Paris Canyon Mine
Preliminary Assessment Report

Bear Lake County
State of Idaho

Department of Environmental Quality

November 2007

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

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List of Acronyms

Acronym	Definition
bgs	below ground surface
BLM	United States Bureau of Land Management
Cd	Cadmium
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Cr	Chromium
Co	Cobalt
Cu	Copper
DEQ	Idaho Department of Environmental Quality
EPA	United States Environmental Protection Agency
IDFG	Idaho Department of Fish and Game
IDL	Idaho Department of Lands
IDWR	Idaho Department of Water Resources
Ni	Nickel
PA	Preliminary Assessment
RMP	Area Wide Risk Management Plan
SDWIS	Safe Drinking Water Information System
Se	Selenium
Su	Standard Units
TDL	Target Distance Limit
USFS	United States Forest Service
USGS	United States Geological Survey
V	Vanadium
Zn	Zinc

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Section 1. Introduction

The Department of Environmental Quality (DEQ) was contracted by Region 10 of the United States Environmental Protection Agency (EPA) to provide technical support for completion of preliminary assessments at various mines within Idaho.

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

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

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

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

This report presents the results of the preliminary assessment (PA) of the Paris Canyon Mine and also documents the interagency PA and risk screening activities conducted for this *inactive mine site* located within the boundaries of the *Southeast Idaho Phosphate Mining Resource Area* (Figure 1; the green border outlines the resource area). The interagency PA was prepared by the DEQ, in collaboration with the United States Bureau of Land Management (BLM), the United States Forest Service (USFS), and the Idaho Department of Lands (IDL)—the primary mining administration agencies in southeast Idaho.

Site descriptions, conditions, data, and photos are taken directly from the *Orphan Mine Site Preliminary Assessment Screening Report* published in 2004 (DEQ, 2004a). Recommendations from the earlier report have been expanded upon in this report, based on DEQ evaluation of the earlier screening report and any additional information DEQ was able to obtain through literature review. A site visit and sampling were not conducted as part of this PA process.

1.1 Background of the Orphan Mine Assessments

Inactive mine sites consist of those historic mining operations not previously scheduled for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site-specific investigations conducted under the ongoing selenium investigation activities (DEQ, 2007). This PA was conducted to ensure all historic mining sites within the Idaho Phosphate Mining Resource Area have been inspected and evaluated in accordance with the goals and objectives outlined in the *Area Wide Risk Management Plan* (DEQ, 2004b):

- Protecting southeast Idaho's surface water resources by reducing risks to existing aquatic life and sensitive species from selenium and related trace metal

concentrations in regional sub basins and stream segments through (a) compliance with the National Toxics Rule and State Water Quality Regulation numeric criteria (b) development and demonstration of Best Management Practices (BMPs) to prevent future mining releases and associated risks from selenium and related trace metals in receiving streams and water bodies, and (c) development of a long-term monitoring plan for regional surface water resources to ensure effectiveness of risk reduction measures.

- Protecting wildlife, habitat, and ecological resources in southeast Idaho by reducing subpopulation risks to local wildlife to acceptable levels as established by risk-based action levels and by minimizing wildlife risks through the development and demonstration of effective BMPs for future mines.
- Maintaining and protecting multiple beneficial uses of the Southeast Idaho Phosphate Mining Resource Area by reducing livestock grazing risks and associated losses from selenium exposures in forage and drinking water sources and by preventing potential future public health risks by prohibiting residential land use and development in the immediate vicinity of phosphate mining waste units and/or impacted areas.
- Protecting southeast Idaho's ground water resources by identifying, characterizing, and responding to groundwater contamination sources that may present potential public health or ecological risks and by developing and demonstrating BMPs to control future mining releases and associated risks from selenium and related trace metals in groundwater.

The earlier mine site screening effort (DEQ, 2004a) included preliminary assessment activities at fourteen historic mine sites identified through lease records and literature reviews of past mining activities. Preliminary site inspections and environmental sampling of potentially impacted media (surface water, soil, sediment, and vegetation) was conducted by interagency sampling teams in May and July of 2002. Risk evaluation consisted of reviewing site data in terms of site conditions, areas of impact, potential for continued releases, and regional risk-based action levels developed for the Area Wide Risk Management Plan.

1.2 Overview

The Paris Canyon Mine site is located in Bear Lake County, Section 8, Township 14 South, Range 43 East, approximately two miles west of Paris, Idaho (Figure 1). The site is located on a northwest-facing slope within Paris Canyon, on private land, and can be reached from Paris by driving east along Paris Creek Road for approximately two and one-half miles. The public has access to the mine from the main road. There are no locked gates or posted signs in the proximity of the mine site.

The topography around the site is illustrated by Figure 2; Figure 3 shows the proximity of domestic and public water system wells within four miles of the site and surface water time of travel (TOT) delineations for 3, 6, and 10-year spans.

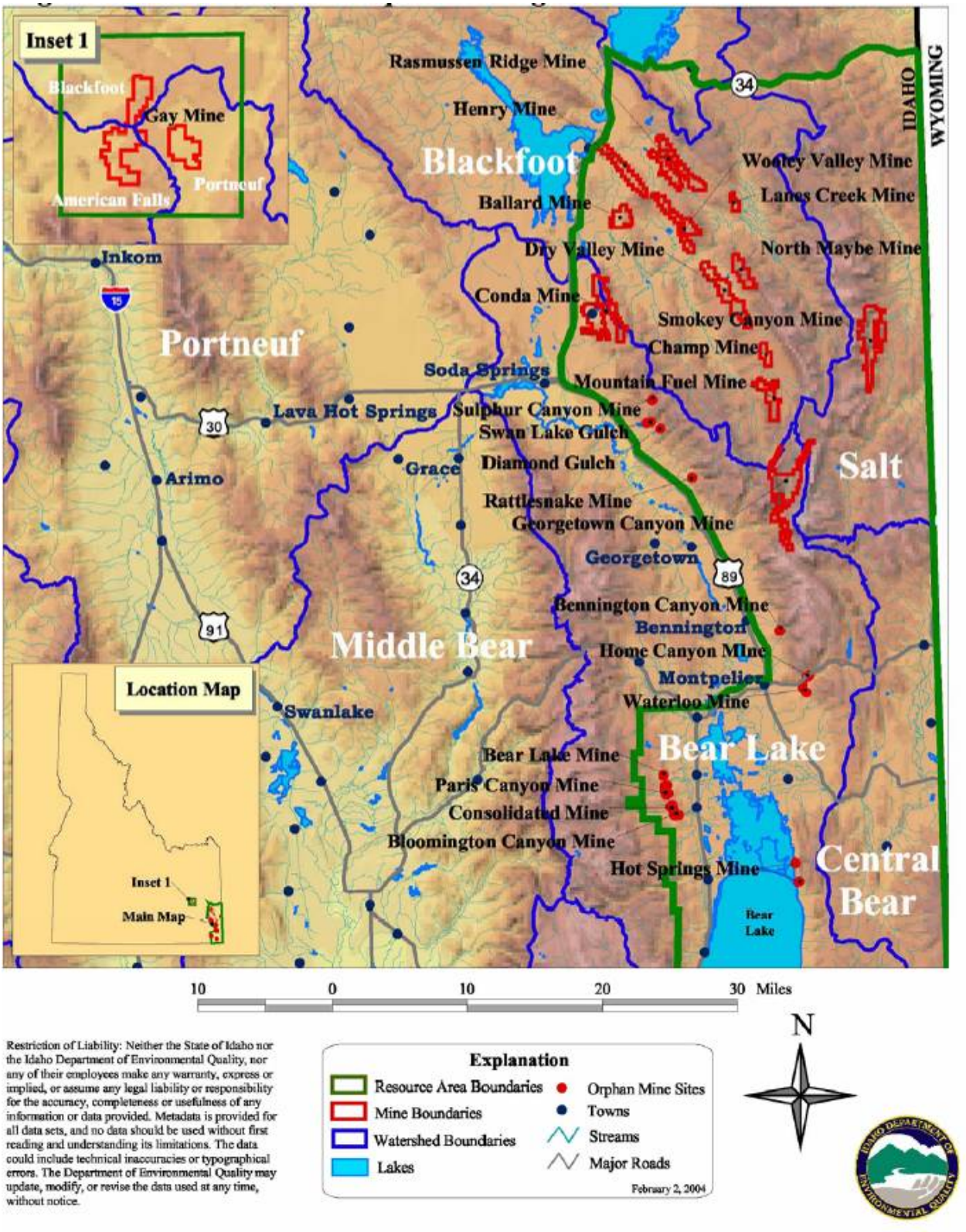


Figure 1. Location of the Paris Canyon Mine and delineation of the Southeast Idaho Phosphate Mining Resource Area (green boundary).



Figure 2. Topographic overview of the Paris Canyon Mine area.

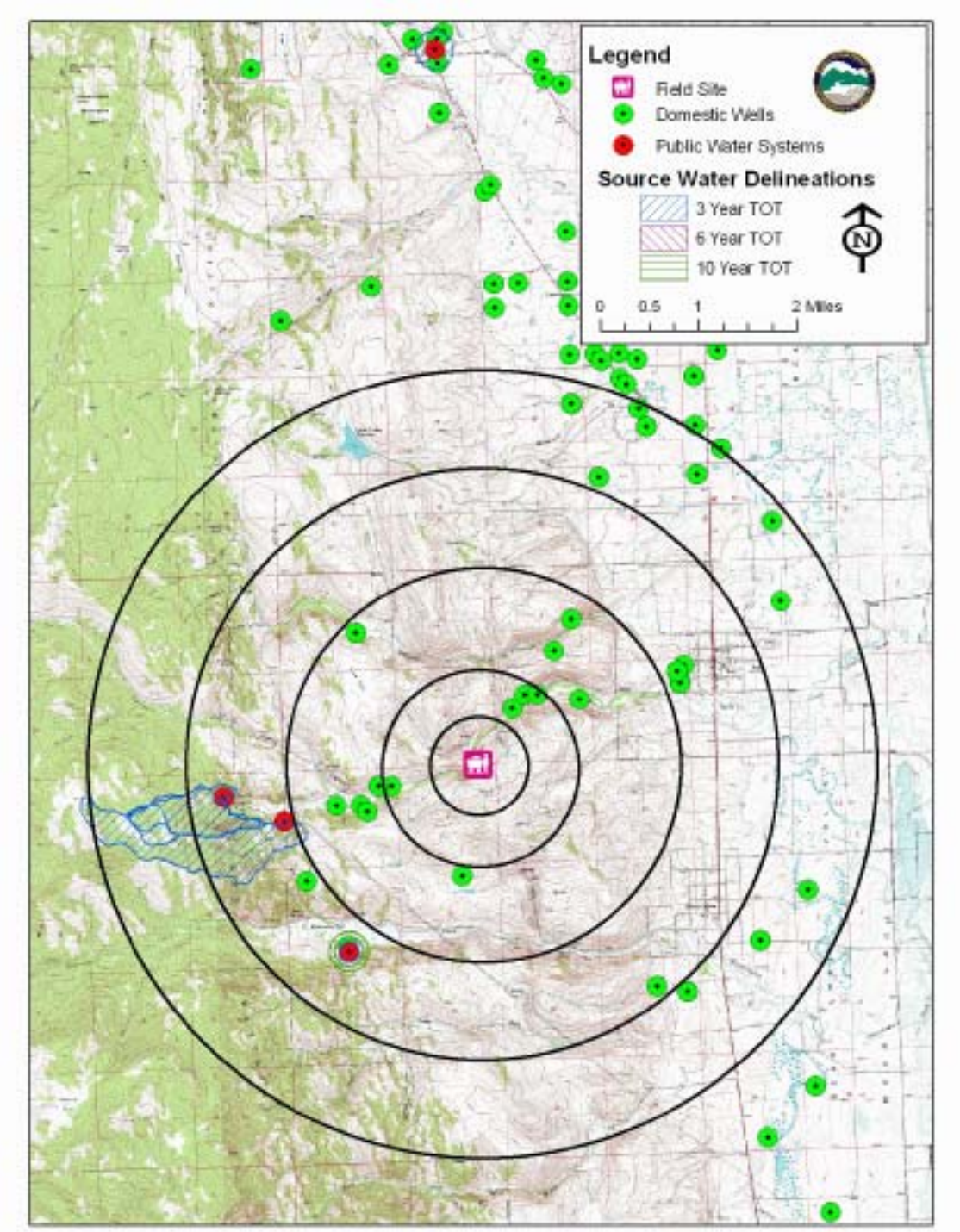


Figure 3. Domestic and public water system wells within a 4-mile radius.

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Section 2. Site Description, Operational History, and Waste Characteristics

Physical characteristics of the Paris Canyon Mine site are presented in the following, along with the mine's operational histories and characteristics of the wastes that remain.

2.1 Ownership

The Paris Canyon Mine is on private property, located on a northwest facing slope of Paris Canyon. Originally, the property was owned by Margarette Grandi. Development of the mine was started in 1917 by the Western Phosphate Mining and Manufacturing Company, which was sold to the Idaho Phosphate company in 1921. The current owner Earth Sciences Inc. (ESI) acquired the site in 1973.

Currently, the site is located on private land owned by ESI and leased by Eric Madsen for grazing. According to the Bear Lake County Tax Assessor, the current owner of record is Earth Sciences, Inc., 8100 S. Parkway, Suite B-2, Littleton, Colorado, 80120.

2.2 Historical Perspective

The site was originally discovered due to erosion caused by a breached ditch in 1913. In 1915, Leo W. Bach opened three prospects and shipped ore to the Anaconda Copper Company for testing. Development of the mine started in 1917, by the newly formed Western Phosphate Mining and Manufacturing Company. Approximately 60,000 tons of phosphate ore had been produced at the mine by the end of 1919. The operation grew to the point of requiring a mill on-site, which could facilitate 300 tons of ore per day. At this point, the mill employed several hundred people, and a bunkhouse and mess hall were constructed. At the end of 1920, the mine was reported to be 2,000 feet long with 53 different stopes.

After 1920, the phosphate market began to fluctuate, and the mine opened and closed according to market demands. In 1921, the Western Phosphate Company went bankrupt, and the mine was sold to the Idaho Phosphate Company. The mine operated intermittently through the 1920s and 1930s. During 1942, the Metals Reserve Company confiscated much of the rail workings for the war effort, and the mine permanently closed. Wyodak Coal Mining and Potash Company, performed site explorations in the area, however, no further production occurred at the mine.

2.3 Regional Climate

Climate in southeast Idaho is influenced by major topographic features, including the Pacific coast and local mountain ranges. The mountains affect local wind, precipitation, and temperature patterns.

Summer temperatures in the valleys are typically dry with average maximum temperatures in the low 80s (˚F) and average minimum temperatures in low to mid 40s (˚F). Summer precipitation is usually associated with thunderstorms. Fall and winter are dominated by cold, dry continental air and by cyclonic storms. The average maximum temperatures during February are in the low 30s (˚F) with the average minimums below 10 ˚F. Most precipitation during fall and winter falls as snow accumulating in the valleys and on the surrounding mountains. Spring precipitation usually results from cool marine air flowing in from the south.

The average annual precipitation varies widely throughout the resource area and with elevation. Lifton pumping station, located at the north end of Bear Lake, approximately 8 miles southeast of the site, has an average total annual precipitation of 10.62 inches based on a 1935 to 2007 period of record, while on the north end of the resource area, Conda, reports an annual total average precipitation of 18.91 inches over a period of record from 1948 to 1978 (Western Regional Climate Center, 2007). Precipitation in the surrounding mountains range from 25 to 35 inches annually (BLM, 2000). The heaviest 1-day rainfall during the period of record at Montpelier was 2.50 inches on June 16, 1939. Thunderstorms occur on about 24 days each year, and most occur between May and August (Natural Resource Conservation Service, 2007).

> "The average seasonal snowfall is 58.3 inches. The greatest snow depth at any one time during the period of record at Montpelier was 31 inches recorded on March 4, 1952. On an average, 108 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 13.0 inches recorded on December 19, 1951".
>
> (Natural Resource Conservation Service, 2007)

The prevailing wind direction is from the west-southwest, causing accumulation of snow on east and north facing ridges. Ralston et al. (1980) state that snow melt is the largest source of ground water recharge to the areas bedrock aquifers, giving the east and north facing ridges the greatest potential for significant recharge.

2.4 General Geology

The Paris Canyon Mine lies within the northern region of the Basin and Range physiographic province and is characterized by linear, north-trending fault-bounded ranges and basins created by extensional tectonics initiated during the last 10 to 20 million years (Figure 4). Ranges in southeastern Idaho are generally composed of deformed Paleozoic and Mesozoic sedimentary rocks, including thick marine clastic units, comprising cherts and limestones. The valleys are largely in-filled with Quaternary alluvium and colluvium that overlie Pleistocene basalt flows. Middle Pleistocene rhyolite flows of the Snake River Plain regions cover much of the area and complete the geologic sequences in the region.

Massive accumulations of marine sediment occurred during the Paleozoic Era over large areas of eastern Idaho. During the Permian Era, the Phosphoria Formation was deposited, forming the western phosphate field, part of which is located in the Idaho Phosphate Mining Resource Area.

2.5 Stratigraphy and Lithology ---Ownership

The stratigraphy of the area is characterized by Paleozoic and Mesozoic sediments overlain by Pleistocene igneous extrusions. The stratigraphy most encountered by mining activities in the area is generally limited to four principal rock units. The stratigraphy, approximate ages, and a description of each unit are summarized in Table 1.

Table 1. Generalized Stratigraphic Setting of Project Area[1].

Unit Name	Age	Description
Dinwoody Formation	Triassic	Interbedded claystone, limestone, and siltstone; ranges from 1,000 to 2,000 feet thick in project area
Phosphoria Formation	Permian	Composed of cherty mudstone, phosphatic mudstone, chert, phosphorite, limestone, and dolomite; phosphorite is the source of phosphate ore and is typically found in the lowermost portion of the formation.
Grandeur Limestone	Permian Pennsylvanian	Massive limestone that is discontinuous in the project area
Wells Formation	Pennsylvanian	Fine to very fine grain quartzitic to calcareous sandstone; approximately 1,500 to 2,000 feet thick in the project area.
Notes: 1. By convention, units are presented from top to bottom, as youngest to oldest.		

At the eastern edge of the resource area, the Phosphoria Formation corresponds to an ancient ocean shelf and is more calcareous and less argillaceous than Phosphoria Formation outcrops to the west.

The Phosphoria Formation includes four members: Meade Peak Phosphatic Shale, Rex Chert, Cherty Shale, and Retort Phosphatic Shale. The Meade Peak member, which ranges in thickness from about 55 to 200 feet, is the oldest and is either overlain by the Rex Chert or the Cherty Shale. The Retort member is discontinuous and is found in the north and eastern parts of the resource area. The Meade Peak member of the Phosphoria Formation is the source of the majority of the produced phosphate ore. Concentrations of phosphate minerals in the Meade Peak member are significantly higher that typical concentrations found in other marine sedimentary rock. (Montgomery Watson, 1998)

2.6 Structure

The Paris Canyon Mine and the surrounding area are located in the Idaho-Wyoming-Utah Overthrust belt, which extends from the Snake River Plain to near Salt Lake City and is part of the Cordilleran Foreland Thrust belt that extends from Alaska to Mexico. Thrusting began as movement on the Paris Thrust, the westernmost thrust plate during the late Jurassic to early Cretaceous.

The major thrust plate in the study area is the Paris Overthrust. The ore bearing units at the Consolidation Mine approximately one mile to the southeast from the Paris Mine consist of Pennsylvanian to Triassic age (Table 1), rock within an overturned syncline. The strata in the mine area are overturned and dip 55˚ westward, in the west limb of a syncline. They strike close to N45ºW.

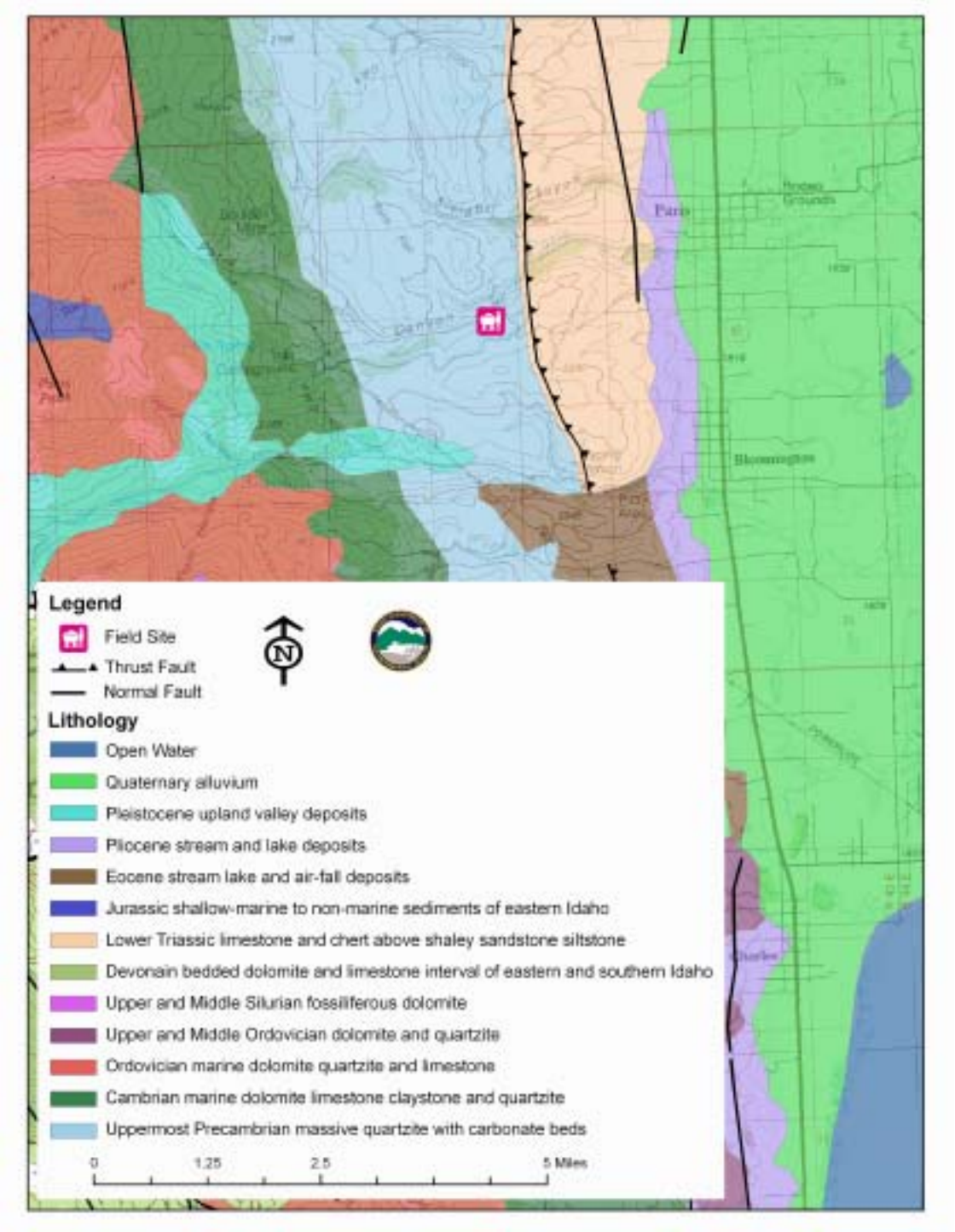


Figure 4. Geologic Map of Paris Canyon Mine Area.

2.7 Hydrogeology

The major ground water flow systems within the phosphate mining resource area exist in the valley fill sediments, which consist of Thaynes, Dinwoody, and Wells formations. The Phosphoria formation has not been found to support any major ground water flow

systems and generally acts as a confining unit between the Dinwoody and Wells formations.

Ground water flow in the valley sediments is generally from the valley margins towards the valley center then down valley towards lower elevations. Ground water flow within the bedrock aquifers is often controlled by stratigraphy and structural geology, flowing along the bedding in the direction of dip and/or plunge. Regional and localized faulting may form preferential flow paths or boundaries to ground water flow within the bedrock systems.

2.8 Current and Potential Future Land Uses

Future land use could potentially include some year-round and/or seasonal homes on the private parcels of property. However, given the sparse population density in the area and the predominately sagebrush vegetation type, this land use is not anticipated in the near future.

2.9 Area Fish Species

According to the Idaho Department of Fish and Game (IDFG) database, fish in Paris Creek include redband rainbow trout [*Oncorhynchhus mykiss* gairdneri], Bonneville cutthroat trout [Oncorhynhus clarki Utah], rainbow (hatchery) trout, brook trout [Salvelinus foninalis] and the mottled sculpin [Cottus bairdii] (IDFG, 2002).

2.10 Wetlands

Official wetland surveys for the area indicate that Little Canyon contains no wetland areas. However, within a 15-mile radius there are approximately 18,000 acres of wetlands (Figure 6).

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Section 3. Site Overview, Sampling, and Waste Characterization

An interagency team conducted a site visit to the Paris Canyon Mine during May 2002 (DEQ, 2004a) in accordance with the goals and objectives in the Area Wide Risk Management Plan. The visit included a visual inspection of the mine and the collection of seventeen samples, including; six surface water samples, four soil samples, three stream sediment samples, two vegetation samples one duplicate surface water sample and one rinseate sample. Sampling locations are shown on **Figure 5**, and Photos 12.4 through 12.13 in the Appendix. Samples were analyzed for trace metals and compared to action levels developed for the Area Wide Risk Management Plan (DEQ, 2004b).

3.1 Area Wide Risk Management Plan Action Levels

The Area Wide Risk Management Plan (RMP) was written as a discretionary guidance document to assist Lead and Support Agency representatives with their mine-specific risk management decision-making responsibilities regarding historic mining operation releases and associated impacts from selenium and related trace metals in the Southeast Idaho Phosphate Mining Resource Area. The plan provides removal action goals, objectives, and action levels intended to assist in identifying site-specific areas of concern, focusing regulatory resources, and supporting consistent decision-making using a regional perspective.

The risk-based action levels were developed using deterministic single media dose proportions as the initial basis. These action levels were tested and validated using probabilistic methods that assume simultaneous exposure from all action level media to numerous limited home range surrogate species representing sensitive receptors from the various feeding guilds present in the resource area.

Due to the limited area of impact and low likelihood of population-level effects, the action level development approach used by DEQ applied slightly less conservative assumptions regarding acceptable hazard quotient ranges than a typical population-level ecological risk assessment might. However, many of the receptor dose model parameters, such as site use, bioavailability, and secondary media exposure point concentrations, remained conservatively-biased to represent receptors residing exclusively in impacted areas during toxicologically critical periods such as spawning, nesting, and breeding. The DEQ's risk management decisions focus resources in areas where efforts to minimize potential impacts to ecological subpopulations will provide the greatest benefit.

Action levels were established for the primary media that support sensitive habitats and are most amenable to standard industry measurement and mitigation techniques, which were surface water, groundwater, sediments, fluvial/riparian soils, and vegetation. Elevated contaminant concentrations in the selected action level media are also indicative of the presence of past and/or ongoing releases.

3.2 Sampling

Seventeen samples were collected from eight locations around the site. **Figure 5** shows the locations of the sampling sites, and Tables 2, 3, 4, and 5 present the analytical results.

- Soil sample OS-PAR-SO-01-01 (Photo 12.4), was taken from the riparian zone between the main waste dump near the south portal and Paris Creek. The area was highly vegetated and located in the Paris Creek flood plain.
- Sample OS-PAR-SW-02-01 (Photo 12.5) was a surface water sample collected from runoff that had apparently run off a black shale waste dump and collected in the roadway. This sample was collected approximately 200 feet north of the south portal. The pH of the water was 7.8 standard units (su) and the water temperature was 11º C.
- Two samples were collected between a small black shale dump and Paris Creek (Photo 12.6). They were located about 15 feet south of the riparian zone within the flood plain of the creek. Sample OS-PAR-SO-03-01, was a soil sample composed of black, organic soil. Dandelions were collected in the same location for the vegetation sample OS-PAR-VE-04-01.
- Soil sample OS-PAR-SO-05-01, was taken along the side of the same waste dump as soil sample 03-01 (Photo 12.7). It was composed of nearly 100% coarse and fine black shale material.
- Samples OS-PSR-SW-06-01 and OS-PAR-SE-07-01 were collected from Paris Creek, approximately 100 feet down stream from the mining activity. Sample SW-06-01, was a surface water sample taken from Paris creek. The pH of the water was 8.6 (su) and the temperature 7.5º C. Sample SE-07-01 was a sediment sample from the bed of Paris creek, collected near the same location as the water sample. It was pulled from the upper end of a gravel bar in the middle of the creek.
- Sample OS-PAR-SW-08-01 was a surface water sample collected form Paris Creek at the Caribou National Forest boundary, approximately 2 miles upstream from the mine site. The intent of the sample was to document background conditions upstream from the mining activities. The pH of the water was 8.4 (su) and the temperature was 6.0º C. Sample OS-PAR-SE-09-01 is a sediment sample from the bed of Paris Creek taken at the same location as SW-08-01 (Photo 12.9).
- Four samples were collected from a spring/seep area between the north portal and Paris Creek. The springs emerge two terraces below the portal at the creek level. Sample OS-PR-SW-10-01 (Photo 12.10), was a surface water sample collected from a spring with a pH of 7.3 (su) and temperature of 6.2º C. Sample OS-PAR-SW-11-01 (Photo 12.11), was a surface water sample taken from another spring located about 30 feet south of the previous sample. The pH of the water was 7.3 (su), and the temperature was 6.6º C. Soil sample OS-PAR-SO-12-01 is a soil sample taken at the same location as sample SW-11-01. The sample was composed of rocky brown soil with the mineralized portion consisting of approximately 80% chert, 15 % quartzite, and 5% shale. Indian Rice Grass was collected as vegetation sample OS-PAR-VE-13-01 from the same area (Photo 12.12).

- Sample OS-PAR-SW-14-01 is a Quality Assurance rinseate water sample collected from the sampling equipment. Sample number OS-PAR-SW-15-01 is a surface water sample collected from Paris Creek approximately 1/3 of a mile downstream from the mine and 75 feet upstream from the powerhouse. The pH of the water was 8.5 (su) and the temperature was 5.0º C. A sediment sample, OS-Par-SE-16-01(Photo 12.13), was taken from the same location. The sample location consisted of 90% quartzite boulders and gravel; no shale was observed.

3.3 Sampling Results

Summaries of analytical results from the sampling are presented in Table 1 through Table 5. Key findings included the following:

- Soil sample OS-PAR-SO-03-01 collected from the small black shale dump within the floodplain of Paris Creek showed elevated concentrations above the Area Wide Risk Criteria (AWRC) of cadmium (Cd), nickel (Ni), selenium (Se), vanadium (V), and zinc (Zn).
- Soil sample OS-PAR-SO-05-01 taken from the side of the small black shale waste dump had elevated concentrations of cadmium (Cd), chromium (Cr), nickel (Ni), selenium (Se), vanadium (V), and zinc (Zn).
- Dandelion vegetation sample OS-PAR-VE-04-01 had concentrations of cadmium (Cd), above the AWRC.
- All three of the stream sediment samples showed metal concentrations below the AWRC.
- Of the six surface water samples, only sample OS-PAR-SW-02-01, collected from the small pond showed selenium (0.11 mg/l) concentrations to be above the AWRC.

Table 2. Paris Canyon Mine Soil Analytical Results (ppm).

Sample ID	Media	Metal Concentrations in Parts Per Million (ppm)								Hardness	Species/ Type
		Cd	Co	Cr	Cu	Ni	Se	V	Zn		
OS-PAR-SO-01-01	Soil	3.5	7.9	93	25	33	0.94	63	170		Soil
OS-PAR-SO-03-01	Soil	**25**	7.7	140	27	**61**	6.4	**240**	**570**		Soil
OS-PAR-SO-05-01	Soil	**300**	4.5	**1500**	180	**660**	**75**	3700	**6600**		Dump
OS-PAR-SO-12-01	Soil	1	6.5	27	13	15	0.43	33	67		Soil
OS-PAR-SW-14-01	Rinseate	0.0004	<.0025	<.0005	0.22	0.0004	<.001	0.0007	0.075	1	Quality Assurance
Areawide Risk Criteria		9.2		187.0	402.0	44.0	7.5	72.0	210.0		

Table 3. Paris Canyon Mine Stream Sediment Analytical Results (ppm).

Sample ID	Media	Metal Concentrations in Parts Per Million (ppm)								Hardness	Species/Type
		Cd	Co	Cr	Cu	Ni	Se	V	Zn		
OS-PAR-SE-07-01	Stream Sediment	2.5	2.4	30	5.1	13	0.57	30	68		Stream Sediment
OS-PAR-SE-09-01	Stream Sediment	<0.75	1.7	14	8.4	28	0.52	22	22		Stream Sediment
OS-PAR-SE-16-01	Stream Sediment	2.6	2.7	36	6.2	16	1.1	34	56		Stream Sediment
Areawide Risk Criteria		14.0		130	117	47	5.2	100	738		

Table 4. Paris Canyon Mine Surface Water Analytical Results (ppm).

Sample ID	Media	Metal Concentrations in Parts Per Million (ppm)								Hardness	Species/Type
		Cd	Co	Cr	Cu	Ni	Se	V	Zn		
OS-PAR-SW-02-01	Surface Water	0.11	<.0025	0.0015	0.0002	0.021	**0.11**	**0.74**	0.42	398	Small Pond
OS-PAR-SW-06-01	Surface Water	<.00013	<.0025	<.0005	<.00013	<.00013	<.001	0.00052	0.011	133	Stream
OS-PAR-SW-08-01	Surface Water	<.00013	<.0025	<.0005	<.00013	<.00013	0.002	0.00047	0.006	147	Stream
OS-PAR-SW-10-01	Surface Water	0.0005	<.0025	0.0006	0.0003	<.00013	<.001	0.0016	0.008	51	Spring/Stream
OS-PAR-SW-11-01	Surface Water	0.0001	<.0025	<.0005	<.00013	<.00013	<.001	0.0012	0.008	41	Spring/Stream
OS-PAR-SW-11-02	Surface Water	<.00013	<.0025	<.0005	<.00013	<.00013	<.001	0.0008	0.007	41	DUPLICATE
OS-PAR-SW-15-01	Surface Water	<.00013	<.0025	<.0005	<.00013	<.00013	0.003	0.0003	0.006	139	Stream
Areawide Risk Criteria		0.245		8.7	11.0	0.614	0.005	0.0972	43.4		

Table 5. Paris Canyon Mine Vegetation Analytical Results (ppm).

Sample ID	Media	Metal Concentrations in Parts Per Million (ppm)								Hardness	Species/Type
		Cd	Co	Cr	Cu	Ni	Se	V	Zn		
OS-PAR-VE-04-01	Vegetation	**4.6**	0.45	2	16	3	3.2	2.7	120		Dandelion
OS-PAR-VE-13-01	Vegetation	<0.4	0.2	0.54	9.7	<2.0	0.24	0.57	27		Indian Rice Grass
Areawide Risk Criteria		4.2		30.6	88	35.5	5.0	55.9	615.0		

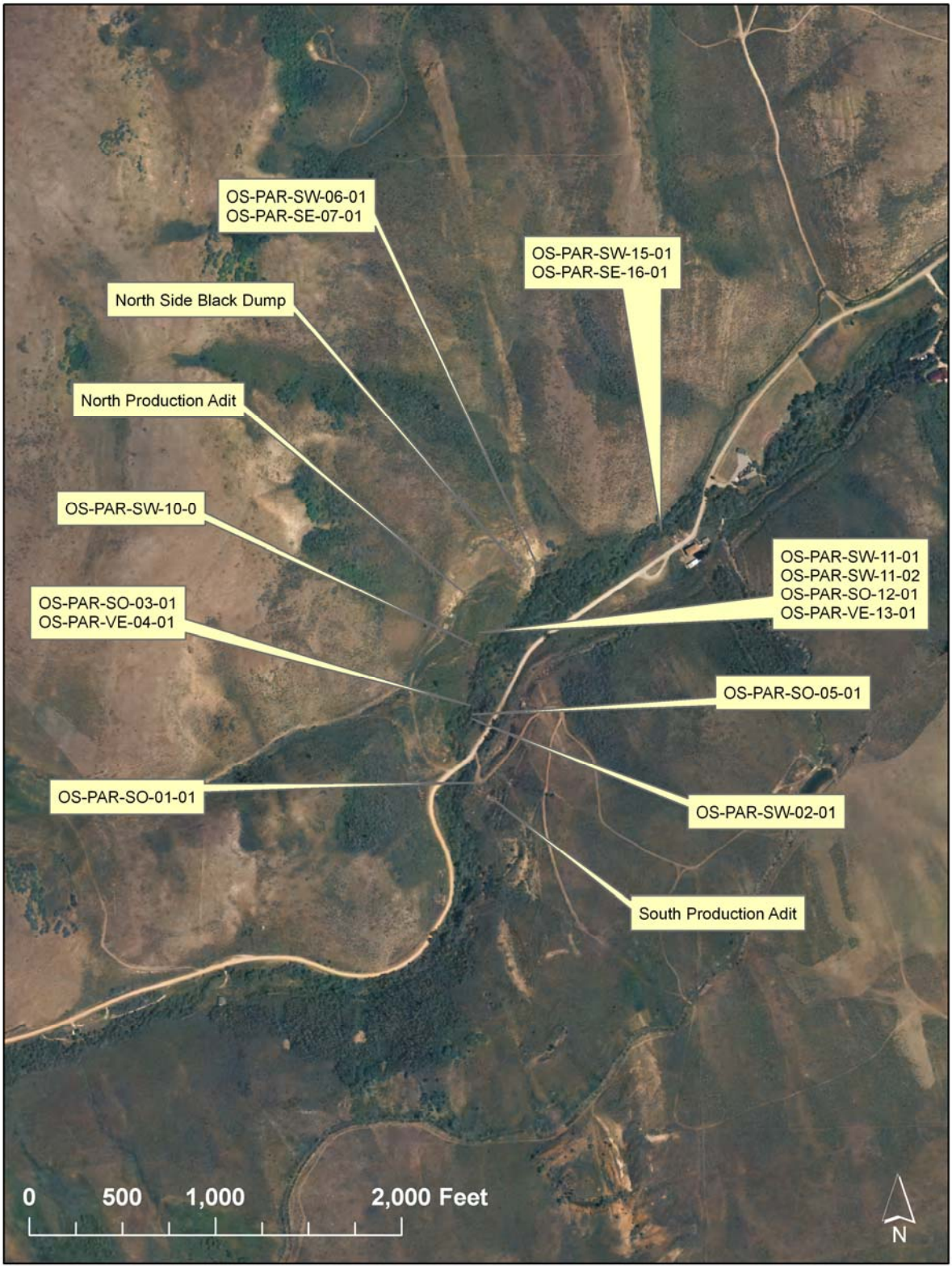


Figure 5, sampling locations at the Paris Canyon Mine.

3.4 Inspection Findings

DEQ conducted a site visit to the mine during July 2002. The visit included a visual inspection of the Paris Canyon Mine and collection of twelve media and two QA/QC samples. Several of these sampling locations are shown in Photos 12.1 through 12.13.

The mine consist of two production adits, one north of Paris Creek and one south of the creek. Five waste dumps were noted along with a large complex of platforms and foundations. Both adits are still open to entry. The south adit is approximately thirty feet up slope from the canyon road. Brickwork and concrete foundation is plentiful below the portal. Historically, there was a large mill and tram system in this location. Approximately 15 feet down slope from the adit is the largest waste dump. The toe of the dump was observed within approximately three feet of the east bank of Paris Creek. It is composed of Phosphoria Formation lithologies.

Approximately 200 feet north of the adit, there are two small black shale waste dumps. The waste dump south of the road is cut by Paris Canyon Road (Photo 12.2). It is approximately 15 feet wide and 20 feet tall (approximately 3,800 cubic yards, as measured from Google Earth). The second waste pile on the north side of the road is conical in shape, approximately 30 feet in diameter and 15 feet tall (approximately 30 cubic yards as calculated from description). The waste pile extends to within 20 feet of Paris Creek and has no vegetation on it.

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Section 4. Pathway and Environmental Hazard Assessment

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

4.1 Surface Water

Paris Creek headwaters are located approximately nine miles west of the mine site in the Bear River Range. The creek flows east to within a few hundred feet of the mine then continues east into Bear Lake Valley, approximately three miles east of the site near the town of Paris. Paris Creek is designated as a 303(d) stream for not meeting water quality standards for nutrients and sediment (DEQ, 1998).

There are approximately 18,000 acres of wetland within the 15 mile Target Distance Limit (TDL) of the site (Figure 6). This area encompasses the large wetlands north and around the northern perimeter of Bear Lake.

4.2 Soil/Air Exposure

The mine is located on Paris Creek Road; access to the mine site is not restricted or posted, so the public has easy access to the mine adits and waste rock. Waste rock has been noted on the road, so it is assumed that dust-containing metals would occur at the site and along the road, depending on wind conditions. Likewise, easy access to the site would complete the soil ingestion pathway for casual visitors and other recreationists.

4.3 Groundwater

Idaho Department of Water Resources (IDWR) records show ground water flow in the area moves from the highlands eastward toward the Bear Lake Valley floor. This flow is consistent with the topography of the area. It should be noted that the mine is located on or close to a fault (Figure 4), which may also affect local ground water flow patterns.

It has not been determined whether the mine is located along a gaining or losing section of Paris Creek.

Water levels from domestic wells near the site vary from 218 feet below ground surface (bgs) on the ridge southwest of the mine to approximately 3 feet bgs on the valley floor. According to IDWR records, 32 domestic water wells are reported to be located within a 4-mile radius of the site (Figure 3). The majority of these wells are located along Bear Lake Valley, close to the nearby towns of Paris and Bloomington.

Three public water systems are located within a 4-mile radius of the site:

- The City of Paris well is located approximately 2.1 miles west of the site. According to the Safe Drinking Water Information System (SDWIS) (DEG,

2006), the system services 251 users and has had detections of selenium (1982 and 1999), arsenic (1996) and cyanide (1992). However, all the detections have been below Maximum Contaminant Levels (MCLs).

- The City of Bloomington spring well is located approximately 2.3 miles southwest of the site. According to SDWIS (DEQ, 2006), this system services 585 users and has no water issues.
- The USFS Paris Springs Campground spring well is located 2.6 miles west south-west of the mine. According to SDWIS, the spring well services 25 users and has had no water issues. This well is sampled for nitrates only.

The public water wells shown in Figure 3 are up-gradient from any of the mining activities; the blue hatching represents travel time for groundwater to migrate from the perimeter of the hatching to the extraction well. This gives a relative groundwater travel time for the area west of the mine. East of the mine site, wells appear to be completed in the alluvial materials associated with the Bear Lake Valley. Here, groundwater is very shallow and would travel at a much faster rate than in the surrounding highlands.

4.3.1 Potential Receptors

Potential receptors include local residents, hunters, anglers, cattlemen, trail riders (motorized and non-motorized), campers, and, rarely, tourists. Cattle activity surrounding and within the mine site is unknown. Residents and outdoor enthusiasts remain the likeliest potential receptors, as they reside nearby or use surrounding land for recreational activities.

The land within a two-mile radius of the site is primarily BLM land, but minor amounts of private land exist. The parcels of land occupied by the mines and waste dumps are owned by private parties.

4.3.2 Schools, Day-Care Facilities, Private Residences

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

4.3.3 Plant and Animal Species of Concern

Species of concern in the proximity of the site are listed Table 6. Species of concern within four miles of the site include the Northern Leopard Frog.

Red Glasswort and Purple Meadow-rue are the only plant species of concern within the 15 mile TDL of the site (Figure 7). Animal species listed as a species of concern located within the 15 mile TDL include the California Gull, Eared Grebe, Western Grebe, Northern Leopard Frog, Double-crested Cormorant, Snowy Egret, Cattle Egret, White-faced Ibis, Franklin's Gull, Caspian Tern, Black-crowned Night-heron, Forster's Tern, Bald Eagle, and Trumpeter Swan (IDFG, 2002).

4.3.4 Soil Sample Concentrations

Soil samples collected from the site contained the following concentrations:

- Selenium (Se) from 0.43 to 75 mg/kg
- Copper (Cu) from 4.5 to 7.3 mg/kg
- Cadmium (Cd) from 1 to 300 mg/kg
- Chromium (Cr) from 27 to 1500 mg/kg
- Vanadium (V) from 33 to 3,700 mg/kg
- Nickel (Ni) from 15 to 660 mg/kg
- Zinc (Zn) from 67 to 6,600 mg/kg

Complete analytical results are presented in Table 2 through Table 5. Arsenic was not analyzed for during this sampling event.

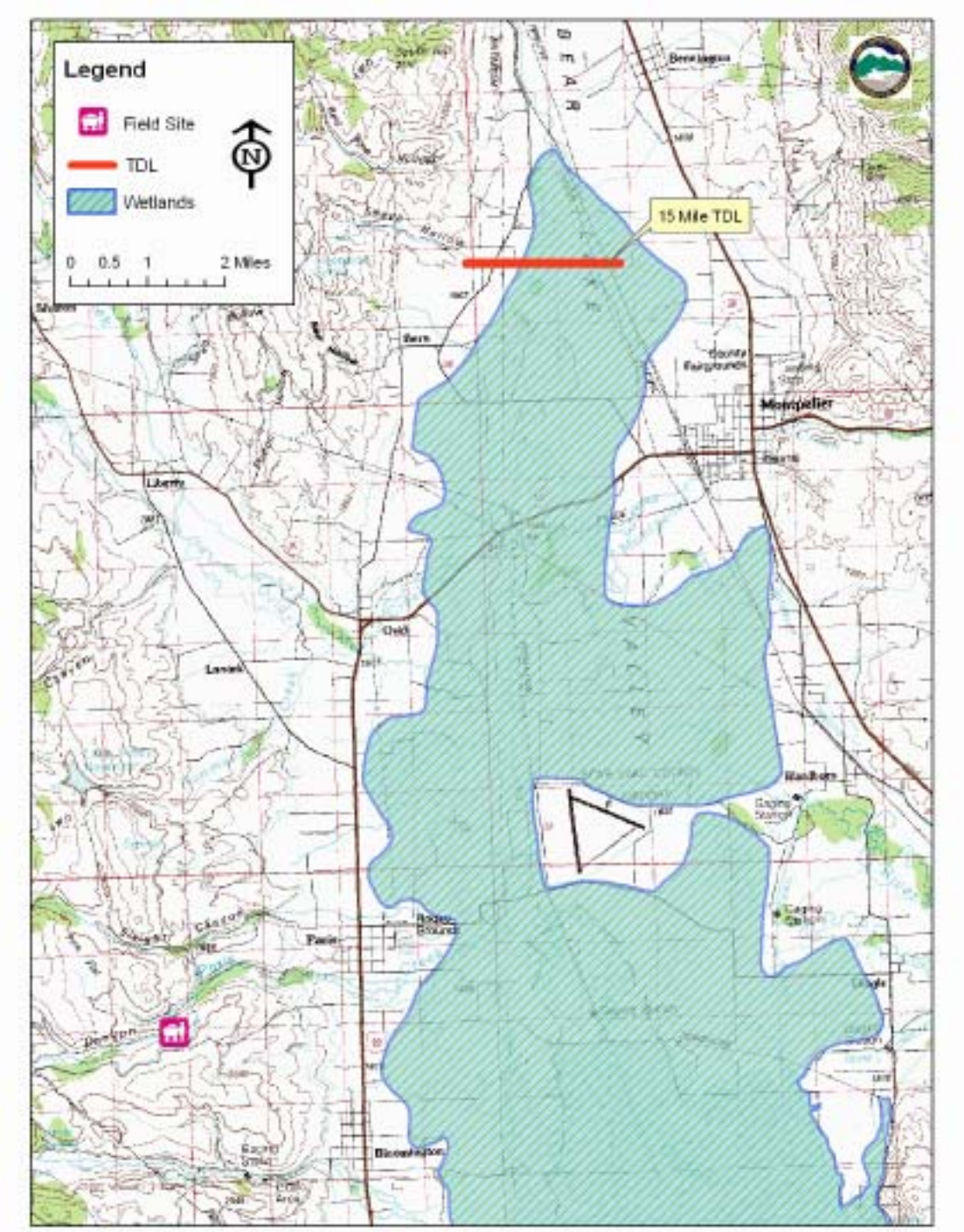


Figure 6. Wetlands.

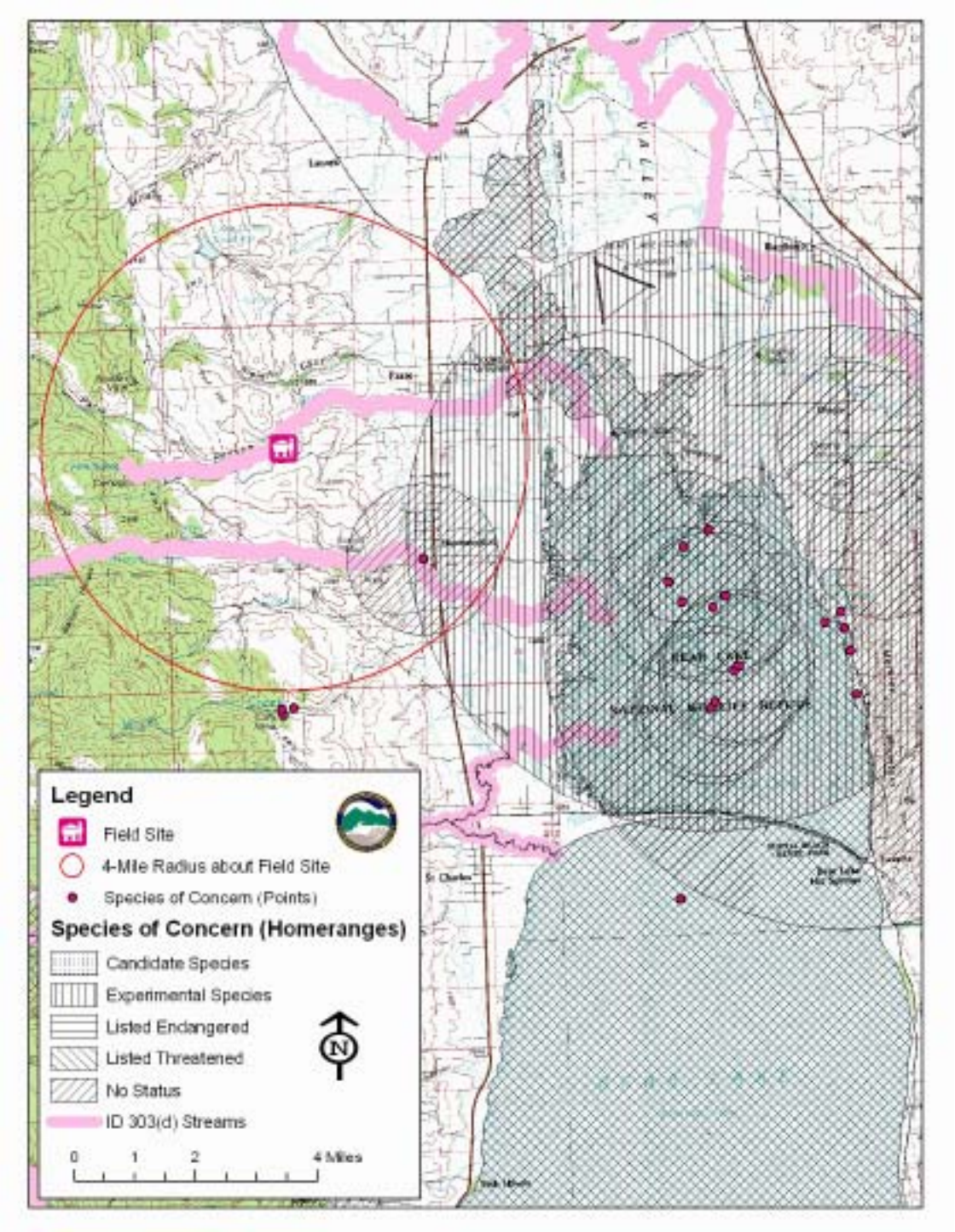


Figure 7, Species of Concern within the Paris Canyon mining area.

Table 6. Plant and animal species of concern in the Paris Canyon mining area.

Common Name	Scientific Name	Classification	Ecological Concern
Purple Meadow Rue	Thalictrum dasycarpum	Vascular Plant	
Western Glasswort	Salicornia rubra	Vascular Plant	
Bald Eagle	Haliaeetus leucocephalus	Vertebrate Animal	Wintering Area
Black-crowned Night-Heron	Nycticorax nycticorax	Vertebrate Animal	Colonial Breeding Area
California Gull	Larus californicus	Vertebrate Animal	Colonial Breeding Area
Caspian Tern	Sterna caspia	Vertebrate Animal	Colonial Breeding Area
Cattle Egret	Bubulcus ibis	Vertebrate Animal	Colonial Breeding Area
Double-crested Cormorant	Phalacrocorax auritus	Vertebrate Animal	Colonial Breeding Area
Eared Grebe	Podiceps nigricollis	Vertebrate Animal	Colonial Breeding Area
Forster's Tern	Sterna forsteri	Vertebrate Animal	Colonial Breeding Area
Franklin's Gull	Larus pipixcan	Vertebrate Animal	Colonial Breeding Area
Northern Leopard Frog	Rana pipiens	Vertebrate Animal	Museum Specimen
Snowy Egret	Egretta thula	Vertebrate Animal	Colonial Breeding Area
Trumpeter Swan	Cygnus buccinator	Vertebrate Animal	Wintering Area
Western Grebe	Aechmophorus occidentalis	Vertebrate Animal	Colonial Breeding Area
White-faced Ibis	Plegadis chihi	Vertebrate Animal	Colonial Breeding Area

Section 5. Conclusions and Recommendations

The recommendations contained herein address localized release pathways, associated ecological risks, and public safety concerns regarding the presence of open adits, portals, or mine shafts. The Paris Canyon Mine is recommended for additional sampling, potential erosion control, and reclamation improvements. Additional actions, in the form of further site investigations, waste consolidation, erosion controls, and reclamation improvements, are also recommended.

5.1 Presence of Wetlands

Based on official wetland surveys and aerial photographs of the area, approximately 18,000 acres of wetlands exist near the site or within the 15-mile TDL (Figure 6).

5.2 Impacts on Water Quality

Six surface water samples and three sediment samples were collected upstream, adjacent to the site, and down stream from the Paris Canyon Mine. Of these samples only one surface water sample, collected from the small pond located near the south portal, showed metal constituents above the AWRC. This sample showed selenium at 11µg/l; the AWRC for selenium is 5µg/l.

Ground water impacts related to the mine site are currently unknown. However, there are no known impacts, and the nearby public water systems are located west south-west and up-gradient from the site. Potential down-gradient receptors are approximately two and a half miles away, near the town of Paris. According to driller's logs, most domestic wells are located in valley sediments containing very shallow groundwater, which may represent an entirely different aquifer system than beneath the Paris Canyon Mine.

5.3 Potential Exposure for Wildlife and Vegetation

The waste rock piles may present potential exposure for wildlife and vegetation. According the 2002 PA (DEQ 2004), vegetation on the waste piles varies while exhibiting significant erosion. Native plant species may bio-accumulate high concentrations of metals that may be consumed by the local wildlife. Wildlife, such as deer and elk, that may be exposed to elevated concentrations of metals (via water, soil, or plant material) may be harvested and consumed by humans.

5.4 Potential Exposure for Humans

The public has access to the mine via the Paris Canyon Road. There are no fences or other barriers around the property (DEQ 2004a).

Commercial or subsistence fishing does not occur within the 15-mile downstream distance, but sport fishing does. According to the IDFG database, redband rainbow trout, Bonneville cutthroat trout, rainbow (hatchery) trout, and brook trout are present in Paris Creek (IDFG, 2000).

Human activity around the mine site is likely moderate, due to its relatively remote location. However, due to its proximity to the road and potential access to Paris Creek, anglers, mountain bikers, hikers, hunters, snow mobile operators, off-road four wheeling enthusiasts, and outdoor recreation enthusiasts may potentially frequent the area because access is not restricted.

Fugitive dust and direct contact with the waste piles are the two main mechanisms through which humans could be exposed to the metal concentrations at the site. These sources may present a threat from dust emissions from the waste rock on the road. Although the waste piles have been shown to have high metal concentrations, exposure for humans to elevated metal concentrations is low due to the remoteness of the site.

5.5 Recommendations

Overall, the soil, vegetation, and surface water samples from the site showed some elevated metal concentrations with respect to the Area Wide Risk Management Plan criteria. As a result, the agencies performing the 2002 PA recommended additional actions at the Paris Canyon Mine site, in the form of further site investigation, waste consolidation erosion controls, closing adits and openings on the site, and reclamation improvements.

Additional recommendations based on DEQ's current evaluation of the data include the following:

- Observation of erosion from the waste piles to determine the extent of this material, the degree of impact to Paris Canyon road, and whether waste rock has reached Paris Creek itself.
- Re-contouring and re-vegetating those waste piles where natural vegetation has not established itself and removing waste rock from the Paris Canyon road to prevent the spread of potentially contaminated material.
- Continue sampling of Paris Creek adjacent to and down-gradient of the Paris Mine site to determine potential impacts.

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Appendix: Photographs

The following photographs were taken during the Preliminary Assessment (DEQ, 2004a)



Photo 12.1
Paris Canyon Mine, south portal. View to south.



Photo 12.2
Paris Canyon Mine, Paris Canyon road. View to west.



Photo 12.3
Paris Canyon Mine, north portal. View to northwest.



Photo 12.4
Paris Canyon Mine, sample OS-PAR-SO-01-01. Located in Paris Creek riparian zone. View to southwest.



Photo 12.5
Paris Canyon Mine, sample OS-PAR-SW-02-01. Ponded runoff in the lower center of photo. View to southwest.



Photo 12.6
Paris Canyon Mine, sample location for OS-PAR-SO-03-01 and OS-PAR-VE-04-01. Paris Creek flood plain and riparian area. View to southeast.



Photo 12.7
Paris Canyon Mine, sample OS-PAR-SO-05-01. View to north.



Photo 12.8
Paris Canyon Mine, sample location for OS-PAR-SW-06-01 and OS-PAR-SE-07-01. Cliff in top center of photo is overturned Rex Chert. View to west. Water flows center to left.



Photo 12.9
Paris Creek, 2 miles upstream from mine. Sample location for OS-PAR-SW-08-01 and OS-PAR-SE-09-01. View to north. Water flows left to right.



Photo 12.10
Paris Canyon Mine, seep below north portal. Sample location for OS-PAR-SW-10-01. View to west.



Photo 12.11
Paris Canyon Mine, second seep below north portal. Sample location for OS-PAR-SW-11-01. View to east.



Photo 12.12
Paris Canyon Mine, sample location OS-PAR-SO-12-01 and OS-PAR-VE-13-01. North portal in background. View to north.



Photo 12.13
Paris Creek, downstream from mine. Sample location for OS-PAR-SW-15-01 and OS-PAR-SE-16-01. View to northeast.

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