricultural land. The creek water shows no sign of obvious discoloration. Free-range cattle have severely affected the riparian zone.

None of the ground surface shows much, if any, evidence of human activity despite its proximity to Pearl Road. Cattle and wildlife are most susceptible to any potential contamination from the site. Wildlife witnessed during the visit include big game animal tracks (mule deer), small game manure (jackrabbit or cottontail), game birds (Hungarian partridge, California quail), scavenger birds (magpies), and songbirds. This area is also a deer-wintering area, as evidenced by the shed deer antler found within a mile of the site. Free-range cattle traverse the area at least part of the year. The stream contained small (up to two inches) unidentified fish (red-side shiners?) downstream of the waste rock pile and upstream of the tailings pile.


FIGURE 2-2 Site Map and Sampling Locations of Leviathan Mine
Pearl Townsite
Pearl Road
Water Sample "Leviathan 1"
Fine-grained Waste Pile
Soil Sample "Leviathan 2"
Seep
North Fork Willow Creek
Concrete Foundation
Large Waste Rock Pile
Former Adit Site
Seeps
0 50 100 Meters
N

3. MIGRATION/EXPOSURE PATHWAYS AND TARGETS

The following sections describe migration/exposure pathways and potential targets within the site's range of influence (Figures 3-1, 3-2 and 3-3).

3.1 GROUND WATER MIGRATION PATHWAY

Relating to the ore deposits, Anderson (1934) described the events leading to the present day geology of the Pearl District in the following order: Lodes and dikes were formed along a fracture zone in the Idaho batholith during the middle of the Tertiary Period. Recurring movement created fissures and preferential pathways for ore solutions to enter the country rock. Subsequent erosion leveled the topography to near present day levels by the middle of the Miocene, before it was covered by Columbia River basalts and sediments of the Payette formation during the middle or upper Miocene. Lastly, the lodes and dikes have been exposed by erosion before, during, and after regional warping and normal faulting.

Ground water flow is expected to be limited to preferential pathways of faults and brecciated zones within the country rock. Two small seeps were noted upgradient of the mine site, and one on contour to the west from the fine-grained waste pile. This water as well as any absorbed precipitation would generally follow the topsoil-fractured bedrock interface and contribute to North Fork Willow Creek, providing that a fracture does not intercept it first.

Contributions to the aquifer in close proximity to Leviathan Mine will predominantly be as a direct result of precipitation or surface water. North Fork Willow Creek is an influent stream. As the region is semi-arid, it receives only limited annual precipitation, mostly in the winter months. Annual precipitation for Emmett, Idaho, located approximately 9 miles to the west, is 13.45 inches, with a maximum 24-hour rainfall event of 2.47 inches.

Dry-season rainfall occurs almost exclusively in relatively short bursts, usually related to thunderstorm activity. It is expected that almost all dry-season rainfall events would be completely absorbed by the soils and plants, without much, if any, contributions to the ground water. However, because both the waste rock pile and tailings pile have high angle slopes and lie adjacent to North Fork Willow Creek, a higher percentage of rainfall would be expected to drain into the stream.

According to Idaho Department of Water Resources July 2002 records, 22 drinking water wells are reported to be located within a 4-mile radius of the site. They are summarized in the Table 1, below. It is estimated that 594 people are served by these wells, based on the average number of persons per household in Gem County (DOC, 2000).

Table 1 Domestic Ground Water Wells Within a 4-Mile Radius of the Leviathan Mine, Gem County, Idaho	
Distance	**No. of Wells**
0-0.5 miles	1
0.5-1.0	1
1-2	3
2-3	2
3-4	15
Total	22

No irrigation wells were identified within a 4-mile radius of the site, and the site is not located within a wellhead protection area (DEQ, 2003). The closest ground water well used for domestic purposes is located at a distance approximately 0.25 miles northeast of Leviathan Mine (Figure 3-3). The well is up a tributary on the opposite side of North Fork Willow Creek. Depth to water for this well was reported to be 27 feet. Another domestic well is also located approximately .52 miles upgradient (southeast) of the mine. Depth to water for this well was reported to be 47 feet. Due to depth and location, it is not expected that the mine would affect either well.

3.2 AIR MIGRATION PATHWAY

The nearest permanent residence to Leviathan Mine is approximately 0.25 miles north- northwest of the site. Direct observation noted livestock grazing within and around the mine site.

The site is comprised of an unconsolidated sulfide-rich tailing pile varying in degree of compaction. The waste rock is primarily confined to dumps. Aerial dispersal from the dumps is expected to be a very rare occurrence. The fine-grained waste pile adjacent to the stream could be subject to wind dispersal within the immediate area; however, no significant dispersion is expected. No reclamation or other activities to establish plant growth have occurred.

3.3 SOIL EXPOSURE PATHWAY

Access to the mine site is essentially unrestricted due to a dilapidated barbed wire fence and an easily crossed stream. The private land surrounding the mine is not posted with trespass information. The mine is in close proximity (30 yards) to a public corridor (Pearl Road).

Potential receptors include hunters, cattlemen, and rarely, tourists. Cattle activity surrounding and within the mine site is quite high, as they utilize water from North Fork Willow Creek, eat grass growing on the hillside, and lie on the flat bulldozed

former adit sites. North Fork Willow Creek dries up in the summer months at a point approximately 2.5 miles downstream from Leviathan mine where the stream channel enters agricultural land and begins to meander.

The land surrounding Leviathan mine is used almost exclusively as rangeland (IDWR[1], 1997). Ownership within the 4-mile radius is approximately 80% private, 10% State of Idaho, and 10% BLM (USGS, 1991).

There are no schools or day-care facilities within 200 feet of the site. There are no private residences or workers within 200 feet of the site.

Soil sample (Leviathan 2) contained arsenic at concentrations of 61,500 mg/kg, iron at concentrations of 58,700 mg/kg, and lead at concentrations of 640 mg/kg (Appendix B). No reclamation or other activities to establish plant growth have occurred.

Soil exposure at Leviathan Mine site is expected to be low for all receptors.

3.4 SURFACE WATER MIGRATION PATHWAY

The entire site slopes northward towards the westerly flowing North Fork Willow Creek. Direct observation noted spring runoff water has down-cut through the fine-grained tailing pile. Based on test results of the soil sample, this is a potential Probable Point of Entry (PPE). Overland flow in the vicinity of Leviathan Mine would flow directly into North Fork Willow Creek. No water discharges were observed from either of the former shafts. EPA has designated North Fork Willow Creek as a 1998 addition to the 303(d) list (unknown) under the TMDL program (DEQ[2], 2000).

During DEQ's July 2003 visit, three small seeps were observed in close proximity to the mine site. One seep is located to the west approximately 30 yards and at the same elevation as the mine site. The other seeps are located uphill of the mine site approximately 30 yards. None of the uphill seeps were producing any standing water during the site visit. Higher flow rates would be expected during the spring, at which time they might pose a higher potential as a secondary factor.

Sport, commercial, or subsistence fishing does not occur within the 15-mile downstream distance, although small (up to two inches long) fish (red-side shiners?) were observed near at the mine site.

One plant species listed as a species of concern (F&G, 2002), was identified at two locations within a 4-mile radius of Leviathan Mine (Figure 3-1). Aase's onion was found 1.4 miles southwest and 3.1 miles south-southwest of the site.

The use of surface water for watering of livestock and wildlife is expected. Crop irrigation is not considered a significant use because North Fork Willow Creek dries up during the summer before it reaches any agricultural land.

There are no primary targets for surface water. Secondary targets include livestock. No sensitive environments were noted during the site visit, however some potential wetland areas exist along North Fork Willow Creek.

4.0 SUMMARY AND CONCLUSIONS

Leviathan mine was a hard-rock gold mine, which operated prior to 1910. It is located within the Pearl Mining district in Gem County, Idaho and approximately 400 yards upstream of Pearl, Idaho, just south of Pearl Road. The mine was developed to access well-mineralized gold-bearing fissures. Approximately 2,500 feet of tunneling occurred along 1,300 feet of drifts that reached depths of 400 feet in places.

All structures relating to mining activity have been burned, removed, or covered, however, a waste rock pile and a fine-grained tailings pile remain and are visible from Pearl Road. A soil sample taken from the fine-grained tailings pile contained elevated concentrations of arsenic and lead, and high levels of iron. A water sample taken from North Fork Willow Creek just below the soil sample location contained high concentrations of arsenic and cadmium.

A PPE exists for secondary targets in surface water at the fine-grained tailings pile, however, based on limited sampling data, air, soil, and water pathways do not represent a significant threat to primary targets.

FIGURE 3-1

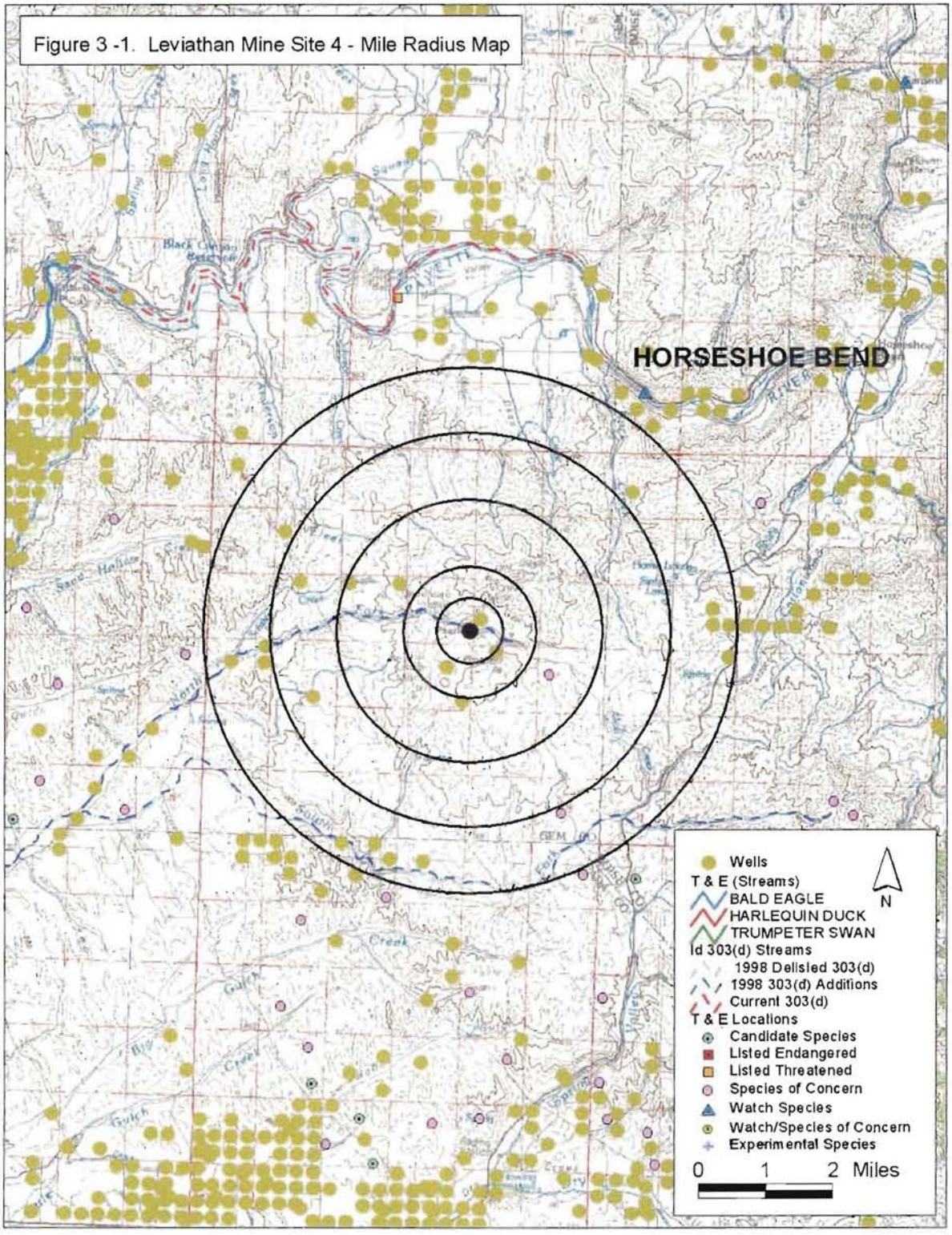

Figure 3 -1. Leviathan Mine Site 4 - Mile Radius Map
HORSESHOE BEND
Wells
T & E (Streams)
BALD EAGLE
HARLEQUIN DUCK
TRUMPETER SWAN
Id 303(d) Streams
1998 Delisted 303(d)
1998 303(d) Additions
Current 303(d)
T & E Locations
Candidate Species
Listed Endangered
Listed Threatened
Species of Concern
Watch Species
Watch/Species of Concern
Experimental Species
N
0 1 2 Miles

FIGURE 3-2

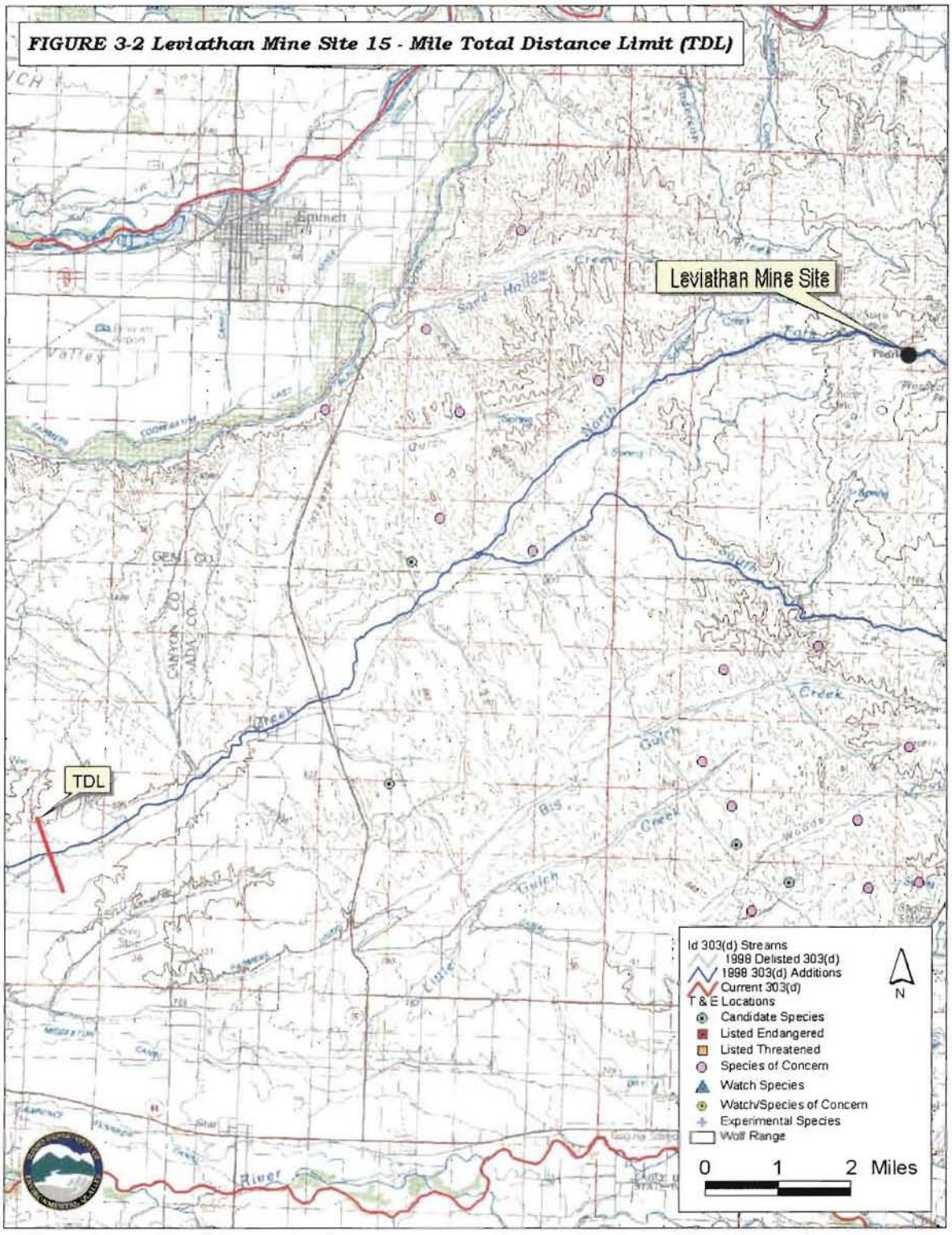
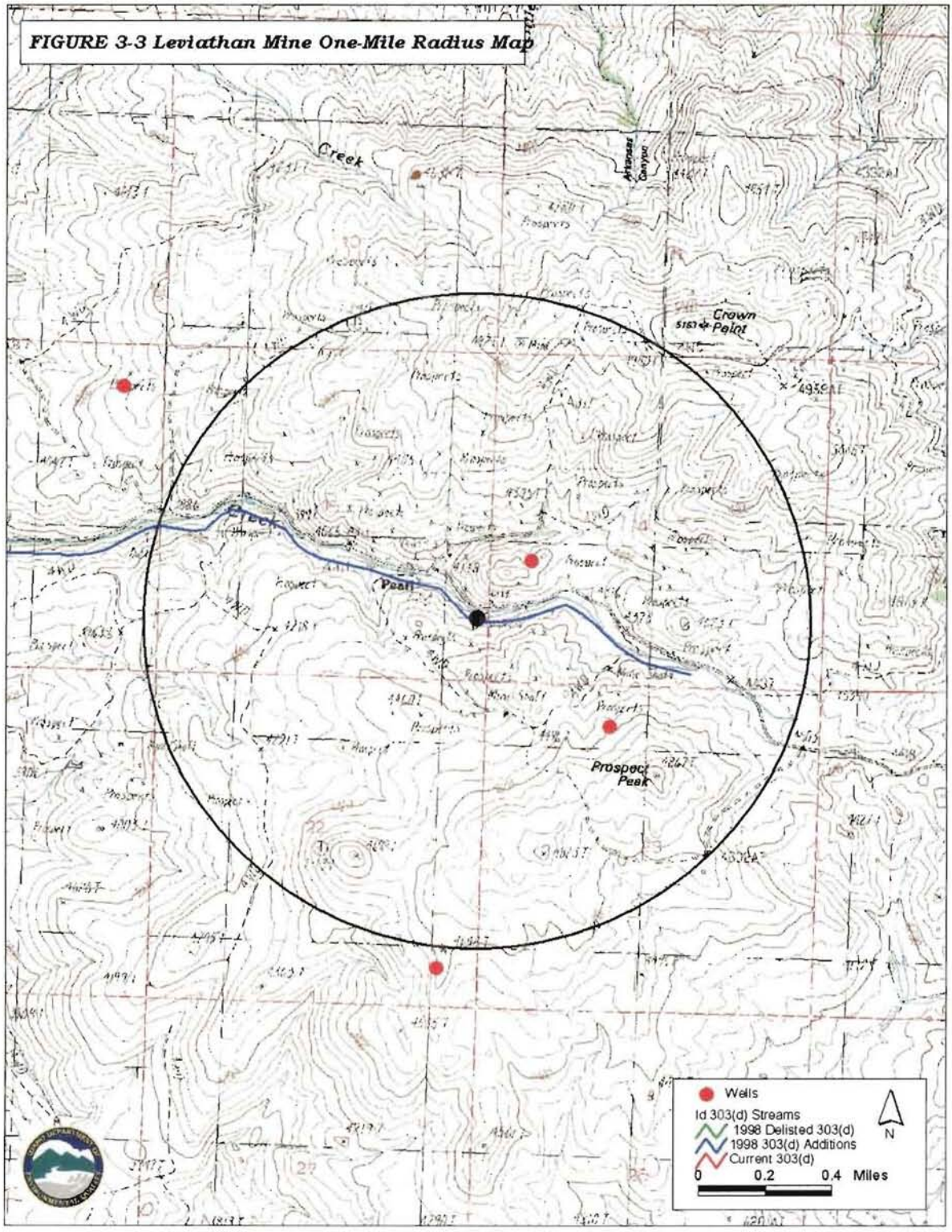

FIGURE 3-2 Leviathan Mine Site 15 - Mile Total Distance Limit (TDL)
Leviathan Mine Site
TDL
Id 303(d) Streams
1998 Delisted 303(d)
1998 303(d) Additions
Current 303(d)
T & E Locations
Candidate Species
Listed Endangered
Listed Threatened
Species of Concern
Watch Species
Watch/Species of Concern
Experimental Species
Wolf Range
N
0 1 2 Miles

FIGURE 3-3


FIGURE 3-3 Leviathan Mine One-Mile Radius Map
Creek
Crown Point
Peak
Prospect Peak
Wells
Id 303(d) Streams
1998 Delisted 303(d)
1998 303(d) Additions
Current 303(d)
N
0 0.2 0.4 Miles

REFERENCES

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F&G (Idaho Department of Fish and Game), 2002. http://www2.state.id.us/fishgame/info/cdc/plants/vasc_plants&status_n-r.htm

IDWR[1] (Idaho Department of Water Resources), 1997. COVERAGE IDOWN -- Idaho Surface Ownership

IDWR[2], 2002. GIS shapefile of well database.

USGS (United States Geological Survey), 1991. Digital map file of major land uses in the United States

United States Department of Commerce (DOC), United States Census Bureau, 2000, General Housing Characteristics, Gem County, Idaho.

Wells, M.W., 1983, *Gold Camps & Silver Cities*, Idaho Bureau of Mines and Geology, Bulletin No. 22, 2nd Edition.

WRCC (Western Regional Climate Center), 2002. http//:www.wrcc.dri.edu/htmlfiles/id/id.ppt.ext.html

APPENDIX A

SITE PHOTOGRAPHS

LEVIATHAN MINE

Photo 1



Leviathan Mine, fine grained waste pile. Photo taken from Pearl Road and facing south. Soil Sample (Leviathan 2) was taken just below wood debris at left side of photo. Water Sample (Leviathan 1) taken below mass wasting present in foreground. North Fork Willow Creek flows left to right (West to East).

APPENDIX B

ANALYTICAL RESULTS

Table 2
Soil and Surface Water Sample Data for the Leviathan Mine, Gem County, Idaho

Analyte	Surface Water Sample Upstream (mg/L)	Surface Water Sample Leviathan 1 (mg/L)	Surface Water Sample Downstream (mg/L)	Soil Sample Leviathan 2 Total (mg/kg)	Soil Sample Leviathan 2 TCLP (mg/l)
WAD CN	NA				<0.01
Arsenic	0.015	1.0	0.23	61500	0.5
Barium	0.14	0.076	0.063	22	0.2
Cadmium	<0.001	0.02	<0.001	<5	0.05
Chromium	<0.005	<0.005	<0.005	<10	>0.1
Copper	<0.01	0.74	<0.01	300	NA
Iron	1.4	10.4	0.27	58700	NA
Lead	<0.005	0.007	<0.005	640	10.5
Mercury	<0.0005	<0.0005	<0.0005	12	<0.005
Nickel	<0.01	<0.01	<0.01	<10	NA
Selenium	<0.01	<0.01	<0.01	5.6	<0.1
Silver	<0.001	<0.001	<0.001	33	<0.1
Zinc	<0.005	3.3	0.008	220	NA

NA = not analyzed