Narrow Gauge Gulch

aka

Narrow Gauge Mine & Pass Group

Preliminary Assessment Report

Blaine County
State of Idaho

Department of Environmental Quality

September 2008

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

September 25, 2008

Cutler, Wiest & Calaway LLC
784 North Crest Drive
Salt Lake City, Utah 84103

RE: Preliminary Assessment of the Narrow Gage and Pass Group Mines; Encompassing the Narrow Gage #1 and Bannock Patented Mining Claims RP1M0000001520 in Blaine County, Idaho

To Whom It May Concern:

The Idaho Department of Environmental Quality (IDEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines within the Mineral Hill Mining District in Blaine County, Idaho. Furthermore, 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.

Access, in order to perform assessments on some of the patented mining claims surrounding the Narrow Gauge Mine, the Pass Group, was given to IDEQ by Daniel Henry, John Esser, Jewel Cutler and Shan Spencer in March of 2007. Public access is unrestricted in Narrow Gauge Gulch, Bullion Gulch and Red Cloud Gulch. Because of this access, and the fact that IDEQ did not observe any significant risks to human health or the environment any of the adjoining properties, assessments of adjoining properties were included in the attached preliminary assessment report.

In sum, IDEQ found that heavy metals concentrations of some mine wastes warrant some risk management in the form of access control. However, the limited volumes of waste present are not significant enough to trigger more technical remedial actions on any of the properties.

Based on the remoteness of the site, minimal area of exposure and few receptors, IDEQ is recommending to EPA that there is no calculation of a Hazard Ranking Score for the Pass Group, Narrow Gauge Mine and the miscellaneous workings within Narrow Gauge Gulch. Furthermore, IDEQ is recommending that under the current conditions the properties be designated as “No Remedial Action is Planned”. IDEQ’s recommendation may change if significant development at the properties does occur that increases risk of releases from the mine waste dumps or underground workings.

IDEQ is also advising owners that all of the mine openings described in the report are very dangerous physical hazards and they should be closed. The most dangerous openings are located

on the Narrow Gage #1 and Argent patented Claims which include adits, open stopes and a shaft. These openings are directly accessible from frequently used ORV trails and hunting camps.

If you have any questions or comments about this report or IDEQ's Site Assessment Program, please contact me at (208) 373-0554.

Sincerely,

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

Attachments

September 25, 2008

Harry I Johnson Estate
c/o Shan Spencer
600 Moonlite
Idaho Falls, Idaho 83402

RE: Preliminary Assessment of the Narrow Gage and Pass Group Mines; Encompassing the Narrow Gage #2 Patented Mining Claim RP1M0000000880 in Blaine County, Idaho

Dear Mr. Spencer:

The Idaho Department of Environmental Quality (IDEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines within the Mineral Hill Mining District in Blaine County, Idaho. Furthermore, 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.

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

Attachments

September 25, 2008

David Christian Outsen
1270 Indigo Run Lane
Gastonia, North Carolina 28056

RE: Preliminary Assessment of the Narrow Gage and Pass Group Mines; Encompassing the Dreadnaught, Dusty Bill and Moscow Patented Mining Claims RP1M0000001660 in Blaine County, Idaho

Dear Mr. Outsen:

The Idaho Department of Environmental Quality (IDEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines within the Mineral Hill Mining District in Blaine County, Idaho. Furthermore, 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.

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Sincerely,

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Mine Waste Projects Coordinator
Waste Management and Remediation Division

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September 25, 2008

David W. Reimers
2726 Carnelian Circle
Eldorado Hills, California 95762

RE: Preliminary Assessment of the Narrow Gage and Pass Group Mines; Encompassing the Dreadnaught, Dusty Bill and Moscow Patented Mining Claims RP1M0000001350 in Blaine County, Idaho

Dear Mr. Reimers:

The Idaho Department of Environmental Quality (IDEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines within the Mineral Hill Mining District in Blaine County, Idaho. Furthermore, 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.

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Sincerely,

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

Attachments

September 25, 2008

Colleen Jean Cunningham
509 East Addeson
Meridian, Idaho 83642

RE: Preliminary Assessment of the Narrow Gage and Pass Group Mines; Encompassing the Dreadnaught, Dusty Bill and Moscow Patented Mining Claims RP1M0000001690 in Blaine County, Idaho

Dear Ms. Cunningham:

The Idaho Department of Environmental Quality (IDEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines within the Mineral Hill Mining District in Blaine County, Idaho. Furthermore, 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.

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

Attachments

September 25, 2008

Carol R. Rowley
PO Box 42
Darby, Montana 59829

RE: Preliminary Assessment of the Narrow Gage and Pass Group Mines; Encompassing the Dreadnaught, Dusty Bill and Moscow Patented Mining Claims RP1M0000001410 in Blaine County, Idaho.

Dear Ms. Rowley:

The Idaho Department of Environmental Quality (IDEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines within the Mineral Hill Mining District in Blaine County, Idaho. Furthermore, 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.

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If you have any questions or comments about this report or IDEQ's Site Assessment Program, please contact me at (208) 373-0554.

Sincerely,

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

Attachments

September 25, 2008

Karl Miller
New Mexico LLC
18543 Granite Hills Lane
Clovis, Georgia 93611

RE: Preliminary Assessment of the Narrow Gage and Pass Group Mines; Encompassing the Manchestor L&M and Walla Wall L&M Patented Mining Claims RP1M0000000910 in Blaine County, Idaho.

Dear Mr. Miller:

The Idaho Department of Environmental Quality (IDEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines within the Mineral Hill Mining District in Blaine County, Idaho. Furthermore, 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.

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Sincerely,

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

Attachments

September 25, 2008

Eric Wilson
Idaho Dept of Lands
954 West Jefferson Street
PO Box 83720
Boise, Idaho 83720-0050

RE: Preliminary Assessment of the Narrow Gage and Pass Group Mines; Encompassing the Dreadnaught, Dusty Bill and Moscow Patented Mining Claims RP1M0000001410 in Blaine County, Idaho.

Dear Mr. Wilson:

The Idaho Department of Environmental Quality (IDEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines within the Mineral Hill Mining District in Blaine County, Idaho. Furthermore, 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.

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Sincerely,

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

Attachments

September 25, 2008

Jeff Gabardi
USDA Forest Service
Sawtooth National Forest
2647 Kimberly Road East
Twin Falls, Idaho 83301

RE: Preliminary Assessment of the Narrow Gage and Pass Group Mines; Encompassing the Eclipse Lode Patented Mining Claims RP1M0000000600 in Blaine County, Idaho.

Dear Mr. Gabardi:

The Idaho Department of Environmental Quality (IDEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines within the Mineral Hill Mining District in Blaine County, Idaho. Furthermore, 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.

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Sincerely,

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

Attachments

September 25, 2008

Daniel Henry
308 North 2nd Avenue
Hailey, Idaho 83333

RE: Preliminary Assessment of the Narrow Gage and Pass Group Mines; Encompassing the Hidden Treasure, Sunny South and Monarch Patented Mining Claims in Blaine County, Idaho.

Dear Mr. Henry:

The Idaho Department of Environmental Quality (IDEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines within the Mineral Hill Mining District in Blaine County, Idaho. Furthermore, 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.

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Attachments

September 25, 2008

Gordon L Esser
PO Box 24
Cole Harbor, North Dakota 58531

RE: Preliminary Assessment of the Narrow Gage and Pass Group Mines; Encompassing the Lafayette, Thurber, Ace, Duece, Burnt Firs, Success, Justice, Link, St. Louis, Mishap, Monell, Aunt Nan, Uncle Hod and Argent Patented Mining Claims RP1M0000001260 in Blaine County, Idaho.

Dear Mr. Esser:

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Section 1 Introduction

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IDEQ often receives complaints or information about sites that may be contaminated with hazardous waste. These sites can include abandoned mines, rural airfields that have served as bases for aerial spraying, old landfills, illegal dumps, and abandoned industrial facilities that have known or suspected releases.

In February 2002, IDEQ initiated a Preliminary Assessment Program to evaluate and prioritize assessment of such potentially contaminated sites. Due to accessibility and funding considerations, priority is given to sites where potential contamination poses the most substantial threat to human health or the environment.

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

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

This document presents the results of the preliminary assessment (PA) of the various mining properties located within the Narrow Gauge Gulch sub-drainage. The Narrow Gauge Mine and the Pass Group, including the Argent claim, have historical references, while the remaining workings, mostly occupying the upper drainage do not.

Access to the Narrow Gauge Mine, the Pass Group and to adjacent patents was given by Daniel Henry, John Esser, Jewel Cutler and Shan Spencer in March of 2007. Public access and use of the area is unrestricted by way of the Narrow Gauge Gulch, Bullion Gulch and Red Cloud Gulch roads and across the surrounding public lands which are administered by the U.S. Department of Agriculture Forest Service (USDA). No physical or posted access restrictions exist on the boundaries of the private properties which the public routinely enters.

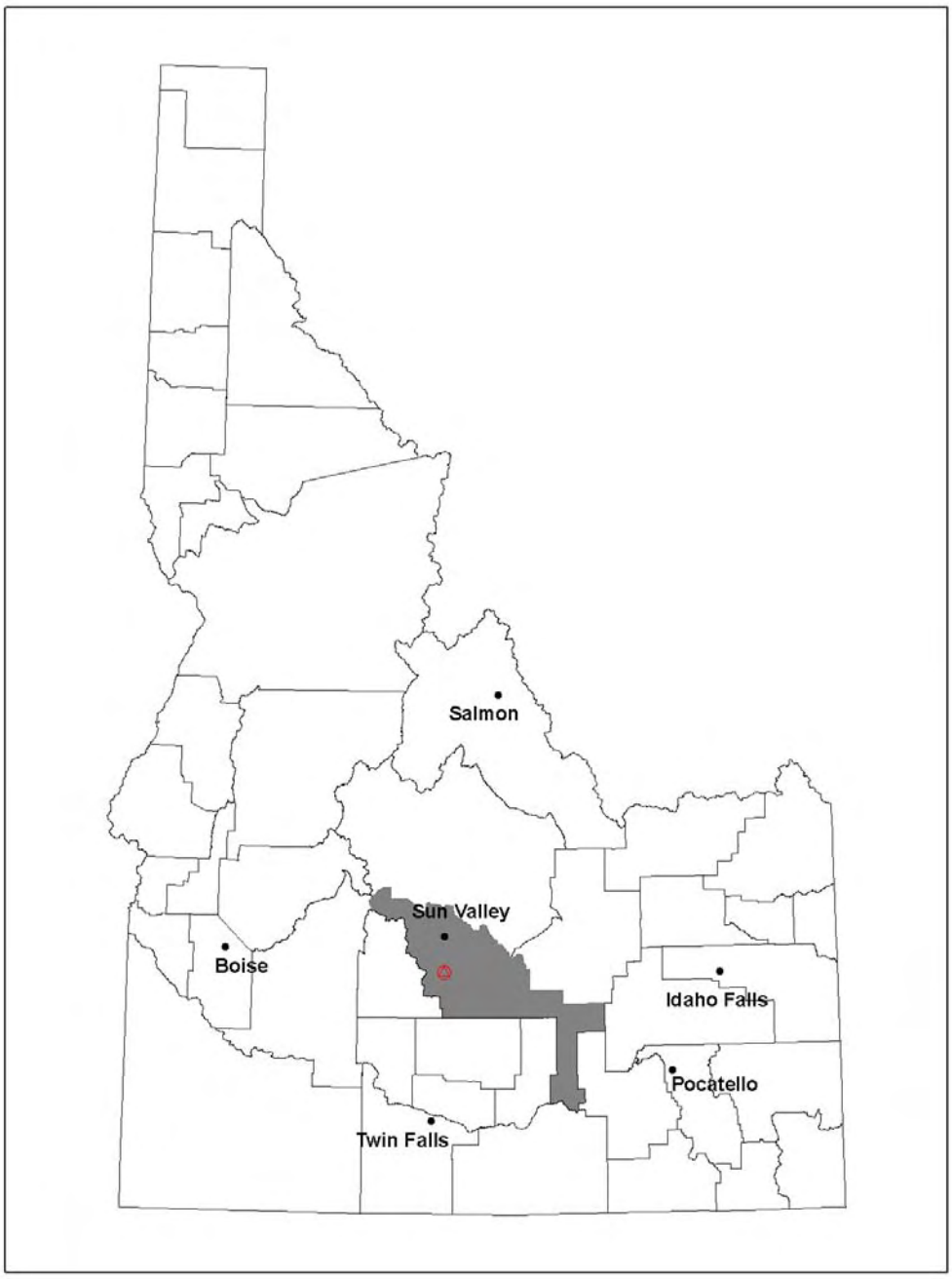

Figure 1
Location of Narrow Gauge Gulch

Section 2 Ownership

IDEQ does not warrant the ownership research or location of property boundaries contained in this report. The information regarding ownership and property boundaries was obtained from the Blaine County Tax Assessor's Office in Hailey, Idaho. The poor juxtaposition of the claims' boundaries that will be observed in this report's figures are plotted according to the Blaine County Tax Assessor's data base, and are indicative of probable errors that exist in the recorded surveys of the properties.

Within the following ownership descriptions the **"Partial Determination"** is meant to convey a very brief summary of 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.

Owner	Claim	Parcel Number	Partial Determination
Cutler, Wiest, Calaway LLC 784 North Crest Drive Salt Lake City, UT 84103	Narrow Gauge (#1) Bannock	RP1M0000001520	
Harry I Johnson Estate c/o Shan Spencer 600 Moonlite Idaho Falls, ID 83402	Narrow Gauge # 2	RP1M0000000880	
David C Outsen 1270 Indigo Run Lane Gastonia, NC 28056	1/5 Dreadnaught 1/5 Dusty Bill 1/5 Moscow	RP1M0000001140	
David Christian Outsen 1270 Indigo Run Lane Gastonia, NC 28056	1/5 Dreadnaught 1/5 Dusty Bill 1/5 Moscow	RP1M0000001660	
David W Reimers 2726 Carnelian Circle Eldorado Hills, CA 95762	1/5 Dreadnaught 1/5 Dusty Bill 1/5 Moscow	RP1M0000001350	
Colleen Jean Cunningham 509 E Addeson Meridian, ID 83642	1/5 Dreadnaught 1/5 Dusty Bill 1/5 Moscow	RP1M0000001690	

Carol R Rowley Box 42 Darby, MT 59829	1/5 Dreadnaught 1/5 Dusty Bill 1/5 Moscow	RP1M0000001410
New Mexico LLC Karl Miller & Kneisel 18543 Granite Hills Lane Clovis, CA 93611	Manchester L & M Walla Walla L & M	RP1M0000000910
Idaho Dept. of Lands 319 S 417 E Jerome, ID 83338	FR lots: Section 16 T 2 N R 17 E	RP02N170160010
USFS Box 2356 Ketchum, ID 833340	Eclipse Lode Forest Creek	RP1M0000000600
Daniel Henry 308 North 2nd Ave Hailey, ID 83333	Hidden Treasure Sunny South Monarch	RP1M0000001390 RP1M0000001230 RP1M000000069A
Gordon L Esser PO Box 24 Coleharbor, ND 58531	Lafayette Thurber Ace Deuce Burnt Firs Success Justice Link St. Louis Mishap Monell Aunt Nan Uncle Hod Argent	RP1M0000001260

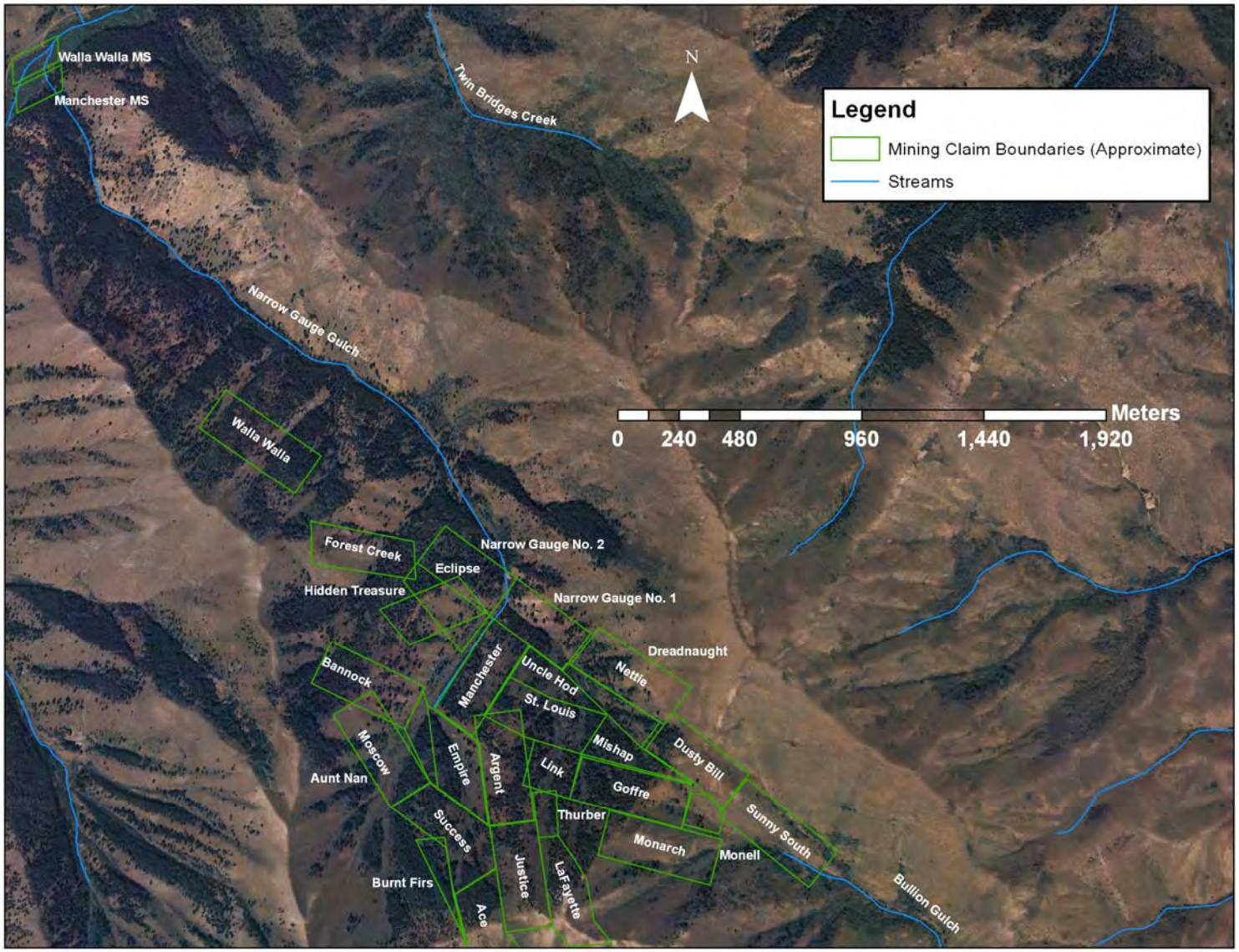

Figure 2
Narrow Gauge Gulch area

Section 3 Overview

Numerous patented claims are located within Narrow Gauge Gulch, along the ridges bordering Bullion and Red Elephant gulches to the south, Red Cloud Gulch to the east and Deer Creek to the north. The two principal mines are the Narrow Gauge and the Pass Group.

The Narrow Gauge Mine is located in the upper reaches of Narrow Gauge Gulch, a tributary to the Deer Creek sub-drainage, approximately six miles west of Hailey, Idaho, in Section 9 of Township 2 North, Range 17 East of the Boise Meridian, at Latitude 43º 31' 15.43"N, and Longitude 114º 26' 6.54"W (see Figure 1). The mine sites are located on private lands and on public lands administered by the Idaho Department of Lands, the USDA Forest Service and the Bureau of Land Management.

The most direct route to Narrow Gauge from Hailey is obtained by driving north on Highway 75 to the Deer Creek Road [NFD 097], then west for approximately 6.5 miles to the junction of NFD 100 Road. One continues approximately 0.12 miles past this junction to a narrow unimproved road leading across Deer Creek. Here, the Mill Site lies between the Deer Creek Road and the mouth of Narrow Gauge Gulch. As pictured below, one turns south (left), fords Deer Creek and travels on a narrow unimproved road, marked as NFD 111, into the gulch.

After crossing Deer Creek, one continues up the gulch trail for approximately 1.75 miles to reach the Narrow Gauge Mine; the Lower Narrow Gauge claims lie approximately 0.3 miles to the

northwest and are accessed by foot along a game trail. About 0.4 miles beyond the Narrow Gauge Mine the road forks. At this point, the road becomes nearly impassable, except by foot or "Off Road Vehicle" (ORV). The left fork leads east to the Pass Group workings at approximately 0.25 miles; the Upper Narrow Gauge workings at about 0.75 miles. The right fork leads to the Red Cloud Mine workings approximately one mile to the west.

Local waters are dominated by surface water and near surface ground water which is recharged by seasonal precipitation. Annual precipitation for Hailey, Idaho, located approximately five miles to the east, is 16 inches, predominately during the winter months, with an average annual snowfall of 81 inches (WRCC, 2006).

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

Section 4 Historical Perspective

Narrow Gauge Gulch contains multiple prospects and mine workings. In 1930, the two most notable, the Narrow Gauge Mine and Pass Group, were described by J.B. Umpleby, L.G. Westgate and C. Ross. In their report to the Department of Interior they said:

> *The Narrow Gauge mine, which comprises two claims, is near the creek level in the upper part of Narrow Gage Gulch, at an altitude of 6,750 feet, in sec. 9 T. 2 N., R. 17 E...The mine is credited with an estimated production of $200,000 prior to 1898; it has been worked but little since...In 1913 tailings from the old mill were being hand-jigged for zinc...* (p.165)

Production records, contributed by E. Daft at the Ketchum smelter (ibid), are summarized as: 1,341.8 tons of ore and concentrate were shipped from the mine between 1883 and 1918; 14 tons of tailings material was shipped in 1914. The smelter returns included 0.959 fine ounces of gold, 119,924.2 fine ounces of silver, and 1,490,248 pounds of lead. Production of zinc was not recorded.

> *The Pass Group is $1^{1/2}$ miles northwest of Bullion, about the head of Narrow Gage Gulch, a tributary of Deer Creek, in sec. 9, T. 2 N., R. 17 E. ..The principal development is on the Argent claim, which was worked for many years prior to 1900 and is credited with a production of about $160,000. A little ore has been produced since then...Presumably the production credited to the Pass mine came from claims of this group other than the Argent. The records of the United States Geological Survey show that 1 ton of ore yielding 99 ounces of silver and 1,571 pounds of lead was shipped in 1911* (ibid, p. 158).

Production records of the Pass mine, contributed by E Daft at the Ketchum smelter (ibid), are summarized as: 198.3 tons of ore were shipped from the mine between 1885 and 1899. Production records, contributed by E Daft at the Ketchum smelter (ibid) indicate that 1,341.8 tons of and concentrate were shipped from the mine between 1883 and 1918. Additionally, 14 tons of tailings material was shipped in 1914. The smelter returns included 0.959 fine ounces of gold, 119,924.2 fine ounces of silver, and 1,490,248 pounds of lead.

Production records of the Argent claim are summarized as: 394.6 tons of ore shipped between 1885 and 1896. The smelter returns included 36,987.7 fine ounces of silver, and 449,965 pounds of lead (ibid, p. 159).

Current Site Conditions

During the visitation of the Narrow Gauge Gulch mines IDEQ staff designated identification of mine facilities in the order in which they were encountered. The site visit began at the ridgeline

separating Narrow Gauge Gulch from Bullion Gulch. A background soil sample [UNGBGSS-1], collected near the head of Narrow Gauge Gulch, was deemed applicable for screening level comparisons to the lower elevation facilities.

Field note descriptions and sample markings were designated as “Upper Narrow Gauge (UNG)”, “Narrow Gauge (NG)” and “Lower Narrow Gauge (LNG)”. IDEQ subsequently correlated field GPS data with historical information and determined that the UNG and NG workings lie within the Pass Group of claims, and the LNG matches the Narrow Gauge Mine and adjacent claims. The mill site area was assessed during a subsequent site visit, but is included in this report for continuity. Figure 7 illustrates the overall locations of the various workings and sample points. Figure 8 shows the relative locations of these workings to the patent boundaries.

Multiple adits, shafts and prospect explorations were mapped across the Pass Group. These include:

- The *upper portion*, shown in Figure 3, consists of one (1) collapsed shaft, four (4) caved adits, two open (2) stopes and associated waste dumps. The largest of the waste dumps (#3) is estimated to contain <2500 cubic yards of material. All of these workings were dry.

View to NW across the collapsed UNG Shaft # 1. Background sample UNGBGSS-1 was collected on the hillside above the shaft (upper center).

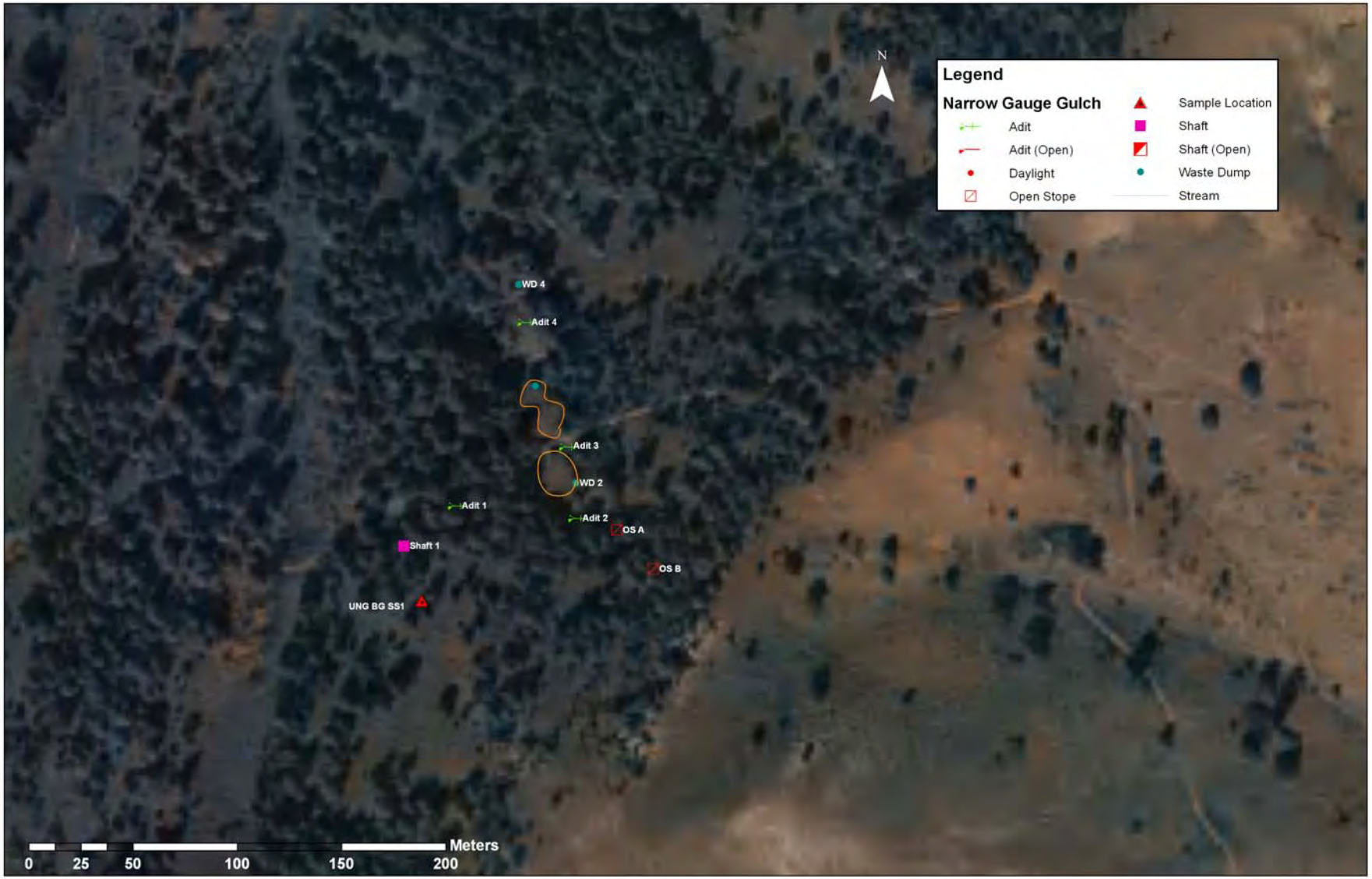

Figure 3
PASS GROUP WORKINGS

View to the ESE. Open stope in the UNG (Pass Group) workings. Veinlets of gray sulfides, dipping 50-80º E within iron-stained argillite.

View to north. Two tiered UNG WD # 3(Pass Group) consisted of mostly weathered shale-argillite and arsenopyrite in coarse stockwork. The waste dump was estimated to contain <2500 of material. No samples were collected.

- The *middle portion*, shown in Figure 4, consists of seven (7) caved adits and one (1) open shaft and one (1) closed shaft and their associated waste dumps. The largest waste dump (#6) was estimated to contain >5000 cubic yards of material. Water was observed discharging from Adit # 6. Shaft # 2, which may in fact be an open raise, possibly connected to Adit #7, measured 50 feet by 15 feet, with an unknown depth.

View to NE. Head-frame and hoist at NG Shaft # 1. The shaft is closed.

View to NNE across NG Adit # 6 waste dump. The very small wetlands (center) which crosses the landing is covered by adit discharge. Sediment and surface water samples were collected.

View to NNE. NG WD # 6, trestle (top center), estimated to contain >5000 cubic yards of material.

View to SE. Looking down into open Shaft 2 at the Pass Group, unknown depth.

Figure 4
Pass Group

View to ESE from WD # 8. Pass Group workings: WD # 5 (top center) above the road, WD # 6 (upper left) large dump, WD # 7 (upper right).

- The *lower portion*, shown in Figure 5, consists of two (2) caved adits. The workings are located across the gulch on a ridge spur, adjacent to the old road which leads to the Red Cloud Mine. Both of these workings are shallow and dry. The largest waste dump was estimated to contain <200 cubic yards of material.


Legend
Narrow Gauge Gulch
Adit
Adit (Open)
Daylight
Open Stope
Sample Location
Shaft
Shaft (Open)
Waste Dump
Stream
N
Pass Group
Adit 8
Adit 9
WD 8
WD 9
Narrow Gauge Gulch
Meters
0
25
50
100
150
200

Figure 5

The Narrow Gauge Mine lies adjacent to the creek and is readily accessible from the old road. The portal to Adit # 1 is open, but caved a few meters beyond. A daylight opening in the tunnel's back is visible from the slope above. Water was observed discharging from the portal into the creek. Open stopes, trending northwest-southeast, were noted on the hill above the portal. The steep headwalls are particularly dangerous when approached from above. The openings were estimated at 40 meters in length, 1-2 meters in width and at least 6 meters in depth. Water was observed discharging from Adit # 2, which in turn fed a small (<.1 acres) wetlands area. Surface water samples were collected from both of these adit locations. Both Adit # 2 and Adit # 3, located in a draw approximately 0.25 miles to the southeast, are caved.

Miscellaneous workings, located on the hillside west of Narrow Gauge, consisted of three (3) caved adits and one (1) partially open adit. All of these workings were dry. The open adit (#13) was mostly caved, but a crawl space was apparent. Figure 6 illustrates the location of these workings and sample collection sites.

View to ESE. LNG Adit # 1. Surface water (foreground) emanated from beneath rubble pile in front of adit opening. Based upon historical records, this appears to be the main level of the Narrow Gauge Mine.

Daylight opening through back of Adit # 1

View to E. Adit # 1 (upper left) discharging water across landing toward Narrow Gauge Gulch (not pictured at lower right)

View to NW. Open stope above Adit # 1, NW terminus.

View to SE. Mid-point of exposed open stope. Stays noted (in shadow at center)

View to SE. Open stope, depth unknown.

View to NW. Upper terminus of open stope.

View to NNW. WD # 2, the dump has been used as a hunting camp

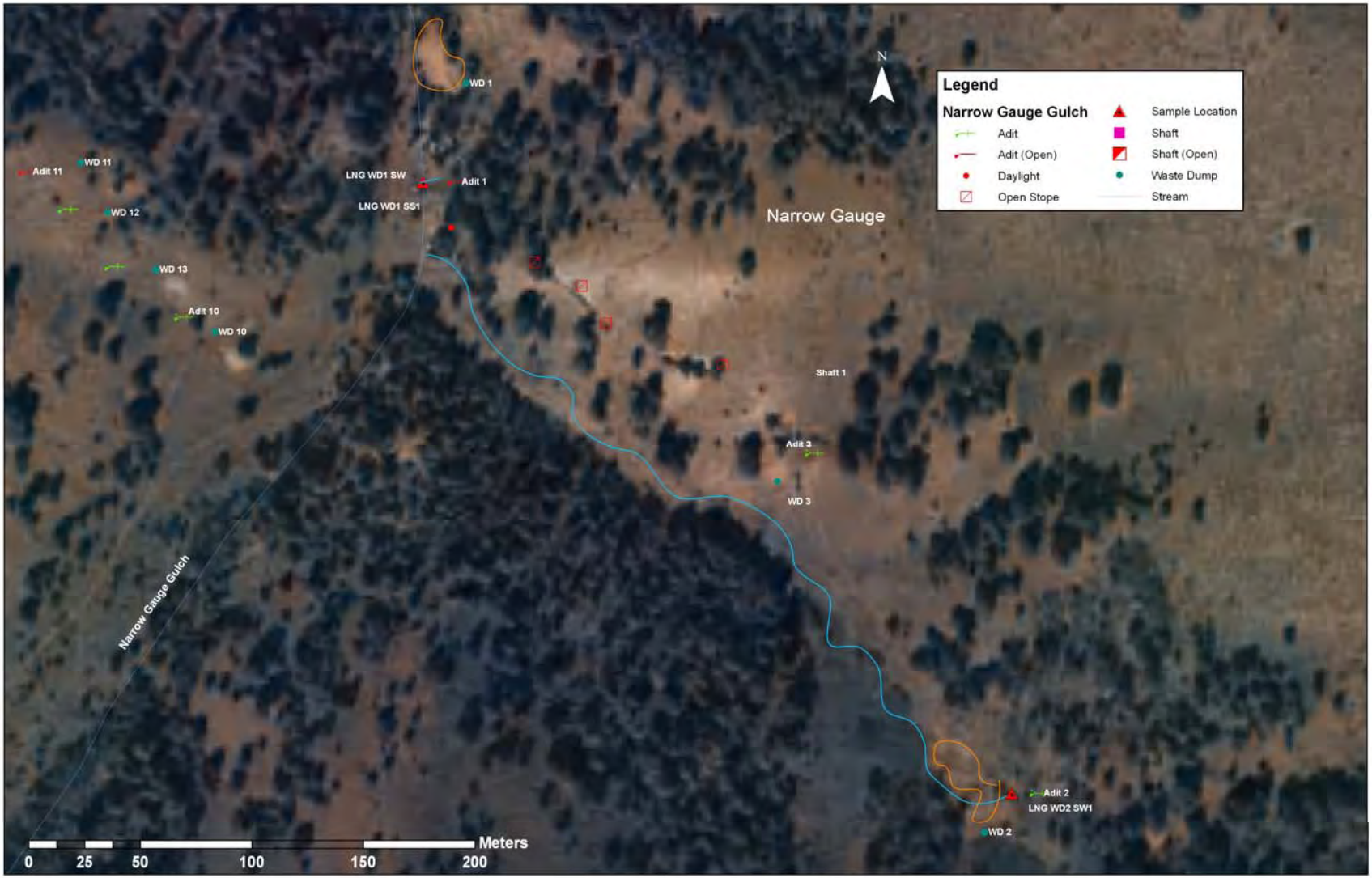

Figure 6
Narrow Gage Mine

The Mill Site area stretches across Deer Creek's channel to the mouth of Narrow Gauge Gulch. The area is heavily vegetated and no milling features or remnant structures could be discerned. Likely, the Walla Walla and Manchester patented claims never supported milling operations. Figure 7 shows the relative location of these patents.

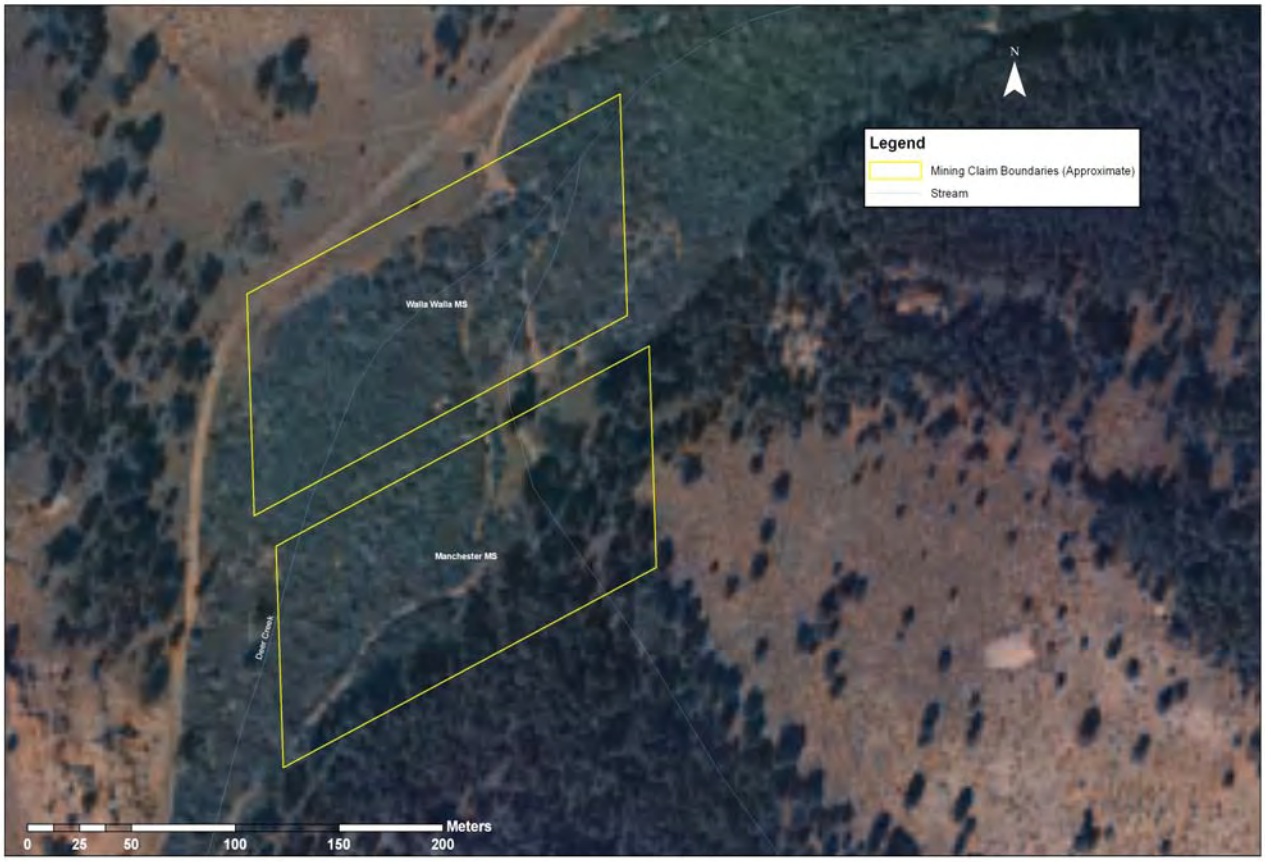

Figure 7
Walla Walla and Manchester Mill Sites

View to SE, across millsite claims, Narrow Gauge Gulch (upper right)

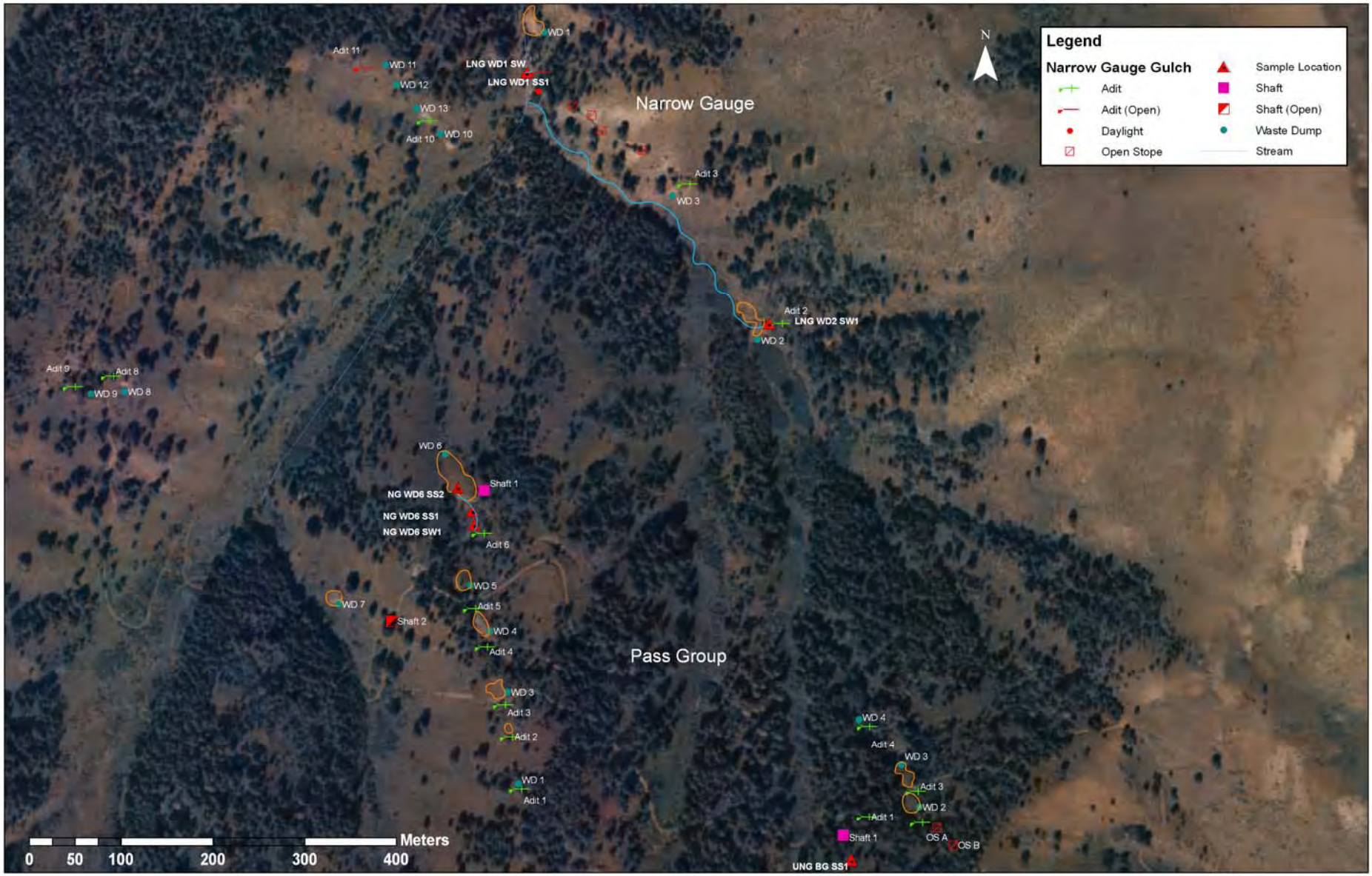
Legend
Narrow Gauge Gulch
Adit
Adit (Open)
Daylight
Open Stope
Sample Location
Shaft
Shaft (Open)
Waste Dump
Stream
N
Narrow Gauge
Pass Group
WD 1
Adit 11
WD 11
WD 12
WD 13
Adit 10
WD 10
LNG WD1 SW
LNG WD1 SS1
Adit 3
WD 3
Adit 2
LNG WD2 SW1
WD 2
Adit 9
Adit 8
WD 9
WD 8
WD 6
Shaft 1
NG WD6 SS2
NG WD6 SS1
NG WD6 SW1
Adit 6
WD 5
WD 7
Adit 5
Shaft 2
WD 4
Adit 4
WD 3
Adit 3
Adit 2
WD 1
Adit 1
WD 4
Adit 4
WD 3
Adit 3
WD 2
Adit 1
Shaft 1
OS A
OS B
UNG BG SS1
Meters
0
50
100
200
300
400

Figure 8

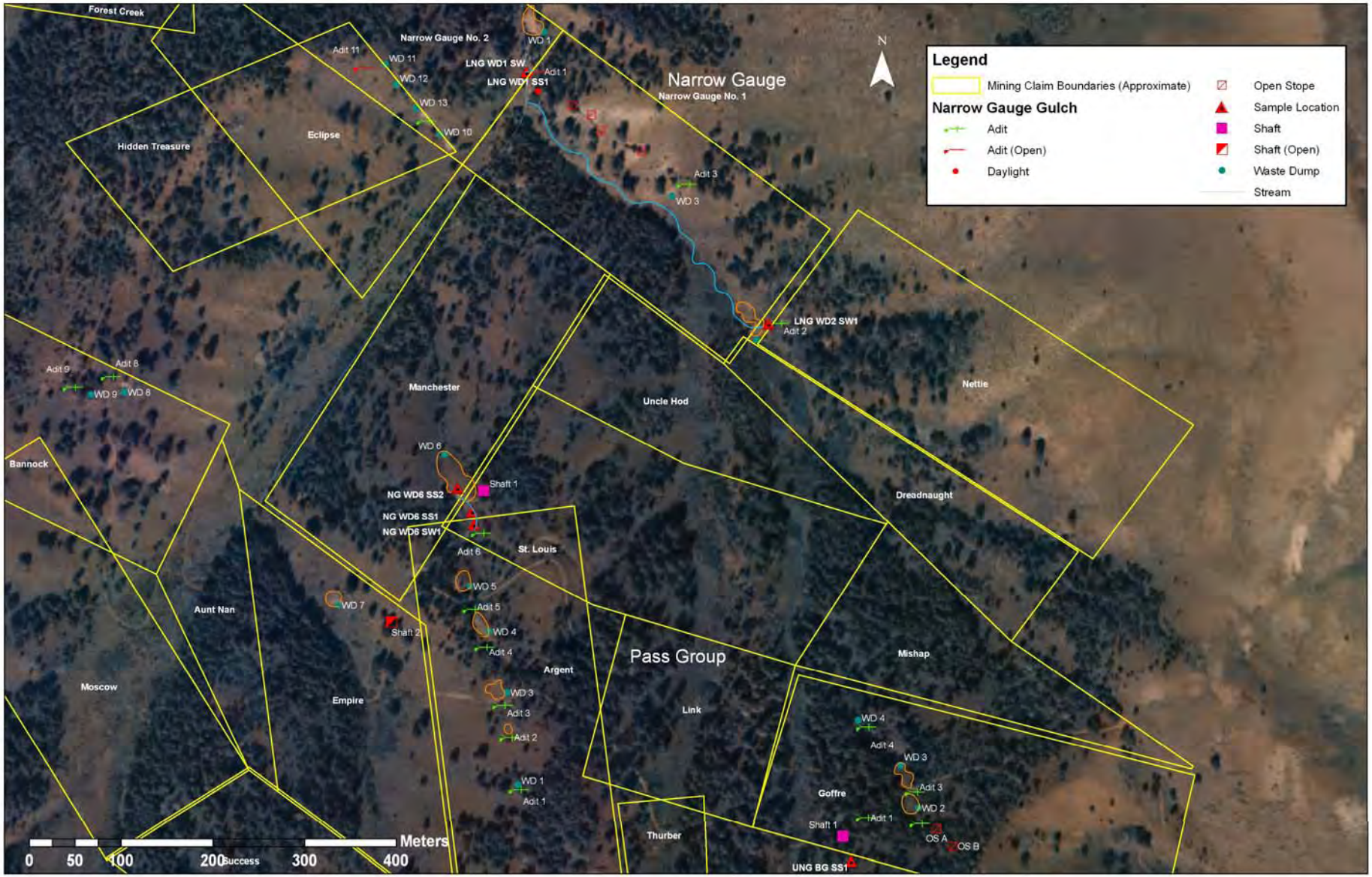
Forest Creek
Narrow Gauge No. 2
WD 1
Adit 11
WD 11
LNG WD1 SW
Adit 1
WD 12
LNG WD1 SS1
WD 13
WD 10
Hidden Treasure
Eclipse
Narrow Gauge
Narrow Gauge No. 1
N
Legend
Mining Claim Boundaries (Approximate)
Narrow Gauge Gulch
Adit
Adit (Open)
Daylight
Open Stope
Sample Location
Shaft
Shaft (Open)
Waste Dump
Stream
Adit 3
WD 3
LNG WD2 SW1
Adit 2
Adit 9
Adit 8
WD 9
WD 8
Manchester
Uncle Hod
Nettie
Bannock
WD 6
Shaft 1
NG WD6 SS2
NG WD6 SS1
NG WD6 SW1
Adit 6
St. Louis
Dreadnaught
WD 5
Adit 5
WD 7
Shaft 2
WD 4
Adit 4
Aunt Nan
Pass Group
Mishap
Argent
Moscow
WD 3
Empire
Adit 3
Link
Adit 2
WD 1
Adit 1
WD 4
Adit 4
WD 3
Adit 3
Goffre
WD 2
Shaft 1
Adit 1
OS A
OS B
Thurber
UNG BG SS1
Meters
0
50
100
200
300
400

Figure 9

Section 6 Geology

Figure 10 illustrates the lithology and structural geology at the Narrow Gauge Mine and surrounding area. In 1930, J.B. Umpleby, L.G. Westgate and C. Ross briefly described the geology and workings of the Narrow Gauge Mine and Pass Group, respectively.

> *...It lies near the quartz monzonite contact with Pennsylvanian rocks (Wood River formation), which here consist of massive fine-grained sandstone and black calcareous shale...*
>
> *The vein, a narrow fissure that strikes northwest and dips 85º SW., is developed by two shafts and several tunnels, nearly all of which are now accessible*[sic]. *As described by Lindgren the ore consisted of galena, zinc blende, and a little chalcopyrite and occurred as streaks and bands in a siderite gangue. The main pay shoot was found above the lowest tunnel on the south claim* (pp. 165-166).

The workings of the Pass Group patents are detailed in the following:

> *...It lies within the area in sedimentary rocks a few hundred yards back from the quartz monzonite....*
>
> *The group is developed by four principal tunnels, only the lower of which, at an altitude of 7,300 feet, was accessible in 1913, when visited by Umpleby. It was not visited during the examination made by Ross in 1923. Several shoots of ore extend upward from this level, but little ore is now in sight. Between the shoots the roof of the tunnel shows clay gouge as much as 6 feet wide, which is locally replaced by vein quartz studded thickly with pyrite and sparsely with galena and sphalerite. Clean walls with an average strike of N. 20º W. and dip of 60º NE. border the gouge seam. This vein is crossed by another that strikes more westerly; the principal ore body, an irregular curved mass, roughly followed their intersection. Lindgren reports that on level 6 (presumably next above the one accessible in 1913) the principal ore shoot contained chiefly galena and that a shoot of gray siderite was found near the face of the tunnel* (ibid).

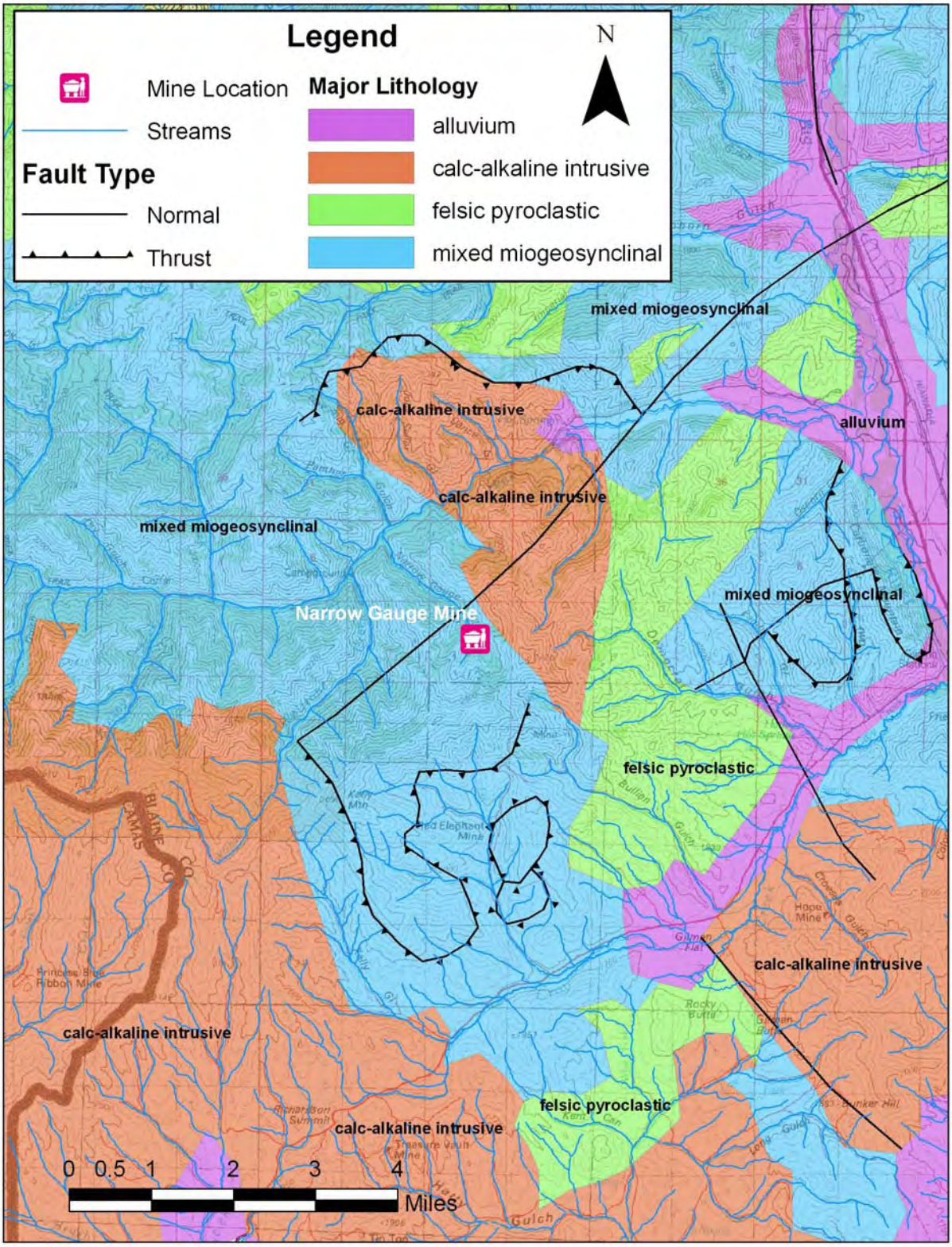
Legend
Mine Location
Streams
Fault Type
Normal
Thrust
Major Lithology
alluvium
calc-alkaline intrusive
felsic pyroclastic
mixed miogeosynclinal
N
mixed miogeosynclinal
calc-alkaline intrusive
alluvium
calc-alkaline intrusive
mixed miogeosynclinal
Narrow Gauge Mine
mixed miogeosynclinal
felsic pyroclastic
calc-alkaline intrusive
calc-alkaline intrusive
felsic pyroclastic
calc-alkaline intrusive
0 0.5 1 2 3 4
Miles

Figure 10

> *The Hailey-Bellevue mineral belt is underlain by a varied assemblage of sedimentary and igneous rocks, which, except for volcanics of mid-Tertiary age and some still younger unconsolidated sedimentary rocks, are all older than the ore deposits. The earlier rocks include fairly wide exposures of the Milligen and Wood River formations-the host of so many of the ore deposits in the Wood River region-and also rather large intrusive bodies of diorite and quartz monzonitic rock which are regarded as outliers of the Idaho batholith. There is also a younger group of intrusive rocks which are of more pertinent interest because of their close association with the mineralization.…In addition to the Milligen formation (Mississippian age) and the Wood River formation (Pennsylvanian age), the area contains some strata in and beneath a series of Tertiary volcanics (Oligocene) and much poorly consolidated and unconsolidated slope wash, terrace gravels, and stream alluvium of Quaternary age.* (Anderson, 1950, p. 2)

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

Numerous previous studies of the geology and mineral resources of the Wood River and adjacent areas have been made. Geologic studies have been conducted to investigate mineral deposits (Lindgren, 1900 & 1933; Umpleby et al, 1930; Anderson and Wagner, 1946; Anderson et al, 1950; Hall et al, 1978; Wavra and Hall, 1989; Link and Worl, 2001; Worl and Lewis, 2001); individual formations and units (Hall et al, 1974; Sandberg et al, 1975; Wavra and Hall, 1986; Worl and Johnson, 1995); quadrangles (Batchelder and Hall, 1978; Mitchell et al, 1991; Kiislgaard et al, 2001) and to compile regional information (Rember and Bennett, 1979). Preliminary and environmental assessment investigations have been conducted to assess current and potential impacts from historic mining in the region (Mitchell and Gillerman, 2005; IDEQ, 2002 & 2006; IDEQ & USEPA, 2006 & 2007). Link and Worl (2001) reviewed previous geologic and historic information relating to stratigraphy and mineralization relationships in the Mineral Hill district, including Red Elephant Gulch.

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

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

Section 7 Current and Potential Future Land Uses

Current land uses in the area include biking, hiking, hunting, horseback riding and off-road vehicle (OVR) touring. Narrow Gauge is accessible from Deer Creek, Bullion Gulch and Wolftone Creek roads. ORV enthusiasts, woodcutters and hunters appear to somewhat maintain the local trail system. As detailed in the Section 3 of this report, the most direct route approaches the gulch from Deer Creek. A second road climbs from Wolftone Creek through the Red Cloud Mine, while the third road extends north from Bullion Gulch.

Fish Species Observed

Fish presence/absence studies have not been conducted in Narrow Gauge Gulch to confirm any fish species that may reside in this stream. However, visual observations in Deer Creek and nearby Wolftone Creek confirm the presence of brook trout [Salvelinus foninalis]. Redband rainbow trout [*Oncorhynchhus mykiss* gairdneri], mountain white fish [Prosopium williamsoni], wood river sculpin [Cottus leiopomus], and brook trout [Salvelinus foninalis] are present within the Big Wood River (IDFG, 2000). 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.

Apparent Wetlands

Wetland surveys near the site were reviewed (USFWS, 2007) along with aerial photographs (see Figure 11). These indicate that the nearest wetlands are located in Narrow Gauge Gulch, created from adit discharges, and in Deer Creek. Overland transportation of mine and mill waste entering Narrow Gauge Gulch may occur seasonally, but their subsequent deposition was not readily identified along the lower reaches of the gulch.

Future Land Use

Future land use could potentially include some year-round and/or seasonal homes on the private parcels of property in the sub-basin, owing to its close proximity to Hailey.

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

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

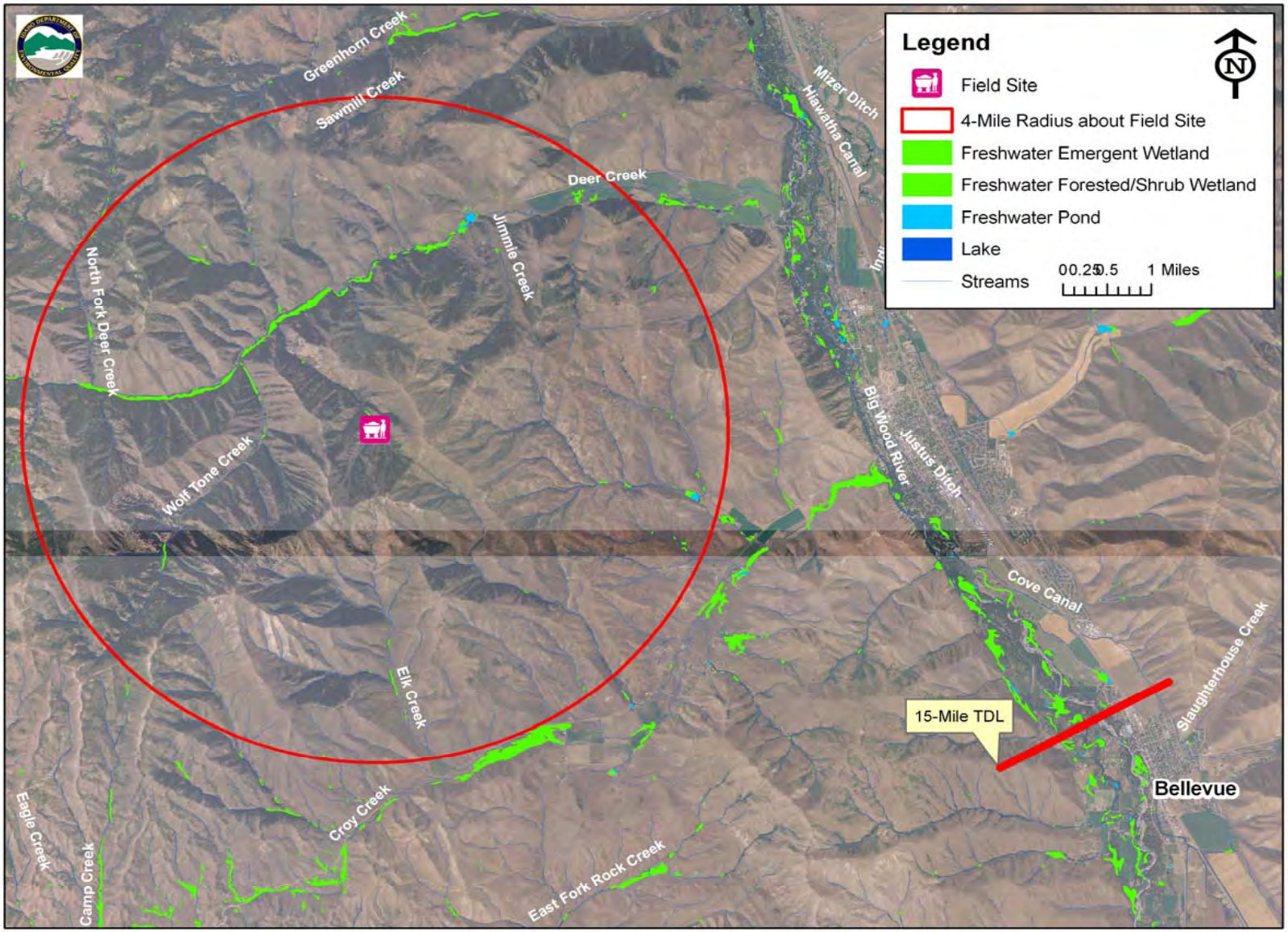
Legend
Field Site
4-Mile Radius about Field Site
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Lake
Streams
0 0.25 0.5 1 Miles
Greenhorn Creek
Sawmill Creek
Deer Creek
Jimmie Creek
North Fork Deer Creek
Wolf Tone Creek
Elk Creek
Croy Creek
Eagle Creek
Camp Creek
East Fork Rock Creek
Mizer Ditch
Hiawatha Canal
Big Wood River
Justus Ditch
Cove Canal
Slaughterhouse Creek
15-Mile TDL
Bellevue

Figure 11

Section 8 Waste Sampling and Characterization

Sample Collection

Waste

Two sediment samples (NGWD6SS-1 & LNGWD1SS-1) were collected from the landing areas of Adit # 6 at the Pass Group and Adit # 1 at the Narrow Gauge Mine. One soils/waste sample (NGWD6SS-2) was collected from the waste dumps corresponding to Adit # 6 and Shaft # 1.One soils sample (UNGBGSS-1) was collected for background analysis of soils.

Each soil sample collected was, initially approximately ten (10) pounds in size. Each sample location (except stream sediment samples) 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 an 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 samplers. It was then placed in a cloth sample bag which was marked exactly the same way. Sample descriptions were entered into field log books for this analysis. The samples were logged on a standard chain-of custody lab submittal form and placed on ice in a cooler. Once samples were taken to IDEQ's field office at the end of the day they were placed in secure storage to await shipping.

Water

Three surface water samples were collected from adit discharges. These included: Adit # 6 at the Pass Group (NGWD6SW-1) and Adit # 1 (LNGWD1SW-1) and Adit # 2 (LNGWD2SW-1) at the Narrow Gauge Mine. No surface water background samples were collected, owing to the lack of discernable seeps or springs above these workings.

While dry, sample bottles were appropriately marked with location, location description, samplers, date and time, preservatives and desired lab analysis. Sample bottles were rinsed three times using water from the creek, effluent or in-stream flows below the PPEs. The sample bottles were filled by submerging the bottles back into the source. Once filed, the samples were preserved using pre-measured ampules of nitric acid that accompanied sample bottles from SVL Laboratories. The full sample bottles were then placed in sterile plastic zip lock bags, logged on a standard chain-of custody lab submittal form and placed on ice. Once samples were taken to IDEQ's field office at the end of the day, they were placed in a freezer to await shipping.

Sample Description

Soils

Background Sample **UNGBGSS-1** was collected on the north facing slope of the ridgeline separating Narrow Gauge Gulch and Bullion Gulch. This sample site location is just above the upper workings of the Pass Group. The location for the sample was in heavy forest with a thick blanket of organic matter. This matter was cleared away from the sample location until very little organics were observed. The sample location was then excavated approximately 6 more inches in very coarse rock and soil. The sample was brown or buff colored and appeared to be very weathered fine- grained shale. Approximately 50% of the sample passed the 10 mesh sieve, and more than 50% was plus 1" rock with very little woody debris.

Sample **NGWD6SS-1** was collected from a shallow discharge stream in the landing area adjacent to Adit # 6 at the Pass Group. The sediment contained 40% solids (olive green-brown), 10-20% organic material, fine to very fine-grained.

Sample **NGWD6SS-2** was a composite sample collected from waste rock material on the dump. The sample contained some coarse fragments greater than 3". After hand sorting to dispose of the plus 1" material the dump sample was still coarse with <50% passing the 10 mesh screen and about 50% being between ¼" and 1" in size. The sample was generally brown or buff colored, but there was clear evidence of altered sulfides in the mix.

Sample **LNGWD1SS-1** was collected from a shallow discharge stream in the landing area adjacent to Adit # 1 at the Narrow Gauge Mine. The sediment contained 60% solids (buff-brown) and 10-20% organic material.

Water

Sample **NG WD6 SW-1** was collected at the base of the caved portal of Adit # 6 at the Pass Group. The stream, which separated into two branches, flowed across the landing area before infiltrating into the waste rock. A small wetland, measuring approximately 24 square meters, was sustained by the flow. No odors were detected and the vegetation did not appear stressed.

Sample **LNG WD1 SW-1** was collected below the partially collapsed portal of Adit # 1 at the Narrow Gauge Mine. The discharge was observed to flow across the landing and into Narrow Gauge Gulch, a distance of nearly 25 meters. A small wetland, measuring approximately 60 square meters, was sustained by the flow. No odors were detected, the moss was clear and the vegetation did not appear stressed.

Sample L**NG WD2 SW-1** was collected at the base of the caved Adit # 2 at the Narrow Gauge Mine. The discharge was observed to flow along the upper edge of the waste dump and into the adjacent ephemeral drain. Vegetation did not appear stressed, nor were odors apparent.

Sample Analysis

IDEQ Sample Analysis of stream sediment and waste dumps sample analysis is presented in Table 1. Samples were analyzed for Total Recoverable Metals (Totals), but subsequent TCLP analyses were not performed. 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).

The background soil sample **UNGBGSS-1** was collected above the Pass Group near the ridgeline between Bullion and Narrow Gauge Gulch(s). However, a background water sample was not obtained due to the lack of sources upgradient from Adit # 6. Water sample analyses are presented in Table 2.

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

	IDEQ Initial Default Threshold Level (IDTL) values	EPA Region 6 Human Health Screening Criteria	Upper Narrow Gauge Gulch Background Soil Sample	Pass Group Waste Dump # 6 Sediment Sample	Pass Group Waste Dump # 6 Soil Sample	Narrow Gauge Mine Waste Dump # 1 Sediment Sample
Description			UNGBGSS-1	NGWD6SS-1	NGWD6SS-2	LNGWD1SS-1
Arsenic	0.391	**23**	54	649*	817*	79
Barium	896	**1600**	191	55	96.7	14.2
Cadmium	1.35	**39**	9.79	265*	13.4	13.6
Chromium	7.9	**210**	31.9	20.5	21	21.2
Copper	921	**2900**	38.6	188*	36.4	10.3
Lead	49.6	**400**	357	279	115	1330*
Mercury	0.00509	**23**	0.090	0.262*	6.9*	0.310*
Selenium	2.03	**390**	<4	<4	<4	<4
Silver	0.189	**390**	4.04	<0.50	0.68	4.96
Zinc	886	**23000**	1010	28300*	1230	1000
	At or Exceeds IDTLs					
*	At or Exceeds Background Levels by 3 times					
	At or exceeds EPA Region 6 HHSLs					

Note: MDL for Se exceeds IDTL value

Sample Analysis indicates that the mine concentrations for total arsenic, total cadmium, total chromium, total lead, total mercury, total silver and total zinc exceed Idaho's *Initial Default Target Levels* (IDTLs). These IDTLs are risk-based target levels for certain chemicals that have been developed by IDEQ using conservative 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 qualify true risk under current site conditions.

Generally speaking, soils analysis indicates that the heavy metals of concern for the site are arsenic (817 ppm), cadmium (265 ppm), lead (1,330 ppm) and zinc (28,300 ppm), which far exceeds IDTLs, EPA Region Six's Human Health Screening levels and background conditions. These numbers, although used for comparison even at remote locations, are more applicable in locations were 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 Narrow Gauge-Pass Group mines, these numbers would be more indicative that additional site assessment should be undertaken if the sites were to be developed for "unrestrictive uses", specifically "residential", in the future.

Table 2: IDEQ Water Samples Total Recoverable Metals Analysis (mg/L)

(Standards in "dissolved" unless stated)

Narrow Gauge Gulch

Description	IDEQ Ground Water Standard (T)	IDEQ Drinking Water Standard MCL	IDEQ Cold Water Biota Standard Acute	IDEQ Cold Water Biota Standard Chronic	Adit No. 6 Discharge Pass Group NG WD6 SW1	Adit No. 1 Discharge Narrow Gauge LNG WD1 SW1	Adit No. 2 Discharge Narrow Gauge LNG WD2 SW1
Arsenic	0.01	0.01	0.36	0.19	<0.025	<0.025	**0.60**
Barium	2	2			0.0051	0.0085	0.433
Cadmium	0.005	0.005	0.00082 (H)	0.00037 (H)	0.0082	0.0046	**2.60**
Chromium (Total)	0.1	0.1			<0.0060	<0.0060	0.091
Copper	1.3		0.0046 (H)	0.0035 (H)	<0.010	<0.010	0.24
Lead	0.015	0.015	0.014 (H)	0.00054 (H)	<0.0075	0.0655	1.470
Mercury	0.002	0.002	0.0021	0.000012 (T)	<0.00020	<0.00020	<0.00020
Selenium	0.05	0.05	0.018 (T)	0.005 (T)	<0.040	<0.040	<0.040
Silver	0.1*		0.00032 (H)		<0.0050	<0.0050	<0.0050
Zinc	5*		0.035 (H)	0.032 (H)	1.22	0.239	**128**

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

Sample analyses indicate elevated levels of arsenic, cadmium and zinc from the Adit 2 discharge. Although these values exceed the IDEQ standards, these concentrations were relatively

unremarkable due to the area’s remoteness, and the lack of connectivity with Deer Creek on the valley floor

Section 9 Pathway and Environmental Hazard Assessment

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

Ground Water

Ground water flow is expected to be controlled structurally within faults and brecciated zones in the country rock and be expressed at the surface as springs. The discharge from the Narrow Gauge and Pass Group adits appears fairly minimal, perhaps owing to more pervasive conduits within the local strata. Other than those adit discharges no other springs were noted or mapped near the mines.

Shallow ground water and surface waters are inextricably related in Narrow Gauge Gulch downstream in Deer Creek, as both are bounded by meta-sedimentary and crystalline bedrock and flow through or on top of the valley fill colluvium. The amount of recharge of regional aquifers by surface and ground water in the Narrow Gauge Gulch area is unknown.

According to Idaho Department of Water Resources July 2002 records, 13 private drinking water wells are located within a 4-mile radius of the site. The closest domestic wells (3) are located to the northeast along Deer Creek at Clarendon Hot Springs, 2.75 air miles and approximately 5.25 miles downstream from the Narrow Gauge Mine (Adit # 1). No wells were sampled. There are no known persistent water quality problems in the area water supply wells.

During the cleanup activities of the nearby mines, such as Triumph and the Minnie Moore Mill site, the first concerns were related to potential human health risks as a result of contamination of public and private drinking water supplies. Generally speaking, contamination of drinking water systems was thought likely to occur from two types of sources (ore bodies and waste dumps) and along three pathways, as illustrated by the following three scenarios. First, heavy metals are leached from mine waste dumps, enter ephemeral or perennial drains and then contaminate the area's shallow ground water system. Second, heavy metals leach from the local ore bodies and are transported through the geologic structure to the shallow ground water. Third, heavy metals could leach out of the ore bodies, and be discharged from the underground workings as adit water, that is then conveyed through ephemeral and perennial drains to the shallow ground water systems.

For the purposes of completing Preliminary Assessments, Source Water Assessments (completed for local public drinking water supplies) were used to identify any known affects to those systems. Although IDEQ's Source Water Assessments were used to evaluate potential affects of this mine on public drinking water supplies no inferences can be made about the affects that this and adjoining mines have on local private wells.

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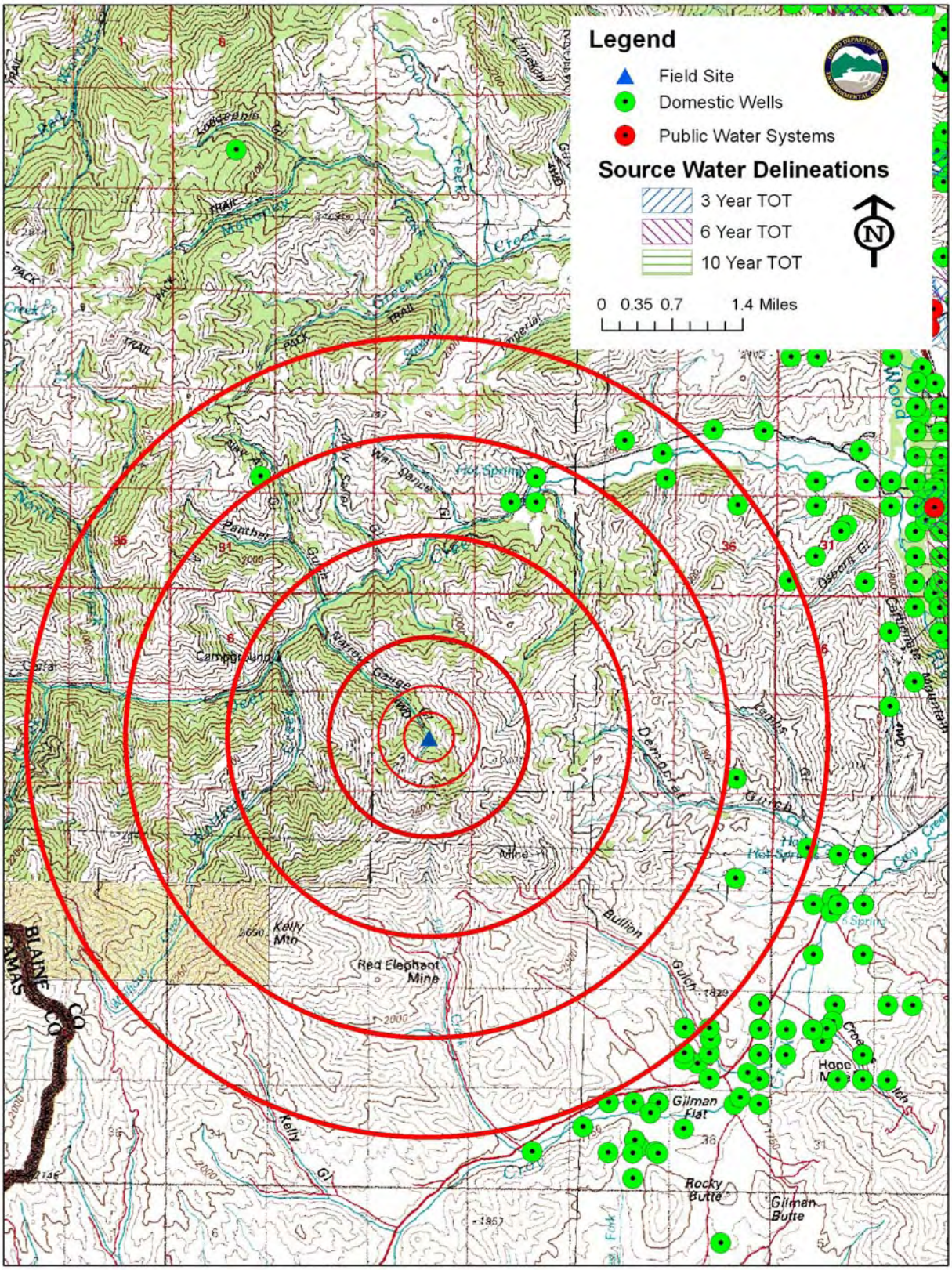
Legend
Field Site
Domestic Wells
Public Water Systems
Source Water Delineations
3 Year TOT
6 Year TOT
10 Year TOT
N
0 0.35 0.7 1.4 Miles
Red Elephant Mine
Kelly Mtn
Gilman Flat
Rocky Butte
Gilman Butte
Bullion Gulch
Hot Spring
Campground
BLAINE CO
CAMAS CO

Figure 12

Source water assessments provide information on the potential contaminant threats to public drinking water sources. In the Big Wood River Valley Idaho, most of those sources (>95%) are ground water (IDEQ 2000). Each source water assessment:

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

Each assessment is summarized in a report that describes the above information and provides maps of the location of the public water system, the source area delineation, and the locations of potential contaminant sources. Idaho began developing source water assessments in 1999, and in May 2003 met its obligation under the amendments of the Safe Drinking Water Act by completing delineations for all 2100+ public water systems that were active in Idaho as of August 1999 (IDEQ 2000). Source water assessments for new public drinking water systems are being developed as those systems come online. Each public water system is provided with two copies of its final assessment report. Four source water assessments for drinking water supplies have been used in this Preliminary Assessment Process to evaluate the potential impacts to both public and private drinking water supplies in and around Sun Valley, Ketchum, Hailey and Bellevue.

The information extrapolated from these reports is based on data that existed at the time of their writing, and the professional judgment of IDEQ staff. Although reasonable efforts were made to present accurate information, no guarantees, including expressed or implied warranties of any kind are made with respect to these reports or this Preliminary Assessment by the State of Idaho or any of its agents who also assume no legal responsibility for accuracy of presentation, comments or other information in these publications or this Preliminary Assessment report. The results should not be used as an absolute measure of risk, and they should not be used to undermine public confidence in public drinking water systems.

The Source Area delineation process establishes the physical area around a well or surface water intake that becomes the focal point of the source water assessment. The process includes mapping the boundaries of the zone of contribution (the area contributing water to the well or to the surface water intake) into time of travel zones (TOT) indicating the number of years necessary for a particle of water to reach a well or surface water intake (IDEQ 2000). The size and shape of the source water assessment area depend on the delineation method used, local hydrogeology, and volume of water pumped from the well or surface water intake.

IDEQ used a refined computer model approved by EPA to determine the 3-year (Zone 1B), 6-year (Zone 2), and 10 year (Zone 3) time of travel associated with the Big Wood River Aquifer and its sources (IDEQ 2000). This information is illustrated in Figure 12.

This process involves collecting, recording, and mapping existing data and geographical information system (GIS) coverage to determine potential contaminant sources (e.g., gas stations) within the delineated source water assessment area. The potential contaminant source inventory is one of three factors used in the susceptibility analysis to evaluate the overall potential risk to the drinking water supply (IDEQ 2000). The inventory process goal is to locate and describe those

facilities, land uses, and environmental conditions that are potential sources of ground water or surface water contamination.

This susceptibility analytical process determines the susceptibility of each public water system well or surface water intake to potential contamination within the delineated source water assessment area. It considers hydrogeologic characteristics, land use characteristics, potentially significant contaminant sources, and the physical integrity of the well or surface water intake. The outcome of the process is a relative ranking into one of three susceptibility categories: high, moderate, and low. The rankings can be used to set priorities for drinking water protection efforts (IDEQ 2000).

There are numerous public and private drinking water supplies in the Big Wood River Basin. The Sun Valley Water and Sewer District operates and maintains nine wells in two groupings (IDEQ 2000). The City of Ketchum drinking water system consists of seven wells in two groupings. The City of Hailey's drinking water system consists of six wells and a spring (IDEQ 2000).The City of Bellevue drinking water system consists of two wells and three springs (IDEQ 2000).

Generally speaking, public drinking water systems in the Big Wood River Valley are rated as moderate to high (IDEQ 2000). Multiple factors affect the likelihood of movement of contaminants from the sources to the aquifer, which led to this moderate to high score. Soils in the area are poorly to moderately drained. The vadose zone is predominantly gravel, which increases the score. On the valley floors the average depth to ground water is twenty to fifty feet.

To date, routine water quality monitoring of public drinking water indicates that there are no significant volumes of heavy metals migrating through the regional or localized ground water systems. There is no current, long term or recurring water chemistry problems in the City of Ketchum's drinking water sources. Arsenic, nickel, antimony, barium, selenium, chromium, cyanide and nitrate have been detected in Ketchum's wells, but all were well below MCLs (IDEQ 2000). There is no long term or recurring water chemistry problems in the City of Hailey's drinking water sources. Manganese, zinc, chromium, and mercury have been detected in Hailey's wells, but all were well below MCLs (IDEQ 2001). Currently, there are no data that indicate that any metal concentrations have exceeded MCLs in the Bellevue drinking water systems (IDEQ 2000).

Surface Water

The mine discharge from Adit 6 at the Pass Group was observed to infiltrate into the waste rock. The adit water was not observed to resurface, either along the toe of the dump or from the adjacent ground.

Two observed flows were identified discharging from the Narrow Gauge Mine's Adit 1 and Adit 2. Chemical analysis of the mine water discharge, which is minimal, indicates that the effluent contains unremarkable concentrations of metals.

Narrow Gauge Gulch drains northward for approximately 1.75 miles where it enjoins Deer Creek. The east flowing Deer Creek continues approximately 6.5 miles where it merges with the Big Wood River. The remainder of the 15-mile Target Distance Limit (TDL) lies within this river's drainage. The Big Wood River is an EPA CWA §303(d) listed stream.

Commercial or subsistence fishing does not occur within the 15-mile downstream distance, but sport fishing does. Redband rainbow trout [*Oncorhynchhus mykiss* gairdneri], mountain whitefish

[Prosopium williamsoni], wood river sculpin [Cottus leiopomus], and brook trout [Salvelinus foninalis] are, however, present within the Big Wood River (IDFG, 2000).

Soil Exposure and Air

Access to the mine sites is unrestricted from the Deer Creek, Bullion Gulch and Wolftone Gulch Roads. Human and ecological receptors may be exposed to soils and mine waste by inhalation, dermal contact and ingestion. As with most of the mine sites in the Big Wood River area, strong winds on hot summer afternoons suspends fugitive dust in the air, which may be inhaled. Visitors may also have direct contact with heavy metals in wastes while exploring the site.

Potential Receptors

Potential receptors include hikers, hunters, anglers, cattlemen, and trail riders (motorized and non-motorized). Sheep graze the surrounding area, but their presence within the mine site is minimal. Outdoor enthusiasts remain the highest percentage of human receptors, as they frequent the area for a number of recreational activities. The land within a two (2) mile radius of the site is primarily public land administered by the USDA Forest Service.

Schools, Day-Care Facilities, Private Residences

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

Plant and Animal Species of Concern

Camas Goldenweed and Long-legged Myotis were the only IDF&G listed species of concern (F&G, 2002) within a 4-mile radius of the mining site. Gray Wolves and North American Wolverines 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. The Species of Concern are illustrated in Figure 13.

Soil Sample Concentrations

Frequent exposure to heavy metals at the site for all receptors exists. Risks due to these exposures may be high particularly exposures to arsenic, cadmium and lead.

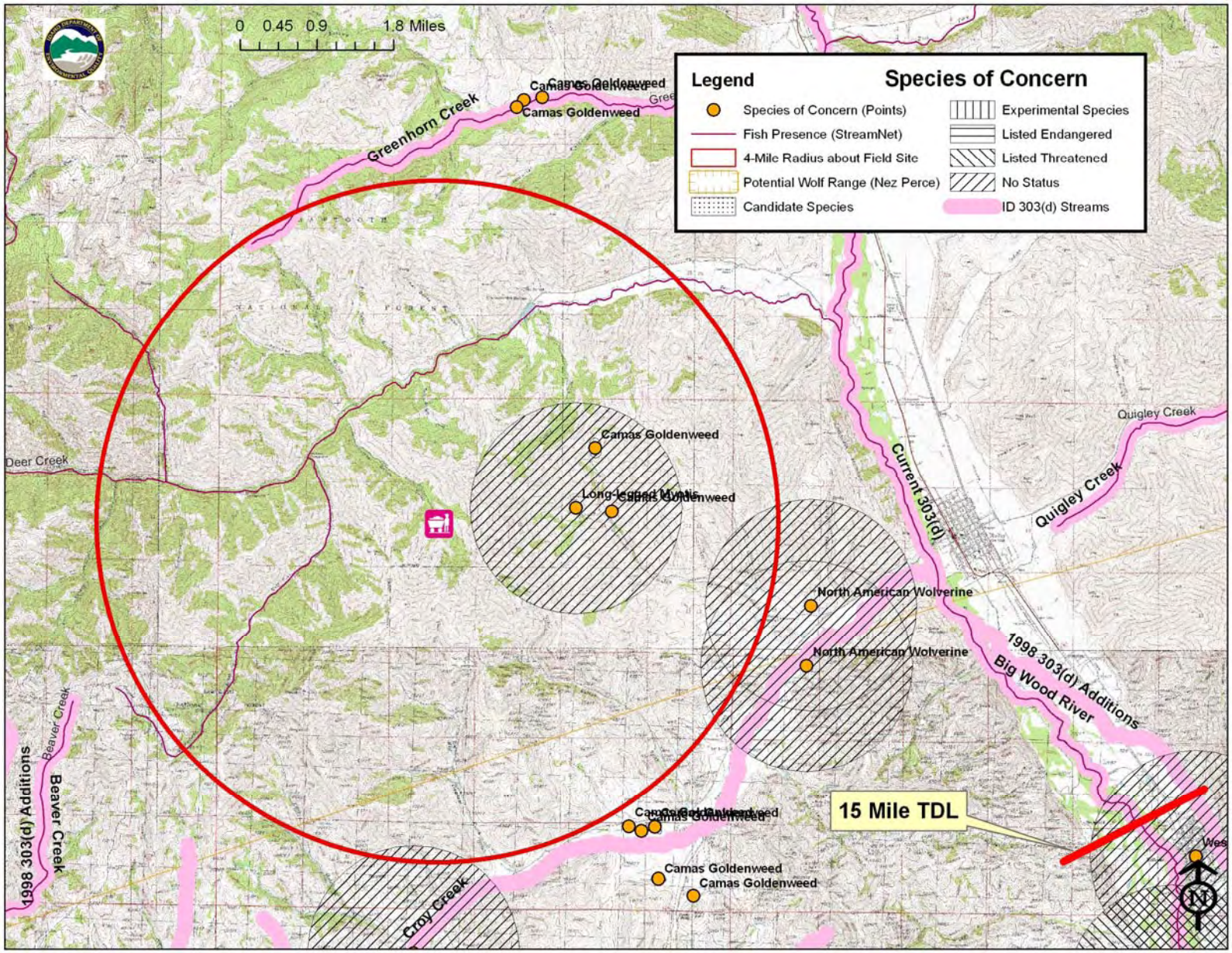
0 0.45 0.9 1.8 Miles
Legend
Species of Concern
Species of Concern (Points)
Fish Presence (StreamNet)
4-Mile Radius about Field Site
Potential Wolf Range (Nez Perce)
Candidate Species
Experimental Species
Listed Endangered
Listed Threatened
No Status
ID 303(d) Streams
Greenhorn Creek
Camas Goldenweed
Camas Goldenweed
Deer Creek
Camas Goldenweed
Long-legged Myotis
Current 303(d)
Quigley Creek
Quigley Creek
North American Wolverine
North American Wolverine
1998 303(d) Additions
Big Wood River
1998 303(d) Additions
Beaver Creek
Beaver Creek
15 Mile TDL
Camas Goldenweed
Camas Goldenweed
Croy Creek
N

Figure 13

Section 10 Summary, Conclusions and Recommendations

Although heavy metals concentrations in the mine wastes warrant some risk management in the form of access control is warranted. However, there are not sufficient volumes of waste to trigger extensive remedial actions on any of the properties. Based on the remoteness of the site, minimal area of exposure and few receptors, IDEQ is recommending to EPA that there is no calculation of a Hazard Ranking Score for the Pass Group, Narrow Gauge Mine and the miscellaneous workings within Narrow Gauge Gulch and that No Remedial Action is Planned for the site. However, IDEQ is also recommending to the owners that all of the mine openings should be closed. The most dangerous openings are: the open stopes and Shaft # 2, located in the Pass Group workings and the linear stopes in the Narrow Gauge workings. Most of these openings are directly accessible from frequently used ORV trails.

Presence of Wetlands

Official wetland surveys and aerial photographs of the area, wetlands exist on the site. Based observations and available wetlands data, existing wetlands in Narrow Gauge Gulch and downstream are probably not significantly impacted by this site.

Impacts on Water Quality

No overland connections were observed between seasonal runoff and nearby surface or ground water systems. Furthermore, source water assessments indicate that there are no adverse impacts to public or private drinking water supplies from mining in the area. If future development encroaches on the site, new wells drilled at the site would not be likely impacted by heavy metals from the site.

Potential Exposure for Wildlife, Livestock, 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 or livestock. Livestock and wildlife may be exposed at the site, particularly to elevated lead and silver concentrations, but relative to the extensive range of the livestock and wildlife, compared to the area of the dumps, it is unlikely that significant exposures to heavy metals occurs.

Potential Exposure for Humans

Human activity around the site is high due to the recreational values of the area. This site is frequently visited by mountain bikers, hikers, hunters, snowmobile operators, off-road four wheeling, and various other outdoor recreation enthusiasts. Humans may receive very small doses of heavy metals, especially arsenic, cadmium, chromium, lead, mercury, silver and zinc. Fugitive dust or direct contact with the waste piles appears to be the most significant route of exposure to humans for elevated constituents. Considering the site access is very easy, these exposure levels are likely and probably should be addressed.

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