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MANAGEMENT & REMEDIATION DIVISION

**REMOVAL REPORT  
NORTH TAILINGS IMPOUNDMENT  
CINNABAR MINE  
YELLOW PINE, IDAHO  
AUGUST 2003**

**Pat Trainor  
On Scene Coordinator  
USDA - Forest Service  
Region 4 - Payette National Forest  
McCall, Idaho**



19011

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**FINAL REPORT FOR THE  
NORTH TAILINGS IMPOUNDMENT  
CINNABAR MINE  
YELLOW PINE, IDAHO  
CERCLA ID # IDD980665160**

## **1.0 INTRODUCTION**

The USDA Forest Service (USFS) initiated a removal action at the Cinnabar Mine Site, located near Yellow Pine, Idaho on August 20, 2002. The removal site is tan tailings located on the north of the mill building. The site posed a potential threat to human health and environment exposure pathways; a removal action was necessary to address the immediate threats.

Immediate threats addressed in the removal action included the tan tailings. All contaminated soils were capped in place. The removal action was conducted from August 5, 2003 through August 18, 2003

## **2.0 SITE DESCRIPTION**

The Cinnabar Mining Area can be reached by traveling east from McCall, Idaho, on Forest Highway 48 to the town of Yellow Pine, Idaho. The Site is about 15 miles east of Yellow Pine, on Forest Road 50412, in Valley County (See Figure 1 and 2). The specific location for this removal within the Site is along Cinnabar Creek in the north tailings impoundment.

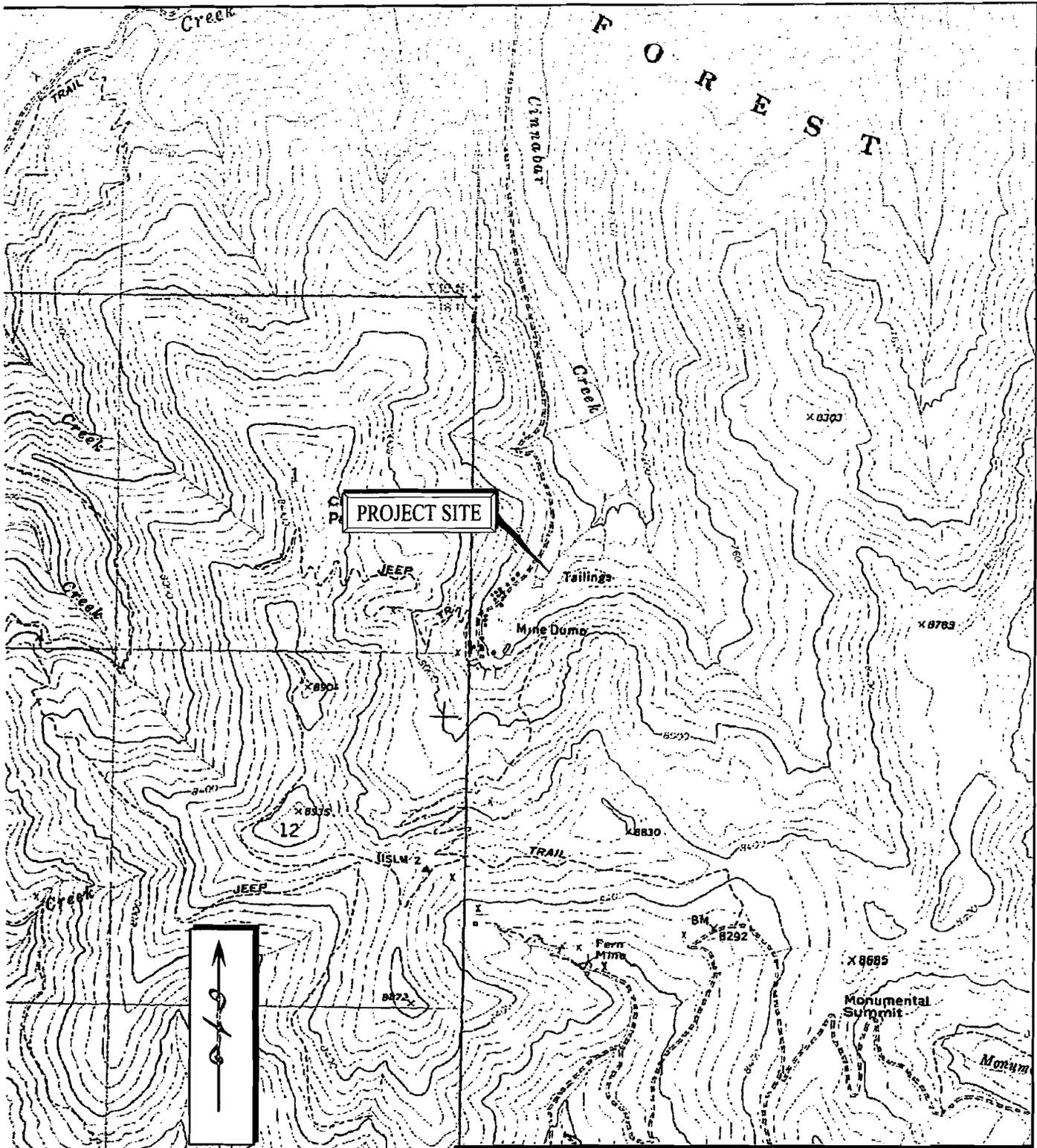
The Cinnabar Mining Site is on both private patented and public lands administrated by the Payette National Forest. It is generally located 15 miles east of the town of Yellow Pine on Forest Road 50412, in Valley County, Idaho (Figure 1) or in Township 18 North, Range 10 East, Sections 6 and 7.

The Cinnabar Mine Site has been mined intermittently for mercury over the last century. The mercury deposit was discovered about 1902 with initial development starting in 1921 under the United Mercury Mines Company, known then as the Hermes mine. Production was intermittent until 1942 with only 23 flasks (76 pounds/flask) of mercury processed during that time.

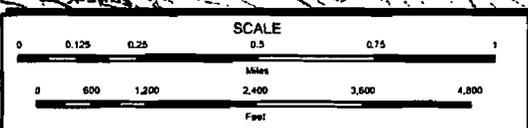
In 1942, the mine was taken over by the Bonanza Mining Inc. Bonanza Mining produced 6,800 flasks of mercury from 1942 through 1949. The ore processing method was to roast the ore, mercuric sulfide (cinnabar), with oxygen to produce free mercury vapor and sulfur dioxide gas. Mercury was collected when flue condensers cooled the vapor.



VICINITY MAP — IDAHO  
 FIGURE 1



REFERENCE: U.S.G.S. 7.5 MINUTE QUADRANGLE,  
STIBNITE, IDAHO 1973



**MSE** Millennium Science and Engineering, Inc.

1605 North 13th Street  
Boise, ID 83702 USA  
Phone: (208) 345-8292

**VICINITY MAP**

**CINNABAR MINE**  
VALLEY COUNTY, IDAHO

B2336

10-30-03

Resource Analytics

**FIGURE 2**

The process was reported to be uncontrolled; during operations, liquid mercury could be collected from the walls and rain-gutters of the process building.

United Mercury Mines started operations in 1952 and they processed 1,244 flasks of mercury from 1952-1953.

Holly Minerals Corporation operated the mine from 1953-1959. They used the existing roasting process until 1956 and they produced 633 flask of mercury. A fire in the mill building in 1956 caused Holly to change processes to a wet flotation and electro-separation process. They produced 4,299 flasks from 1956 to 1959.

The mine was operated very little after 1959. Antimony Gold Ores Company produced only 16 flasks of mercury in 1963. The last known operator was Electronic Metals Inc. in 1966 producing only 2 flasks of mercury.

### **3.0 ENVIRONMENTAL SETTING**

This site shows high levels of mercury in the sediments and tailings along the Cinnabar Creek. There is an estimated 3,000 cubic yards of mercury-laden tailings behind the impoundment structure. Results of soil samples taken at this impoundment structure in June 1985 by EPA's Regional X Technical Assistance Team found mercury to be 1000 ppm while background was measured at 15 ppm.

The exposure by hazardous substances has an immediate effect on the aquatic life because of the sediment deposits. It will have a chronic effect on the aquatic life and terrestrial life because of the long-term exposure to the heavy metals.

### **4.0 PREVIOUS INVESTIGATIONS**

The EPA inspected the site in August 1979 however no samples were taken at that time. The EPA Region X Technical Assistance Team (TAT) performed a preliminary site assessment in June 1985. A total of twenty-one samples were taken. The report concluded that presents several potential health and environmental hazards. The North Tailings Impoundment samples are discussed in section 3.0.

The Idaho Department of Health and Welfare performed investigations at Cinnabar in September 1984. The report and analytical results show elevated mercury on site. The report concluded that the mine be given a high priority for Clean up of toxic and environmental degrading wastes and compounds.

The USDA Forest Service, Payette National Forest, prepared a Macro invertebrate Analysis report at two locations on Cinnabar Creek one below the site and the other on a branch of Cinnabar Creek not influenced by the mine.

The report concludes that the ecosystem below the mine was severe stress with adverse water chemistry. The other sampling point shows the ecosystem to be normal for locations of that size and elevation. Samples were taken at the south tailings impoundment in 1991. Samples were analyzed according to EPA Method 245.1. Analysis showed that the south tailings impoundment were significantly higher in Mercury as compared to the background samples.

## **5.0 REMOVAL ACTIVITIES**

### **5.1 Objectives and Strategy**

The Action Memorandum for this site intended that the Removal Action achieve the following objectives:

- 1. Remove remaining tailings along Cinnabar creek. Slope the tailings to a 3:1 and place riprap along stream to prevent erosion from high flows.*
- 2. Re-grade the tailings within the impoundment so that the surface water flows away from the tailings. Cover the tailings with a geo-fabric and cover with a minimum of 18 inches of topsoil, seed and mulch.*

### **5.2 Chronology of Events**

July 17, 2003	USDA FS issues an Action Memorandum authorizing a time-critical removal action (Appendix A).
August 5, 2003	Millennium Science & Engineering (MSE) the contractor, men and equipment mobilize to Cinnabar to prepare for removal.
August 6, 2003	MSE personnel start opening Sugar/Cinnabar Creek road. A 30-foot temporary bridge is placed at Sugar Creek crossing.
August 11, 2003	Access road open to allow equipment access to the removal area. Equipment starts working at north tailings impoundment.
August 14, 2003	Contractor completes all objectives of the removal and starts demobilization off of site.
August 18, 2003	The contractor completes demob including removal of temporary bridge. Bridge is hauled to McCall, ID as required in the contract.

### **5.3 Removal Action**

The equipment was mobilized to the site on August 5, 2003. Work started on August 6, 2003. Equipment on site was one 12 c.y. dump truck, Cat 235 excavator, Loader, and small dozer. During this period the efforts completed were opening the road access and placing a 30-foot long temporary bridge across Sugar Creek. Full access to the north tailings was completed by August 8.

On August 11 work started on the North Tailings (see Figure 3. Tailings along Cinnabar Creek were removed to the main tailings impoundment leaving a final slope to the creek at 3:1. Geo-fabric was placed and riprap, 1 foot in diameter and greater, was added adjacent to the creek. Riprap was placed along the slope at the toe to a vertical height of 3 feet above the current flow levels. A minimum of 18 inches of topsoil was placed on the remaining slope.

The dozer re-sloped the main impoundment so that no surface water would pond on the pile. The new shape directed the surface water away from the pile. One layer of 8 oz. non-woven fabric was placed and a minimum of 18 inches of topsoil was placed over that. The topsoil was roughened to prevent any channelized flows from occurring on the surface. The Payette National Forest crews hydro-seeded the entire disturbed area. Straw mulch was hand placed and contractor equipment placed wood debris over the entire impoundment area. Completed task can see on Figure 4

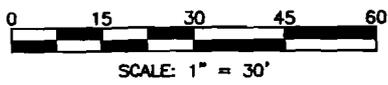
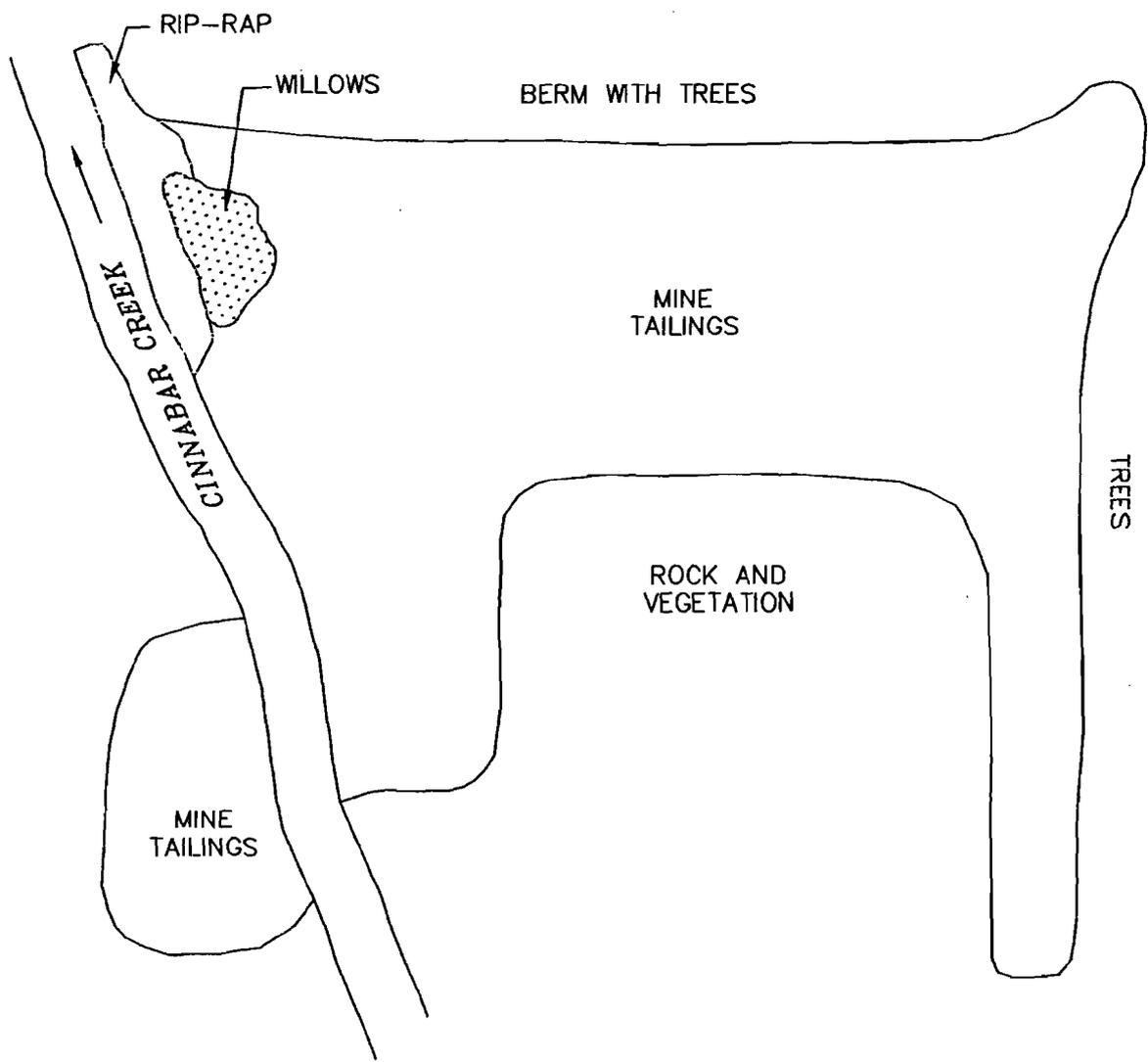
The Contractor started moving his equipment off site on August 14. Water bars were placed along the access road as part of the surface water management. The bridge was pulled on August 15. Contractor completed mobilization off site and returned the temporary bridge to a location near McCall on August 18, 2003.

## **6.0 PROBLEMS ENCOUNTERED**

The weather remained good throughout the project with little or no rain/snow events. No problems were encountered.

## **7.0 COMMUNITY RELATIONS –**

A news ad was placed in the Star-News a local paper on November 6, 2003. The administrative record is available for public review and has been since July 17, 2003. This was a time-critical removal action.



**MSE** Millennium Science & Engineering, Inc.

1605 North 13th Street  
Boise, Idaho 83702 USA  
Phone: (208) 345-8292

**NORTH TAILINGS AREA  
PRIOR TO  
REMOVAL ACTION**

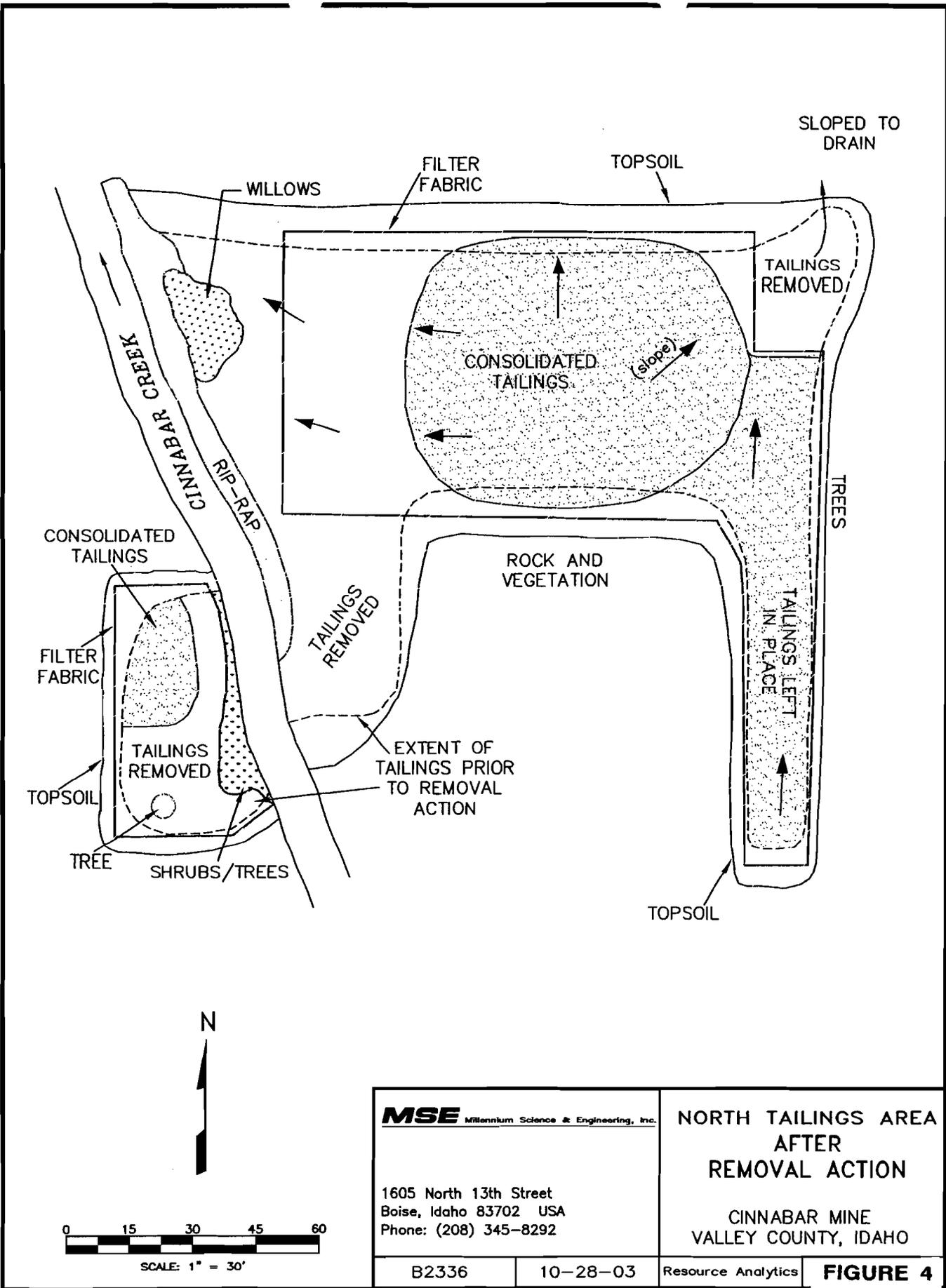
**CINNABAR MINE  
VALLEY COUNTY, IDAHO**

B2336

10-10-03

Resource Analytics

**FIGURE 3**



## 8.0 SAFETY

The OSC maintained the ultimate responsibility for site safety during the removal action. Each individual was responsible for the implementation of the site-specific safety plans. A site Safety Plan was written by MSE and a pre-work safety meeting was made on August 8, 2003. There were no mishaps or injuries that occurred during this removal. Appendix B is a copy of the Health and Safety Plan.

The close proximity of heavy equipment to workers posed the most potential physical hazards. The metal debris and partially collapsed buildings presented puncture and laceration hazards.

The workers were required to remain in level D PPE as long as the tailings were exposed. Standard dust masks were used in areas where dust was encountered during excavation. At no time did tailing particles become airborne due to windy conditions. A pump was provided on site to provide water to settle dust, if needed.

There were no injuries during this removal.

## 9.0 COST SUMMARY

The total authorized ceiling was \$ 80,000. The estimated cost to accomplish this action is summarized below:

FS Oversight	\$ 8,120
MSE Construction cost	<u>\$ 45,000</u>
<b>Total</b>	<b>\$ 53,120</b>

## 10.0 EFFECTIVENESS OF THE REMOVAL ACTION

At the completion of the demobilization from the site on August 18, 2003 all of the removal objectives were completed.

Site visits are planned in the following summers to evaluate the removal action effectiveness after a spring run-off season and check vegetative effectiveness.

## **11.0 REFERENCES**

- 1) Millennium Science & Engineering, Inc., 2003, Cinnabar Mine North Tailings Impoundment Non-Critical Removal Action Report, November 17, 2003
- 2) Pioneer Technical Services, Inc. 1992, Preliminary Assessment For The Cinnabar Mine, Stibnite, Idaho, May 5, 1992

**APPENDIX A**  
**Action Memorandum**



United States  
Department of  
Agriculture

Forest  
Service

Intermountain  
Region

324 25<sup>th</sup> Street  
Ogden, UT 84401-2310

File Code: 2160/6740/7470

Date: July 11, 2003

## **TIME CRITICAL ACTION MEMORANDUM**

**Cinnabar Mine Site  
Payette National Forest  
Valley County, Idaho**

### **I. PURPOSE**

A release, or a significant threat of a release, has occurred or is occurring that poses a threat to public health or welfare or the environment, on and/or from lands under the jurisdiction, custody, or control of the USDA Forest Service, Payette National Forest (National Forest System or NFS lands).

The purpose of this Action Memorandum is to document, pursuant to the guidelines of the National Oil and Hazardous Substance Contingency Plan (NCP), 40 C.F.R. 300, et seq. (1995), and to authorize time critical removal actions as authorized by section 104 (42 U.S.C. § 9604) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; 42 U.S.C. § 9601 et seq.), with respect to National Forest System lands.

The overall removal site for this response action is defined as the "north tailings impoundment". It is located on the southern area within the Cinnabar Mine Site in the SW1/4, SW1/4 of section 6 in T.18.N, R10.E.

For the reasons described herein, I hereby authorize the below-described actions to occur on National Forest System lands.

### **II. SITE CONDITION AND BACKGROUND**

#### **A. Site description and background.**

Mine tailings containing high levels of metals are located behind the impoundment structure at the removal site previously defined as the north tailings impoundment. These tailings are a result of early mining activities in the Cinnabar Mine area during the late 1950's. The tailings were the waste product of the



"flotation process" after the mercury was extracted from the mined ore.

The Cinnabar Mining Site is a mixed ownership area containing both public and patented lands. It is on, or adjacent to, public lands administrated by the USDA Forest Service, Payette National Forest. The removal site is located on public lands administrated by the Payette National Forest.

Cinnabar is an ore that has been mined intermittently for mercury since 1921. United Mercury Mines Company (known then as the Hermes Mine) was the first to operate at this area. Production was intermittent until 1930. In 1942, the mine was taken over by Bonanza Mining Inc. The major development occurred in the 1950s under Holly Minerals. It is believed that, the north tailings were created in the 1950's during Holly Minerals' period of operation. Holly's initial ore processing method was to roast the ore, mercuric sulfide (cinnabar), to produce free mercury vapor and sulfur dioxide gas. Mercury was collected in cooled flue condensers. This process was reported to be uncontrolled and liquid could be collected from the walls and rain gutters of the processing building. In 1958 Holly Minerals converted to a flotation process which resulted in the creation of fine tailings that were placed in the tailings impoundment area. The last reported operation was in 1966 by Electronic Metals Inc.

The Estate of J.J. Oberbillig possesses the private ownership interests in several unpatented mining/mill Site claims (hereinafter referred to as claims) through the provisions of the 1872 Mining Law, (30 U.S.C. 22) on public lands.

On September 2, 1992, the Forest Service initiated a CERCLA response and enforcement action at the Site pursuant to its authority delegated by the President, Executive Order 12580 (since amended by Executive Order 13016), Section 2(e)(1), and 7 CFR 2.60(a)(39)). Consistent with the NCP the Forest Service also assumed its "lead agency" responsibilities for response activities on lands under its jurisdiction.

The Forest Service voluntarily provided to EPA a Preliminary Assessment (PA), as a 42 U.S.C. 9604(b) investigation, on May 21, 1992. The EPA has subsequently suggested that, based on the information provided by the Forest Service in the PA, the Site "scored" high enough for listing on the National Priority List (NPL) as a "Superfund site". However it has not to date been considered for the NPL by the EPA.

## **1. Removal Site Evaluation**

Holly Minerals constructed the north tailings impoundment facility in the late 1950's while processing mercury using the gravity separation flotation process noted above, to extract the mercury.

Soil and sediment samples from this specific area were analyzed in 1985. The samples showed that the sediments contained metals that are over three-times background (see paragraph 4).

## **2. Physical Location**

The Cinnabar Mine Site can be reached by traveling east from McCall, Idaho, on Forest Highway 48 to the town of Yellow Pine, Idaho. This area is about 14 miles east of Yellow Pine, on Forest Road 50412, in Valley County, then another 5 miles up Sugar Creek/Cinnabar Creek.

The north tailings impoundment is located in Township 18 North, Range 10 East, and Section 6. The latitude-longitude intersection is located at the center of the Cinnabar Mine Site, at 115 17' 23.9" longitude, and 44 55' 08.8" latitude.

## **3. Site Characteristics**

All surface run-off from the north tailings impoundment flows into Cinnabar Creek. The tailings are located adjacent to Cinnabar Creek. All the drainages within the Cinnabar Mine Site are listed as critical habitat for the Chinook salmon, Bull trout, and Steelhead. The ponds are located on National Forest System lands.

## **4. Release, or threatened release, into the environment of a hazardous substance, pollutant, or contaminant**

A CERCLA removal action is necessary to stabilize the north tailings impoundment. This is due to high levels of mercury in the sediments and tailings along the Cinnabar Creek. There are an estimated 3,000 cubic yards of mercury-laden tailings behind the impoundment structure. Results of soil samples taken at this impoundment structure in June 1985 by EPA's Regional X Technical Assistance Team was as follows:

<b>Parameter</b>	<b>North Tailings - 1985</b>	<b>Background</b>
Mercury	1000 ppm	15 ppm

Sediments sampled in July 1994 by an EPA contractor doing a site investigation showed that mercury levels were higher downstream of the tailings than upstream of the tailings. The results were 91.3 milligrams per kilogram ("mg/kg") while the background was measured at 7.3 mg/kg.

## **5. NPL Status**

EPA has indicated that although the Site could potentially be proposed for the NPL, it has no plans to list the Site.

### **B. Other Actions To Date**

The Cinnabar Mine Site was reported to the National Response Center (NRC) on January 7, 1991, NRC case number 101930.

The Forest Service initiated a potentially responsible party (PRP) search on September 2, 1992, pursuant to CERCLA section 104(a) and 107. It formally notified the Estate of J.J. Oberbillig of its status as a PRP. Holly Minerals was notified on December 18, 1997. Both the Forest Service On-Scene Coordinator (OSC), and the Office of General Counsel (OGC) attorney assigned to this matter, have incurred, and continue to incur, CERCLA response costs in working with the PRPs, the State of Idaho, and EPA on related enforcement matters.

In September 1992 The Forest Service completed a time-critical removal action on the "south tailings". The proposed action was to construct a diversion ditch to carry Cinnabar Creek around that tailings impoundment. However the removal was amended to include constructing a spillway such that water would not be contained behind the impoundment structure.

EPA in the summer of 1996 completed a time-critical removal to address various other sources on site. Activities included the demolishing of the large fuel tanks; the removal and disposal of the smelter roster that was located in Cinnabar Creek; and re-constructing the old diversion thereby moving Cinnabar Creek away from the south tailings.

In 1998, EPA completed another time-critical removal. This removal addressed the continued erosion of the "red waste pile" into Cinnabar Creek. These piles are located approximately in the middle of the Cinnabar Mine Site. This removal accomplished the reinforcement of Cinnabar Creek with riprap at locations where the creek was eroding into the red waste piles. The piles were re-graded to reduce the amount of surface water on the piles from entering Cinnabar Creek.

### **C. State and Local Action Roles**

#### **1. State and Local Action to Date**

The State of Idaho Department of Health and Welfare Division of Environmental Quality (DEQ) have made numerous visits to the Site. DEQ has taken no cleanup actions on the Site.

## **2. Potential for Continued State and Local Response**

Little potential remains for partnerships between all groups.

### **III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES**

#### **A. Threats to Public Health or Welfare**

A significant threat to public health and welfare, through actual or potential exposure by hazardous substances to nearby populations or human food chain, exists at this site. Metals could be released into Sugar Creek and get into the food chain through bottom-dwelling insects and fish. Sugar Creek is used as a recreational fishery.

#### **B. Threats to the Environment**

A significant threat to the environment exists with regards to the north tailings impoundment area. Runoff from snow melts flows through the north tailings area each spring. Tailings enter into Cinnabar Creek through active erosion from both creek and meteoric surface flows. The exposure to hazardous substances will have an immediate effect on the aquatic life because of the sediment deposits. It will have a chronic effect on the aquatic and terrestrial life because of the long-term exposure to the heavy metals. This on going exposure has had, and continues to have an adverse effect on the Chinook salmon, Bull trout, and Steelhead species listed as "threatened" pursuant to the Endangered Species Act.

### **IV. ENDANGERMENT DETERMINATION**

Actual or threatened releases of hazardous substances from the site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, welfare, or the environment. The project has been approved and mitigation will be implemented as described in the on-going Biological Opinion by the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) for the Cinnabar Mine project.

### **V. PROPOSED ACTIONS AND ESTIMATED COSTS**

## **1. Proposed Action Description:**

### **Soils cap the tailings in place.**

The tailings chemical analyses show that the metals are not mobile in water; therefore, the tailings will be covered in place. The cover will be sloped to a minimum of three percent and 18 inches of topsoil will be placed on top of one layer of filter fabric to provide cover over the tailings.

The part of the north tailings impoundment that is in contact with the creek will have riprap placed along the edge of the stream and the tailings will be regraded to a 3:1 slope and covered as described above. Finally, the disturbed areas will be seeded and woody debris placed to provide for long-term nutrients and soil stabilization.

## **2. Contribution to Remedial Performance**

No remedial actions are planned at this time

## **3. Applicable or Relevant and Appropriate Requirements (ARAR's)**

Due to the exigent nature of the CERCLA time critical removal process, no federal or State of Idaho ARARs have formally been identified at this time. Federal and Idaho ARARs, and/or other requirements determined to be practicable for this Site are the various requirements authorized by the Forest Service's Organic Act and other authorizing statutes, the Clean Water Act, the Resource Conservation and Recovery Act, the Endangered Species Act (ESA), and the National Historic Preservation Act.

The Forest Service has taken the lead in entering into consultation regarding this action with the NMFS and USFWS under section 7 of the ESA.

## **4. Project Schedule**

The action is scheduled for July 2003. This project should be completed by September 2003. After that time, the weather will become a factor. The removal must be accomplished this field season, as any delay would put the deteriorating ponds into another winter. This would subject the sediments to the continued erosion and flooding events of Spring run off.

## **5. Estimated Costs**

The cost estimate to complete this project is \$ 80,000.

Cost summary is as follows:

FS Costs (oversight, design, and support)	
SUB-Total	\$ 10,000
Construction contract	\$ 65,000
Additional 10% Contingency Allowance	<u>\$ 1,000</u>
Sub-total	\$ 76,000
Direct costs	
Management FS costs	\$ 4,000

**Total Removal Project Oversight Ceiling Estimate: \$ 80,000**

#### **VI. EXPECTED CHANGE IN SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN**

Delayed action could result in continued release of tailings, creating sediments with hazardous levels of metals in Cinnabar Creek. Hazardous substances would enter the food chain and possibly affect humans, Chinook salmon, Bull trout and Steelhead, a threatened species. There is a likelihood that such releases would be even more significant this next Spring. A Time Critical Removal is imperative.

#### **VII. OUTSTANDING POLICY ISSUES**

There are no outstanding policy issues

#### **VIII. ENFORCEMENT**

The Forest Service is exercising its authority as a "lead agency" as defined by 40 CFR 300.5, and pursuant to said role is undertaking this action. The FS by acknowledging its role as "lead agency," or by taking, or planning to take any enforcement or other activity at this Site, neither represents nor acknowledges, expressly or by implication, any duty, liability, or responsibility under any federal or state law.

**IX. DECISION**

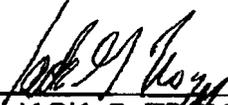
I hereby find that a release, or a significant threat of a release, has or is occurring that poses a threat to public health or welfare or the environment, and hereby authorize the described action to occur on National Forest System lands. A true and accurate copy of this Action Memorandum, and its attachments, will be placed in the Administrative Record, as set forth by the NCP. It may be viewed during regular business hours at the Krassel District Office, 500 N. Mission, McCall, Idaho, 83638. A formal notice of this Action Memorandum's and the Administrative Record's availability will be published in a local newspaper of general circulation within 60 days of initiation of on-site removal actions. Copies of this Action Memorandum will also be sent directly to EPA's project-wide OSC, and to the State of Idaho. I also reaffirm my designation of Pat Trainor as OSC and public spokesperson for the Cinnabar Mine Site.

RECOMMENDED:   
PAT TRAINOR  
Cinnabar On-Scene Coordinator

DATE: July 11, 2003

RECOMMENDED:   
for MARK J. MARDID  
Forest Supervisor

DATE: July 14, 2003

APPROVED:   
JACK. G. TROYER  
Regional Forester

DATE: 7/17/03

**APPENDIX B**  
**Health and Safety Plan**



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## 1.0 GENERAL

### 1.1 Project Description

This Health and Safety Plan covers removal activities to be conducted by MSE at the Cinnabar Mine during 2003. Field activities include the following:

- Rehabilitation (grading) of approximately five miles of access road;
- Grading and covering the tailings pile with geotextile and topsoil; and
- Local excavation, transport and placement of riprap in Cinnabar Creek.

### 1.2 Site Description

The Stibnite mining district is located approximately 14 miles southeast of Yellow Pine, Idaho, along the East Fork of the South Fork of the Salmon River (EFSFSR). The Cinnabar Mine project area is located on Cinnabar Creek, a few miles southeast of the EFSFSR confluence with Sugar Creek.

## 2.0 CONTACTS

All MSE–EnviroSearch (“Millennium”) Boise contacts may be reached at (208) 345–8292.

Emergency contact	Payette Dispatch	FS radio or
		(208) 634-5782
MSE Satellite 'phone		(254) 204-0171
Client(s):	Pat Trainor, Payette N.F.	(208) 253-0176
	Kathy Zirbser, USFS Region	(801) 625-5454
Thornton Construction		satellite (208) 431-2282
		home/office (208) 645-2282
Program Director:	Richard K. Kelsey	(208) 345–8292
Project Manager(s):	Jim Kuchera	“
Boise Office Manager:	Paul K. Hunter	“
Boise Health & Safety Officer:	Michael May	“
Millennium Salt Lake City:	John Mackey	(801) 461–0888
Millennium McLean:	Dale A. Rice	(703) 734–1090

### 2.1 Emergency Response Procedures

The most likely emergencies include accident and fire.

#### 2.11 Site Evacuation

If evacuation of the site is necessary, exit via the main road towards Sugar Creek, then west towards Stibnite and Yellow Pine. Remain available at the bridge crossing the East Fork of the South Fork of the Salmon River (about one–eighth mile above Sugar Creek) until all site personnel are accounted for.

## 2.12 Notification Procedures

If a situation arises which is immediately hazardous to life and health, presents a fire or explosion hazard, or results in a risk of release of fuel or other hazardous materials, notify **Payette Dispatch** on Forest Service radio or 634-5782 first (the Forest Service will provide MSE with a FS radio). As soon as practicable, notify the Millennium project manager or Boise office manager, followed by the client (if different than the site contact). In the event that Boise personnel are unavailable, contact Dale A. Rice at the McLean, Virginia office.

In case of an injury accident, provide first aid and medical attention, as required and as your qualifications allow. As soon as practicable, provide notification as in the previous paragraph.

## 2.13 Initial Response Steps

Evaluate the situation *quickly*. Is it immediately dangerous? Are there injuries that require treatment? Can injured persons be moved? Do you have the materials necessary to contain a spill? Are site personnel or other Millennium personnel readily available?

Take actions with the following priority:

1. If widespread evacuation is necessary, provide notification.
2. Remove and treat injured persons, if movement is not precluded by the injuries.
3. Contain spill, if any.

Obtain help for any actions you cannot handle yourself.

## 2.2 Nearest Hospital

The nearest medical facility is:

**McCall Memorial District Hospital**  
100 State Street  
McCall, Idaho 83612  
(208) 634-2221

**For emergency treatment, consider Life Flight to Boise:**

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**St. Alphonsus Regional Medical Center**  
1055 North Curtis Road  
Boise, Idaho 83706  
(208) 367-2121  
(208) 367-3221 emergency

Directions to hospital:

(to McCall Memorial) Go north along Cinnabar Creek to Sugar Creek, then west to the East Fork of the South Fork of the Salmon River. Turn right and proceed to Yellow Pine. Take East Fork Road west from Yellow Pine to Lick Creek, then turn left (west) on Lick Creek Road and proceed to McCall. Turn left onto Davis Avenue and proceed about ½ mile to Thompson. Turn right on

Thomson and proceed west about ¼ mile to Park Street, then turn slightly left onto Park for another ¼ mile to Highway 55. Turn right on Highway 55 and proceed about ½ mile to the hospital, opposite to Payette Lake at the intersection with State Street.

### 2.3 Nearest Mine Rescue Teams

No underground work is within the scope of this project. Therefore, the use of underground rescue teams is not anticipated.

## 3.0 CHEMICAL HAZARD ASSESSMENT

### 3.1 Characterization

The following is a brief description of the work site and expected hazards. The hazard assessment is based on information supplied by Pat Trainor of the Payette National Forest.

Facility Type	Facility Status		Waste Type		Waste Class		Exposure Route	
Landfill	Active		Gas		Corrosive		Inhalation	x
Commercial	Inactive	x	Liquid	x	Flammable		Absorption	x
Industrial	Abandoned		Solid	x	Poison	x	Ingestion	x
Residential	Other (specify)		Unknown		Radioactive			
Public					Oxidizer			
Military					Explosive			
Agricultural					Carcinogen	x		
Other (specify)					Misc.			
					Other (specify)			

### 3.2 Known Site Background Information on Chemical Hazards

Contaminants of concern include mercury, arsenic and lead. Other mining wastes and milling reagents may be buried in the tailings.

### 3.3 Relative Toxicity and Potential Health Risks of Chemicals

Chemicals that may be encountered are described below. CAS registry numbers are unique identification numbers assigned by the Chemical Abstracts Service, a division of the American Chemical Society. DOT numbers are assigned by the US Department of Transportation, and may be used in conjunction with the *North American Emergency Response Guidebook*. NFPA ratings are assigned by the National Fire Protection Association. They are listed in the order Health-Flammability-Reactivity, where 4 represents a severe hazard and 0 a minimal hazard. Information presented here was primarily obtained from the *NIOSH Pocket Guide to Chemical Hazards*, June 1994 Edition, with supplementary information from manufacturer's Material Safety Data Sheets (MSDSs). A general discussion of the routes of exposure appears below, in section 3.4. Acronyms and abbreviations commonly used in the discussion of chemical hazards are given in the table below.

Acronym	Meaning
APF	Assigned Protection Factor
APR	Air-Purifying Respirator
CAS	Chemical Abstracts Service
DOT	US Department of Transportation
HEPA	High Efficiency Particulate Air
IARC	International Agency for Research on Cancer
IDLH	Immediately Dangerous to Life and Health
LEL	Lower Explosive Limit
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit (OSHA)
PPE	Personal Protective Equipment
REL	Recommended Exposure Limit (NIOSH)
SAR	Supplied-Air Respirator
SCBA	Self-Contained Breathing Apparatus
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
TWA	Time-Weighted Average

### 3.31 *Metals, Mine Wastes and Inorganic Compounds*

Metals and inorganic compounds may be encountered in mining wastes, in industrial or agricultural wastes, or as natural geochemical constituents. Most metals may be present in many chemical forms, with differing physical properties and hazards. The eight "RCRA metals" (toxic contaminants according to 40 CFR 262.24) are: arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. The wastewater Priority Pollutants (40 CFR 423, App. A) include 13 metals: antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium and zinc, as well as two inorganic compound classes: asbestos and cyanide compounds.

Metals generally have high melting points and negligible vapor pressures; mercury is a notable exception, being a liquid at room temperature. Current NIOSH-approved monitoring techniques require collecting samples on a filter, followed by laboratory spectrographic analysis. This is not practical for real-time field hazard monitoring. Metals are typically encountered at mine sites as mineral tailings, waste rock, sediments, or as dilute solutions in ground water and surface water, not as pure metals. The hazards described below are generally for pure materials, except as noted.

#### *Antimony (CAS 7440-36-0)*

Elemental antimony (Sb), also known as stibium, is a silver-white, lustrous, hard, brittle solid, forming scale-like crystals; or a dark-gray, lustrous powder. It is noncombustible in solid bulk form, but antimony dust presents a moderate explosion hazard when exposed to flame. It is incompatible with strong oxidizers, acids and halogenated acids (HCl, HF, HBr), and reacts with fresh hydrogen gas to form toxic stibine gas. The OSHA PEL and the NIOSH REL are both 0.5 mg/m<sup>3</sup>. The IDLH concentration is 50 mg/m<sup>3</sup>.

**Respirator:** For concentrations up to 5 mg/m<sup>3</sup>, NIOSH recommends any dust and mist respirator having APF of 10 (except single-use or quarter-mask models), or any SAR. For higher concentrations, consult the *NIOSH Pocket Guide*.

**Symptoms:** Inhalation of dusts is the primary route of exposure. Ingestion and skin or eye contact are alternate exposure routes. Symptoms include: irritation of the eyes, skin, nose, throat or mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; and interference with the sense of smell. Target organs are: eyes, skin, respiratory system and the cardiovascular system.

**First Aid:** Eyes should be irrigated immediately with clean water. Wash exposed skin with soapy water immediately. Respiratory support should be provided in case of breathing difficulty, and immediate medical attention is required in case of swallowing.

#### ***Arsenic (CAS 7440-38-2) and inorganic arsenic compounds except arsine***

Arsenic (As) is a silver-gray or tin-white, brittle, odorless solid. It is noncombustible in solid bulk form, but arsenic dust presents a slight explosion hazard when exposed to flame. It is incompatible with strong oxidizers and bromine azide, and reacts with hydrogen gas to form highly toxic arsine gas. The OSHA PEL is 0.010 mg/m<sup>3</sup>, and the NIOSH 15-minute STEL is 0.002 mg/m<sup>3</sup>. The IDLH concentration is 5 mg/m<sup>3</sup>. NIOSH considers inorganic arsenic compounds to be Potential Occupational Carcinogens.

**Respirator:** NIOSH usually recommends that occupational exposures to carcinogens be limited to the lowest feasible concentration, and recommends the use of a self-contained breathing apparatus (SCBA) or supplied-air respirator (SAR) at all detectable concentrations. NIOSH recommends full-face air-purifying respirator (APR) with acid gas and HEPA cartridges and APF=50 or escape-type SAR for escape. For details, consult Appendix A in the *NIOSH Pocket Guide to Chemical Hazards*.

**Symptoms:** Inhalation of dusts is the primary route of exposure. Inhalation can result in ulceration of the nasal septum; absorption can result in dermatitis or gastrointestinal disturbances; contact can result in peripheral neuropathy or respiratory irritation; and ingestion can result in skin hyperpigmentation or cancer.

**First Aid:** Eyes should be irrigated immediately with clean water. Wash exposed skin with soapy water. Respiratory support should be provided in case of breathing difficulty, and immediate medical attention is required in case of swallowing.

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#### ***Barium sulfate (CAS 7727-43-7, DOT UN1564)***

Barium sulfate (BaSO<sub>4</sub>), also known as barite or barytes, is a white or yellowish, odorless powder. It is sparingly soluble in water. It is non-combustible, but is incompatible with phosphorus, and can explode when combined with aluminum in the presence of heat. The OSHA 8-hour PEL is 15 mg/m<sup>3</sup> (total) or 5 mg/m<sup>3</sup> (respirable fraction), and the NIOSH REL is 10 mg/m<sup>3</sup> (total) or 5mg/m<sup>3</sup> (respirable fraction). The IDLH concentration is 250 mg/m<sup>3</sup>. It should be noted that soluble barium compounds, such as barium nitrate and barium chloride are more toxic than barium sulfate. Consult the *NIOSH Pocket Guide* if these compounds are suspected.

*Respirator:* No current NIOSH recommendation (<http://www.cdc.gov/niosh/npg/npgd0047.html>).

*Symptoms:* Inhalation and skin or eye contact are the primary exposure routes. Exposure can result in irritated eyes, nose, and upper respiratory system; or benign pneumoconiosis (baritosis).

*First Aid:* Eyes should be irrigated immediately with clean water. Wash exposed skin with soapy water. Respiratory support should be provided in case of breathing difficulty, and immediate medical attention is required in case of swallowing.

### ***Cadmium dust (CAS 7440-43-9) and compounds***

Cadmium (Cd) is a silver-white, blue-tinged lustrous, odorless metal. The metal is insoluble in water, but many compounds are soluble. It is noncombustible in bulk form, but will burn in powder form. Elemental cadmium is incompatible with elemental sulfur, selenium and tellurium. The OSHA PEL is 0.005 mg/m<sup>3</sup>. The IDLH concentration is 9 mg/m<sup>3</sup>. NIOSH considers cadmium to be a Potential Occupational Carcinogen.

*Respirator:* NIOSH usually recommends that occupational exposures to carcinogens be limited to the lowest feasible concentration, and recommends the use of a self-contained breathing apparatus (SCBA) or supplied-air respirator (SAR) at all detectable concentrations. NIOSH recommends full-face air-purifying respirator (APR) with HEPA cartridge and APF=50 or escape-type SAR for escape. For details, consult Appendix A in the *NIOSH Pocket Guide to Chemical Hazards*.

*Symptoms:* Inhalation and ingestion of dusts are the primary exposure routes. Exposure can result in pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia, and possibly cancer.

*First Aid:* Eyes should be irrigated immediately with clean water. Wash exposed skin with soapy water. Respiratory support should be provided in case of breathing difficulty, and immediate medical attention is required in case of swallowing.

### ***Chromium (CAS 7440-47-3)***

Chromium may be encountered either as a metal, in salts, or as a cation in solution. The toxicity of the metallic form is low relative to the cation (as a salt or in solution). It is not likely that chromium metal will be encountered as part of this project. Chromium salts may exhibit a corrosive action on the skin and mucous membranes. NIOSH considers all compounds containing chromium in the hexavalent oxidation state to be carcinogens. The OSHA PEL is 0.1 mg CrO<sub>3</sub>/m<sup>3</sup> (ceiling) for chromic acid and chromates, ACGIH recommends an 8-hour TWA of 0.05 mg Cr(VI)/m<sup>3</sup> for water soluble Cr(VI) compounds. The primary routes of exposure are ingestion, dermal contact, and inhalation of aerosols. Ingestion of even small amounts may result in death, symptoms vary with the particular chromium compound. Contact may result in lesions confined to exposed skin areas and mucous membranes of the nasal septum. If exposure continues, perforation of the nasal septum may result.

### ***Lead (and inorganic lead compounds)***

Lead (Pb) is a heavy, ductile, blue-gray metal that is very soft. Inorganic lead compounds include lead oxides, metallic lead, and lead salts. Lead is slightly soluble in water. Ingestion of lead dust is the primary route of entry for metallic lead. However, organically complexed lead can be present as a constituent in petroleum fuels. The OSHA 8-hour PEL for metallic lead, lead oxides and inorganic lead salts and soaps is 0.050 mg/m<sup>3</sup>, and the NIOSH 10-hour REL for metallic lead, lead oxides, and all lead salts except lead arsenate is 0.100 mg/m<sup>3</sup>. The IDLH concentration is 100 mg/m<sup>3</sup> (as lead).

*Symptoms:* Lead compounds can enter the body through inhalation, adsorption, or ingestion. Systemic effects of lead poisoning are difficult to identify except through laboratory testing. Symptoms of exposure include weakness, lassitude, insomnia, facial pallor, eye palpitations, anorexia, constipation, tremor, headache, aching bones and kidney disease.

*First Aid:* Eyes should be irrigated immediately with clean water. Flush exposed skin with soapy water. Respiratory support should be provided in case of breathing difficulty, and immediate medical attention is required in case of swallowing.

### ***Mercury (and inorganic mercury compounds)***

Metallic mercury (Hg) is a heavy, silver-white odorless liquid between -38°F and at 674°F. Inorganic mercury compounds include all inorganic and aryl Hg compounds, but not alkyl compounds (such as methyl mercury). The primary routes of entry for mercury are by inhalation, absorption, and ingestion. The NIOSH 8-hour PEL for mercury vapor is 0.050 mg/m<sup>3</sup> (as Hg). The IDLH concentration is 10 mg/m<sup>3</sup> (as Hg).

*Symptoms:* Mercury compounds can enter the body through inhalation, adsorption, or ingestion. Symptoms of exposure include irritated eyes, skin irritation, coughing, chest pain, insomnia, anorexia, tremor, headache, and fatigue.

*First Aid:* Eyes should be irrigated immediately with clean water. Flush exposed skin with soapy water. Respiratory support should be provided in case of breathing difficulty, and immediate medical attention is required in case of swallowing.

### ***Selenium (CAS 7782-49-2)***

Elemental selenium (Se) is an amorphous or crystalline, red to gray solid. Selenium also occurs as an impurity in most sulfide ores. It is a combustible solid, and also reacts with acids, strong oxidizers and cadmium. The OSHA PEL and NIOSH REL are 0.2 mg/m<sup>3</sup> (as Se) for selenium and its compounds, except selenium hexafluoride gas.

*Respirator:* NIOSH recommends any dust and mist respirator or APR with HEPA cartridge for concentrations up to 1 mg/m<sup>3</sup>.

*Symptoms:* Inhalation, ingestion and, skin and/or eye contact are exposure routes. Exposure can result in irritation of the eyes, skin, nose or throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; or eye/skin burns. Exposure in animals can result in anemia; liver

necrosis, cirrhosis; kidney, spleen damage. Consumption of selenium-accumulating plants such as *Astragalus* spp. (locoweed) are thought to cause blind staggers and other diseases in livestock ([http://www.pprl.usu.edu/selenium\\_accumulators.htm](http://www.pprl.usu.edu/selenium_accumulators.htm)).

*First Aid:* Eyes should be irrigated immediately with clean water. Flush exposed skin with soapy water. Respiratory support should be provided in case of breathing difficulty, and immediate medical attention is required in case of swallowing.

### ***Silver dust and soluble compounds (CAS 7440-22-4[metal])***

Metallic silver (Ag) is a white, lustrous solid. Some silver salts are soluble in water. Metallic silver is a noncombustible solid, but is flammable in the dust or powder forms. It is incompatible with acetylene, ammonia, hydrogen peroxide, bromoazide, chlorine trifluoride, ethyleneimine, oxalic acid and tartaric acid. The OSHA PEL and NIOSH REL are both 0.01 mg/m<sup>3</sup>, and concentrations of 10 mg/m<sup>3</sup> are immediately dangerous to life and health (IDLH).

*Respirator/PPE:* For concentrations up to 0.5 mg/m<sup>3</sup>, any full-face APR with HEPA filter, SAR or SCBA having APF of 50 meets NIOSH recommendations. For higher concentrations, consult the *NIOSH Pocket Guide*. Eye and skin protection are also recommended.

*Symptoms:* Inhalation is the primary exposure route. Ingestion and skin or eye contact are alternate routes. Symptoms include: blue-gray eyes, irritation of the nasal septum or throat; irritation or ulceration of the skin; and gastrointestinal disturbance. The target organs are: the nasal septum, skin and eyes.

*First Aid:* Eyes should be irrigated immediately with clean water. Flush exposed skin with water. Respiratory support should be provided in case of breathing difficulty, and immediate medical attention is required in case of swallowing.

### ***Sodium cyanide (CAS 143-33-9, DOT UN1689)***

Sodium cyanide, like other cyanide salts, is a white granular crystalline solid with a faint almond-like odor. Cyanide salts are highly soluble in water, and under acidic conditions liberate the highly toxic gas hydrogen cyanide (*q.v.*). They are also reactive with strong oxidizers, such as chlorine. The PEL is 5 mg/m<sup>3</sup>, and concentrations of 25 mg/m<sup>3</sup> are immediately dangerous to life and health (IDLH). Primary routes of exposure are inhalation, ingestion and skin/eye contact.

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Cyanide displaces oxygen from hemoglobin molecules in the bloodstream, and results in symptoms of oxygen deprivation. These include: weakness, headache, confusion, nausea, vomiting, increased respiratory rate, slow gasping respiration, thyroid and blood changes, and death. Minor exposure can result in irritation to the eyes or skin.

First aid for contact is immediate irrigation. Skin contacting cyanide salts should be immediately washed with soapy water. In case of breathing difficulties, respiratory support should be provided. **Medical attention is required.**

### ***Hydrogen cyanide (CAS 74-90-8)***

Hydrogen cyanide (HCN; also known as hydrocyanic acid, Prussic acid, or formonitrile) is a colorless or pale blue liquid (below 78°F) or gas with a bitter almond-like odor. It is often used in industry as a 96% aqueous solution. It is most likely to be encountered in mine waste as a breakdown product of sodium cyanide or other cyanide salts (*q.v.*). It freezes at 7°F, boils at 78°F, and is miscible in water. It is a Class IA flammable liquid/flammable gas, with flash point at 0°F (below the freezing point) and explosive range from 5.6% to 40%. Based on skin absorption, the OSHA 15-minute PEL is 11 mg/m<sup>3</sup> (10 ppm), the NIOSH REL is 5 mg/m<sup>3</sup> (4.7 ppm), and concentrations of 55 mg/m<sup>3</sup> (50 ppm) are immediately dangerous to life and health (IDLH).

**Respirator/PPE:** Any supplied-air respirator with APF=10 meets NIOSH recommendations up to concentrations of 47 ppm. For higher concentrations, consult the *NIOSH Pocket Guide*. Eye and skin protection are recommended.

**Symptoms:** Inhalation, absorption and ingestion are all exposure pathways. Cyanide displaces oxygen from hemoglobin in the blood stream, resulting in asphyxia. Exposure symptoms include: asphyxia; lassitude (weakness, exhaustion), headache, confusion; nausea, vomiting; increased rate and depth of respiration or respiration slow and gasping; or thyroid and blood changes. The target organs are the central nervous system, cardiovascular system, thyroid and, blood.

**First Aid:** Eyes should be irrigated immediately with clean water. Wash exposed skin with water. Respiratory support should be provided in case of breathing difficulty, and immediate medical attention is required in case of swallowing.

### **3.32 Reagents**

Chemical reagents that may be used by Millennium personnel in furtherance of site activities include:

#### ***Methanol (CAS 67-56-1, DOT UN1230, NFPA 1-3-0)***

Methanol (also known as methyl alcohol, wood alcohol or carbinol) is a colorless liquid with a characteristic pungent odor, and is miscible with water. It may be used as a decontamination solvent. It is a Class IB Flammable Liquid (flash point 52°F, flammable range 6.0–36%) and burns with a colorless flame. The PEL is 200 ppm (with a NIOSH 15-minute exposure limit of 250 ppm for skin absorption). Exposure routes include inhalation, skin absorption, ingestion and skin/eye contact.

**Symptoms:** Exposure may result in irritation of the eyes, skin and upper respiratory tract; headaches, drowsiness, dizziness, vertigo, lightheadedness, nausea, vomiting; distorted vision, optic nerve damage (blindness) and/or dermatitis.

**First Aid:** Eyes should be irrigated immediately with clean water. Wash exposed skin with soapy water. Respiratory support should be provided in case of breathing difficulty, and immediate medical attention is required in case of swallowing.

Source: *NIOSH Pocket Guide to Chemical Hazards*, June 1997.

***Hexane (CAS 110-54-3, DOT UN1208, NFPA 1-3-0)***

Hexane is a colorless liquid with a gasoline-like odor. It may be used as a decontamination solvent. It is a Class IB Flammable Liquid (flash point -7°F, flammable range 1.1-7.5%).

*Exposure Limits:* The primary exposure route is inhalation. Alternate pathways are ingestion and skin or eye contact. The PEL is 500 ppm, with TLV of 50 ppm and IDLH of 1100 ppm.

*Symptoms:* Exposure may result in irritation of the eyes and nose; lightheadedness; nausea or headaches; peripheral neuropathy (numbness of the extremities or muscular weakness); dermatitis; giddiness; or chemical pneumonia (due to aspiration into the lungs during ingestion).

### **3.4 Routes of Chemical Exposure**

The routes of chemical exposure and relevant safety practices are briefly described below.

#### **3.41 Inhalation**

Breathing a gas, vapor, mist, fume, or dust is the most common type of accidental exposure. Generally, respirators should be worn when activities involve the generation of airborne particles or when organic vapors are suspected. It is the responsibility of the site safety officer to determine where and when respirators will be worn (see Section 5.0).

#### **3.42 Skin Absorption**

Skin absorption is the second most common accidental means of entry of chemicals to the body. Avoid unnecessary contact with contaminated surfaces. All skin areas shall be protected when working with hazardous materials. Items to protect the skin may include: disposable Tyvek® suits, rubber boots, gloves and face shield.

After work is completed all contaminated protective equipment must be decontaminated or disposed of in accordance with the applicable and relevant or appropriate regulations.

#### **3.43 Ingestion**

Ingestion is a common route of chemical exposure. Thus, the following activities are prohibited on site within the primary work area: eating, drinking, smoking or chewing gum.

#### **3.44 Eye Contact**

Most chemicals have the ability to injure the eye to some degree through surface contact or absorption. Appropriate safety goggles shall be worn on the site. Furthermore, contact lenses are not allowed in work areas where hazardous chemicals are encountered.

#### **4.0 PHYSICAL HAZARDS**

Field personnel may be exposed to a number of physical hazards, including:

- fire and explosion;
- industrial hazards: lifting, hand tools, falls and slips;
- electrical hazards;
- heat or cold stress;
- excavation hazards;
- hazards from heavy equipment and motor vehicles;
- noise; and
- water hazards.

#### **5.0 SAFETY AND HEALTH CONTROLS**

Sections 5.1 through 5.3 describe general Safety and Health Controls applicable to all project activities conducted on the site. Activity-specific controls are described in section 5.4.

##### **5.1 Site Control**

The following section defines measures and procedures for maintaining site control. Site control is an essential component in the implementation of the site health and safety program.

##### **5.11 *Buddy System***

The implementation of a buddy system is mandatory during all activities or when some conditions present a risk to personnel. A buddy system requires at least two people who work as a team, each looking out for the other.

##### **5.12 *Site Communications Plan***

Successful communications between field teams and contact with personnel in the support zone is essential. Standard hand signals will be used for communications during activities at the site when verbal communications are difficult or not possible. Hand-held two-way GMRS (General Mobile Radio Service) radios will be used for communication between persons who are out of sight of each other (for example, in different Operable Units on the site).

##### **5.13 *Work Zone Definitions***

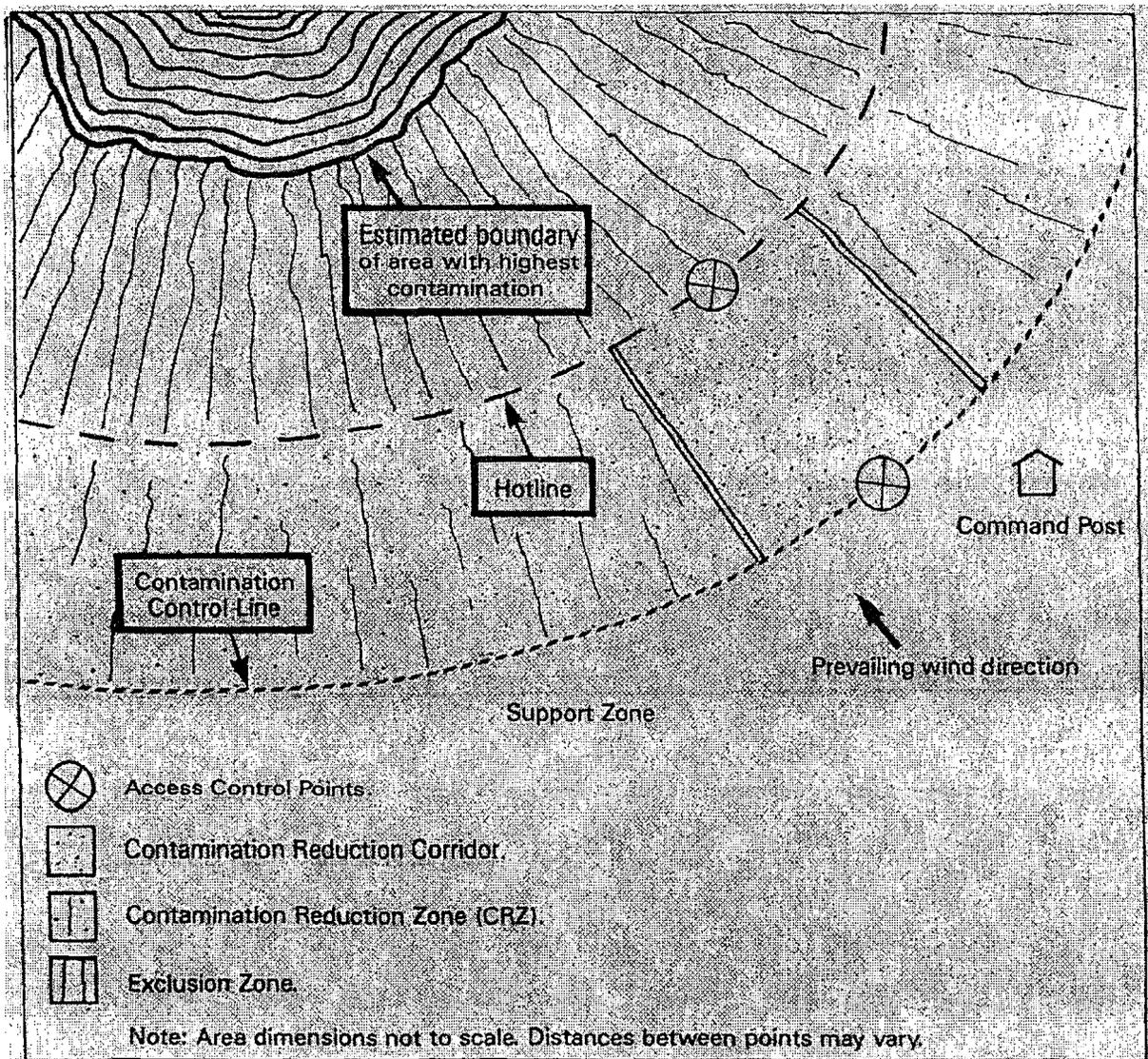
The three general work zones established at the Site are the Exclusion Zone, Contamination Reduction Zone, and Support Zone. The relationship of these zones is shown in Figure 5.1. Due

to low levels of contamination and other hazards anticipated at the site, the number of work zones in each Operable Unit will be kept to a minimum and controlled accordingly.

The Exclusion Zone (or "hot zone") is defined as the area where contamination is either known or likely to be present, or because of activity, will provide a potential to cause harm to personnel. Entry into the Exclusion Zones requires the use of personnel protective equipment. The Site Safety Officer will mark the exclusion zone for each work activity by means of traffic cones, construction fencing or signs prior to the commencement of work.

The Contamination Reduction Zone is the area where personnel conduct personal and equipment decontamination. It is essentially a buffer zone between contaminated areas and clean areas. Activities to be conducted in this zone will require personal protection as defined in the decontamination plan.

The Support Zone is situated in clean areas where the chance to encounter hazardous materials or conditions is minimal. Personal protective equipment is therefore not required.



## **5.14 Site Visitors**

All site workers must read and sign this H&S Plan and abide by its provisions when in the work areas referenced in the scope of work in Section 1.1. This includes employees of subcontractors, the US Forest Service or the Idaho Department of Environmental Quality or the US Environmental Protection Agency.

In addition, members of the general public or representatives of Natural Resource Trustees or Potentially Responsible Parties. Persons wishing to observe or photograph work operations shall be permitted to do so, under the following conditions:

- Such observation shall not be allowed to interfere with work operations;
- The Site Safety Officer (SSO) will summarize the physical and chemical hazards of the work activity to the visitor;
- The visitor will not be allowed in the Exclusion Zone or Contaminant Reduction Zone, and may be restricted from the Support Zone at the discretion of the SSO;
- The visitor shall sign a waiver stating that the hazards and terms of entry have been explained and agreed to (see Appendix C); and
- The SSO may revoke permission for visitors to be present if they cause any work disruption or hazard to themselves or site workers.

## **5.2 Accident Prevention**

This section describes general physical hazard minimization controls that shall be applicable for all project activities on the site. See Section 5.3 for more stringent controls that may apply to specific activities.

### **5.21 General**

- First Aid and safety equipment will be provided as listed in section 5.21 below.
- Personal protective equipment (PPE) will be worn, as required in section 5.22 below. Facial hair that interferes with the satisfactory fit of respirators must be shaved before respirator use.
- No alcoholic beverages or illegal drugs are allowed on site.
- Accidents shall be reported to the Project Manager and the Boise Regional Manager in a timely fashion.
- Tools and equipment will be used in accordance with normal safe working procedures. This includes equipment inspection before use, and will usually require the use of eye protection.
- Safe lifting and carrying procedures shall be followed. Lift with your legs, not with your back!

### 5.22 *Fire Protection*

Portable fire extinguishers shall be provided in each Millennium vehicle at the job site. These fire extinguishers will be inspected and maintained in accordance with National Fire Protection Agency Regulation 10, *Portable Fire Extinguishers*.

### 5.23 *Excavation and Drilling Hazards*

All excavation activities must be performed in accordance with OSHA safety standards for excavating, 29 CFR 1926 Subpart P. In particular, the following points shall be observed:

- Any underground or overhead utilities in the vicinity shall be located prior to excavation or drilling activities.
- Millennium personnel shall stand well clear of trenches and pits during excavation. Personnel not involved in monitoring or operation of excavating equipment or drilling rig shall remain a safe distance from the equipment.
- Access by the general public shall be impeded by means of traffic cones, construction fencing or barricades, if drilling or excavation occurs in a publicly trafficked area. If it is absolutely necessary that an excavation be left open overnight, the area shall be fenced and a warning sign placed. Open excavations shall not be left unattended without the permission of the project manager and the property owner or tenant.
- Vehicles and equipment shall be kept far enough from excavations to prevent caving hazards, and shall not under any circumstances be placed closer than three feet from the edge of an excavation.
- Entry into any unshored excavation greater than five feet in depth is forbidden, unless the slope is gentler than 1:1.
- Personnel shall stand upwind of excavations, boreholes, spoils, etc., whenever practical. Always approach an excavation into potentially contaminated material from upwind.
- All team members must make a conscious effort to remain aware of their own and others' positions relative to moving equipment. **Know where the emergency shutoff is located.**
- Personnel shall not, under any circumstances, enter or ride in any equipment not designed specifically for carrying human passengers.

### 5.24 *Heat Stress*

Anticipated weather conditions indicate that the risk of heat stress is moderate to high. Various degrees of heat stress are described below.

Extreme heat can cause heat exhaustion or heat stroke, possibly resulting in death. Heat stress can be avoided by taking rest breaks in cool or shaded areas, drinking water or dilute drinks to maintain electrolyte balance, and maintaining physical fitness.

**Heat exhaustion** is characterized by pale, cool and clammy skin; profuse perspiration, fatigue or weakness, headache, dizziness, slurred speech or confusion, and nausea. First aid procedures call for removing the victim to a cool uncontaminated area, removing PPE, cooling the victim with water and fanning, allowing the victim to drink water and rest.

*Heat stroke* is characterized by extremely high body temperature; hot, red and dry skin; reduced perspiration; a rapid strong pulse; and possible confusion or unconsciousness. First aid is the same as for heat exhaustion, but the victim should be transported to a medical facility, since *heat stroke is a medical emergency*.

#### 5.25 *Cold Stress*

Anticipated weather conditions indicate that the risk of cold stress is moderate to low. Various degrees of cold stress are described below.

*Frostnip* is characterized by a sudden blanching of the skin. First aid requires covering the affected area with warmth until symptoms subside.

*Frostbite* is characterized by white or waxy skin that feels firm to the touch. First aid procedures call for covering the affected area with warmth, and moving the victim to a heated shelter when possible. A physician's care should be sought as soon as possible.

*Mild hypothermia* is characterized by shivering, numbness and drowsiness. For first aid, apply heat and move the victim to a heated shelter.

#### 5.26 *Confined Spaces*

The scope of work does not require entry into any confined space, and **entry into any confined space is forbidden**. An excavation with limited egress constitutes a confined space, as defined by 29 CFR 1910.146. A permit-required confined space (permit space) is a confined space which:

1. Contains or has potential to contain a hazardous atmosphere; or
2. Contains a material that has the potential of engulfing an entrant; or
3. Has an internal design that could trap or asphyxiate an entrant by walls that converge inwardly, or by a floor that slopes downward and tapers to a smaller cross-section; or
4. Contains any other recognized serious safety or health hazard.

On the basis of the potential to engulf an entrant, the potential to contain a hazardous atmosphere, and the potential for heavy equipment operation, excavations deeper than four feet or in which water is accumulating will be classified as a permit-required confined space.

If work activities within the excavation prove necessary, they shall be conducted in accordance with the appropriate regulations, and only after consultation with the Project Manager. In particular, the following points shall be observed:

- Samples will be obtained from excavations by using a backhoe and/or a disposable bailer, thereby eliminating the necessity of entering the excavation.
- If a permit space is to be entered by Millennium personnel, a permit form must be completed and posted outside the space. The decommissioning contractor is responsible for completing and posting the permit and for controlling access to the permit space. Approval must also be obtained from the Project Manager or Boise Health and Safety Officer.

- Entry into the confined space occurs when any part of the body breaks the plane of the entrance. For an excavation, this plane is the horizontal plane corresponding to the original ground surface.
- Backhoes or other heavy equipment shall not be operating while the confined space is occupied.
- An attendant familiar with permit space regulations shall be available outside the confined space and on duty at all times during which the confined space is occupied. The attendant shall continuously monitor work activities and behavior inside the confined space and maintain communication with the worker inside. If conditions warrant, the attendant shall instruct the worker to exit the confined space. If required, the attendant shall call for qualified rescue personnel. **Under no circumstances shall the attendant enter the confined space.**
- A flammable gas/oxygen meter shall be used to verify that flammable gases do not exceed 10% of the Lower Explosive Limit (LEL) and that oxygen concentrations are between 19.5% and 23.5% by volume at the entry point. If either of these limits is exceeded, entry is forbidden.
- A photo-ionization detector (PID) or flame ionization detector (FID) shall be used to continually monitor vapor concentrations within the excavation. If concentrations exceed 1 ppm, a half-face air purifying respirator shall be worn. If concentrations exceed 15 ppm, entry shall be forbidden.

#### 5.27 *Biological Hazards*

This activity is being conducted on a National Forest. Staff may encounter ticks, mosquitoes, poisonous snakes or similar hazards.

#### 5.28 *Water Hazards*

Placement of riprap in the stream channel is likely to involve some "manual" placement of materials with shovel or other similar tools, necessitating physical entry into the stream channel. Special care should be taken to maintain footing while in the stream channel. The use of waders and/or footwear with non-slipping soles is recommended. Low water temperatures contribute to the risk for hypothermia (see section 5.25). No workers should enter the stream channel unless they are in the line of sight of at least one other worker.

### 5.3 **Chemical Hazard Minimization**

This section describes general chemical hazard minimization controls that shall be applicable for all project activities on the site. See Section 5.4 for more stringent controls that may apply to specific activities.

5.31 **Required First Aid and Safety Equipment**

fire extinguisher	x	monitoring equipment:	
first-aid kit	x	PID or FID	
eye-wash station	x	Draeger tubes	
traffic cones	x	Dust Monitor (see below)	X
two-way radios	x		

5.32 **Required Personal Protective Equipment, Respiratory Protection and Air Monitoring**

Modified level D personal protective equipment is required, as outlined in the table and text below. Hard hats and safety glasses or goggles and safety shoes are required (steel-toed boots are recommended). Under dusty conditions (see below), eye protection must be equipped with side shields and downwind workers must wear respiratory protection. Half-face or full-face air-purifying respirators equipped with P100 or HEPA cartridges are acceptable. Respirators and cartridges must be available on site at all times.

**Required Personal Protective Equipment (PPE)**

hard hat	x	harness	
safety glasses	x	coveralls, coated tyvek	
safety goggles		hearing protection	
outer gloves, type	x	respirator (see below)	x
liner gloves		traffic vests	
safety shoes	x		
boots w/ steel toe			

Airborne dust will be monitored in an area representative of the breathing zone, using a nephelometric monitor (PDR-1000 DataRAM or equivalent). Respiratory protection is required for all workers in atmospheres containing soil dust concentrations of 50 mg/m<sup>3</sup> or higher, and at all times when ash is being handled. This value is based on mean soil concentrations of the various metals and their PELs, as shown in the table below. **If airborne dust concentrations exceed 500 mg/m<sup>3</sup> at any time, air-purifying respirators will not be adequate. Contact the MSE Safety Officer before proceeding.**

Equipment operators in enclosed cabs may be exempted from the requirement for chemical PPE (Tyvek, chemical resistant gloves and respirators), if checks with the monitor indicate that in-cab concentrations are below 50 mg/m<sup>3</sup>. Watering down the area to reduce airborne dust may be required.

### Exposure Limits (EL) for Airborne Dust

Metal	1991 Tailings Data			1985 Tailings/Soil/Sediment Data	
	PEL (mg/m <sup>3</sup> )	soil conc. (mg/kg)	dust EL (mg/m <sup>3</sup> )	dust EL (mg/m <sup>3</sup> )	dust EL (mg/m <sup>3</sup> )
As	0.01	200	50	—	—
Pb	0.1	19	5263	—	—
Hg	0.05	147	340	527	95

Representative concentrations are arithmetic means  
Data provided by USFS from report to EPA by Roy F. Weston.

#### 5.33 *Decontamination*

An area shall be designated as the decontamination area. All equipment decontamination and removal and bagging of protective clothing shall occur in this area. All other portions of each drilling site should be considered potentially contaminated, and the protective measures provided herein shall be used.

#### 5.34 *Training*

All Millennium personnel assigned to this project shall be qualified for working at mine waste-contaminated sites. They shall meet the following requirements:

- Successful completion of a 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training program as required by 29 CFR 1910.120.
- Successful completion of an 8-hour HAZWOPER refresher training course during the past 12 months, provided the 40-hour training occurred over 12 months ago.
- Current qualification to wear a respirator, in accordance with Millennium Safety and Health Manual.
- Successful completion of Hazard Communication training in accordance with the Millennium Safety and Health Manual.

#### 5.35 *Medical Monitoring*

All Millennium personnel assigned to this project shall be enrolled in Millennium's Medical Surveillance Program. The program requires baseline (upon employment) and periodic (annual) examinations by a licensed physician. Records of these examinations for Boise personnel are maintained at Occupational Medicine Associates, 6533 West Emerald Street, Boise, Idaho (208) 377-1520. Records for Salt Lake City personnel are maintained at Work Care, 2390 South Redwood Road, Salt Lake City, Utah.

### 6.0 GENERAL SAFETY AND HEALTH REQUIREMENTS

- 6.1 All Millennium personnel shall follow the corporate Health and Safety Manual, except where this site-specific Health and Safety plan conflicts, in which case this plan shall take precedence.

- 6.2 A brief safety meeting will be held at the site weekly, or as conditions or job activities change. At a minimum, the following information will be reviewed:
- Work to be done
  - Basic and specific work procedures
  - Review of chemical/physical hazards
- 6.3 No persons other than those pre-approved by the site Health and Safety Officer shall be allowed on the site during exploration activities.
- 6.4 A minimum of two persons (including drilling contractor personnel) are required on-site when activities are taking place.
- 6.5 Smoking, eating, drinking, or chewing gum are not permitted on site, except in designated areas outside the Exclusion Zone and Contaminant Reduction Zone. Wash hands and face before engaging in these activities off-site.
- 6.6 Avoid touching on-site materials, walking through known or suspected "hot zones" or contaminated puddles, kneeling or sitting on the ground, sitting or leaning against potentially contaminated equipment or machinery.
- 6.7 All contractors or subcontractors shall contact the site Health and Safety Officer or project manager if any unsafe condition or practice occurs.

## **7.0 AUTHORITY**

### **7.1 Site Safety Officer**

The Site Safety Officer (SSO) has the authority to enforce all rules and regulations applicable to this project and to ensure Millennium's policies and procedures are followed, including this Health and Safety Plan. The SSO shall consult with the Office Health and Safety Officer (OSHO) and/or Project Manager (PM) before making changes because of changing or unexpected site conditions, except in case of an emergency in which such consultation is impractical. The SSO shall keep written records of all such changes to the Plan.

### **7.2 Project Manager**

The Project Manager (PM) has the responsibility for making sure that all aspects of the Health and Safety Plan are reviewed prior to starting field activities.

### **7.3 Subcontractors**

The Millennium Site Safety Officer (SSO) has the right to stop any work activities of a subcontractor if, in his/her opinion, the subcontractor is operating in an unsafe manner. This authority in no way absolves the subcontractor from responsibility for the safety of its own employees or other persons.

7.4 Signatures

Plan Number h284 Cinnabar.doc July 24, 2003

Plan Author(s): Michael De May

Site Safety Officer: Joy Rickett

Project Manager: James Ruelson

Boise Health & Safety Officer: Michael De May

Millennium Field Personnel:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
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- Attachments: A: Route to Hospital  
B: Safety Briefing Attendance Log  
C: Visitor Safety Release

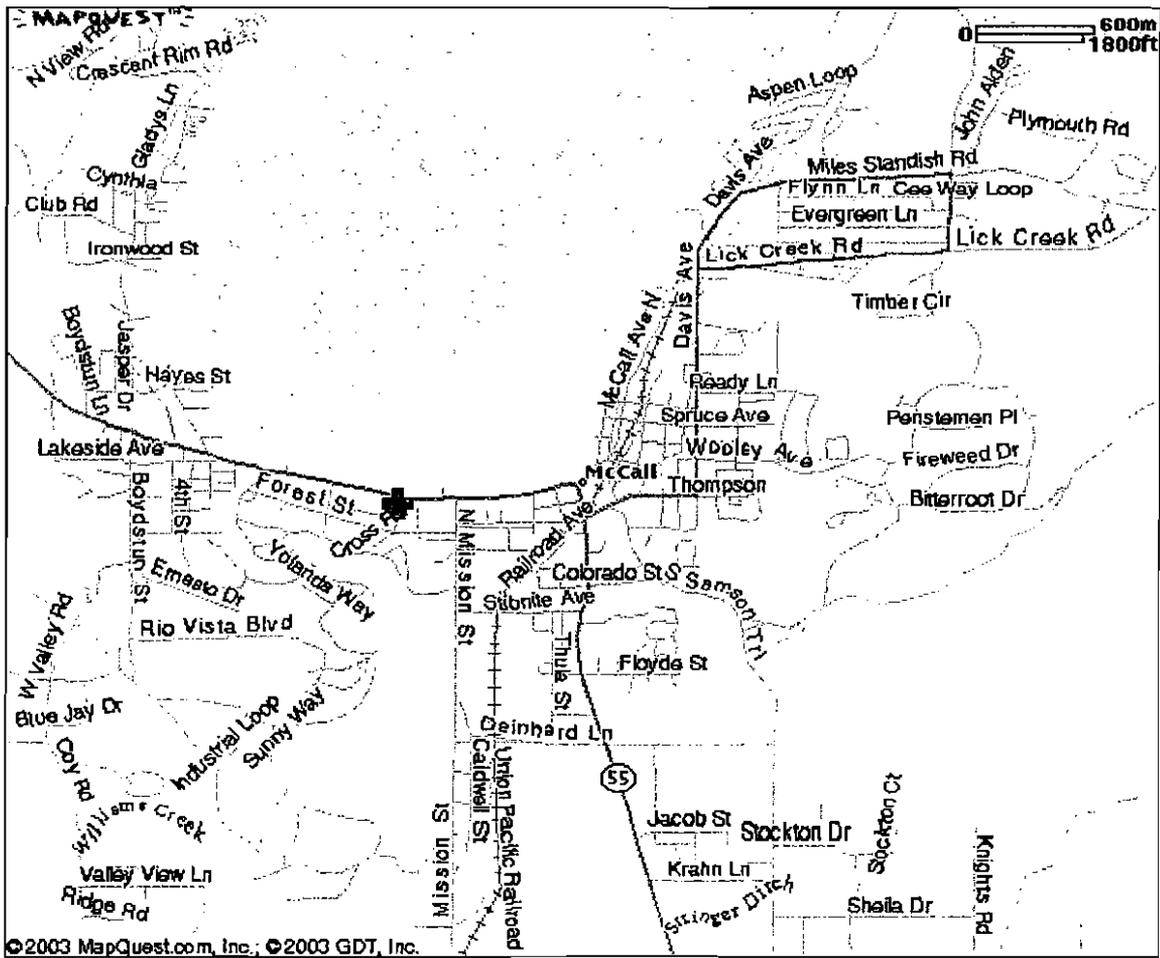
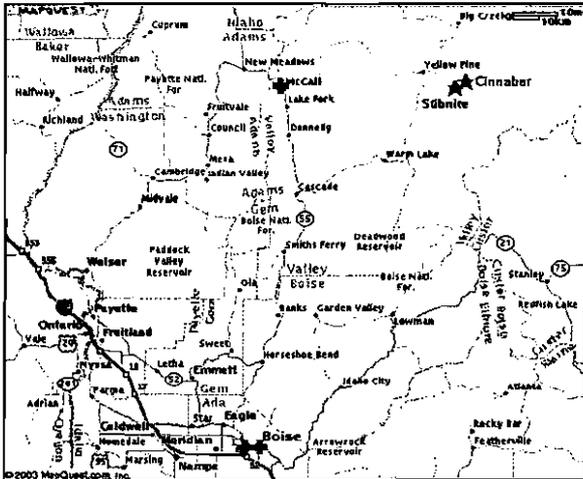
h284 cinnabar.doc

## ATTACHMENT A—Route to Hospital

**McCall Memorial Distrist Hospital**  
 100 State Street  
 McCall, Idaho 83612  
 (208) 634-2221

### Directions:

Go north along Cinnabar Creek to Sugar Creek, then west to the East Fork of the South Fork of the Salmon River. Turn right and proceed to Yellow Pine. Take East Fork Road west from Yellow Pine to Lick Creek, then turn left (west) on Lick Creek Road and proceed to McCall. Turn left onto Davis Avenue and proceed about ½ mile to Thompson. Turn right on Thomson and proceed west about ¼ mile to Park Street, then turn slightly left onto Park for another ¼ mile to Highway 55. Turn right on Highway 55 and proceed about ½ mile to the hospital, opposite to Payette Lake at the intersection with State Street.



**ATTACHMENT B—Safety Briefing Attendance Log**

<b>Date &amp; Time</b>		
<b>Briefing Conducted By:</b> _____		
<b>Topics Covered:</b> _____		
_____		
_____		
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_____		
<b>Attendees:</b>		
<b>Printed Name</b>	<b>Organization</b>	<b>Signature</b>
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**APPENDIX C**  
**Photo Documentation**

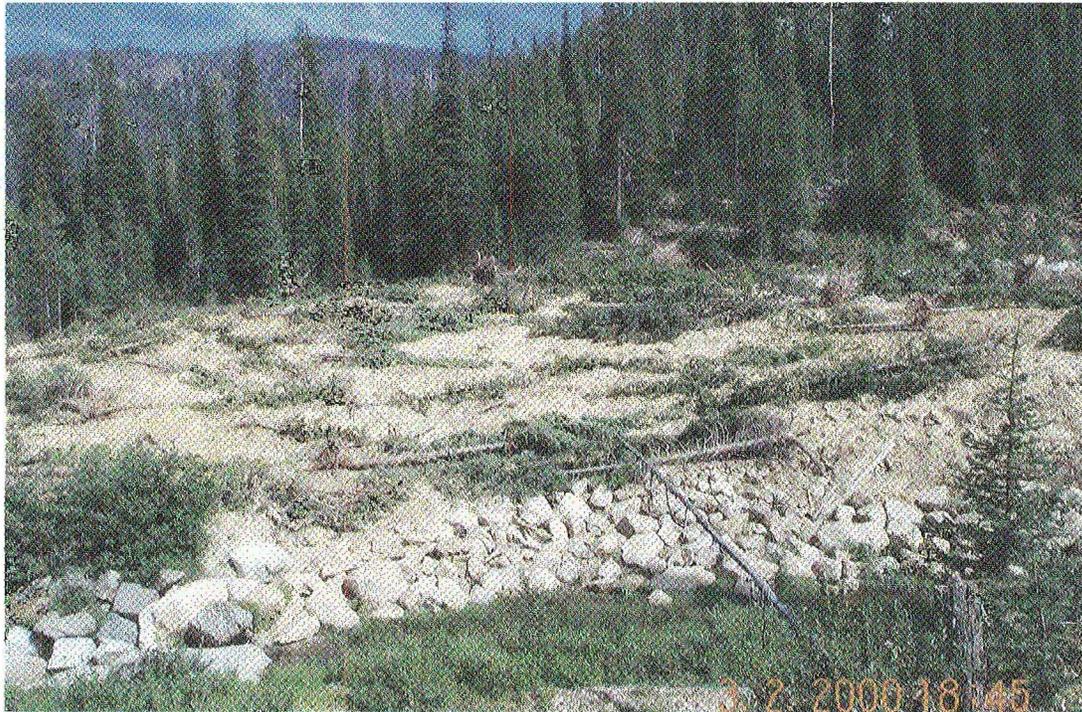


Bridgework (shown above and below)





Completed project- Creek in the middle



Completed Project



Topsoil cover



Placement of wood debris



Placing of Geo-fabric over the tailings



Placing of topsoil cover



Tailings removal along Cinnabar Creek



Impoundment re-grading



Site before the Removal



Site after completion