

Kelly Gulch Mine Site Preliminary Assessment Report

Blaine County
State of Idaho



Department of Environmental Quality

January 2008

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

Mr. Schuld -
Could you please send an electronic
copy to: kulina@aol.com

Thank
Charles B. Kulina
5 FEB 08
C.L. "Butch" Otter, Governor
Toni Hardesty, Director

January 17, 2008

Charles B. Kulina
Trustee
1425 Broadway #422
Seattle, WA 98122-3854

RE: Site Assessment of the Mountain View Patented mining Claim (Blaine County, Idaho).

Dear Sir or Madam:

The Idaho Department of Environmental Quality (IDEQ) has completed a review of historical mining data and geological information of the above referenced mining claims. Subsequent to that review, IDEQ conducted a site visit of the Kelly Gulch mines and associated claims. During the site visit, mining facilities were mapped and sampled to complete a Preliminary Assessment (PA).

PAs are conducted according to the Federal Comprehensive Environmental Response, Compensation and Liabilities Act (CERCLA). The reasons to complete a PA include:

- 1) To identify those sites which are not CERCLIS caliber because they do not pose a threat to public health or the environment (No Remedial Action Planned (NRAP));
- 2) To determine if there is a need for removal actions or other programmatic management of sites;
- 3) To determine if a Site Investigation, which is a more detailed site characterization, is needed; and/or
- 4) To gather data to facilitate later evaluation of the release through the Hazard Ranking System (HRS)

IDEQ also completed PAs under contract with the U.S. Environmental Protection Agency in order to identify risks to human health and the environment, and make recommendations to land owners regarding how risks might be managed, if necessary.

Based on existing conditions and uses, historic information, background, mine waste and adit discharge samples were collected during the site visit. Subsequent to our analysis IDEQ has

Charles B. Kulina - Trustee
Kelly Gulch Mines
January 17, 2008

determined that No Remedial Action is Planned (NRAP) for this property. However, based on historical information regarding mine development and production, and observations made during our visit IDEQ recommends that if you decide to develop these properties, you should conduct more detailed site investigations, and if necessary, based on those investigations, you should incorporate risk management provisions in development plans, particularly if the development involves residential construction.

IDEQ noted a considerably dangerous mine opening on the Mountain View patented mining claim. Although IDEQ does not have jurisdictional authorities over safety issue, IDEQ routinely notifies mine owners of the existence of such physical hazards such that owners may take appropriate actions to eliminate the hazards or restrict access.

Attached is the Preliminary Assessment Report of the property and mine facilities. The report contains a brief mine history, limited geologic information, maps and additional discussion of observations made at the property. There are also photos of the mine facilities.

IDEQ very much appreciates your cooperation and approval for our access, and looks forward to addressing any questions you may have regarding our findings. Please call me if you have any comments, questions, or I may be of any other assistance. We very much appreciate any feedback you can give us relative to our services.

Sincerely,



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

Attachments

cc: Ken Marcie – U.S. Environmental Protection Agency
Bruce Wicherski – IDEQ State Office
Megan Stelma – Blaine County
Steve Moore – U.S. Bureau of Land Management
file

January 17, 2008

Atlas Mine and Mill Supply
North 15 Havana Street
Spokane, WA 99202-0000

RE: Site Assessment of the Kelly Gulch Mines, aka Spotted Tail, Silver View, Wiggle Tail, Lucre, Kitty, Sinaloa, Sonora, and Utica patented mining claims.

Dear Sirs:

The Idaho Department of Environmental Quality (IDEQ) has completed a review of historical mining data and geological information of the above referenced mining claims. Subsequent to that review, IDEQ conducted a site visit of the Kelly Gulch mines and associated claims. During the site visit, mining facilities were mapped and sampled to complete a Preliminary Assessment (PA).

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Atlas mine & Mill Supply
Kelly Gulch Mines
January 17, 2008

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IDEQ did not note any dangerous openings or other physical hazards at the Kelly Gulch Mines which should be managed or closed, but subsidence of abandoned underground workings may threaten new construction at the site, if any.

Attached is the Preliminary Assessment Report of the property and mine facilities. The report contains a brief mine history, limited geologic information, maps and additional discussion of observations made at the property. There are also photos of the mine facilities.

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file

January 17, 2008

Mr. Dan Henry
308 North 2nd Street
Hailey, ID 83333

RE: Site Assessment of the Kelly Gulch Mines, aka Cyrus Jacob, Alturas, Ellen Stilts, Hebe, Valley View, Hoosier patented mining claims.

Dear Mr. Henry:

The Idaho Department of Environmental Quality (IDEQ) has completed a review of historical mining data and geological information of the above referenced mining claims. Subsequent to that review, IDEQ conducted a site visit of the Kelly Gulch mines and associated claims. During the site visit, mining facilities were mapped and sampled to complete a Preliminary Assessment (PA).

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Mr. Dan Henry
Kelly Gulch Mines
January 17, 2008

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Section 1 Introduction

This document presents the results of the preliminary assessment (PA) of the Kelly Gulch Mines. The Idaho Department of Environmental Quality (IDEQ) was 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.

IDEQ often receives complaints or information about sites that may be contaminated with hazardous waste. These sites can 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, IDEQ 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.

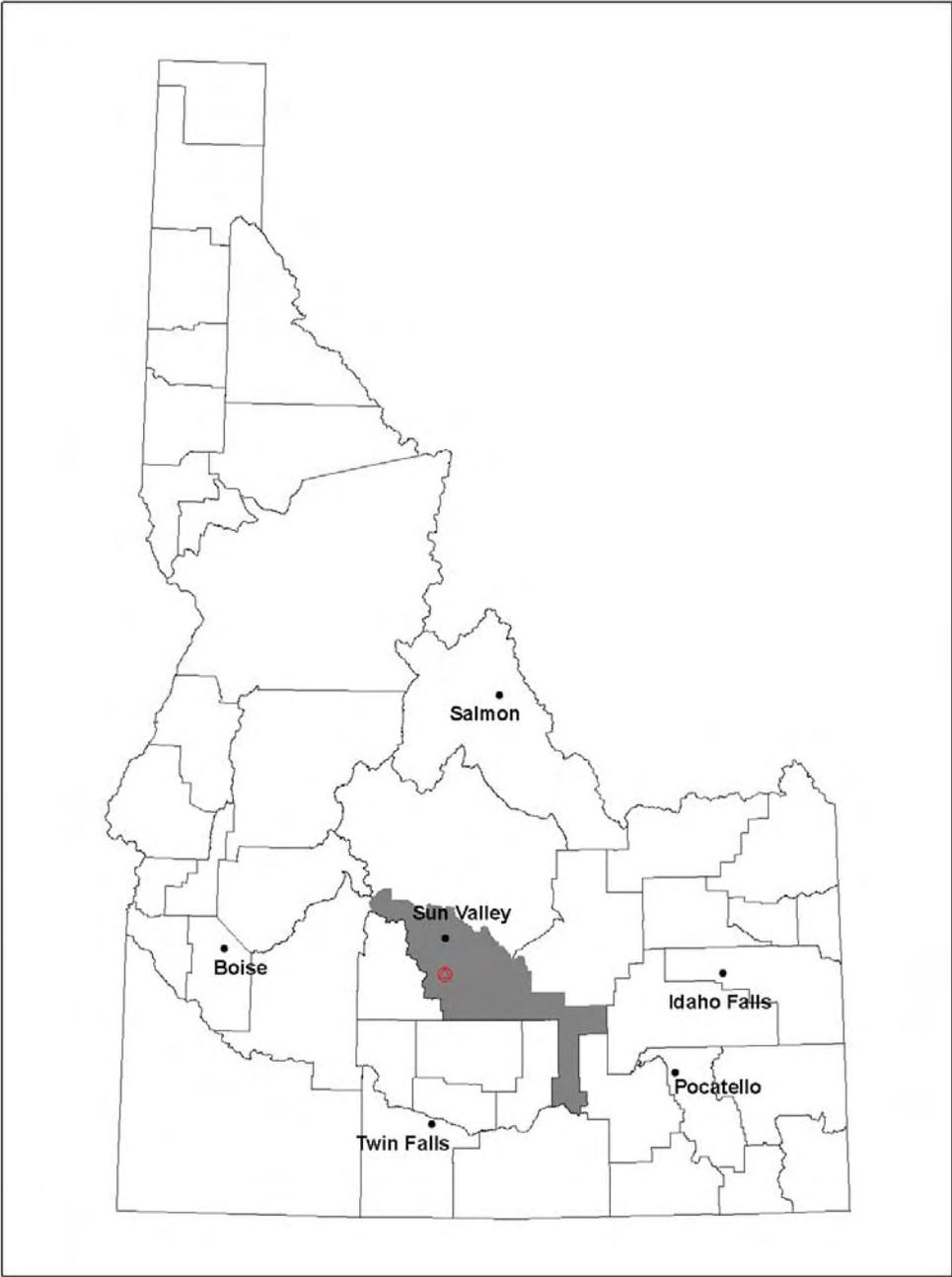
For additional information about the Preliminary Assessment Program, see the following:

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

Access to the private lands for completion of this preliminary assessment was given by Mr. Daniel Henry and Atlas Mine & Mill Supply. The Mountain View patented mining claim, which belongs to Charles B. Kulinas, was also visited and assessed as this claim is along the mine road to the mine workings from the Mayflower Mine in Bullion Gulch. None of these properties have physical access restrictions, and all have evidence of multiple uses by the public.

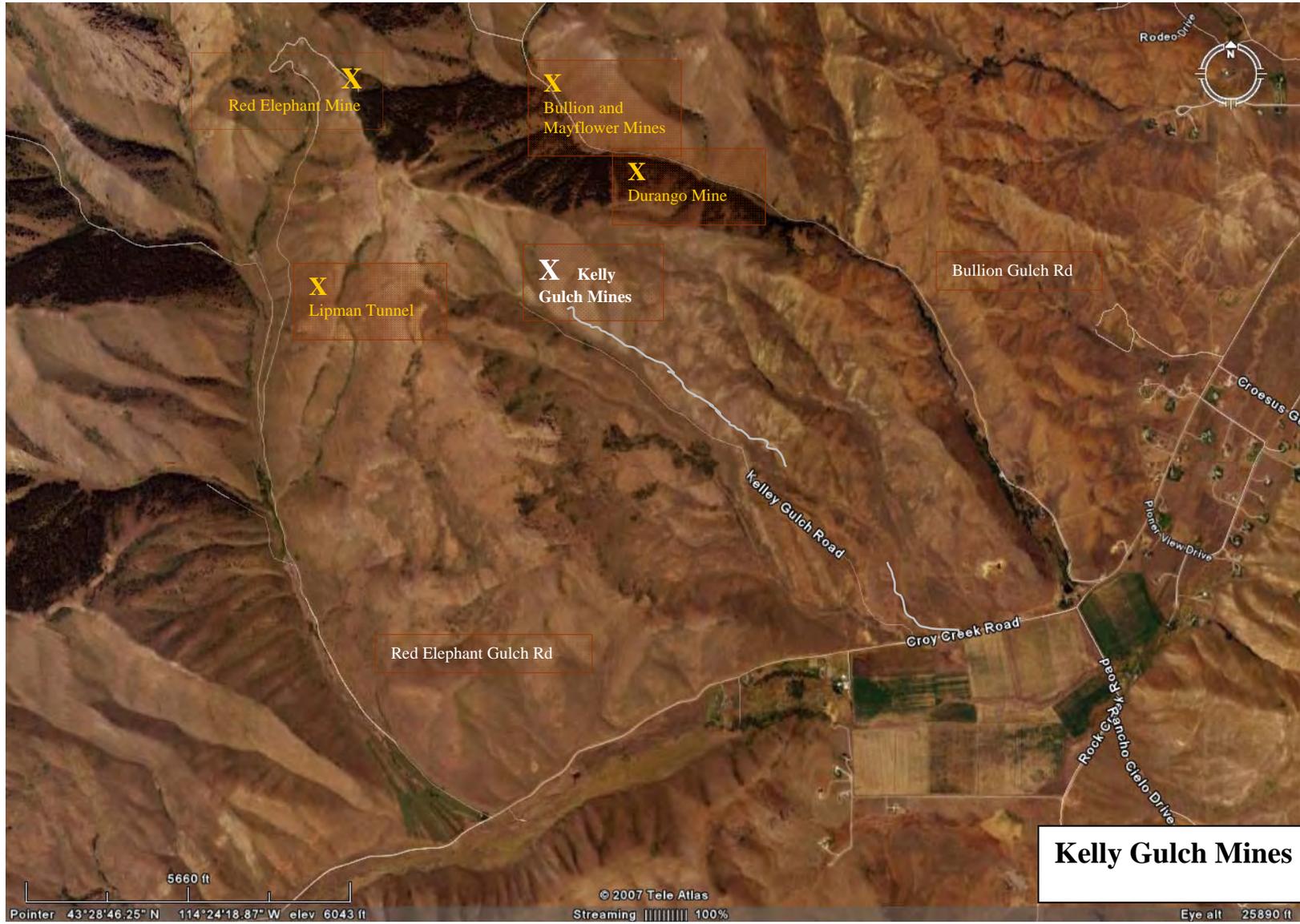
As is common in this historic mining district, the patented claims appear to have minor fractions and parcels of land that are public, which are administered by the U.S. Department of Interior Bureau of Land Management. Of particular note, those waste dumps with field designations Kelly Gulch Adit and Waste Dump #1 and #2 are located on public lands. Neither of these waste dumps appear to contain or present risk to human health or the environment.

Kelly Gulch Mine Site
Preliminary Assessment Report



Location of the Kelly Gulch Mines within the State of Idaho.

Kelly Gulch Mine Site
Preliminary Assessment Report



Kelly Gulch Mines

Kelly Gulch Mine Site
Preliminary Assessment Report

Section 2 Ownership

IDEQ 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.

Within the following ownership descriptions the **“Partial Determination”** is meant to convey a very brief summary of IDEQ’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 IDEQ did not find any significant evidence that would indicate the potential of adverse effects to human or ecological receptors. This determination says nothing about risks associated with physical hazards such as open adits, open shafts, high walls, or unstable ground. However, IDEQ has made observations regarding physical hazards, or their absence, and will present those observations in the following report.

<u>Owner</u>	<u>Claim</u>	<u>Parcel Number</u>	<u>Partial Determination</u>
Daniel Henry 308 North 2nd Ave Hailey, ID 83333	Cyrus Jacob	RP1M0000001510	No Working (NRAP)
	Alturas	RP1M0000001510	No Working (NRAP)
	Ellen Stilts	RP1M0000001510	3 Maj. Workings (NRAP)
	Hebe	RP1M0000001510	1 Maj. Workings (NFRAP)
	Valley View	RP1M0000001510	3 Minor Workings (NRAP)
	Hoosier	RP1M0000001510	3 Maj. Workings (NRAP)
Atlas Mine & Mill Supply North 115 Havana Street Spokane, WA 99202-0000	Spotted Tail	RP1M000000127A	No Workings (NRAP)
	Silver View	RP1M000000127A	No Workings (NRAP)
	WiggleTail	RP1M0000001270	No Workings (NRAP)
	Lucre	RP1M0000001270	No Workings (NRAP)
	Kitty	RP1M0000001270	No Workings (NRAP)
	Sinoloa	RP1M0000001270	No Workings (NRAP)
	Sonora	RP1M0000001270	No Workings (NRAP)
	Utica	RP1M0000001270	No Workings (NRAP)
Charles B. Kulina Trustee 1425 Broadway #422 Seattle, WA 98122-3854	Mountain View	RP1M0000001250	No Workings (NRAP)

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Section 3 Overview

The patented claims and Kelly Gulch Mines are located mostly in the upper reaches of Kelly Gulch, which is an ephemeral drain approximately half way between Red Elephant Gulch and Bullion Gulch. The patented claims somewhat drape over into the Bullion Gulch Drainage. The workings are approximately 1.5 miles north of the Croy Creek Road, at the northern end of Kelly Gulch Road.

The general location of the Kelly Gulch Mines is on private land at latitude 43 29' 14.38" N and longitude 114 24' 50.56" W, within Sections 22, 23, 26, and 27 in T2N R17E. The closest town to the mine site is the City of Hailey, approximately six miles by air and road.

The mine facilities can be reached from Hailey by driving east along the Croy Creek Road, then north along the Bullion Gulch to the Mayflower Mine. From there, there is an abandoned mine road that traverses the mountainside to the south. Once the road crosses the ridgeline it overlooks the mine workings at the head of Kelly Gulch. Another route, which was blocked on private lands along Croy Creek is to take the Kelly Gulch Road northwest approximately 1.5 miles to the mine sites. This road goes through both private land and BLM administered lands, access was not given to use this road so IDEQ used the previous route, which was unrestricted.

Section 4 Historical Perspective

IDEQ did not find any specific historical reference to the workings in Kelly Gulch, and where this historical information does not now seem very relevant, no additional historical research was conducted. However it would appear that these workings are likely penecontemporaneous with development of the Red Elephant Mine, the Lipman Tunnel, the Mayflower Mine, the Bullion Mine, and the Durango Mine workings. To say the least, these famous mines had a long history, produced great volumes of lead, silver and gold ores, and had a tremendous impact on both socio-economics and the environment in western Blaine County. Therefore, some of the history for those sites is related.

The U.S. Department of Interior Bureau of Land Management General Land Office records indicate that most of the claims in Kelly Gulch were patented between 1884 and 1887.

Lead and silver ore was first discovered in 1864, and the boom days of the region were in 1880 to 1887. The total production has amounted to more than \$25,000,000, most of which came from lead-silver ore, with minor amounts from gold, copper and zinc ore. (Umpleby, et al, 1930, p. X)

The deposit (Red Elephant Mine) was worked during the early period of mining activity in the region but made its principal production between 1890 and 1898; more recently it has been worked by lessees but with only moderate success, and in 1923 it had been shut down for several years. The mine reopened in 1926. (Umpleby, et al, 1930, p. 146)

The Bullion, Mayflower, Jay Gould, and Ophir mines are on the Mayflower Lode on the south side of the old town of Bullion. These famous

Kelly Gulch Mine Site Preliminary Assessment Report

mines, and some less known adjoining claims (presumably some in Kelly Gulch), and the Red Elephant Mine on the same hill further west were held under lease by the Bunker Hill & Sullivan Mining and Concentrating Company in 1923. (Umpleby, et al, 1930, p. 137)

In 1939 the Idaho Mine Inspector's reports production of "silver ore from the Liberty, Bullion-Ophir, and Kelly mines".

Section 5 Site Description

With the exception of the open raise and exploration "dog hole" on the ridgeline traversing the Mountain View, most of the Kelly Gulch workings are located on generally south facing very arid slopes. There are very few communities of large woody species present except where caved workings provide for catchments for snow, and collect deeper blankets of snow and hold them for longer periods of time during spring thaws. There are very few indications that seasonal runoff occurs rapidly enough to cause significant erosion of even the finer grained dump materials.



Open raise on the ridgeline which diagonally cuts the Mountain View patented claim in two. This opening is a serious physical hazard and is frequented by hunters and hikers as evidenced by the shot gun shells, and trash left at the location.

None of the roadways, dumps or caved openings, except the Mountain View raise present any type of physical hazard. But there is evidence of use by hunters, hikers, and mountain bikers.

Kelly Gulch Mine Site
Preliminary Assessment Report



*Standing on the dump of Mountain View “dog hole”
looking due south towards the open raise which is just in the shadow of
the pine tree on the skyline*

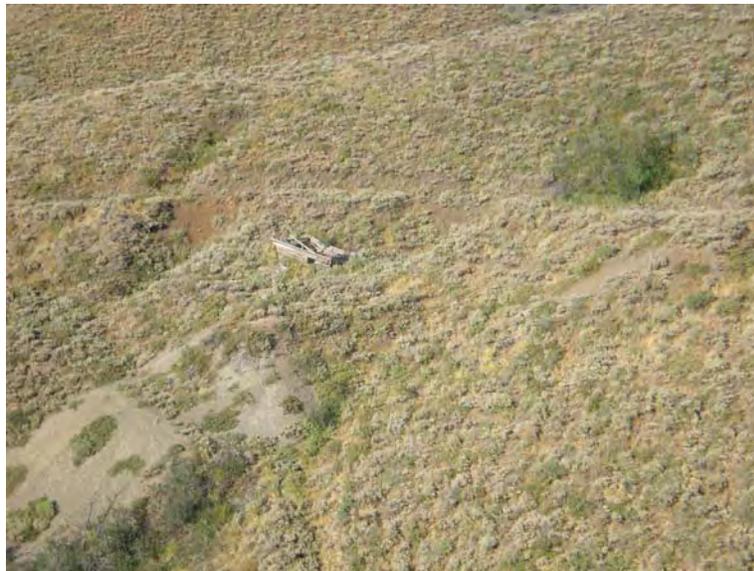


*Looking due west from the Silver View Claim down onto the Adit and Waste
Dump #3. Waste Dumps #1 and #2 are on the left edge of the photo.*

Kelly Gulch Mine Site
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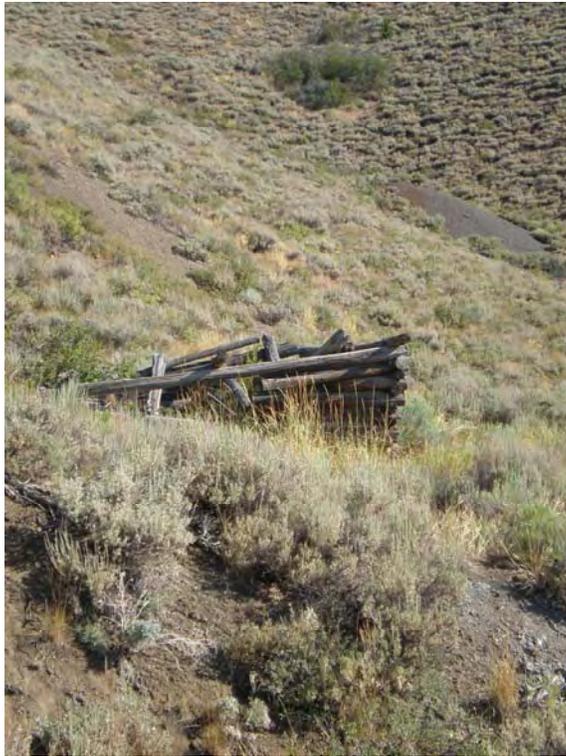


Looking southwest at Adit and Waste Dump #4. Small insignificant (caved) openings are located near the large willows above the dump.



Remains of a cabin at the caved adit and above Waste Dump #4

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Cabin on top of Waste Dump #4



Caved Adit #6

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Looking due east and down onto Adit and Waste Dump #6 from Waste Dump #7



Looking due north along the ridgeline that has the workings on the Hebe Claim (left) and the Ellen Stilts Claim (right)

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Contributions to the aquifers in close proximity to the Kelly Gulch Mines will predominantly be as a direct result of precipitation or surface water. Kelly Gulch is an intermittent drainage that flows into Croy Creek. Annual precipitation for Hailey, Idaho, located approximately five miles to the east, is 16 inches, predominately during the winter months, with an average annual snowfall of 81 inches (WRCC, 2006).

Dry-season rainfall occurs almost exclusively in relatively short bursts, usually related to thunderstorm activity. It is expected that except for rare flash flood-type events, almost all dry-season rainfall events would be completely absorbed by the soils and plants, without much, if any, contribution to the ground water.

Section 6 Operational History

IDEQ did not find any production records for these facilities.

Section 7 Geology

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-the host of so many of the ore deposits in the Wood River region-and also rather large intrusive bodies of diorite and quartz monzonitic rock which are regarded as outliers of the Idaho batholith. There is also 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 (p 7) went on to note that, “*The folding within the area is comparatively simple and consequently faulting constitutes the outstanding feature.*”

Numerous previous studies of the geology and mineral resources of the Wood River and adjacent areas have been made. 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; Kiisgaard 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; IDEQ, 2002 & 2006; IDEQ & USEPA, 2006 & 2007). Link and Worl (2001) reviewed previous geologic and historic information relating to stratigraphy and mineralization relationships in the Mineral Hill district, including Red Elephant Gulch.

The Bullion mineralized area...is underlain by the lower and middle members of the Pennsylvanian and Permian Dollarhide Formation, which are folded into upright and west-overtuned map scale folds....The lower member of the Dollarhide Formation hosts most of the mineralized rock (Skiip 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

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(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)

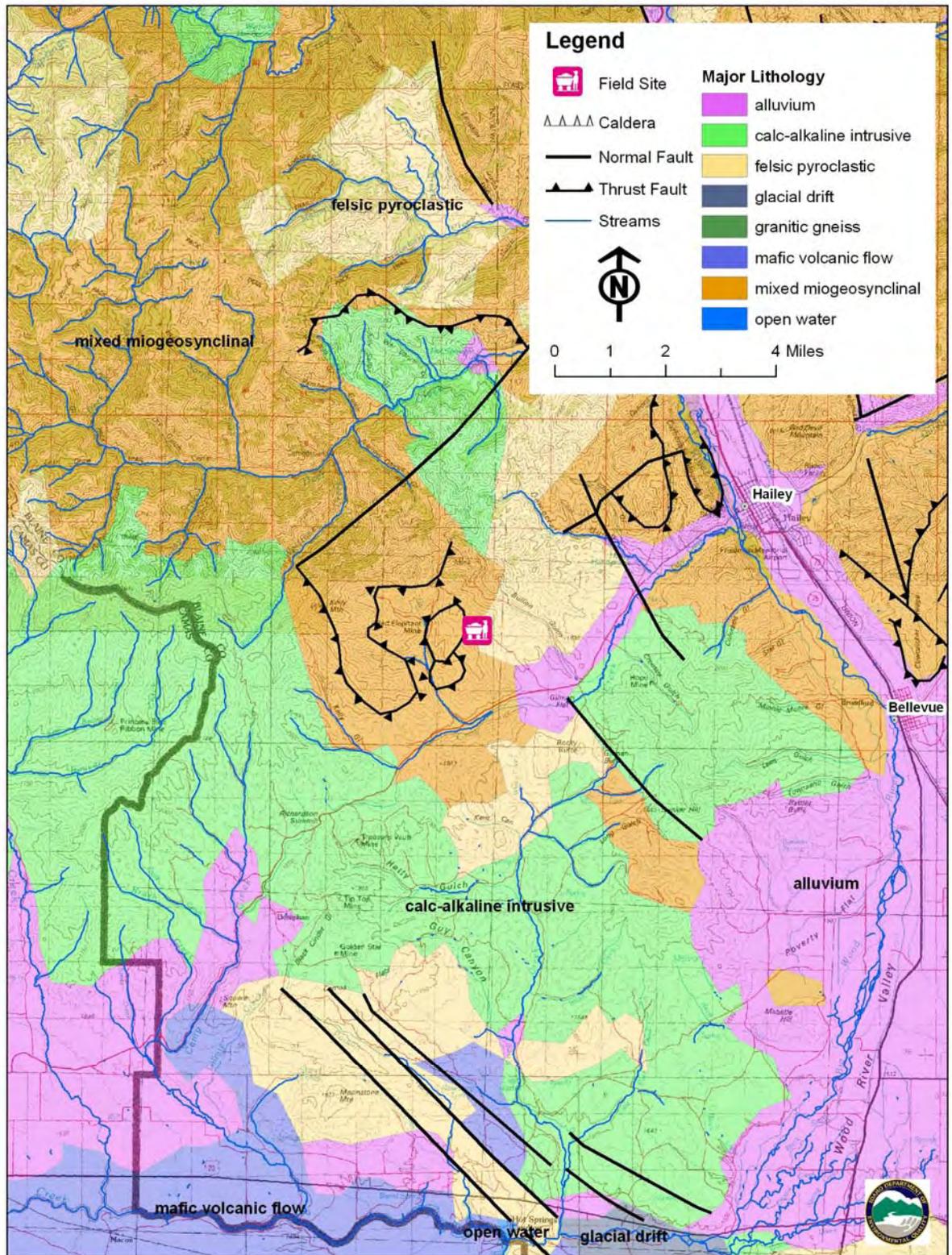
Fryklund (1950, pp. 65-66) noted the following in regards to the structure of the rocks:

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.

Umpleby, et al (1930, p. 217) noted a broad anticline southwest of the river:

Southwest of the river the beds dip generally westward at inclinations that largely range from 20° to 40°. It's thus clear that the sediments form a broad anticline, of which the crest almost coincides with the Big Wood River Valley...The underlying Milligen formations shows a wide range in local dip and strike...

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Section 8 Current and Potential Future Land Uses

Current land uses in the area include biking, hiking, hunting, horseback riding and off-road vehicle touring. The Kelly Gulch Mines are accessible from both the Bullion Gulch Road and the Croy Creek Road. During the course of the field work conducted, the DEQ site investigators observed hikers and mountain bikers using the Bullion Gulch Road.

Fish Species Observed

Fish presence/absence studies have not been conducted on Elk Creek to confirm any fish species that may reside in this stream. Visual observations confirm the presence of brook trout [*Salvelinus foninalis*] in a small stock water pond near the bottom of Red Elephant Gulch. Redband rainbow trout [*Oncorhynchus 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). These are the closest observations of fish to the mine site. Commercial or subsistence fishing does not occur within the 15-mile downstream distance, but sport fishing does.

Apparent Wetlands

Wetland surveys near the site were reviewed (USFWS, 2007) along with aerial photographs. These indicate that the nearest wetlands are approximately 1.5 miles from the site and are located in the Croy Creek floodplain. There were no indications of wetlands observed on the site, nor are there any indications that overland transportation of mine waste enters surface waters or the distant wetlands.

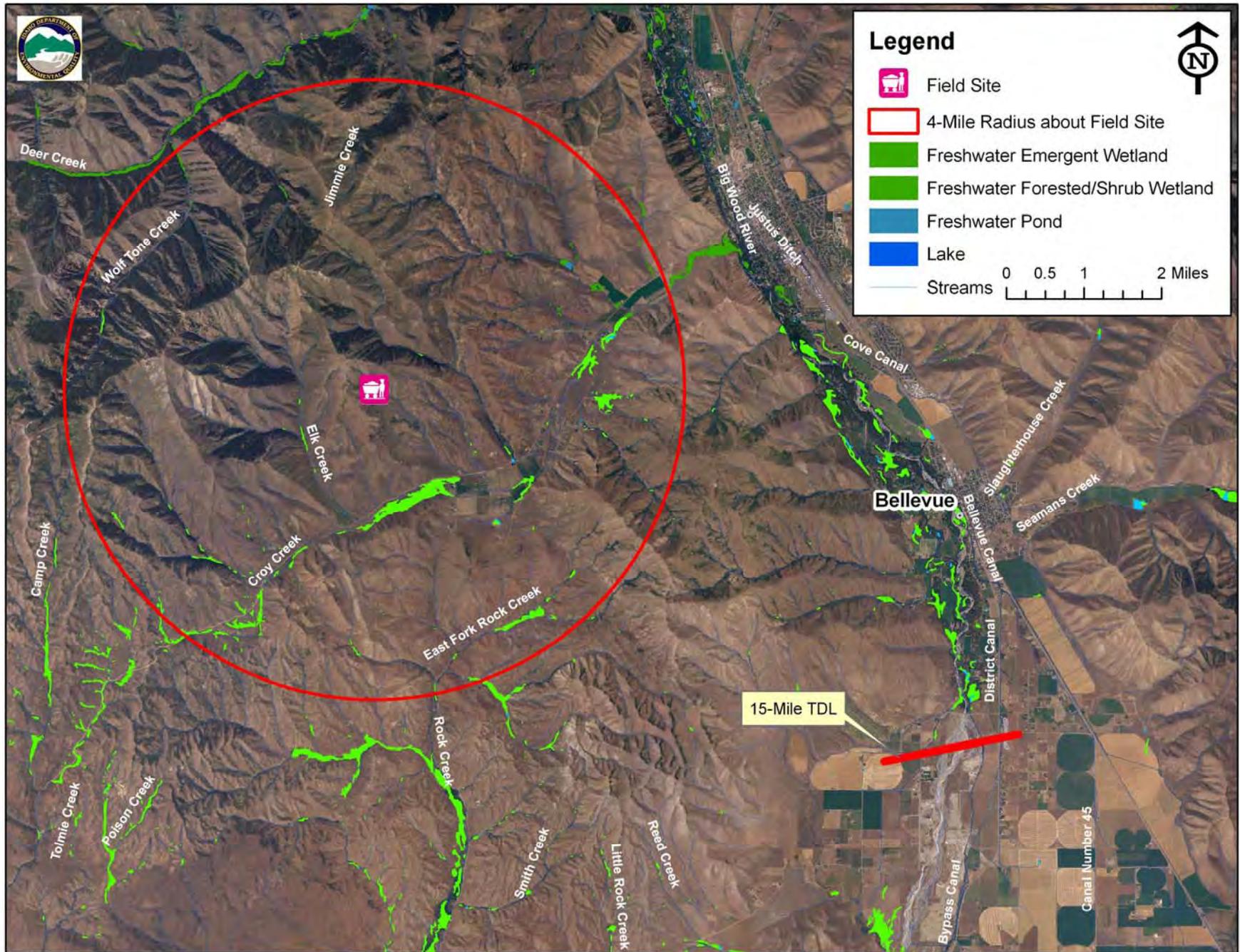
Future Land Use

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 is likely that recreational use of the site will increase as the local populations and recreation industry expands.

The site will also likely continue to provide limited grazing values to livestock and wildlife.

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Section 9 Waste Sampling and Characterization

Although the sizes of the mine waste dumps were small, multiple use of the area suggested that there might be some human health risk concerns. All of the dumps were very similar in character relative to the type of waste rock and the lack of significant volumes of sulfide bearing waste rock. One mine waste dump sample (KGWD6SS-1) was collected from what was designated in the field as Kelly Gulch Mine Waste Dump #6. This sampling location is actually on the patented Hebe mining claim.

Description	IDTLs	EPA Region 6 Human Health Screening Criteria	Kelly Creek Waste Dump #6 KG WD6-SS1
Aluminum			
Antimony	4.77	31	
Arsenic	0.391	23	138
Barium	896	1600	97.0
Beryllium	1.63	160	
Cadmium	1.35	39	50.4
Calcium			
Chromium	7.9	210	52.5
Cobalt		900	
Copper	921	2900	192
Iron		55,000	
Lead	49.6	400	9230
Magnesium			
Manganese	223	3600	
Mercury	0.00509	23	
Nickel	59.1	1600	
Potassium			
Selenium	2.03	390	<4.0
Silver	0.189	390	55.3
Vanadium		390	
Zinc	886	23,000	6510

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Sample KGWD6SS-1 was a composite sample of the largest dump on the site, which happens to be located on the Hebe patented mining claim. This dump contains approximately 4500 cubic yards of waste rock which appears similar to the lower member of the Dollarhide Formation, which in the Bullion area contains fine- to medium-grained sandstone, black siltite and black limestone or marble. The sample was mainly fine grained to sandy with over 80% passing the 10 mesh screen. There were very few organics and even fewer indications of sulfide or oxide ore.

Sample Results

Essentially, the mine waste concentrations for total arsenic, total cadmium, and total lead, total silver and total zinc exceed Idaho's *Initial Default Target Levels* (IDTLs) and total Lead exceeds EPA region 6's Human Health Screening levels (HHSLs) by 20 times. The IDTLs and HHSLs are risk-based target levels for certain chemicals that have been developed by DEQ and EPA, respectively, using conservative input parameters, a target acceptable risk of 10^{-6} , and a *Hazard Quotient* of 1. An exceedence of the IDTLs or HHSLs indicates that if pathways are complete, and receptors can get a prolonged exposure to contaminants from the site, then additional site assessment work may be necessary to qualify true risk under current site conditions. An exceedence of the IDTLs or HHSLs may also be indicative of risks that may evolve under new site conditions if the site conditions change such as development for residential uses.

These numbers, although used for comparison even at remote locations such as the Kelly Gulch Mines, are more applicable in locations where these types of contaminants are determined to be readily available to receptors under unrestricted uses such as residential development. In the case of the Kelly Gulch Mines, these concentrations, particularly for Lead, indicate that additional site assessment should be undertaken if the sites were to be developed for "unrestrictive uses" such as residential in the future, and that risk management should be employed if use changes significantly increase exposures to the waste rock.

Section 10 Pathway and Environmental Hazard Assessment

Pathway and environmental hazards were assessed for groundwater, surface water, and soil/air exposure. The findings from these assessments are presented in the following.

Ground Water

Ground water flow is expected to be controlled structurally within faults and brecciated zones in the country rock and be expressed at the surface as springs. In the Kelly Gulch drainage, no springs were witnessed. Densely vegetated portions of the hillsides indicate potential ground water discharge areas, but due to the timing of the site visit, no distinct springs could be mapped.

Shallow ground water may also be encountered within the alluvial deposits of the major tributaries to the Big Wood River. This aquifer system provides drinking water to multiple sources along the Croy Creek drainage. The interaction between the shallow alluvial aquifer systems with the deeper country rock aquifer is not known.

According to Idaho Department of Water Resources July 2002 records, 93 private drinking water wells are reported to be located within a 4-mile radius of the site. The majority of these wells are located within the Croy Creek drainage, closer to the nearby towns of Hailey and Bellevue. The

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closest domestic well to the site was located 1.5 miles below the site at the bottom of Kelly Gulch. The well was not sampled.

Ten (10) irrigation wells were identified within a four-mile radius of the site, and the site is not located within a wellhead protection area (DEQ, 2003).

During the cleanup activities of the nearby mines, such as Triumph and the Minnie Moore Mill site, 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 mine waste 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 IDEQ'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 (IDEQ 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 (IDEQ 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.

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The information extrapolated from these reports is based on data that existed at the time of their writing, and the professional judgment of IDEQ 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 (IDEQ 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.

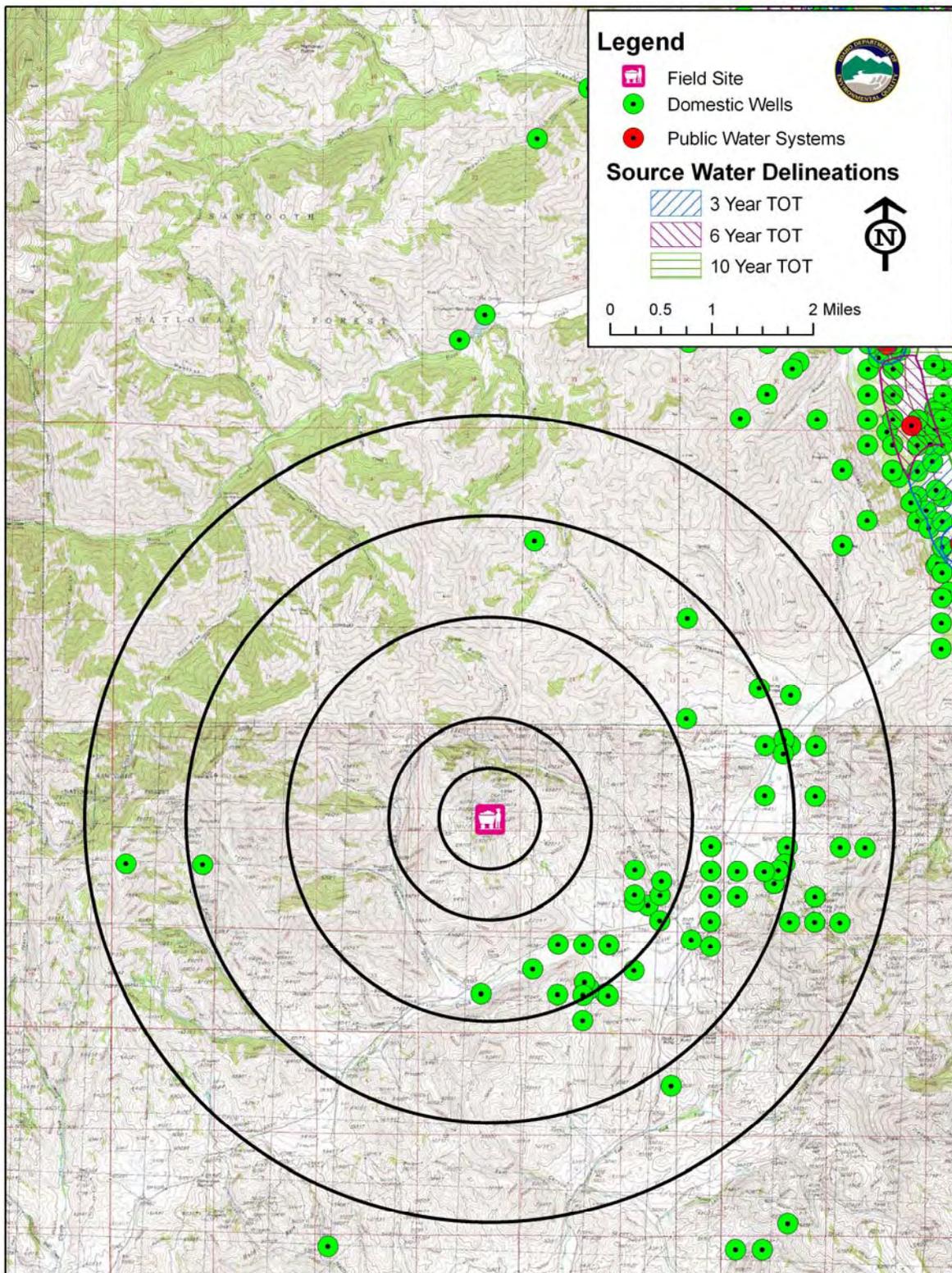
IDEQ used a refined computer model approved by EPA to determine the 3-year (Zone 1B), 6-year (Zone 2), and 10 year (Zone 3) time of travel associated with the Big Wood River Aquifer and its sources (IDEQ 2000). This information is illustrated in Figure 4.

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 (IDEQ 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 (IDEQ 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 (IDEQ 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 (IDEQ 2000). The City of Bellevue drinking water system consists of two wells and three springs (IDEQ 2000).

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Generally speaking, public drinking waters systems in the Big Wood River Valley are rated as moderate to high (IDEQ 2000). Multiple factors affect the likelihood of movement of contaminants from the sources to the aquifer, which led 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 (IDEQ 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 (IDEQ 2001). Currently, there are no data that indicate that any metal concentrations have exceeded MCLs in the Bellevue drinking water systems (IDEQ 2000).

Surface Water

The Kelly Gulch area drains southward towards the east flowing Croy Creek. Overland flow across or in the vicinity of the waste piles would only flow to the upper reaches of Kelly Gulch before disappearing into the porous colluvium. Kelly Gulch is not currently listed on the EPA §303(d) list of impaired streams, but Croy Creek is currently listed for flow alteration, nutrients, and siltation. However, there is no evidence that overland flows from the mine site connect, even seasonally with Croy Creek.

Commercial or subsistence fishing does not occur within the 15-mile downstream distance, but sport fishing does. Redband rainbow trout [*Oncorhynchus mykiss gairdneri*], mountain white fish [*Prosopium williamsoni*], wood river sculpin [*Cottus leiopomus*], and brook trout [*Salvelinus foninalis*] are, however, present within the Big Wood River (IDFG, 2000).

There are no surface water intakes for drinking water or any type of industry within the 15-mile TDL. Multiple drinking water wells are located within the 4-mile radius of the Kelly Gulch Mines and are discussed further in the Groundwater Pathway section.

Soil Exposure and Air

Access to the mine site is unrestricted from the Bullion Gulch Road, although this route is arduous. Human and ecological receptors may be exposed to soils and mine waste by inhalation, dermal contact and ingestion. As with most of the mine sites in the big Wood River area, strong winds on hot summer afternoons suspends fugitive dust in the air. Visitors may also have direct contact while exploring the site.

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Potential Receptors

Potential receptors include hikers, hunters, anglers, cattlemen, and trail riders (motorized and non-motorized). Cattle and sheep graze the surrounding area, but their presence within the mine site is minimal. Outdoor enthusiasts remain the highest percentage of human receptors, as they frequent the area for a number of recreational activities. The land within a two (2) mile radius of the site is primarily BLM; however minor amounts of private land exist.

Schools, Day-Care Facilities, Private Residences

There are no schools, day-care facilities, or private residences within 200 feet of the site, however, BLM or Forest Service workers, in addition to the outdoor recreation enthusiasts, may occasionally be within 200 feet of the site.

Plant Species of Concern

Bugleg goldenweed was the only plant species in the area were listed as a species of concern (F&G, 2002) within a 4-mile radius of the mining site. Animal species listed as a species of concern that are located within a 4-mile radius of the site include Gray Wolf, North American Wolverine, and Long-legged Myotis (F&G, 2002).

Soil Sample Concentrations

Infrequent exposure to heavy metals at the site for all receptors exists particularly to high lead concentrations measured in the mine waste samples.

Section 11 Summary and Conclusions

It is unknown how much ore was produced from these workings. They probably operated or were explored intermittently between 1885 and 1940. Earlier production (1882-1900) records of the adjacent Red Elephant Mine suggest crude ore was shipped directly to the Ketchum smelter for processing.

Based on the infrequency of human visitations, and the wide range for most ecological receptors, it is very unlikely that any remedial actions need to be undertaken at this site. However, because of the heavy metals concentrations, particularly lead, measured in the mine wastes, risk management or remedial action would be necessary if future use of the site were to include residential or other unrestricted use.

Presence of Wetlands

Official wetland surveys and aerial photographs of the area, wetlands do not exist on the site. Samples were not collected from any wetlands near this site. Based observations and available wetlands data, existing wetlands are not adversely impacted by this site.

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Impacts on Water Quality

No overland connections were observed between seasonal runoff and nearby surface or ground water systems. Furthermore, source water assessments indicate that there are no adverse impacts to public or private drinking water supplies from mining in the area. However, as future development encroaches on the site, new wells drilled at the site would be more likely impacted by heavy metals from the site.

Potential Exposure for Wildlife, Livestock, and Vegetation

Potential exposure from the tailings pile to wildlife and vegetation from the site is present. Native plant species may bio-accumulate high concentrations of metals that may be consumed by the local wildlife or livestock. Livestock and wildlife may be exposed at the site, particularly to elevated lead concentrations, but relative to the extensive range of the livestock and wildlife, the area of the dumps and exposure is small, and therefore dosage of toxic metals would likely be insignificant.

Potential Exposure for Humans

Human activity around the site is low, due to remoteness of the site. This site may be visited by mountain bikers, hikers, hunters, snowmobile operators, off-road four wheeling, and various other outdoor recreation enthusiasts may also frequent the area via the main access road. Humans may receive very small doses of heavy metals, especially lead. Fugitive dust or direct contact with the waste piles appears to be the most significant route of exposure to humans for elevated constituents. Considering the site access is very remote, these exposure levels are limited and not considered a significant factor to address.

Increased risks to humans may exist if human activity was higher on the tailings pile. If exposure to the tailings pile increases, then the risk associated with that exposure will increase accordingly. If the site is ever developed as a residential area, the level of exposure/risk would increase significantly.

Recommendations

Based on existing conditions and uses, IDEQ is not recommending that any further site investigations or remedial actions be undertaken at the properties. However, if redevelopment of the properties becomes a consideration, then additional site characterization and risk analysis based on conceptual planned uses is warranted.

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