

# **Banner Mine Area**

**(A.K.A Banner, Crown Point, Wolverine, Panamint, Ritchie, Silver Chief, State of Idaho, Kloppenberg)**

## **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 30, 2008

Richard A. & Dorothy M. Hamilton  
3381 B1 E Tulare Avenue  
Tulare, California 93274

RE: Site Assessment of the Banner Mine Area; A.K.A Banner, Crown Point, Wolverine, Panamint, Ritchie, Silver Chief, State of Idaho, Kloppenberg.

Dear Mr. and Mrs. Hamilton:

The Idaho Department of Environmental Quality (IDEQ) has completed a review of historical mining data and geological information at the above referenced sites. Subsequent to that review, IDEQ conducted a site visit of the Banner Mine Area. During the site visit, mining facilities were mapped and sampled to complete the analysis necessary to complete a final Preliminary Assessment (PA) report (attached).

Preliminary Assessments are conducted according to the Federal Comprehensive Environmental Response, Compensation and Liabilities Act. The reasons to complete a Preliminary Assessment 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 has also completed PAs under contract with the U.S. Environmental Protection Agency in order to identify risks to human health and the environment, and to make recommendations to land owners regarding how risks might be managed under current site conditions and in future use scenarios.

Mining at the Banner commenced in 1865 and actively continued until 1921. The mill was built and began operations in 1878, running for 20 years. Early arastra production was replaced by stamp milling, ore roasting and concentration. More recent milling, as evidenced by PVC piping, may have resumed in the 1960s, although specific information was not available. The Banner is credited with producing nearly \$3,000,000 in silver.

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During IDEQ's site visit a number of the shafts and tunnels appeared collapsed beyond their portals. However, an open stope was identified above the Banner Tunnel. **This opening is extremely dangerous, and should be closed.** The caved stope has steep unstable walls and may be a collapsed portion of the Banner tunnel. Water from the adjacent gulch has seeped into the hole, further weakening the structure. Foundations, old equipment and miscellaneous debris remain at the mill site. The unknown extent and location of underground workings in the area indicates that subsidence should be considered a factor in future development plans.

Waste dump material appears to be moderately consolidated, though sparsely vegetated. The oldest mill tailings, estimated to contain <500 cubic yards of material, remain downhill from the former structures on the east side of Banner Creek. During periods of rapid snowmelt or high intensity rains, erosion of mine and mill wastes is likely to deliver mine and mill wastes to Banner Creek. Delivery of mine and mill wastes to Banner Creek may violate federal and State rules and regulations. Therefore, stabilization of these wastes and a site wide water management plan should be implemented to prevent waste delivery and the potential intervention by state or federal authorities. IDEQ would be willing to assist you in developing a plan.

The level of arsenic in all of the soil sample locations poses an excess cancer risk and a hazard for residential and non-residential receptors. Arsenic concentration was 65 % higher in the Crown Point waste than the Banner shaft waste. Lead and mercury levels were notably excessive from the settling basin sample. **If development of this mine site occurs, whether it is for mining or residential purposes, risk management of sources, pathways and points of exposure should be incorporated in those development plans.**

Arsenic concentrations in the water discharging from the Crown Point adit and to a lesser extent from the Banner tunnel may pose risks to human and ecological receptors. Analysis indicates that the Crown Point water is four times higher than the IDEQ Ground Water Standard and twenty times the IDEQ Drinking Water Standard. Effluent from the Banner Tunnel water slightly exceeds the IDEQ Ground Water Standard for arsenic. Banner Creek down gradient from the Crown Point adit discharge exceeds the IDEQ Drinking Water Standard for arsenic.

Water quality samples and analysis indicate that surface and ground waters should not be used as potable water supplies. Further, if development of the property occurs, whether for mining or residents, water treatment systems may be mandated by the Federal Clean Water Act and/or Idaho's Water Quality Standards, Groundwater Rule, and Wastewater Rule.

Potential exposure 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.

In summation, the patented claims **Ritchie, Kloppenberg, Wolverine, Panamint, and State of Idaho** contain few if any concerns for human health and the environment. IDEQ is recommending to EPA that these claims be designated as **NRAP, or "No Remedial Action Planned"**.

However, IDEQ is recommending that EPA **Calculate a preliminary Hazard Ranking Score(s)** for the **Banner Mill Site, Crown Point Mill Site, Crown Point, Banner, and Silver Chief**

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patented claims. Although it is unlikely that these sites will score high enough to become cleanup sites under CERCLA, IDEQ is recommending that you consider permanent closure of mine openings, implementation of best management practices to control erosion and other risk management techniques on these claims.

IDEQ very much appreciates your cooperation and your approval for our access. I look forward to addressing any questions you may have regarding our findings. You may contact me at (208) 373-0554. If you are interested in addressing some or all of the risks identified in the attached report, I would be happy to discuss some state programs that may help you to do so.

Sincerely,



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

BAS:TE:tg G:\Waste & Remediation\Bruce Schuld\Banner\Banner PA 12 2008

Attachment

cc: Ken Marcie, Environmental Protection Agency  
Jim Curtis, USDA Forest Service, Boise National Forest  
Maggie Manderbach, USDA Forest Service Region IV  
file

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## List of Acronyms

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<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

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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 the completion of preliminary assessments at various mines within the Boise Basin and the Banner District in Boise County, Idaho.

This document presents the results of the Preliminary Assessment (PA) of the Banner, Crown Point and Wolverine mines and the Banner and Crown Point mill sites. 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 PAs at various mines within the Banner Mining District in Boise 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. 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](http://www.deq.idaho.gov/waste/prog_issues/mining/pa_program.cfm)

Access to assess the Banner-Crown Point mill site and the Banner, Crown Point, and Wolverine mines was obtained from Mr. Richard Hamilton in July of 2007. Mr. Hamilton's local representative and realtor, Joe Rohner of Idaho City, provided access through the property's locked gate and accompanied IDEQ while touring the Crown Point, Wolverine and Banner areas. Public lands, administered by the U.S. Forest Service, were accessed to facilitate continuity of the assessment.

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Figure 1: Location Map

## Section 2. Ownership

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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”** or **“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>Partial Determination</u>
Richard A. & Dorothy M. Hamilton 3381 B1 E Tulare Avenue Tulare, California 93274 (559) 967-2367	Banner Millsite	RP08N08E200040A	HRS Needs Reclamation
	Crown Point		HRS Needs Reclamation
	Crown Point Millsite		HRS Needs Reclamation
	Ritchie		NRAP
	Kloppenber	RP08N08E212440A	NRAP
	Wolverine		NRAP
	Banner	RP08N08E168390A	HRS Needs Reclamation
	Panamint		NRAP
	Silver Chief		HRS Needs Reclamation
	State of Idaho		NRAP

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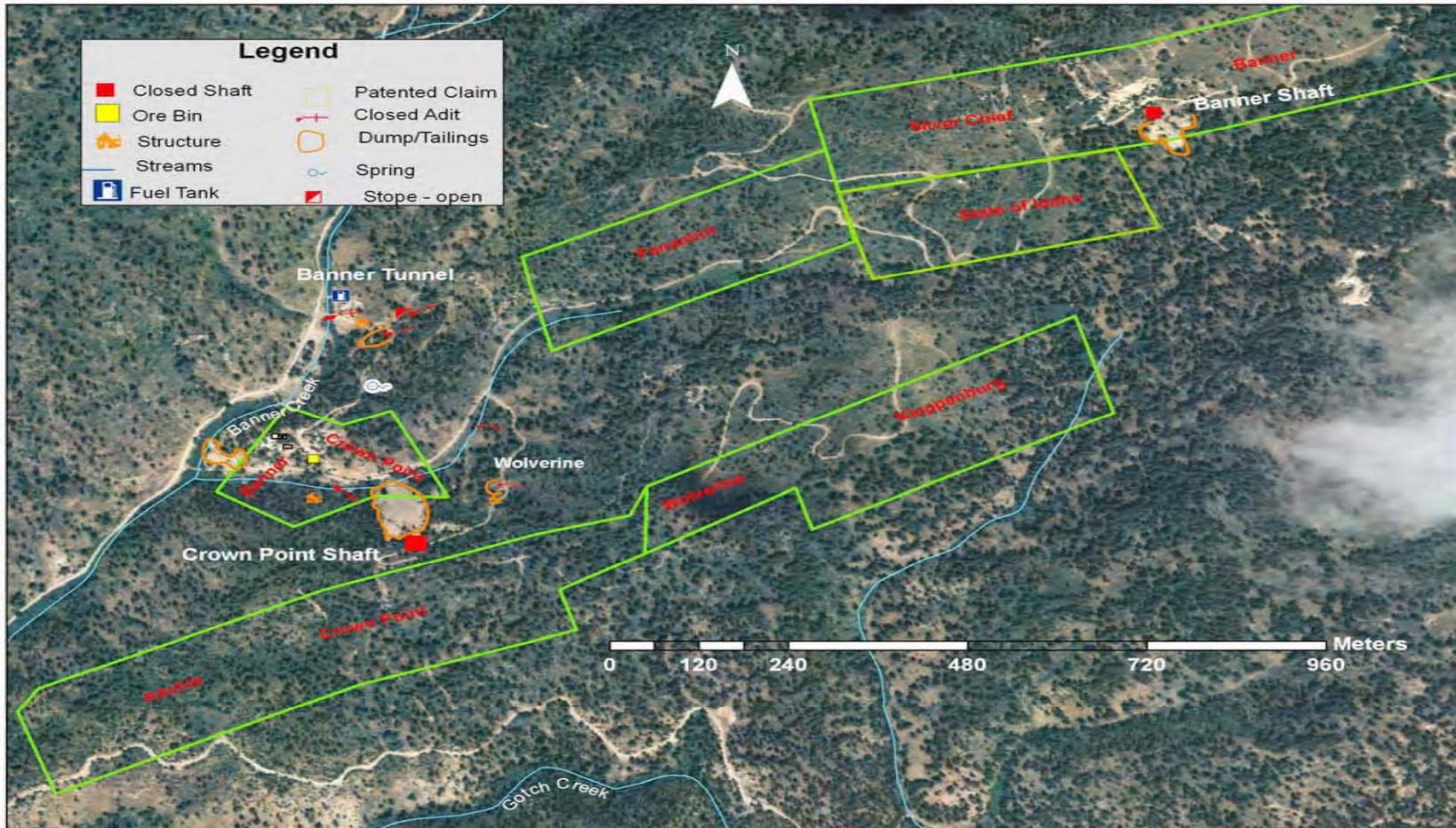


Figure 2: Patented claims in the Banner mine area

## Section 3. Overview

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The Banner mine area is located in upper Banner Creek, a tributary to the Crooked River sub-drainage of the Boise River, approximately six miles southeast of Lowman and 20 miles northeast of Idaho City, Idaho, in Sections 17 and 20 of Township 8 North, Range 8 East of the Boise Meridian, at Latitude 44° 01' 19"N, and Longitude 115° 31' 40"W (see Figure 1).

The Banner mine area can be accessed from Idaho City, Idaho by heading northeast on state Highway 21 for a distance of approximately 20 miles, then turning southeast (right) onto National Forest Development (NFD) 384 Road at the Edna Creek turnoff. NFD 384 Road, also known as the Edna Creek Road, heads toward the community of Atlanta along Crooked River. One travels approximately 3.5 miles from the turnoff until reaching NFD 312 Road. One turns northeast (left) onto NFD 312 Road which is marked by a sign to Jackson Peak. One continues for a distance of approximately 1.25 miles then veers to the north (left) onto NFD 385 Road, also known as the Banner Creek Road. NFD 385 Road is marked by a sign indicating the Banner mine. The former mill site is encountered after traveling approximately 2.8 miles while the Banner tunnel is located approximately 0.25 beyond. Both sites are located on the east side of Banner Creek. The access road to the mill site is restricted by a locked gate. Access to the Banner tunnel area, however, is mostly unrestricted.

The Banner tunnel, nearby adits and at least one stope were opened on unpatented claims. The Banner shaft, the Crown Point shaft and tunnel, Wolverine tunnel, lesser adits and the mill sites appear to be located on patented claims. An ore-processing mill was located below the Crown Point tunnel on the east side of Banner Creek (see Figure 2).

There is no precipitation data available for the Banner mine. Consequently, the information provided in this section is based on a climate summary for the Lowman site, which was obtained from the Western Regional Climate Center (WRCC, 2008).

The Lowman meteorological station is located approximately six miles northwest from the mine at an elevation of 3,790 feet amsl. Based upon records from 1909 to 2005, the mean annual precipitation is 27.86 inches; the mean annual snowfall is 119 inches; and the 100-year, 24-hour event is 3.97 inches, recorded in 1952. Based upon records from 1909 to 2005, the lowest temperature recorded for this period was -35° F in 1937 while the highest was 108° F in 1961.

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 Banner mine is characterized by cool dry summers and cold winters. The majority of precipitation occurs as snow, occurring mostly from November through March. The driest months are July, August and September.

Dry-season rainfall occurs almost exclusively in relatively short bursts, usually related to thunderstorm activity. It is anticipated 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

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Unpublished reports by Hansen (1935), Shannon (1969), and O'Toole (1981) were reviewed to supplement the limited ownership, mine development and mill production information.

The original Banner lode discovery was attributed to Jess Bradford and J. H. Hawley. News of the silver discovery soon led to the arrival of hundreds of prospectors and the establishment of the Banner and Eureka camps.

*By the end of February 1865, a tunnel toward the Banner vein progressed 270 of the 300 feet that were expected to be necessary, and eight other tunnels, ranging mostly from 100 to 160 feet (one was 240), were being driven on other properties....by mid-August, the Banner tunnel penetrated the required 300 feet, where the vein was struck 150 feet below the surface...Arastra production came to Banner in the early days, but stamp milling took longer to get under way. The lack of a road held the camp back until 1868. By mid-summer that year, a shaft had been sunk on the Banner vein for 80 feet below the end of the 300-foot tunnel...After a decade of arastra production, C.W. Craft finally got a mill into Banner in 1874, and capital from Elmira, New York, helped develop the district still more in 1878. Stamp-mill production continued at Banner for more than ten years, with a considerable spurt of activity there from 1882 to 1884 (Wells, 1983, pp.65-66).*

*The Banner district. — The Elmira Company are sinking on the Banner mine, and are down about 70 feet from the main tunnel, which is 280 feet from the surface. They are sinking outside the vein to avoid water. It is intended to cross-cut the ledge when a depth of 300 feet is reached. The ledge is about 2 ½ feet in width and contains silver glance, horn silver, and ruby silver. There is considerable water to contend with in working this mine, but the prospects are said to be very flattering. There is enough ore in sight to keep their mill running more than a year. The production during 1883 was about \$105,000, consisting of 76 large and 6 small bars. The largest bar ever cast in the Territory was run by the company during the summer of 1883. The number of tons of ore run through its mill the past season was 1,024 ½ and from the amount in sight, if it proves as good in the bottom of the shaft as in the tunnel, it will prove a very valuable property.*

*A correspondent writing from Banner to the Idaho World, under date of January 8, 1884, states this cuts a ledge 8 feet wide, carrying ore assaying all the way from \$156 to \$575 per ton, and that there is now more rock in sight than at any time since the company made it's big run (US Mint, 1884, pp.459-460).*

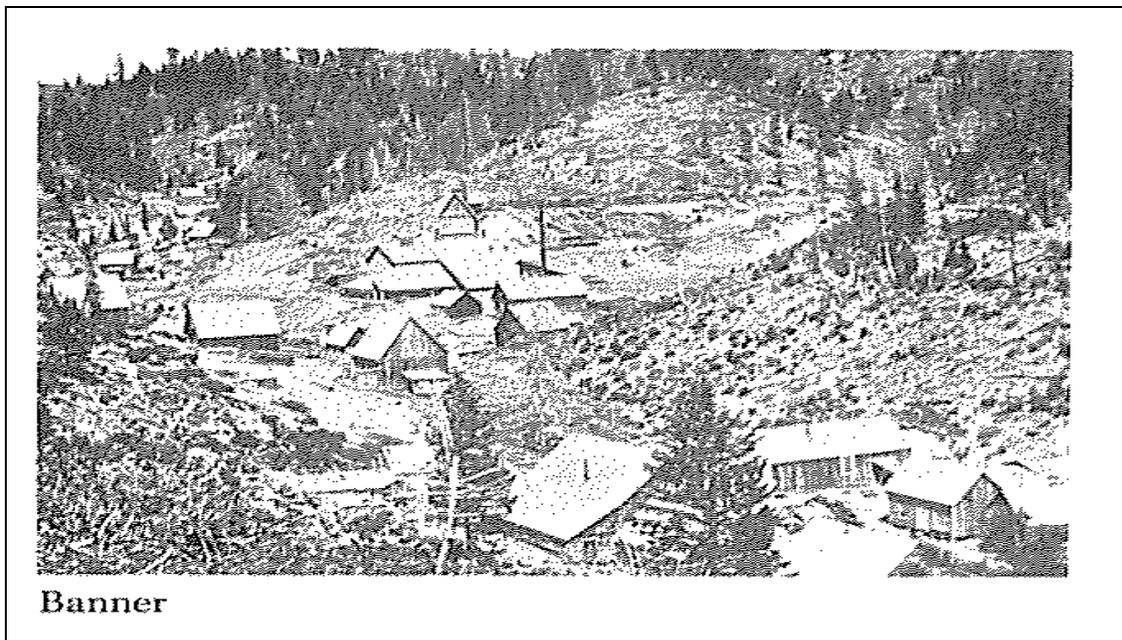
*During the height of its boom days it produced silver bullion valued at more than \$2,000,000. The rich silver deposits were discovered in 1864, but most of the production came between 1882-1894, principally from the Crown Point and Banner lodes. The total production has been estimated at about \$3,000,000, two-thirds of it from the Crown Point and the remainder from the Banner. Mining declined in the present century and there has been no production since 1921 (Anderson & Rasor, 1934, p. 371).*

Banner mill records indicate that approximately 8,700 tons of ore was produced from the Banner; 13,500 tons from the Crown Point; 1,300 tons from the Wolverine; and 184 tons from the Panamint (Shannon, 1969, Table I). Shannon determined that the ore's assay averaged \$79.03 per ton with an average weight of 61.26 ounces per ton. He estimated that the Crown Point dump contains 35,000 tons of waste rock; the Banner shaft 20,000 tons; and the Banner tunnel 10,000 tons (ibid, Table II).

A chronology of the Banner mine's history adapted from O'Toole (1981, p. A01-001) is presented below:

1864	Claim staked by J. H. Hawley
1874-76	Mill built by Craft
1878	Craft sold mill to S. Fassett, banker/senator from Elmira, NY; who formed Elmira
Silver	Mining Co. (Elmira) which mined the Banner and Crown Point-Wolverine veins
for	twenty years.
1880	C.P. (Crown Point) shaft started
1882	Banner shaft started
1888	C.P. shaft down to 600 feet and the Banner to about 500 feet
1888-91	Long tunnel extended to 4000 feet
1893	Collapse of C.P. shaft; head frame, collar, pumps and heavy machinery due to
heavy	snow
1894-98	Mining confined to Banner vein
1898	Operations suspended by Elmira
1903	Vivian Thorne acquired interests of Elmira
1915	Washoe Mining Co. mined and shipped 2 carloads of ore from Golden Gate
reputed to	average 33 oz/ton
1917	Charles Hussey acquired option to work the Banner claim
1933	Anglo-American Mining Corp obtains option to purchase mining properties
1933	USGS funds study by Alfred L. Anderson & Alfred Roser
1935	Mayer Hansen study conducted
1961	Formation of Silver Chief Mining Co., consolidates the interests of the Thorne
and	Hawley heirs
1969	Lakeside Engineering study
1980	Control of Banner mine acquired by National Resources Corp.

On March 21, 2005, the patented claims were acquired by Richard Hamilton.



**Picture 1. Historical picture of Banner mine area. (Wells, 1983, p. 66)**

## Section 5. Current Site Conditions

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IDEQ conducted site visits on July 12, 2007. Apparently, Mr. Hamilton had listed the Banner properties for sale. When possible, IDEQ located the workings and structure ruins via GPS coordinates. Figure 3 illustrates the workings locations relative to the approximate patent boundaries.



Picture 2. View to NE. Intersection of Banner Creek Road and old mill access road (gate). “For Sale” sign posted at left.

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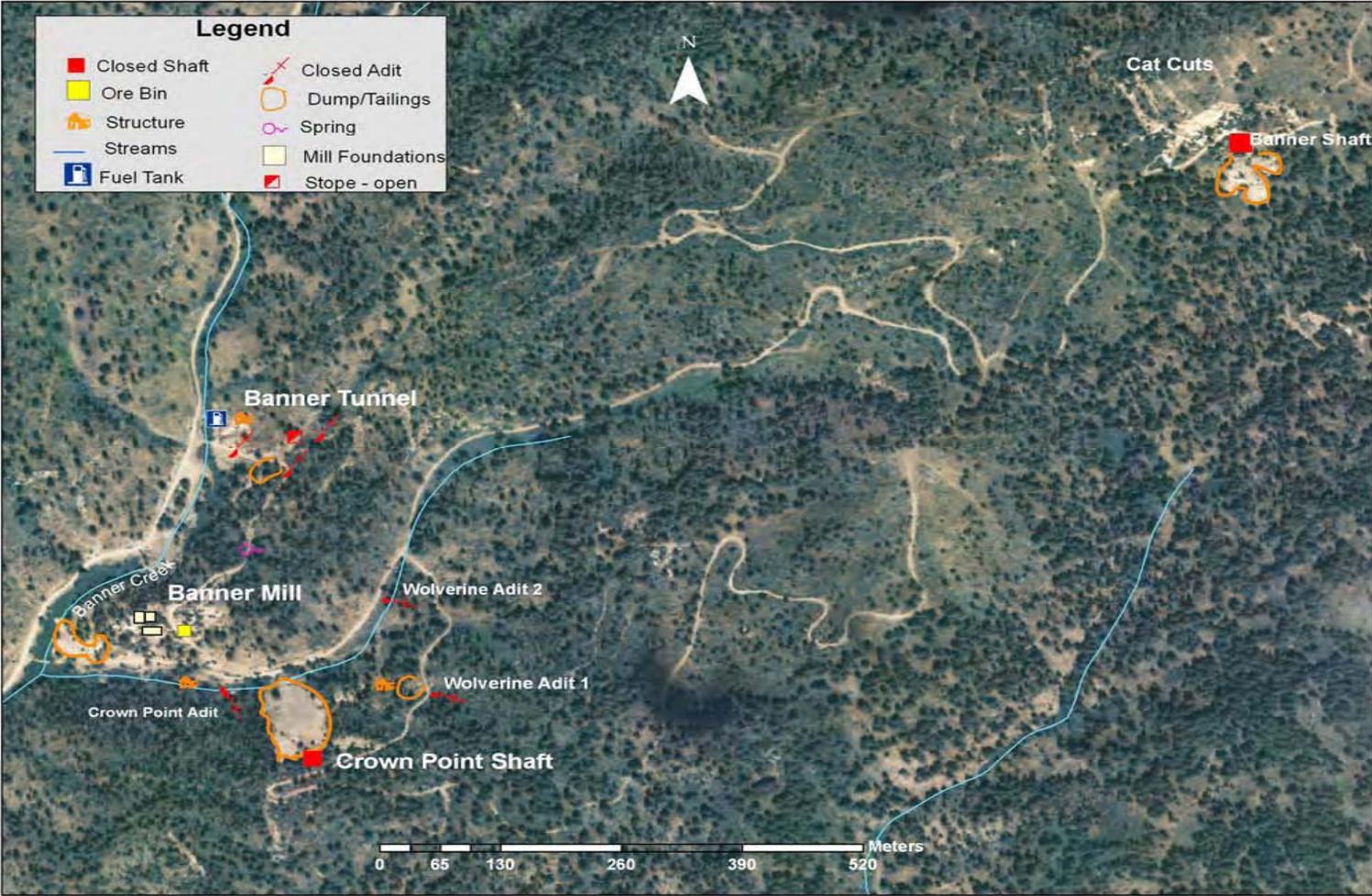


Figure 3: Banner mine workings; mill site

## Mine Workings

In a report to the Director of the US Mint in 1884, development work at the Banner was noted accordingly:

*The Panamint is located some distance southwest of the Banner, of which it is an extension. It is owned by James Irwin, Benjamin Miller, and Harvey Lester. Three tunnels have been run. The lower is in 175 feet. It will have to be extended 225 feet further to reach the vein, and it is estimated would tap it at the depth of 200 feet. The tunnel above this is in 240 feet. It tapped the ledge 100 feet from the mouth, and follows on the vein the remainder of the distance, 140 feet. The vein where tapped is 2 ½ feet in width. After running a short distance the vein split, or rather another vein shot off toward the hanging wall. This vein is not so large as the other, but carries higher grade ore, the character being ruby silver. Between the two veins is a body of porphyry. After running a short distance on the foot-wall vein a cross-cut was run to the one carrying ruby silver. They have been at work the past two or three weeks running a cross-cut east, which is now in 30 feet, to tap the hanging-wall vein. The cross-cut commences at the face of the main tunnel, and will tap the vein by running a few feet farther. The ore is of the same character as that of the Banner, carrying ruby, black sulphurets, bromides, native and antimonial silver, and is richer than the Banner was at the same depth. A tunnel has been run on the other side of the hill and 600 feet east of the last one mentioned. It was driven in 150 feet and cuts the ledge, which is at this point 30 feet between walls.*

*The Crown Point and Wolverine mines, the former of which was a few years ago a valuable producer, are still being worked, and have some good ore in the west end, but no permanent ledge as yet. In this end the main tunnel has been driven 40 feet, and a cross-cut 44 feet running north (p. 459)*

Mayer Hansen conducted an examination of the Banner mine over a period of five months in 1935. In conjunction with the annual assessment, Hansen noted the following:

*The Banner vein is said to be 485 feet long as mined on the 200 level. Mining on the successive levels (300, 400 and 500 levels) indicated a pitch of the ore to the east...Along the vein the values are erratic and will vary from 1 to 200 ounces in five feet...About 210 feet of the Golden Gate drift was opened up of which 120 feet was ore...Going west from the intersection of the Banner drift with the long tunnel crosscut, the workings enter the Silver Chief claim. For all practical purposes the Silver Chief vein is a continuation of the Banner vein (pp. 7-8). The two companies, Silver Chief and Elmira, agreed to mine at least a portion of the ore jointly. In about 1879 or 1880, a tunnel 875 feet long was driven to hit the vein near the common end line at a depth of 200 ft (p. 16).*

*Of the old mine plant nothing that can be used remains...Considerable drifting and crosscutting has been done on the property, totaling in all something around 17,000 to 20,000 feet together with 1,100 feet of shaft sinking. At the Banner shaft area, only the tunnel level is open plus two 100 foot raises and 120 feet of stope at the top of the Golden Gate raise...but in all it amounts to approximately 5,000 feet.*

*Stoping operations have removed all of the pillars or ore such that the original drifting on the 500, 400, 300 and 200 levels is gone. The shaft collar of the Banner is caved and covered with broken timber...The Crown Point shaft is also caved at the surface. Tunnel levels were driven at*

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*various points down to the 200 level but all are now caved...the shaft is down a little over 600 feet, it is said, with levels at 100 foot intervals down to the 600 level. The ore is supposed to have been mined out completely from the 400 level up but still exists below this point...There are two very large dumps... Both the Crown Point and Banner Mines are wet. At the Crown Point area the lowest tunnel (200 foot level) was dammed up and the flow of water...indicated 60 gallons per minute...At the Banner shaft area the flow from the long tunnel is slightly greater running about 75 gallons per minute.*

*From the Banner long tunnel workings there is a raise of some 100 feet which connects with the Banner Shaft after a small amount of drifting and crosscutting. Thru this, air circulates freely to the end that all workings had good air even where dead-ended 400 or 500 feet from the main channel of air movement (pp. 11-12).*

Based upon these accounts, the workings consist of the Banner long tunnel (approximately 3,800 feet in length), the Wolverine tunnels, the Crown Point shaft and 200 level tunnel, the Banner shaft, the Silver Chief tunnel and lesser workings such as those found at the Panamint. Bulldozer trenches were observed along the ridge on the Silver Chief and Banner claims and IDEQ presumes that numerous minor workings, "dog holes" or exploration pits lie scattered throughout the area, as well. IDEQ noted two open workings; an open stope or possible back collapse along the Banner Tunnel and the Crown Point tunnel (200-level). None of the remaining workings were observed to be open.

#### Mill Site

Concrete footings and foundations, piping, miscellaneous equipment, and tailings are all that remains of the former mill site. It appeared as though portions of the mill site were rebuilt in later years and operated on a limited basis, due to the presence of a PVC pipe network observed in the remains of one building. An adjacent concrete pad appeared to be used as a settling pond. The volume of tailings remaining within these two foundations was estimated to be <75 cubic yards. However, the nature of the milling process used by this network was not determined by IDEQ and historical accounts were not available. Tailings piles, perhaps from the 19<sup>th</sup>-century milling operations, were observed downhill from the concrete foundations along the east side of Banner Creek. These piles were estimated to contain <500 cubic yards of material. Other structures, in various stages of decay, were noted near the major workings.

As noted in the Eighth Annual Report of 1876 (USGS, 1883), the original mill contained a battery of 20 stamps which fed ore to the furnace. Chloride salts were added to the ore and roasted to enhance silver concentration. The roasted ore was then processed in three concentrators.

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**Picture 3. View to SW. Former ore roasting furnace; scrap metal, bricks and tails.**



**Picture 4. View to N. Brick pile of former roasting kilns and tails, (sample collected).**

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Picture 5. View to NW from Crown Point shaft. Mill building ruins, ball or rod mill & ore hopper (right).



Picture 6. View to W. Mill foundation, scattered debris; white pile of lime (upper left).



**Picture 7. View to W. Network of pipes within building foundation; treatment process unknown (sample collected).**



**Picture 8. View to NE. Settling basin (samples collected) with concrete foundation**

Crown Point Shaft

Historical records indicate the depth of the shaft at 600 feet with a mined length of nearly 450 feet. Purportedly, when the collar collapsed from excessive snow, the head frame and equipment fell into the shaft. A portion of the brick foundation of the hoist house remains at the top of the waste dump. A depression measuring 50 feet by 20 feet marks the shaft location. The waste dump is moderately sized, representing a volume of approximately 20,500 cubic yards of material.



**Picture 9. View to SE. Crown Point shaft waste dump; 200 level adit (lower center), core shack (lower right).**

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**Picture 10. View to SE. Crown Point shaft, bricks possibly from hoist house at upper center.**



**Picture 11. View to S. Crown Point shaft collapse.**

Crown Point Adit (200-level)

Historical records indicate that the 200-level was driven to intersect the shaft and provide drainage from the workings. The adit is located near the western toe of the Crown Point waste dump. Surface expression of the adit waste dump was not apparent and consequently, dump volume was not calculated.

Hansen (1935) reported a discharge rate of 60 gallons per minute (gpm) “during October, the driest part of the year” (p. 12). When IDEQ observed the discharge in July 2007, the rate was estimated at 40-50 gpm. The discharge supported healthy vegetation and flowed westward into Banner Creek.



**Picture 12. View to SE. Boarded portal of the 200-level adit; landing area (foreground), drainage flows to right; (water sample CP-Adit-SW1 collected here).**

Wolverine Tunnel

The Wolverine vein was historically explored from two adits. Of these adits the upper one, located approximately 170 meters northeast from the Crown Point shaft, appears to have been the most extensively worked. The waste dump, which was estimated to contain < 500 cubic yards of material, did not contain conspicuous sulfides and was not sampled. The remains of a collapsed structure, possibly a boarding house, lie on the western section of the dump. The adit was closed and dry. The lower adit is located approximately 100 meters to the north-northwest and appears to be only a shallow cross-cut. The waste dump was indiscernible.



**Picture 13. View to N. Collapsed structure on the upper Wolverine waste dump.**

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**Picture 14. View to SSE. Lower Wolverine adit (closed & dry); metal roofing of the collapsed structure near the upper Wolverine is barely visible (upper center).**

Banner Shaft

The Banner and Silver Chief veins were principally worked through the Banner long tunnel, the Banner shaft and the Silver Chief adit. The shaft was closed at the time of the site visit, but the location of the adit was not determined. Shallow surface workings such as bulldozer “cat” cuts and prospects were observed to the north of the shaft. The ground appeared reworked, exposing both country rock and ore.

The shaft’s three-lobed waste dump had been extended beyond the property boundary to the south onto public lands. Abundant iron staining was present; sulfide minerals including sphalerite, galena and arsenopyrite were identified. The dump landing appeared to contain a higher ratio of ore to waste rock. The dump was estimated to contain < 3,000 cubic yards of material.



**Picture 15. View to NW. Banner shaft (collapsed) adjacent to logging road (above).**

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**Picture 16. View to S. Banner shaft waste dump (east side); iron staining.**

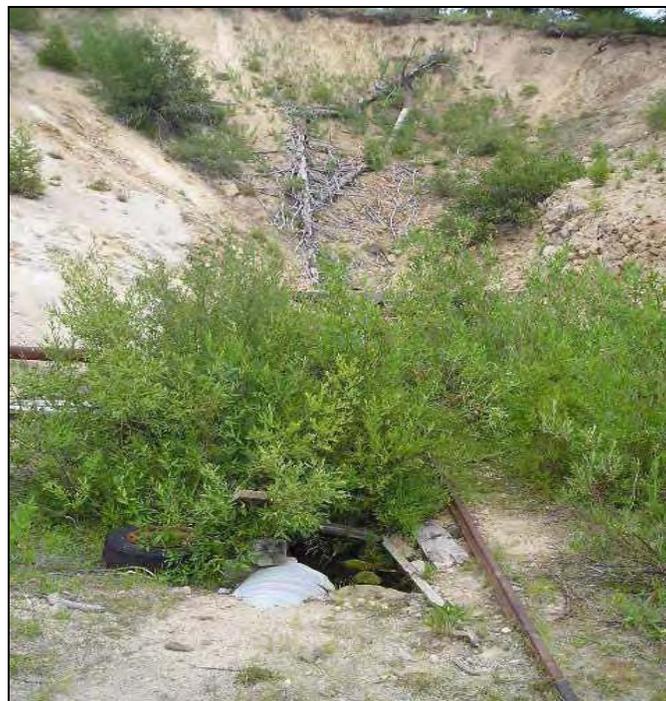


**Picture 17. View to N. exploration trenches & prospects near Banner shaft; background sample (BNR-WD2-BG) collected at upper right.**

Banner Tunnel area

All of the workings in this area appear to be located on public lands. Historical records indicate that the Banner, also known as the “long” tunnel, extended more than 3,800 feet eastward to intersect with the Banner Shaft. Though the tunnel is caved at the portal, adit drainage was significant, estimated at >75 gpm. The adit flow is channeled to Banner Creek. The waste dump which lies between the main road and the creek and extends >100 meters south towards the mill site, was estimated to contain < 10,000 cubic yards of material. Structures and miscellaneous equipment at the site include: two empty aboveground fuel storage tanks (values removed), a portable water tank, compressor shed, steam boiler (ends removed), a loading dock and remnant track rails. The floor of the compressor shed was stained by used oil and/or diesel; additional petroleum releases have stained soils adjacent to the shed and nearby the empty fuel tanks.

In addition to the long tunnel, two collapsed adits, a caved stope and an open stope (possible collapse of the long tunnel’s back) were noted. From the portal area, a jeep trail leads up an adjacent gulch to the east. An open stope was encountered along this trail, beneath a sign posted “Explosives”. Surface flow in the gulch appeared to be seeping into the stope. This opening is extremely dangerous, with steep and unstable walls. Its depth was estimated at <15 feet which gives credence to a direct connection to the Banner tunnel. The adits are located on the opposite flank of the gulch, approximately 50-75 meters, southeast. Both adits are caved. A small waste dump, estimated at <500 cubic yards of material appears to correspond to the larger of the two adits. Both workings sustain healthy vegetation.



**Picture 18. View to E. Banner tunnel drainage through culvert into Banner Creek.**

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**Picture 19. View to E. Gated portal of Banner tunnel; collapsed adit; water discharges at right.**

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**Picture 20. View to E. Banner tunnel waste dump; boiler pipe (upper right).**



**Picture 21. View to N. Empty fuel storage tanks and compressor shed.**

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**Picture 22. View to NE. Collapsed adit and caved stope (above); “private property” sign on tree at upper center.**

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**Picture 23. Open stope; darker soil on far wall is water saturated; noticeable sounds of flowing water emanating from base of the hole; possibly coming from the Banner tunnel.**

## Section 6. Geology

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The Boise Basin has received much more attention than peripheral mining districts. The geology and ore deposits within the Boise Basin are well documented, owing to the preponderance of gold mineralization. The Banner mining district is mainly noted for its silver and base metal production.

Anderson and Roser (1934) studied the mineralization of the Banner mine. Additional investigations (unpublished reports) were conducted to ascertain the viability of reopening the mine. These include Hansen (1935), Shannon (1969), Kershner & Mashburn (1975) and O'Toole (1981). Later, the Idaho Geological Survey (IGS) (Gillerman & Schiappa, 1994 and Leppert & Berwick, 2002) conducted discovery and site inspections.

The following excerpts from Anderson and Roser (1934) discuss Banner district's geology and mineralization:

*Veins in the Banner district are accompanied by porphyry dikes and are confined to a zone of shearing far with the Idaho batholith. There are several prominent shear zones in the general region, each of which contain porphyry and other dikes; and much of the mineralization...Renewed movement along the shear zone following dike intrusion provided channels for the movement of ore solutions, for at least one of the porphries is cut by a vein. Mineralization occurred, however, before igneous activity had entirely ceased, for lamprophyric dikes were intruded into the vein fissures at the close of ore deposition...The porphyry dikes, like those in the Boise Basin, may be classed as granophyre and rhyolite porphyry...Zones of fracturing followed by the porphyry dikes are the major features of the regional structure. They strike about N. 60° E, transverse to the trend of the Idaho batholith...Most of those in the smaller belts, as in the Banner district, are not more than 50 feet wide...Shearing or fissuring in the Banner district is much like that in the Boise Basin. The major fractures trend about N. 80° E. and N. 55° E., and others N. 20°-60° W. The Crown Point and Panamint veins each occupy fissure zones that strike N. 55° E.; the latter dips to the north. The Banner and Golden Gate fissures strike N. 80° E., and the former dips about 80° NW. The fissure zones are limited in width and the veins have more or less defined walls. Minor fractures parallel the Banner vein and it is likely that similar relations exist along major fissure zones.*

*The veins are essentially narrow fissure fillings in granodiorite (locally rhyolite porphyry) with most of the ore in the fissure zones confined to single fractures. The Crown Point...according to early reports differed from the others in its greater size and irregularity. Its average thickness was about four feet, but ranged up to 12 feet, with the ore more or less segregated in pockets. It was mined for 1,000 feet along the strike above the lowest or 450-foot level.*

*The Banner vein is typical of the others and, where examined...ranged from about four to eight inches...It has been mined for 625 feet along strike. The Golden Gate vein is reported*

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*to be from three to six inches thick for at least 325 feet along its strike, but no stoping has been done. The Panamint vein is reported at two and one-half feet.*

*The known hypogene metallic minerals in the ore include pyargyrite, proussite, owyheeite, miargyrite, tetrahedrite, galena, sphalerite, chalcopyrite, arsenopyrite, and pyrite. Of these, the pyargyrite and owyheeite are the only ones conspicuously abundant. Ruby silver comprises from one fourth to one half of the metallic minerals, pyargyrite being more abundant than proussite...The non-metallic gangue minerals include quartz and calcite. Quartz is the chief vein filling; calcite is only locally abundant. (pp. 372-376).*

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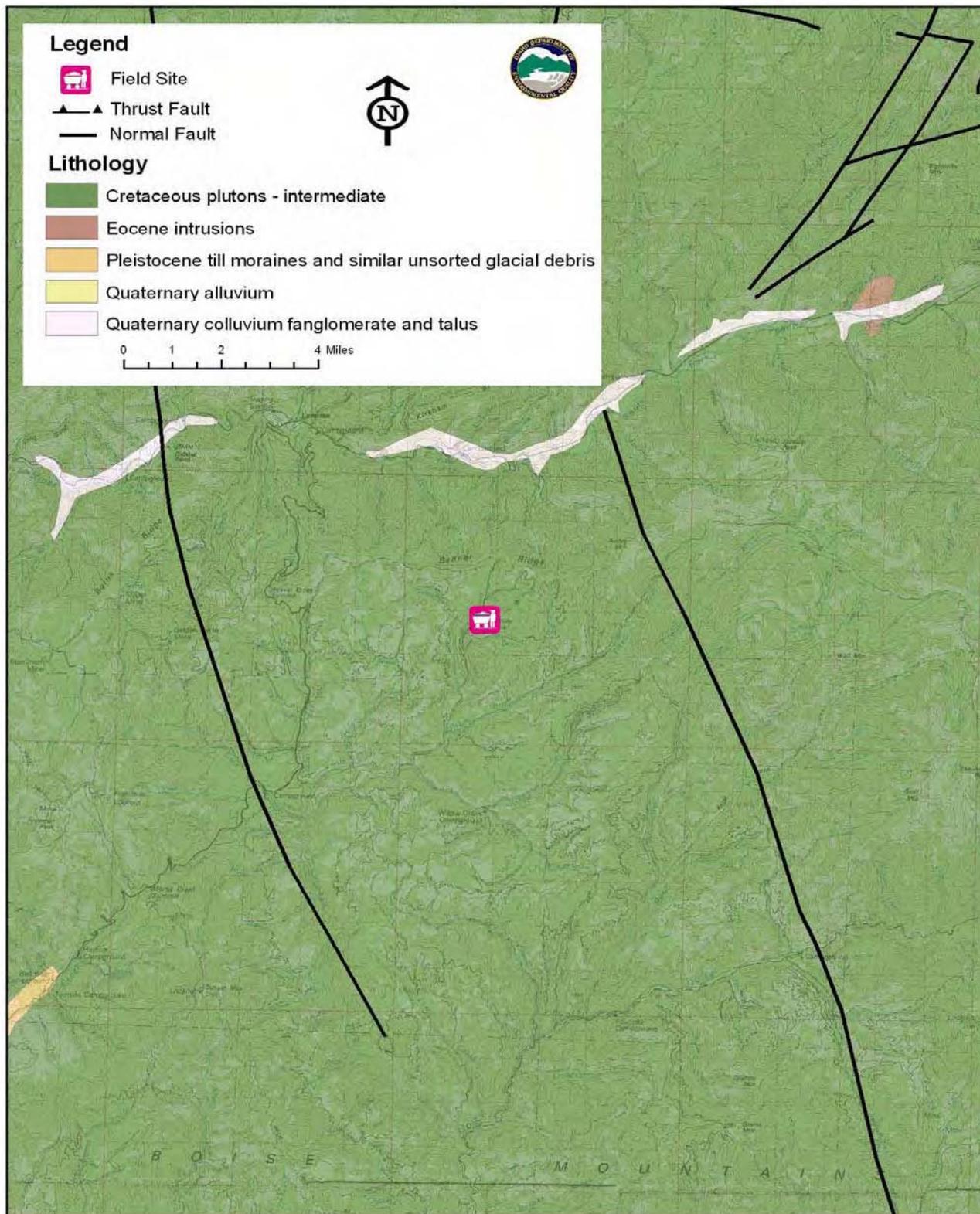


Figure 4: Lithology and Structural Geology of the Banner mine area

## **Section 7. Current and Potential Future Land Uses**

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Current land uses in the area include mineral hunting – for the rare silver mineral Owyheeite, off-road vehicle (ORV) use, hunting, and hiking. The main road leading into the privately-held mine/mill site is secured by a locked gate, but OVR access is unrestricted on the adjacent public lands, especially near the old Banner tunnel. As detailed in the Section 3 of this report, the most direct route approaches the mine from the south via the Crooked River road.

### **Future Land Use**

The property is currently for sale. It may be targeted by developers of either the historic mining use or seasonal home developments. The site will also likely continue to provide grazing values to wildlife, hunting and ORV use.

## **Section 8. Waste Sampling and Characterization**

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### **Sample Collection**

A background water sample [Banner Creek SW1] was collected above the old Banner tunnel. A background soil sample (BNR-WD2-BG) was collected at the highest elevation encountered above the Banner shaft. Sample locations are presented in Figure 5.

### Waste

Soil/waste samples were collected from the Banner shaft waste dump (BNR-WD1-SS1), from the Crown Point waste dump (CP-WD1-SS1), from the lower mill tailings (BNR-MS-SS1), and two samples were collected from the tailings settling basin (BNR-MS-SS2 & BNR-Mill-SS1 for TCLP) and one from the possible tailings/treatment area at the upper mill (BNR-MS-SS3). The Banner tunnel waste dump which is located on public lands was not sampled.

Each dump and tailings soil sample collected was, initially approximately ten (10) pounds in size. Each sample location was excavated several inches with the material discarded. Then the sample hole was excavated approximately 6" more to extract a sample. Waste dumps and tailings had at least three locations within a few square yards sampled and composited. Samples were placed in a large sterile plastic bowl from which coarse (+1") rock and woody debris were hand picked and disposed. The samples were then screened over a 10-mesh sieve and placed in a sterile plastic zip lock bag. The bag was appropriately marked with the sample identification, location description, date, and sampler name. It was then placed in a cloth sample bag, identically labeled. Sample descriptions were entered into field logbooks. The samples were logged on a standard chain-of custody lab submittal form. Once samples were taken to IDEQ's field office at the end of the day they were placed in secure storage to await shipping to S.V.L. Analytical, Inc. in Kellogg, Idaho.

The soil samples from the upper mill were collected differently. The thickness of the material in the settling basin and treatment area was less than 6 inches. Consequently, the sample locations were excavated only a few inches deep with the extra material discarded. The underlying soil was extracted. One of the settling basin samples was placed in an eight-ounce amber glass jar to comply with laboratory protocols, while others were managed, as previously described.

### Water

At the time of the site visit, Banner Creek was observed to maintain a seasonal flow. Background (BNR-BG-SW1) and down-gradient (BRN-SW2) samples were collected directly from the creek. Additional samples were collected at a spring located between the mill site and the Banner tunnel (BNR-Spring-SW1); from the Banner tunnel (BNR-Adit-SW1); from a hose bib located on the Banner tunnel's landing; and from the Crown Point 200-level adit (CP-Adit-SW1). Water samples were collected unpreserved in glass containers and also shipped to S.V.L. Analytical.

## Sample Description

### Soils

Sample **BNR-WD1-SS1** was collected from the side slope of the shaft's waste rock dump. The sample location was excavated approximately 6 more inches in moderately coarse rock and soil. The yellow to red colored sample was a composite of oxidized soil and sulfide material. Approximately 80% of the sample passed the 10 mesh sieve, less than 10% organic material was included.

Sample **BNR-WD2-BG** was a composite sample collected from an area above the Banner shaft. Though the area had been disturbed, recognizable waste rock features were not observed. Consequently, IDEQ concluded that the sampled area was not a dump and chose to include it as a background sample. The sample location was excavated approximately 6 more inches in coarse rock and soil. The buff to yellow colored sample was a composite of concentrate tails and sandy oxidized soil. Approximately 95% of the sample passed the 10 mesh sieve, less than 10% organic material was included.

Sample **CP-WD1-SS1** was a composite sample collected from the base of the Crown Point waste dump. The sample contained some coarser fragments, but generally < 1" diameter. Approximately 90% of the sample passed the 10 mesh sieve, less than 10% organic material was included. The sample was generally buff to orange colored.

Sample **BNR-MS-SS1** was a composite sample collected from what appeared to be the former ore roasting area. The waste material was composed of medium to coarse-grained gray and red colored soil. Some of the red coloring may be attributed to the piles of comingled, disintegrating red bricks. The sample contained few coarse fragments greater than 1". After hand sorting to dispose of the plus 1" material, approximately <95% passed the 10 mesh screen.

Sample **BNR-MS-SS2** was a composite sample collected from the concrete pad in the upper mill that appeared to have been used as a tailings settling basin. The depth of the soils was <6", the top inch of which was crusted. The sample was fine-grained and approximately 95% of the sample passed the 10 mesh sieve. The sample was generally brown to gray colored.

Sample **BNR-Mill-SS1** was a composite sample collected from the concrete pad in the upper mill that appeared to have been used as a tailings settling basin. The depth of the soils was <6", the top inch of which was crusted. The sample was fine-grained and approximately 95% of the sample passed the 10 mesh sieve. The sample was generally brown to gray colored. This sample was collected for TCLP analysis.

Sample **BNR-MS-SS3** was a composite sample collected from within the concrete foundation of the former building, located adjacent to the settling basin. The floor of the building supported a network of PVC pipes and an accumulation of soil and minor vegetation (moss).

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The sample was fine to medium-grained and less than 20 % organic material was included. The sample was generally gray colored.

**Soil Sample Analysis**

IDEQ Sample Analysis of waste dump and tailings is presented in Table 1. Samples were analyzed for Total Recoverable Metals (Totals). Sample BNR-Mill-SS1 was specifically collected for TCLP analyses. In addition to IDTLs, the sample results were compared with the EPA Region 6 Human Health Medium-Specific Screening Levels (HHSL). Although HHSL values are not regulatory, they are derived from EPA guidance equations and commonly used defaults (EPA, 2007).

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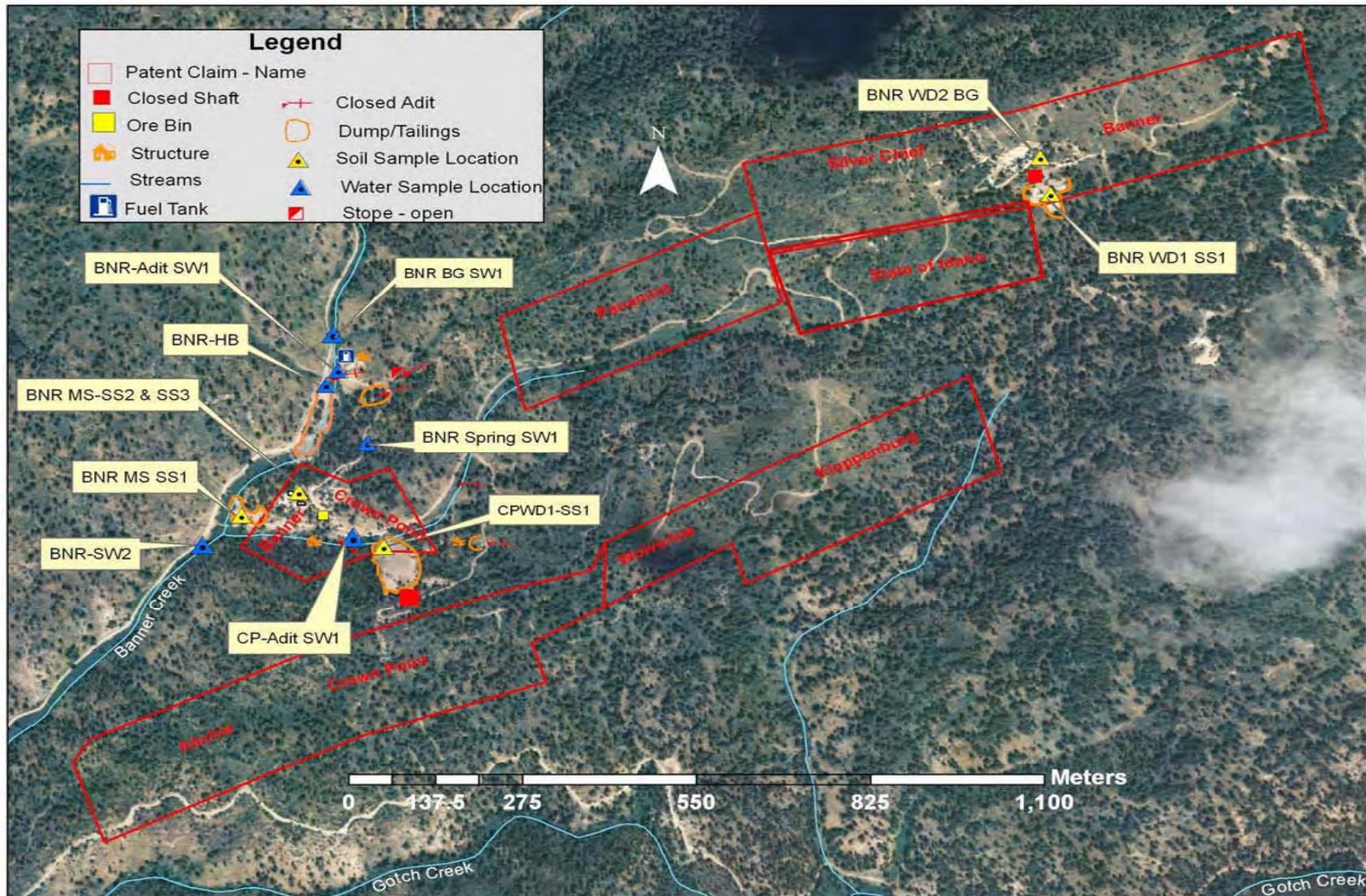


Figure 5: Sample collection locations at the Banner mine

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**Table 1: IDEQ Soils Samples Total Recoverable Metals Analysis (mg/kg)**

	IDEQ Initial Default Threshold Level (IDTL)	EPA Region 6 Human Health Screening Criteria	Banner Shaft Waste Dump #1	Banner Shaft Background	Crown Point Waste Dump	Banner Mill Tailings #1	Banner Mill Settling Basin	Banner Mill Treatment Area	Banner Mill Settling Basin (TCLP)
Description			BNR-WD1-SS1	BNR-WD2-BG	CP-WD1-SS1	BNR-MS-SS1	BNR-MS-SS2	BNR-MS-SS3	BNR-Mill-SS1
<b>Arsenic</b>	0.391	<b>23</b>	1270	633	1970	487	477	144	0.433
<b>Barium</b>	896	<b>1600</b>	115	70.6	67.5	166	225	108	<1.00
<b>Cadmium</b>	1.35	<b>39</b>	1.88	0.23	1.13	0.98	1.76	0.64	<0.010
<b>Copper</b>	921	<b>2900</b>	15.3	4.2	20.8	59.7	57.2	33.3	
<b>Chromium</b>	7.9	<b>210</b>	<0.60	<0.60	<0.60	1.91	111	51.4	
<b>Lead</b>	49.6	<b>400</b>	68.4	107	244	244	459	127	0.0580
<b>Mercury</b>	0.00509	<b>23</b>	0.073	<0.033	0.128	12.2	73.5	16.2	0.00053
<b>Selenium</b>	2.03	<b>390</b>	<4	<4	<4	<4	<4		<0.050
<b>Silver</b>	0.189	<b>390</b>	7.26	4.82	35.7	62.1	21.8	22.1	<0.050
<b>Zinc</b>	886	<b>23000</b>	57.6	23.9	125	266	154	77.5	
	At or exceeds IDTLs								
	At or exceeds EPA Region 6 HHSLs								

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Soil sample analyses indicate that concentrations for total arsenic, total cadmium, total chromium, total lead, total mercury, and total silver at several areas of the Banner mine and mill site exceed Idaho's *Initial Default Target Levels* (IDTLs). The IDTLs are risk-based target levels for certain chemicals that have been developed by IDEQ using conservative residential input parameters, a target acceptable risk of  $10^{-6}$ , and a *Hazard Quotient* of 1. An exceedance of the IDTLs 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 quantify true risk under current site conditions.

Generally speaking, soils analysis indicates that the heavy metal of concern is arsenic, which is elevated throughout the mine and mill sites. Analysis of soils within the settling pad indicates lead (459 mg/kg) and mercury (73.5 mg/kg); which far exceeds both the IDTLs and EPA's Human Health Screening levels. These levels, although used for comparison even at remote locations, are more applicable in locations where these types of contaminants are determined to be readily available to receptors; where exposures might produce an acute or chronic toxicological effect in a population. In the case of the Banner mine, these numbers suggest that additional site assessment should be undertaken if the property were to be developed for "unrestrictive uses" such as residential.

### Sample Description

Sample **BNR-Spring-SW1** was collected from a spring, located on the east side of the old road connecting the Banner tunnel with the mill site. The water was clear and had no discoloration or odor. Field parameters were not taken.

Sample **BNR-BG-SW1** was collected as a background sample from Banner Creek, upstream of any workings of the Banner mine. The water was clear and had no discoloration or odor. Field parameters taken at this point are as follows: pH = 7.58, Conductivity =  $0.097\mu\text{S}/\text{cm}$ , Dissolved Oxygen = 13.7mg/L, Turbidity = 7 and Temperature =  $15.2^{\circ}\text{C}$ .

Sample **BNR-HB** was collected from a hose bib located on the landing near the collapsed portal of the Banner tunnel. Field parameters taken at this point are as follows: pH = 6.36, Conductivity =  $0.120\mu\text{S}/\text{cm}$ , Dissolved Oxygen = 13mg/L, Turbidity = 6 and Temperature =  $16.6^{\circ}\text{C}$ .

Sample **BNR-Adit-SW1** was collected from the drainage pipe, extending through the collapsed portal of the Banner tunnel. The water was clear and had no discoloration or odor. Field parameters taken at this point are as follows: pH = 7.05, Conductivity =  $0.318\mu\text{S}/\text{cm}$ , Dissolved Oxygen = 16.5mg/L, Turbidity = 47 and Temperature =  $10.9^{\circ}\text{C}$ .

Sample **CP-Adit-SW1** was collected from the floor of the Crown Point (200-level) adit, beneath the gated portal. The water was clear and had no discoloration or odor. Field parameters taken at this point are as follows: pH = 6.65, Conductivity =  $0.253\mu\text{S}/\text{cm}$ , Dissolved Oxygen = 16.48mg/L, Turbidity = 72 and Temperature =  $12.2^{\circ}\text{C}$ .

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Sample **BNR-SW2** was collected as a down-gradient sample from Banner Creek, below the point at which the Crown Point adit discharge enters the creek. The water was clear and had no discoloration or odor. Field parameters taken at this point are as follows: pH = 7.8, Conductivity = 0.207 $\mu$ S/cm, Dissolved Oxygen = 16.45mg/L, Turbidity = 354 and Temperature = 12.2 °C.

**Water Sample Analysis**

Sample results are presented in Table 2. The analyses were compared to the Idaho Water Quality Standards.

**Table 2: IDEQ Water Samples Total Recoverable Metals Analysis (mg/L). (Standards in “dissolved” unless stated)**

	IDEQ Ground Water Standard	IDEQ Drinking Water Standard	IDEQ Cold Water Biota Standard	IDEQ Cold Water Biota Standard	Banner Creek background	Banner Creek down-gradient	Banner Tunnel	Banner Tunnel Hose bib	Spring	Crown Point 200-level Adit
Description	(T)	MCL	Acute	Chronic	BNR-BG SW1	BNR-SW2	BNR-Adit-SW1	BNR-HB	BNR-Spring-SW1	CP-Adit-SW1
<b>Arsenic</b>	0.05	0.01	0.36	0.19	<0.00300	0.0524	0.0112	<0.00300	<0.00300	0.208
<b>Barium</b>	2	2			0.0209	0.0181	0.0097	0.0271	0.0032	0.0053
<b>Cadmium</b>	0.005	0.005	0.00082 (H)	0.00037 (H)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
<b>Copper</b>	0.1	0.1			<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
<b>Chromium</b>	1.3		0.0046 (H)	0.0035 (H)	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
<b>Lead</b>	0.015	0.015	0.014 (H)	0.00054 (H)	<0.00300	<0.00300	<0.00300	<0.00300	<0.00300	<0.00300
<b>Mercury</b>	0.002	0.002	0.0021	0.000012 (T)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
<b>Selenium</b>		0.61	0.438 (H)	0.049 (H)	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
<b>Silver</b>	0.05	0.05	0.018 (T)	0.005 (T)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
<b>Zinc</b>	0.1*		0.00032 (H)		<0.010	<0.010	0.029	0.046	<0.010	<0.010
	At or Exceeds GW Standard									
	At or exceeds DW Standard									

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

## Section 9. Risk Analysis

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The heavy metal concentrations exhibited in the tailings piles, the settling pad and treatment area 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 Banner 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 receptors 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 Banner mine are driven by arsenic concentrations.**

Banner shaft waste dump: Excess cancer risk for all residential and non-residential 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.

Above the Banner shaft (background): 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.

Crown Point shaft waste dump: 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.

Banner Mill tailings # 1: Excess cancer risk for residential and non-residential 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.

Banner Mill tailings (settling pad) # 2: Excess cancer risk for residential and non-residential receptors is greater than the acceptable level of  $1E-05$ , as defined by the REM. The non-cancer hazard greater than the acceptable level (Hazard Index = 1) for residential and non-residential receptors.

Banner Mill tailings (treatment area) # 3: Excess cancer risk for residential and non-residential receptors is greater than the acceptable level of  $1E-05$ , as defined by the REM. The non-cancer hazard greater than the acceptable level (Hazard Index = 1) for only residential receptors.

### **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
<b>Banner Shaft waste</b>	1.10E-03	2.84E+01	1.62E-03	8.41E+00	6.97E-05	1.64E+00	8.48E-06	1.32E+00
<b>Banner WD2 Background</b>	2.20E-03	5.71E+01	3.25E-03	1.69E+01	1.40E-04	3.30E+00	1.70E-05	2.65E+00
<b>Crown Point Shaft waste</b>	3.41E-03	8.85E+01	5.04E-03	2.62E+01	2.17E-04	5.12E+00	2.64E-05	4.11E+00
<b>Banner Mill tailings # 1</b>	8.43E-04	2.25E+01	1.25E-03	6.64E+00	5.36E-05	1.30E+00	6.52E-06	1.05E+00
<b>Banner Mill tailings # 2</b>	8.26E-04	2.42E+01	1.22E-03	7.16E+00	5.25E-05	1.42E+00	6.39E-06	1.14E+00
<b>Banner Mill tailings # 3</b>	2.49E-04	7.12E+00	3.69E-04	2.11E+00	1.58E-05	4.17E-01	1.93E-06	3.35E-01

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 (2), springs and seeps. One spring was observed uphill from the old road connecting the Banner tunnel to the mill site. Though the source was not observed, surface water was flowing in the gulch directly east of the Banner tunnel. A minor seep was noted in one of the “cat” cuts just below the ridgeline near the Banner shaft, though no overland flow was detected. Discharge from both the Banner tunnel and the Crown Point adit was pronounced. The amount of recharge of regional aquifers by surface and ground water in the Banner Creek area is unknown.

According to Idaho Department of Water Resources July 2002 records, there are not any private drinking water wells located within a 1-mile radius of the site. The closest domestic well is located approximately 2.9 miles to the north-northeast within the S. Fork Payette River basin. No wells were sampled during this assessment. Drinking water wells are illustrated in Figure 6.

Although no wells were sampled, IDEQ did collect a sample from a spring and a hose bib, located near the Banner tunnel. Neither of the samples exceeds IDEQ’s Drinking Water Standard or Ground Water Standard for the metals analyzed. 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.

Banner Mine Area  
Preliminary Assessment Report

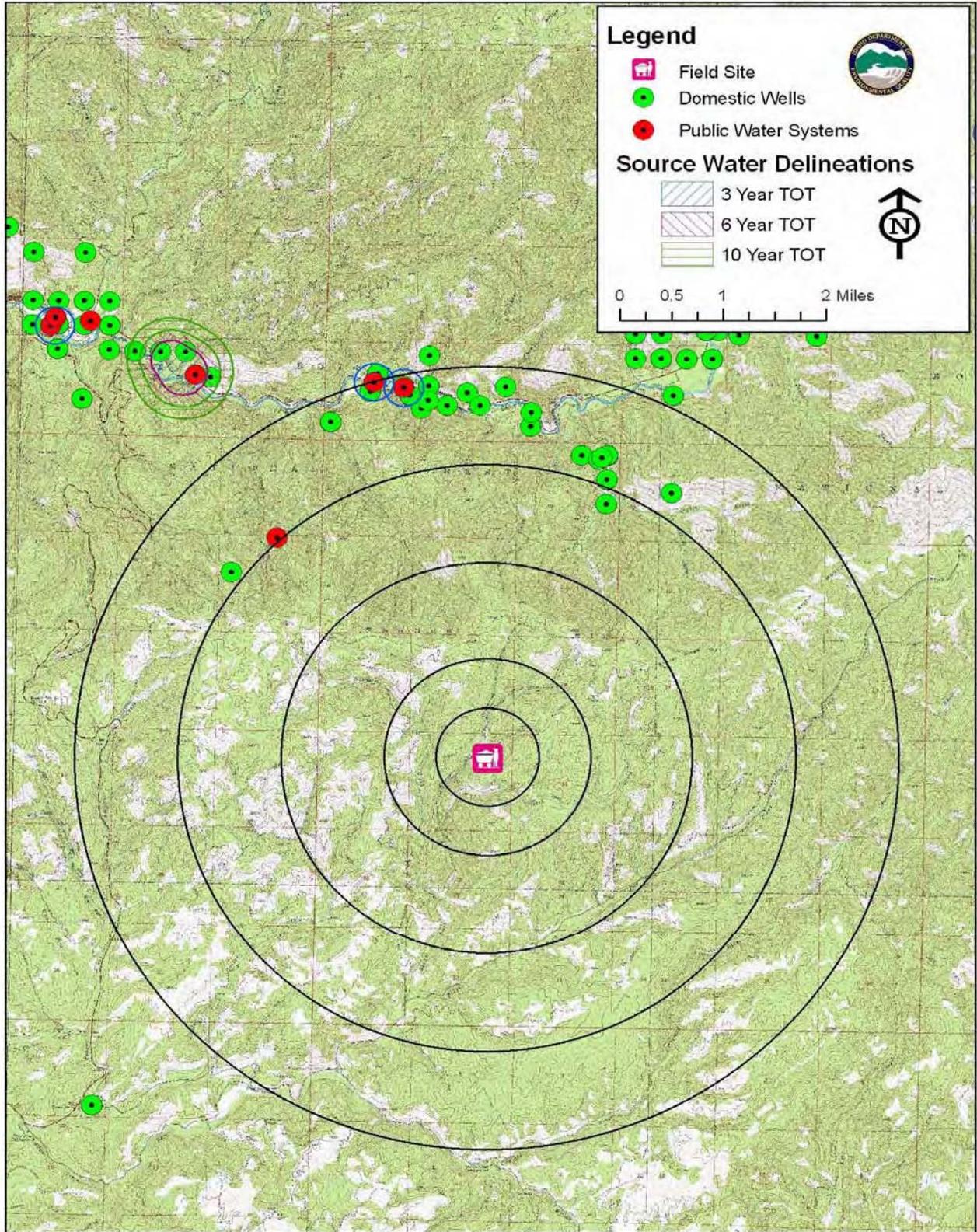


Figure 6: Drinking water wells within 4-mile radius of the Banner mine

Banner Mine Area  
Preliminary Assessment Report

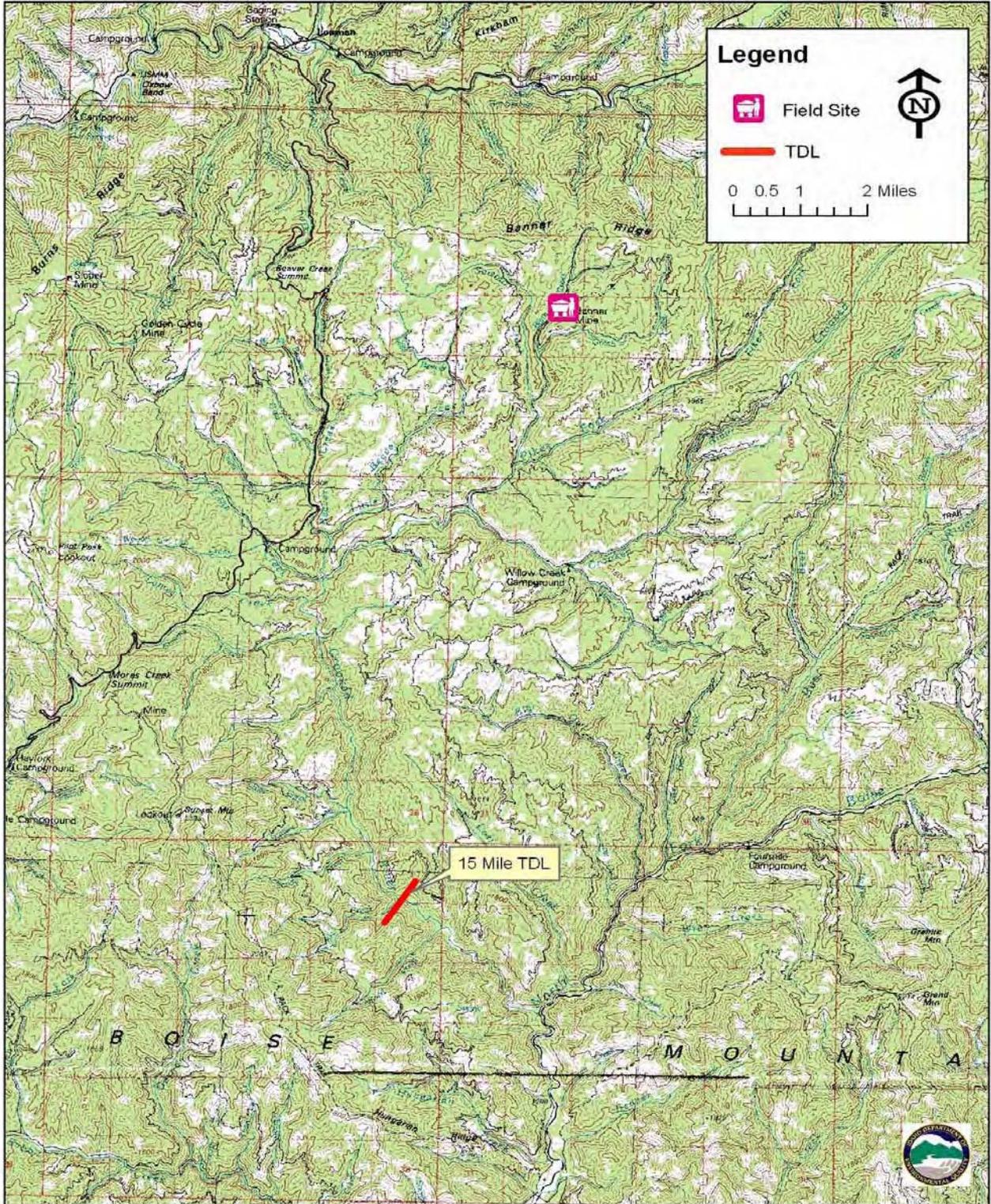


Figure 7: Surface Water - Target Distance Limit

Banner Creek is a perennial tributary to the Crooked River (see Figure 7). Banner Creek flows southward where it joins and is augmented by Gotch Creek at 0.89 miles; by Sawmill creek at 1.95 miles; and by Pikes Forks at 2.85 before merging with the Crooked River at 3.8 miles. Crooked River trends south-southeast before reaching the 15-mile TDL. Crooked River ultimately enjoins the N Fork Boise River.

### **Wetlands and Sensitive Species**

#### **Wetlands**

Wetland surveys near the site were reviewed (USFWS, 2007) along with aerial photographs (see Figure 7). Wetland mapping data pertaining to Banner Creek and Crooked River was not available. Therefore, no wetlands are represented within the downstream 15-mile Target Distance Limit (TDL).

#### **Species of Concern**

Redband rainbow trout [*Oncorhynchus mykiss gairdneri*], brook trout [*Salvelinus foninalis*] and bull trout (*Salvelinus confluentus*) are present within Crooked River (IDFG, 2000) and are presumed to be present in Banner Creek, as well. These are the closest official observations of fish to the mine site. 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 as well as one state listed plant specie, the Giant Helliborne orchid (*Epipaticus gigantea*). Figure 8 illustrates these relationships.

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.

Banner Mine Area  
 Preliminary Assessment Report

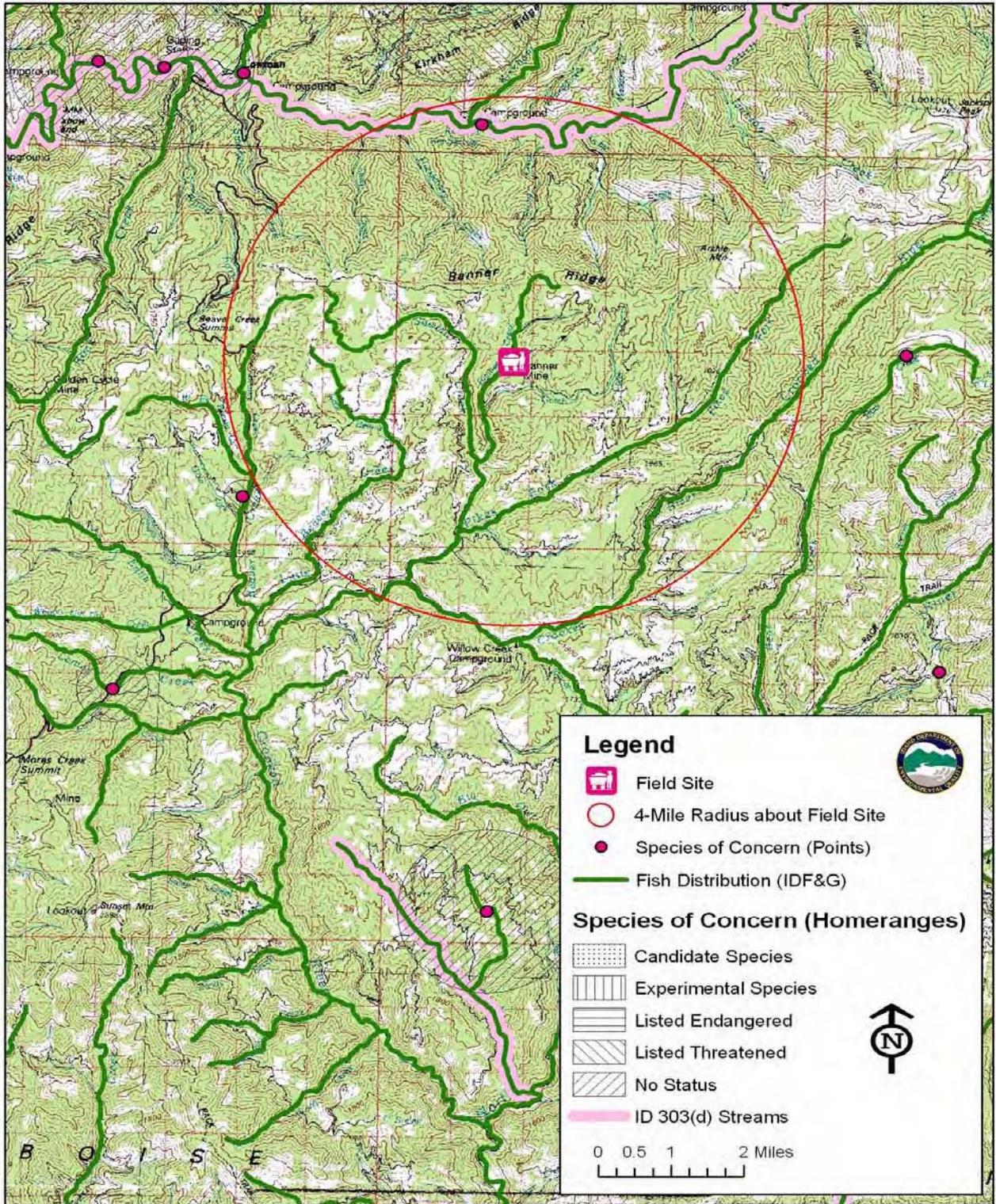


Figure 8: Species of Concern within 4-mile radius of the Banner mine

### **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 historical significance, proximity to popular recreation areas, and the lure of rare mineral collection. The waste dumps are moderately well consolidated and aerial dispersion of this material is expected to be minimal. The mill tailings are finer grained and may become airborne when disturbed by ORV 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). Several of the former workings including the Banner tunnel are located on public lands.

### **Schools, Day-Care Facilities, Private Residences**

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

## **Section 10. Summary, Conclusions and Recommendations**

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Mining at the Banner commenced in 1865 and actively continued until 1921. The mill was built and began operations in 1878, running for 20 years. Early arastra production was replaced by stamp milling, ore roasting and concentration. More recent milling, as evidenced by PVC piping, may have resumed in the 1960s, although specific information was not available. The Banner is credited with producing nearly \$3,000,000 in silver.

Generally speaking most of the shafts and tunnels appear collapsed beyond their portals. Moderate discharges were noted emanating from the Banner tunnel and the Crown Point (200-level) adit. Springs and seeps exist through the area, one of which was noted near the old mill road. An open stope was identified above the Banner Tunnel. **This opening is extremely dangerous, and should be closed.** The caved stope has steep unstable walls and may be a collapsed portion of the Banner tunnel. Water from the adjacent gulch has seeped into the hole, further weakening the structure. Foundations, old equipment and miscellaneous debris remain at the mill site. **The unknown extent and location of underground workings in the area indicates that subsidence may become a factor in future development. It also suggests that additional research of the extent and location of these workings should be completed prior to development.**

Waste dump material appears to be moderately well consolidated, though sparsely vegetated. The oldest mill tailings, estimated to contain <500 cubic yards of material, remain downhill from the former structures on the east side of Banner Creek. During periods of rapid snowmelt or high intensity rains, erosion of mine and mill wastes is likely to deliver mine and mill wastes to Banner Creek. Delivery of mine and mill wastes to Banner Creek may violate federal and State rules and regulations. **Therefore, stabilization of these wastes and a site wide water management plan should be implemented to prevent waste delivery, and the potential intervention by state or federal authorities.**

The level of arsenic in all of the soil sample locations poses an excess cancer risk and a hazard for residential and non-residential receptors. Arsenic concentration was 65 % higher in the Crown Point waste than the Banner shaft waste. Lead and mercury levels were notably excessive from the settling basin sample. **If development of this mine site occurs, whether it is for mining or residential purposes, risk management of sources, pathways and points of exposure should be incorporated in the overall development plans.**

Arsenic concentrations in the water discharging from the Crown Point adit and to a lesser extent from the Banner tunnel may pose risks to human and ecological receptors. Analysis indicates that the Crown Point water is four times higher than the IDEQ Ground Water Standard and twenty times the IDEQ Drinking Water Standard. Effluent from the Banner Tunnel water slightly exceeds the IDEQ Ground Water Standard for arsenic. Banner Creek down gradient from the Crown Point adit discharge exceeds the IDEQ Drinking Water Standard for arsenic. **When evaluated collectively, water quality samples and analysis indicate that surface and ground waters should not be used as potable water supplies. Further, if development of the**

**property occurs, whether for mining or residents, water treatment systems may be mandated by the federal Clean water Act and/or Idaho's Water Quality Standards, Groundwater Rule, and Wastewater Rule.**

### **Potential Exposure for Wildlife and Vegetation**

Potential exposure 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**

Under the current conditions and uses, this site is infrequently visited by mountain bikers, hikers, hunters, snowmobile operators, off-road four wheeling, or various other outdoor recreation enthusiasts. Humans may receive very small doses of heavy metals, especially arsenic, lead, mercury and silver. Aerial dispersion of waste particulates from the tailings or waste dumps appears minor. 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. **Risks of exposure to human would dramatically increase if this site is developed for commercial or residential uses such as mining or seasonal housing. Within these futuristic scenarios, risk management through reclamation or remediation would be warranted.**

In summation, the patented claims Ritchie, Kloppenberg, Wolverine, Panamint, and State of Idaho contain few if any concerns for human health and the environment. IDEQ is recommending that these claims be designated as NRAP, or "No Remedial Action Planned".

However, IDEQ is recommending that EPA calculate a preliminary Hazard Ranking Score(s) for the Banner Mill Site, Crown Point Mill Site, Crown Point, Banner, and Silver Chief patented claims. Although it is unlikely that these sites will score high enough to become cleanup sites under CERCLA, IDEQ recommends that the owners consider reclamation of the sites to manage risks associated with an open stope and erosion of waste dumps that may lead to violations of state and federal water quality regulations.

## References

- Anderson, A.L., and Alfred Rasor. 1934. Economic Geology Vol. XXIX, No. 4, pp. 371-387.  
*Silver Mineralization in the Banner District, Boise County, Idaho.*
- Boise County, 2007, Boise County Assessor, Idaho City, Idaho
- Bureau of Land Management, 2007, *Land Patent Details* – BLM GLO Records.  
<http://www.glorerecords.blm.gov/PatentSearch/Results.asp?QryId=42011.79>
- Environmental Protection Agency (EPA), 2007.  
[http://www.epa.gov/Region6/6pd/rcra\\_c/pd-n/screen.htm](http://www.epa.gov/Region6/6pd/rcra_c/pd-n/screen.htm)
- Idaho Department of Fish and Game (IDF&G), 2002.  
[http://www2.state.id.us/fishgame/info/cdc/plants/vasc\\_plants&status\\_n-r.htm](http://www2.state.id.us/fishgame/info/cdc/plants/vasc_plants&status_n-r.htm)
- Idaho Department of Fish and Game (IDF&G), 2000.
- Idaho Department of Labor (IDL), 2002.  
<http://labor.idaho.gov/lmi/econ-ind/lincitycopop.pdf>
- Idaho Geological Survey (IGS), 2007. Staff Report. S-07-4  
*Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands (Region 4), Boise National Forest: Boise Basin, Lowman, and Middle Fork of Boise River Areas, Boise, Ada, and Elmore Counties, Idaho (Selected Properties)*
- U.S.G.S. Geological Survey (U.S.). (1883). *Bulletin of the United States Geological Survey*.  
Eighth Annual Report, Washington, D.C.: G.P.O.
- US Mint, 1884. *Report of the Director of the Mint upon the Production of Precious Metals of the United States*. Calendar Year 1883.
- Wells, Merle W. 1983. Idaho Bureau of Mines and Geology, Bulletin No. 22. *Gold Camps & Silver Cities: nineteenth century mining in central and southern Idaho*
- Western Regional Climate Center (WRCC), 2008.  
<http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?id5426>