

Whitedelph Mine Preliminary Assessment Report

Bonner County
State of Idaho



Department of Environmental Quality

February 2006

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

Whitedelph Mine
Preliminary Assessment Report
February 2006

Table of Contents

List of Figures.....	iii
List of Photographs	iv
List of Tables.....	iv
List of Acronyms	v
Section 1. Introduction.....	1
1.1 Overview	1
1.2 Site Location.....	1
1.3 Current and Future Uses.....	5
Section 2. Site Description and Regulatory History	9
2.1 Site Description	9
2.2 Regulatory History.....	9
Section 3. Ownership History and Site Characterization	10
3.1 Ownership and Operational History.....	10
3.1.1 Mill Operation	11
3.1.2 Mining Production.....	12
3.2 Waste Characteristics	14
3.3 DEQ Actions.....	15
Section 4. Migration/Exposure Pathways and Targets.....	19
4.1 Ground Water Migration Pathway	19
4.2 Air Migration Pathway	22
4.3 Soil Exposure Pathway	22
4.4 Surface Water Migration Pathway.....	23
4.4.1 Sample Analyses.....	23
4.4.2 Water Quality Concerns and Status	24
4.4.3 Target Species	27
Section 5. Summary	29
References.....	30
Appendix A: Photograph Log	31
Appendix B: Analytical Data	32
Report Index	35

List of Figures

Figure 1. Location of the Whitedelph Mine and the town of Clark Fork within the State of Idaho.....	2
Figure 2. Setting and Topography of the Whitedelph Mine area.....	3
Figure 3. 4-Mile Radius Map.....	4

Whitedelph Mine
Preliminary Assessment Report
February 2006

Figure 4. Aerial photograph of the Whitedelph Mine and surroundings.....	16
Figure 5. Site sketch (not to scale).....	17
Figure 6. Identification of wells surrounding the Whitedelph.	21
Figure 7. 15-Mile Total Distance Limit (TDL).....	26
Figure 8. Target species.	28

List of Photographs

Photograph 1. Whitedelf Mill (circa 1945).	5
Photograph 2. Whitedelf ball mill (1945). The mill's back wall in this photograph is now the northbound lane of Spring Creek Road.	6
Photograph 3. Whitedelf ball mill concrete base (2005), looking west. Note Spring Creek Road in the background.	6
Photograph 4. Whitedelf ball mill concrete base, looking east (2005).	7
Photograph 5. Upper structure of the Whitedelf Mill as seen in Photograph 1 (2005). Spring Creek Road lies in the upper left corner of photograph. May also be the North Portal/Pugh Adit.	7
Photograph 6. Collapsed portion of upper Whitedelf Mill structure as seen in Photograph 5 (2005).	8
Photograph 7. Whitedelf waste rock pile (2005).	14
Photograph 8. Whitedelf tailings impoundment and location of sample WD1 (2005), looking northwest. Note sample jar on the left.	18
Photograph 9. Whitedelf tailings impoundment and sample location of WD2 (2005), looking north.....	18

List of Tables

Table 1. Production of the Whitedelph Mine (from DMEA Final Report, 1958, p. 6)	13
Table 2. Waste source areas.	15
Table 3. August 3, 2005 sample results for total soil analysis of tailings and stream channel sediments.	22
Table 4. August 3, 2005 surface water quality data from Spring Creek (standards and results in mg/L).	24
Table 5. Analytical data: soil and water samples.....	33

List of Acronyms

Acronym	Definition
ATV	All Terrain Vehicle (a.k.a. 4-wheeler)
bgs	below ground surface
DEQ	Idaho Department of Environmental Quality
EPA	United States Environmental Protection Agency
gpm	gallons per minute
PA	Preliminary Assessment
ppm	parts per million
TDL	Target Distance Limit
TMDL	Total Maximum Daily Loads
USBM	United States Bureau of Mines
USFS	United States Forest Service
303 (d)	Section of the Clean Water Act in Idaho

Whitedelph Mine
Preliminary Assessment Report
February 2006

This page intentionally left blank for correct double-sided printing

Section 1. Introduction

This document presents the results of a Preliminary Assessment (PA) of the Clark Fork Mining District. 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 a sub-watershed wide preliminary assessment (PA) at various mines within the Clark Fork Mining District, near the town of Clark Fork, Idaho.

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.state.id.us/waste/prog_issues/mining/pa_program.cfm

1.1 Overview

The Clark Fork Mining District is located in the southeastern part of Bonner County, Idaho. The location of the Whitedelph Mine & Mill is identified in Figure 1. Figure 2 shows the topography within a 1-mile radius around the center of the mine.

The property is alternately identified as “Whitedelf.”

1.2 Site Location

The Whitedelph Mine & Mill site is located within the Sandpoint Ranger District of the Kaniksu National Forest (U.S. National Forest Service), approximately 1 mile north of Clark Fork, Idaho. The site is located on the southeast flank of Howe Mountain, along the west bank of Spring Creek, near its confluence with Lightning Creek.

A topographic map within showing locations within 1/4-mile, 1/2-mile, 1-mile, 2-mile, 3-mile, and 4-mile radii of the Whitedelph is located in Figure 3. The town of Clark Fork, population 569 (USDC, 2005), the Clark Fork River, Lake Pend Oreille and the Pend Oreille State Wildlife Management Area are within a 2-mile radius of the site. The Clark Fork fish hatchery is located approximately 0.5 miles upstream of the Whitedelph on Spring Creek.

Whitedelph Mine
Preliminary Assessment Report
February 2006

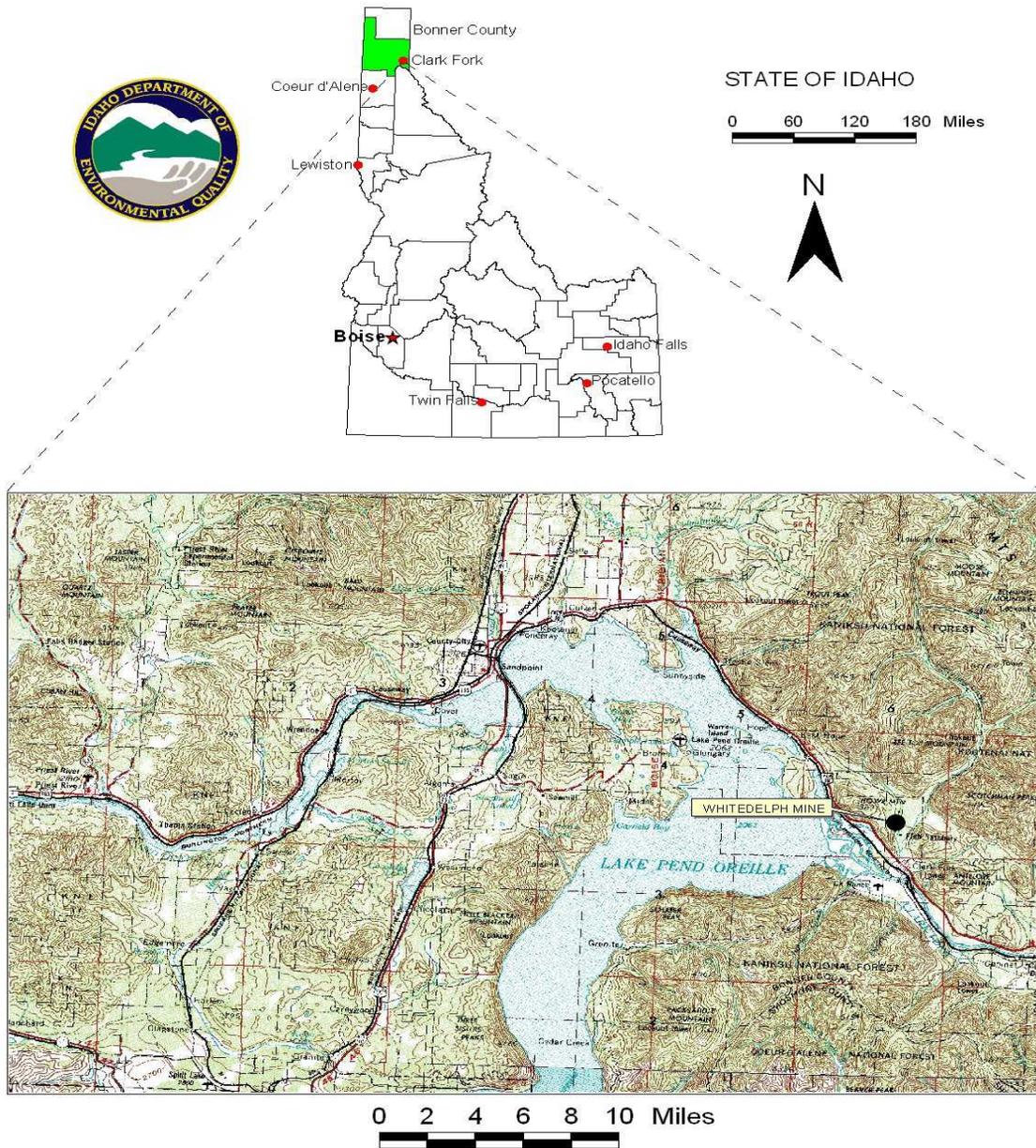


Figure 1. Location of the Whitedelph Mine and the town of Clark Fork within the State of Idaho.

Whitedelph Mine
Preliminary Assessment Report
February 2006



Figure 2. Setting and Topography of the Whitedelph Mine area.

Whitedelph Mine
Preliminary Assessment Report
February 2006



Figure 3. 4-Mile Radius Map.

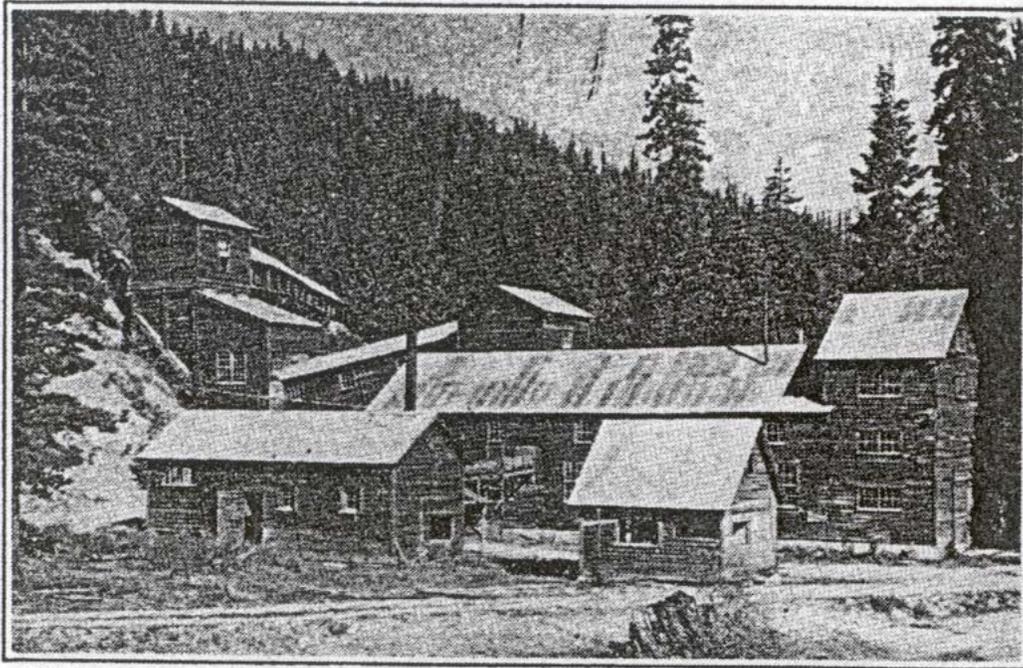
1.3 Current and Future Uses

The mine has been inactive for decades (Photograph 1 shows an image from around 1945), although waste rock piles have been utilized for previous road construction and continue to be used for seasonal road maintenance requirements. The tailings impoundments had been traversed by motorcycles and/or ATVs in the past.

To alleviate this intrusion, the current owner (Mark Heisel) has posted the property with “No Trespassing” signs and installed chain and timber barriers to prevent further unlawful access. A dirt road that runs past the tailings impoundments leads to additional property owned and frequented by Mr. Heisel. The current owner has no immediate or future plans for the former mine property.

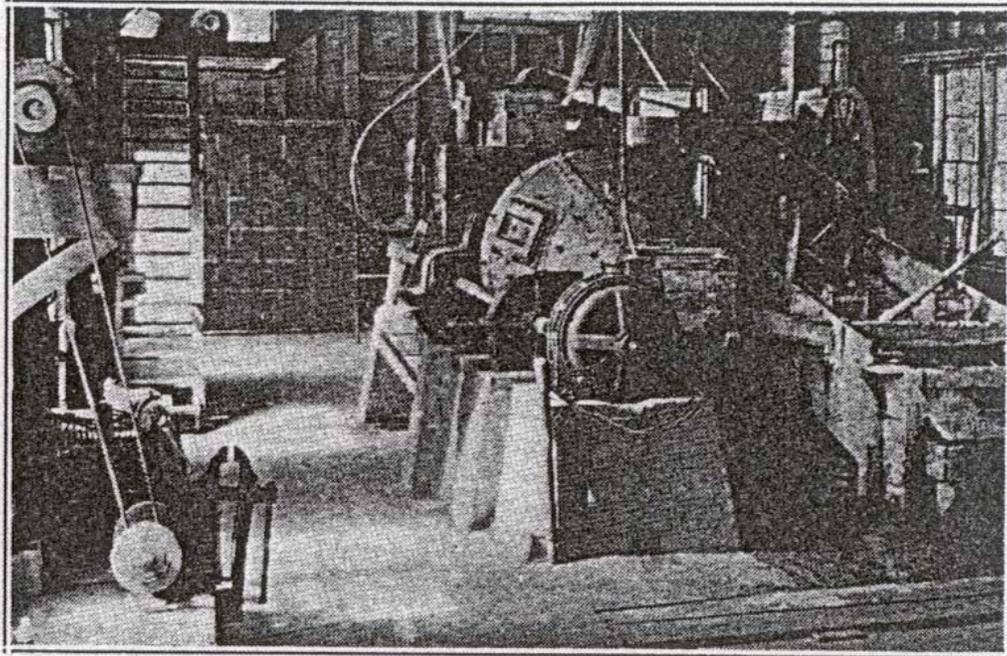
All structures were removed many years ago, with only the raised concrete ball mill bases and minimal metal scrap remaining.

Spring Creek Road currently runs through the western portion of the concentrator mill building. Photographs 2 and 3 show this positional relationship.



Concentrator (Mill) North Portal Whitedelf Mine

Photograph 1. Whitedelf Mill (circa 1945).



**Hardinge Ball Mill and Classifier,
Interior Whitedelf ore concentrating plant**

Photograph 2. Whitedelf ball mill (1945). The mill's back wall in this photograph is now the northbound lane of Spring Creek Road.



Photograph 3. Whitedelf ball mill concrete base (2005), looking west. Note Spring Creek Road in the background.



Photograph 4. Whitedelf ball mill concrete base, looking east (2005).



Photograph 5. Upper structure of the Whitedelf Mill as seen in Photograph 1 (2005). Spring Creek Road lies in the upper left corner of photograph. May also be the North Portal/Pugh Adit.



Photograph 6. Collapsed portion of upper Whitedelf Mill structure as seen in Photograph 5 (2005).

Section 2. Site Description and Regulatory History

This section provides a legal description of the site and a brief regulatory history.

2.1 Site Description

Site Name:	Whitedelph Mine & Mill
CERCLIS ID No.	
Location:	Bonner County, Idaho
Latitude:	48.1631 N
Longitude:	-116.186 W (NAD27 datum)
Legal Description:	NE ¼, Section 34, Township 56N, Range 2E, Boise meridian
Congressional District:	Idaho
Site Owner/Contact:	Mark and Linda Heisel P.O. Box 135 Hope, Idaho 83836 (208) 264-5960

2.2 Regulatory History

The Whitedelph Mine & Mill site and surrounding mining properties were visited and studied by geologists representing the Idaho Bureau of Mines and Geology, the U.S. Geological Survey, and the U.S. Bureau of Mines during its operational history. There have not been any previous state or federal regulatory investigations conducted at this mine site.

Section 3. Ownership History and Site Characterization

This section describes the ownership history of the site and provides a characterization of the site waste.

3.1 Ownership and Operational History

The Whitedelph consists of a series of patented claims principally controlled by Compton I. White, Jr. of the Whitedelf Mining and Development Company. A brief history of the ownership of the site includes the following key points:

- In 1969, Silverfields Mining Corporation of Spokane, Washington acquired controlling interest in the property. Though Silverfields proposed work that included rehabilitation of portions of the mine, dewatering, and drifting on the 800-foot level, no activity was realized.
- On September 11, 1984, Compton and Florence White acquired the land from Silverfields and the Whitedelf Mining and Development Company. Three months later, ownership was transferred to Michael and Elaine White.
- On January 14, 1993, Michael White became sole owner. All ownership was further transferred to Michael White.
- In 1994, Whitedelf Mining and Development Company re-acquired the property.
- In 2004, Two Creeks LLC (Mark Heisel) acquired approximately 28 acres of the patented land encompassing the Norquist adit and associated waste rock pile, the old mill site, including tailings impoundments, and adjacent Spring Creek frontage.

Key points in the operational history of the mine include the following:

- Exploration pits were dug as early as 1924, but the uprooting of a tree in 1926 exposed a shallow high-grade silver vein. The excitement of this discovery furthered exploration until a road cut exposed favorable mineralization on the Pearl vein.
- The principal developer of the site, Compton I. White, Sr., formed the Whitedelf Mining and Development Company in 1926, on a 160-acre tract of patented land, later expanding to 360 patented acres. The Pearl vein would become the major source of ore for the Whitedelph, which proved to be the most productive of any mine in the Clark Fork mining district.
- The following historical information was excerpted from the Defense Minerals Exploration Administration (DMEA) Whitedelf *Final Report*, dated August 1958:
 - “The Whitedelf Mining & Development Company was organized in 1926. Little capital outlay was necessary and the mine showed a profit almost immediately... The Norquist tunnel was advanced and stopes carried to the surface, and by the end of 1927 the

Norquist tunnel had been extended approximately to its present limits. The mine was furnished with electricity, and an inclined shaft was collared 420 feet from the adit portal. By the end of 1928 the shaft had been sunk to the 200-foot level, with drifts northeast and southwest on the 100- and 200-foot levels. A 50-ton flotation mill was erected and placed in operation in 1929. Shaft sinking continued and by 1932 the shaft had been completed to the 400-foot level.

The mine was closed in 1933 because of the low price of lead and remained idle except for leasing operations until 1937...In 1938 the mine was dewatered, the lower levels were retimbered, and an incline winze was sunk from the 400 level to the 600-foot level from a point about 420 feet northwest of the shaft.

Up to this time all work had been done in ground lying northeast of the Pugh fault, but in 1938 the portion of the Pearl vein lying south of the Pugh fault was discovered on the southwest slopes of Howe Mountain, and in 1939 high-grade ore was mined from it. In 1940 the company suspended operations and leased the mine to James E. White, brother of Compton I. White, Sr. In 1940 the James E. White and Reid-Clagg adits were started on the southwest slope of Howe Mountain to explore further the south part of the structure. A body of silver-rich ore, called the South ore body, was opened along the James E. White tunnel. After the ore above the tunnel was mined out in 1941, development was transferred to the 400 level, where a drift southwest was started that eventually cut the South ore body. In this development work two other ore bodies, the Dougherty and Thornton ore shoots, were cut on the 400 level between the Pugh fault and the South ore shoot.

In 1943 the Bureau of Mines proposed diamond drilling the Pearl vein between the Whitedelf mine and the adjoining Hope mine. Diamond drilling was started in 1944 and completed in early 1946...During 1946-48, 554 feet of development drift and 100 feet of sinking were completed.” (pp. 3-5).

- As of 1956, the Whitedelph included 12,676 feet of underground workings (ibid). Limited operations continued until 1964, but additional development figures are not available.

3.1.1 Mill Operation

With the advent of electricity to the mine in 1927, construction on the Whitedelph Mill began in 1928 and was completed in early 1929. Scant historical information regarding the operation of the mill exists. The Whitedelf Mining and Development Company's 1945 stock prospectus includes a photograph of the concentrating plant's Hardinge ball mill and classifier (Photograph 2).

Additionally, reports pertaining to the mill's capacity vary. The DMEA report (1958) mentions a 50-ton flotation operation, while Savage (1967) refers to a 75-ton concentrator.

3.1.2 Mining Production

Hershey (1939) reported net returns of \$231,895.82 and \$457,992.70 in 1936. According to Kauffman (1975), the South ore body yielded \$84,000 by the end of 1941.

In May 1951, the Whitedelf Mining and Development Company applied for and was granted exploration assistance under the Defense Production Act of 1950. The DMEA contract, which totaled \$223,882.76 (50% shared costs), terminated by mutual agreement on October 12, 1956. During the contract, exploration ore milled from the 800 level produced 79.7 tons of concentrate, which contained 7,875 ounces of silver, 91,614 pounds of lead and 3,743 pounds antimony (DMEA, 1958).

Though sporadic operations continued until 1964, no further production figures are available.

Table 1 lists the recoverable metals produced from the Whitedelph from 1926 to 1955.

Whitedelph Mine
Preliminary Assessment Report
February 2006

Table 1. Production of the Whitedelph Mine (from DMEA Final Report, 1958, p. 6)

Year	Gold fine ounces	Silver fine ounces	Copper pounds	Lead pounds	Zinc pounds
1926	0.95	37,795	893	683,852	---
1927	---	103,163	209	1,685,318	---
1928	---	64,636	338	1,144,566	---
1929	1.7	66,082	664	1,057,193	---
1930	---	81,227	2,123	1,778,550	---
1931	---	61,635	1,520	1,259,956	---
1932	---	39,736	618	779,188	---
1933	---	4,574	76	84,322	---
1934	---	4,678	75	85,296	---
1935	No Production	---	---	---	---
1936	---	1,796	---	28,600	---
1937	---	14,480	---	326,038	---
1938	2.0	26,185	---	433,960	---
1939	1.0	25,608	439	409,790	---
1940	1.0	46,302	2,000	484,914	---
1941	---	50,477	2,500	446,580	---
1942	---	29,944	1,625	101,155	---
1943	No Production	---	---	---	---
1944	---	32,906	1,172	142,862	---
1945	1.0	36,917	1,122	188,500	13,500
1946	---	6,666	270	45,850	2,950
1947	---	2,262	---	12,300	890
1948	---	9,594	600	76,657	2,355
1949	---	11,381	1,140	133,800	---
1950	---	5,002	335	97,000	---
1951	---	4,656	187	60,861	2,013
1952	No Production	---	---	---	---
1953	---	2,319	100	36,512	1,287
1954	---	7,928	300	109,600	4,400
1955	---	1,703	---	9,000	500
TOTAL	7.65	779,649	18,506	11,702,220	27,895

3.2 Waste Characteristics

The Whitedelph lies within a wide fracture zone associated with the Hope fault. The fault zone defines mineralization in the area. Moderate temperature (mesothermal) lead-silver deposits, like the Whitedelph, are concentrated south of the Hope fault (Anderson, 1930). The mine is located on the steep south face of Howe Mountain and is covered by thick vegetation and glacial drift. “A number of mineralized fissures occur on this end of Howe Mountain, but only one, the Pearl, has so far been of consequence. These deposits are mainly replacements along steeply dipping fissures with the Middle Wallace, which here shows some calcareous shales and quartzites of greenish and bluish shales or argillites” (ibid, p.93).

The principal ore minerals are galena and several of the sulfantimonides (Savage, 1967). “Some of the ore in lower levels of the mine consists almost completely of sulfosalts. Small quantities of sphalerite, pyrite, tetrahedrite, and arsenopyrite are also present. Gangue minerals consist of small quantities of siderite and quartz” (ibid, p. 90). The lead derives from the galena, silver from tetrahedrite.

Observation of waste rock at the Whitedelph did not identify specific minerals, as the rock was well weathered. Historical records indicate that ore was frequently hand-sorted to ensure maximum recovery value. Based upon this information and the lack of identifiable mineralization, it is assumed that most of the waste rock consists of disseminated sulfide minerals.



Photograph 7. Whitedelf waste rock pile (2005).

The Whitedelph property, as investigated, consists of the collapsed Pugh (also referred to as Norquist) adit and surrounding landing, two (2) tailings impoundments, and one (1) waste rock pile (Photograph 7). Among these, the tailings impoundments and the waste rock pile appear to pose the greater hazard. These waste source areas are presented in Table 2.

Table 2. Waste source areas.

Workings	Waste Rock Location	Description	Dimensions (ft) (L x W x H)	Volume cubic yards (yd³)
Adit	Beside Norquist Tunnel	Waste rock landing, ore track to dump	45 x 6 x 5	50
Waste Rock Pile	Directly north of adit	Waste rock from adit	25 x 25 x 30	694
Tailings	Upper tier	Fine-grained soil, color - buff to reddish gray (depth)	100 x 30 x 6	667
	Lower tier	Same as above, partially vegetated	40 x 20 x 6	178

3.3 DEQ Actions

On August 3, 2005, Bruce Schuld and Robert Higdem of DEQ conducted a preliminary assessment (PA) of the Whitedelph property. The property owner, Mark Heisel, was not present during the site visit.

DEQ also performed sample collection activities, which were limited to surface water, stream sediments, and tailing media. As there were not any visible adit discharge points, DEQ chose to collect two (2) surface water samples (up- and down-gradient). One (1) stream sediment sample was collected immediately adjacent to the downgradient surface water sample. Two (2) soil samples were collected from the upper and the lower tailings impoundments.

Both an aerial photograph of the site and a site sketch are included in Figures 4 and 5, respectively.



Figure 4. Aerial photograph of the Whitedelph Mine and surroundings.

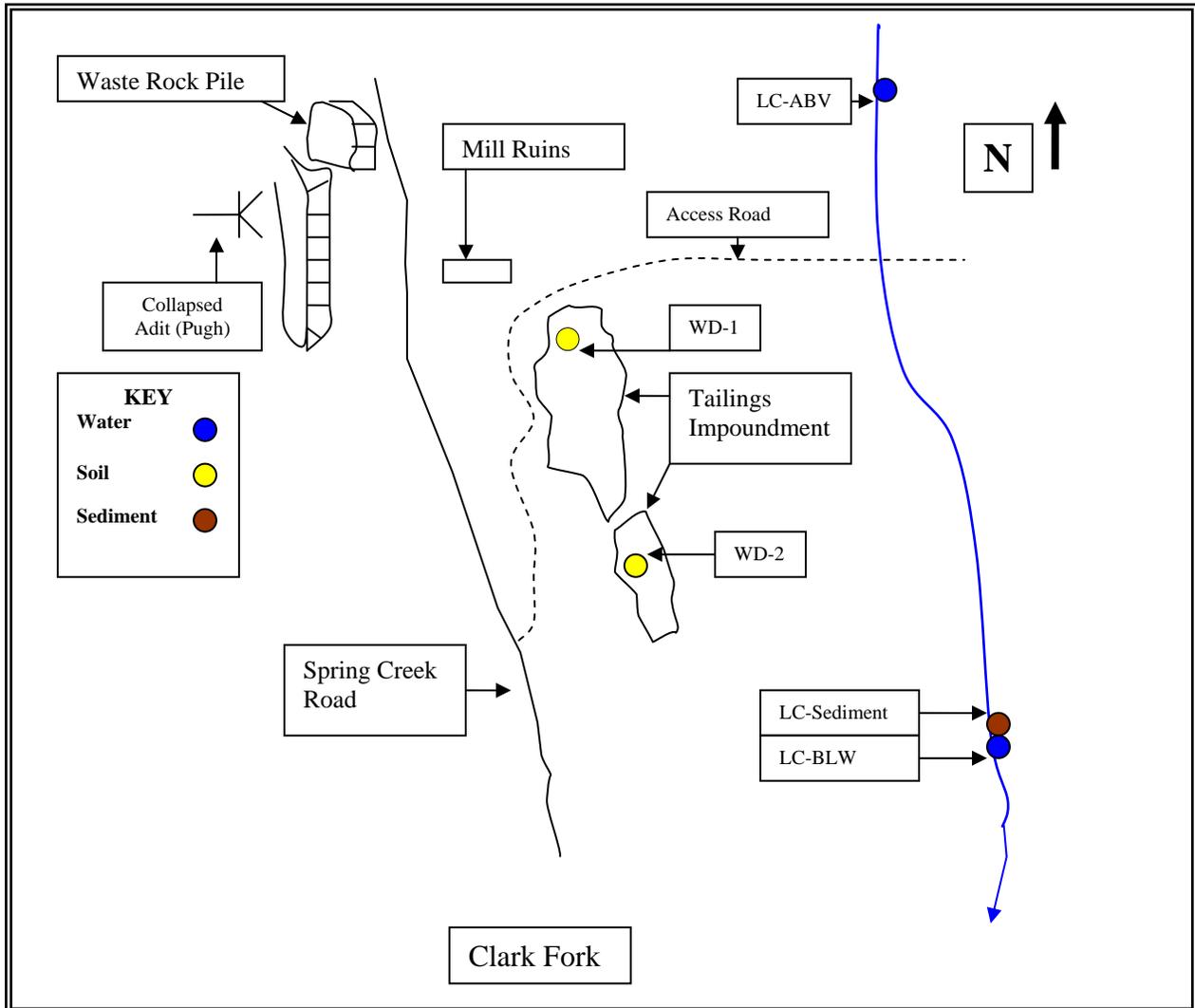


Figure 5. Site sketch (not to scale).



Photograph 8. Whitedelf tailings impoundment and location of sample WD1 (2005), looking northwest. Note sample jar on the left.



Photograph 9. Whitedelf tailings impoundment and sample location of WD2 (2005), looking north.

Section 4. Migration/Exposure Pathways and Targets

Migration/exposure pathways and potential targets within the site's range of influence (Figure 3, page 4) are described in the following. Receptors in the area have been identified as workers at the Clark Fork Fish Hatchery (0.5 miles north), inhabitants of the town of Clark Fork (1.25 miles south) and seasonal recreationists, including occasional tourists, hikers, campers, hunters, and snowmobilers. The current owner of the Whitedelph purchased the site to connect his holdings east of Spring Creek with road access to Clark Fork.

4.1 Ground Water Migration Pathway

The workings of the Whitedelph lie within rocks of the Belt series, known as the "Supergroup." The Whitedelph was wholly developed within the middle member of the Wallace formation, which dates to the pre-Cambrian era (1.4-0.85 billion years ago). "The entire formation bears evidence of shallow water deposition; the more shaly facies are mud cracked, while the sandy facies are ripple marked" (Wagner, 1949, p. 12).

The formation consists of mostly thin-bedded calcareous sediments:

"The rocks contain carbonates of magnesium and iron as well as of calcium, but the calcium seems the most abundant. The formation comprises three members which are fairly distinct in general character, but which grade into one another... The lowest member is characterized by the prevailing green color of its rocks... Higher in the formation the proportion of limy material is greater, as is indicated by the yellow color assumed by the rocks when weathered; numerous bands of whitish calcareous sandstone and a few strata of blue and white argillite make their appearance."

Calkins and Jones, 1912, pp. 13 and 14).

Rock outcrops at the Whitedelph contain few mud cracks or ripple marks, suggesting the workings lie wholly within the middle member of the Wallace formation.

The Whitedelph lies within a wide fracture zone, predominated by the Hope fault. The Hope is characterized by Anderson (1930, pp. 44 & 45) as follows:

"...one of a series of great transverse faults which trend in a westerly direction or a little north of west, and whose displacement, in place of being in a vertical direction..., is largely horizontal... The trace of the main Hope fault is outlined by a distinct depression several hundred yards across, except where completely filled with glacial debris, and it is probably best to consider the fault a complex fracture with many planes of movement distributed through a wide zone."

“Among the principal faults are the Pearl, Middle, and South faults, all of which appear to be high-angle reverse faults. The Pugh is a high-angle strike-slip fault that offsets the Pearl fault...The trend of the fault zone ranges from N 3° to 45° and dips from 60° to 80° SE” (Savage, 1967, p. 90).

Consequently, ground water is expected to follow preferential pathways along bedding planes and be controlled by faults and fractures, locally. The interconnection of these fractures appears to permit the ready movement of ground water throughout the mine. Hersey (1939), noting active movement of water adjacent to the Pugh fault, commented: “Considerable water is now going down the stope to the lowest level” (p.6). The lowest levels of the mine would be similarly impacted from their close proximity to Spring Creek.

The location and type of wells surrounding the Whitedelph is presented in Figure 6. The municipal well for Clark Fork is located within a 1-mile radius of the mine, but data (not presented here) does not indicate the presence of unacceptable levels of metals.

No precipitation data is available for the Whitedelph. Therefore, precipitation data from Cabinet Gorge, Idaho, located approximately 9 miles southeast, was used. The weather station has recorded data from 1956 to the present. This site is located at an elevation of 2,059 feet above mean sea level. The mean annual precipitation is 32.23 inches, and the maximum, 24-hour event of 2.77 inches occurred on June 13, 1992 (WRCC, 2005).

Whitedelph Mine
 Preliminary Assessment Report
 February 2006

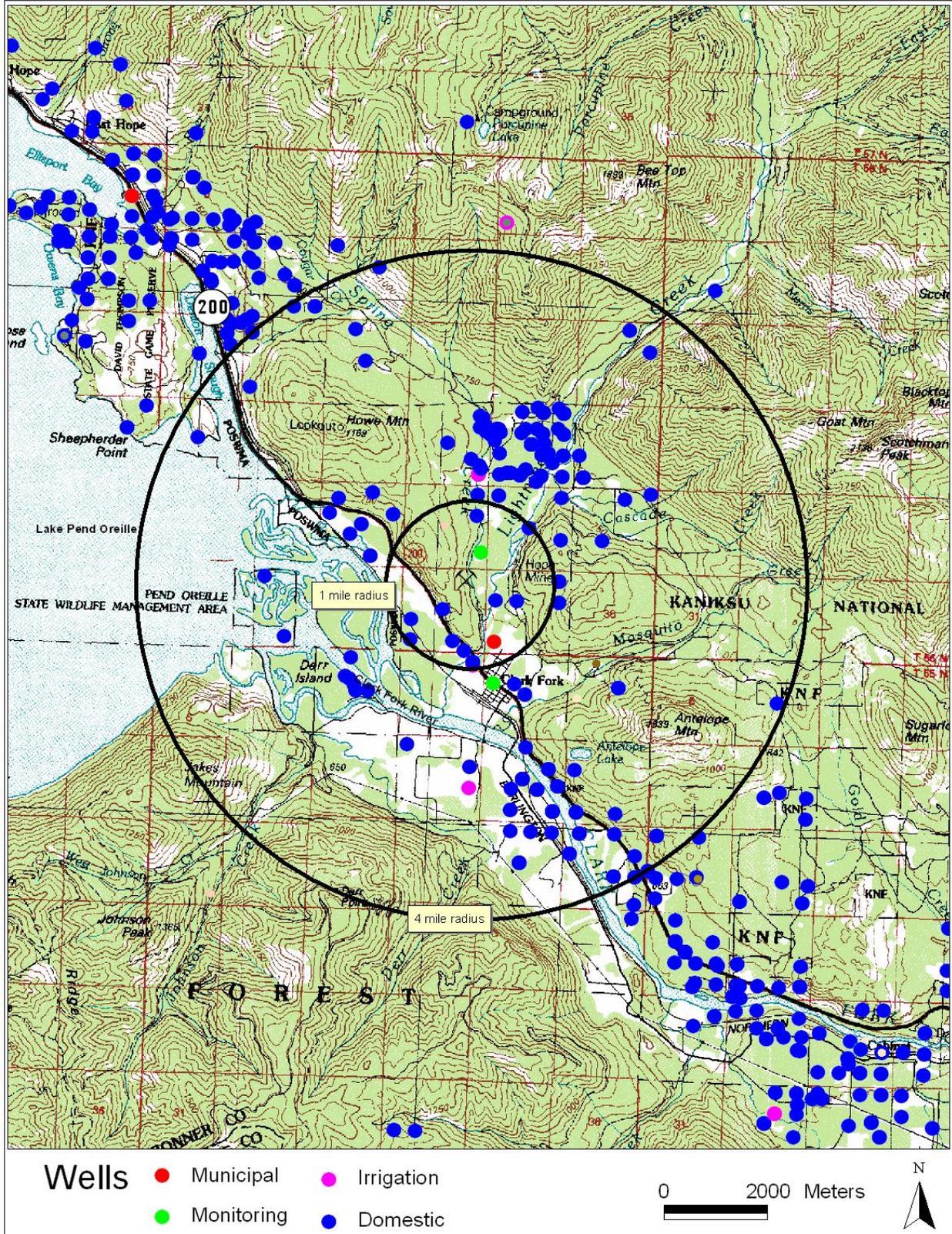


Figure 6. Identification of wells surrounding the Whitedelph.

4.2 Air Migration Pathway

The site is situated within a mountainous canyon covered with heavy vegetation, consisting mostly of coniferous trees and an under-story of heavy brush. The existing waste rock dump and tailings impoundments are overgrown with annual and perennial vegetation.

The waste rock pile has been mined for road construction source material for several years.

The remaining waste rock, which appears to represent approximately 30 percent of its original volume, does not present an aerial dispersal potential. Though the fine-grained tailings show evidence of recreational ATV and motorcycle usage and, therefore, the potential distribution of particulates, the owner's recent installation of security equipment should curtail unwanted access to these areas and mitigate potential aerial dispersion from the impoundments.

4.3 Soil Exposure Pathway

Access to the Whitedelph is via Spring Creek Road, extending north from Clark Fork. The road is maintained year-round to allow access to the Clark Fork fish hatchery. The property is not fenced, but cable and timber barriers are in place to prevent access to the tailings impoundments area. The site is posted with "No Trespassing" signs.

As shown in Table 3, with only three exceptions, all samples exceeded the Idaho Default Target Limits (IDTL) for silver, arsenic, cadmium, lead, zinc and mercury. However, the IDTL values are risk-based target levels using conservative input parameters. The analytical results indicate levels not significantly above background/naturally-occurring minerals within the Wallace Formation. These results are also indicative of levels found in other mineralized locations in north Idaho.

Table 3. August 3, 2005 sample results for total soil analysis of tailings and stream channel sediments.

Chemical of Concern	Sample Site Location (cross referenced with Figure 5)			Idaho Initial Default Target Levels under REM (mg/kg)
	WD-1 Upper tailings (Totals, mg/kg)	WD-2 Lower tailings (Totals, mg/kg)	LC DG stream sediments (Totals, mg/kg)	
Silver	41.5	14.2	4.36	0.189
Arsenic	221	201	108	0.391
Cadmium	1.87	8.97	0.97	1.35
Lead	1,720	707	1430	49.6
Zinc	377	1,180	190	886
Mercury	0.200	0.335	0.267	0.00509

*Highlighted cells indicate that the concentration exceeds DEQ's Idaho Default Target Limits (IDTL) values.

4.4 Surface Water Migration Pathway

“Spring Creek is a large, spring fed tributary to lower Lightning Creek. It is the primary source of water for the Clark Fork state fish hatchery, and the community of Clark Fork has a water diversion facility further upstream. Downstream from the hatchery, Spring Creek has a low gradient channel which meanders through a modified riparian zone comprised largely of hardwoods and young conifers. Water temperatures appear to be suitable for salmonids. Juvenile bull trout have been reported from Spring Creek, but no bull trout spawning activity has been documented in recent years. Rainbow trout, Westslope cutthroat trout, and brook trout have all been documented in Spring Creek”

DEQ, 2001, p. 42

From the lower tailings impoundment, Spring Creek flows approximately 0.5 miles south to Lightning Creek. Flowing in a southward direction, Lightning Creek joins the Clark Fork River after approximately 1.15 miles.

The Clark Fork River enters its delta into Pend Oreille Lake at the confluence with Lightning Creek. Though the delta is naturally braided, it appears that the water from Lightning Creek merges to form the North Fork as it meanders through the delta. The North Fork traverses approximately 2.0 miles before enjoining Pend Oreille Lake. The lake's flow continues to the northwest for another 11.35 miles to the border of the TDL (Figure 7).

4.4.1 Sample Analyses

Analytical results of the surface water sample taken on August 3, 2005 are presented in Table 4, in which the data is compared to both the surface water standard and the ground water standard. The Idaho numeric water standards for surface water presented in Table 4 are hardness dependant criteria intended for the protection of aquatic life.

Table 4. August 3, 2005 surface water quality data from Spring Creek (standards and results in mg/L).

Chemical of Concern	Sample Result LC-ABV	Sample Result LC-BLW	Surface Water Standard adjusted for hardness (IDAPA 58.01.02)		Ground water Standard (IDAPA 58.01.11)
			CMC	CCC	MCL
Silver	<0.00010	<0.00010	0.00032		0.1
Arsenic	<0.0030	<0.0030	0.34	0.15	0.05
Cadmium	<0.0020	<0.0020	*0.00052	*0.00037	0.005
Lead	<0.0030	<0.0030	*0.014	*0.00054	0.015
Mercury	<0.00010	<0.00010	0.0021	0.000012	0.002
Zinc	<0.010	<0.010	*0.036	*0.036	5

*Hardness dependent, standard shown represents a hardness value of 25 mg/L

CMC = Criterion Maximum Concentration is defined as the maximum instantaneous or one (1) hour average concentration and should adequately protect aquatic organisms from acute toxicity if not exceeded more than once every three (3) years. This is equivalent to "acute criteria."

CCC = Criterion Continuous Concentration is defined as the four (4) day average concentration of a toxic and should adequately protect aquatic organisms from chronic toxicity if not exceeded more than once every three (3) years. This is equivalent to "chronic criteria."

Highlighted cells indicate that the concentration exceeds the MCL.

The ground water standards for the State of Idaho are also presented; these are based on the protection of human health and are more appropriate for comparison of this data. The sample results show that Spring Creek is not being impacted from the Whitedelph workings.

4.4.2 Water Quality Concerns and Status

Spring Creek (headwaters to mouth) was listed in 1994 as a water body not fully supporting all of its designated beneficial uses due to sediment pollution. The source of this listing was the 305(b) report.

Since then, DEQ beneficial use reconnaissance data collected on Spring Creek was analyzed for evidence of beneficial use support. Data collected in 1995 and 1996 was first determined to be needing verification for support status. Further analysis and review has determined that, based on available data, Spring Creek is currently supporting all designated beneficial uses" (DEQ, 2001, p.43).

The lower Lightning Creek reach, below its confluence with the Spring Creek tributary, is designated as a 303(d) stream for the pollutant of sediment.

The Clark Fork River is designated as a 303(d) water body for the pollutants of metals, nutrients, and sediment.

Pend Oreille Lake was added to the 303(d) list due to its "threatened" status. The increasing amounts of nutrients in the lake, coupled with the threat of metals pollution from the Clark Fork River, required the lake to be so designated.

Commercial and subsistence fishing are not conducted within the surface water Target Distance Limit (TDL). Sport fishing may occur on Lightning Creek and the Clark Fork River, though direct evidence of this was not observed. However, on Pend Oreille Lake,

sport fishing and boating are popular activities, often supporting local economies. Fish catch data was not available at the time of the inspection.

The use of surface water for watering of livestock and irrigation appears to be present along Lightning Creek and the Clark Fork River within the TDL. Large indigenous mammals (deer, elk, bear, etc.) are presumed to be present in the area and would utilize the water from all of the surface waterways. There are no drinking water intakes within the TDL.

Whitedelph Mine
 Preliminary Assessment Report
 February 2006

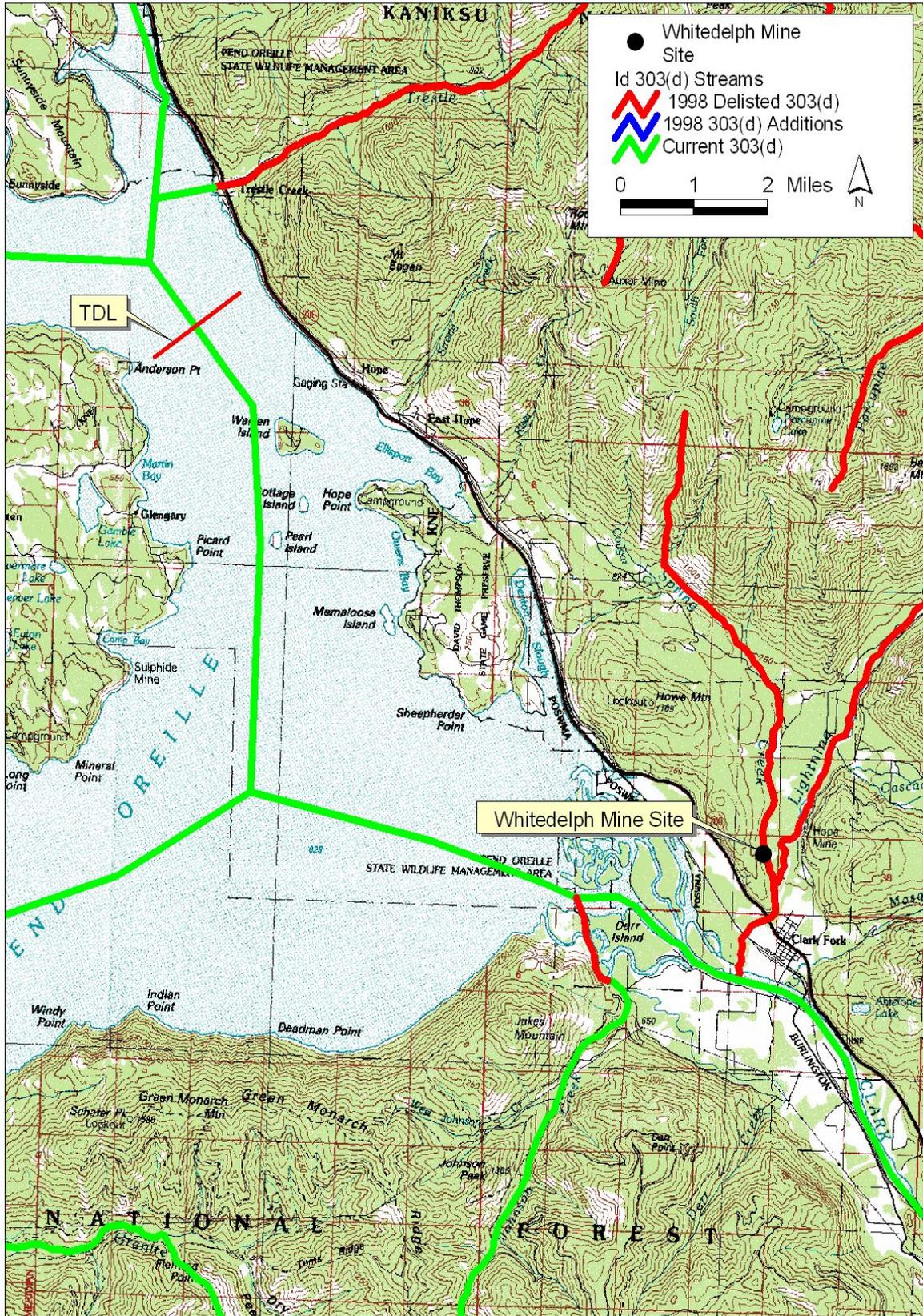


Figure 7. 15-Mile Total Distance Limit (TDL).

4.4.3 Target Species

Flora and fauna identified federally as “endangered” or “threatened,” or as an Idaho state “species of concern,” are illustrated in Figure 8. Where appropriate, the corresponding “home range” is included.

The following threatened, endangered, or state species of concern were recorded at these distances and directions from the Whitedelph:

- Bald Eagle (*Haliaeetus leucocephalus*): 1.5 miles SSW, 1.75 miles WSW, 1.36 NW, and 2.61 miles WNW
- Bull Trout (*Salvelinus confluentus*): 0.1 miles east in Spring Creek, 0.5 miles SE in Lightning Creek, 1.75 miles south in the Clark Fork River, and 2.5 miles SW in Johnson Creek
- Coeur d’Alene Salamandar (*Plethodon idahoensis*): 1.75 miles south
- Common Loon (*Gavia immer*): 3.0 miles WSW and 2.4 WNW
- Deer Fern (*Blechnum spicant*): 2.1 miles east
- North American Wolverine (*Gulo gulo luscus*): 0.9 miles SE
- Northern Leopard Frog (*Rana pipiens*): 1.75 miles south
- Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*): 0.5 miles SE in Lightning Creek and 1.75 miles south in the Clark Fork River

Whitedelph Mine
 Preliminary Assessment Report
 February 2006

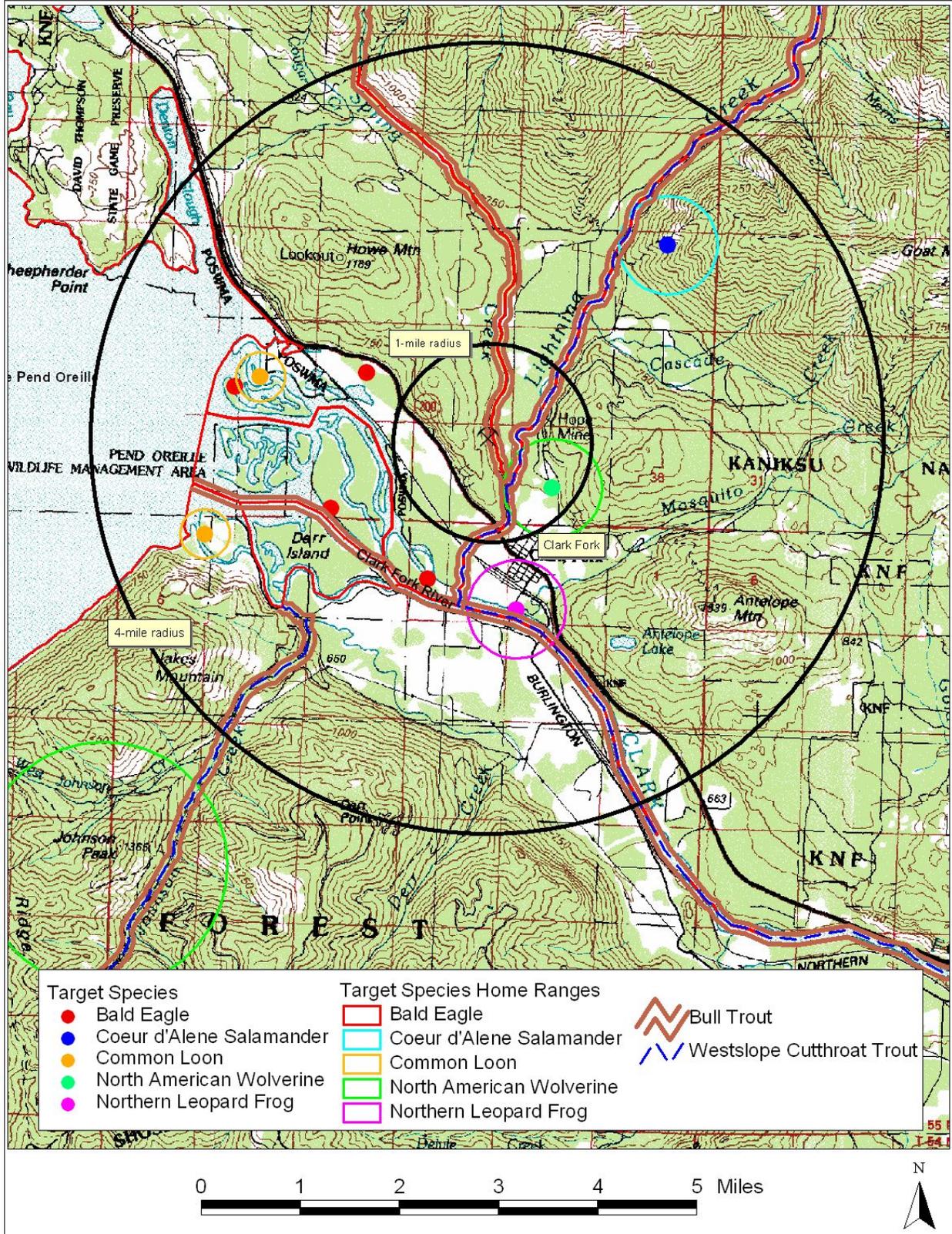


Figure 8. Target species.

Section 5. Summary

The Whitedelph Mine and Mill property is located within the Lightning Creek sub-drainage, along the west bank of Spring Creek. The site is situated on the southeast flank of Howe Mountain, chiefly underlain by glacial drift and covered with heavy vegetation, consisting mostly of hardwoods, young coniferous trees, and an under-story of dense brush. The waste rock pile has been excavated for road construction/maintenance source material. The two tailings impoundments have been previously impacted by off-road enthusiasts (ATVs and motorcycles), but are currently protected by security devices. Both the waste rock and tailings areas are becoming overgrown with annual and perennial vegetation. The main adit, the Pugh (Norquist) tunnel, is collapsed at the portal and does not exhibit any ground water discharge.

Off-site exposure to metals contamination from this site via surface water appears to be low. Samples collected from the tailings impoundments and from the sediment in Spring Creek reveal elevated levels of silver, arsenic, cadmium, lead, zinc, and mercury exceeding the conservatively set Idaho Default Target Limits. The samples indicate the presence of metals at levels normally found within the Wallace Formation and other mineralized locations in north Idaho. Additionally, surface water data downstream and at the nearest drinking water intake (outside the 15-mile target distance limit) have never detected any elevated levels of metals. Spring Creek is a 303-d listed stream, but for sediment, not metals.

At this time, the likelihood of on-site human exposure to metals contamination is low. The property surrounding the mill and tailings impoundments are privately owned, and the current owner presently has no plans to develop the site or to construct any dwellings. Additionally, the owner has taken steps to minimize access to the tailings impoundments with barriers. Because the barriers are not designed to prevent animals from entering the site, the likelihood for on-site wildlife exposure is moderate; this would be further exacerbated if the impoundments were sought out as sources of nutrients (i.e., "salt licks").

Off-site exposure may occur from airborne dusts originating from the tailings impoundments, but with no permanent residences in the vicinity, this exposure would be low. As access is limited, dust-causing activities have virtually ceased (vehicles, walking, etc.). Vegetation has slowly begun to grow on the impoundments but only on the borders. There appears to be a slight potential for wind dispersion of metals contaminated dusts.

Overall, the likelihood of on-site human exposure to contaminants is low, and the likelihood of off-site exposure is very low. With only the potential for moderate exposure of metals contamination to mammals in the immediate vicinity of the tailings impoundments, it appears the Whitedelph Mine and Mill site does not warrant further investigation at this time. Should future activities in the area occur (including construction, residential development, creek access, road widening, etc.), then a closer examination and possible remediation of the tailings impoundments should be included.

References

- Anderson, Alfred, L., March 1930, Geology and Ore Deposits of the Clark Fork District, Idaho, Idaho Bureau of Mines and Geology Bulletin No. 12, 127 pages.
- Calkins, F. C. and E.L. Jones, Jr., 1912, Economic Geology of the Region around Mullan, Idaho and Saltese, Montana, U.S. Geological Survey Bulletin 540-E, Part I.
- DEQ, Idaho Department of Environmental Quality, November 18, 1999, revised April 17, 2000, revised November 2000, revised March 2001, Clark Fork/Pend Oreille Sub-Basin Assessment and Total Maximum Daily Loads, 310 pages. Available URL:
http://www.deq.state.id.us/water/data_reports/surface_water/tmdls/sba_tmdl_master_list.cfm.
- DMEA, Department of the Interior Defense Minerals Exploration Administration, Field Team, Region 1, August 1958, Final Report, Contract Idm-E18.
- FWS, United States Fish and Wildlife Service, 2005. Available URL:
http://ecos.fws.gov/tess_public/servlet/gov.doi.tess_public.servlets.UsaLists?state=ID
- Hersey, Oscar, H., August 21, 1939, Report on the Whitedelf Mine, Consultant Report for Bunker Hill & Sullivan M. & C. Co.
- Savage, C. N., January 1967, Geology and Mineral Resources of Bonner County, Idaho Bureau of Mines and Geology, County Report No. 6, 131 pages.
- USDC, U.S. Department of Commerce, 2005, Available URL:
<http://quickfacts.census.gov/qfd/states/16/16017lk.html>
- WRCC (Western Regional Climate Center), 2005.
Available URL: <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?idcabi>.

Appendix A: Photograph Log

Photo Description

1. Whitedelf mill (circa 1945).
2. Whitedelf ball mill (1945). The mill's back wall in this photograph is now the northbound lane of Spring Creek Road.
3. Whitedelf ball mill concrete base (2005). Note Spring Creek Road in the background. Looking west.
4. Whitedelf ball mill concrete base, looking east (2005).
5. Upper structure of the Whitedelf mill as seen in Photograph 1 (2005). Spring Creek Road in the upper left corner of photograph. May also be the North Portal/Pugh Adit.
6. Collapsed portion of upper Whitedelf mill structure as seen in Photograph 5 (2005).
7. Whitedelf waste rock pile (2005).
8. Whitedelf tailings impoundment and location of sample WD1 (2005). Looking northwest. Note sample jar on the right.
9. Whitedelf tailings impoundment and sample location of WD2 (2005). Looking north.

Appendix B: Analytical Data

Whitedelph Mine
Preliminary Assessment Report
February 2006

Table 5. Analytical data: soil and water samples.

Soil Samples												
Sample ID	Specific Location	By	Sample Medium	Date	* Ag	* As	* Ba	* Cd	* Cr	* Pb	* Se	* Hg
H-1	Adit No. 1 waste rock pile	RH	Rock	7/27/04	<2.5	1580	57.6	<1.0	3.8	11.8	<5.0	<0.0330
H-6	10" deep at Adit No. 1 waste dump	RH	Soil	7/27/04	<2.5	2450	50.9	<1.0	9.5	9.5	<5.0	0.052
H-2	Rock dump (Adit No. 1)	RH	Soil	7/27/04	<0.005 0	0.087	0.209	<0.0020	<0.0060	<0.0050	<0.010	<0.00020
	* Units – mg/kg											
Water Samples												
Sample ID	Specific Location	By	Sample Medium	Date	* Ag	* As	* Ba	* Cd	* Cr	* Pb	* Se	* Hg
H-3	Olentange Ck upstream of adit	RH	Water	7/27/04	<0.005 0	<0.010	0.0037	<0.0020	<0.0060	<0.0050	<0.010	<0.00020
H-4	Olentange Ck @ adit discharge	RH	Water	7/27/04	<0.005 0	0.013	0.0049	<0.0020	<0.0060	<0.0050	<0.010	<0.00020
H-5	Olentange Ck downstream	RH	Water	7/27/04	<0.005 0	<0.010	0.004	<0.0020	<0.0060	<0.0050	<0.010	<0.00020
					* Cu	* Zn	pH					
H-ADIT	Lowest adit, collected at portal	CS	Water	9/1/04	0.0128	<0.0050	8.09					
H-V	Olentange Ck above all workings	CS	Water	9/1/04	<0.003 0	<0.0050	7.85					
H-L	Olentange Ck below all workings	BG	Water	9/1/04	0.0047	0.0077	7.84					
	* Units - mg/L											

This page intentionally left blank for correct double-sided printing

Report Index

abandoned industrial facilities	1	Michael and Elaine White.....	10
abandoned mines.....	1	minerals,.....	14
aerial spraying.....	1	motorcycle.....	22
airfields	1	motorcycles	5, 29
argillites.....	14	Norquist adit.....	10
ATV	v, 22	ore minerals.....	14
ATVs.....	5, 29	patented land	10
ball mill	6, 7	Pearl vein	10, 11
barriers	5, 22, 29	Pend Oreille Lake	23, 24
boating.....	25	precipitation	20
Bonner County	i, 1, 9, 30	Preliminary Assessment (PA).....	1
Bruce Schuld.....	15	Preliminary Assessment Program	
Clark Fork	1, 2, 10, 19, 20, 22, 23, 24, 25, 27, 30	additional information URL.....	1
Clark Fork Mining District	1	quartzites	14
Compton I. White, Jr.....	10	recoverable metals	12
Compton I. White, Sr.....	10, 11	Region 10	
concentrator.....	5, 12	EPA	1
concentrator mill building.....	5	REM.....	22
Cossack Tunnel.....	24	Robert Higdem.....	15
Defense Minerals Exploration		sample collection	15
Administration (DMEA)	10	shales.....	14
drinking water	25, 29	silver.....	10, 11, 12, 14, 22, 29
electricity.....	11	Silverfields Mining Corporation.....	10
elevation.....	20	species of concern.....	27
fish hatchery.....	1, 22, 23	Spring Creek Road.....	5, 6, 7, 22, 31
fishing	24	tailings.....	22
Hardinge ball mill and classifier.....	11	tailings impoundments	5, 10, 15, 22, 29
hazardous waste	1	The Department of Environmental Quality	
Heisel, Mark.....	5, 9, 10, 15	(DEQ).....	1
Hershey	12	topographic map.....	1
Howe Mountain	1, 11, 14, 29	U.S. Bureau of Mines.....	9
Idaho Bureau of Mines and Geology	9, 30	U.S. Geological Survey.....	9, 30
Idaho Default Target Limits (IDTL).....	22	United States Environmental Protection	
illegal dumps.....	1	Agency (EPA)	1
James E. White tunnel.....	11	vegetation.....	14, 22, 29
Kaniksu National Forest	1	Wallace Formation.....	22, 29
Kauffman	12	waste rock	5, 10, 14, 15, 22, 29, 31
landfills	1	Whitedelf Mining and Development	
Lightning Creek	1, 23, 24, 25, 27, 29	Company	10
mammals	25, 29	Whitedelph Mine & Mill	
		site	1

Whitedelph Mine
Preliminary Assessment Report
February 2006