BULLION & OPHIR MINES

Aka: Durango Tunnel, Ophir Shaft, Brown Tunnel, and Bullion, Durango, Check, Fairie Queen, Index, Indian Queen, Mountain View, Oneida, Ophir and Rough & Ready patented mine claims

PRELIMINARY ASSESSMENT REPORT

Blaine County
State of Idaho

Department of

Environmental Quality

December 2009

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

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1410 North Hilton • Boise, Idaho 83706 • (208) 373-0502

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

December 30, 2008

Atlas Mine & Mill Supply
North 1115 Havana Street
Spokane, WA 99202

RE: Site Assessment of the Bullion & Ophir Mines aka: Durango Tunnel, Ophir Shaft, Brown Tunnel, and Bullion, Durango, Check, Fairie Queen, Index, Indian Queen, Mountain View, Oneida, Ophir and Rough & Ready patented mine claims.

Dear Sir or Madam:

The Idaho Department of Environmental Quality (DEQ) has evaluated an extensive amount of existing data, and conducted limited field exams on the above referenced mines and mining claims. This evaluation and discussion is attached as a Preliminary Assessment report. DEQ has determined that the sites should be designated as **No Remedial Action Planned** based on existing conditions and uses, historic information, data observations made during the site visit, analysis of the mine and mill wastes, potential pathways of contaminants to receptors, and potential exposures to ecological and human receptors.

However, if any plans are considered for residential development of any of these properties, additional site investigations and risk analysis should be conducted. If risks do exist as DEQ has discussed in the Preliminary assessment, then specific risk management objectives and pans should be incorporated in any development of the properties.

In addition, there are numerous mine openings and physical hazards that may pose a risk to recreationists and future residents, if any. These mine openings should be properly managed to or restricted to prevent injuries.

If you have any questions you may have regarding our determinations, please contact me at (208) 373-0554.

Sincerely,

Bruce A. Schuld
Mine Waste Projects Coordinator
Waste Management and Remediation Division

BAS:TE:tg G:\Waste & Remediation\Bruce Schuld\Bullion Ophir Mines

attachment

cc: Ken Marcie, Environmental Protection Agency
file

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Kulina Family Trust
c/o Charles B. Kulina - Trustee
1425 Broadway #422
Seattle, Washington 99202

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Table of Contents

List of Acronyms 6
Section 1. Introduction 7
Section 2. Ownership 8
Section 3. Overview 10
Section 4. Mine Site History 12
Section 5. Climate 13
Section 6. General Geology 14
6.1 Structure 15
6.2 Site Geology 16
Section 7. Current and Potential Future Land Uses 19
7.1 Current Land Uses 19
7.2 Future Land Use 19
Section 8. Site Conditions and Waste Characterization 20
Section 9. Soil & Sediment Sample Collection 23
9.1 Soils Analysis 27
9.2 Sediment 30
Section 10. Surface Water Sample Collection 32
10.1 Results 32
Section 11. Pathways and Environmental Hazards 34
11.1 Ground Water Pathways 34
11.2 Surface Water Pathways 38
11.3 Air Quality Pathways 38
11.4 Soil Exposure 38
11.5 Domestic Wells and Public Water Supplies 39
11.6 Residences, Schools and Day Care Facilities 39
11.7 Wetlands 40
11.8 Sensitive Species (Plant and Animal) 42
11.9 Fisheries 42
11.10 Sensitive Waterways 44
11.11 Livestock Receptors 44
Section 12. Summary and Conclusions 45
Section 13. References 46

List of Figures

Figure 1. Location of the Mayflower Lode claims with USFS parcel data overlay (Map source: NAIP 2004). 9
..... 11
Figure 2. Location of Claims and Field Sites (Map source: Blaine County 2004). 11
Figure 3. Geology of the Mayflower Lode (Map source: USGS 24k). 18
Figure 4. Map of Bullion Mine (Durango tunnel) sampling locations, adits, and waste rock dumps (from E&E, 2007). 24
Figure 5. Map of Ophir Mine soil and sediment sampling locations, adits, and waste rock dumps (from E & E, 2007). 25
Figure 6. Map of Durango Mine adits, shafts and waste rock dumps (from E&E, 2007). 26
There were not any samples collected from the Durango Mine site. 26
Figure 7. Map of Unnamed Mine soil and sediment sampling locations, adit and waste rock dump (from E&E, 2007). 27
Figure 8. Drinking Water Well locations and source water delineations (Map source: NIAP 2004). 37
Figure 9. Wetlands and 15-Mile TDL map (Source Fair 100k, Sunv 100k, NIAP 2004). 41
Figure 10. Sensitive species near the Mayflower lode mines (Source: Fair 100k, Sunv 100k, USGS 24K Topo). 43

List of Attachments

Attachment 1. Bullion Mine (IGS Number: HA-329) Abandoned/Inactive Mine Land Inventory Field Checklist
Attachment 2. Ophir/Brown Mine IGS Number: HA-331) Abandoned/Inactive Mine Land Inventory Field Checklist

List of Tables

Table 1: Total Recoverable Metals Analysis (mg/kg) 29
* Bullion, Ophir & Unnamed Mines sample data excerpt from Table 6-4, Page 6-19 (E & E, 2007) 29
Table 2: Sediment Samples Total Recoverable Metals Analysis (mg/kg) [excerpt from E & E, 2007] 31
Table 3: DEQ Water Samples Total Recoverable Metals Analysis (mg/L). 33

List of Acronyms

Acronym	Definition
amsl	above mean sea level
BLM	United States Department of the Interior, Bureau of Land Management
DEQ	Department of Environmental Quality
EPA	United States Environmental Protection Agency
E & E	Environment & Ecology, Inc.
gpm	gallons per minute
IDTL	Initial Default Target Levels
IGS	Idaho Geological Survey
MCL	Maximum Concentration Limit
PPE	Probable Point of Entry
HHSL	Human Health Medium-Specific Screening Levels
TCLP	Toxicity Characteristic Leaching Procedure
TDL	Target Distance Limit
TMDL	Total Maximum Daily Load
USFS	United States Department of Agriculture, Forest Service

Section 1. Introduction

This document presents the results of the preliminary assessment (PA) for the Bullion Mine. 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 within the Mineral Hill Mining District in Blaine County, Idaho.

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 was also given to mining districts where groups or clusters of sites could 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

As these sites are on a patented mine claims and public lands, in 2006 DEQ staff formally requested legal access to the patented claim to conduct a site visit. At the time of the site visits with the U.S. EPA in 2006, DEQ and EPA did not have access to the private properties. DEQ did have access to the public lands adjoining the patents from which most observations and samples were collected. DEQ also entered and mapped properties where there were no restrictions to public access, and there was evidence that the public routinely accessed these properties.

In 2007 DEQ received access to some of the properties owned by Atlas Mine and Mill Supply (Atlas), and additional information was collected from those properties. Subsequently, DEQ continued site assessment work on Atlas's property where access was granted.

DEQ was able to make sufficient observations to determine that under the current site conditions ad use none of these properties contain significant risks to human health or the environment. Therefore, DEQ included these properties and determinations (No Remedial Actions Planned (NRAP)) in this report.

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 that will be observed in this report's figures are plotted according to the Blaine County Tax Assessor's data base, and are indicative of probable errors that 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 that based on current conditions at the site DEQ did not find any significant evidence that would indicate the potential of adverse effects to human or ecological receptors on the parcel of land. 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 that DEQ has determined that there is sufficient evidence to warrant calculation of a Hazard Ranking Score (HRS) by EPA's contractors. It also indicates that 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.

Owner	Claim	Parcel Number	Partial Determination
Edward B. Crofoot Mrs. F. R. Stryker 6846 Pacific Street, Ste 101 Omaha, NE 68106	Bullion Ophir	RP1M0000000480	NRAP NRAP
Atlas Mine & Mill Supply North 1115 Havana St. Spokane, WA 99202	Oneida Indian Queen Fairie Queen Index Check Durango	RP1M0000001270	NRAP NRAP NRAP NRAP NRAP NRAP
Charles B. Kulina – Trustee Kulina Family Trust 1425 Broadway #422 Seattle, WA 98122-3854	Mountain View Rough & Ready	RP1M0000001250	NRAP NRAP

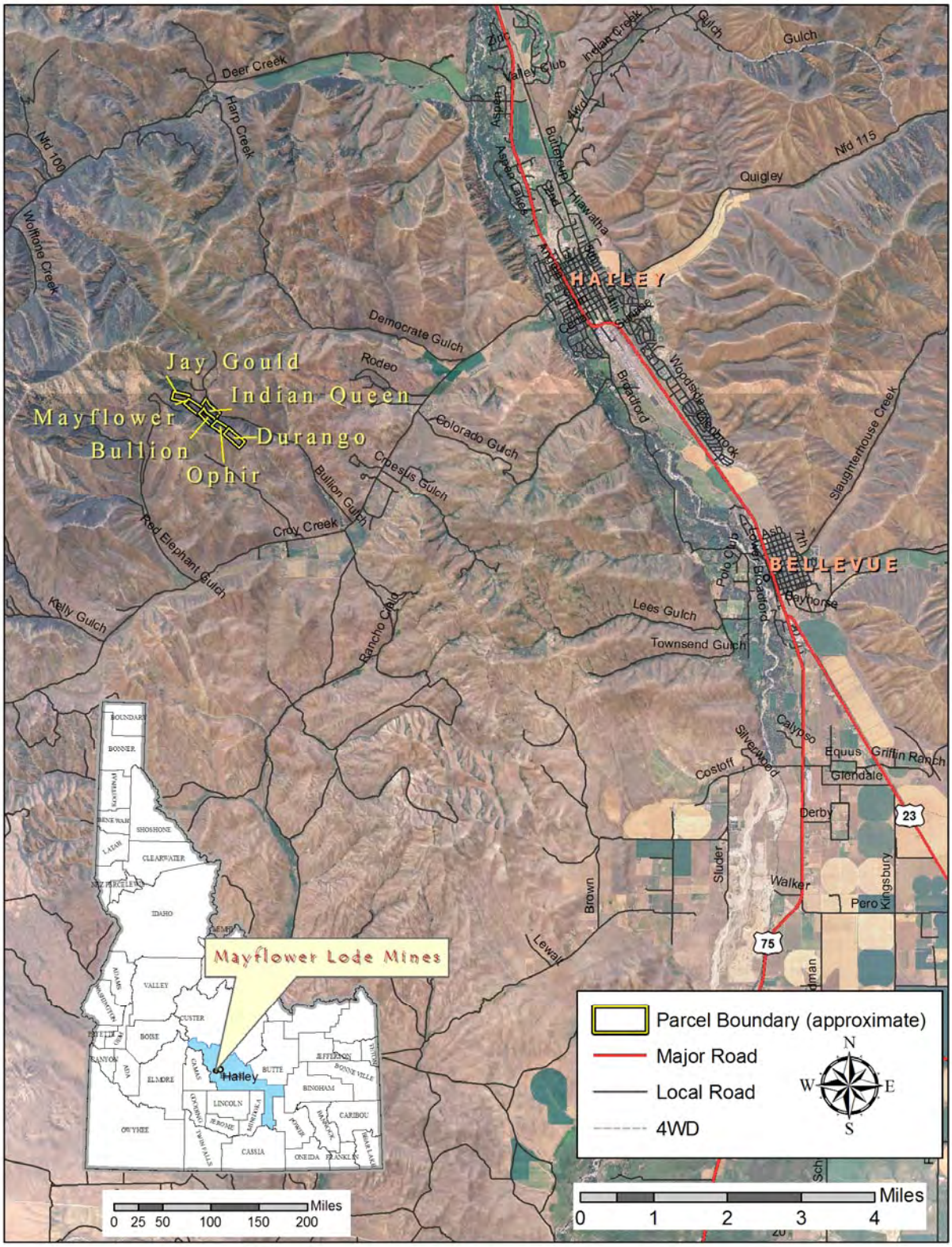


Figure 1. Location of the Mayflower Lode claims with USFS parcel data overlay (Map source: NAIP 2004).

Section 3. Overview

The Bullion and Ophir mines, and the Durango Tunnel are located in Bullion Gulch, a tributary to the Croy Creek sub-drainage, approximately six miles west of Hailey, Idaho, in Sections 22 of Township 2 North, Range 17 East of the Boise Meridian, at Latitude DD: 43.495, Longitude. DD: -114.4094. The "Unnamed" mine is located on the Check patented claim in Sections 23 of Township 2 North, Range 17 East of the Boise Meridian, at Latitude DD: 43.4934 Longitude. DD: -114.4027. The mine sites which are associated with the Mayflower Lode are illustrated in Figure 1.

Directions to the mines
The most direct route to the Bullion is obtained by driving west from Highway 75 in Hailey onto Bullion Street. At the Big Wood River bridge the road's name changes to Croy Creek Road. One continues west for approximately 4 miles to the junction of Bullion Gulch Road. One turns right, proceeding north up Bullion Gulch, only the lowest 0.5 miles of this road is graveled. High-clearance vehicles are recommended beyond this point.

Unnamed mine
One continues on Bullion Gulch Road for approximately 2.1 miles, until reaching the right-hand access road to the Idahoan/Arizona mines. At this point, the Unnamed mine lies approximately 75 yards west of the intersection across the gulch.

Durango Tunnel
One continues on Bullion Gulch Road for approximately 0.3 miles beyond the Unnamed mine. The waste dump of the Durango tunnel is readily visible from the road, on the west side of the gulch.

Bullion, Ophir & Durango mines
One continues on Bullion Gulch Road for approximately 0.3 miles beyond the Durango tunnel, until reaching a fork in the road. One takes the left-hand fork and continues for another 0.1 miles where a second fork is encountered. One takes the left fork which leads into the gulch. Beyond this point, ORV or hiking is suggested, one crosses the gulch at the base of the Mayflower mine's lower waste dump and turns left. The old road continues for a short distance to the south, ending at the Indian Queen. The old road degrades into a trail which switchbacks up to the Ophir shaft/Brown tunnel area and extends to just beyond the Durango shaft.

The patented claims associated with the southern extension of the Mayflower lode and the Bullion Mine workings as well as the approximate location of the mine sites (Ophir, Durango tunnel & Unnamed) from which samples were collected, are shown in Figure 2.

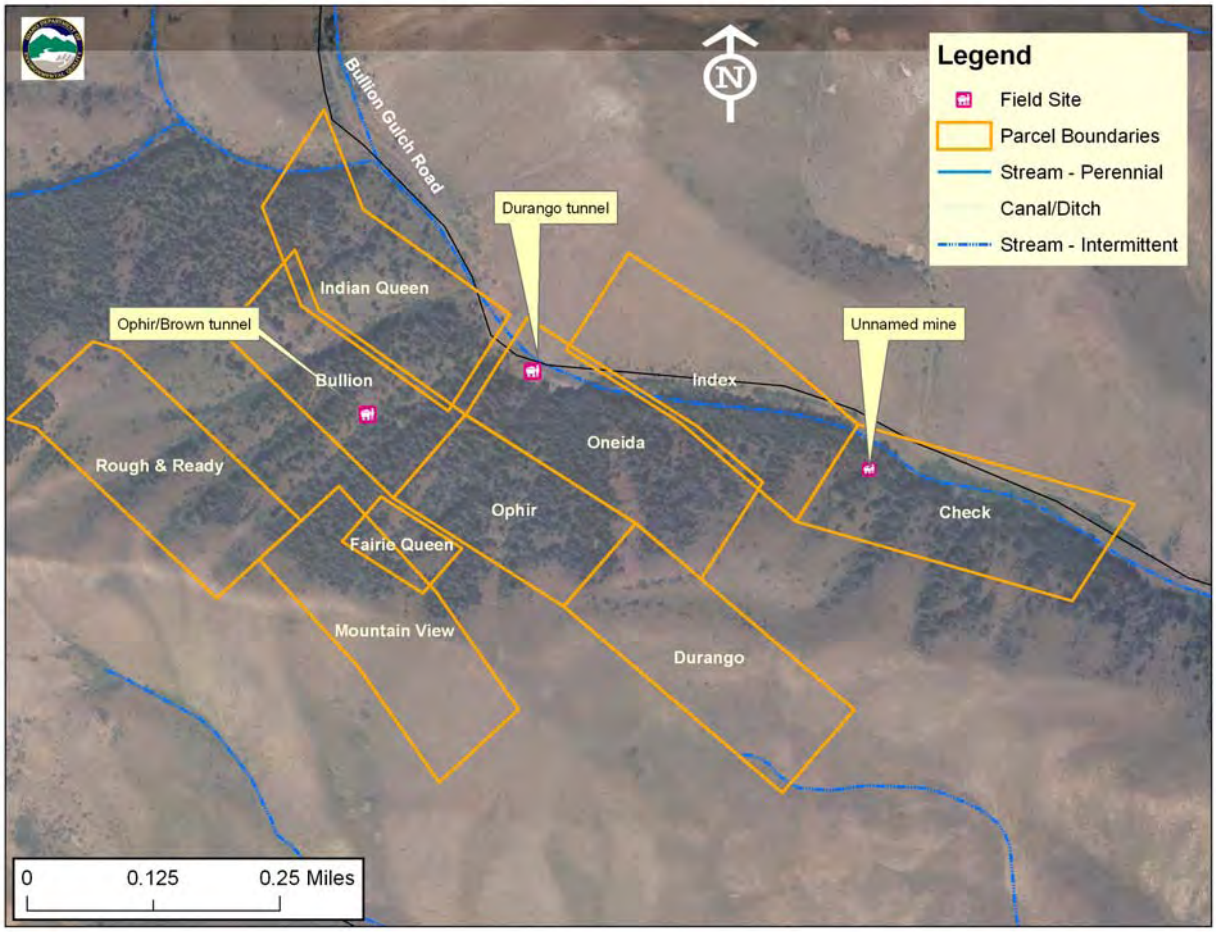


Figure 2. Location of Claims and Field Sites (Map source: Blaine County 2004).

Section 4. Mine Site History

Several mines lie within or adjacent to Bullion Gulch, once designated as the "Bullion District". Many of the higher producing mines were located within the Mayflower fault zone. The Mayflower, Jay Gould, Bullion, Ophir and Durango mines trace the Mayflower vein. Most of these mines were interconnected.

The adjoining Bullion and Ophir claims were patented in 1882 by the Wood River Gold and Silver Mining Company (GLO, 2009). The mines on the Mayflower lode operated almost continuously from 1880 to 1898.

> *The Bullion mine, located near the town of Bullion, a short distance west of the Idahoan, is the best-developed and richest mine in this region. It has nearly 6,000 feet in tunnels, drifts, and winzes, and has been explored to a depth of about 300 feet. The ore runs high, about $180 to the ton, and it is shipping about 10 tons a day. The mine belongs to the Wood River Gold and Silver Mining Company, and is in excellent condition. It has some 700 tons of second-class ore on the dump which will concentrate about 4 tons into one of first-class ore.* (USGS, 20th Ann. Rpt., p. 448)

Umpleby and others (1930) report the Bullion and other mines on the Mayflower lode were held under lease by the Bunker Hill & Sullivan Mining & Concentrating Co., which started work in 1921 and continued until 1924 without discovering any commercial grade ore bodies.

Production records of the Bullion, contributed by E. Daft at the Ketchum smelter and from the USGS (ibid, p. 139) are summarized as:

<u>Bullion Mine</u>
The Ketchum smelter listed production from 1881 – 1908
Tons of Ore and Concentrates – 3,275.9
Gold – 0.051 fine ounces
Silver - 485,182.5 fine ounces
Lead – 3,518,288 pounds

Later production recorded by USGS 1902 - 1909
Tons of Ore – 47
Silver – 6.3 fine ounces
Lead – 44,142 pounds

From 1888 to 1891, Ophir produced 62.5 tons of ore which yielded 4,834 fine ounces of silver and 24,205 pounds of lead.

DEQ was not able to locate any historical information or production records pertaining to the Unnamed mine, located on the Check patented claim.

Section 5. Climate

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 degrees Fahrenheit (F). The lowest temperature recorded for this period was – 28 degrees F in 1962. The highest temperature for this period of record was 100 degrees F in 1953. January is the coldest month with an average temperature of 19.5 degrees F. July is the hottest month with an average temperature of 67 degrees F.

Section 6. General Geology

Numerous geology and mineral resource studies of the Wood River and adjacent areas have been accomplished. 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 Bullion mine lies within the Mayflower fault zone and is generally characterized by quartzite with undifferentiated sandstones, limestones and argillites of the Wood River formation. Figure 2 shows the generalized geology of Bullion mine 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

Anderson (1950, p. 7) went on to note that, "The folding within the area is comparatively simple and consequently faulting constitutes the outstanding feature."

In discussion of the Red Elephant and Bullion areas Link and Worl (2001) described geologic and historic information relating to stratigraphy and mineralization relationships within Dollarhide sedimentary sequences in the Mineral Hill district.

> *The Bullion mineralized area...is underlain by the lower and middle members of the Pennsylvanian and Permian Dollarhide Formation, which is folded into upright and west-overturned map scale folds.…The lower member of the Dollarhide Formation, hosts most of the mineralized rock (Skipp and others, 1994). Fryklund (1950), following Umpleby and others (1930), labeled these rocks as Wood River Formation, though he notes, "it is possible that Milligen formation is also present" (p. 64). An unpublished map (circa 1970) of W.E. Hall labels the dark-colored rocks in the Bullion area as*

Milligen Formation. Hall (1985) showed the rocks as Dollarhide Formation, and Wavra and Hall (1989) showed them as upper member, Dollarhide Formation.

The lower member of the Dollarhide Formation in the Bullion area contains fine- to medium-grained sandstone, black siltite and black limestone or marble. A distinctive lithology in the lower member is channelized disorganized conglomerate that contains mainly intrabasinal soft-sediment clasts of siltstone and sandstone. The lower member occupies both sides of Bullion Gulch and the central part of Red Elephant Gulch. The rocks east of Bullion Gulch are mapped as being stratigraphically high in lower member Dollarhide Formation, because the middle member quartzite is not present. They are intruded on the east by the Deer Creek stock.

In the Bullion area the middle member of the Dollarhide Formation (regionally about 300 m [984 ft] thick) contains silicified sandstone that crops out as light-gray to brown quartzite that forms the high ridge between Red Elephant and Bullion Gulches. These rocks were shown as Wood River Formation on the map of Hall (1985). The mineralized veins of the Bullion area do not extend southward into the middle member Dollarhide Formation. The middle member, much less silicified, is also present in west-dipping beds on the ridge of Kelly Mountains (Link and Worl, 2001, pp. 12 & 14).

6.1 Structure

Fryklund (1950, pp. 65-66) noted the following in regards to the general structure of the rocks and more specifically, those associated with The Mayflower:

The most obvious and significant structural features of the area are the major faults or fault zones which divide the area into a number of distinct blocks...The age of the oldest faults are to be placed as pre-intrusive and possibly all the major faulting is pre-intrusive...All of the major faults are probably pre-mineral as well as pre-intrusive.

The Mayflower fault zone strikes approximately N. 50° W. roughly paralleling the strike of the bedding through which it passes, dips at the surface vary from 70-85 degrees to the southeast. Maximum dips underground are much flatter and average perhaps 50 degrees with some dips as low as 30 degrees.

On the surface the fault zone may be traced as a discontinuous iron gossan which varies from 5-75 feet in width. The discontinuous outcrop in the Bullion claim, and the underground structure sections show that there are parallel and overlapping fault planes which constitute the Mayflower fault zone.

On the east, the fault zone cannot be traced on the surface from the Bullion Claim to the Durango Shaft, nor can it be traced westward beyond the central portion of the Jay Gould claim although there are prospect pits in the Jay Gould Extension Claim which possibly are on the Mayflower lode.

6.2 Site Geology

In 1930, J.B. Umpleby, L.G. Westgate and C. Ross described the geology and workings of the Mayflower and associated lodes.

> *...The country rock of the Mayflower and associated lodes belongs to the Wood River formation. Most of the rock in and near the principal workings in dark calcareous shale, with varying amounts of siliceous and calcareous material but without beds of sufficiently striking and constant characteristics to be useful as horizon markers...It* (ore body) *consisted chiefly of galena intergrown with considerable tetrahedrite and sphalerite in a gangue of siderite, quartz, and altered country rock, with calcite in some places. The first-class ore contained 50 to 65 per cent of lead and 90 to125 ounces of silver to the ton. The early operators are reported to have found sand carbonate (cerusite) and iron and manganese oxides in stopes near the surface...Most of levels 4 and 5 of the Bullion mine were accessible in 1923. Almost all traces of metallic minerals have been removed from the old stopes. The lode ranges in width from a few inches to over 10 feet and is defined on one or both sides by clean-cut walls, which in places are grooved up dip...The lode beyond the limit of the stopes is merely a zone of crushed rock with calcite veinlets, bands of gouge, and in places limonite staining. A number of slips intersect the lode at different angles, but none of those appear to have caused much displacement.*
>
> *Much of the work on the Boggs level has been done in the last few years...When the raise connecting the Durango workings with the Boggs level was driven a few fragments of galena were found in yellow material similar in appearance to the altered granodiorite...A little ore is reported to have been exposed in a raise above the first drift off the Durango tunnel, which is now inaccessible. The extensive work on the Durango tunnel level, which is 160 feet vertically below the Boggs level, has failed to disclose any ore of commercial value...The Durango tunnel and crosscut explore the ground for more than 1,110 feet horizontally southwest of the Boggs level in the direction of the dip of the lode...*
>
> (ibid, pp. 141-144)

The final years of operations along the Mayflower lode concentrated efforts in the Bullion Mine.

> *Development has been carried on principally through tunnels. It is continuous for about 4,300 feet on the course of the vein and extends through a vertical range of about 480 feet, although no ore bodies have been found in the last 150 feet of depth...In the summer of 1924, when the Bunker Hill & Sullivan Mining &*

Concentrating Co. abandoned its work, the Boggs level had been driven on the vein until it encountered the old workings on the Mayflower tunnel level, without finding any ore. Each branch of the Durango crosscut was then about 1,800 feet long. From the left branch there is a short irregular drift in which is exposed the only ore discovered in the course of the company's work on the Durango tunnel level.

(ibid, p. 140)

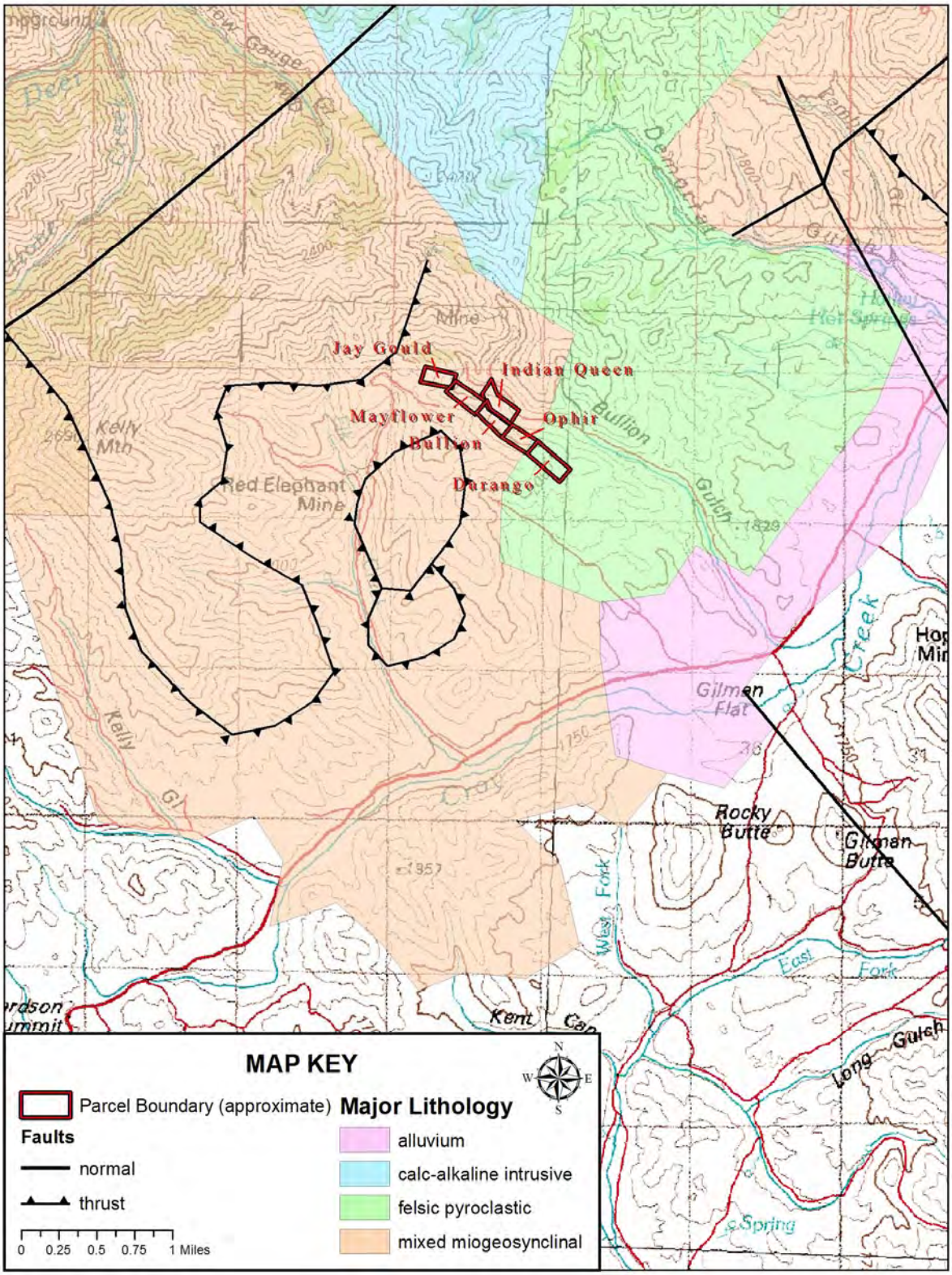


Figure 3. Geology of the Mayflower Lode (Map source: USGS 24k).

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. Only in the lower most portion of Bullion Gulch has residential housing. Occupancy appears to be seasonal for these residences, however. As detailed in the Section 3 of this report, the most direct route approaches Bullion Gulch from Croy Creek.

Public access to the Bullion Gulch workings, which are quite extensive, is unrestricted. During several DEQ site visits to Bullion Gulch properties, mountain bikers and hikers were frequently observed throughout the entire reach of the gulch.

7.2 Future Land Use

Future land use could potentially include some year-round and/or seasonal homes on the private parcels of property in the sub-basin, owing to its close proximity to Hailey. It appears likely that access to the properties may increase as the local populations and recreation industry expands.

Section 8. Site Conditions and Waste Characterization

The Idaho Geologic Survey (IGS) visited the site in 1994 that culminated in a site report. In July 2006, DEQ in conjunction with E&E conducted a PA/SI whose findings were reported in E &E's *Croy Creek Site Inspection Report* (2007).

DEQ and E & E collected two background, four waste rock dump, and three probable points of entry soil/sediment samples. The E&E report contains some descriptions of workings and samples that are on or collected from the Bullion Mine (Durango tunnel), on the Oneida patented claim and from the Ophir Mine on the Bullion patented claim. This conclusion is based on the parcel boundary information as shown on Blaine County's parcel map (2009), Plates 16 and 17 in Umpleby and others (1930), and Plate 3 in Fryklund (1950).

Based upon historical accounts and field mapping by Fryklund (1950), Gillerman and Griggs (2005), and DEQ and E & E (2007) the following assumptions are presented:

- The Ophir Shaft and the Brown Tunnel, collectively referred to as the Ophir Mine, are located on the Bullion patented claim
- The Durango Mine is located on the Ophir patented claim
- The Durango tunnel referred to as the "Bullion Mine" (E & E, 2007) is located on the Oneida patented claim
- The jig tailings pile, attributed to the Bullion mine (E & E, 2007), is located on the Indian Queen patented claim.

Figure 4 is a site drawing developed by E&E that shows the

The relative location of mine workings and sample locations at the Durango tunnel; Figure 4 denote similar relationships at the Ophir Mine.

During a site visit in July 1998, a field team from the Idaho Geological Survey (IGS) conducted site visits at the Bullion Mine, the Ophir Shaft and Brown Tunnel, and at the Durango shaft. A copy of the IGS field reports, site sketches and photographs are included in this preliminary assessment report as Attachment 1. Descriptions of the respective workings are presented.

> *The workings of the Bullion Mine include those principally on the Bullion claim, which adjoins the southeast of the Mayflower claim along a prominent northeast-trending ridge line. The Mayflower Lode trends slightly more south southeasterly on the Bullion claim. It is marked by a large trench or shallow, collapsed stope ending in a small open pit (Pit 1) in the gulch. The high wall to the pit is up to 25 feet high, but readily visible. The area can only be reached by hikers. An old rusty generator sits on skids at the pit, and a large dump extends down the gulch. Other dumps on the sage and grass-covered, south-facing slope appear to originate at small prospects, now caved. Adit 1 has a 2-foot high opening and portal across the gulch from the pit, also near the top of the large Dump 6. The timber portal has a leaf nest in it, and has served as an animal shelter. It is not particularly inviting and is fairly difficult to get to. A gate on Adit 1 is a lower priority than closing shafts and stopes on the nearby sites.*

(Gillerman & Griggs, 2005, p. 10)

A copy of the Ophir/Durango tunnel IGS field report, site sketches and photographs are included in this preliminary assessment report as Attachment 2.

> *Two areas of workings were mapped at this site, an upper one along the Mayflower Lode, and a lower area along the main Bullion Gulch road and creek. Shafts on the upper area of the Ophir/Brown Mine may actually belong to the Durango mine. They constitute some of the most dangerous hazards seen in the Hailey area. The upper workings visited at this site are located on the south half of the bullion claim, the Ophir claim, and probably another claim or possibly a non patented area...the Ophir and Brown workings can be reached by following a faint trail or old road through the woods southeast of Adit 1 of the Bullion Mine. Adit 3, the Brown Tunnel is caved, and a nearby Adit 2 on the road is partially open and should be closed.*
>
> *The Durango Shafts are reached by bushwacking along trend uphill. The dump and the three steep-walled shafts are heavily vegetated and difficult to see until one is right next to them. Only a few feet separate the shafts and the area around the shaft collars are undercut. An old pipe sticks out of one, but no concrete reinforcement was seen. All three shafts are wide open and vey deep. Any person or deer approaching from above would fall in and never be able to get out. They should be totally closed and the whole area fenced off as well...The lower workings on Site 031 are those on the Indian Queen and Oneida claims. Most prominent is the Durango Tunnel (Adit 4) and Dump 8 along the main Bullion gulch road. The adit is caved, but it does have a discharge. The water had a pH of 8.9 and specific conductivity of 290, along with a healthy wetland vegetation. No environmental problem is indicated, though some iron and manganese stain is apparent. An open adit, not examined, is located approximately one-third mile further down the main road on the west side of the road. It should probably be gated as it is very visible to visitors.*
>
> (Gillerman & Griggs, 2005, p. 11)

Bullion Mine (Durango Tunnel)
The Durango tunnel contained two waste dumps and one adit (Figure 3). The adit was observed to discharge, seeping into the landing near the portal. The larger dump, designated as "Waste Rock Pile 1", measured approximately 150 feet in length by 74 feet in width having a thickness of approximately 60 feet on land with an approximate 43º slope. The estimated volume of Pile 1 was calculated at 3,536 cubic yards [recalculated at 7,399 cubic yards] of material. The smaller dump, Waste Rock Pile 2 measured approximately 79 feet in length by 20 feet in width having a thickness of approximately 20 feet on land with an approximate 24º slope. The estimated volume of this dump was calculated at 94 cubic yards [recalculated at 351 cubic yards] (E & E, 2007, pp. 6-7 & 6-8).

Bullion Mine (Indian Queen). A dump at this site appeared to be jig tailings and was located approximately 500 feet up the access road.

(E & E, 2007, pp. 2-4 & 2-5)

Ophir Mine (Bullion claim) contained six waste rock piles and two adits. The adits were observed dry and the smaller waste rock piles were not sampled. The largest dump, Waste Rock Pile 1, measured approximately 150 feet in length by 100 feet in width having a thickness of approximately 10 feet on land with an approximate 35º slope. The estimated volume of the dump was calculated at 463 cubic yards [recalculated at 1,435 cubic yards].

Ophir Shaft and Brown Tunnel. The site consists of one open adit and three closed adits. Water was flowing from the open adit at an estimated rate of 15 gpm. Additionally, a wetland was noted at this adit. Three open shafts were also noted. No water associated with these shafts was noted. Two structures were noted at the site, a collapsed building and outhouse. As many as five dumps may be associated with this site.

Section 9. Soil & Sediment Sample Collection

Bullion Mine (Durango Tunnel)

Three soil and two Probable Point of Entry (PPE) sediment samples were collected from the site in 2006 during the E&E site inspection. Soil samples included three waste rock collected from selected points across Waste Dump 1 and two PPE samples collected at the adit discharge and downgradient of the waste dump. Soil sample locations were recorded, but apparently omitted on the E & E drawing, shown as Figure 4. Waste Dump 2 did not contain a significant volume and, consequently a sample was not collected from it. A background soil sample [BGBG02SS] which was collected near the ridge line above the Bay State claim in upper Bullion Gulch was deemed applicable for screening level comparisons to the lower elevation facilities.

Surface soil (0 to 6 inches below ground surface [bgs]) samples were collected using dedicated plastic spoons. Collected material was placed in a dedicated plastic bowl, thoroughly homogenized, and placed into a pre-labeled container (E & E, 2007, p. 3-4).

PA/SI sample naming convention is as follows:

- The first two letters represent the mine.
  - BU – Bullion Mine
  - OM – Ophir Mine
- The next two letters are a description of the sample type.
  - BG – background
  - WR – waste rock
  - PP – probable point of entry
- The are numbered sequentially
- The final two letters represent the sampled media
  - SS – soil
  - SD – sediment

For example: BUWR02SS was the second soil sample collected at the Bullion Mine from a waste rock dump.

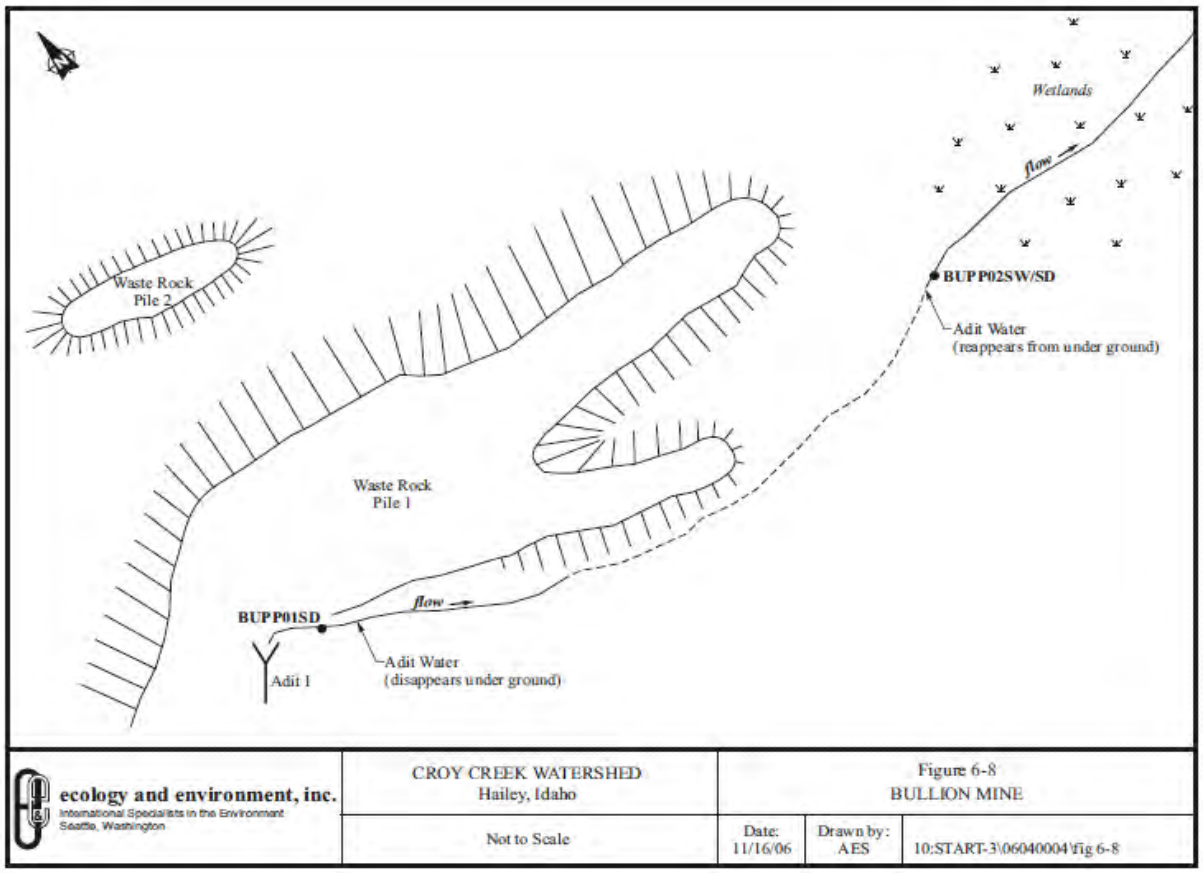


Figure 4. Map of Bullion Mine (Durango tunnel) sampling locations, adits, and waste rock dumps (from E&E, 2007).

Three soil samples [BUWR01SS, BUWR02SS & BUWR03SS] not shown on drawing and two PPE samples [BUPP01SD & BUPP02SD] were collected from the Durango tunnel site.

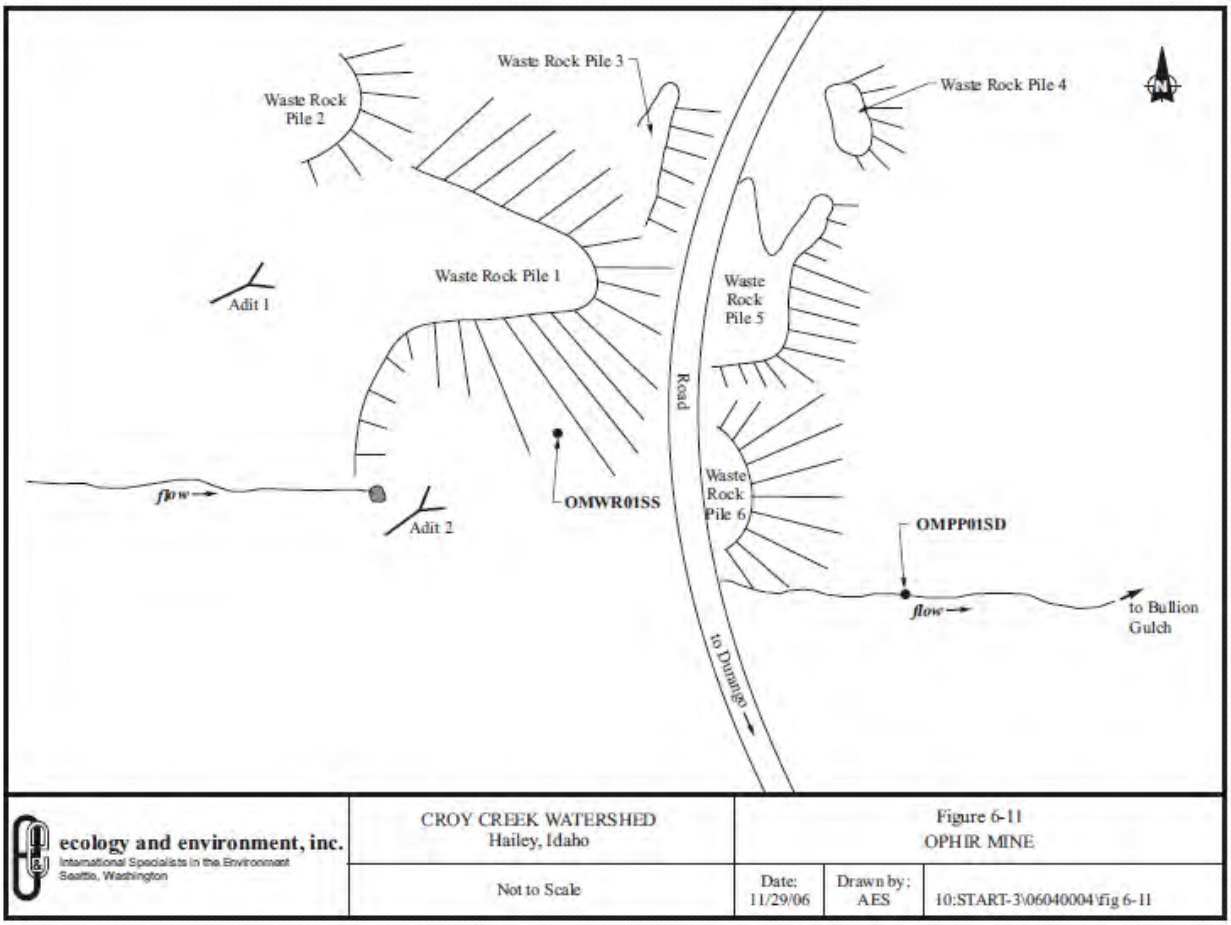


Figure 5. Map of Ophir Mine soil and sediment sampling locations, adits, and waste rock dumps (from E & E, 2007).

One soil sample [OMWR01SS] and one PPE sample [OMPP01SD] was collected from the Ophir Mine. Sample OMWR01SS was collected near the base of Waste Rock Pile 1 while the PPE sample was collected in the draw downhill from the Waste Rock Pile 6.

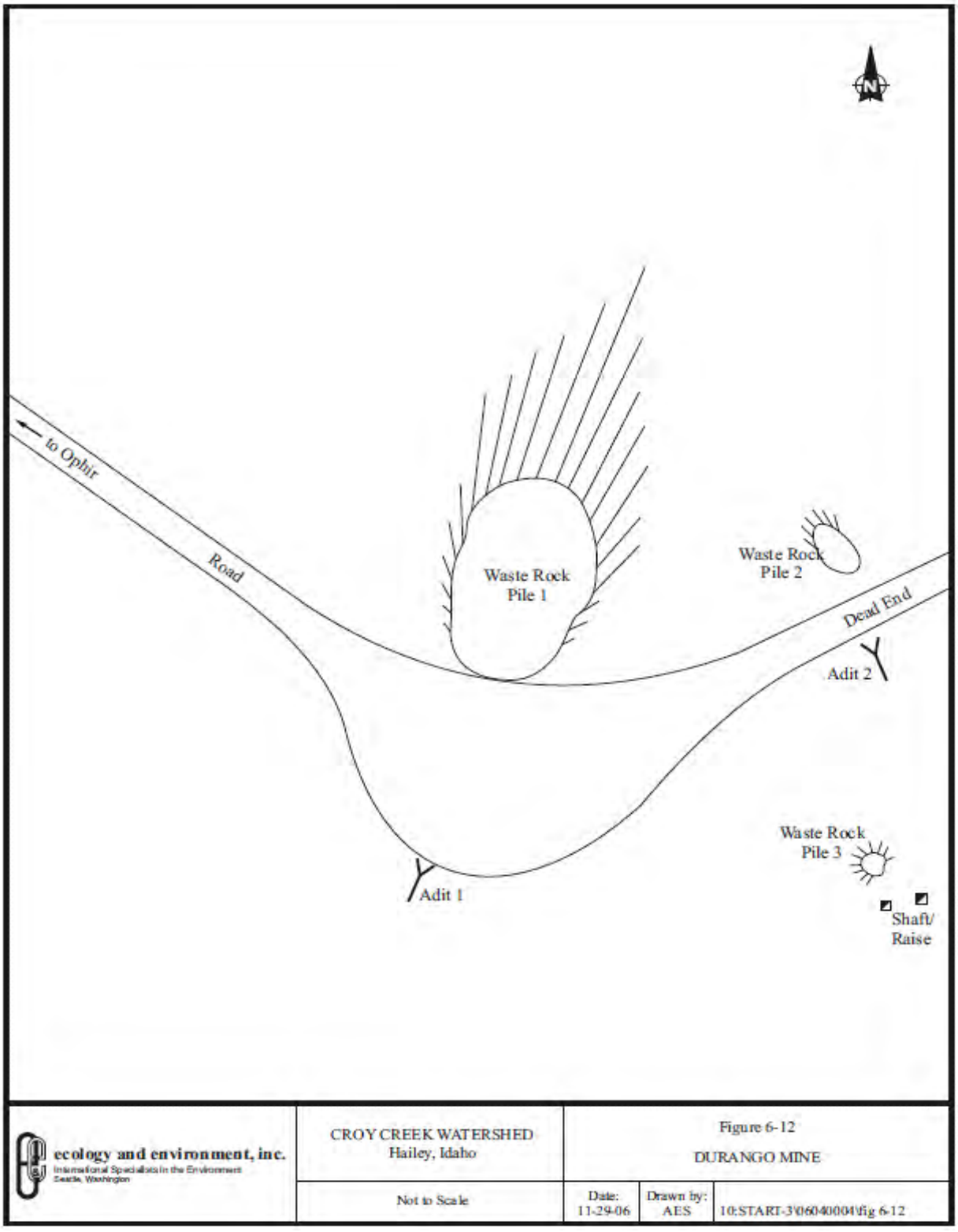


Figure 6. Map of Durango Mine adits, shafts and waste rock dumps (from E&E, 2007).

There were not any samples collected from the Durango Mine site.

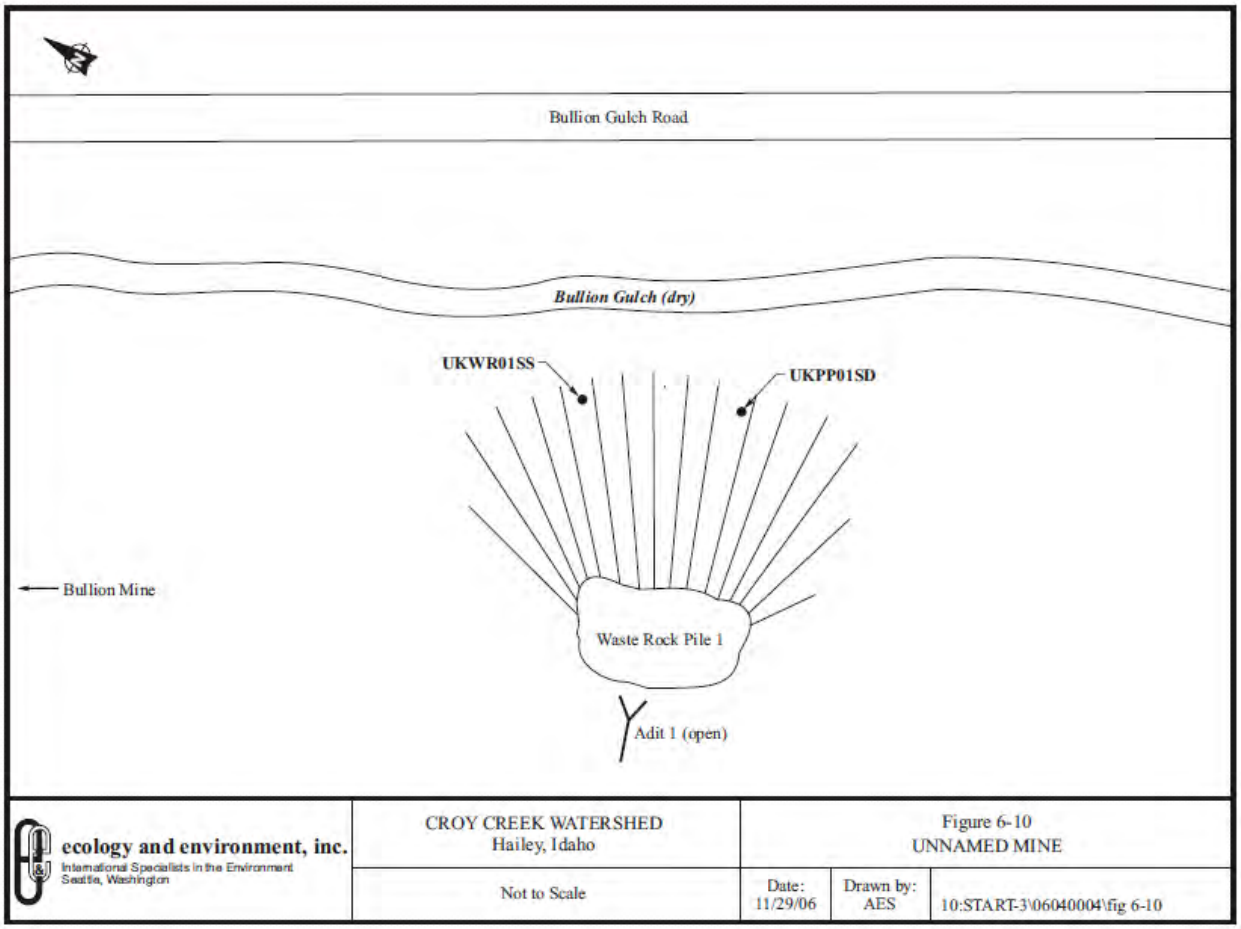


Figure 7. Map of Unnamed Mine soil and sediment sampling locations, adit and waste rock dump (from E&E, 2007).

9.1 Soils Analysis

Table 1 summarizes laboratory analytical results for surface soil samples.

Laboratory analysis of the soil background sample (BMBG02SS) showed arsenic, cadmium, iron, lead, mercury, and silver concentrations in exceedance of Idaho's *Initial Default Target* (IDTLs). Arsenic exceeded both the IDTLS and EPA Region 6's Preliminary Human Health Screening Levels (HHSLs) in the background sample.

IDTLs are very conservative risk based soil screening levels developed by the state of Idaho to provide preliminary screening levels for contaminants. HHSLs used in this report are health based screening levels developed by EPA for a residential scenario. The results of the analyses are as follows:

Bullion (Durango Tunnel)
All three of the samples collected from Waste Dump 2 showed concentrations arsenic, cadmium, iron, lead, manganese, mercury, selenium and silver that exceeded IDTLs. Sample BUWR03SS exceeded IDTLs for antimony and zinc, as well.

BUWR03SS exhibited the highest concentration of metal constituents with respect to background levels. Antimony, lead, manganese, mercury, selenium, silver, and zinc concentration was determined to exceed at least three times the background level.

Ophir
OMWR01SS had antimony, arsenic, cadmium, iron, lead, manganese, mercury, selenium, silver and zinc concentration that exceeded IDTLs. Arsenic, cadmium, iron, lead and manganese concentrations also exceeded HHSLs. Antimony, arsenic, cadmium, copper, lead, manganese, mercury, selenium, silver, and zinc concentrations were determined to exceed at least three times the background level.

Unnamed
UKWR01SS had arsenic, cadmium, iron, lead, manganese, mercury, selenium and silver concentrations that exceeded IDTLs. However, none of the HHSLs were exceeded. Mercury was determined to exceed at least three times the background level.

Table 1: Total Recoverable Metals Analysis (mg/kg)
*** Bullion, Ophir & Unnamed Mines sample data excerpt from Table 6-4, Page 6-19 (E & E, 2007)**

Description	DEQ Initial Default Threshold Level (IDTL) values	EPA Region 6 Human Health Screening (HHSL) Criteria	Bullion Gulch Background Soil Sample BGBG02SS	Bullion Mine Waste Dump # 1 Soil Sample BUWR01SS	Bullion Mine Waste Dump # 2 Soil Sample BUWR02SS	Bullion Mine Waste Dump # 3 Soil Sample BUWR03SS	Ophir Mine Waste Dump # 1 Soil Sample OMWR01SS	Unnamed Mine Waste Dump # 1 Soil Sample UKWR01SS
Antimony	4.77	314	<2.0 JL	3.8 JQ	1.9 UJL	**6.9 JL**	**29.3 JL**	0.69 JL
Arsenic	0.391	21.65	**76.4**	**50.8 JL**	**37.6 JL**	**113 JL**	**558 JL**	**11.1**
Barium	896	15642	127	12.3 JQ	23.5	25.8	18.6 JQ	43.3
Cadmium	1.35	39	**6.3**	**5.7 JL**	**3.9**	**13.6**	**46**	**5.1**
Chromium	NSC	NSC	29.2	2.7 JL	3.5 JL	0.54 JL	25 JL	32.8
Copper	921	2,900	53.6	26	14.5	25.7	162	37.7
Iron	5.76	55,000	**24700**	**12500 JL**	**13700 JL**	**54300 JL**	**70100 JL**	**6010**
Lead	49.6	400	**221 JL**	**568 JL**	**195 JL**	**2000 JL**	**9170 JL**	**89 JL**
Manganese	223	3,239	907 JL	**1530 JL**	**2100 JL**	**29400 JL**	**18500 JL**	174
Mercury	0.00509	23 U	**0.10**	**0.55**	**0.37**	**0.62**	**1.8**	**0.87**
Selenium	2.03	391 JQ	1.3	0.33 JQ	**3.5 UJL**	**17.7 UJL**	**7.0 UJL**	**3.4 U**
Silver	0.189	391	**1.5**	**8.7**	**2.0**	**17.1**	**98.8**	**1.8**
Zinc	886	23,464	718	872 JL	551 JL	**2570 JL**	**7090 JL**	289

Notes: **Bold – value above IDTLs** - value above HHSLs Blue – values above background ____ ≥ 3 times background
J – The associated value is an estimated quantity K - Unknown bias L - Low bias Q - The detected concentration is below the method reporting limit/contract required quantitation limit, but is above the method quantitation limit. NA – Not Analyzed, U - The material was analyzed for, but was not detected above the level of the associated value
NSC – no screening criteria value listed SQL = Sample quantitation limit.

9.2 Sediment

Table 2 summarizes laboratory analytical results for the background and PPE samples. The background sediment samples were collected from Bullion Gulch near the Bay State claim, from an unnamed tributary to Bullion Gulch near the Idahoan Mine, and from an unnamed tributary near the Gold Bottom Mine.

Laboratory analysis of the sediment background samples (BGBG01SD, IMBG01SD and UTBG01SD) showed arsenic, cadmium, iron, lead, manganese, mercury, and silver concentrations in exceedance of Idaho's *Initial Default Target* (IDTLs). Arsenic and cadmium exceeded both the IDTLS and EPA Region 6's Preliminary Human Health Screening Levels (HHSLs) in all background samples. The location of the samples collected and their analysis are as follows:

Bullion Mine (Durango tunnel)
Two Probable Point of Entry (PPE) samples were collected at the Bullion Mine (Durango tunnel). Sample BUPP01SD was collected in the flow emerging from Adit 1 and sample BUPP02SD was collected downgradient from Waste Rock Pile 1 and 2. Water from Adit 1 flows underground for some distance, and then reemerges farther down slope. BUPP02SD was collected at the point where this adit water reemerges (Figure 4).

Antimony, arsenic, cadmium, iron, lead, manganese, selenium, silver and zinc constituents exceeded IDTLs in both samples, while BUPP01SD also exceeded for mercury. Both sediment samples exceeded HHSLs for arsenic, cadmium and lead constituents. Cadmium and silver concentration in sample BUPP01SD was determined to exceed at least three times the background level. Lead and silver concentration in sample BUPP02SD was determined to exceed at least three times the background level.

Ophir Mine
One PPE sample was collected at the Ophir Mine. Sample OMPP01SD was collect below the workings in the dry creek bed of an unnamed tributary to Bullion Gulch (Figure 5).

Antimony, arsenic, cadmium, iron, lead, manganese, mercury, selenium, silver and zinc constituents exceeded IDTLs. OMPP01SD exceeded HHSLs for arsenic, lead and manganese constituents. Antimony, arsenic, lead, manganese, mercury, silver and zinc concentration was determined to exceed at least three times the background level.

Unnamed Mine

One PPE sample [UKPP01SD] was collected from the dry creek bed of Bullion Gulch, adjacent to the mine. However, Figure 7 depicts the collection point at the base of the waste dump.

Antimony, arsenic, cadmium, iron, lead, manganese, selenium, silver and zinc constituents exceeded IDTLs in both samples, while UKPP01SD exceeded HHSLs for arsenic, cadmium, lead, and manganese constituents. Antimony, arsenic, lead, manganese, mercury, silver and zinc concentration was determined to exceed at least three times the background level.

Table 2: Sediment Samples Total Recoverable Metals Analysis (mg/kg) [excerpt from E & E, 2007]

	DEQ Initial Default Threshold Level (IDTL) values	EPA Region 6 Human Health Screening Criteria	Bullion Gulch Background Sediment Sample (Bay State Mine area)	Bullion Gulch Background Sediment Sample (Idahoan Mine)	Bullion Gulch Background Sediment Sample (Gold Bottom Mine)	Bullion Mine Adit 1 PPE Sediment Sample	Bullion Mine PPE2 Sediment Sample	Ophir Mine PPE Sediment Sample	Unnamed Mine PPE Sample
Description			BGBG01SD	IMBG01SD	UTBG01SD	BUPP01SD	BUPP02SD	OMPP01SD	UKPP01SD
Antimony	4.77	314	2.1 JL	2.0 JQ	1.9 JL	3.5 JQ	4.0 JQ	**9.6 JL**	**34.9 JL**
Arsenic	0.391	21.65	**57.2**	**22.6**	**37.3**	**39.1 JL**	**51.0 JL**	**297 JL**	**524**
Barium	896	15642	139	74.9	33.7	19.9 JQ	114	81	82.7
Cadmium	1.35	39	**8250**	**7630**	**10500**	**35800**	**10500**	**37.8**	**55.9**
Chromium	NSC	NSC	25.8	16.3	16.3	19.7 JL	40.3 JL	24 JL	29.8
Copper	921	2,900	46.6	34.4	31.5	24.0	40.7	109	369
Iron	5.76	55,000	**24500**	**12600**	**22200**	**8470 JL**	**24700 JL**	**44600 JL**	**40400**
Lead	49.6	400	**223 JL**	**72.9 JL**	**73.9 JL**	**581 JL**	**1250 JL**	**4410 JL**	**17300 JL**
Manganese	223	3,239	**1160**	**618**	**393**	**1560 JL**	**1150 JL**	**9110 JL**	**6360**
Mercury	0.00509	23	**0.16 U**	**0.088 JQ (0.1 SQL)**	**0.13 U**	**0.19**	**0.075 JQ**	**0.55**	**2.1**
Selenium	2.03	391	1.9 JQ (5.56 SQL)	0.44 JQ (3.59 SQL)	1.1 JQ (4.54 SQL)	**3.5 UJL**	**4.4 UJL**	**3.5 UJL**	**2.9 JQ**
Silver	0.189	391	**1.8**	**0.51 JQ (1.02 SQL)**	**0.33 JQ**	**7.0**	**11.4**	**51.4**	**120**
Zinc	886	23,464	822	318	456	**1150 JL**	**1850 JL**	**5960 JL**	**8980**

Notes: **Bold – value above IDTLs** - value above HHSLs Blue – values above background ____ ≥ 3 times background

J – The associated value is an estimated quantity K - Unknown bias L - Low bias Q - The detected concentration is below the method reporting limit/contract required quantitation limit, but is above the method quantitation limit. NA – Not Analyzed, U - The material was analyzed for, but was not detected above the level of the associated value

NSC – no screening criteria value listed SQL = Sample quantitation limit.

Section 10. Surface Water Sample Collection

Surface water samples were collected either by hand-dipping the pre-preserved sample container into the water (if possible) or by creating a funnel with a dedicated 1-liter polyethylene sample bottle, with the bottom of the bottle removed into a pre-preserved sample container (E & E, 2007, p. 3-4).

One background surface water sample UTBG01SW was collected from an unnamed tributary to Bullion Gulch in the area of the Gold Bottom Mine. The sample had a pH of 7.76 and a conductivity of 0.604 mS/cm. This sample will be used for comparison to all surface water samples collected in the Bullion Gulch drainage basin (ibid, p.5-3).

Durango tunnel - Flow at this adit was approximately 3 to 4 gallons per minute (gpm). The pH of sample BUPP02SW measured 7.69, and conductivity was 0.537 mS/cm.

10.1 Results

The background water sample UTBG01SW shows elevated levels of aluminum and iron. The background lead levels were high, but below the standards. Analytical results of sample BUPP02SW indicate the presence of lead at an elevated concentration with respect to background concentrations. The lead values exceed the DEQ cold water biota standards for Acute and Chronic criteria. The extent to which cold Water Biota may be affected by the elevated lead levels was not determined by DEQ.

Table 3: DEQ Water Samples Total Recoverable Metals Analysis (mg/L).
(Standards in "dissolved" unless stated)

Bullion Mine

	DEQ Ground Water Standard	DEQ Drinking Water Standard	DEQ Cold Water Biota Standard	DEQ Cold Water Biota Standard	Background Sample Unnamed tributary (Gold Bottom area)	Bullion Mine Water Sample
	(T)	MCL	Acute	Chronic		
Description					UTBG01SW	BUPP02SW
Aluminum	0.200				0.287	0.088 JQ
Antimony	0.006	0.006			0.0017 JQ (0.060 SQL)	0.003
Calcium					87.400	72.500
Iron	0.3*				0.470	0.194
Lead	0.015	0.015	0.014 (H)	0.00054 (H)	0.014	**0.0445**
Magnesium					3.580 JQ	7.880
Manganese	0.05*				0.047	0.034
Zinc	5*		0.035 (H)	0.032 (H)	0.081	0.0708

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

Key:
J = Associated value is an estimated quantity.
Q = Detected concentration is below the method reporting limit/contract required quantitation limit, but is above the method quantitation limit.
SQL = Sample quantitation limit.

Section 11. Pathways and Environmental Hazards

11.1 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 affects of this mine on public drinking water supplies no inferences can be made about the affects 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 Idaho, most of those sources (>95%) 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 staff. 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 4.

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 susceptibility 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 Basin. 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).

Generally speaking, public drinking waters 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 that any metal concentrations have exceeded MCLs in the Bellevue drinking water systems (DEQ 2000).

There are not any domestic drinking water wells within 1 mile of the Bullion/Ophir mines. The closest domestic well is located approximately 1.6 miles south-southeast on Bullion Gulch Road. There are seven wells located within a distance of 1 to 2 miles of the sites; 37 wells within 2 to 3 miles; and 10 wells within 3 to 4 miles of the mine sites. The majority of these wells are located at residences within and immediately adjacent to the Croy Creek Road area.

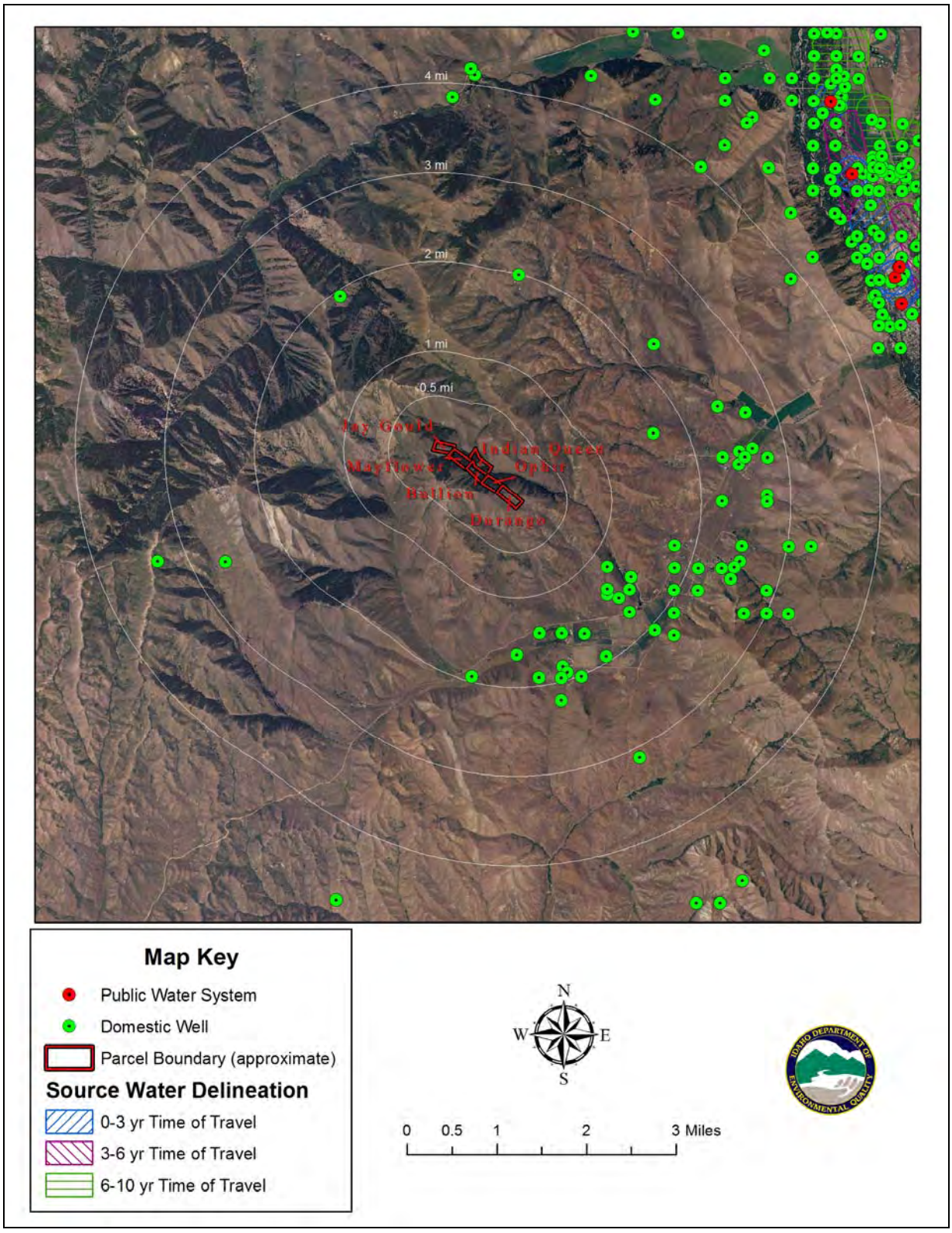


Figure 8. Drinking Water Well locations and source water delineations (Map source: NIAP 2004).

11.2 Surface Water Pathways

The surface water migration pathway target distance limit (TDL) begins at the probable point to 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 Bullion Gulch sub-drainage is presented in Figure 9.

Bullion Gulch is an ephemeral drain through most of its reach. Bullion Gulch drains toward the south-southeast from the Durango Tunnel. At approximately 0.35 miles it is enjoined by an ephemeral tributary which originates near the Idahoan and Arizona mines. At this point a small (0.64 acres) wetland was observed. These relationships are illustrated in Figure 9. The Big Wood River is an EPA CWA §303(d) listed stream.

The probable point of entry (PPE) of mine and mill runoff into Croy Creek is approximately 1.5 miles to the south where Bullion Gulch enters Croy Creek. The 15-mile target distance limit (TDL) is approximately 7.5 miles south of Hailey on the Big Wood River. The city of Hailey sites at about mile 6 of the TDL. There are no surface water intakes for public drinking water systems within the 15-mile TDL. None of the mines are within a floodplain (FEMA 1998).

Although there is significant evidence of erosion and discharge to the ephemeral and perennial waters of Bullion Gulch, there is not any evidence that these discharges are significant in volume of metals concentrations.

11.3 Air Quality Pathways

Steep slopes, established vegetation, and the lack of direct road access to the Ophir Mine workings appear to prevent off road vehicles (ORV) from accessing the waste rock piles. At the Bullion Mine (Durango tunnel) evidence of ORV activity suggests that the most likely air quality pathway would be relative to fugitive dust emissions. However, delivery of dust from the mine site to local residents is not likely because of the distance (1.75 miles) to those residents.

11.4 Soil Exposure

Relative to soil exposure DEQ's Risk Evaluation Manual states that 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 currently complete for residential or construction worker receptors at the Bullion, Ophir and Unnamed mines. However, the non-residential receptor pathway is potentially complete for recreational users at the Bullion and Ophir mines, but not at the Unnamed mine.

The residential pathway for hypothetical future residential receptors on these mine sites is also potentially complete if the claims are developed for residential housing.

A cumulative risk and hazard index analysis was completed by DEQ staff using Idaho's Risk Evaluation Manual (REM). Where multiple samples were collected at a source (i.e., Bullion waste rock pile # 2) the highest detected constituent level was selected for modeling. The analysis was performed for antimony, arsenic, cadmium, lead, manganese, mercury, selenium, silver, and zinc.

Bullion Mine

Results of the analysis showed a cumulative risk of 1.24×10^{-5} at Waste Rock Pile #2 and a cumulative hazard index of 1.38 for non-residential receptors. Both the risk and hazard indices are larger for the hypothetical future residential receptor. The primary driver for both the risk and hazard index is arsenic with a risk of 1.24×10^{-5} and a hazard quotient of 0.293. Remedial action levels are typically set between 1×10^{-4} and 1×10^{-6} for risk and/or a hazard index of 1. Based on this analysis, there is some human health risk and hazard associated with frequent recreational use of the Durango tunnel site through inhalation, dermal contact and ingestion of site soils.

Ophir Mine

Results of the analysis showed a cumulative risk of 6.14×10^{-5} and a cumulative hazard index of 2.66 for non-residential receptors. Both the risk and hazard indices are larger for the hypothetical future residential receptor. The primary driver for both the risk and hazard index is arsenic with a risk of 1.24×10^{-5} and a hazard quotient of 1.45. Remedial action levels are typically set between 1×10^{-4} and 1×10^{-6} for risk and/or a hazard index of 1. Based on this analysis, there is some human health risk and hazard associated with frequent recreational use of the Durango tunnel site through inhalation, dermal contact and ingestion of site soils.

11.5 Domestic Wells and Public Water Supplies

There are approximately 120 domestic, commercial and municipal water wells within a four mile radius of the mine. No public water system wells or their zones of capture are located within a 4-mile radius of the Bullion, Ophir, Durango and Unnamed mines (Figure 8). The nearest domestic well is located approximately 1.5 miles down hydraulic gradient from the site near the mouth of Bullion Gulch. The six or so domestic wells locate at or near the mouth of Bullion Gulch are the most likely wells to be impacted by historic mining activities within Bullion Gulch. Analytical data pertaining to these wells were not available. DEQ recommends that owners of the wells have their well water tested on a regular basic for metals.

11.6 Residences, Schools and Day Care Facilities

The nearest residence is approximately 1.50 miles southeast of the Unnamed mine; 1.75 miles southeast of the Durango tunnel; and 2.0 miles from the Bullion and Ophir mines. There are not any schools or day care facilities within 200 feet of any of these mine sites.

11.7 Wetlands

Significant wetlands exist along Croy Creek 2-3 miles down stream of the mill site to the 15-mile TDL on the Big Wood River (Figure 9). However, there are no wetlands in the immediate area of the Bullion, Durango, and Ophir mines. The nearest wetland area, which is characterized as freshwater forest/shrub wetland, is located approximately 100 yards southeast of the Unnamed mine and approximately 0.3 miles southeast of the Durango tunnel (USFWS, 2009).

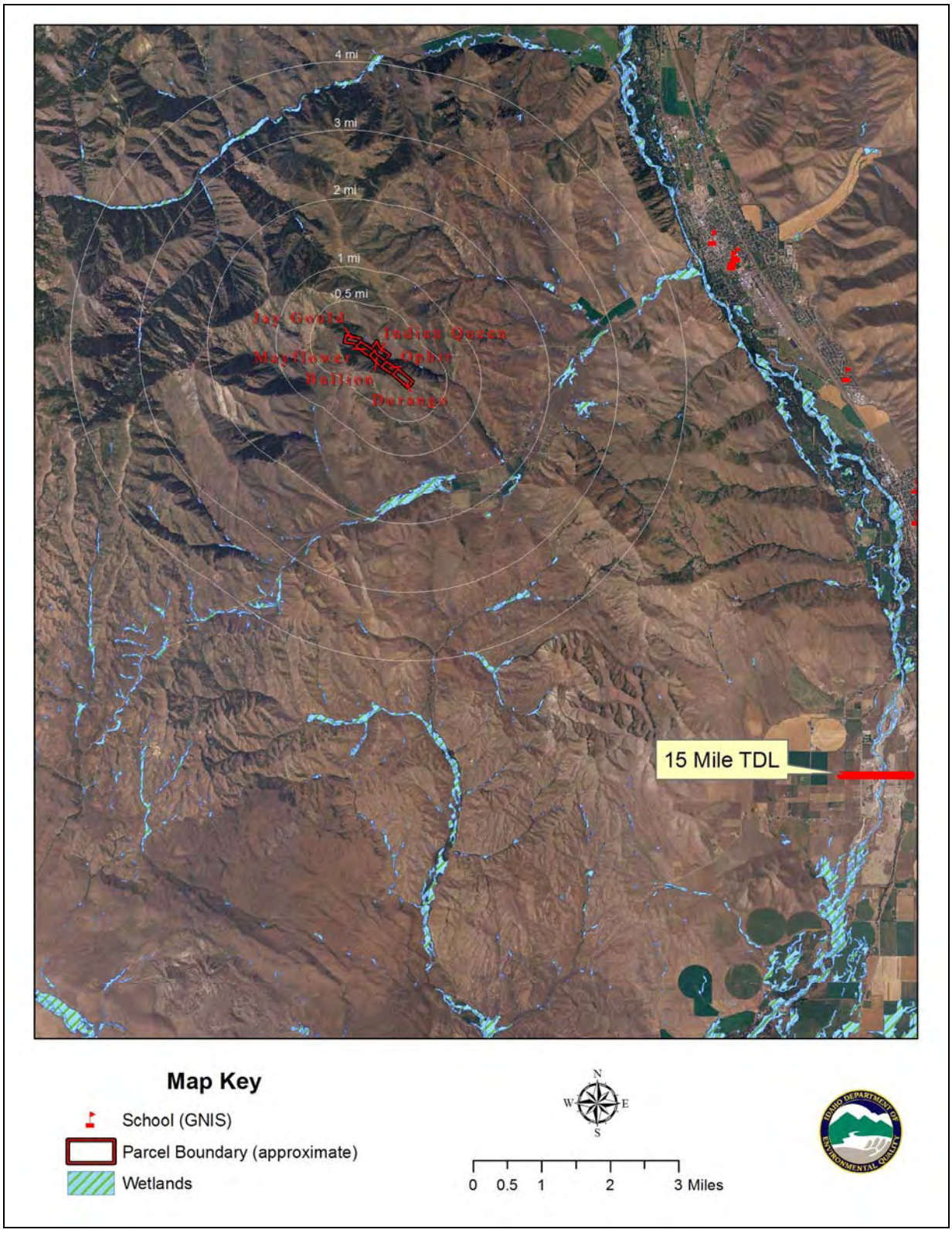


Figure 9. Wetlands and 15-Mile TDL map (Source Fair 100k, Sunv 100k, NIAP 2004).

11.8 Sensitive Species (Plant and Animal)

Although the site is located within a defined range and habitat for wolves, the size of the dumps relative to the total range is very small and therefore unlikely to be a significant source for exposure. Camas Golden weed (*Haplopappus insecticruris*) and Long-legged Myotis (*Myotis volans*) are listed as sensitive species located within a 4-mile radius of the claims.

11.9 Fisheries

Redband rainbow trout [*Oncorhynchhus mykiss* gairdneri], wood river sculpin [Cottus leiopomus], and brook trout [Salvelinus foninalis] are present within Greenhorn. Redband rainbow trout [*Oncorhynchhus mykiss* gairdneri], mountain white fish [Prosopium williamsoni], wood river sculpin [Cottus leiopomus], and brook trout [Salvelinus foninalis] are present within the Big Wood River (IDFG, 2000).

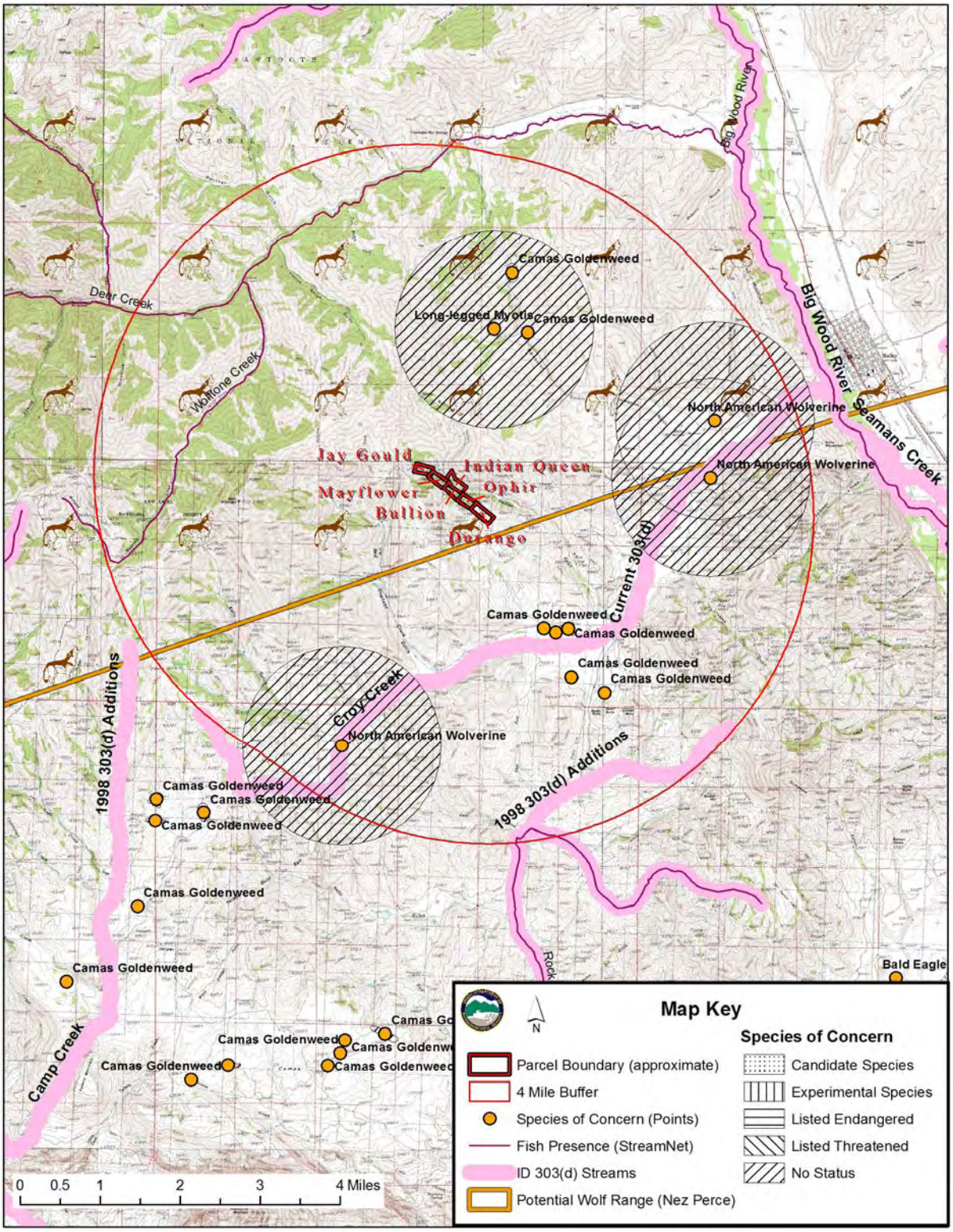


Figure 10. Sensitive species near the Mayflower lode mines (Source: Fair 100k, Sunv 100k, USGS 24K Topo).

11.10 Sensitive Waterways

Croy Creek and the Big Wood Rivers are both Clean Water Act 303(d) listed streams down gradient from the Bullion, Durango, Ophir and Unnamed mines, which might be adversely affected by contaminant delivery from the site. However, the ephemeral stream draining Bullion Gulch likely only flows during spring runoff and runoff from the mine would provide only a small percentage to total stream flow.

11.11 Livestock Receptors

There was no indication that the area is used for livestock grazing. However, the Bullion, Durango, Ophir and Unnamed mines fall within the BLM's Bullion grazing allotment, indicating the potential for grazing to occur on the property.

Section 12. Summary and Conclusions

Based on existing conditions and uses, historic information, data observations made during the site visit, analysis and size of the mine and mill wastes, potential pathways of contaminants to receptors, and potential exposures to ecological and human receptors, DEQ has determined that the sites should be designated as No Remedial Action Planned.

However, if any plans are considered for residential development of any of these properties, additional site investigations and risk analysis should be conducted. If risks do exist as DEQ has discussed, then specific risk management objectives and pans should be incorporated in any development of the properties.

In addition, there are numerous mine openings and physical hazards that may pose a risk to recreationists and future residents, if any. These mine openings should be properly managed to or restricted to prevent injuries.

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