

Enterprise Group

**(A.k.a. Blackbird No. 5 Tunnel, Diana Mines, Mineral Mines
&
Baby Mines; Blackbird, Enterprise Fraction, Enterprise, Red
Flag & Commonwealth lode & Red Flag millsite patents)**

Preliminary Assessment Report

Boise County
State of Idaho



Idaho Department of Environmental Quality

December 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

December 19, 2008

Mr. Randy Anderson
10907 W. Annafaye St.
Star, ID 83669

RE: Preliminary Assessment of the Blackbird/Enterprise/Red Flag Mining Claims
Located in T 8N, R 5E, Sections 23, 24, 13 and T 8N, R 6E, Section 18.

Dear Mr. Anderson:

The Idaho Department of Environmental Quality (IDEQ) has completed a review of historical mining data and geological information of the above referenced mining facilities. Subsequent to that review, IDEQ conducted site visits of the Blackbird and Enterprise Mill sites and associated mines (Enterprise, Red Flag). During these site visits, mining facilities were mapped and sampled to complete a Preliminary Assessment (PA) report.

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 managers regarding how risks might be managed, if necessary.

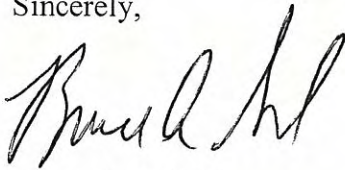
Based on existing conditions and historic uses of the property, mine waste and adit discharge samples were collected during the site visits. Subsequent to our analysis IDEQ has determined that No Remedial Action is Planned (NRAP) for this property.

IDEQ did not observe any dangerous openings or other physical hazards during the site inspection.

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 openings and waste dumps, remnant structures and miscellaneous equipment as well.

IDEQ very much appreciates your cooperation with our site assessment program and projects, and looks forward to addressing any questions you may have regarding our findings. Please call me at (208) 373-0554 if you have any comments, questions, or if 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

BAS:TE:tg enterprise group pa 12 15 08.doc

Attachment

cc: Ken Marcie, Environmental Protection Agency
Gordon Ravenscroft, Emergency/Dispatch Manager, Boise County
Jim Curtis, USDA Forest Service, Boise National Forest
Maggie Manderbach, USDA Forest Service Region IV
file

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List of Acronyms

<u>Acronym</u>	<u>Definition</u>
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
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

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Section 1. Introduction

The Idaho Department of Environmental Quality (DEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines within the Grimes Pass Mining District in Boise County, Idaho. This document presents the results of the preliminary assessment of the Enterprise Group mine and millsite and associated mines.

DEQ 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, 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

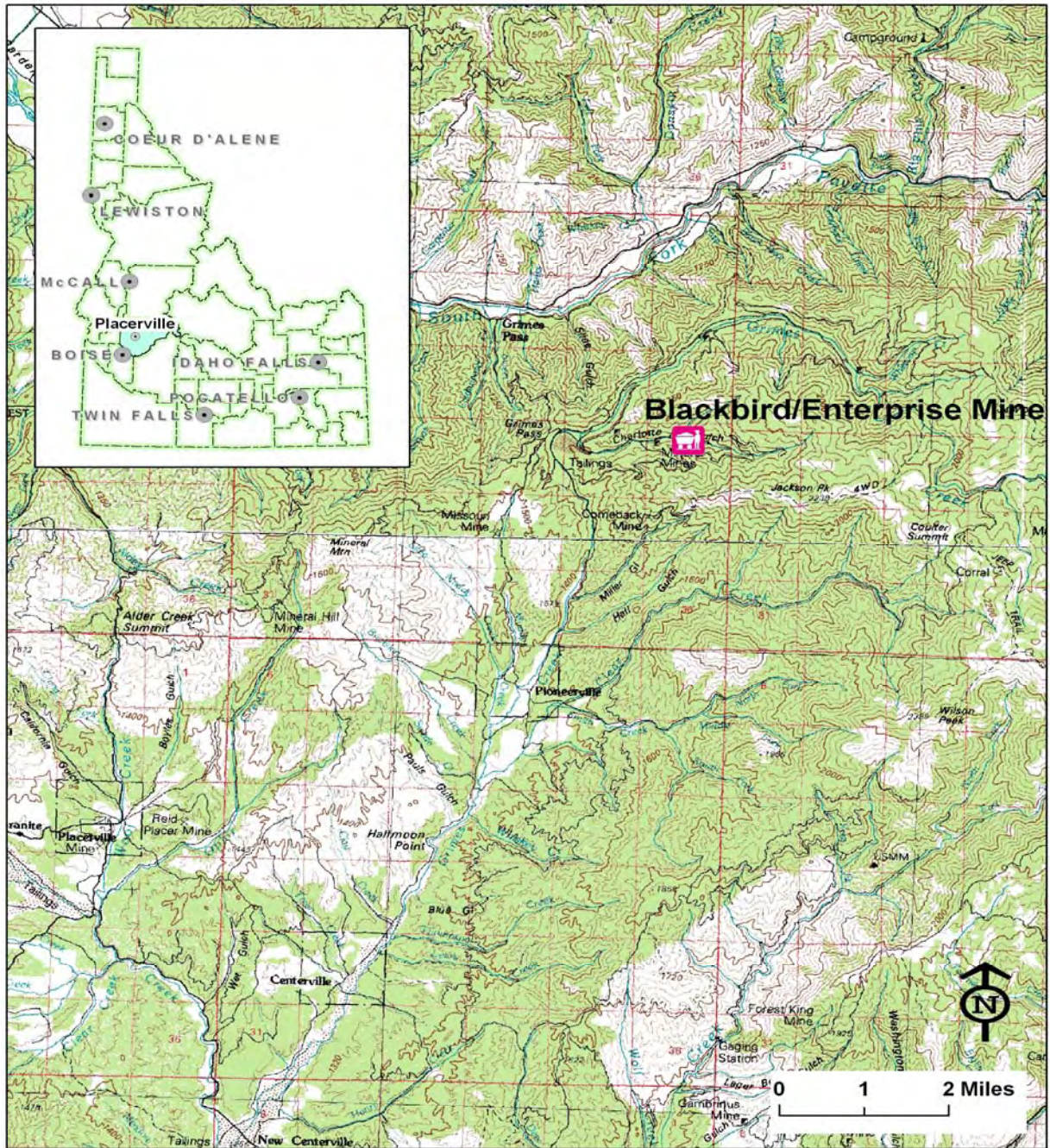


Figure 1: Location Map

Section 2. SITE BACKGROUND

Ownership

Based on a limited search, the current owner of the patented mine claims and millsite claim is Randy Anderson. However, there may be other associated facilities located on USDA Forest Service (Forest Service) administered lands. 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 Boise County Tax Assessor's Office in Idaho City, 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 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 IDEQ has determined that there is sufficient evidence to warrant calculation of a Hazard Ranking Score (HRS) by EPA's contractors. It also indicates that IDEQ 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.

<u>Owner</u>	<u>Claim</u>	<u>Parcel Number</u>	<u>Determination</u>
Randy Anderson 10907 W. Annafaye Star, ID 83669	Red Flag MS	RP08N05E233450A	NRAP
	Enterprise	RP08N05E130650A	NRAP
	Blackbird	RP08N05E240660A	NRAP
	Red Flag		
	Enterprise Fraction	RP08N06E180050A	NRAP
	Commonwealth	RP08N06E180660A	NRAP

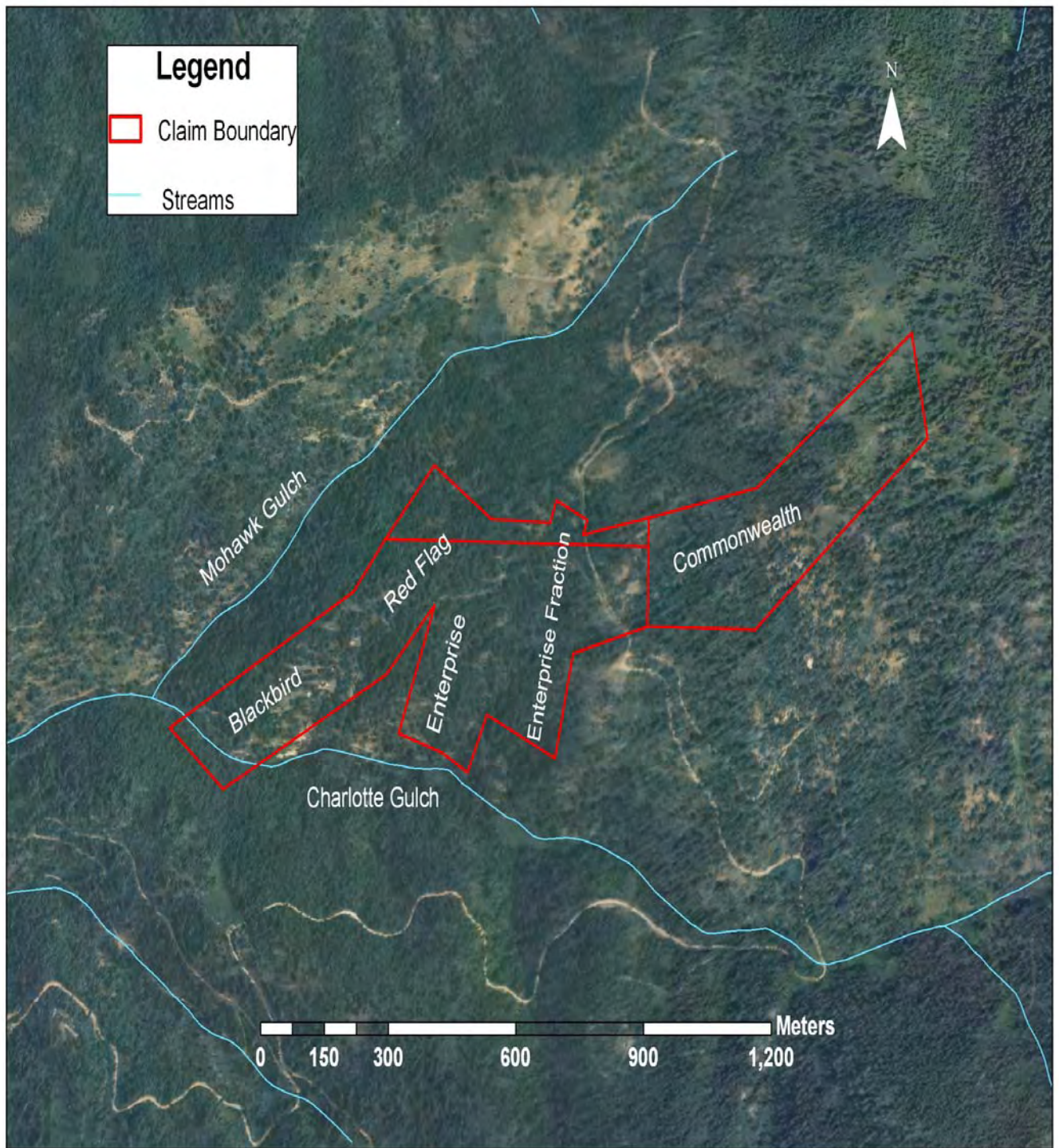


Figure 2: Patented Claims of the Enterprise Group Mine

Location

The site is located approximately 6 miles north of Pioneerville in Boise County. The patented land is spread out over Township 8N, Range 5E, Sections 23, 24, 13 and Township 8N, Range 6E, Section 18, of the Boise Meridian. The main portion of the mill foundations of the former Enterprise Mill are located at Latitude 43° 56' 28"N, and Longitude 116° 00' 56"W. Access by vehicle to the Enterprise Mine is on Forest Service Road No. 382D approximately two miles east of Grimes Pass. The upper portions of the site are accessible only by all-terrain vehicle. The Blackbird millsite is a separate parcel of patented land located near the bottom of Charlotte Creek at an elevation of approximately 5000 feet. The block of patented claims stretch out along the upper portions of Charlotte Creek reaching a maximum elevation of approximately 5800 feet at the former bunkhouse and over 6000 feet at some of the upper prospect locations.

No gates or fences are present to restrict access to this site. The area is used by the general public to access public lands. IDEQ obtained legal access to conduct a site visit from Randy Anderson, the property owner.

Climate

There are no precipitation records available specifically for the Enterprise Group Mine. The information provided in this section is based on climate summaries for two nearby weather stations (Centerville and Lowman) obtained from the Western Regional Climate Center (WRCC, 2007).

The Centerville Arbaugh Ran station (site # 101636) is located approximately 10 miles southwest from the mine at an elevation of 4,440 feet amsl. Records from 1949 to 2007 indicated the mean annual precipitation is 27.75 inches; the mean annual snowfall is 119 inches; and the 100-year, 24-hour event is 2.28 inches. Based upon records from 1998 to 2007, the lowest temperature recorded for this period was – 23° F recorded in January 2002 while the highest was 101° F recorded in August 2001.

The Lowman weather station (site # 105414) is located approximately 15 miles northeast from the mine at an elevation of 3870 feet amsl. Records from 1948 to 2005 indicate that the mean annual precipitation is 25.84 inches and the mean total snowfall depth is 90.2 inches. Average temperatures range from a low of 13.9 ° F in January to a high of 85.9 ° F in August.

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 area around the Enterprise Mine is characterized by cool dry summers and cold winters. The majority of precipitation occurs as snow, occurring mostly in December and January. The driest months are July, August and September. Dry-season rainfall occurs in relatively short episodes, usually as 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.

General Geology

Figure 3 illustrates the lithology and structural geology at the Enterprise Mine and surrounding area. Country rock in the area consists primarily of Cretaceous biotite granodiorite and muscovite-biotite granite (Kiilsgaard & McCarthy, 2001).

Relatively large masses of Tertiary (Eocene) diorite and quartz monzonite intrude the granitic basement. Dikes, primarily rhyolite, generally follow a northeast trend. Northeast-trending faults of the Trans-Challis fault system cut the area into elongate blocks.

During the past 100 plus years numerous authors including Ballard (1924), Ross (1933) and Anderson (1947) have described the geology and/or ore deposits within the Grimes Pass Mining District. Later investigations IGS staff members (Mitchell & Bennett, 1995; Leppert and others, 2007) did not include the Enterprise Group or the nearby Golden Age mines, as the private property owners would not provide access.

Anderson (1947) wrote about the structure and mineralogy of the Enterprise:

The development has been confined to a single lode, which lies on the north side of the quartz monzonite porphyry stock in a prominent fissure zone in intensely sericitized granitic rock. Several rhyolite, rhyolite porphyry, and quartz monzonite porphyry dikes of north-northeast trend are nearby, but it is not known whether they are exposed underground or are cut by the lode, which trends about N.70.E. and dips 45° or more to the southeast.

Where the lode has been exposed by sluicing at the caved portal of one of the upper tunnels it is contained in an iron-stained and copper-stained zone about 20 feet across. The average thickness of the lode, however, is said to be about 40 inches, though locally it may be several times as thick. In it occur quartz and sulfide lenses, but in places the sheared and fractured hanging wall is reported to contain disseminated ore minerals as far as 20 feet from the main fissures. The ore otherwise tends to occur as compact seams, lenses, and kidney-shaped masses along the main fissure. Most of the individual seams and ore masses are several inches thick. Much gouge lies along the walls, and in it are numerous rounded boulders of ore. The principal ore shoot was about 400 feet long.

Most of the ore recently mined consisted of intensely sericitized rock with irregularly disseminated sulfides and compact seams and nodules, and locally small quartz lenses and stringers. The sulfides include chiefly galena, sphalerite, and pyrite, and minor amounts of tetrahedrite and galena, and in part associated with scant auriferous quartz and carbonates. Some of the ore is coarse-grained, some fine-grained, and some is crushed and ground up in the gouge. Much of the quartz is younger than the sulfides and in part occurs as fine-grained druses in open clefts. The ore contains an average of 0.25 ounce of gold per ton, but the gold content is higher in the more siliceous ore. (pp. 302 & 303)

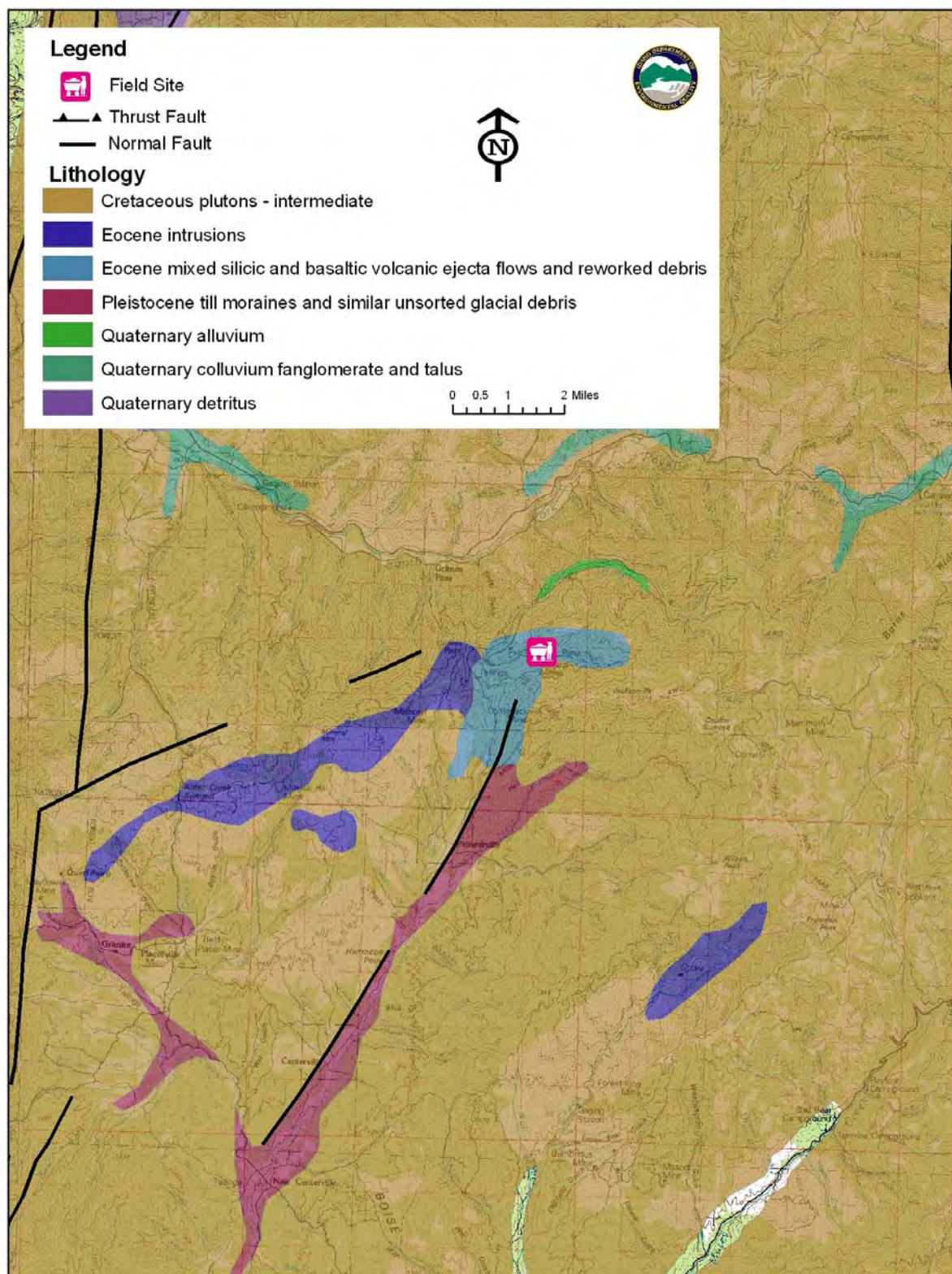


Figure 3: Geological Map of the Enterprise Group Area

Mine Operations and History

The amount of historical information IDEQ found on the site was limited. Figure 4 shows the Red Flag millsite area, while Figure 5 illustrates the workings, dumps and remnant structures at the main site. Specific production records were not available but the main mining activity occurred from 1902-1940. The Enterprise Group, also known as the Baby, Ingle, Diana and Blackbird, produced gold, silver, lead, copper, and zinc.

Jones (1916) noted the following:

A mill was built in 1902 to treat the ores from the Enterprise group. The processes employed, a combination of amalgamation and concentration, are reported to have been not very satisfactory. This mill was acquired by the Diana Mines Co., and experiments are being made on the ores from that company's numerous claims. Some of these ores are composed chiefly of sphalerite and chalcopryite (p. 108).

Ballard (1924) described the tenor of the ore produced from the Enterprise workings. He noted:

As disclosed in the lower Blackbird level, the typical sulphides are pyrite, galena sphalerite, chalcopryite, and occasionally tetrahedrite...The ore which was removed during the development work was hand-sorted and the reject was concentrated in a 15-ton experimental plant, which included a two-stamp mill and an improvised two-compartment water-driven Harz jig (pp. 82-83).

Anderson (1947) wrote:

The Enterprise group, held under lease and bond by the Mineral Mining Co. from 1919 until the early thirties, lies in Charlot Gulch in sec. 24, T.8N., R.5E., a little less than 2 miles east of Grimes Pass. The group, formerly known as the Ingle, was worked as early as 1902, at which time there were three tunnels, each driven 800, 1,000, and 1,200 feet on the lode and connected by raises. The ore could not be successfully treated at the mill at that time, and after a short run the mill was closed down and development work discontinued until the property was acquired by the Diana Mines Co. in 1915. The company reopened the old workings, rehabilitated the mill, and began work on a lower tunnel, the No. 4. In 1919 the Mineral Mining Co. acquired possession of the property and began a long prospect tunnel from the west of the group far down the gulch. This tunnel, the No. 5, passed about 110 feet below the No. 4 tunnel, and in 1930 had a length of 1,200 feet, joined to the No. 4 tunnel, and in 1930 had a length of about 1,200 feet, joined to the No. 4 by raises. A 100-ton concentrator completed in 1925 proved unsatisfactory was dismantled and changed for fine grinding and flotation. The mill was finally adjusted in 1930, and considerable ore was treated. A large amount of development was done in 1931, the mill was run intermittently, and some high grade concentrate was shipped. The property was then idle until 1934, when a winze was sunk from the No. 5 level. Since then the mill has been doing custom work. When the property was examined, the No. 4 and No. 5 levels were partly open. All the ore had been stoped above the No. 5. Production records were not available (p. 302).

Anderson (1947) also wrote of the Baby workings:

The Baby workings are on the Enterprise group near the top of the ridge, about 1,500 feet east-northeast of the Enterprise workings. The development includes a 125-foot shaft and drifts of undetermined length. The workings are old and were not accessible when the property was visited. The lode is supposed to be a continuation of the one described above. According to Ballard, the shaft, which was sunk in the lode, exposed considerable quartzose ore containing galena, some of which still remains on the dump. The drifts uncovered an ore shoot 110 feet long and 3 feet wide (pp. 303-304).

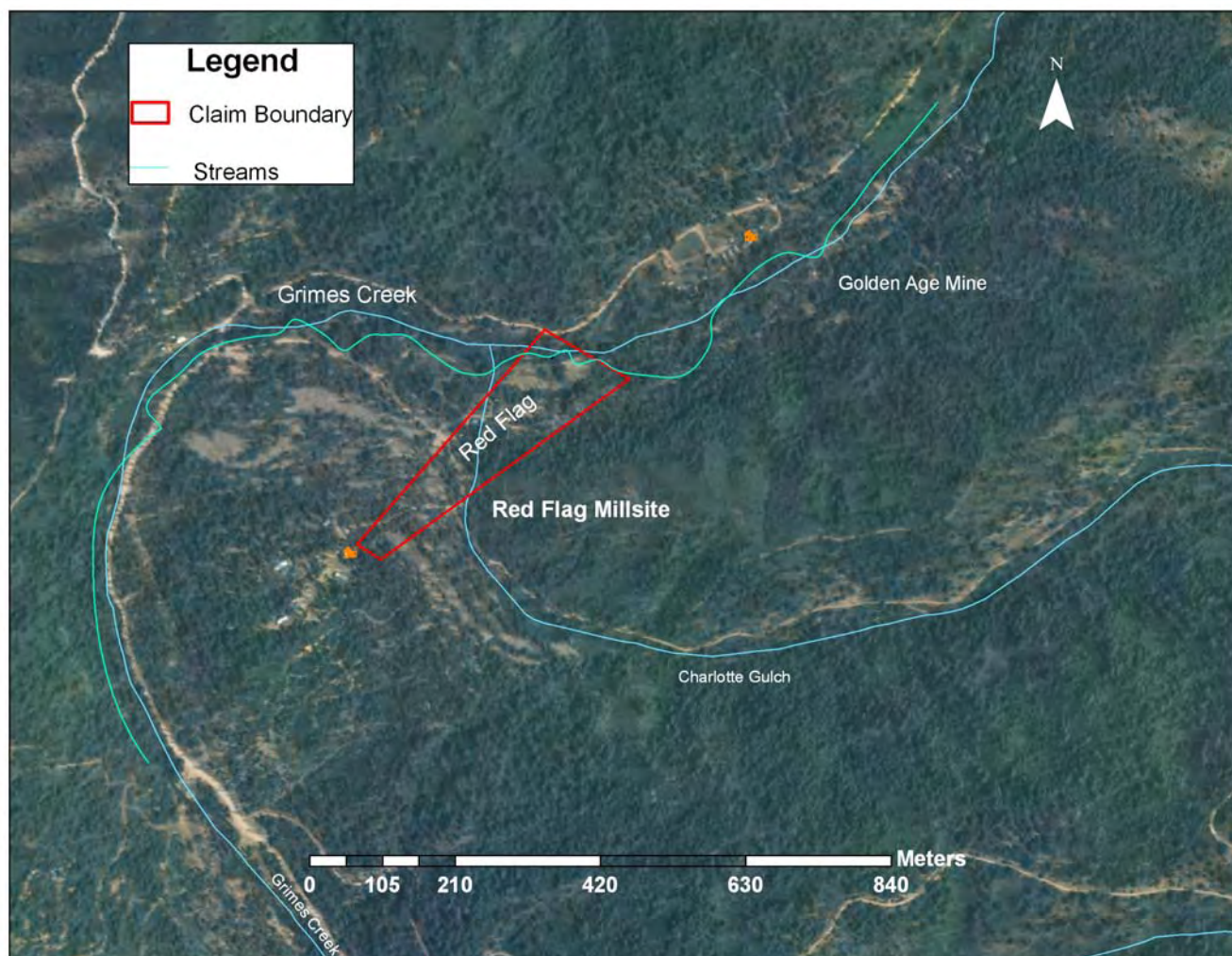


Figure 4: Red Flag Millsite

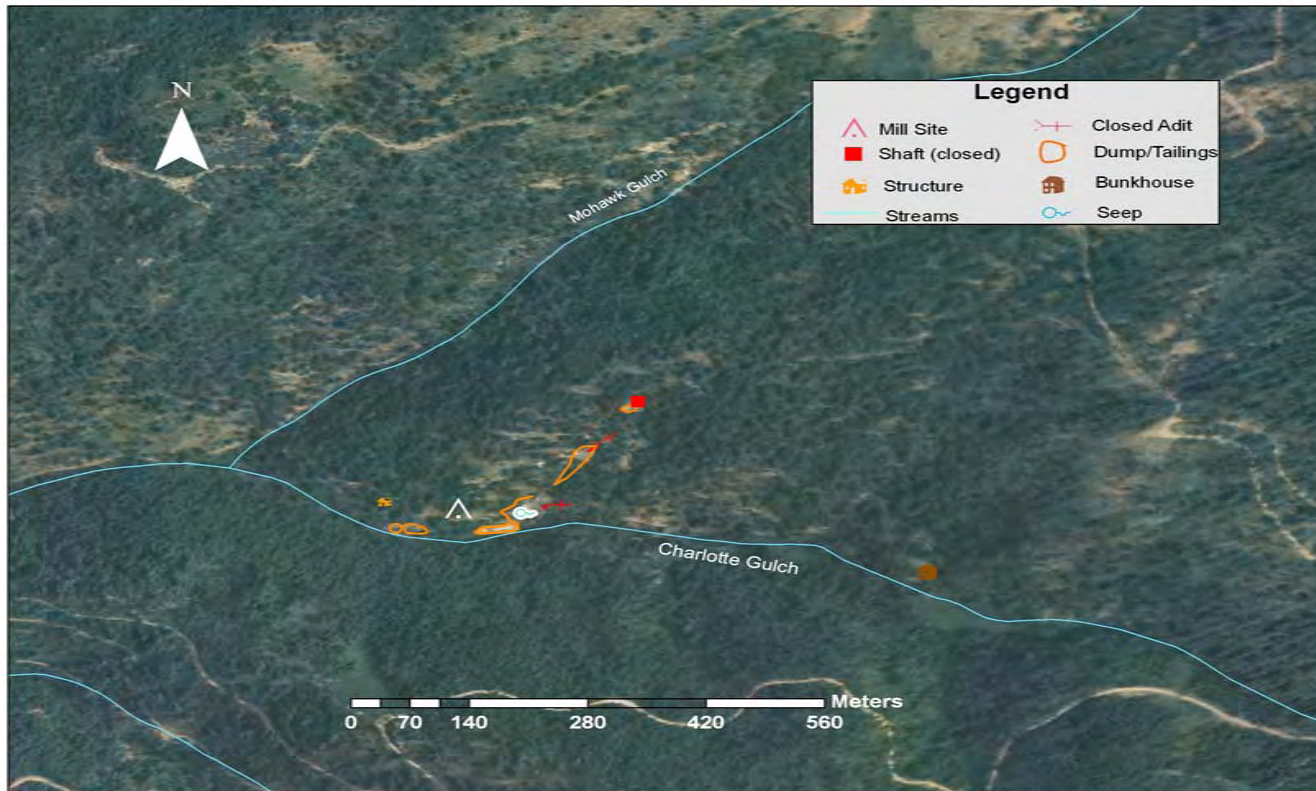


Figure 5: Enterprise Group mine workings and millsite

Section 3. Site Description and Field Activities

IDEQ conducted a site visit to the Enterprise Group mine on July 11, 2007. According to the Mr. Randy Anderson, the property owner, limited mining activity has occurred on the property since the 1940s.

No open adits were observed. The Baby shaft was not observed, though historical accounts confirm that it is caved. Wooden supports around the previous workings have collapsed. Remnants of the main mill site, where a 50-ton ball mill once operated, consisted of wood debris located at a flat spot just above the creek. Metal piping and track rails remain scattered throughout the steep, forested hillside.



Photo No. 1: Looking NE up the hill towards several waste dumps from the main road near the main adit (collapsed).



Photo No. 2: Looking NE towards collapsed structure (believed to be former mill) below main road. The piping for the hose bib in top of portion of the picture appears bent. Soil sample SS1 was collected below this point.

A ponded area with water several inches deep was apparent below the closed adit, allowing water-loving plants to grow. This water eventually discharges into Charlotte Creek. A water sample of the yellowish-brown liquid was collected as well as a sediment (soil) sample.



Photo No. 3: View of adit seep area. Minor ferric hydroxide precipitate noted in the boggy sediments.

Brownish/ tan colored fine-grain tailings extend along the north side of Charlotte Creek below the millsite area.



Photo No. 4: View of eroding waste dump along northern bank of Charlotte Creek (looking east). Soil sample SS4 was collected along this lower waste dump.



Photo No. 5: View of Charlotte Creek below waste dumps (looking west). Water sample SW1 was collected near here.

Former wooden structures including an ore bin and a small laboratory or sample processing area are located south of the road into the mine. One empty 55-gallon barrel was observed among the wooden debris.



Photo No. 6: View of former lab sample structure below main road (looking east). SS3 was collected near the bottom of the picture.



Photo No. 7: View of collapsed workings with hydraulic piping in middle portion of hillside (looking east). Possibly correlates to Blackbird No. 4 adit in historical records.

A series of waste dumps extend up the hill from the millsite. In total, the waste dumps appear to be approximately 3000 cubic yards in size. The waste dumps are relatively long, narrow and steep with few terraced areas of flat spots. As the waste dumps are not vegetated, significant erosion has occurred over time.



Photo No. 8: View of collapsed portal and waste dump located above the road on the western portion of the site (looking up to the north).



Photo No. 9: View of upper waste dumps showing signs of significant erosion (looking east).

Further up Charlotte Creek is a cabin/former bunkhouse. Several hundred miners lived here at one time during active operations in the early 1900s.



Photo No. 10: View of former bunkhouse (circa 1930's), east of the working at top of the road.

Numerous prospects appear above the Enterprise Group mine site. The upper-most workings were not accessible and it is not clear if they were on private or public lands, and the dump sizes indicate that they are, perhaps, insignificant.

The patented Red Flag millsite does not appear to have supported any milling operations. It consists of approximately 6 acres of flat land covered with trees and shrubs located near the confluence of Charlotte Creek and Grimes Creek. No mill structures or waste materials were observed at this location during the site visit. A small cabin is located nearby.



Photo No. 11: View of clearing in middle portion of Red Flag millsite claim.

Section 4. Current and Future Potential Beneficial Uses

The area appears to be occasionally used by recreational vehicles and off-road vehicles (ORV). Other uses include mountain biking, hiking, hunting, horseback riding, firewood collection.

The lower workings and millsite are easily accessible off the main entrance road along Charlotte Creek. An old trail linking the upper workings with the mill is overgrown, thus limiting motorized access.

Soil Sample Collection and Analysis

No samples were collected at the Red Flag mill site claim because there was no evidence of potential contamination.

Five soil samples were collected around the waste dumps and mill site. These are: Blackbird mill site SS-1; Blackbird drainage area SS-2 (sediment); Blackbird lab area SS-3; Blackbird lower waste dump SS-4; and Blackbird upper waste dump SS-5. Sample locations are illustrated in Figure 6.

Each sample was approximately five pounds in size and was screened through a No. 10 sieve screen. Approximately 95% of each sample passed through the screen. The material passing was mixed in a clean bucket prior to placing it in a one-gallon zip lock bag, which was then placed in a cloth mineral sample bag. Both bags were appropriately marked, and then documented on Chain of Custody Forms for submittal to SVL laboratories.

Each sample was similar in appearance consisting of fine to coarse grained pink or buff colored sand. There were no visible indications of sulfide minerals.

Total arsenic exceeded both Idaho's *Initial Default Target Levels* (IDTLs) and EPA Region 6's Preliminary Human Health Screening Levels (HHSL). The IDTLs are risk-based target levels for certain chemicals that have been developed by DEQ using conservative input parameters, a target acceptable risk of 10^{-6} , and a *Hazard Quotient* of 1. These numbers, although used for comparison even at remote locations, are more applicable to sites where it is expected to see "unrestricted uses" such as residential development. Similarly, the Region 6 HHSLs are human health based risk derived for screening where residents are at risk for exposure. These concentrations are not unusual for a location or facility in a historic mining district.

Concentrations of total arsenic, total lead and total zinc in the mill tailings exceeded both the IDTL's and HHSL's. Concentrations of total cadmium, total chromium, total mercury and total silver, fell somewhat in between the IDTL's and HHSL's. Concentrations of arsenic, cadmium, and lead in soil at the Enterprise Group mill site would generally trigger removal and/or other remedial action if there were residential receptors nearby.

Surface Water Sample Collection and Analysis

Four water samples were collected. These are: Blackbird adit seep; Charlotte Creek background; Charlotte Creek below waste dump SW-1; and Charlotte Creek down gradient SW-2. The down gradient sample was collected below any of the workings. The samples were preserved with nitric acid and kept cool until submittal for totals metals analysis at SVL Laboratories. Sample locations are illustrated in Figure 6.

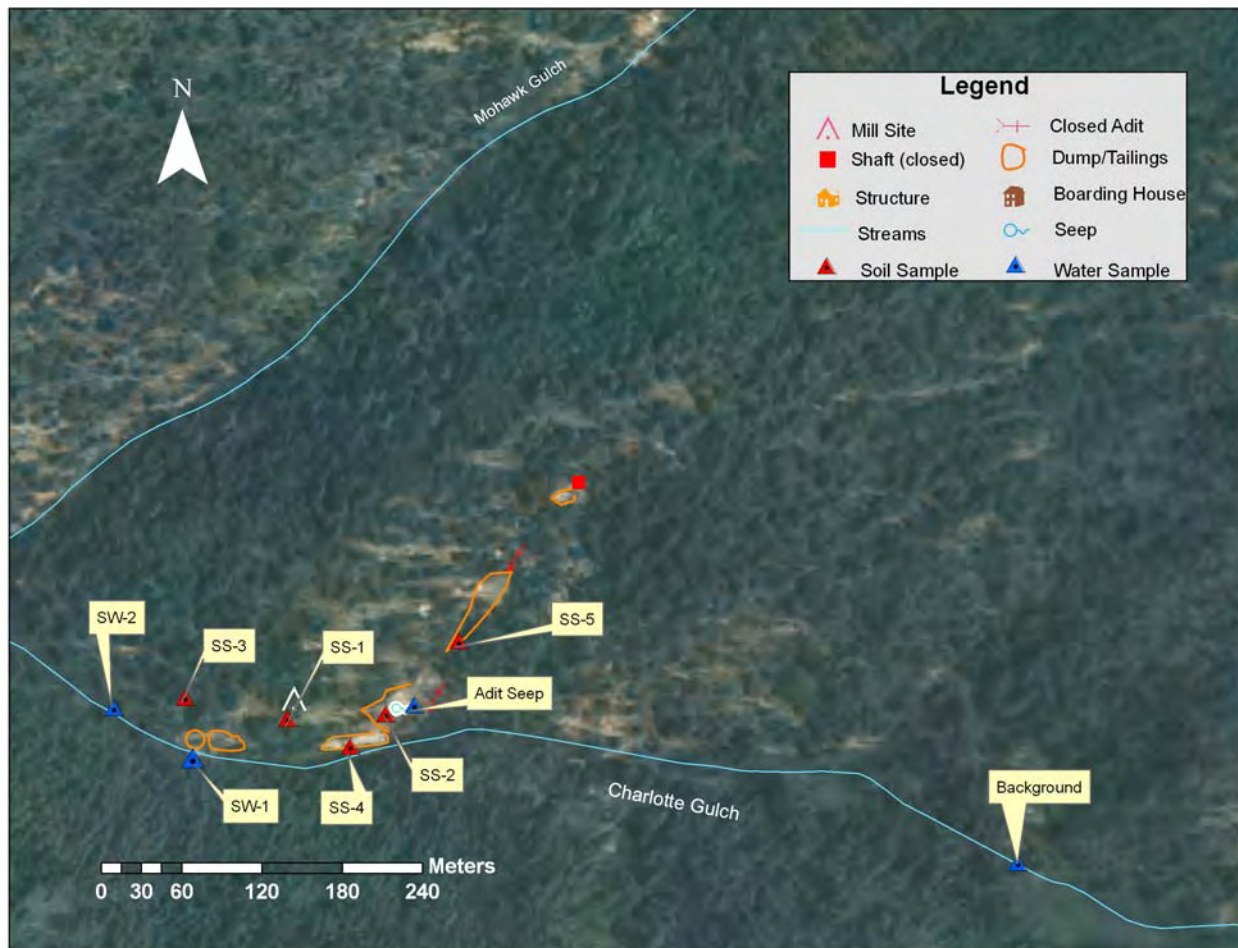


Figure 6: Sample Collection Locations

Table 1: Soil Sample Results (Total Metals) for Blackbird Mine Area (mg/kg)							
Chemical	IDEQ IDTL values	EPA Region 6 Human Health Standard	Blackbird mill site SS1	Blackbird Drainage area SS2	Blackbird Lab area SS3	Blackbird lower waste dump SS4	Blackbird Upper waste dump SS5
Arsenic	0.391	23	1480	48.3	141	80.5	65
Barium	896	5400	183	224	300	78.9	116
Cadmium	1.35	39	59.5	9.50	5.12	23.1	1.44
Chromium	7.9	210	6.26	8.42	11.6	2.42	3.14
Copper	921	2900	1150	161	91.8	138	62.5
Lead	49.6	400	5560	3490	1710	3050	2250
Mercury	0.00509	23	5.88	3.08	2.40	1.32	0.257
Selenium	2.03	390	<4.0	<4.0	<4.0	<4.0	<4.0
Silver	0.189	390	110	9.51	10.6	9.64	7.97
Zinc	886	23,000	4340	1280	393	2490	266

Table 2: Water Sample Results for Blackbird Mine Area Total Recoverable Metals Analysis (mg/L) (Standards in “dissolved” unless stated)								
Chemical	IDEQ Ground Water Standard	IDEQ Drinking Water Standard	IDEQ Cold Water Biota Standard	IDEQ Cold Water Biota Standard	Blackbird adit seep	Charlotte Creek Back Ground	Charlotte Creek Below waste dump SW1	Charlotte Creek down gradient SW2
			Acute	Chronic				
Aluminum	0.2*							
Arsenic	0.05	0.01	0.36	0.19	0.0059	<0.0030	<0.0030	<0.0030
Barium	2	2			0.0484	0.0177	0.0213	0.0193
Cadmium	0.005	0.005	0.00082 (H)	0.00037 (H)	0.0620	<0.0020	<0.0020	<0.0020
Chromium	0.1	0.1			<0.0060	<0.0060	<0.0060	<0.0060
Cobalt								
Copper	1.3		0.0046 (H)	0.0035 (H)	0.416	<0.010	<0.010	<0.010
Iron	0.3*							
Lead	0.015	0.015	0.014 (H)	0.00054 (H)	0.783	<0.00300	0.0070	0.00463
Manganese	0.05							
Mercury	0.002	0.002	0.0021	0.000012 (T)	<0.00020	<0.00020	<0.00020	<0.00020
Nickel		0.61	0.438 (H)	0.049 (H)				
Selenium	0.05	0.05	0.018 (T)	0.005 (T)	<0.04	<0.04	<0.04	<0.04
Silver	0.1*		0.00032 (H)		<0.005	<0.005	<0.005	<0.005
Zinc	5*		0.035 (H)	0.032 (H)	21.3	<0.010	0.122	0.102

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

Section 5. Risk Analysis

The heavy metal concentrations commonly associated with milling operations and waste rock dumps may present an unacceptable health risk for receptors visiting and/or working at the site. To identify risks to human health from the Enterprise Group soils, DEQ performed the following risk evaluation using the DEQ 2004 Risk Evaluation Manual (REM). This analysis is based on exposure to surface soils, and it utilized the following sample data from the tailings, waste dump (adit) and assay area.

It is assumed that recreational visitors have the potential to contact contaminants at the site while hiking, hunting, and riding mountain bikes or ORVs. Therefore, the exposure routes, in decreasing order of significance, are incidental soil ingestion, inhalation of particulates, and dermal contact.

Exposure Duration and Frequency

Both excess cancer risk and non-cancer risk (hazard index) were modeled. The age-adjusted receptor represents an individual who visits the site over 30 years, six times as a child, nine times as an adolescent, and fifteen times as an adult. For non-residential receptor the exposure duration is 6.6 years. The exposure duration of a construction worker is 30 days; this is assumed to be a conservative estimate owing to the duration of most construction projects.

For exposure routes involving direct contact with soil, including soil ingestion and dermal exposure, it is assumed that receptors have contact with soil primarily in warmer months, when the ground is not frozen or snow covered. For this reason, an exposure frequency of 270 days per year is used for these exposure routes for both residential and nonresidential scenarios. The direct contact exposure frequency for construction workers is 30 days per year (REM, Appendix E, p. E-2).

Discussion

Although construction worker has been included for reference, the most appropriate receptor for the site is the non-residential. The construction worker scenario is presented to represent the timber harvesting worker, since the site has been logged in the past. Considering the climate, the elevation and slope aspect of the workings, late-May through early November might represent the recreational season when soil exposure would be most prevalent.

Excess cancer risk and non-cancer hazards at the Enterprise Group mine and Blackbird mill site are driven by arsenic concentrations.

Blackbird millsite [SS-1]: Excess cancer risk for all receptors is greater than the acceptable level of 1E-05, as defined by the REM. The non-cancer hazard is greater than the acceptable level (Hazard Index = 1) for all receptors.

Sediment below lower adit [SS-2]: Excess cancer risk and non-cancer hazard is exceeded for only residential receptors.

Lab area [SS-3]: Excess cancer risk for residential and non-residential receptors is greater than the acceptable level, while the non-cancer hazard is greater than the acceptable level for only residential receptors.

Lower waste dump: Excess cancer risk for residential and non-residential receptors is greater than the acceptable level, while the non-cancer hazard is greater than the acceptable level for only residential receptors.

Upper waste dump: Excess cancer risk for all residential receptors is greater than the acceptable level, while the non-cancer hazard is greater than the acceptable level for only residential receptors in the child age category.

Uncertainty

The risk estimates presented here are based on specific locations and may not be representative, as it is unlikely receptors would repeatedly spend so much time in these areas over an exposure duration of many years, or even 30 days.

The analysis presented here assumed that all of the arsenic is 100% bioavailable. It is likely that bioavailability varies in soils throughout this site; 60% arsenic bioavailability has often been assumed for arsenic in soils contaminated with mine waste.

Table 3: Summary of Cumulative Risk and Hazard Index

Routes of Exposure Surface Soil: Inhalation of Vapors and Particulates, Dermal Contact, and Accidental Ingestion								
	CHILD		AGE-ADJUSTED		NON-RESIDENTIAL		CONSTRUCTION WORKER	
	Risk	Hazard Index	Risk	Hazard Index	Risk	Hazard Index	Risk	Hazard Index
Blackbird Millsite SS-1	2.56E-03	6.82E+01	3.79E-01	2.02E+01	1.63E-04	3.96E+00	1.98E-05	3.18E+00
Blackbird SS-2 (sediment)	8.36E-05	2.54E+00	1.24E-04	7.51E-01	5.32E-06	1.51E-01	1.98E-05	3.10E+00
Blackbird Lab SS-3	2.44E-04	6.56E+00	3.61E-04	1.94E+00	1.55E-05	3.81E-01	1.89E-06	3.06E-01
Blackbird Lower WD SS-4	1.39E-04	4.24E+00	2.06E-04	1.25E+00	8.86E-06	2.52E-01	1.08E-06	2.02E-01
Blackbird Upper WD SS-5	1.13E-04	2.98E+00	1.66E-04	8.82E-01	7.15E-06	1.73E-01	8.70E-07	1.39E-01

Section 6. 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 fracture zones in the country rock and be expressed at the surface as drainage from adits, springs or seeps. Though the source was not observed, surface water was flowing in Charlotte Gulch directly southwest of the Enterprise Group. A seep was emanating from beneath the collapsed Blackbird No. 5 tunnel. Recharge of regional aquifers by surface and ground water in the Charlotte Gulch area is unknown.

According to Idaho Department of Water Resources July 2002 records, there is one private drinking water well located within a 1-mile radius of the site; approximately 0.75 miles to the northwest near the Golden Age mine. No wells were sampled during this assessment. Drinking water wells are illustrated in Figure 7.

Although no wells were sampled, IDEQ did collect a sample from the adit seep and surface water samples from the creek in Charlotte Gulch. The seep water exceeded IDEQ's Drinking Water Standard and Ground Water Standard for cadmium and lead, though downstream samples did not show elevated levels of these metals. However, it is not known whether either of these sources is used for drinking water.

During the cleanup activities of mining and milling properties, the first concerns are 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.

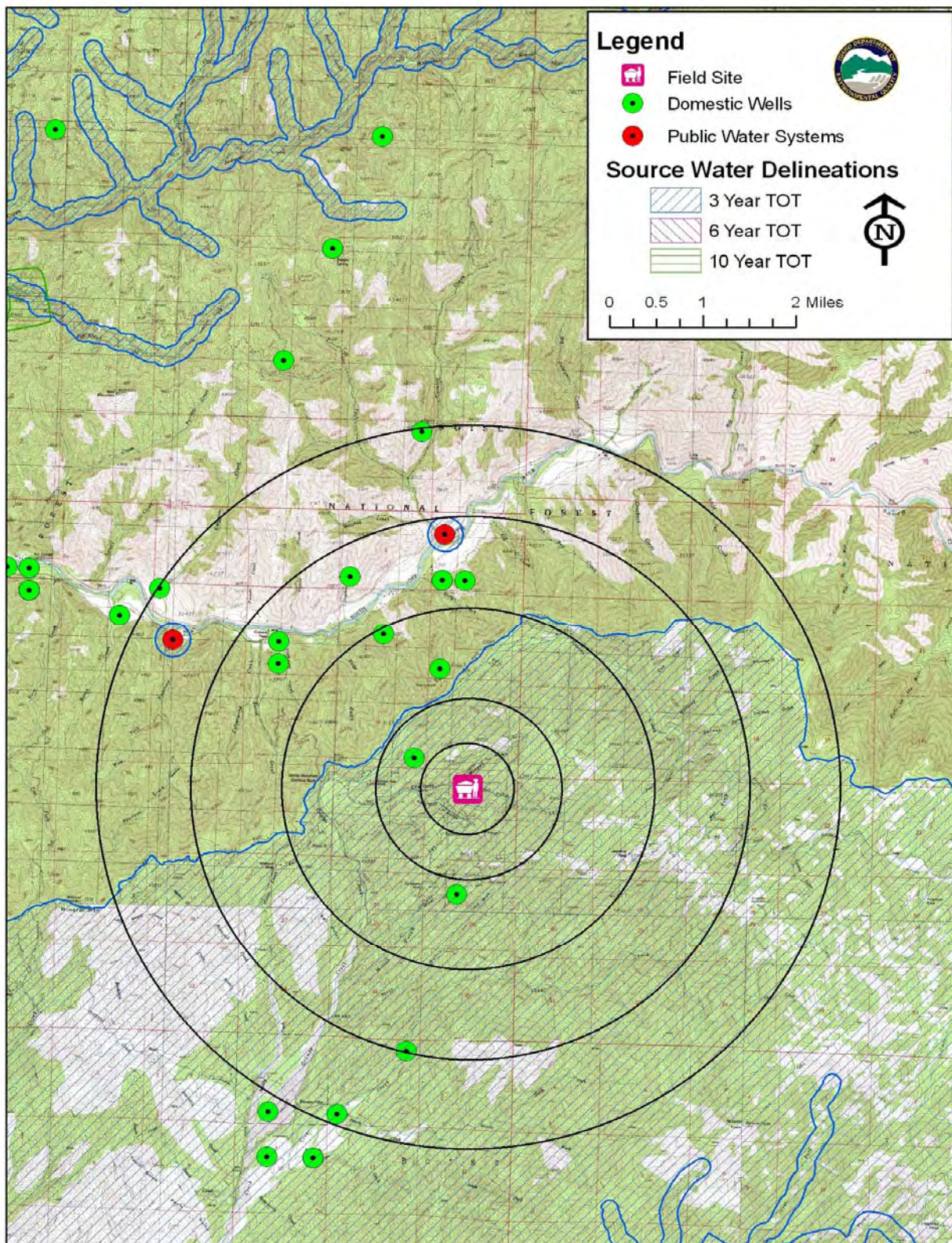
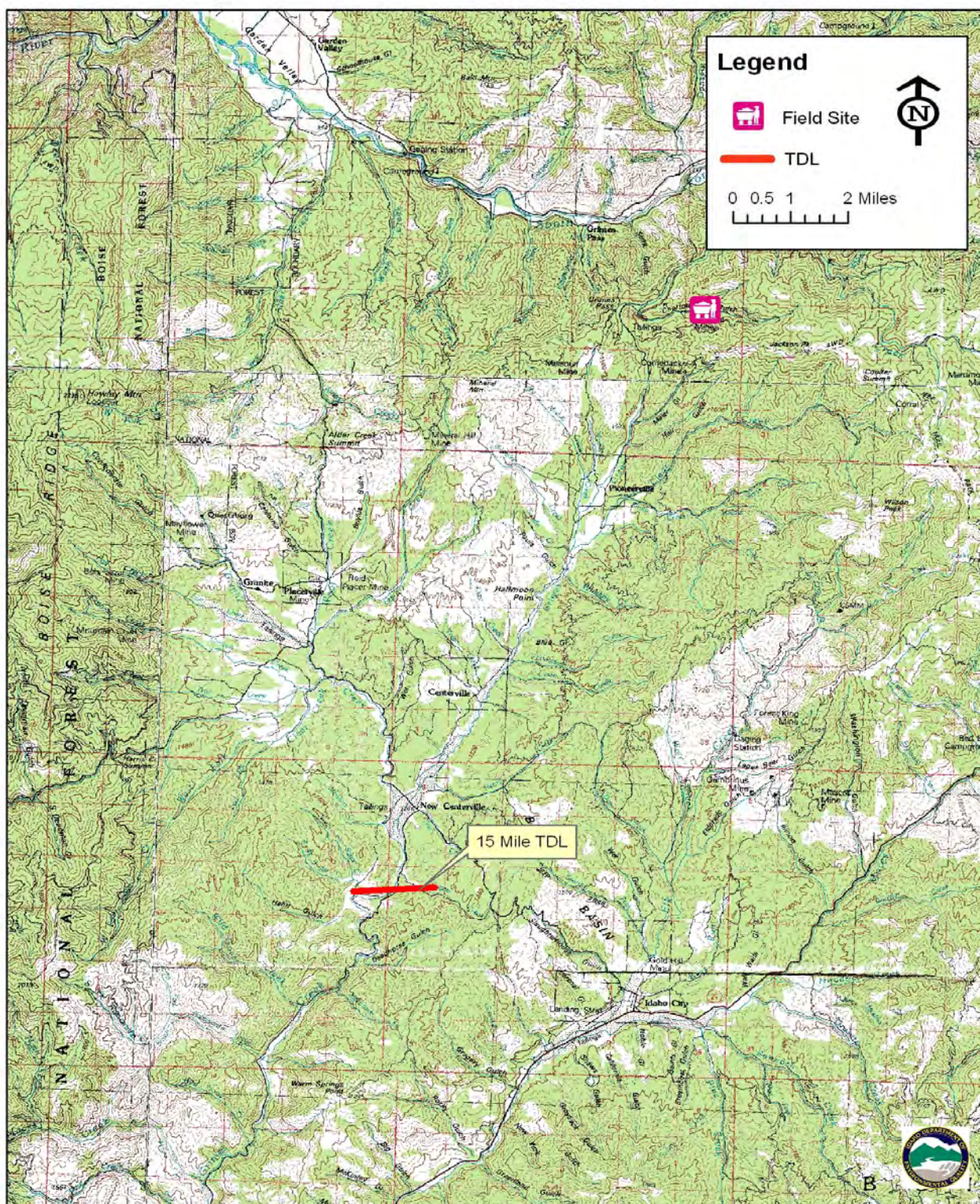


Figure 7: Drinking water wells within 4-mile radius of the Enterprise Group mine



Surface Water

Charlotte Gulch is a perennial tributary to Grimes Creek (see Figure 8). Charlotte Gulch flows northwest where it is enjoined by Mohawk Creek at 0.2 miles and by Ader Creek at 0.5 miles; before merging with the Grimes Creek at 1.7 miles. The Grimes Creek drainage contains several miles of stream alteration caused by placer mining operations. Placer tailings evidenced by gravel windrows line the channel of Grimes Creek and its many minor tributaries, including Charlotte Gulch. Grimes Creek briefly flows west then trends south-southwest before reaching the 15-mile TDL. Grimes Creek is an EPA CWA §303(d) listed stream for sediment and temperature, indicative of the extensive stream alteration caused by the placers.

Surface water samples collected from the creek adjacent to the lower waste dump and downstream of the site did not show elevated metal constituent levels. However, IDEQ's Cold Water Biota Standard (Chronic) is exceeded for lead and zinc.

Wetlands and Sensitive Species and Wetlands

Wetlands

Wetland surveys near the site were reviewed (USFWS, 2007) along with aerial photographs (see Figure 8). Wetland mapping data pertaining to Charlotte Gulch and Grimes Creek was not available. Therefore, no wetlands are represented within the downstream 15-mile Target Distance Limit (TDL).

Species of Concern

Bull trout [*Salvelinus confluentus*] are present in Charlotte Gulch and Redband rainbow trout [*Oncorhynchus mykiss gairdneri*]; brook trout [*Salvelinus fontinalis*] and bull trout are present within Grimes Creek (IDFG, 2000). Commercial or subsistence fishing does not occur within the 15-mile Target Distance Limit (TDL), but sport fishing does.

Bald Eagle [*Haliaeetus leucocephalus*] wintering areas lie along the South Fork of the Payette River, to the north. Two state listed plant species; the Giant Helliborne orchid [*Epipaticus gigantea*] is found along the South Fork of the Payette River and the Tall Sweet Onion [*Allium validum*] flourishes in the headwaters of Grimes Creek. These relationships are illustrated in Figure 9.

Additionally, the Gray Wolf (*Canis lupus*) may also range in this area. Due to the much greater area of range for these animals compared to the size of the waste dumps, it is unlikely that individual animals would experience sufficient doses to be at risk.

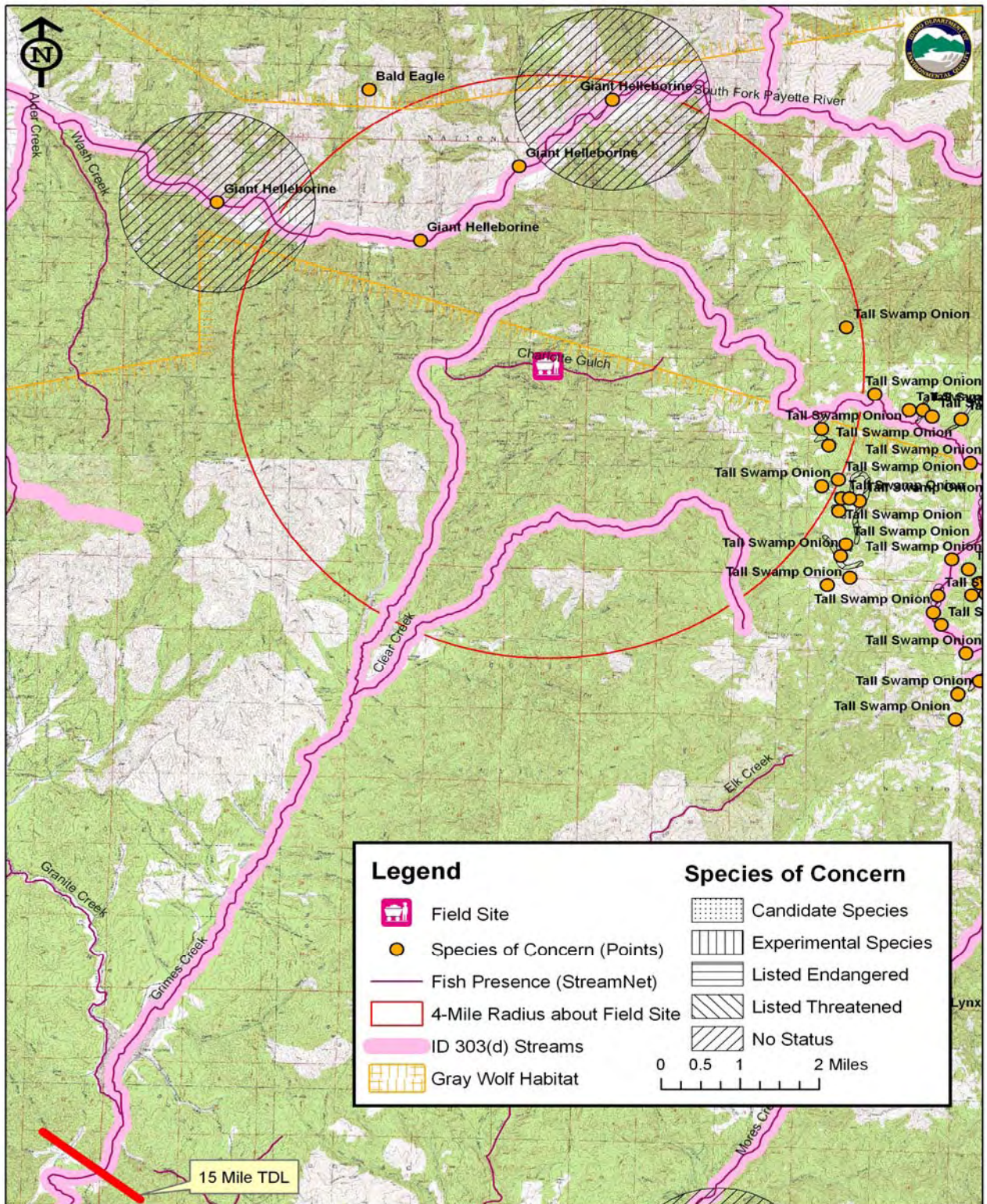


Figure 9: Species of Concern within 4-mile radius of the Enterprise Group mine

Soil Exposure and Air

Access to the mine site is generally unrestricted. Human and ecological receptors may be exposed to soils and mine waste by inhalation, dermal contact and ingestion. Visitors may have direct contact with heavy metals in wastes while exploring the site. Human activity around the site should be considered moderate, due to its proximity to popular recreation areas. Erosion of waste dump material is pronounced and the establishment of vegetative growth is minimal. Aerial dispersion of this material is expected to be moderate, especially during seasonal thunderstorm activity. The mill tailings are finer grained and may become airborne when disturbed by OVR traffic or storm-driven winds.

Potential Receptors

Potential receptors include rock hounds, hikers, hunters, trail riders (motorized and non-motorized) and wildlife. Outdoor enthusiasts remain the highest percentage of human receptors, as they may frequent the area for a number of recreational activities. The land within a one (1) mile radius of the site is a mixture of private and public land administered by the USFS (Boise NF). Many, if not all, of the former workings appear to be located on private land.

Schools, Day-Care Facilities, Private Residences

There are no schools or day-care facilities, or private residences within 200 feet of the site. One year-round residence is located at the Golden Age mine, approximately 1.1 miles west of the site.

Section 7. Summary, Conclusions and Recommendations

Mining at the Enterprise, then called the “Ingle”, commenced in 1902 and continued until 1940. Milling began in 1902 with two-stamps and a Harz jig operation. Later rehabilitation of the mill in 1915 and 1925 which included the addition of a 100-ton concentrator, failed to successfully treat the ore. Fine grinding and flotation techniques were applied in 1930 which finally enabled considerable ore to be treated. Specific production information was not available.

The Baby shaft is closed and the Blackbird tunnels are collapsed. Very minor seepage was observed emanating below the collapsed lower adit, presumed to be the Blackbird No. 5 tunnel. Collapsed wooden structures, old equipment and miscellaneous debris remain at the millsite and near the workings. One structure remains in fair condition; a bunkhouse, located approximately 0.3 miles to the east up Charlotte Gulch.

Waste dump material appears to be readily erodible and consequently is sparsely vegetated. The mill tailings are estimated to contain <500 cubic yards of material, while the total volume of the waste dumps are estimated to contain <3,000 cubic yards of material. Placer mining of adjacent ground may add to the instability of site soils. During periods of high-water snowmelt or flash flooding associated with thunderstorm activity portions of the tailings and the lower waste dump may erode into the creek.

The level of arsenic in all of the soil sample locations poses an excess cancer risk and a hazard for all residential receptors and a moderate risk for non-residential receptors. All of the soil/sediments samples showed elevated arsenic, cadmium at mill site, and lead concentration, particularly at the former millsite. Seepage from the lower adit contained elevated lead and zinc concentrations, though down gradient surface water samples indicate that the heavy metal constituent levels were below the permissible limit.

Potential Exposure for Wildlife and Vegetation

Potential exposure to heavy metals from the waste dumps and landing areas 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. Wildlife may be exposed at the site, particularly to elevated arsenic concentrations, but relative to the extensive range of the wildlife, compared to the area of the dumps and tailings; it is unlikely that significant exposure to heavy metals occurs.

Potential Exposure for Humans

This site is infrequently visited by mountain bikers, hikers, hunters, snowmobile operators, off-road vehicles, or various other outdoor recreation enthusiasts. Humans may receive very small doses of heavy metals, especially arsenic and lead. Aerial dispersion of waste particulates from the tailings or waste dumps may occur. Direct contact with the wastes appears to be the most significant route of exposure to humans for elevated constituents. The exposure levels do not appear to pose a substantial

risk, based upon current property uses.

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