

Kelly Creek Mine Site

Aka

Black Barb Mine or

Carboniferous and Black Barb

Patented Mining Claims

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

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

January 26, 2008

Jane Andrews Estate
C/O Ms. Marcia Penny
2547 Dorm Road
Twin Falls, Idaho 83301-8407

RE: Site Assessment of the Carboniferous and Black Barb patented mining claims
(a.k.a.)

Dear Ms Penny:

The Idaho Department of Environmental Quality (IDEQ) has completed a review of historical mining data and geological information, and subsequent to that review IDEQ conducted a site visit of the Black Barb Mine. 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 identification 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.

There was roughly 3,000 tons of ore and an additional 3,000 tons of waste rock produced at the Kelly Creek mines, or Black Barb Mine, on the Black Barb and Carboniferous patented claims. The bulk of the work and remaining waste disposal occurred on the

Carboniferous claim. Operators periodically worked to develop the Black Barb Mine from about 1889 through the 1920s, but there is no evidence that any activities occurred after that time.

Based on the infrequency of human visitations, and the wide range for most ecological receptors, it is very unlikely that substantial human or ecological risks exist 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.

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

attachments

cc: Ken Marcie – U.S. Environmental Protection Agency
Steve Moore – USDOJ Bureau of Land Management
Bill Allred – IDEQ TWFR0
Megan Stelma – Blaine County
file

Section 1 Introduction

This document presents the results of the preliminary assessment (PA) of the **Kelly Creek Mines** also known as the **Black Barb** and **Carboniferous** patented mining claims. 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.

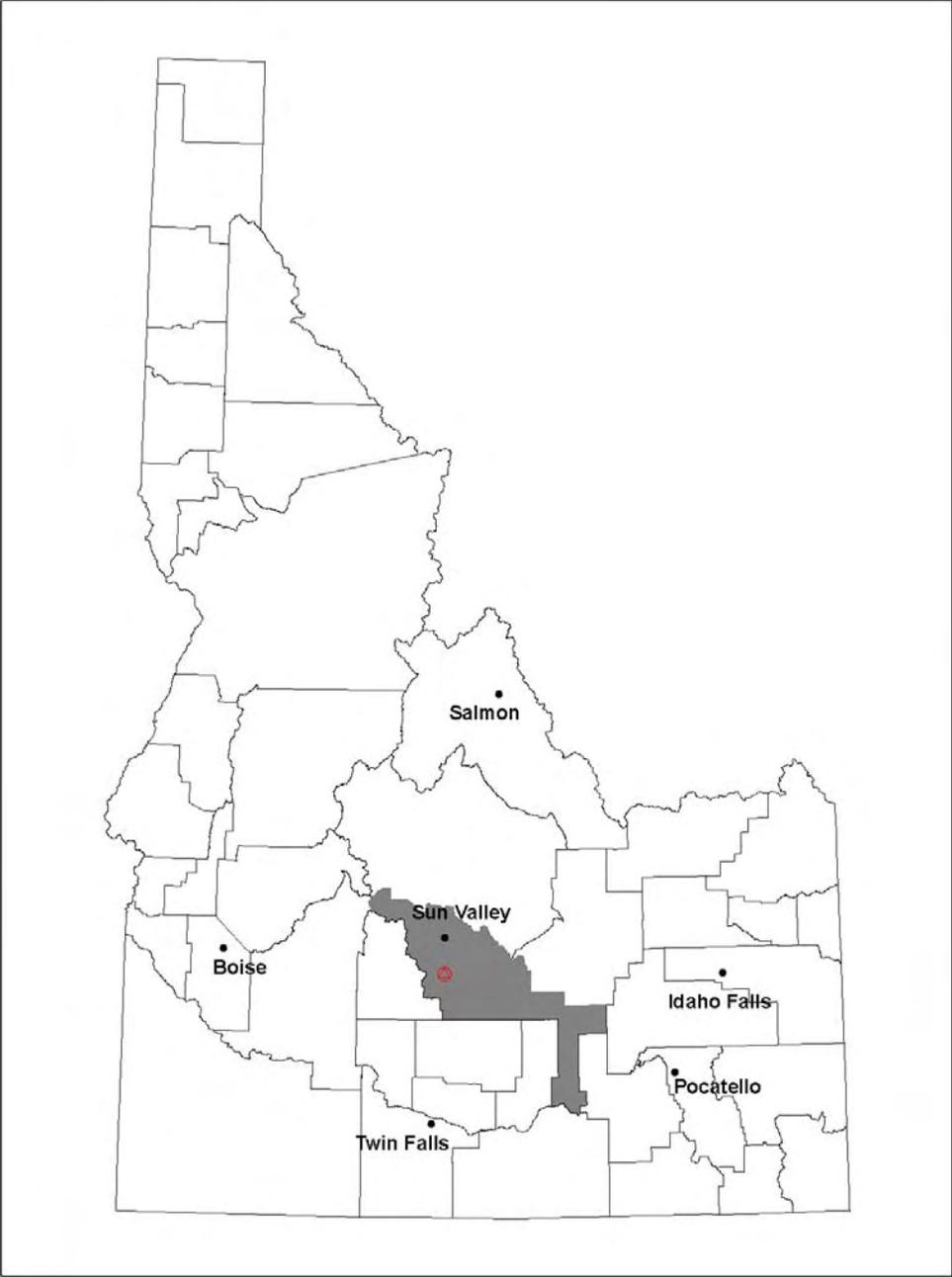
For additional information about the Preliminary Assessment Program, see the following:

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

Access to the Carboniferous patented mining claim for completion of this preliminary assessment was given by Ms. Marcia Penny of the Jane Andrews Estate. Public access and use of the Carboniferous and Black Barb is unrestricted on the Kelly Creek Road across the surrounding public lands which are administered by the U.S. Department of Agriculture Forest Service (USDA) and U.S. Department of Interior Bureau of Land Management (BLM). No physical or posted access restrictions exist on the boundaries of the Black Barb and the public routinely enters this property, as such IDEQ accessed the workings on the Black Barb, which were obviously insignificant from a human and ecological risk perspective.

As is common in this historic mining district, the patented claims are completely surrounded by federal lands. It is obvious that the federal land management agencies manage this area as a grazing allotment(s), and have developed springs for stock watering.

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

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 based on current conditions at the site 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.

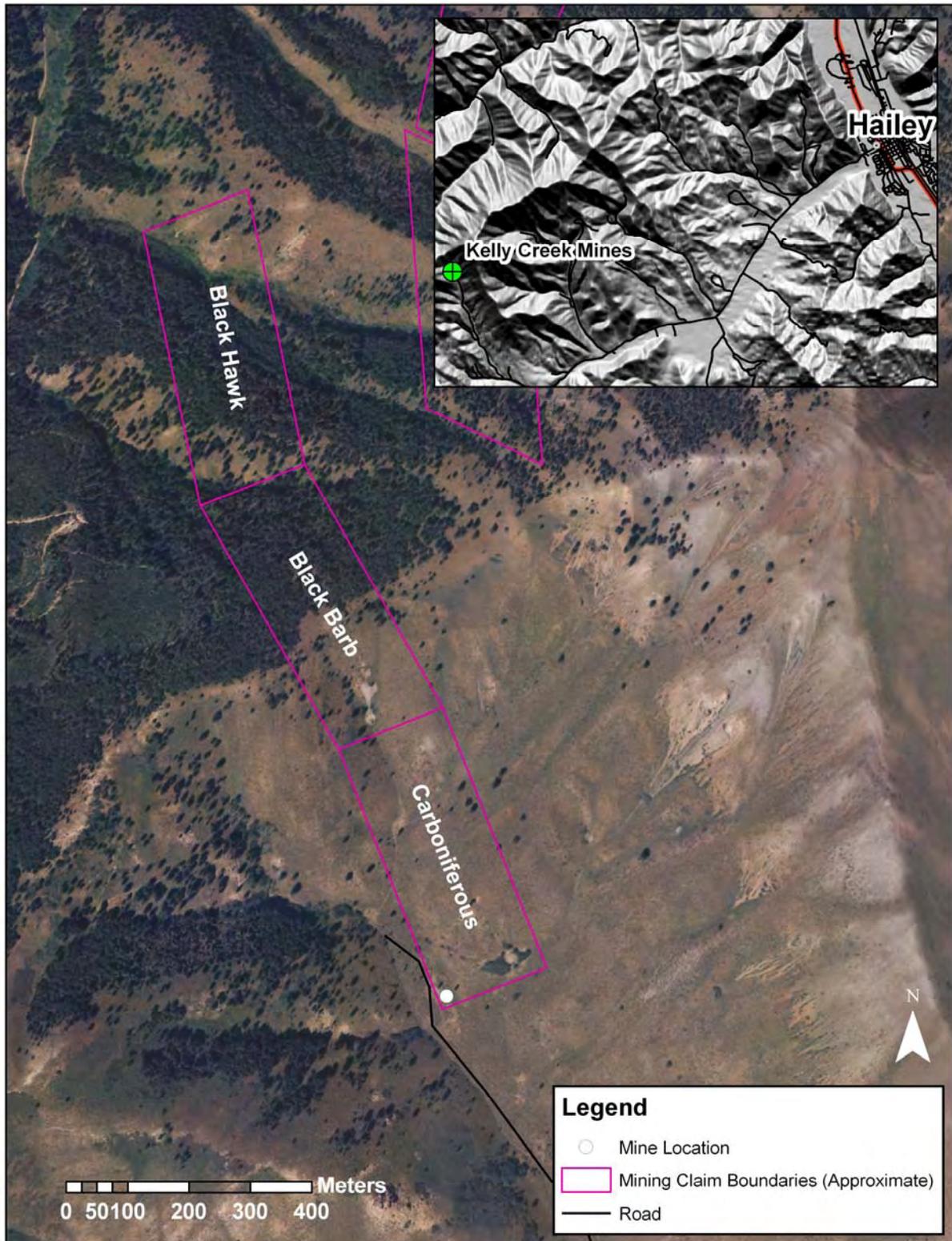
<u>Owner</u>	<u>Claim</u>	<u>Parcel Number</u>	<u>Partial Determination</u>
Jane Andrews Estate c/o Marcia Penny 2547 Dorm Drive Twin falls, Idaho 83301	Carboniferous	RPM0000000050	3 major workings (NRAP) 2 minor workings 1 exploration pit
Grant and Jeanne Core 22B Hurley Street Christchurch, New Zealand 8001	Black Barb	RPM0000000130	3 minor workings (NRAP) 4 exploration pits

Section 3 Overview

The patented claims and Kelly Creek Mines are located mostly in the upper reaches of Kelly Creek, which is an ephemeral drain approximately 2 miles west of red Elephant Gulch. The Black Barb patented claim somewhat drapes over the east west running ridgeline on the west side of Kelly Mountain. This puts about half of the Black Barb into the upper end of the Wolfstone Creek drainage.

The general location of the Kelly Creek is on the patented Black Barb and Carboniferous claims at latitude 43 29.045' N and longitude 114 28.495' W, within Sections 19, 20, 29 ad 30 in T2N R17E. The closest town to the mine site is the City of Hailey, approximately six miles by air and road.

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The mine facilities can be reached from Hailey by driving east along the Croy Creek Road, then north along the Kelly Creek road northwest approximately 1.5 miles to the mine sites. This road goes through BLM administered lands.

Contributions to the aquifers in close proximity to the Kelly Creek Mines will predominantly be as a direct result of precipitation or surface water. Kelly Creek 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 4 Historical Perspective

IDEQ found one brief reference to the Black Barb and Carboniferous claim in “Geology and Ore Deposits of the Wood River Region, Idaho” (1930) by Joseph B. Umpleby et al. this is not to say that there are not others, but the description and ore production records contained therein were sufficient for this report.

Umpleby et al reported:

“Among the prospects mentioned may be the Black Barb, Carboniferous, Continental Kelly and Field Mutual. No work was in progress on any of these prospects in 1923, and they were not visited. According to Cambell (Cambell and Stewert, 1922, “ Twenty-fourth Annual Report of the Mining Industry of Idaho for the year 1922”) the Continental Kelly Mining Company holds six unpatented claims with total developments of about 600 feet, and Field Mutual Mining Company holds 14 unpatented claims with about 3,000 feet of developments. Lead-silver ores were sought on both properties.

Umpleby also reported early production records for the Black Barb. In this report it appears that between 1889 and 1908 approximately 30 tons were produced, which yielded ½ ounce of gold, 1,741 ounces of silver and 28,862 ounces of lead. It appears that even though this production may be related to the Black Barb, this is the name of the mine not claim. In fact, based on mapping of the Carboniferous and Black Barb claims it is obvious that the bulk of production occurred through Carboniferous adits #3, #4 and #5 where the dumps cumulatively contain approximately 6,000 cubic yards of waste, as opposed to the Black Barb adits #1 through #3, whose waste dumps cumulatively contain less than 1,000 cubic yards of waste.

The U.S. Department of Interior Bureau of Land Management General Land Office records indicate that the Black Barb and Carboniferous claims were patented in between 1922 and 1905 respectively.

Section 5 Site Description

Black Barb Patented Claim

The Black Barb patented mine claim contains four exploration “dog” holes with waste dumps containing less than 50 cubic yards each. There are three minor workings Black Barb Adits #1 through #3, on whose waste dumps there is less than 1,000 cubic yards total.

The workings are at the head of a west facing dry drainage in the headwaters of Kelly Creek. Although there are springs in the Kelly Creek drainage about 1500 feet below the workings, there is no evidence that significant drainage discharges from the adits at any point in time, nor does there appear to be a direct connection between the erosional features on the waste dumps and the perennial flows in Kelly Creek.



From the end of the Kelly Mountain Road looking northeast, these are the four lower Black Barb exploration “dog holes” and waste dumps.

Although there were apparently seven separate workings on the claim all of the openings have caved shut, and there are no overhanging rocks above the previous openings that may be considered dangerous physical hazards.

The waste dumps on the Black Barb contain fine grained mixtures of decomposed quartz monzonite and shale. The waste dumps are very poorly vegetated. Consequently they remain unstable and are susceptible to erosion during spring runoff and rain storm events. Never-the-less there are only a couple of major erosional features which are located along the sides of the dumps and where the dumps contact the most voluminous flows of spring runoff from the hillside.

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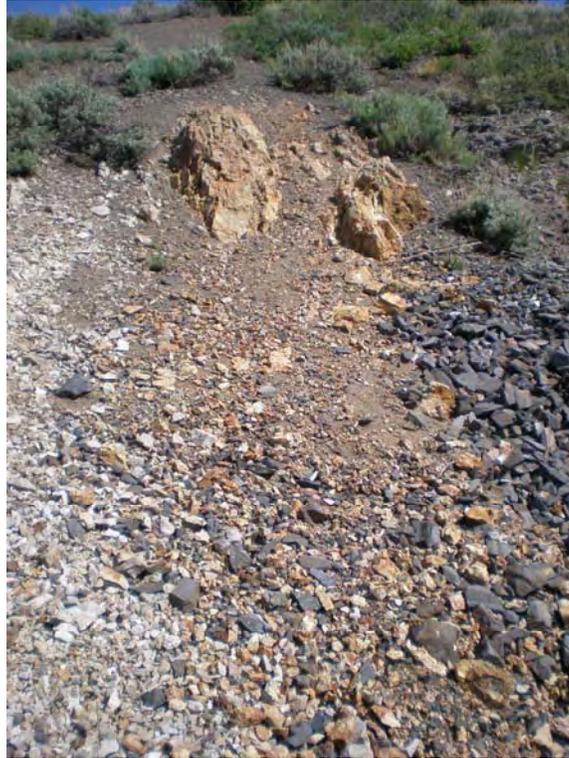


Alteration colors of waste rock on Black Barb Waste Dump #1 from oxidation of sulfides.



Side view (looking north) of Black Barb Waste Dump #1

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Caved Black Barb Adit #3 on contact zone between intrusives and sediments



Black Barb erosional channels onto Waste Dump #1 from Waste Dump #2

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*Erosion of Black Barb Waste Dump #3 on to Waste Dump #2
over Adit #2*

Most of the material eroded from the Black Barb Waste Dumps #2 and #3 settles on the Waste Dump #1. Although this appears as fairly voluminous alluvial fans, there does not seem to be a similar deposit below Waste Dump #1.



*Looking west down Black Barb Waste Dump #2 towards Black
Barb Waste Dump #1*

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Black Barb Waste Dumps #1 and #2 from Waste Dump #3.



Black Barb Collapsed Adit #3

Carboniferous Patented Claim

The Carboniferous patented mine claim contains one exploration “dog” hole and waste dumps containing less than 50 cubic yards. There are also two minor workings Carboniferous #1 and #2, on whose waste dumps there is less than 1,000 cubic yards total. However the Carboniferous also contains three major workings Carboniferous Adits # 3, #4, and #5 whose total volume of waste is greater than 3,000 cubic yards. Furthermore, IDEQ believes that these three major workings are actually the Black Barb “Mine”.

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The workings are at the head of a west facing dry drainage in the headwaters of Kelly Creek. Although there are springs in the Kelly Creek drainage about 500 feet below the workings, there is no evidence that significant drainage discharges from the adits at any point in time, nor does there appear to be a direct connection between the erosional features on the waste dumps and the perennial flows in Kelly Creek.

Although there were apparently six separate workings on the claim all of the openings have caved shut, and there are no overhanging rocks above the previous openings that may be considered dangerous physical hazards.



Looking west from Carboniferous Waste Dump #1 towards Kelly Creek and the Kelly Mountain Road.



Looking north to Carboniferous Adit (caved) and Waste Dump #1

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Collapsed cabin near Carboniferous Waste Dump #1



Carboniferous Waste Dumps # 3 and #4, all of the adits are caved.

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Exploration pit about 100 yards north of Carboniferous Waste Dump #3 and #4



Looking down from the exploration pit, onto Carboniferous Waste Dump #5 and the Kelly Creek Road.

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Although the Carboniferous Waste Dump #5 appears to be a stand alone waste dump or loading area, if one carefully looks in the brush to the east, you will find the remains of the caved adit.



Looking down from Carboniferous Waste Dump #5, there is a well developed stack tank and springs that are most likely fed by waters emanating through the old mine workings.

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Looking uphill (east) towards the Carboniferous Waste Dump
#5

Section 6 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.

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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 (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 Kelly Mountain 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)

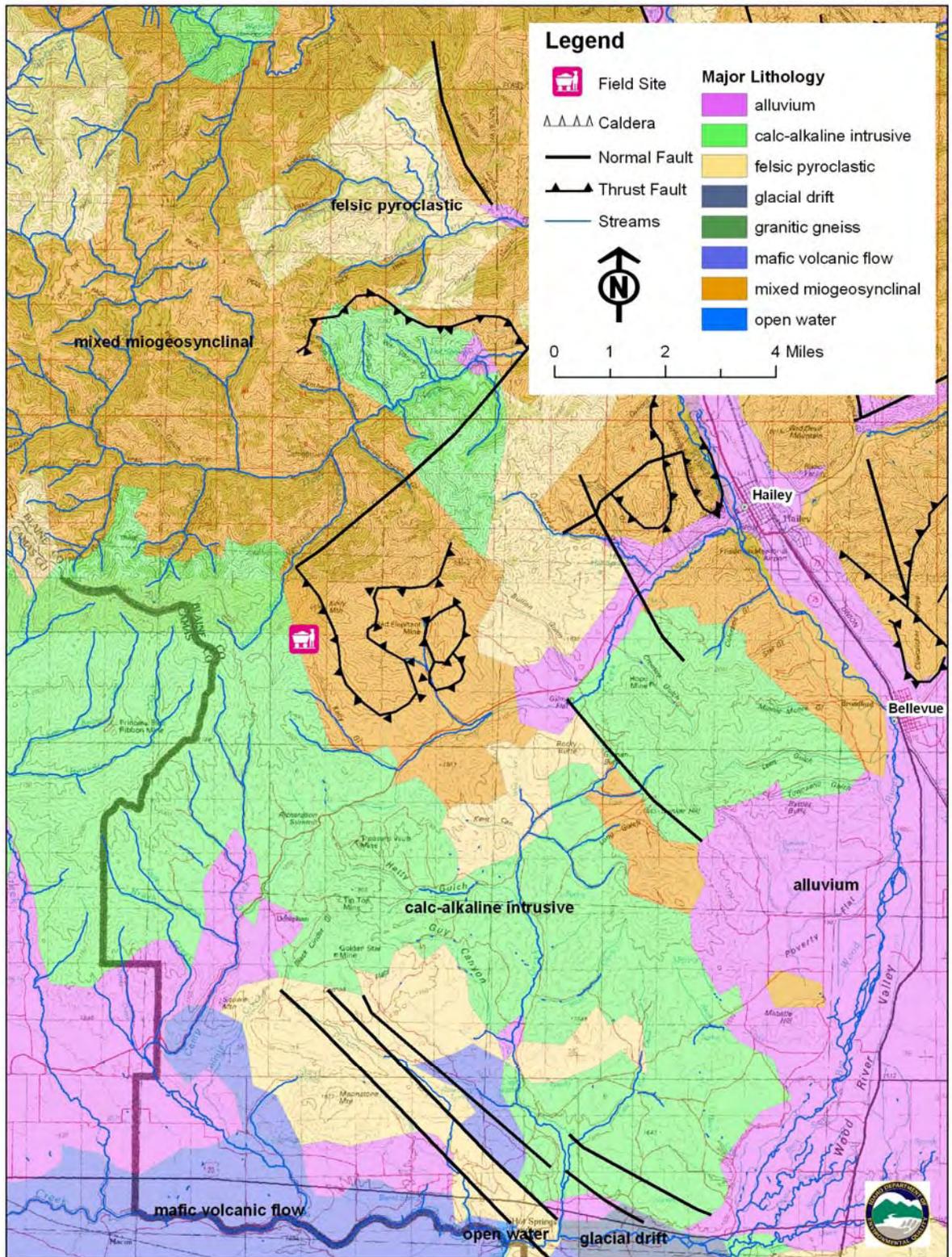
Fryklund (1950, pp. 65-66) noted the following in regards to the structure of the rocks:

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 7 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 Creek Mines are accessible from Croy Creek Road. The mines are also accessible from the north where an off-road vehicle (ORV) trail starts at the end of the Wolfstone Creek Road, zig zags up to the ridgeline on the west side of Kelly Mountain and then down to the Kelly Creek Road by the mines. During the course of the field work conducted, the DEQ site investigators observed lots of evidence of hikers, mountain bikers and ORVs who use this trail system.

Fish Species Observed

Fish presence/absence studies have not been conducted on Kelly 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 one mile from the site and are located in the Kelly 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 grazing values to livestock and wildlife.

Section 8 Waste Sampling and Characterization

Sample Collection

Waste

Two soils and two waste dump samples were collected from the Kelly Creek Mines. Although the ten mine and exploration “dog hole” waste dumps on the Black Barb (claim) were considerably less than 500 cubic yards in volume, a background soil sample (BBGSS-1) was collected on the ridge above the mine. Another background soil sample (CBGSS-1) was collected on the ridgeline above the six Carboniferous mine and exploratory workings. Two mine waste dump samples were collected on the Carboniferous Waste Dump #4 (CWD4SS-1) and Carboniferous Waste Dump #5 (CWD5SS-1).

The Black Barb claim was located on or near the contact zone of the quartz monzonite intrusives and the shales. The background sample BBGSS-1 appears to be fine grained decomposed shale. Approximately 5 kilograms of sample were collected with greater than 90% passed the #10 mesh screen. This fraction of the sample was dark brown to buff color, silty appearing as a weather shale or mudstone. This portion of the sample was bagged for analysis. There was less than 5% organics in the sample. The coarse fraction contained some organics and coarse grained quartz sands that may have originated as quartz monzonite, which was disposed on-site.

The Carboniferous claim is also located on or near the contact zone of the quartz monzonite intrusives and the shales. The background sample CBGSS-1 appears to be fine grained decomposed shale. Approximately 5 kilograms of sample were collected with greater than 90% passed the #10 mesh screen. This fraction of the sample was dark brown to buff color, silty appearing as a weather shale or mudstone. This portion of the sample was bagged for analysis. There was less than 5% organics in the sample. The coarse fraction contained some organics and coarse grained quartz sands that may have originated as quartz monzonite, which was disposed on-site.

Samples CWD4SS-1 and CWD5SS-1 both appear to be fine grained decomposed and altered shale with considerable iron staining that may indicate weathered sulfides. Both were collected as composite samples from ten holes in each of the two waste dumps. Each hole was excavated to approximately 6” with that material tossed aside. Each hole was then excavated approximately six more inches (6”-12”) with that material placed in a sterile bowl with the rest of the composite sample from that dump. Approximately 5 kilograms of sample were collected with greater than 60% passed the #10 mesh screen. This fraction of the sample was dark brown to buff color, it was silty appearing as a weather shale or mudstone. This portion of the sample was bagged for analysis. The coarse fraction contained coarse grained sands composed largely of quartz that may have originated as quartz monzonite, large fragments of fractured quartz monzonite, and large fragments of shale, all of which was disposed on-site.

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Water

The livestock tank, which was located below the Carboniferous Waste Dump #5 was sampled (CAR SW-1). This stock tank appears to be fed by springs that may emanate directly from the caved Carboniferous Adit #5. The water outflow from this tank is not of sufficient volume to reach the ephemeral portion of Kelly Creek, which is approximately 500 feet down hill from the tank. There were no measurable flows in Kelly Creek within 1 mile of the mine site above or below the mines.

Sample Analyses

Waste

Both background soil samples exceeded Idaho IDTLs and EPA Region 6's HHSLs for total arsenic, total lead and total zinc. Both samples also exceeded Idaho IDTLs for total cadmium, total chromium, and total zinc.

Kelly Creek Mine Sites - Carboniferous and Black Barb Claims

Description	IDEQ IDTL values	EPA Region 6 Human Health	Black Barb Background Soil Sample	Carboniferous Background Soil Sample	Carboniferous Waste Dump 4 Soil Sample	Carboniferous Waste Dump 5 Soil Sample
		Screening Level	BBGSS-1	CBGSS-1	CWD4SS-1	CWD5SS-1
Aluminum						
Antimony	4.77	31				
Arsenic	0.391	23	36.8	284	836	64.9
Barium	896	1600	120	52.8	9.12	24.6
Beryllium	1.63	160				
Cadmium	1.35	39	6.33	8.56	9.18	4.8
Calcium						
Chromium	7.9	210	32.1	29.9	24.1	31.2
Cobalt		900				
Copper	921	2900	52.4	78.7	75	77.1
Iron		55000	36700	30200	34100	37100
Lead	49.6		59.1	1830	1270	40.5
Magnesium						
Manganese	223	3600				
Mercury	0.00509	23	0.035	0.093	0.65	0.672
Nickel	59.1	1600				
Potassium						
Selenium	2.03	390	<4	< 4	<4	<4
Silver	0.189	390	0.65	5.66	4.66	0.91
Vanadium		390				
Zinc	886	23	295	1730	1240	276

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Carboniferous Waste Dump #4 Sample (CWD4SS-1) exceeded Idaho IDTLs and EPA Region 6's HHSs for total arsenic, total lead and total zinc. CWD4SS-1 also exceeded Idaho IDTLs for total cadmium, total chromium, total mercury, and total silver. **CWD4SS-1 did not exceed background levels for any total metals by more than three times.** Generally speaking this indicates that the Carboniferous Waste Dump #4 does not pose any more significant risks to human and ecological receptors than do the local soils.

Carboniferous Waste Dump #5 Sample (CWD5SS-1) exceeded Idaho IDTLs and EPA Region 6's HHSs for total arsenic. CWD5SS-1 also exceeded Idaho IDTLs for total cadmium, total chromium, total mercury, and total silver. **CWD5SS-1 did not exceed background levels for any total metals by more than three times.** Generally speaking this indicates that the Carboniferous Waste Dump #4 does not pose any more significant risks to human and ecological receptors than do the local soils.

Kelly Creek Stock Tank Water Quality Analysis

Description	IDEQ Ground Water Standard	IDEQ Drinking Water Standard	IDEQ Cold Water Biota Standard	IDEQ Cold Water Biota Standard	Stock Tank Water
			Acute	Chronic	CAR SW 1 TOTALS
Arsenic	0.05	0.00002 (D)	0.36 (D)	0.19 (D)	<0.025
Barium					0.0042
Cadmium	0.01		0.0037 (D)	0.001 (D)	< 0.002
Chromium	0.05		0.157 (D)	0.18 (D)	<0.0060
Copper	1		0.017 (D)	0.0106 (D)	<0.010
Iron	0.3				0.104
Lead	0.05		0.065 (D)	0.0025 (D)	<0.0075
Mercury	0.002	0.00014 (D)	0.00204 (D)	0.000012 (T)	<0.00020
Nickel		0.61 (D)	1.4 (D, H)	0.16 (D, H)	
Selenium	0.01		0.02 (T)	0.005 (T)	<0.04
Silver	0.05		0.0034 (D)		<0.0050
Zinc	5		0.11 (D)	0.10 (D, H)	0.302

Water

Field metrics of the water in the live stock tank do not indicate anything of great significance, except for the buffering capacity. The tank contained water with a pH of 9.5, conductivity of 0.20, turbidity of 10 NTUs, dissolved oxygen of 13.6 mg/l, temperature of 16 degrees C, and a salinity of 0.0.

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Laboratory analysis for total metals in the stock tank water are unremarkable indicating that it is unlikely that it poses a risk to human or ecological receptors as long as it is not developed as a domestic or public drinking water system.

Section 9 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 Creek drainage, only the springs feeding the stock tank, and one other approximately 1,000 downhill on the west side of the drainage were noted. 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. Although the Wells Map indicates that there are two domestic wells within one mile of the site, these are springs that have been developed by the BLM and ranchers for live stock watering. The actual closest domestic well to the site was located 3.2 miles below the site at the bottom of Red Elephant 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

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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:

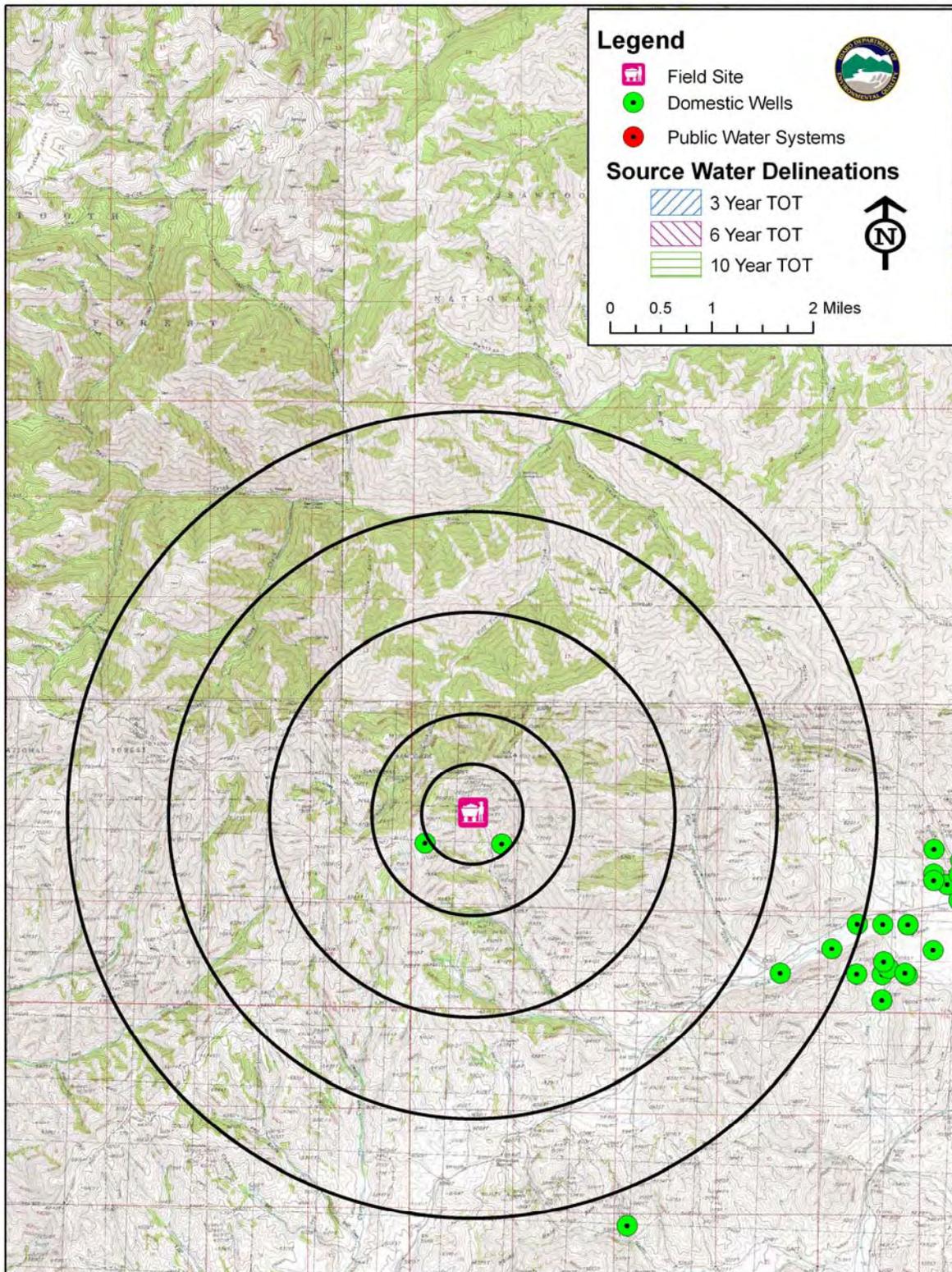
- Defines the zone of contribution, which is that portion of the watershed or subsurface area contributing water to the well or surface water intake (source area delineation).
- Identifies the significant potential sources of drinking water contamination in those areas (contaminant source inventory).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

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.

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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).

Generally speaking, public drinking water 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 Creek 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 Creek before disappearing into the porous colluvium. Kelly Creek is not currently listed on the EPA

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§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 Creek Mines and are discussed further in the Groundwater Pathway section.

Soil Exposure and Air

Access to the mine site is unrestricted from the Kelly Creek Gulch Road. 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 suspend fugitive dust in the air, which may be inhaled. Visitors may also have direct contact with heavy metals in wastes while exploring the site.

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 and Animal Species of Concern

Bugleg goldenweed was the only plant species in the area 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). Due to the much greater area of range for animals compared to the size of the waste dumps, it is unlikely that the animal species of concern would experience sufficient durations of exposure and dose to be at risk.

Soil Sample Concentrations

Infrequent exposure to heavy metals at the site for all receptors exists; but, the exposure is not particularly dangerous relative to lead and silver concentrations measured in the mine waste samples.

Section 10 Summary and Conclusions

There was roughly 3,000 tons of ore and an additional 3,000 tons of waste rock produced at the Kelly Creek mines, or Black Barb Mine, on the Black Barb and Carboniferous patented claims. The bulk of the work and remaining waste disposal occurred on the Carboniferous claim. Operators periodically worked to develop the Black Barb Mine from about 1889 through the 1920s, but there is no evidence that any activities occurred after that time.

Based on the infrequency of human visitations, and the wide range for most ecological receptors, it is very unlikely that substantial human or ecological risks exist 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 on observations and available wetlands data, existing wetlands are not adversely impacted by this site.

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, if 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 and silver 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.

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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 recommending that No Remedial Action is Planned for this site. 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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