Preliminary Assessment and Site Inspection Report for West Fork Mine
(aka West Fork #1, West Fork #2, Black Hawk, Yellow Jacket, and Satellite Lode.)

Blaine County

State of Idaho
Department of Environmental Quality

April 2021



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Acknowledgments

DEQ would like to thank the Taylor family for permitting access to West Fork Mine site.

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List of Acronyms

amsl	above mean sea level
ATV	all-terrain vehicle
CWA	Clean Water Act
DEQ	Idaho Department of Environmental Quality
DO	dissolved oxygen
EPA	United States Environmental Protection Agency
FSP	Field Sampling Plan
ft	feet
GIS	geographic information system
IDL	Idaho Department of Lands
IGS	Idaho Geological Survey
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NA	not available
NTU	nephelometric turbidity unit
ORP	oxidation reduction potential
PA	preliminary assessment
PPE	probable point of entry
ppm	parts per million
PWS	public water system
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
RSLs	regional screening levels
SAP	Sampling Analysis Plan
SC	specific conductivity
SI	site inspection
SVL	SVL Analytical, Inc.
SWA	source water assessment
TDL	target distance limit
TMDL	total maximum daily load
µs/cm	micro-Siemens per centimeter
USFWS	United States Fish and Wildlife Service

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1 Introduction

This report is the result of the preliminary assessment and site inspection (PA/SI) conducted at the West Fork Mine site in Blaine County, Idaho. The purpose of this PA/SI was to assess the threat posed to human health and the environment and determine the need for additional investigation at site. This PA/SI was performed at the request of the property owner.

Under a cooperative agreement with the United States Environmental Protection Agency (EPA) Region 10, the Idaho Department of Environmental Quality (DEQ) provides technical support for performing the PA/SI process at various mine and industrial sites located on private, state, or mixed ownership (public and private) lands. Additional information about DEQ's PA program can be found at: *https://www.deq.idaho.gov/*.

DEQ initiated the preliminary assessment (PA) program in February 2002 to prioritize and assess 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. In recent years, this priority focuses DEQ's efforts in areas where residential and recreational developments are encroaching on historic mining districts. Priority is also given to mining districts where groups or clusters of sites can be cost-effectively assessed on a watershed basis.

The PA/SI process is presented in the following sections:

- Section 2, **Site Description**, compiles desktop research information to present the location, ownership, general geology, and climatology for the site. Desktop research also includes compiling the operational history of past mining activities and current and potential future land uses.
- Section 3, **Sample Collection and Analysis**, describes the sampling locations and presents the analytical results.
- Section 4, **Migration/Exposure Pathways and Targets**, presents observations and potential targets for exposure pathways, such as surface water, ground water, soil, and air.
- Section 5, **Conclusions and Recommendations**, presents a summary of the PA/SI conclusions and recommendations based on the current conditions at the site and health and safety information.
- Appendix A, **Site Photographs**, includes photos taken during the site visits on September 9 and 23, 2020.
- Appendix B, **Analytical Laboratory Report**, includes the environmental sample results from the laboratory.
- Appendix C, **DEQ Factsheet**, "Historic Mining Areas: Health and Safety"

2 Site Description

The West Fork Mine site is located in Blaine County, Idaho, within the Warm Springs Mining District, approximately 4.5 miles west of Ketchum, Idaho (Figure 1). Mining activity at the site predominantly occurred in the late 19th and early 20th centuries. The site is on private property and was listed for sale at the time of this report.

Historic references used in the following sections may include alternative spellings for claim names, town sites, and/or geographic features. The spelling and usage from the original source documents has been retained.

2.1 Site Location

Site Name:	West Fork Mine
Latitude/Longitude:	43°40'56"N 114°27'38.6"W
Legal Description:	4N, 17E, 17
County:	Blaine, Parcel No. RP1M0000001610
Congressional District:	ID2
Site Owner:	N M Taylor 1735 Conant Avenue Burley, Idaho 83318
Site Contact:	Ms. Ryan Taylor 1726 Miller Avenue Burley, Idaho 83318

2.2 Site Description

The West Fork Mine site is a privately owned and abuts the Sawtooth National Forest on all sides. Within one-mile of the site are three other historic mines: Allen Mine, Moonlight Mine, and Silver Star Mine (IGS 2020). DEQ conducted a PA of the privately owned Allen Mine in 2007. The Moonlight and Silver Star mines are located on U.S. Forest Service (USFS) land.

The site is approximately 7,000-8,000 feet above-mean-sea-level (amsl). A north south ridgeline divides the site into east and west facing slopes, which have gradients between 15 and 35 degrees. The east facing slope is steeper and mostly barren. The west facing slope is timbered and impacted by the Castle Rock fire in 2007 (NIFC 2019).

During summer months, the site is accessible via Log Lane by off-road vehicle or via Trail #146 (Eve's Gulch Trail) by foot or non-motorized vehicle. The Eve's Gulch trail is a single-track dirt trail that connects the mine site to the Adam's Gulch Trailhead, located approximately 3-miles northeast. During winter months, site access is limited by snowfall. Debris from past avalanches could be seen along both sides of Log Lane as DEQ traveled to the site in September 2020.

Travel directions to the West Fork Mine site from Ketchum, Idaho – follow Warm Springs Road west for approximately 6 miles from its intersection with Idaho Highway 75, then turn north on Log Lane and travel approximately 2.5 miles to the site. An off-road vehicle is recommended for travel on Log Lane.

2.2.1 General Site Geology

The major lithology surrounding the West Fork Mine site is shown in Figure 2. The site is located within the Warm Springs mining district, which borders the Mineral Hill mining district to the south. These two districts cover the majority of Blaine County, Idaho, and the Big Wood River watershed. Several historic reports discuss the geology of this area, including the "Detailed Geology of Certain Areas in the Mineral Hill and Warm Springs Mining Districts, Blaine County, Idaho", which provides:

> 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 that host many of the ore deposits in the Wood River region. They also host rather large intrusive bodies of diorite and quartz monzonitic rock which are regarded as outliers of the Idaho batholith. There is 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 et al., 1950, p. 2

The site and many other mine sites along the Warm Springs Creek, are in the Eagle Creek member of the Wood River Formation (Lower Permian and Upper Pennsylvanian) – calcareous sandstone, sandy and silty limestone, quartz arenite, siltstone, and argillite (Worl et al., 1991).

2.2.2 General Site Climatology

Climate information was obtained from the Western Regional Climate Center's Ketchum Ranger Station, Station No. 104845(WRCC 2020). The station is located in Ketchum, Idaho, at 5,890 feet amsl, approximately 4.5 air miles east and 2,000 feet below the West Fork Mine site.

Based on data collected at the Ketchum Ranger Station between 1937 and 2016, total annual precipitation averages 18.13 inches with a total annual snowfall average of 111.9 inches. The driest months of the year are July and August. The average annual high temperature is 54.5°F and the average annual low temperature is 24.5°F. July is the hottest month with an average temperature of 80.3°F. January is the coldest month with an average temperature of 5.7°F.

2.3 Ownership History

In 1882, the Philadelphia Mining and Smelting Company patented five lode mine claims in the Warm Springs Mining District in the territory of Idaho – West Fork #1, West Fork #2, Black Hawk, Yellow Jacket, and Satellite Lode (BLM 2020). These claims now make-up the West Fork Mine site. In 2006, the Blaine County assessor conducted a parcel determination at the request of property owner, N M Taylor. The assessor's findings state:

> … I have reviewed the pertinent deeds and maps of these five contiguous mining claims located in the West Fork Canyon area of Warm Springs and determined that they are a single Lot of Record. These claims… are known as the West Fork #1, West Fork #2, Black Hawk #39, Yellow Jacket #40, and Satellite Lode #40 A&B….This unplatted property was in single ownership and was of record on a single deed as of early April, 1977, the effective date of county zoning and subdivision ordinances….[the] recorded deed does not express a clear content to convey each mining claim as a separate parcel…. Therefore this property is considered a single Original Parcel and correspondingly a single Lot of Record.
>
> Bergin 2006

The site can also be identified as Blaine County Parcel No. RP1M0000001610. As of 2020, Blaine County tax records list N M Taylor as the owner of the West Fork Mine site (Blaine County 2020). However, an application for DEQ preliminary assessment submitted by Ms. Ryan Taylor in June 2020, states the property was inherited.

2.3.1 Current and Potential Future Land Uses

Although privately owned, the West Fork Mine site is relatively indistinguishable from the national forest land that surrounds it. The site is not fenced, gated, or posted. There are no residents, structures or equipment at the site. At the time of this PA/SI, the property was listed for sale.

In its current state, the site is primarily used by recreationalists as a travel corridor. Log Lane and the Eve's Gulch Trail, which intersect just beyond the north eastern property line, provide a connecting route between Warm Springs Road and the Adam's Gulch Trailhead. Hunters, mountain bikers, and off-road motorcyclists passed through the property while DEQ conducted its site inspections. The site may also be used for activities such as camping, hiking, horseback riding, all-terrain vehicle (ATV) touring, and winter activities like backcountry skiing and snowshoeing. Recreational activities are likely to persist unless they are controlled by a property owner.

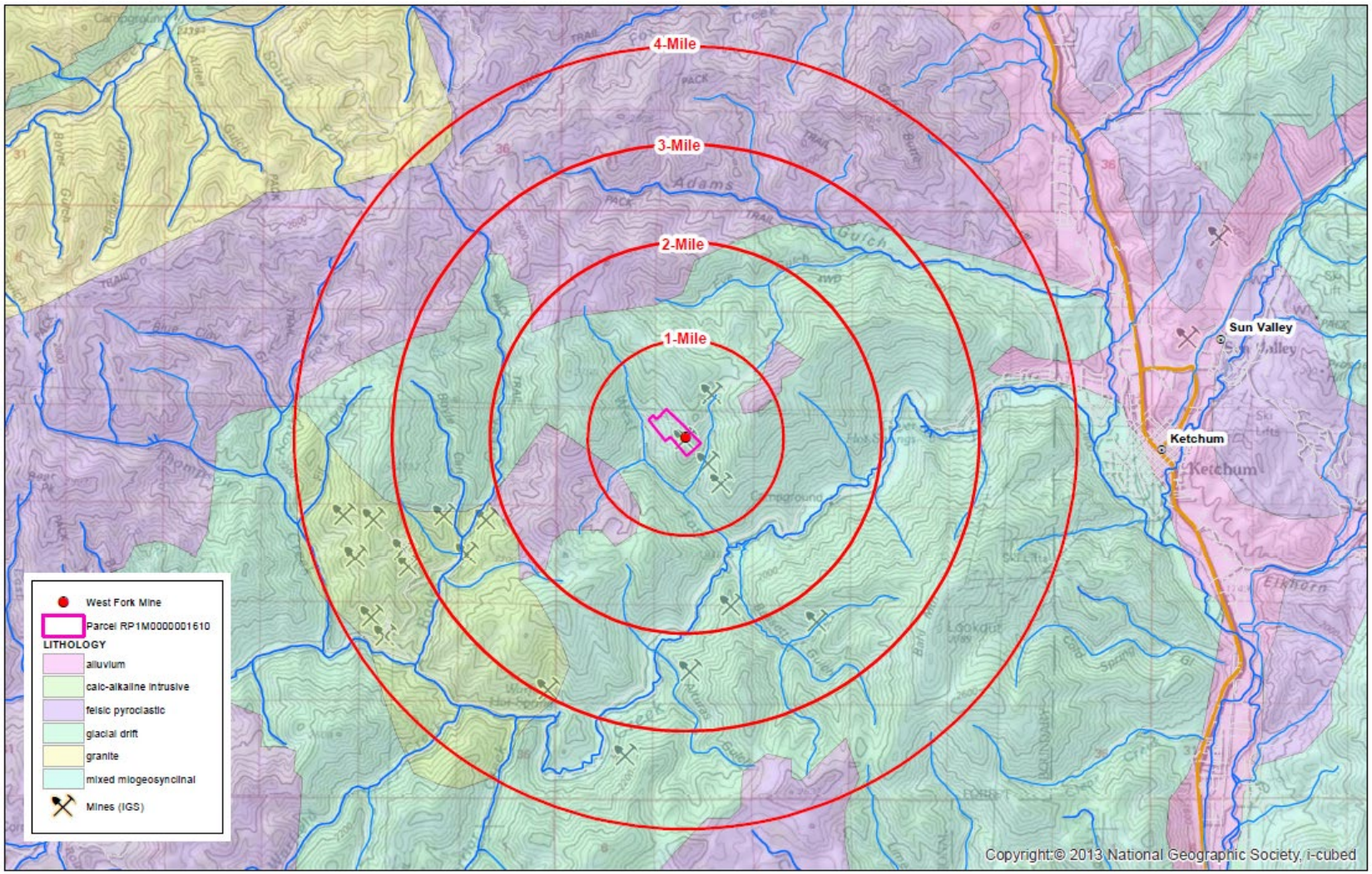
The parcel is zoned as Rural Residential R-10 and is within the county's Mountain Overlay District (MOD). The purpose of MOD is to preserve the natural character and aesthetic of hillsides and mountains within particular areas of Blaine County (Blaine County Code § 9-21). Development at the site would be subject to the MOD rules in addition to the zoning restrictions. The MOD also requires county permitting for future mining activities.

Figure 1. Map of the West Fork Mine location.



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Figure 2. Map of major lithology in the vicinity of the West Fork Mine.



West Fork Mine - Lithology

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0 0.5 1 2 Miles

N

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2.4 Site Operations and Source Characteristics

Information about the operational history of past mining activities helps DEQ understand the levels of production, commodities, and potential waste types at the site. This information documents the relative importance of historic mining districts and workings as they are reevaluated from the perspective of economics, multiple land use, human health risks, and ecological risks. DEQ uses historical research for several purposes: identify the potential contaminants of concern, estimate the magnitude of waste at the site, locate potentially dangerous physical hazards such as open adits and shafts, and identify historical land uses that coincide with mining.

2.4.1 Historic Mining

In 1882, the Philadelphia Mining and Smelting Company patented the five claims which make-up the West Fork Mine site. The claims were named the West Fork #1, West Fork #2, Black Hawk, Yellow Jacket, and Satellite Lode. Mines on these claims predominantly operated in the late 19th century, prior to statehood, and they produced gold, silver, copper, and lead ore. The "Report of the Director of the Mint Upon the Production of the Precious Metals in the United States During the Calendar Year 1883", provides the status of gold and silver production in the United States and its territories during 1883, and includes the following related to the West Fork Mine site:

> The West Fork group (owned by the Philadelphia Mining and Smelting Company) is leased, and the lessees are taking out considerable ore.
>
> The Black Hawk Has a well-defined ledge of iron, about 12 inches thick, developed tunnels and shafts to a depth of 200 feet and 400 feet in length. Its recent work shows a streak of galena averaging 4 inches, assaying 180 ounces silver.
>
> The Night Hawk, an extension of the Black Hawk, has a shaft on the ledge100 feet deep. The east 15 feet is run through an ore-chute 8 inches thick of galena and carbonate, assaying 120 to 180 ounces silver and 65 per cent. [sic.] lead.
>
> Buchard et al. 1884, p. 457

The USGS Bulletin 814, "Geology and Ore Deposits of the Wood River Region, Idaho", from 1930, provides:

> Three groups of claims on the West Fork of Warm Springs Creek about 5 miles west of Ketchum produced a considerable amount of ore between 1880 and 1885. The principal mines were known as the West Fork, the Moonlight about a mile north of it, and the Allen about a mile southeast of it. All are situated between altitudes of 7,000 and 8,000 feet. The West Fork produced about $50,000; each if the others somewhat less. In the West Fork group there was one eastward-trending vein cut by five westward-dipping, flat-lying faults, which caused offsets of as much as 100 feet. Most of the ore was mined within 100 feet of the surface. In addition to this vein there were two north-south veins. One of these cropped out at the surface for a distance of about 50 feet, and pillars now remaining in the stope show that the vein was made up of about 8 inches of clean galena ore bordered on the hanging-wall side by crushed limestone only slightly mineralized. The contents of recent shipments and three of the older ones are shown in the following table:

Production of West Fork mine

[From records of E. Daft and U. S. Geological Survey]

Year	Ore sold or treated	Crude ore shipped to smelter	Metals recovered			
			Gold	Silver	Copper	Lead
	Tons	*Tons*	*Fine ounces*	*Fine ounces*	*Pounds*	*Pounds*
1884	8.85	8.85	----------	778.67	----------	11,976
1885	18.26	18.26	----------	1,501.61	----------	19,439
1886	16.04	16.04	----------	1,320.02	----------	16,845
1915	21	21	0.48	1,828.00	14	25,981
1916	1	1	----------	112.00	----------	900
	65	65	.48	5,540.20	14	75,155

Umpleby et al. 1930, pp.196-97

DEQ was unable to identify additional production data. However, according to a discussion paper issued by Sawtooth National Forest's Ketchum Ranger District titled "BioMyne Mining Exploration Proposal West Fork Warm Springs Creek", a private mining company, BioMyne Inc., did some mining exploration of the West Fork of Warm Springs drainage from 1988 to 1992 (USDA, n.d.). Although the paper does not explicitly mention exploration of the West Fork Mine site, a letter sent by N M Taylor to BioMyne Inc. provides notice that a mining lease between the two parties was in default as of August 11, 1993 (Taylor 1993).

2.4.2 Source Characteristics

As mentioned in a 1994 IGS inspection report (see Section 2.5), several waste rock dumps can be found throughout the West Fork Mine site. During site visits, DEQ identified at least 20 workings at the site, including open and collapsed adits and shafts, pits, and a large trench. The majority of dumps are located to either side of Log Lane as it approaches the ridge top. Many small dumps coalesce with a larger dump near the top of the western slope. The larger dump is likely associated with a predominant working (Adit N) and is likely 300-500 cubic yards in size. The majority of dumps are smaller, only 10-40 cubic yards in size. A few other dumps are 80-100 cubic yards in size. All waste rock at the site may total 1,000 cubic yards. All of the dumps are exposed. It appears little to no remediation has occurred, which is not uncommon for historic mine sites.

DEQ did not identify any adit discharges or mill tailings at the site. Like with the Allen Mine, DEQ presumes that ore from the West Fork Mine would have been hauled to Ketchum for processing (the nearby Basset Gulch Mill was not yet built). The waste rock dumps appear to be stable. There was little to no evidence of water or wind erosion. The majority of the dumps are surrounded by timber and shrubs. No perennial or intermittent waterways are on the site.

Contaminants of concern are metals and inorganic compounds associated with historical mining activities, such as antimony, arsenic, beryllium, cadmium, chromium, cobalt, copper, cyanide, lead, manganese, mercury, nickel, selenium, silver, and zinc. Contaminants found at the West Fork Mine site are further discussed in Section 3.

2.5 Previous Investigations

The only previous investigation of the West Fork Mine site that DEQ identified was the 2014 IGS "Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands (Region 4)". It includes the findings of an IGS inspection conducted at the West Fork Mine site in 1994, in which IGS noted several physical hazards including open adit portals and an exposed shaft. The inspection report states:

> This is an interesting mine. It covers a small area that is extensively honeycombed by small stopes, prospect pits, adits, and workings. On the surface, there is one large dump and about 15 coalescing smaller dumps. There is no water at the site; the mine is on a ridge top. There are no hazardous structures, but there are at least 6 open adits and shafts in close proximity to FS jeep trail #146….
>
> …Main mine site (east side of ridge)
>
> > There are several open adits and stopes with steep declines inside. The stopes plunge 50°-60°. These stopes are directly along the east side of the ridge and road. *The workings go under the road.* Two of the stopes are open enough for a person to intentionally crawl into a 2-foot by 3-foot opening. The other openings are caved in part. The workings are open to at least 40 feet back from the entrances. They are along or below low angle fault zones with breccias. Some high angle quartz veins in host rocks that range from quartizite to limy sandstone. ….
>
> …West side of ridge
>
> > This site includes the main portal to the mine and the largest dump. The main dump includes ≥500 cubic yards of material. Some lumber piles with nails are on the dump. There is a 2-foot high opening to partly caved in main adit, with about 40-foot open area inside. **Nearby (about 100 feet above the main portal) is a small (3 feet by 3 feet), but very dangerous, open shaft.** There is no fence or sign around this shaft, and it would be very easy to all into it. Red flagging was put over it for a marker. There are multiple dumps, pits, adits, and stopes in this area. The dumps all coalesce.
>
> West Fork Mine has numerous (5-6) hazardous open workings proximal to a little-used but public recreational area. The open shaft needs to be fenced or filled in, because it is impossible to see from a distance. The hill is honeycombed with irregular stopes and tunnels.
>
> (Mitchell and Bennett 2014)

Physical hazards at the West Fork Mine site are further discussed in section 2.6.1

2.6 Site Inspection

On September 9 and 23, 2020, DEQ staff visited the West Fork Mine site. Property access was granted by Ms. Ryan Taylor upon her application for preliminary assessment submitted June 10, 2020. DEQ personnel did not purposely or knowingly trespass on any private holdings during the field work.

On September 9, 2020, Trevor George, Idaho Department of Lands (IDL), accompanied Kevin Kostka and Don Carpenter, DEQ, at the West Fork Mine site. Ms. Taylor separately granted Mr. George access for purposes related to IDL's Abandoned Mine Lands (AML) program.

Spencer Cordova, a self-identified local resident, also visited the site on September 9, 2020, while DEQ and IDL were present. Mr. Cordova expressed interest in the property and showed

DEQ and IDL where some open adits and the shaft was located. Mr. Cordova told DEQ that some of the adits on opposing sides of the ridge converged underneath Log Lane.

2.6.1 Sample Collection and Analysis

Sampling and laboratory analysis was conducted in accordance with DEQ's Quality Assurance Project Plan (QAPP) for Mine Sites Addressed under the PA Program (DEQ 2016) and the Field Sampling Plan (FSP) for West Fork Mine (DEQ 2020). All samples were collected, handled, and stored in accordance with the QAPP/FSP and submitted to SVL Analytical, Inc. (SVL) in Kellogg, Idaho. X-ray Fluorescence (XRF) soil readings were taken during DEQ's site visit on September 9, 2020. Soil samples were collected during a follow-up DEQ site visit on September 23, 2020.

During the site inspection, DEQ identified at least 21 mine workings at the West Fork Mine site. These workings all had some kind of associated waste rock dump, but no mill tailings were found at the site. Waste rock is the most likely source of contamination at the site, and it was DEQ's focus for sampling.

Twenty-one target XRF readings of waste rock were taken near identifiable historic workings. Seven background XRF readings were taken in areas where the surface soil appeared less impacted by mining activities. DEQ used the XRF results to assist in selecting nine target and background soil sampling sites for further analysis. All soil sample sites correlate to XRF locations except WF-WP4-SS1. This site was selected due its proximity to Log Lane, which crosses waste rock extending downhill from Adit N. The road was sampled because it is a likely source of soil exposure for anyone accessing the site.

XRF and soil sample data is summarized in Tables 2 and 3 and Figures 4 and 5. Related exposure pathways are further discussed in Section 3.3. The laboratory analysis report can be found in Appendix B.

2.6.2 Physical Hazards

DEQ identified several physical hazards at the West Fork Mine site, including an open shaft, a large exposed trench, and several open or partially collapsed adit portals (Table 1 and Figure 3). Many of these hazards were located within 100-feet of Log Lane. None were posted, fenced, or gated. At the request of the property owner, the IDL AML program conducted its own inspection of these hazards. Physical hazards at the site are significant and dangerous.



Photo 1. Exposed trench at Adit U.



Photo 2. Open shaft at Adit N2.

Additional photos are included in Appendix A.

Table 1. Summary of physical hazards at West Fork Mine site.

Name	Status	Description	Latitude (WGS84)	Appendix A
Adit A	**Open**	Open portal on eastern slope approximately 30 feet downhill from Log Lane. Adit appears to travel toward west, under Log Lane, for an unknown distance.	Lat. 43.6821832250001 Lon. -114.459951984	Photos 4,5
Adit B	**Open**	Open portal on eastern slope approximately 30 feet downhill from Log Lane. Adit appears to travel toward west, under Log Lane, for an unknown distance.	Lat. 43.6821164150001 Lon. -114.459917589	Photos 6,7
Adit C	**Open**	Partially collapsed portal on eastern slope approximately 30 feet downhill from Log Lane. Adit appears to travel toward west, under Log Lane, for an unknown distance.	Lat. 43.681828415 Lon. -114.460055704	Photos 8,9
Adit D	**Open**	Partially collapsed portal on eastern slope approximately 50 feet downhill from Log Lane. Adit appears to travel toward west, under Log Lane, for an unknown distance.	Lat. 43.6815874700001 Lon. -114.45997465	Photos 10,11
Adit F	**Open**	Mostly collapsed portal on eastern slope approximately 50 feet downhill from Log Lane. Adit appears to travel toward west, under Log Lane, for an unknown distance.	Lat. 43.6814555180001 Lon. -114.459894409	Photos 14,15
Adit E	**Open**	Mostly collapsed portal on eastern slope approximately 50 feet downhill of Log Lane. Adit appears to travel toward west, under Log Lane, for an unknown distance.	Lat. 43.6813640840001 Lon. -114.459913554	Photos 12,13
Adit G	Collapsed	Collapsed portal on eastern slope approximately 200 feet downhill from Log Lane.	Lat. 43.680916084 Lon. -114.459631904	Photos 16,17
Adit H	**Open**	Open portal on eastern slope approximately 300 feet downhill from Log Lane. Adit appears to travel toward northwest for an unknown distance.	Lat. 43.680481543 Lon. -114.459628795	Photos 18,19,20
Adit I	Collapsed	Collapsed portal on eastern slope approximately 300 feet downhill from Log Lane .	Lat. 43.680545448 Lon. -114.459342904	Photos 21, 22
Adit J	Collapsed	Collapsed portal on eastern slope approximately 100 feet downhill from Log Lane.	Lat. 43.6809214090001 Lon. -114.460146759	Photos 23, 24
Adit K	**Open**	Mostly collapsed portal on eastern slope approximately 50 feet downhill from Log Lane. Adit appears to travel toward northwest, under Log Lane, for an unknown distance.	Lat. 43.6811819750001 Lon. -114.460060325	Photos 25, 26
Adit L	Collapsed	Collapsed portal or tunnel on western slope approximately 30 feet uphill from Log Lane.	Lat. 43.6814180000001 Lon. -114.460231	Photos 27
Adit M	Collapsed	Collapsed portal or tunnel on western slope approximately 30 feet uphill from Log Lane.	Lat. 43.6815971510001 Lon. -114.460438729	Photos 28

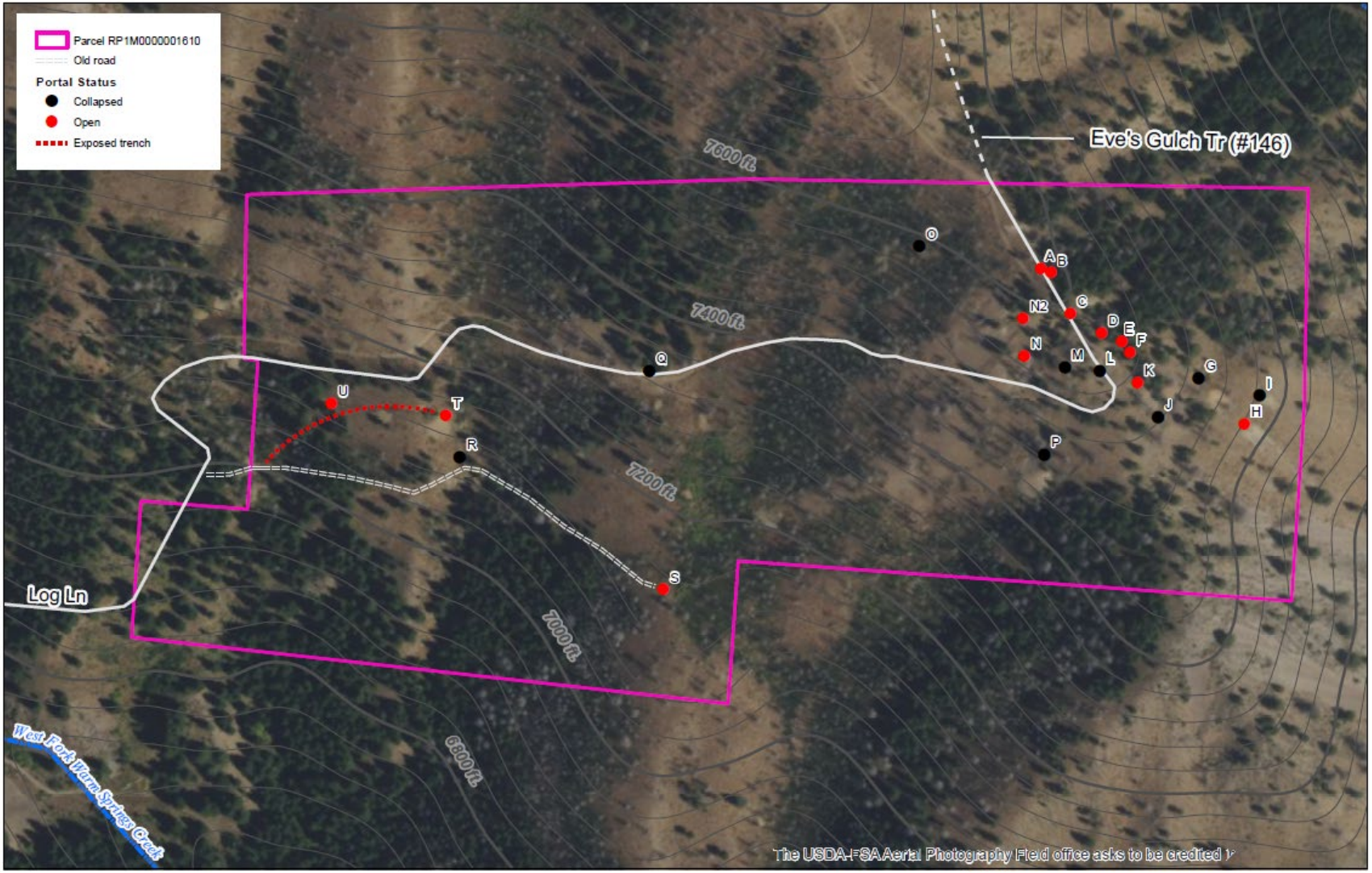
Table 1 pp.1 of 2

Table 1 Continued

Adit N	**Open**	Open portal on western slope approximately 70 feet uphill from Log Lane. The adit appears to travel north for an unknown distance and may possible connect to vertical shaft (N2) located approximately 100 feet uphill. This adit is associated with largest waste rock dump at the site and maybe the entrance to the West Fork Mine.	Lat. 43.6818452960001 Lon. -114.460629585	Photos 29, 30, 31, 32
Adit N2	**Open**	Open shaft on western slope approximately 100 feet uphill from portal of Adit N. **The shaft appears to be collapsing and is very exposed.** Its depth is unknown.	Lat. 43.6820288490001 Lon. -114.460392723	Photos 33
Adit O	Collapsed	Collapsed portal or working on western slope approximately 200 feet uphill from Log Lane.	Lat. 43.6828610000001 Lon. -114.46061	Photos 34
Adit P	Collapsed	Collapsed portal on western slope approximately 100 feet downhill from Log Lane.	Lat. 43.6812805540001 Lon. -114.461137723	Photos 35, 36
Adit Q	Collapsed	Collapsed portal or working on western slope approximately 30 feet downhill from Log Lane.	Lat. 43.683539384 Lon. -114.463196051	Photos 37
Adit R	Collapsed	Collapsed portal or working on western slope approximately 300 feet downhill from Log Lane. Could be related to Adits T which is approximately 30 feet uphill.	Lat. 43.684023 Lon. -114.464996882	Photos 38, 39
Adit S	**Open**	Partially collapsed portal or shaft on western slope approximately 500 feet downhill from road. Can also be found by traveling out old road cut below Log Lane until it ends at a flat spot on ridge. This may have been a building site; some broken glass found in this area.	Lat. 43.682430422 Lon. -114.464522437	Photos 40, 41
Adit T	**Open**	Mostly collapsed portal on western slope approximately 150 feet downhill from Log Lane and 150 uphill from old road cut. This portal is located at the southeastern end of the a large exposed trench (U).	Lat. 43.684286415 Lon. -114.464820585	Photos 42, 43
Adit U	**Open**	Open trench approximately 350 feet long and 2-6 feet wide traveling along western slope. **The trench is very exposed and is approximately 30 feet deep in some areas.** It is located approximately 50 feet downhill from Log Lane or 50 -100 feet uphill from the old road cut. The trench travels southeast from near where Log Lane and the old road cut meet to the waste rock pile below Adit T.	Lat. 43.6848821030001 Lon. -114.465497395	Photos 44, 45, 46, 47, 48, 49, 50

Table 1 pp.2 of 2

Figure 3. Map of physical hazards at the West Fork Mine site.



West Fork Mine - Physical Hazards

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0 250 500 1,000 Feet

N

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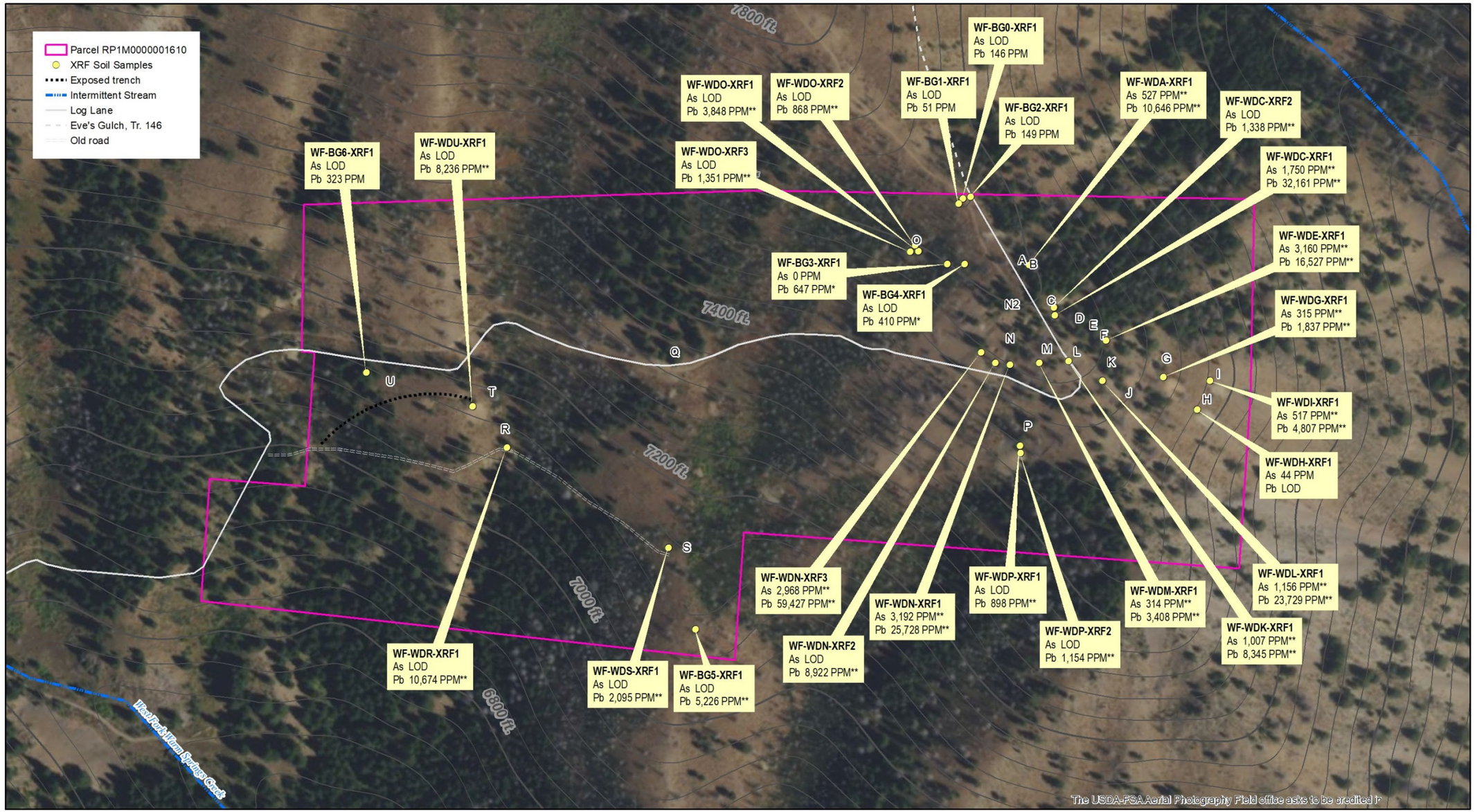
Table 2. Summary of XRF soil readings

				Analyte (mg/kg)												
Sample ID	**Date**	**Type**	**Location Description**	**Antimony (Sb)**	**Arsenic (As)**	**Barium (Ba)**	**Cadmium (Cd)**	**Chromium (Cr)**	**Copper (Cu)**	**Iron (Fe)**	**Lead (Pb)**	**Manganese (Mn)**	**Selenium (Se)**	**Silver (Ag)**	**Zinc (Zn)**	**Mercury (Hg)**
	9/9/2020	XRF	calibration - day start	19.62	427.63	383.27	417.75	240.37	51.89	42,491.98	476.55	803.99	463.61	388.78	81.22	< LOD
WF-BG1-XRF1	9/9/2020	XRF	soil from undisturbed area along Log Lane	<LOD	<LOD	444.59	<LOD	42.76	<LOD	5,689.16	145.99	298.68	<LOD	<LOD	155.19	<LOD
WF-BG2-XRF1	9/9/2020	XRF	soil from undisturbed area along Log Lane	55.94	<LOD	545.78	<LOD	45.38	<LOD	9,700.26	51.17	573.25	<LOD	<LOD	175.22	<LOD
WF-BG3-XRF1	9/9/2020	XRF	soil from undisturbed area along Log Lane	<LOD	<LOD	441.50	<LOD	76.73	<LOD	13,030.80	148.61	757.24	<LOD	<LOD	272.90	<LOD
WF-WDA-XRF1	9/9/2020	XRF	waste rock pile below Adit A	78.54	526.70	302.56	<LOD	85.68	366.31	22,711.02	**10,645.71**	1,191.37	<LOD	91.43	**10,173.08**	<LOD
WF-WDC-XRF1	9/9/2020	XRF	waste rock pile below Adit C	**190.40**	1,750.14	342.19	<LOD	<LOD	<LOD	20,597.35	**32,160.68**	636.72	<LOD	110.39	**2,463.09**	<LOD
WF-WDC-XRF2	9/9/2020	XRF	waste rock pile below Adit C	77.98	<LOD	565.38	68.97	46.87	<LOD	6,029.08	**1,338.30**	**519.69**	<LOD	<LOD	**10,294.68**	<LOD
WF-WDE-XRF1	9/9/2020	XRF	waste rock pile below Adit E	109.57	3,160.46	389.94	94.59	79.81	252.88	**104,011.33**	**16,527.04**	3,012.57	<LOD	68.28	**57,057.62**	<LOD
WF-WDG-XRF1	9/9/2020	XRF	waste rock pile below Adit E	95.63	314.89	349.27	<LOD	<LOD	<LOD	11,120.35	**1,837.05**	538.39	<LOD	29.40	**715.82**	<LOD
WF-WDH-XRF1	9/9/2020	XRF	waste rock pile below Adit H	47.84	43.78	476.64	<LOD	83.77	<LOD	15,558.04	<LOD	<LOD	<LOD	<LOD	129.22	<LOD
WF-WDI-XRF1	9/9/2020	XRF	waste rock pile below Adit I	120.90	517.04	397.44	34.80	<LOD	393.35	24,392.46	4,807.25	1,130.11	<LOD	38.61	**10,012.16**	<LOD
WF-WDK-XRF1	9/9/2020	XRF	waste rock pile below Adit K	116.69	1,006.65	581.19	<LOD	<LOD	<LOD	23,611.33	8,345.48	<LOD	<LOD	47.26	512.65	<LOD
WF-WDL-XRF1	9/9/2020	XRF	waste rock pile below Adit L	**189.31**	1,156.45	129.44	<LOD	<LOD	200.11	20,474.06	**23,728.63**	590.02	<LOD	40.36	**1,117.29**	<LOD
WF-WDM-XRF1	9/9/2020	XRF	waste rock pile below Adit M	121.96	313.86	700.47	40.01	36.83	<LOD	13,561.28	3,408.17	862.03	<LOD	<LOD	543.90	<LOD
WF-WDN-XRF1	9/9/2020	XRF	waste rock outside of Adit N portal	107.47	3,191.70	232.99	39.18	69.30	759.27	67,481.21	**25,728.02**	**7,799.63**	<LOD	57.25	**50,063.20**	<LOD
WF-WDN-XRF2	9/9/2020	XRF	waste rock outside of Adit N portal	92.20	<LOD	<LOD	<LOD	<LOD	<LOD	7,069.16	**8,921.99**	521.17	<LOD	61.86	**1,127.36**	<LOD
WF-WDN-XRF3	9/9/2020	XRF	waste rock outside of Adit N portal	**428.76**	2,967.97	538.63	69.33	<LOD	1,027.98	**105,373.28**	**59,427.47**	**1,881.72**	<LOD	204.68	**22,142.08**	<LOD
WF-WDO-XRF1	9/9/2020	XRF	waste rock outside of Adit O	62.98	<LOD	395.00	<LOD	50.92	<LOD	11,532.05	**3,848.12**	737.75	<LOD	23.19	**1,226.53**	<LOD
WF-WDO-XRF2	9/9/2020	XRF	waste rock outside of Adit O	<LOD	<LOD	581.88	<LOD	53.93	<LOD	10,663.76	**867.72**	1,342.34	<LOD	23.71	**1,043.11**	<LOD
WF-WDO-XRF3	9/9/2020	XRF	waste rock outside of Adit O	<LOD	<LOD	380.15	<LOD	80.16	<LOD	13,317.42	**1,351.09**	1,102.84	<LOD	<LOD	**1,520.17**	<LOD
WF-BG3-XRF1	9/9/2020	XRF	soil in undisturbed area east of Adit O	<LOD	<LOD	108.57	<LOD	<LOD	<LOD	14,408.52	**646.90**	**2,649.32**	<LOD	<LOD	**1,290.35**	<LOD
WF-BG4-XRF1	9/9/2020	XRF	soil in undisturbed area east of Adit O	<LOD	<LOD	481.94	<LOD	<LOD	<LOD	17,716.73	**409.51**	**2,276.82**	<LOD	<LOD	**812.45**	<LOD
WF-WDP-XRF1	9/9/2020	XRF	waste rock pile below Adit P	<LOD	<LOD	517.87	<LOD	53.32	<LOD	12,758.82	**898.13**	1,272.43	<LOD	<LOD	**1,470.41**	<LOD
WF-WDP-XRF2	9/9/2020	XRF	waste rock pile below Adit P	70.54	<LOD	499.14	<LOD	64.62	<LOD	11,910.28	**1,153.91**	1,251.43	<LOD	<LOD	**2,049.73**	<LOD
WF-WDR-XRF1	9/9/2020	XRF	waste rock pile below Adit R	105.18	<LOD	472.57	<LOD	65.60	374.79	**65,556.39**	**10,673.70**	**8,389.35**	<LOD	94.75	**6,898.32**	<LOD
WF-WDS-XRF1	9/9/2020	XRF	waste rock pile below Adit S	<LOD	<LOD	218.93	<LOD	<LOD	<LOD	11,853.21	**2,095.04**	1,551.04	<LOD	<LOD	**683.75**	<LOD
WF-BG5-XRF1	9/9/2020	XRF	soil along top of ridge below (south) of Adit S	91.45	<LOD	522.64	<LOD	47.31	128.14	12,998.86	**5,226.29**	1,385.24	<LOD	49.84	**766.28**	<LOD
WF-WDU-XRF1	9/9/2020	XRF	waste rock at west end of Adit U trench	71.40	<LOD	725.63	58.62	68.98	<LOD	**50,433.68**	**8,235.81**	**8,430.21**	<LOD	70.77	**6,150.48**	<LOD
WF-BG6-XRF1	9/9/2020	XRF	soil in undisturbed timbered area above Adit U	65.19	<LOD	522.70	<LOD	38.89	<LOD	11,265.54	322.85	875.46	<LOD	<LOD	373.47	<LOD
	9/9/2020	XRF	calibration - day end	49.22	439.08	581.69	496.98	241.42	56.82	45,564.42	496.87	943.86	515.18	466.83	84.71	< LOD
EPA RSL for Resident Soil[a] (mg/kg)				31	1	15,000	71	NA	3,100	55,000	400	1,800	390	390	23,000	11
EPA RSL for Industrial Soil[a] (mg/kg)				470	3	220,000	980	NA	47,000	820,000	800	26,000	5,800	5,800	350,000	46
Mean Concentrations in Blaine County, Idaho[b] (ppm)				NA	25.4	NA	NA	NA	22.9	NA	125.4	556.2	0.8	NA	411.0	0.2
Average Background[c] (mg/kg)				55.94	<LOD	477.29	<LOD	54.96	<LOD	9,473.41	115.26	543.06	<LOD	<LOD	201.10	<LOD
3x Average Background (mg/kg)				167.82	<LOD	1,431.87	<LOD	164.87	<LOD	28,420.22	345.77	1,629.17	<LOD	<LOD	603.31	<LOD

Notes:

Gray shaded values exceed regional screening levels (RSLs) for residential soils.
Orange shaded values exceed RSLs for both residential and industrial soils.
Gold shaded rows are background XRF readings from areas of site that appeared to be less disturbed.
Blue shaded rows are XRF calibration readings of standard.
Bold = Three times greater than the average background concentrations.
[a]Based on a target hazard quotient of 1.0 from May 2020. https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables
[b]Significant digits shown as reported by USGS. Mean concentrations are not available for Sb, Ba, Cd, Cr, Fe, and Ag. https://mrdata.usgs.gov/geochem/county.php?place=f16013&el=Pb&rf=northwestern
[c]Average Background calculated using XRF readings from WF-BG1-XRF1, WF-BG2-XRF1, and WF-BG3-XRF1
mg/kg = milligrams per kilogram
ppm = parts per million
<LOD = result lower than XRF detection limit
XRF= Portable x-ray fluorescence spectrometry

Figure 4. Map of XRF results for Arsenic and Lead



West Fork Mine - XRF Soil Sample Results for Arsenic (As) and Lead (Pb)

XRF readings collected on September 9, 2020. Regional Screening Levels (RSL) based on a target hazard quotient of 1.0 from May 2020.
https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables
LOD = result lower than XRF detection limit
* Exceeds RSL for both residential soils
** Exceeds RSL for both residential and industrial soils

0 250 500 1,000 Feet

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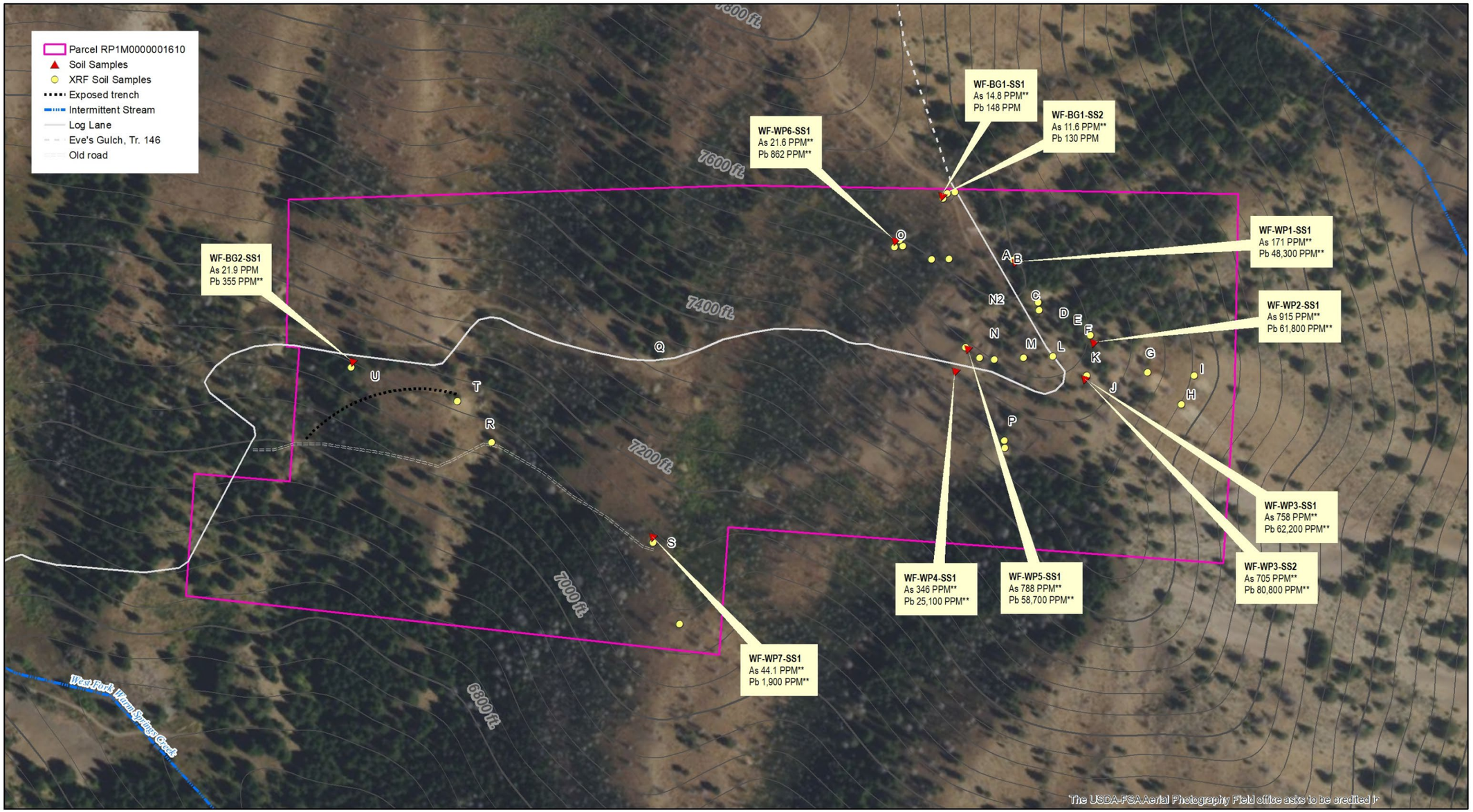
Table 3. Summary of soil sample analysis

				Analyte (mg/kg)												
Sample ID	**Date**	**Type**	**Sample Description**	**Antimony (Sb)**	**Arsenic (As)**	**Barium (Ba)**	***Cadmium (Cd)***	**Chromium (Cr)**	**Copper (Cu)**	**Iron (Fe)**	**Lead (Pb)**	**Manganese (Mn)**	**Selenium (Se)**	**Silver (Ag)**	**Zinc (Zn)**	***Mercury (Hg)***	***Appendix A***
WF-BG1-SS1	9/23/2020	SS	Grab sample of soil collected from undisturbed area along Log Lane; split duplicate	<4.00	14.80	103.00	*3.36*	7.58	12.80	10,400.00	148.00	686.00	<0.30	<1.00	249.00	*<0.03*	*Photo 58*
WF-BG1-SS2	9/23/2020	SS	Split duplicate of WF-BG1-SS1	<4.00	11.60	94.20	*2.85*	7.10	12.40	10,300.00	130.00	628.00	<0.30	<1.00	226.00	*<0.03*	*Photo 58*
WF-WP1-SS1	9/23/2020	SS	Grab sample of waste rock from top of pile located downhill of Adit A	85.80	**171.00**	57.30	***17.80***	20.20	**668.00**	26,200.00	**48,300.00**	**2,340.00**	4.11	189.00	**10,300.00**	*0.65*	*Photo 51*
WF-WP2-SS1	9/23/2020	SS	Grab sample of waste rock from top of pile located downhill of Adit E	274.00	**915.00**	19.00	***54.20***	6.63	**540.00**	**104,000.00**	**61,800.00**	2,140.00	5.57	200.00	**44,100.00**	*3.29*	*Photo 52*
WF-WP3-SS1	9/23/2020	SS	Grab sample of waste rock from top of pile located downhill of Adit K; split duplicate	233.00	**758.00**	72.50	*1.93*	4.83	**68.70**	22,800.00	**62,200.00**	534.00	7.10	210.00	803.00	*1.81*	*Photo 53*
WF-WP3-SS2	9/23/2020	SS	Split duplicate of WF-WP3-SS1	159.00	**705.00**	73.90	*4.81*	5.12	**87.00**	23,400.00	**80,800.00**	477.00	4.39	246.00	**839.00**	*3.93*	*Photo 53*
WF-WP4-SS1	9/23/2020	SS	Grab sample of waste rock from Log Lane where it crosses pile located downhill of Adit N	89.00	**346.00**	31.80	***14.40***	4.69	**304.00**	**34,800.00**	**25,100.00**	516.00	3.32	89.50	**13,700.00**	*1.15*	*Photo 54, 55*
WF-WP5-SS1	9/23/2020	SS	Grab sample of fine soil from outside portal of Adit N	241.00	**788.00**	48.00	*10.40*	10.40	**458.00**	**59,400.00**	**58,700.00**	967.00	3.99	246.00	**13,300.00**	*1.41*	*Photo 56*
WF-WP6-SS1	9/23/2020	SS	Grab sample of waste rock from top of pile located downhill of Adit O	4.51	21.60	119.00	*5.42*	6.27	19.10	9,510.00	**862.00**	907.00	<0.30	4.11	763.00	*0.10*	*Photo 57*
WF-WP7-SS1	9/23/2020	SS	Grab sample of waste rock from top of pile located downhill of Adit S	26.20	44.10	247.00	*9.37*	11.20	29.00	14,100.00	**1,900.00**	1,660.00	0.49	10.60	518.00	*0.29*	*Photo 60*
WF-BG2-SS1	9/23/2020	SS	Grab sample of soil undisturbed timbered area above Adit U	<4.00	21.90	148.00	*6.18*	7.98	14.60	10,700.00	355.00	909.00	<0.30	1.06	346.00	*<0.03*	*Photo 61*
			EPA RSL for Resident Soil[a] (mg/kg)	31	1	15,000	71	NA	3,100	55,000	400	1,800	390	390	23,000	11	
			EPA RSL for Industrial Soil[a] (mg/kg)	470	3	220,000	980	NA	47,000	820,000	800	26,000	5,800	5,800	350,000	46	
			Mean Concentrations in Blaine County, Idaho[b] (ppm)	NA	25.4	NA	NA	NA	22.9	NA	125.4	556.2	0.8	NA	411.0	0.2	
			Average Background[c] (mg/kg)	NA	16.10	115.07	4.13	7.55	13.27	10,466.67	211.00	741.00	NA	NA	273.67	NA	
			3x Average Background (mg/kg)	NA	48.30	345.20	12.39	22.66	39.80	31,400.00	633.00	2,223.00	NA	NA	821.00	NA	

Notes:

Gray shaded values exceed regional screening levels (RSLs) for residential soils.
Orange shaded values exceed RSLs for both residential and industrial soils.
Gold shaded rows are background soil samples from areas of site that appeared to be less disturbed.
Bold = Three times greater than the average background concentrations.
Italicized = Rejected data. Relative Percent Differenc (RPD) exceeded the maximum allowed (±50%) for Cadmium and Mercury.
[a]Based on a target hazard quotient of 1.0 from May 2020. https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables
[b]Significant digits shown as reported by USGS. Mean concentrations are not available for Sb, Ba, Cd, Cr, Fe, and Ag. https://mrdata.usgs.gov/geochem/county.php?place=f16013&el=Pb&rf=northwestern
[c]Average Background calculated using XRF readings from WF-BG1-SS1, WF-BG1-SS2, and WF-BG2-SS1
mg/kg = milligrams per kilogram
ppm = parts per million
<LOD = result lower than detection limit
SS= Soil Sample

Figure 5. Map of soil sample results for Arsenic and Lead



West Fork Mine - Soil Sample Results for Arsenic (As) and Lead (Pb)

Soil samples collected on September 23, 2020. Regional Screening Levels (RSL) based on a target hazard quotient of 1.0 from May 2020.
https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables
* Exceeds RSL for both residential soils
** Exceeds RSL for both residential and industrial soils

0 250 500 1,000 Feet

N

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3 Migration/Exposure Pathways

The purpose of this PA/SI is to evaluate the West Fork Mine site and identify any means by which hazardous substances may pose a threat to human health and the environment. Potential exposure is considered in the context of four pathways: air, ground water, and surface water migration and soil exposure.

3.1 Ground Water Migration Pathway

Mines can be a source of ground water contamination as heavy metals leach from ore bodies or mine waste. In certain situations, contaminated ground water can impact drinking water and irrigation wells, as well as surface water used for the same purpose. Contaminated ground water may also have ecological impacts. Pathways for ground water contamination near mines may include:

- Leachate from tailings and waste rock is eroded and transported into the shallow ground water system by nearby streams.
- Leachate from mined ore bodies is discharged from adits or seeps and transported into the shallow ground water system.
- Leachate from mined ore bodies is transported into the shallow ground water system through the geologic structure of a mine.

Potential drinking water systems recorded by the Idaho Department of Water Resources within the 4-mile radius of the West Fork Mine site include three historical public water systems (PWS) and 204 other wells (e.g. domestic, de-watering, monitoring, etc.) All of the PWS are greater than 3 miles away from the site. The PWS include: Limelight Condominiums (ID5070033), Heidelberg Inn (ID5070056), and Warm Springs Ranch Restaurant (ID5070056). *Source Water Assessments (SWA)* for these PWS have not been conducted because they do not currently supply drinking water to at least 25 people or have at least 15 service connections. Other PWS used by the City of Ketchum are downgradient of the West Fork Mine site, but are located outside of the 4-mile radius (Figure 9). These sources are further discussed in the 2001 DEQ City of Ketchum SWA (PWS# ID5070028). This report states that the city of Ketchum has seven wells that make up a community system serving approximately 4,000 people through 1,350 connections. The report also notes that seasonal fluctuations due to tourism can increase the population approximately 200%. The most current census data from 2019 provides that Blaine County, Idaho, has an average of 2.75 persons per household and a population of 23,021. The population of Ketchum remains below 5,000 residents (U.S. Census Bureau 2019).

A SWA contains information about the population served by each PWS and susceptibility rankings for potential contaminants. The rankings are high, moderate or low for inorganic, volatile organic, synthetic organic and microbial contaminants based on system construction, potential contaminant inventory/land use, and hydrologic sensitivity (i.e., likelihood that the water supply will become contaminated based on the hydrologic and geologic conditions surround the PWS).

There are no wells located at the West Fork Mine site. The nearest private wells which may be used as a drinking water sources are located along Warm Springs Creek, approximately 1-2 miles away from the site, as shown in Figure 9. There are no wells providing irrigation within 4-miles of the site.

The ground water pathway was not further assessed as part of this PA/SI.

3.2 Surface Water Pathway

Mines can be a source of surface water contamination as heavy metals leach from ore bodies or mine waste. In certain situations, contaminated surface water can impact drinking and irrigation water. Contaminated surface water may also have ecological impacts. Hydraulic erosion of tailings and waste rock into nearby streams and leachate discharged from mine adits can be sources of surface water contamination.

The West Fork Mine site is located along a ridgeline at approximately 7,600 feet amsl. The West Fork of Warm Springs Creek lies to the west and an unnamed intermittent stream is to the east. Both are 500 to1,000 feet below the site and approximately ¼-mile away. Since the site is mostly located at the top of the ridge, there is little to no upland drainage from above the site.

DEQ observed no signs of surface water at the West Fork Mine site, to include streams, seeps, springs, adit discharges, or any other types of surface water. There was also little to no sign of hydraulic erosion at the site. Precipitation is likely the sole source of surface water. Runoff from the site would most likely only occur during snowmelt.

The surface water migration pathway target distance limit (TDL) begins at the probable point of entry (PPE) of surface water runoff from a site to a surface water body and extends downstream for 15 miles. The PPE for the West Fork Mine site is the West Fork of Warm Springs Creek, an intermittent stream, which flows into the larger, perennial Warm Springs Creek located approximately 1-mile from the site. Warm Springs Creek is a tributary of the Big Wood River, and the confluence is located in Ketchum, Idaho, approximately 6 miles from the site. The 15-mile TDL ends in the Big Wood River approximately 1-mile below its confluence with another tributary, the East Fork of Wood River (Figure 6).

There are no known surface water intakes being used as a drinking water sources or commercial irrigation water sources within a four-mile radius of the site. There are no wetlands located within a mile of the site; wetlands within two to four miles from the site are located along Warm Springs Creek (Figure 7).

The Clean Water Act (CWA) requires that the State of Idaho prepare a report which lists the current conditions of all state waters (§305[b]) and the waters that are impaired and need a total-maximum-daily-load (TMDL; §303[d]). Listed streams are shown on Figure 8.

Sensitive plant and animal species in Idaho can have large habitat ranges. The USFWS Information for Planning and Conservation System (USFWS 2021) lists the following sensitive species having ranges which may overlap the West Fork Mine site, as well as other historic mines within the region:

- Mammals: Canada Lynx, *Lynx canadensis*, threatened species;

- Plants: Whitebark Pine, *Pinus albicaulis*, candidate species.

The surface water pathway was not further assessed as part of this PA/SI.

3.3 Soil Exposure Pathway

The soil exposure pathway was evaluated based on the threat that mine wastes – waste rock and/or tailings – in surface soil can be a source of exposure for nearby populations. In some situations, soil contamination within two feet of the surface can also increase the likeliness for contaminant exposure via the other pathways – air, ground water, and surface water.

Waste rock dumps of varying sizes can be found throughout the West Fork Mine site. The majority of the waste rock is related to Adit N, which DEQ estimates is approximately 300-500 cubic yards in size. DEQ estimates that most of the other waste rock dumps to be between 10-40 cubic yards in size. A few dumps are 80-100 cubic yards in size. All of the dumps are exposed.

West Fork Mine site is used by recreationalists as a byway to access Eve's Gulch Trail, primarily via Log Lane which connects the trail to the West Fork of Warm Springs Creek. The site is not fenced, gated, or posted, and is generally indistinguishable from the public land that surrounds it. There are no permanent residents at the site. The nearest residence is over 1-mile south of the site. A primary point of exposure is likely Log Lane, especially as it crosses the waste rock downhill from Adit N. Since there was no mill at the site, the road likely served as the main route for transporting ore offsite.

3.3.1 Soil Sample Results

Soil XRF and laboratory analytical results were compared to the following criteria: 1) EPA regional screening levels (RSLs) for residential and industrial soil and 2) background concentrations (Table 3). The industrial RSLs are more applicable due to the current status of this site and use by transient populations, but residential RSLs should be considered if the site is developed in a way that increases the regularly present population.

DEQ observations are based on soil XRF and analytical laboratory results (Tables 2 &3):

- Surface soil near mine workings contains very high concentrations of Arsenic – Sample data shows Arsenic concentrations exceed both residential and industrial RSLs at more than half of target XRF sites and all target soil sample sites. The exceedance is a magnitude of 10 or greater the industrial RSL in many instances. The average concentration of Arsenic in background samples was also greater than the industrial RSL, but still well below the target sample results.

- Surface soil near mine workings contains very high concentrations of Lead – Sample data shows Lead concentrations exceed both residential and industrial RSLs at all but one target XRF sites and all target soil sample sites. In many instances, the exceedance is a magnitude of 100 or greater the industrial RSL. The average concentration of Lead in background samples was less than the residential RSL.

- Surface soil near many mine workings contains high concentrations Antimony – Sample data shows Antimony concentrations exceed residential RSLs at many target XRF and

soil sample sites. The exceedance is a magnitude of 10 or greater the residential RSL in many instances.

- Surface soil near a few mine workings contains high concentrations of Cadmium, Iron, Manganese, and Zinc – Sample data shows concentrations of other metals – Cadmium, Iron, Manganese, and Zinc – also exceed residential RSLs at a few XRF and soil sample sites. However, the potential contamination from these metals seems far less prevalent than Arsenic, Lead, and Antimony.

- Quality Assurance/Quality Control (QA/QC) – Soil samples collected for evaluating QA/QC included two split-duplicate samples. The laboratory and field data are determined to be of acceptable quality and meet the data quality objectives for representativeness and comparability. Accuracy and precision are also considered acceptable for all analytes except Cadmium and Mercury. Relative percent difference (RPD) for Cadmium and Mercury in one of two split-duplicates exceeded the maximum allowed (±50%). Therefore, the soil sample results for Cadmium and Mercury are considered rejected and qualified in Table 3. The XRF calibration duplicates for antimony also exhibited an RPD greater than ±50%, but because of the semi-quantitative nature of XRF data, these results are not qualified.

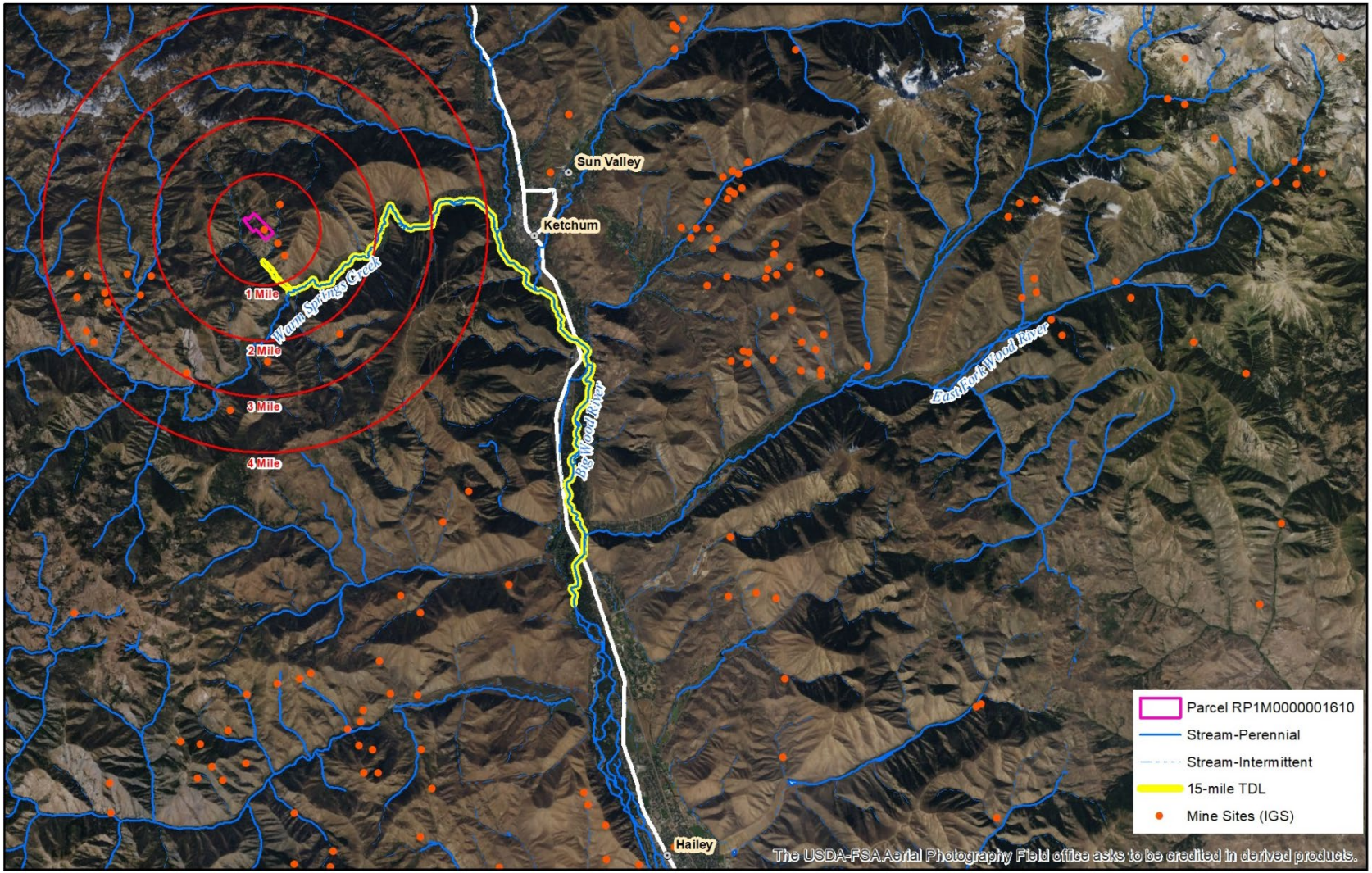
3.4 Air Pathway

Mine waste remaining at the West Fork Mine site includes multiple waste rock dumps, which consists of gravel to cobble sized broken rock and some fine soils. The piles are mostly surrounded by vegetation making fugitive dust unlikely. However, vehicle or foot traffic may produce localized dust during dry conditions, especially along Log Lane. Soil sample WF-WP4-SS1 was collected where waste rock from Adit N intersects Log Lane. Analysis indicated that the surface soil at this location, included Arsenic at more than 100-times the RSL for industrial soils and Lead at more than 30-times the RSL for industrial soils (Table 3).

The nearest residence is over 1-mile south of the West Fork Mine site. DEQ did not identify any daycare facilities or schools within a 4-mile radius. Also, there is no commercial agriculture within a ½-mile of the site. Wetlands located within 4-miles of the site are shown in Figure 7.

The air pathway was not further assessed as part of this PA/SI.

Figure 6. Map of surface water pathway 15-mile Target Distance Limit



West Fork Mine - Surface Water Target Distance Limit (15 mi.)

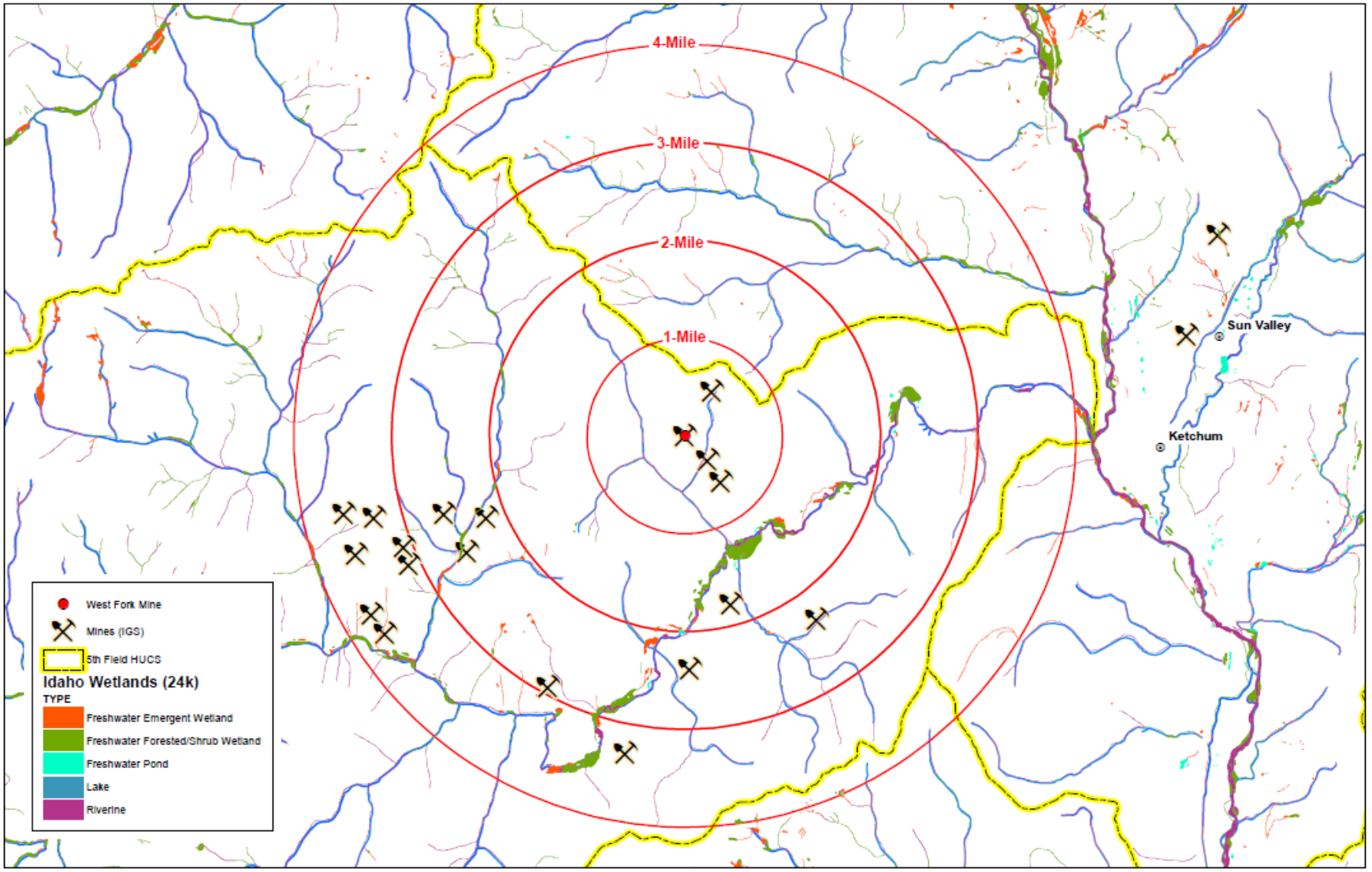
Restriction of Liability: Neither the State of Idaho nor the Department of Environmental Quality, nor any of their employees make any warranty, or assume and legal liability or responsibility for the accuracy, completeness or usefulness, of any information or data provided. The data could include technical inaccuracies or typological errors. IDEQ may update, modify, or revise the data used at anytime, without notice. 08/14/2020

0 1 2 4 Miles

N

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Figure 7. Map of surface water and wetland features



West Fork Mine - Surface Water & Wetlands

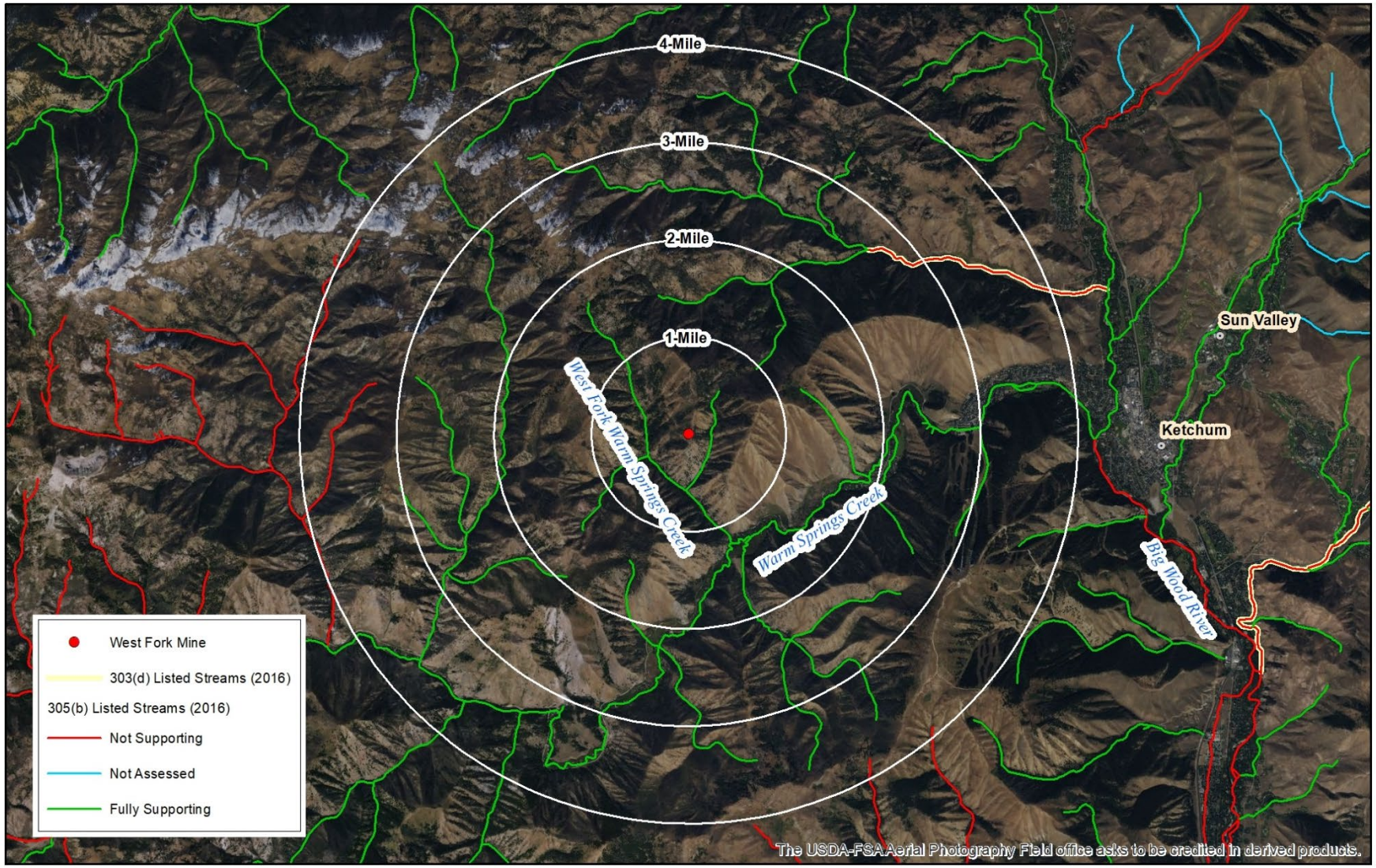
Restriction of Liability: Neither the State of Idaho nor the Department of Environmental Quality, nor any of their employees make any warranty, or assume and legal liability or responsibility for the accuracy, completeness or usefulness, of any information or data provided. The data could include technical inaccuracies or typological errors. IDEQ may update, modify, or revise the data used at anytime, without notice. 08/14/2020

0 0.5 1 2 Miles

N

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Figure 8. Map of 303(d) and 305(b) listed waterways



West Fork Mine - 305(b) and 303(d) Listed Streams

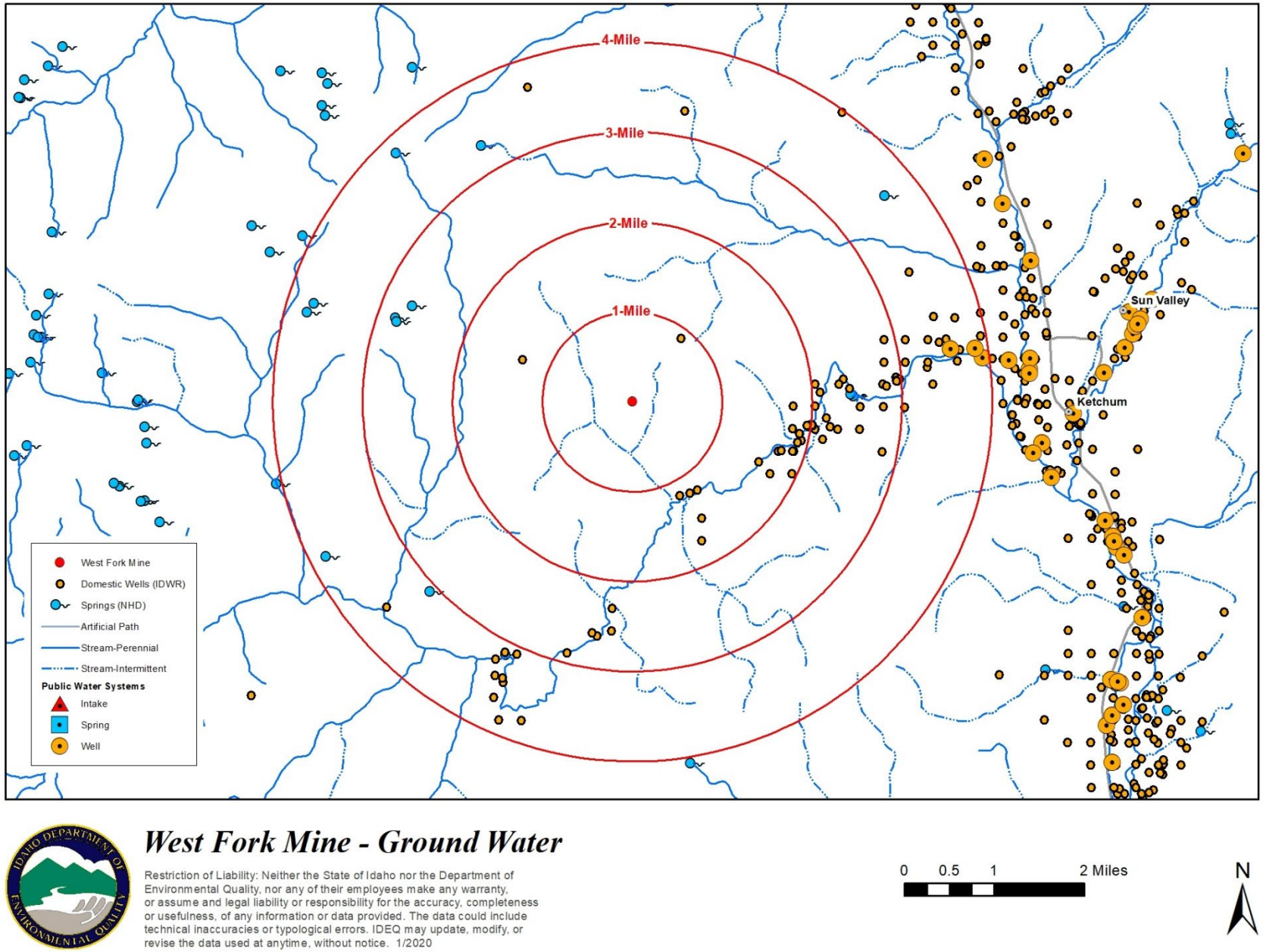
Restriction of Liability: Neither the State of Idaho nor the Department of Environmental Quality, nor any of their employees make any warranty, or assume and legal liability or responsibility for the accuracy, completeness or usefulness, of any information or data provided. The data could include technical inaccuracies or typological errors. IDEQ may update, modify, or revise the data used at anytime, without notice. 1/2020

0 0.5 1 2 Miles

N

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Figure 9. Map of ground water features



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4 Conclusions and Recommendations

This PA/SI was conducted to evaluate whether historic mining operations at the West Fork Mine site pose a threat to human health and the environment and provide information about potential sources of metals contamination, exposure pathways, and related health and safety issues.

The West Fork Mine site is significantly impacted by historic lode mining that took place during the turn of the 20th century. Mine workings are scattered throughout the site, but predominantly along the north-south ridgeline. Samples of surface soil from the site show that metals concentrations are greater than the acceptable regional screening levels (RSL) for Antimony, Arsenic, Iron, Lead, Manganese, and Zinc (see Section 3.3 and Tables 2 & 3). In some areas, Arsenic and Lead concentrations maybe in excess of 100-times the industrial RSL. Although these contaminants are present, several factors limit the exposure pathways, including: soil stability, lack of surface water, transient populations, and distance to drinking water sources.

In addition to the soil contaminants, the site has many physical risks including open adits, shafts, and a deep surface trench, which are unprotected and pose a significant hazard (see Section 2.6.2).

DEQ recommends the following:

- **Address Physical Safety Hazards** – Open adits, shafts, and the trench should be closed or protected. Open historic adits have an increased possibility of collapse and/or contain unsafe air. Open shafts and trenches are prone to collapse and pose a significant fall risk.

- **Further Site Characterization** – Prior to any change in land use, additional action should be taken to more accurately determine the distribution and location of soil contaminants. Further characterization is also needed to identify potential methods of remediation. The sample results related to this PA/SI do not represent the full extent of potential contamination.

DEQ further recommends that notice of hazards be provided to anyone visiting the West Fork Mine site. Notification could include, but is not limited to items on DEQ's "Historic Mining Areas: Health and Safety" factsheet (Appendix C).

Additional assistance investigating and managing the West Fork Mine site may be available through the Idaho Department of Land's Abandoned Mine Lands (AML) program. More information about the ALM program can be found at *www.idl.idaho.gov/mining-minerals/abandoned-mine-lands*.

5 References

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Appendix A. Site Photographs

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K.Kostka, 9/9/2020

Photo – Looking south along ridge from top of site. Also see Photos 2 and 3.



K.Kostka, 9/9/2020

Photo 2 – Looking southwest along ridge from top of site. Also see Photos 1 & 3.



K.Kostka, 9/9/2020

Photo 3 – Looking northwest along ridge from top of site. Also see Photos 1 and 2.



K.Kostka, 9/9/2020

Photo 4 – Open portal at Adit A.



K.Kostka, 9/9/2020

Photo 5 – Waste rock downhill from Adit A.



K.Kostka, 9/9/2020

Photo 6 – Open portal at Adit B.



K.Kostka, 9/9/2020

Photo 7 – Waste rock downhill from Adit B.



K.Kostka, 9/9/2020

Photo 8 – Partially collapsed portal at Adit C.



K.Kostka, 9/9/2020

Photo 9 – Waste rock downhill from Adit C.



K.Kostka, 9/9/2020

Photo 10 – Partially collapsed portal at Adit D.



K.Kostka, 9/9/2020

Photo 11- Waste rock downhill from Adit D.



K.Kostka, 9/9/2020

Photo 12 – Mostly collapsed portal at Adit F.



K.Kostka, 9/9/2020

Photo 13 – Waste rock downhill from Adit F.



K.Kostka, 9/9/2020

Photo 14 – Mostly collapsed portal at Adit E.



K.Kostka, 9/9/2020

Photo 15 – Waste rock downhill from Adit E.



K.Kostka, 9/9/2020

Photo 16 – Collapsed portal of Adit G.



K.Kostka, 9/9/2020

Photo 17 – Waste rock downhill from Adit G.



K.Kostka, 9/9/2020

Photo 18 – Open portal at Adit H.



K.Kostka, 9/9/2020

Photo 19 – Adit H portal. Approximately 5-feet tall and 4-feet wide. Length unknown.



K.Kostka, 9/9/2020

Photo 20 – Waste rock downhill from Adit H.



K.Kostka, 9/9/2020

Photo 21 – Waste rock downhill from Adit I.



K.Kostka, 9/9/2020

Photo 22 – Collapsed portal at Adit I.



K.Kostka, 9/9/2020

Photo 23 – Collapsed portal at Adit J.



K.Kostka, 9/9/2020

Photo 24 – Waste rock downhill from Adit J.



K.Kostka, 9/9/2020

Photo 25- Mostly collapsed portal at Adit K.



K.Kostka, 9/9/2020

Photo 26 – Waste rock downhill from Adit K.



K.Kostka, 9/9/2020

Photo 27 – Collapsed portal or tunnel at Adit L.



K.Kostka, 9/9/2020

Photo 28 – Collapsed portal or tunnel at Adit M.



K.Kostka, 9/9/2020

Photo 29 – Panorama of hillside looking up at Adit N (left, west) to Adit M (right, east).



K.Kostka, 9/9/2020

Photo 30 – Area outside of Adit N portal. Adit N appeared to be largest working at site. This adit could be the main entrance to the West Fork Mine. Also see photos 31, 32, and 33.



K.Kostka, 9/9/2020

Photo 31 – Old lumber and fine powdery soil near Adit N. Also see photos 30, 32, and 33.



K.Kostka, 9/9/2020

Photo 32 – Open portal at Adit N. Approximately 3-feet tall and 6-feet wide. Length unknown, but possibly connects to shaft at Adit N2. Also see photos 30, 31, and 33.



K.Kostka, 9/9/2020

Photo 33 – Open shaft at Adit N2. Approximately 6-foot opening. No barriers or postings surround shaft. Depth unknown. Could possibly connect to Adit N. Also see photos 30, 31, and 32.



K.Kostka, 9/9/2020

Photo 34 – Collapsed portal or general working at Adit O.



K.Kostka, 9/9/2020

Photo 35 – Collapsed portal at Adit P.



K.Kostka, 9/9/2020

Photo 36 – Waste rock downhill from Adit P.



K.Kostka, 9/9/2020

Photo 37 – Collapsed portal or working and waste rock at Adit Q.



K.Kostka, 9/9/2020

Photo 38 – Collapsed portal at Adit R.



K.Kostka, 9/9/2020

Photo 39 – Waste rock downhill from Adit R.



K.Kostka, 9/9/2020

Photo 40 – Flat area at end of old road cut uphill from Adit S. Possibly an old building site.



K.Kostka, 9/9/2020

Photo 41 – Partially collapsed portal or shaft at Adit S.



K.Kostka, 9/9/2020

Photo 42 – Waste rock downhill from Adit T.



K.Kostka, 9/9/2020

Photo 43 – Collapsed portal at Adit T which could be an extension of trench (Adit U).



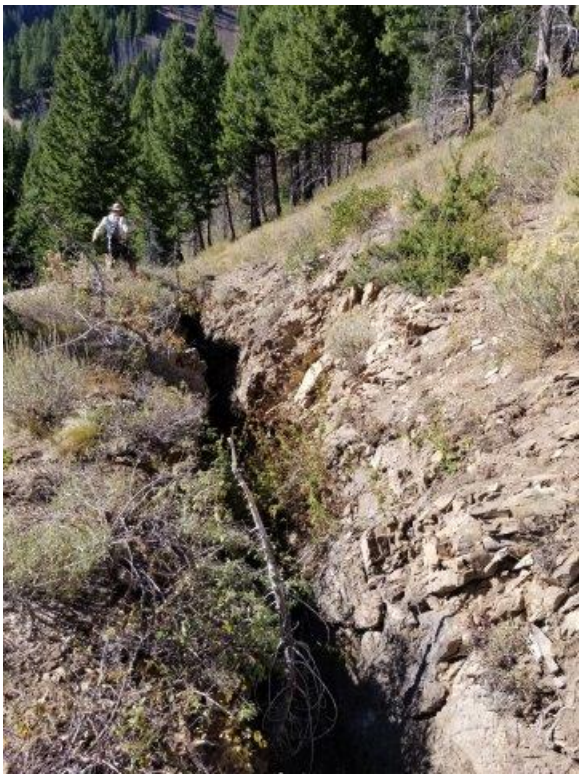
K.Kostka, 9/9/2020

Photo 44 – East end of Adit U trench. Also see photos 45, 46, 47, 49, and 50.



K.Kostka, 9/9/2020

Photo 45 – Looking southeast along Adit U trench. Also see photos 44, 46, 47, 48, 49, and 50.



K.Kostka, 9/9/2020

Photo 46 – Looking northwest along Adit U trench. Approximately 4-feet wide and 15-feet deep. Also see photos 44, 45, 47, 48, 49, and 50.



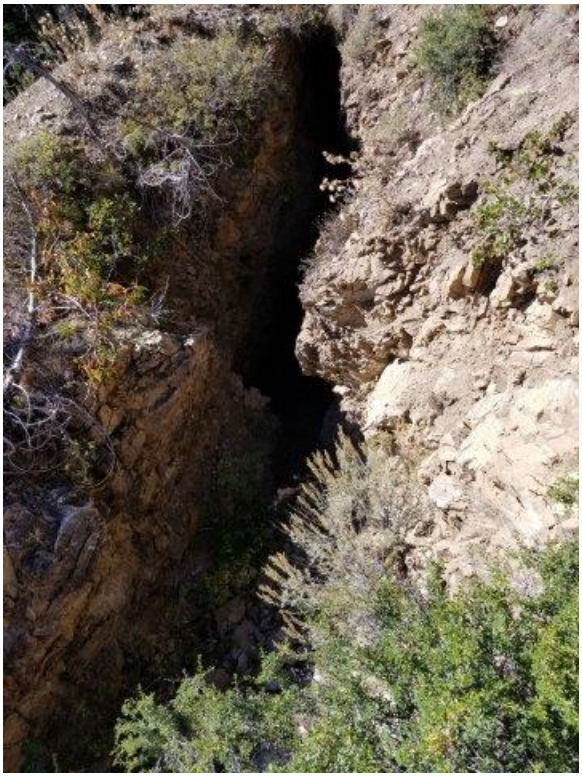
K.Kostka, 9/9/2020

Photo 47 - Looking southeast again along Adit U trench (back at vantage point of Photo 47). Also see photos 44, 45, 46, 48, 49, and 50.



K.Kostka, 9/9/2020

Photo 48– Looking northwest again along Adit U trench. Approximately 6-feet wide and 20-feet deep. Also see photos 44, 45, 46, 47, 49, and 50.



K.Kostka, 9/9/2020

Photo 49 – Looking northwest into Adit U trench from same vantage point as Photo 47. Also see photos 44, 45, 46, 47, 48, and 50.



K.Kostka, 9/9/2020

Photo 50 - West end of Adit U trench. Also see photos 44, 45, 46, 47, 48, and 49.



K.Kostka, 9/23/2020

Photo 51 – Sample site WF-WP1-SS1.

Soil collected from waste rock in foreground. Adit A portal in background. Also see Photos 4-5.



K.Kostka, 9/23/2020

Photo 52 – Sample site WF-WP2-SS1.



K.Kostka, 9/23/2020

Photo 53 – Sample site WF-WP3-SS1 and WF-WP3-SS2.



K.Kostka, 9/23/2020

Photo 54 – Sample site WF-WP4-SS1.

Located downhill from Adit N where Log Lane crosses waste rock. Also see photo 55.



K.Kostka, 9/23/2020

Photo 55- Sample site WF-WP4-SS1.

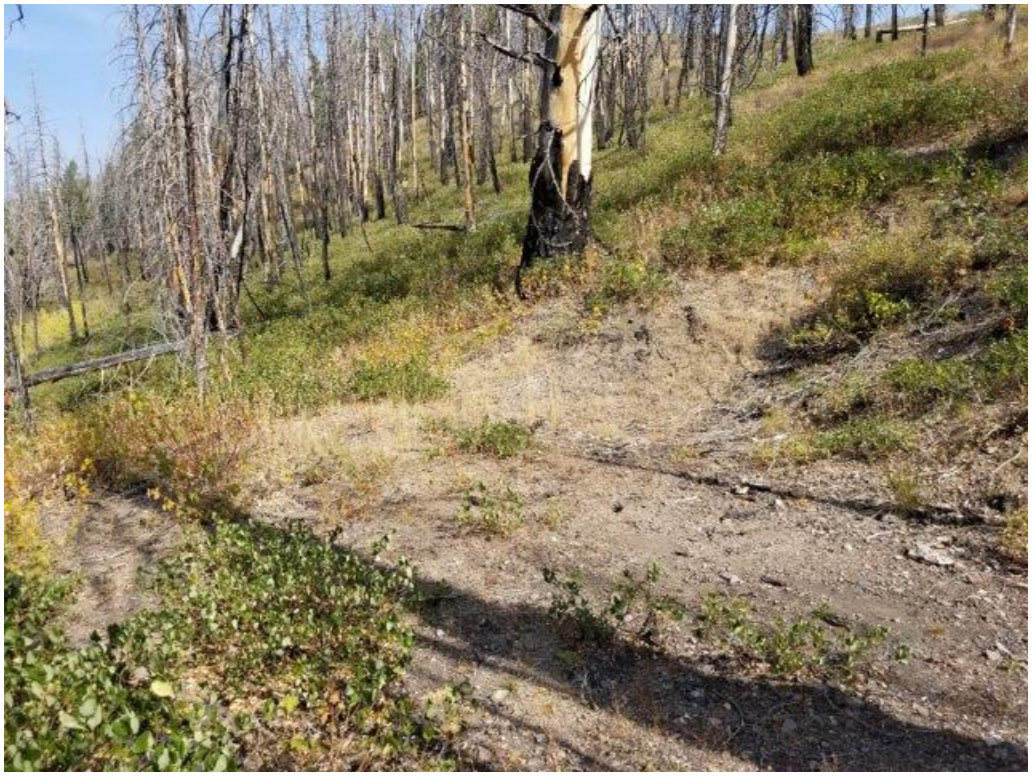
Soil collected from uphill (right) track in road. Also see Photo 54.



K.Kostka, 9/23/2020

Photo 56 – Sample site WF-WP5-SS1.

Soil collected near old lumber. Adit N portal in background. Also see Photos 29-32.



K.Kostka, 9/23/2020

Photo 57 – Sample site WF-WP6-SS1



K.Kostka, 9/23/2020

Photo 58- Sample site WF-BG1-SS1 and WF-BG1-SS2.



K.Kostka, 9/23/2020

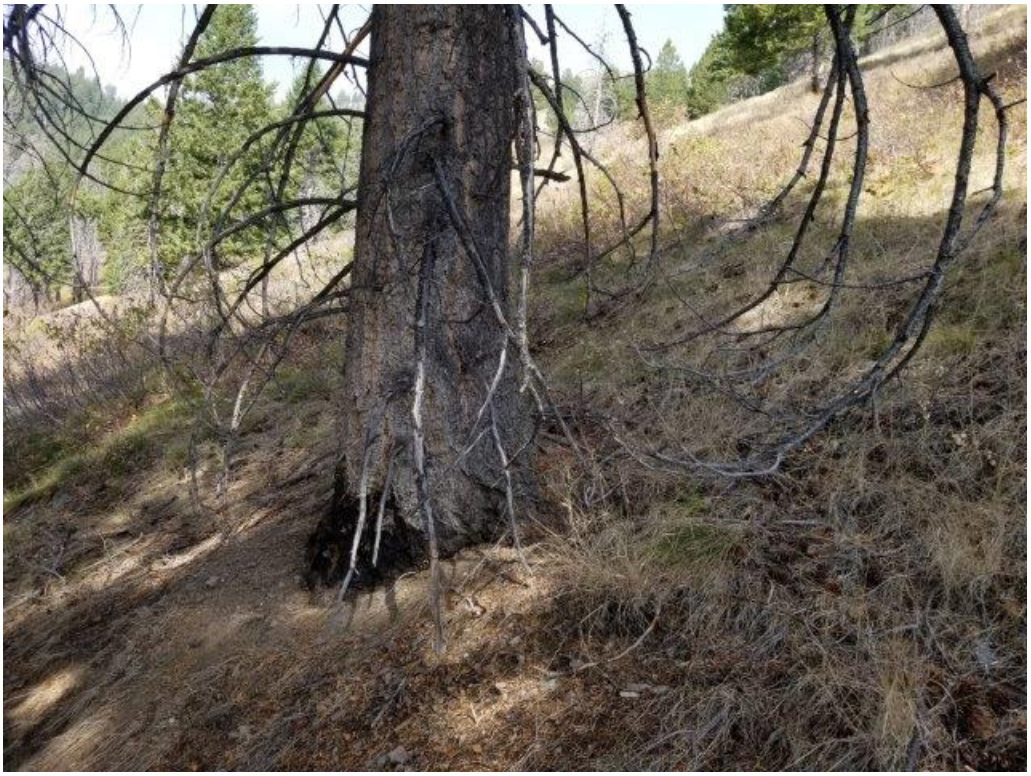
Photo 59 – Looking north at intersection of Log Ln and Eve's Gulch Trail (#146).

Log Lane extends uphill where it dead ends.



K.Kostka, 9/23/2020

Photo 60 – Sample site WF-WP7-SS1.



K.Kostka, 9/23/2020

Photo 61 – Sample site WF-BG2-SS1

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Appendix B. Analytical Laboratory Report

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One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received	Notes
WF-WP1-SS1	X0I0676-01	Soil	23-Sep-20 10:37	DC	30-Sep-2020	
WF-WP2-SS1	X0I0676-02	Soil	23-Sep-20 10:55	DC	30-Sep-2020	
WF-WP3-SS1	X0I0676-03	Soil	23-Sep-20 11:08	DC	30-Sep-2020	
WF-WP3-SS2	X0I0676-04	Soil	23-Sep-20 11:08	DC	30-Sep-2020	
WF-WP4-SS1	X0I0676-05	Soil	23-Sep-20 11:22	DC	30-Sep-2020	
WF-WP5-SS1	X0I0676-06	Soil	23-Sep-20 11:34	DC	30-Sep-2020	
WF-WP6-SS1	X0I0676-07	Soil	23-Sep-20 11:57	DC	30-Sep-2020	
WF-BG1-SS1	X0I0676-08	Soil	23-Sep-20 12:24	DC	30-Sep-2020	
WF-BG1-SS2	X0I0676-09	Soil	23-Sep-20 12:24	DC	30-Sep-2020	
WF-WP7-SS1	X0I0676-10	Soil	23-Sep-20 13:32	DC	30-Sep-2020	
WF-BG2-SS1	X0I0676-11	Soil	23-Sep-20 13:52	DC	30-Sep-2020	

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested.
Sample preparation is defined by the client as per their Data Quality Objectives.
This report supercedes any previous reports for this Work Order. The complete report includes pages for each sample, a full QC report, and a notes section.
Analyses were performed in accordance with SVL standard operating procedures and calibrations were performed and met SVL internal QC criteria.
The results presented in this report relate only to the samples, and meet all requirements of the NELAC Standards unless otherwise noted.
This report shall not be reproduced except in full, without the written approval of SVL Analytical, Inc.

Case Narrative: X0I0676

The state of origin only accredits for drinking water analyses.

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(208) 784-1258
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IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

Client Sample ID: **WF-WP1-SS1**
SVL Sample ID: **X0I0676-01 (Soil)**

Sampled: 23-Sep-20 10:37
Received: 30-Sep-20
Sampled By: DC

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6010D	**Antimony**	85.8	mg/kg	4.00	0.76		X041229	AS	10/13/20 11:40	
EPA 6010D	**Barium**	57.3	mg/kg	0.40	0.18		X040258	AS	10/13/20 10:15	
EPA 6010D	**Cadmium**	17.8	mg/kg	0.40	0.14		X040258	MH	10/12/20 15:06	
EPA 6010D	**Chromium**	20.2	mg/kg	0.60	0.20		X040258	MH	10/12/20 15:06	
EPA 6010D	**Copper**	668	mg/kg	1.00	0.32		X040258	MH	10/12/20 15:06	
EPA 6010D	**Iron**	26200	mg/kg	20.0	6.6		X040258	MH	10/12/20 15:06	
EPA 6010D	**Lead**	48300	mg/kg	150	33.0	100	X040258	KH	10/14/20 09:46	D2
EPA 6010D	**Manganese**	2340	mg/kg	1.2	1.0		X040258	MH	10/12/20 15:06	
EPA 6010D	**Silver**	189	mg/kg	10.0	2.00		X042084	MH	10/14/20 11:52	M3
EPA 6010D	**Zinc**	10300	mg/kg	100	34.0	100	X040258	MH	10/13/20 12:02	D2
EPA 6020B	**Arsenic**	171	mg/kg	0.300	0.0118	2	X041228	JFB	10/12/20 15:17	D1,M4
EPA 6020B	**Selenium**	4.11	mg/kg	0.300	0.024	2	X041228	JFB	10/12/20 15:17	D1,M4
EPA 7471B	**Mercury**	0.647	mg/kg	0.033	0.011		X041075	KH	10/09/20 11:56	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
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IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

Client Sample ID: **WF-WP2-SS1**
SVL Sample ID: **X0I0676-02 (Soil)**

Sampled: 23-Sep-20 10:55
Received: 30-Sep-20
Sampled By: DC

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6010D	**Antimony**	274	mg/kg	4.00	0.76		X041229	AS	10/13/20 11:49	
EPA 6010D	**Barium**	19.0	mg/kg	0.40	0.18		X040258	AS	10/13/20 10:19	
EPA 6010D	**Cadmium**	54.2	mg/kg	0.40	0.14		X040258	MH	10/12/20 15:10	
EPA 6010D	**Chromium**	6.63	mg/kg	0.60	0.20		X040258	MH	10/12/20 15:10	
EPA 6010D	**Copper**	540	mg/kg	1.00	0.32		X040258	MH	10/12/20 15:10	
EPA 6010D	**Iron**	104000	mg/kg	2000	660	100	X040258	AS	10/13/20 11:04	D2
EPA 6010D	**Lead**	61800	mg/kg	150	33.0	100	X040258	KH	10/14/20 09:49	D2
EPA 6010D	**Manganese**	2140	mg/kg	1.2	1.0		X040258	MH	10/12/20 15:10	
EPA 6010D	**Silver**	200	mg/kg	10.0	2.00		X042084	MH	10/14/20 12:02	
EPA 6010D	**Zinc**	44100	mg/kg	500	170	500	X040258	MH	10/13/20 12:06	D2
EPA 6020B	**Arsenic**	915	mg/kg	30.0	1.18	200	X041228	JFB	10/12/20 16:37	D1
EPA 6020B	**Selenium**	5.57	mg/kg	0.300	0.024	2	X041228	JFB	10/12/20 15:24	D1
EPA 7471B	**Mercury**	3.29	mg/kg	0.330	0.110	10	X041075	KH	10/09/20 12:43	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

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IDEQ (Boise)
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Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

Client Sample ID: **WF-WP3-SS1**
SVL Sample ID: **X0I0676-03 (Soil)**

Sampled: 23-Sep-20 11:08
Received: 30-Sep-20
Sampled By: DC

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6010D	**Antimony**	233	mg/kg	4.00	0.76		X041229	AS	10/13/20 11:53	
EPA 6010D	**Barium**	72.5	mg/kg	0.40	0.18		X040258	AS	10/13/20 10:22	
EPA 6010D	**Cadmium**	1.93	mg/kg	0.40	0.14		X040258	MH	10/12/20 15:14	
EPA 6010D	**Chromium**	4.83	mg/kg	0.60	0.20		X040258	MH	10/12/20 15:14	
EPA 6010D	**Copper**	68.7	mg/kg	1.00	0.32		X040258	MH	10/12/20 15:14	
EPA 6010D	**Iron**	22800	mg/kg	20.0	6.6		X040258	MH	10/12/20 15:14	
EPA 6010D	**Lead**	62200	mg/kg	150	33.0	100	X040258	KH	10/14/20 09:52	D2
EPA 6010D	**Manganese**	534	mg/kg	1.2	1.0		X040258	MH	10/12/20 15:14	
EPA 6010D	**Silver**	210	mg/kg	10.0	2.00		X042084	MH	10/14/20 12:06	
EPA 6010D	**Zinc**	803	mg/kg	1.00	0.34		X040258	MH	10/12/20 15:14	
EPA 6020B	**Arsenic**	758	mg/kg	3.00	0.118	20	X041228	JFB	10/12/20 16:39	D1
EPA 6020B	**Selenium**	7.10	mg/kg	2.00	0.240	20	X041228	JFB	10/12/20 16:39	D1
EPA 7471B	**Mercury**	1.81	mg/kg	0.330	0.110	10	X041075	KH	10/09/20 12:49	D2

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IDEQ (Boise)
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Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

Client Sample ID: **WF-WP3-SS2**
SVL Sample ID: **X0I0676-04 (Soil)**

Sampled: 23-Sep-20 11:08
Received: 30-Sep-20
Sampled By: DC

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6010D	**Antimony**	159	mg/kg	4.00	0.76		X041229	AS	10/13/20 11:56	
EPA 6010D	**Barium**	73.9	mg/kg	0.40	0.18		X040258	AS	10/13/20 10:25	
EPA 6010D	**Cadmium**	4.81	mg/kg	0.40	0.14		X040258	MH	10/12/20 15:18	
EPA 6010D	**Chromium**	5.12	mg/kg	0.60	0.20		X040258	MH	10/12/20 15:18	
EPA 6010D	**Copper**	87.0	mg/kg	1.00	0.32		X040258	MH	10/12/20 15:18	
EPA 6010D	**Iron**	23400	mg/kg	20.0	6.6		X040258	MH	10/12/20 15:18	
EPA 6010D	**Lead**	80800	mg/kg	150	33.0	100	X040258	KH	10/14/20 09:55	D2
EPA 6010D	**Manganese**	477	mg/kg	1.2	1.0		X040258	MH	10/12/20 15:18	
EPA 6010D	**Silver**	246	mg/kg	10.0	2.00		X042084	MH	10/14/20 12:09	
EPA 6010D	**Zinc**	839	mg/kg	1.00	0.34		X040258	MH	10/12/20 15:18	
EPA 6020B	**Arsenic**	705	mg/kg	0.300	0.0118	2	X041228	JFB	10/12/20 15:44	D1
EPA 6020B	**Selenium**	4.39	mg/kg	0.300	0.024	2	X041228	JFB	10/12/20 15:44	D1
EPA 7471B	**Mercury**	3.93	mg/kg	0.330	0.110	10	X041075	KH	10/09/20 12:52	D2

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Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

Client Sample ID: **WF-WP4-SS1**
SVL Sample ID: **X0I0676-05 (Soil)**

Sampled: 23-Sep-20 11:22
Received: 30-Sep-20
Sampled By: DC

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6010D	**Antimony**	89.0	mg/kg	4.00	0.76		X041229	AS	10/13/20 11:59	
EPA 6010D	**Barium**	31.8	mg/kg	0.40	0.18		X040258	AS	10/13/20 10:28	
EPA 6010D	**Cadmium**	14.4	mg/kg	0.40	0.14		X040258	MH	10/12/20 15:22	
EPA 6010D	**Chromium**	4.69	mg/kg	0.60	0.20		X040258	MH	10/12/20 15:22	
EPA 6010D	**Copper**	304	mg/kg	1.00	0.32		X040258	MH	10/12/20 15:22	
EPA 6010D	**Iron**	34800	mg/kg	2000	660	100	X040258	AS	10/13/20 11:07	D2
EPA 6010D	**Lead**	25100	mg/kg	150	33.0	100	X040258	KH	10/14/20 09:59	D2
EPA 6010D	**Manganese**	516	mg/kg	1.2	1.0		X040258	MH	10/12/20 15:22	
EPA 6010D	**Silver**	89.5	mg/kg	10.0	2.00		X042084	MH	10/14/20 12:13	
EPA 6010D	**Zinc**	13700	mg/kg	100	34.0	100	X040258	MH	10/13/20 12:10	D2
EPA 6020B	**Arsenic**	346	mg/kg	3.00	0.118	20	X041228	JFB	10/12/20 15:57	D1
EPA 6020B	**Selenium**	3.32	mg/kg	0.300	0.024	2	X041228	JFB	10/12/20 16:53	D1
EPA 7471B	**Mercury**	1.15	mg/kg	0.033	0.011		X041075	KH	10/09/20 12:08	

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Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

Client Sample ID: **WF-WP5-SS1**
SVL Sample ID: **X0I0676-06 (Soil)**

Sampled: 23-Sep-20 11:34
Received: 30-Sep-20
Sampled By: DC

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6010D	**Antimony**	241	mg/kg	4.00	0.76		X041229	AS	10/13/20 12:02	
EPA 6010D	**Barium**	48.0	mg/kg	0.40	0.18		X040258	AS	10/13/20 10:31	
EPA 6010D	**Cadmium**	10.4	mg/kg	0.40	0.14		X040258	MH	10/12/20 15:25	
EPA 6010D	**Chromium**	10.4	mg/kg	0.60	0.20		X040258	MH	10/12/20 15:25	
EPA 6010D	**Copper**	458	mg/kg	1.00	0.32		X040258	MH	10/12/20 15:25	
EPA 6010D	**Iron**	59400	mg/kg	2000	660	100	X040258	AS	10/13/20 11:10	D2
EPA 6010D	**Lead**	58700	mg/kg	150	33.0	100	X040258	KH	10/14/20 10:02	D2
EPA 6010D	**Manganese**	967	mg/kg	1.2	1.0		X040258	MH	10/12/20 15:25	
EPA 6010D	**Silver**	246	mg/kg	10.0	2.00		X042084	MH	10/14/20 12:16	
EPA 6010D	**Zinc**	13300	mg/kg	100	34.0	100	X040258	MH	10/13/20 12:14	D2
EPA 6020B	**Arsenic**	788	mg/kg	3.00	0.118	20	X041228	JFB	10/12/20 15:59	D1
EPA 6020B	**Selenium**	3.99	mg/kg	0.300	0.024	2	X041228	JFB	10/12/20 16:55	D1
EPA 7471B	**Mercury**	1.41	mg/kg	0.033	0.011		X041075	KH	10/09/20 12:14	

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Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

Client Sample ID: **WF-WP6-SS1**
SVL Sample ID: **X0I0676-07 (Soil)**

Sampled: 23-Sep-20 11:57
Received: 30-Sep-20
Sampled By: DC

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6010D	**Antimony**	4.51	mg/kg	4.00	0.76		X041229	AS	10/13/20 12:15	
EPA 6010D	**Barium**	119	mg/kg	0.40	0.18		X040258	AS	10/13/20 09:35	M1
EPA 6010D	**Cadmium**	5.42	mg/kg	0.40	0.14		X040258	MH	10/12/20 15:29	
EPA 6010D	**Chromium**	6.27	mg/kg	0.60	0.20		X040258	MH	10/12/20 15:29	
EPA 6010D	**Copper**	19.1	mg/kg	1.00	0.32		X040258	MH	10/12/20 15:29	
EPA 6010D	**Iron**	9510	mg/kg	20.0	6.6		X040258	MH	10/12/20 15:29	M3
EPA 6010D	**Lead**	862	mg/kg	15.0	3.30	10	X040258	KH	10/14/20 10:05	D2,M4
EPA 6010D	**Manganese**	907	mg/kg	1.2	1.0		X040258	MH	10/12/20 15:29	
EPA 6010D	**Silver**	4.11	mg/kg	1.00	0.20		X040258	AS	10/13/20 09:35	
EPA 6010D	**Zinc**	763	mg/kg	1.00	0.34		X040258	MH	10/12/20 15:29	M3
EPA 6020B	**Arsenic**	21.6	mg/kg	3.00	0.118	20	X041228	JFB	10/12/20 16:01	D1
EPA 6020B	Selenium	< 0.300	mg/kg	0.300	0.024	2	X041228	JFB	10/12/20 16:58	D1
EPA 7471B	**Mercury**	0.103	mg/kg	0.033	0.011		X041075	KH	10/09/20 12:16	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

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Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

Client Sample ID: **WF-BG1-SS1**
SVL Sample ID: **X0I0676-08 (Soil)**

Sampled: 23-Sep-20 12:24
Received: 30-Sep-20
Sampled By: DC

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6010D	Antimony	< 4.00	mg/kg	4.00	0.76		X041229	AS	10/13/20 12:18	
EPA 6010D	**Barium**	103	mg/kg	0.40	0.18		X040258	AS	10/13/20 09:48	
EPA 6010D	**Cadmium**	3.36	mg/kg	0.40	0.14		X040258	MH	10/12/20 15:49	
EPA 6010D	**Chromium**	7.58	mg/kg	0.60	0.20		X040258	MH	10/12/20 15:49	
EPA 6010D	**Copper**	12.8	mg/kg	1.00	0.32		X040258	MH	10/12/20 15:49	
EPA 6010D	**Iron**	10400	mg/kg	20.0	6.6		X040258	MH	10/12/20 15:49	
EPA 6010D	**Lead**	148	mg/kg	1.50	0.33		X040258	KH	10/12/20 15:49	
EPA 6010D	**Manganese**	686	mg/kg	1.2	1.0		X040258	MH	10/12/20 15:49	
EPA 6010D	Silver	< 1.00	mg/kg	1.00	0.20		X040258	AS	10/13/20 09:48	
EPA 6010D	**Zinc**	249	mg/kg	1.00	0.34		X040258	MH	10/12/20 15:49	
EPA 6020B	**Arsenic**	14.8	mg/kg	3.00	0.118	20	X041228	JFB	10/12/20 16:04	D1
EPA 6020B	Selenium	< 0.300	mg/kg	0.300	0.024	2	X041228	JFB	10/12/20 17:00	D1
EPA 7471B	Mercury	< 0.033	mg/kg	0.033	0.011		X041075	KH	10/09/20 12:21	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

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Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

Client Sample ID: **WF-BG1-SS2**
SVL Sample ID: **X0I0676-09 (Soil)**

Sampled: 23-Sep-20 12:24
Received: 30-Sep-20
Sampled By: DC

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6010D	Antimony	< 4.00	mg/kg	4.00	0.76		X041229	AS	10/13/20 12:22	
EPA 6010D	**Barium**	94.2	mg/kg	0.40	0.18		X040258	AS	10/13/20 09:51	
EPA 6010D	**Cadmium**	2.85	mg/kg	0.40	0.14		X040258	MH	10/12/20 15:53	
EPA 6010D	**Chromium**	7.10	mg/kg	0.60	0.20		X040258	MH	10/12/20 15:53	
EPA 6010D	**Copper**	12.4	mg/kg	1.00	0.32		X040258	MH	10/12/20 15:53	
EPA 6010D	**Iron**	10300	mg/kg	20.0	6.6		X040258	MH	10/12/20 15:53	
EPA 6010D	**Lead**	130	mg/kg	1.50	0.33		X040258	KH	10/12/20 15:53	
EPA 6010D	**Manganese**	628	mg/kg	1.2	1.0		X040258	MH	10/12/20 15:53	
EPA 6010D	Silver	< 1.00	mg/kg	1.00	0.20		X040258	AS	10/13/20 09:51	
EPA 6010D	**Zinc**	226	mg/kg	1.00	0.34		X040258	MH	10/12/20 15:53	
EPA 6020B	**Arsenic**	11.6	mg/kg	3.00	0.118	20	X041228	JFB	10/12/20 16:06	D1
EPA 6020B	Selenium	< 0.300	mg/kg	0.300	0.024	2	X041228	JFB	10/12/20 17:02	D1
EPA 7471B	Mercury	< 0.033	mg/kg	0.033	0.011		X041075	KH	10/09/20 12:23	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

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Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

Client Sample ID: **WF-WP7-SS1**
SVL Sample ID: **X0I0676-10 (Soil)**

Sampled: 23-Sep-20 13:32
Received: 30-Sep-20
Sampled By: DC

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6010D	**Antimony**	26.2	mg/kg	4.00	0.76		X041229	AS	10/13/20 12:25	
EPA 6010D	**Barium**	247	mg/kg	0.40	0.18		X040258	AS	10/13/20 09:54	
EPA 6010D	**Cadmium**	9.37	mg/kg	0.40	0.14		X040258	MH	10/12/20 15:57	
EPA 6010D	**Chromium**	11.2	mg/kg	0.60	0.20		X040258	MH	10/12/20 15:57	
EPA 6010D	**Copper**	29.0	mg/kg	1.00	0.32		X040258	MH	10/12/20 15:57	
EPA 6010D	**Iron**	14100	mg/kg	20.0	6.6		X040258	MH	10/12/20 15:57	
EPA 6010D	**Lead**	1900	mg/kg	15.0	3.30	10	X040258	KH	10/14/20 10:15	D2
EPA 6010D	**Manganese**	1660	mg/kg	1.2	1.0		X040258	MH	10/12/20 15:57	
EPA 6010D	**Silver**	10.6	mg/kg	1.00	0.20		X040258	AS	10/13/20 09:54	
EPA 6010D	**Zinc**	518	mg/kg	1.00	0.34		X040258	MH	10/12/20 15:57	
EPA 6020B	**Arsenic**	44.1	mg/kg	3.00	0.118	20	X041228	JFB	10/12/20 16:08	D1
EPA 6020B	**Selenium**	0.489	mg/kg	0.300	0.024	2	X041228	JFB	10/12/20 17:04	D1
EPA 7471B	**Mercury**	0.290	mg/kg	0.033	0.011		X041075	KH	10/09/20 12:25	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.



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Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

Client Sample ID: **WF-BG2-SS1**
SVL Sample ID: **X0I0676-11 (Soil)**

Sampled: 23-Sep-20 13:52
Received: 30-Sep-20
Sampled By: DC

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6010D	Antimony	< 4.00	mg/kg	4.00	0.76		X041229	AS	10/13/20 12:28	
EPA 6010D	**Barium**	148	mg/kg	0.40	0.18		X040258	AS	10/13/20 09:57	
EPA 6010D	**Cadmium**	6.18	mg/kg	0.40	0.14		X040258	MH	10/12/20 16:01	
EPA 6010D	**Chromium**	7.98	mg/kg	0.60	0.20		X040258	MH	10/12/20 16:01	
EPA 6010D	**Copper**	14.6	mg/kg	1.00	0.32		X040258	MH	10/12/20 16:01	
EPA 6010D	**Iron**	10700	mg/kg	20.0	6.6		X040258	MH	10/12/20 16:01	
EPA 6010D	**Lead**	355	mg/kg	15.0	3.30	10	X040258	KH	10/14/20 10:29	D2
EPA 6010D	**Manganese**	909	mg/kg	1.2	1.0		X040258	MH	10/12/20 16:01	
EPA 6010D	**Silver**	1.06	mg/kg	1.00	0.20		X040258	AS	10/13/20 09:57	
EPA 6010D	**Zinc**	346	mg/kg	1.00	0.34		X040258	MH	10/12/20 16:01	
EPA 6020B	**Arsenic**	21.9	mg/kg	3.00	0.118	20	X041228	JFB	10/12/20 16:11	D1
EPA 6020B	Selenium	< 0.300	mg/kg	0.300	0.024	2	X041228	JFB	10/12/20 17:06	D1
EPA 7471B	Mercury	< 0.033	mg/kg	0.033	0.011		X041075	KH	10/09/20 12:27	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Dave Tryon
Project Manager

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IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

Quality Control - BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
Metals by EPA 6000/7000 Series								
EPA 6010D	Antimony	mg/kg	<4.00	0.76	4.00	X041229	13-Oct-20	
EPA 6010D	Barium	mg/kg	<0.40	0.18	0.40	X040258	13-Oct-20	
EPA 6010D	Cadmium	mg/kg	<0.40	0.14	0.40	X040258	12-Oct-20	
EPA 6010D	Chromium	mg/kg	<0.60	0.20	0.60	X040258	12-Oct-20	
EPA 6010D	Copper	mg/kg	<1.00	0.32	1.00	X040258	12-Oct-20	
EPA 6010D	Iron	mg/kg	<20.0	6.6	20.0	X040258	12-Oct-20	
EPA 6010D	Lead	mg/kg	<1.50	0.33	1.50	X040258	12-Oct-20	
EPA 6010D	Manganese	mg/kg	<1.2	1.0	1.2	X040258	12-Oct-20	
EPA 6010D	Silver	mg/kg	<1.00	0.20	1.00	X040258	13-Oct-20	
EPA 6010D	Silver	mg/kg	<1.00	0.20	1.00	X042084	14-Oct-20	
EPA 6010D	Zinc	mg/kg	<1.00	0.34	1.00	X040258	12-Oct-20	
EPA 6020B	Arsenic	mg/kg	<0.300	0.0118	0.300	X041228	12-Oct-20	D1
EPA 6020B	Selenium	mg/kg	<0.300	0.024	0.300	X041228	12-Oct-20	D1
EPA 7471B	Mercury	mg/kg	<0.033	0.011	0.033	X041075	09-Oct-20	

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals by EPA 6000/7000 Series									
EPA 6010D	Antimony	mg/kg	99.0	100	99.0	80 - 120	X041229	13-Oct-20	
EPA 6010D	Barium	mg/kg	98.4	100	98.4	80 - 120	X040258	13-Oct-20	
EPA 6010D	Cadmium	mg/kg	98.4	100	98.4	80 - 120	X040258	12-Oct-20	
EPA 6010D	Chromium	mg/kg	99.3	100	99.3	80 - 120	X040258	12-Oct-20	
EPA 6010D	Copper	mg/kg	101	100	101	80 - 120	X040258	12-Oct-20	
EPA 6010D	Iron	mg/kg	977	1000	97.7	80 - 120	X040258	12-Oct-20	
EPA 6010D	Lead	mg/kg	99.3	100	99.3	80 - 120	X040258	12-Oct-20	
EPA 6010D	Manganese	mg/kg	97.0	100	97.0	80 - 120	X040258	12-Oct-20	
EPA 6010D	Silver	mg/kg	4.90	5.00	98.0	80 - 120	X040258	13-Oct-20	
EPA 6010D	Silver	mg/kg	4.79	5.00	95.7	80 - 120	X042084	14-Oct-20	
EPA 6010D	Zinc	mg/kg	98.9	100	98.9	80 - 120	X040258	12-Oct-20	
EPA 6020B	Arsenic	mg/kg	2.41	2.50	96.3	80 - 120	X041228	12-Oct-20	D1
EPA 6020B	Selenium	mg/kg	2.40	2.50	96.2	80 - 120	X041228	12-Oct-20	D1
EPA 7471B	Mercury	mg/kg	0.844	0.833	101	80 - 120	X041075	09-Oct-20	

Quality Control - MATRIX SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch and Source ID	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6010D	Antimony	mg/kg	165	85.8	100	79.6	75 - 125	X041229 - X0I0676-01	13-Oct-20	
EPA 6010D	Barium	mg/kg	262	119	100	143	75 - 125	X040258 - X0I0676-07	13-Oct-20	M1
EPA 6010D	Cadmium	mg/kg	101	5.42	100	95.9	75 - 125	X040258 - X0I0676-07	12-Oct-20	
EPA 6010D	Chromium	mg/kg	104	6.27	100	98.1	75 - 125	X040258 - X0I0676-07	12-Oct-20	
EPA 6010D	Copper	mg/kg	117	19.1	100	98.3	75 - 125	X040258 - X0I0676-07	12-Oct-20	
EPA 6010D	Iron	mg/kg	11600	9510	1000	0.30R>S	75 - 125	X040258 - X0I0676-07	12-Oct-20	M3
EPA 6010D	Lead	mg/kg	1030	862	100	0.30R>S	75 - 125	X040258 - X0I0676-07	14-Oct-20	D2,M4
EPA 6010D	Manganese	mg/kg	1080	907	100	0.30R>S	75 - 125	X040258 - X0I0676-07	12-Oct-20	M3
EPA 6010D	Silver	mg/kg	9.01	4.11	5.00	97.8	75 - 125	X040258 - X0I0676-07	13-Oct-20	
EPA 6010D	Silver	mg/kg	233	189	50.0	87.8	75 - 125	X042084 - X0I0676-01	14-Oct-20	
EPA 6010D	Zinc	mg/kg	961	763	100	0.30R>S	75 - 125	X040258 - X0I0676-07	12-Oct-20	M3

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IDEQ (Boise)
1410 N. Hilton
Boise, ID 83706

Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment
Work Order: **X0I0676**
Reported: 14-Oct-20 17:08

Quality Control - MATRIX SPIKE Data (Continued)

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch and Source ID	Analyzed	Notes
Metals by EPA 6000/7000 Series (Continued)										
EPA 6020B	Arsenic	mg/kg	177	171	2.50	0.30R>S	75 - 125	X041228 - X0I0676-01	12-Oct-20	D1,M4
EPA 6020B	Selenium	mg/kg	7.48	4.11	2.50	135	75 - 125	X041228 - X0I0676-01	12-Oct-20	D1,M4
EPA 7471B	Mercury	mg/kg	0.338	0.033	0.333	91.3	75 - 125	X041075 - X0I0619-01	09-Oct-20	
EPA 7471B	Mercury	mg/kg	0.405	0.103	0.333	90.7	75 - 125	X041075 - X0I0676-07	09-Oct-20	

Quality Control - MATRIX SPIKE DUPLICATE Data

Method	Analyte	Units	MSD Result	Spike Result	Spike Level	RPD	RPD Limit	% Recovery	Batch and Source ID	Notes
Metals by EPA 6000/7000 Series										
EPA 6010D	Antimony	mg/kg	166	165	100	0.3	20	80.1	X041229 - X0I0676-01	
EPA 6010D	Barium	mg/kg	261	262	100	0.3	20	142	X040258 - X0I0676-07	M1
EPA 6010D	Cadmium	mg/kg	101	101	100	0.0	20	95.8	X040258 - X0I0676-07	
EPA 6010D	Chromium	mg/kg	104	104	100	0.7	20	97.4	X040258 - X0I0676-07	
EPA 6010D	Copper	mg/kg	118	117	100	0.5	20	98.9	X040258 - X0I0676-07	
EPA 6010D	Iron	mg/kg	12900	11600	1000	11.0	20	0.30R>S	X040258 - X0I0676-07	M3
EPA 6010D	Lead	mg/kg	1020	1030	100	1.3	20	0.30R>S	X040258 - X0I0676-07	
EPA 6010D	Lead	mg/kg	1050	1030	100	1.9	20	0.30R>S	X040258 - X0I0676-07	D2,M4
EPA 6010D	Manganese	mg/kg	1070	1080	100	1.3	20	0.30R>S	X040258 - X0I0676-07	M3
EPA 6010D	Silver	mg/kg	9.14	9.01	5.00	1.5	20	101	X040258 - X0I0676-07	
EPA 6010D	Silver	mg/kg	193	233	50.0	19.0	20	0.30R>S	X042084 - X0I0676-01	M3
EPA 6010D	Zinc	mg/kg	997	961	100	3.6	20	0.30R>S	X040258 - X0I0676-07	M3
EPA 6020B	Arsenic	mg/kg	214	177	2.50	18.6	20	0.30R>S	X041228 - X0I0676-01	D1,M4
EPA 6020B	Selenium	mg/kg	7.62	7.48	2.50	1.9	20	140	X041228 - X0I0676-01	D1,M4
EPA 7471B	Mercury	mg/kg	0.337	0.338	0.333	0.1	20	91.2	X041075 - X0I0619-01	

Qualitiv Control - SERIAL DILUTION Data

Method	Analyte	Sample Result	Serial Dilution Result	RPD	Q	QC Limits	Batch and Source ID	Notes
Metals by EPA 6000/7000 Series								
EPA 6020B	Arsenic	177	187	5.4		20	X041228 - MS1	D1
EPA 6020B	Selenium	7.48	7.57	1.1		20	X041228 - MS1	D1
Metals by EPA 6000/7000 Series								
EPA 6010D	Silver	233	227	2.5		20	X042084 - MS1	

Qualitiv Control - SERIAL DILUTION Data

Method	Analyte	Sample Result	Serial Dilution Result	RPD	Q	QC Limits	Batch and Source ID	Notes
Metals by EPA 6000/7000 Series								
EPA 6010D	Barium	262	241	8.5		20	X040258 - MS1	
EPA 6010D	Iron	11600	12100	4.6		20	X040258 - MS1	
EPA 6010D	Manganese	1080	1140	5.0		20	X040258 - MS1	
EPA 6010D	Zinc	961	1010	4.6		20	X040258 - MS1	

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IDEQ (Boise)	**Project Name: West Fork Mine Preliminary Assessment / Preliminary Assessment**	
1410 N. Hilton	Work Order:	**X0I0676**
Boise, ID 83706	Reported:	14-Oct-20 17:08

Notes and Definitions

D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of target analyte.
M1	Matrix spike recovery was high, but the LCS recovery was acceptable.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to spike level. The LCS was acceptable.
M4	The analysis of the spiked sample required a dilution such that the spike recovery calculation does not provide useful information. The LCS recovery was acceptable.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
0.30R>S	% recovery not applicable; spike level is less than 30% of the sample concentration
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable

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Appendix C. DEQ Historic Mining Areas Health and Safety Factsheet

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Historic Mining Areas: Health and Safety

Many historic mining areas in Idaho can have high levels of lead and other metals in waste rock, tailings piles, soil, sediment, and water. Metals can enter the human body in several ways (e.g., when recreating in contaminated soil, putting hands or other objects covered with dust into the mouth, breathing in contaminated dust). Soil and dust from these areas can be unknowingly tracked into vehicles or homes after recreating in areas impacted by past mining activities. When possible, stay away from these potential hazards.

Actions you can take to reduce exposure to metals when recreating and visiting historic mining areas

- Keep hands clean, especially after playing outside and before eating, to keep dirt away from mouths.
    - Wash hands with soap and water, but not creek or river water. Bring water for cleaning.
    - Scrub for at least 20 seconds to remove particles. Use a nail scrub brush to get dirt out of fingernails.
    - Hand sanitizer kills germs but will not remove lead and other metals.
- Have a table or clean barrier (e.g., towel, blanket) between food and the ground. Do not eat food that has been dropped on the ground.
- Do not let children play in loose soil, dust, or muddy areas. Wash children's toys after playing outside.
- When riding ATVs, motorcycles, and bikes off-road, wear protective gear including a mask or other face covering. Avoid riding through dusty areas and increase distance between riders. When returning home, avoid tracking dust into the garage by washing vehicles.
- Do not camp or recreate near old mining structures or mining waste piles.
- Leave shoes outside the camper or tent.
- For homes and cabins in historic mining areas, regularly damp-wipe floors and surfaces indoors and vacuum carpets.
- Dust off or wash off anything that will be brought home.
    - Until they are clean, store dusty recreational clothes, shoes, toys, and equipment separate from clean areas. Wash dusty clothes separately from other laundry.
    - Wash pets that have played in the dirt or the river before letting them into the home.
    - Wash or dust off any camping or recreational items (e.g., tents, bicycles).

Lead and other metals

There is no safe level of lead exposure. Lead is most dangerous to young children, pregnant women, and unborn children. It can cause learning disabilities, behavioral problems, and slow growth. Lead can pose a risk to adults by causing memory loss, irritability, high blood pressure, and muscle or joint pain. Even small amounts of lead, less than a quarter teaspoon of contaminated dust or soil, can harm a child. Young children crawling and putting hands in their mouths have the most risk.

Besides visiting historic mine sites, other potential sources of lead in your home can include: lead paint in homes built before 1978 (*www.epa.gov/lead/protect-your-family-exposures-lead*) and some toys and ceramics may contain lead. Make sure children have plenty of calcium, iron, and vitamin C in their diets. Taking in these essential nutrients can help reduce the amount of lead the body absorbs. For more factsheets on hazardous substances, see the Agency for Toxic Substances and Disease Registry (ATSDR) ToxFAQs: *www.atsdr.cdc.gov/toxfaqs*.

Stay out and stay alive

Every year dozens of people are injured or killed in recreational accidents on mine property. Hazards associated with abandoned mines are not always apparent to recreationalists. STAY OUT AND STAY ALIVE. For more information visit: *www.abandonedmines.gov*

Common hazards associated with mines:

- **Open shafts** are vertical mine openings that can extend hundreds of feet to the lower level of a mine. Open shafts can be concealed by mine debris, dirt, rock, and water.
- **Unstable and decayed support** includes once solid beams and frameworks that have been decaying for more than a hundred years. In many cases, there may be no support at all and the fractured roof or walls of the mine tunnel may eventually collapse in response to vibrations and/or the force of gravity.
- **Deadly gases and lack of oxygen** can be present in abandoned mines that are not ventilated. Pockets of methane, carbon dioxide, and other deadly gases can form and displace oxygen with no visible sign. Breathing in these gases can cause muscles to stop responding normally, impaired thinking, and even unconsciousness and death.
- **Horizontal and vertical openings** can extend for miles. Within a short distance of the entrance there is no light, making it easy to become lost and disoriented inside a mine.

For more information

For more information on historical mining sites and your family's health, contact the Idaho Department of Health and Welfare at 1-800-445-8647 or *https://healthandwelfare.idaho.gov/health-wellness/environmental-health*

For other questions about historic mining areas, contact the nearest DEQ regional office:

- Boise: (208) 373-0550
- Coeur d'Alene: (208) 769-1422
- Idaho Falls: (208) 528-2650
- State Office: (208) 373-0502
- Lewiston: (208) 799-4370
- Pocatello: (208) 236-6160
- Twin Falls: (208) 736-2190