ACTION MEMORANDUM

for the

REMOVAL ACTION FOR THE
MIKE HORSE DAM AND IMPOUNDED TAILINGS,
LOWER MIKE HORSE CREEK, BEARTRAP CREEK AND THE UPPER
BLACKFOOT RIVER FLOODPLAIN REMOVAL AREAS,
UPPER BLACKFOOT MINING COMPLEX SITE

Helena National Forest - Lincoln Ranger District
Lewis and Clark County, Montana

JULY 2007

ACTION MEMORANDUM

Date: July 23, 2007

Subject: Request for Removal Action
Mike Horse Dam and Impounded Tailings, Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River Floodplain Removal Areas, Upper Blackfoot Mining Complex site, Helena National Forest

From: Bethany A. Ihle, On-Scene Coordinator

To: Thomas L. Tidwell, Regional Forester

Through: Kevin Riordan, Forest Supervisor, Helena National Forest
Bob Kirkpatrick, CERCLA Coordinator, Northern Region

TABLE OF CONTENTS

I. PURPOSE

The purpose of this Action Memorandum is to approve the proposed non-time-critical Removal Action described herein for responding to the environmental impacts of historical milling and mining activities, at the Mike Horse Dam and Impounded Tailings, Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River Floodplain removal areas within the Upper Blackfoot Mining Complex on lands within the National Forest System (NFS). Mine wastes from these activities are the source of hazardous substances which degrade water quality in Lower Mike Horse Creek, Beartrap Creek, and the Upper Blackfoot River. Additionally, due to existing conditions, the Mike Horse Tailings Impoundment poses a threat to the future environmental integrity of the drainage. The discussion provided in this memorandum will substantiate the need for a Removal Action, identify the proposed action, and explain the rationale for the proposed action.

This Removal Action addresses the elimination and mitigation of uncontrolled releases of metals from mining-related sources at the sites. By addressing risks from mining and milling wastes that are related to metal enrichment and acidity, a reduction in contaminant concentrations is expected in surface water and groundwater. This Removal Action does not directly address existing groundwater contamination that may be present at the sites. Only mining wastes containing hazardous substances, including those contained within the Mike Horse dam and tailings impoundment which are physically located within the NFS are included in the scope of this removal action. The Montana Department of Environmental Quality (MDEQ), under a Remedial Investigation/Feasibility Study (RI/FS) to be initiated in 2007, will investigate contamination on lands outside the NFS.

This Removal Action will be executed by following the non-time-critical removal action process as defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA; 42 USC 9604) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP; 40 CFR Part 300). Response actions -- as explained in the U.S. Environmental Protection Agency's (EPA) *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA* – are implemented to respond to "the cleanup or removal of released hazardous substances from the environment … as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment…" (EPA, 1993).

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

The project site is located in Lewis and Clark County, Montana, about 16 miles east of the community of Lincoln, Montana. The project area is located in mountainous terrain at an elevation of about 5,700 feet above sea level at the headwaters of the Upper Blackfoot River, including Beartrap Creek, Lower Mike Horse Creek, and the Upper Blackfoot River (Figure 1-1 of the EE/CA).

1. Removal Site Evaluation

Site investigation activities have been ongoing at this site since 1991. Most recently, site investigation and characterization activities have been conducted annually since 2000 as part of an Implementation Plan developed by ASARCO to respond to State of Montana Temporary Water Quality Standards, and the Administrative Order on Consent between the Forest Service and ASARCO LLC (formerly ASARCO, Incorporated, and herein referred to as 'ASARCO') (November, 2002). These activities have included routine seasonal and supplemental monitoring of surface and groundwater sites, soil and waste sampling, a macro invertebrate investigation, a seepage evaluation of the Mike Horse dam in 2003-2004, test pit

sampling and evaluation of floodplain wastes, technical evaluations of the condition of the Mike Horse dam, installation of piezometers and groundwater monitoring wells, and investigations regarding repository site locations. The results of these investigations are presented in the Final Engineering Evaluation/Cost Analysis (EE/CA) for the Mike Horse Dam and Impounded Tailings, Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River Floodplain Removal Areas, Upper Blackfoot Mining Complex, Lewis and Clark County, Montana (Hydrometrics, July 2007).

The MDEQ has also conducted, through ASARCO and Atlantic Richfield (formerly ARCO and The Anaconda Company), site investigations and removal activities on private land portions of the greater UBMC site.

2. Physical Location

The Mike Horse Dam and Impounded Tailings, Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River Floodplain Removal Areas are located on lands within the National Forest System administered by the Helena National Forest. The community of Lincoln is located about 16 miles west of this site and the city of Helena is about 52 miles southeast of the site. The nearest neighbors are dispersed private residences between 0.10 mile and 7 miles of the site. The site is located in Township 15 North, Range 6 West, Sections 21, 22, 27 and 28 (see Figure 1-1 of the EE/CA).

3. Site Characteristics

History

The removal area is part of the Heddleston Mining District in the vicinity of the Upper Blackfoot River and its headwaters tributaries. It was first prospected and mined in the late 1800's and miners took gold and high grade lead-silver ores from the area mines during the early years. The preponderance of the mining districts' products were base metals such as lead and zinc. The Mike Horse Mine, discovered in 1898, was expanded into a larger operation after it was taken over by the Sterling Mining and Milling Company in 1919. Sterling developed a major lead deposit and built a concentrating mill to process the Mike Horse ores and ores from other area mines. In 1938, a new company, the Mike Horse Mining and Milling Company (incorporated in late 1940) leased the mine and constructed a 150 ton-per-day flotation mill. In 1941, the Mike Horse dam was constructed across Beartrap Creek to contain and impound the tailings generated from the flotation mill. Beartrap Creek was diverted to keep water out of the valley bottom where the tailings were being deposited. In the mid-1940's, ASARCO became the corporate successor to the Mike Horse Mining and Milling Company. Sufficient ore was produced to keep the mine and mill operating steadily until the early 1950's. After that it was operated sporadically until 1964, when a large scale exploration drilling project was begun by The Anaconda Company. In 1981, The Anaconda Company terminated its lease of the property and returned the site to ASARCO.

During the operating periods, waste rock dumps (lower grade and uneconomic wastes) were generated and accumulated in piles adjacent to Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River. Mill tailings, the fine grained product that results after processing of the ore through the flotation mill, were slurried from the mill located in Upper Mike Horse Creek into Beartrap Creek which resulted in the development of a tailings pile in the valley bottom of Beartrap Creek (Figure 2-4 of UBMC EE/CA).

In 1964, the Northern Rocky Mountains were the locus of heavy rains and flooding. The Mike Horse dam was inspected later that year by Forest Service engineers and they found the structure to be deteriorating. Headcutting had occurred in the face of the dam beneath the spillway.

In 1975, heavy rains resulted in a slope failure which plugged the Beartrap Creek diversion ditch and damaged the diversion structure. High creek waters flowed onto the tailings impoundment and eroded a significant amount of the tailings into Beartrap Creek and the Upper Blackfoot River. Deposits of these washed out tailing have also been characterized within the removal area. The Anaconda Company built a more substantial dam in 1975 to repair the breach in the tailings impoundment. Since 1975, the Anaconda Company or ASARCO have annually monitored the piezometers in the dam, inspected the overflow pipe, and conducted maintenance on the facility. The rebuilt facility was authorized under a Forest Service Special Use Permit to the Anaconda Company and then ASARCO until 2003.

Dam condition

Recent evaluations of the condition of the Mike Horse dam have been conducted since 2001 and include a stability evaluation of the dam based on its design and actual construction (Hydrometrics, 2001), seepage sampling and weir data measuring water through flow and quality on the downstream face of the dam, and a stability evaluation based on seismic piezocone, or cone penetrometer testing (CPT) and piezometer information (USFS, 2006). Results of these investigations have identified that there has been an increase in seepage through the dam since it was repaired in 1975 and that voids exist within the structure. The overflow pipe has also been found to have the capacity to pass less than one half of the probable maximum flood (Hydrometrics, 2001). The Forest Service's dam integrity analysis (2006) identified that the Mike Horse dam needs to be removed from service. The dam and impoundment area also includes eight groundwater monitoring wells and eight piezometers.

Wastes and Removal Sub Areas

Based on the distribution of the wastes and features at the site, and for ease of description and evaluation, the removal area has been divided into four sub areas: 1) Mike Horse Dam and Impounded Tailings sub area, 2) Lower Mike Horse Creek sub area, 3) Beartrap Creek sub area and 4) Upper Blackfoot River sub area. Detailed descriptions of the wastes and metals concentration levels in surface and groundwater and in the wastes themselves in the four subareas are found in the main body of the EE/CA and in Appendix B (Hydrometrics, 2007).

Mike Horse Dam and Impounded Tailings Sub area

The Mike Horse dam and impounded tailings area in Beartrap Creek includes approximately 375,000 cubic yards of tailings and dam materials covering approximately 14 acres. The impounded area is generally covered, more or less, by water depending on the season. Sample data from the tailings indicates that they are enriched with metals and that they are potentially acid generating. Surface water quality within the impoundment is generally good. Some of the seep water emanating from the downstream toe of the impoundment exceeds water quality standards, while other seeps do not. The impaired seeps are believed to be derived from seepage through the dam while the seeps with good water quality are likely from alluvial discharge. Groundwater sampling into deeper alluvium near the toe of the dam shows good water quality.

Lower Mike Horse Creek Sub area

Mine waste piles deposited along Lower Mike Horse Creek cover less than one acre and include between 10,000 and 15,000 cubic yards of waste material. The wastes lie directly adjacent to the stream along steep-sided banks and on a bench on the south side of the stream. Metals concentrations in these wastes are moderate to high and appear to get more concentrated with depth. The wastes are leaching

metals into soils beneath the wastes. Oxidation and the generation of metal salts are apparent where the wastes are exposed at the surface and they are potentially acid generating. Surface water quality in Lower Mike Horse Creek is generally poor with metals concentrations peaking during spring runoff as metal salts are flushed and decreasing during the summer. Recurrent water quality standards exceedences for several metals, including iron, zinc, cadmium, copper, lead and manganese have been documented. Groundwater in this area is impaired and may be contributing to poor surface water quality in Lower Mike Horse Creek. Stream sediment sampling shows elevated metals concentrations in the substrate of Lower Mike Horse Creek.

Beartrap Creek Sub area

Beartrap Creek below the dam is a confined valley bottom area about 3,000 feet long and from 60 to 300 feet wide. Mill tailings deposited on the Beartrap Creek valley bottom as a result of the 1975 event are found in areas of concentration, as well as areas where the tailings have been intermixed with valley bottom alluvium and soils. There are an estimated 3,000 to 4,000 cubic yards of concentrated tailings and an estimated 60,000 cubic yards of dispersed/intermixed tailings mixed with native alluvial materials, based on backhoe test pit excavations and surface mapping. A small area of wastes, referred to as the Flossie/Louise area, occurs, in part, on private land within this reach.

The concentrated tailings generally have higher metals concentrations and are potentially acid generating. Metals concentrations in the intermixed areas are in some cases higher than the concentrated tailings, however, the concentrated tailings areas generate higher metals in the deionized water extract testing. Beartrap Creek surface water shows water quality exceedences for cadmium, copper, lead, manganese and zinc with higher concentrations occurring during spring runoff events. Alluvial groundwater monitoring indicates elevated metals within the alluvial areas of Beartrap Creek.

Upper Blackfoot River Sub area

The Upper Blackfoot River portion of the site, which starts at the confluence of Beartrap and Anaconda Creeks, includes, in general, two waste deposit types based on hand dug and backhoe test pits and surface mapping. It includes a relatively large area of concentrated, predominantly fine grained tailings near the confluence of Shave Gulch and the Blackfoot River, and smaller, more dispersed deposits of both fine grained and coarse grained tailings scattered along the floodplain for about one and a half miles. The estimated waste volume in these deposits is in excess of 40,000 cubic yards. The concentrated tailings area near Shave Gulch is potentially acid generating and contains moderate to high levels of metals. These tailings are leaching of metals into subsurface soils. The dispersed tailings show variable concentrations of metals from very high to moderate. These are also potentially acid generating. Upper Blackfoot River surface water quality is impaired, particularly during spring runoff periods and shows acidic pH levels. A loadings analysis conducted in 2001 indicated that the Shave Gulch concentrated tailings area are a source of metals contaminants to the Blackfoot River, and also indicated that there may be a metals bearing groundwater source in the same vicinity. Stream sediment samples show that metals concentrations are higher in the fine sediments, and in general, show reduced metals further downstream.

4. Release or Threatened Release into the Environment of a Hazardous Substance

Hazardous Substances

Hazardous substances found at the four sub-areas, as defined in section 101(14) of CERCLA, include aluminum, arsenic, cadmium, copper, iron, manganese, lead, and zinc. Mining wastes deposited on land within the NFS contains elevated levels of metals and other contaminants that are a principal source of acidic, metal-laden leachate and metal particulates that can be mobile in surface water and groundwater, and cause releases of hazardous substances into the environment. The largely unvegetated waste piles and dispersed and concentrated tailings deposits are a source of metals enriched sediment that can erode into Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River. Concentrations of hazardous substances in mine wastes, soils, surface and groundwater are documented in the EE/CA.

The Forest Service's dam integrity analysis indicates that the Mike Horse dam needs to be removed from service. There is a substantial potential for releases of a significant quantity of metals-enriched mill tailings impounded by the dam while the dam remains in its current condition.

Sampling and Analytical Data

Sampling methods used to collect data during site characterization activities are described in the EE/CA prepared by Hydrometrics, Inc. for the USDA Forest Service and ASARCO, LLC (Hydrometrics, Inc. 2007). Surface water, groundwater, soil, and mine waste rock and tailings samples have been collected and results reported annually (with the exception of 2002) by Hydrometrics and other contractors to ASARCO, LLC since 2000. Laboratory analytical results from waste rock and tailings samples collected at the sites indicates that they contain elevated levels of aluminum, arsenic, cadmium, copper, iron, lead, and zinc when compared to background concentrations. Long-term monitoring of surface water in Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River shows that water quality standards for aquatic life are regularly exceeded for cadmium, copper, lead and zinc, particularly during early spring flow conditions when accumulated metal salts are washed into the streams, following summer thunderstorms, but also during other times of the year.

Mechanism for Past, Present, or Future Release

The principal mechanisms of transport of contaminants associated with the wastes in Lower Mike Horse Creek, Beartrap Creek and Upper Blackfoot River into the Upper Blackfoot River and its headwaters tributaries are the following:

- Physical erosion, transport, and deposition of materials by runoff and surface water.
- Dissolution of contaminants into surface runoff.
- Infiltration of runoff containing dissolved metals into soils and groundwater.
- Leaching of metals from wastes into subsurface soils and groundwater.

Physical erosion of materials primarily occurs at Lower Mike Horse Creek, Beartrap below the dam, and Upper Blackfoot River floodplain where mine waste is exposed at the surface. Surface runoff carries metal-laden sediments and dissolved metals directly to these tributaries where it enters the water column or is entrained in the water as dissolved metals and in the bedload of the creek. Unconfined wastes and contaminated surface and groundwater from Upper Mike Horse Creek are transported downstream to Lower Mike Horse Creek and also impact the drainages. The main sources of metals

loading occur during early spring runoff as oxidized materials are flushed out during snowmelt. Later in the spring, loading from surface waste materials may decrease and seepage-related loadings from the Mike Horse dam and/or groundwater may increase. Wastes located on the upper floodplain areas of Beartrap Creek and the Upper Blackfoot River are not as prone to erosion or other physical transport, except during periodic intense thunderstorms or rapid snowmelt, which happened in the spring of 2005.

Dissolved metals contaminants are being released to surface water and groundwater via infiltrating precipitation. Groundwater can transport dissolved contaminants to surface water at seeps, springs, or directly to the stream channel. Documented groundwater impacts (metals concentrations exceeding aquatic life standards) occur upgradient of the site, in lower Mike Horse creek area (cadmium, copper and zinc), in the Beartrap Creek drainage (cadmium, copper and zinc) and at the lower end of the removal area near the concentrated tailings along the Blackfoot River (arsenic, cadmium, copper, lead and zinc).

The Mike Horse dam failure in 1975 resulted in an estimated release of 100,000 cubic yards of metal laden tailings into Beartrap Creek and the Blackfoot River. Evaluations of the stability of the dam have identified that there is potential for overtopping of the dam and the potential for internal dam failure due to piping (USFS, 2006).

Events or Features that could Spread or Accelerate Releases

Large runoff events, particularly during the spring when the snow pack melts in the area, present conditions for increasing erosion and leaching of metals into the surface water system. Severe summer thunderstorms have also been shown to directly influence the rate of erosion and movement of wastes off-site into surface waters. A seismic event or greater than 100 year storm event could result in serious damage to the Mike Horse dam structure, dam failure or overtopping.

Properties that Influence the Rate of Releases

Metal salts are known to form on the dam face, waste rock and tailings at the site and these salts are mobile in snowmelt or runoff, directly impacting water quality in Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River.

5. National Priority List (NPL) Status

CERCLA, sometimes referred to as the "Superfund" statute, was enacted in 1980 to address sites where releases of hazardous substances pose a threat to public health or the environment. Under CERCLA, the nation's most contaminated sites are placed on the National Priorities List (NPL) by the EPA. None of the sites discussed in this Action Memorandum are currently listed or have been proposed for listing on the NPL by the EPA or the Montana Department of Environmental Quality (Montana DEQ). The greater Upper Blackfoot Mining Complex site (UBMC), which includes the Mike Horse mine, Anaconda mine and other sites on private land, as well as the dam and waste areas on lands within the NFS which are the subject of this Action Memorandum, is included on the State of Montana's list of priority cleanup sites under the Comprehensive Environmental Cleanup and Responsibility Act.

6. Maps, Pictures, and other Graphic Representations

A location map and photographs of the dam and impounded tailings areas and repository sites, and aerial photo bases for the removal areas are displayed in the Final EE/CA (Hydrometrics, 2007).

B. Other Actions to Date

1. Previous Actions

In 1980, five years following the 1975 reconstruction of the Mike Horse dam, The Anaconda Company conducted additional work on the Mike Horse dam facility including installation of an additional two feet of material to raise the height of the dam, installation of additional piezometers, and plugging of a basal decant line that is located at the base of the tailings pile (USFS, 2006).

ASARCO and Atlantic Richfield initiated reclamation on private lands at the UBMC site in 1993 and continued annual reclamation activities on a voluntary basis through 1998 under agreement with the State of Montana. This included removal of wastes from several mines and placing them in onsite repositories, construction of a water treatment plant and wetlands system, and monitoring activities. In 1999 ASARCO petitioned the Montana Board of Environmental Review for adoption of temporary water quality standards in portions of streams at the site. ASARCO developed a conceptual plan for mitigation of all water quality limiting factors (Hydrometrics, 2000). These activities were almost entirely confined to private lands owned or controlled by ASARCO. In 2002, ASARCO entered into an Administrative Order on Consent with the Forest Service for performance of an EE/CA for certain lands within the NFS, including the Mike Horse dam and impounded tailings, Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River areas. The EE/CA has been prepared to develop and screen removal action alternatives for applicable portions of the site. The greater Upper Blackfoot Mining Complex site (UBMC) has also been included on the Montana DEQ list of priority sites under their Comprehensive Environmental Cleanup and Responsibility Act.

2. Current Actions

The USDA Forest Service, in conjunction with ASARCO, released a Draft EE/CA for the site in July, 2006. A copy of the Draft EE/CA was mailed to interested persons, adjacent landowners and State and Federal regulatory agencies. A copy of the Draft EE/CA and Administrative Record File was also placed in information repositories at the Lincoln Ranger Station, Helena Forest Supervisors Office and Lewis and Clark County Library. A news article appeared in the Helena Independent Record and a public notice and news article also appeared in the Missoulian identifying the availability of the EE/CA. A 30 day comment period was established and the Regional Forester extended the comment period for an additional 30 days at the request of the public. Public information meetings were held in Helena, Montana on July 27, 2006 and in Lincoln, Montana on August 8, 2006. A public field trip was also held on August 8, 2006. Written comments on the public draft were received from July 17, 2006 through September 18, 2006. A responsiveness summary to comments received is included in Appendix J in the Final EE/CA.

C. State and Local Authorities' Role

1. State and Local Actions to Date

The USDA Forest Service has been coordinating throughout the project with the State of Montana, the United States Environmental Protection Agency, the Natural Resources Damage Trustees for the greater Clark Fork River basin, and the local county commissioners. The agencies have reviewed the various project documents and have provided comments to the USDA Forest Service.

2. Potential for Continued State/Local Response

The State of Montana is initiating a Remedial Investigation and Feasibility Study in 2007 to evaluate the remaining contamination issues at the UBMC.

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

The EE/CA establishes there has been a release of hazardous substances and there is a substantial threat of release into the environment of pollutants and contaminants which may present an imminent and substantial threat to public health or welfare, or to the environment, 42 U.S.C. § 9604(a)(1), as set forth by the criteria identified in the National Contingency Plan (NCP) at 40 CFR 300.415(b)(2). Briefly, this threat is the release and risk of continued releases of heavy metals to surrounding lands, surface water, and groundwater.

Due to the concentrations of metals in mine waste sources (Hydrometrics, 2007), conditions at the sources identified in Sections 3 and 4 above meet the criteria for initiating a Response Action under 42 U.S.C. § 9604(b) and 40 CFR 300.415(b)(2) of the NCP. The following factors from 40 CFR 300.415(b)(2) of the NCP form the basis for USDA Forest Service's determination of the threat present and the appropriate action to be taken:

(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

(ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems;

(iii) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate;

(iv) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

(v) The unavailability of other appropriate federal or state response mechanisms to respond to the release.

A. Threats to Public Health or Welfare

Heavy metals associated with wastes within the EE/CA area can affect human health through inhalation of dust or ingestion of solids or water. Hazard quotients (greater than 1.0) for multiple metals, particularly arsenic, manganese and lead pose unacceptable risks to humans.

(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants

The lands within the NFS at this site are utilized for a variety of recreational purposes by people. Due to the size and unconfined nature of this site, the broad distribution of wastes along a popular river corridor, and the proximity of the site to a primary highway, there is potential for contact with mine wastes and contaminated surface water by these users, including hunters, fishermen, prospectors,

campers and other general dispersed users. There is a year round resident within ¼ mile of this site. The findings of the risk analysis indicate that unacceptable risk to recreational users at this site exists as a result of potential exposure to arsenic, manganese and/or lead. Hazard quotients for arsenic, for example, range from 2.3 to 10.24 within the EE/CA area (Tables 4-2 through 4-6, Appendix B of EE/CA).

(ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems;

Surface water monitoring data has identified water quality exceedences for both human health and aquatic standards over many years, in numerous locations, during different periods of the year. Primary metal contaminants include cadmium, lead, zinc, copper, aluminum, iron and manganese (Tables 3-3, 3-6, 3-10 and 3-14, EE/CA, Appendix B).

(iii) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate;

Waste sampling at the surface has identified that the tailings and mine waste have already been mobilized within the site through erosion off steep slopes into perennial water courses including Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River. Tailings from the Mike Horse impoundment area are documented to have been released in 1975 and eroded and deposited downstream in numerous areas. Metals levels in these wastes consistently show elevated concentrations for lead, zinc, cadmium, aluminum, manganese, copper and iron. Average metal concentrations in the impounded tailings, for example, include lead 3,653 mg/K, zinc 4,168 mg/Kg, aluminum 7,246 mg/kg, manganese 7,242 mg/Kg (Table 3-1, EE/CA Appendix B). Average metal concentrations for wastes adjacent to Lower Mike Horse Creek for these metals are similar, if not higher, and include lead 6,779 mg/Kg, zinc 6,809 mg/Kg, aluminum 4,938 mg/Kg and manganese 3,890 mg/Kg (Table 3-5, EE/CA Appendix B).

Mobilization of metals from the waste piles into the stream system is apparent and samples from stream sediments show that stream sediments are impacted by mine wastes and to some extent have higher metals concentrations. Beartrap Creek stream sediments show metals concentrations, as compared to the surface wastes identified above, include metals concentrations for lead ranging from 8,618 to 9,812 mg/Kg, zinc 8,668 to 19,662 mg/Kg, and manganese 6,945 mg/Kg.

(iv) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

A release of an estimated 100,000 cubic yards of tailings from the Mike Horse impoundment area has already occurred at the site in 1975 as described above and in the EE/CA, Section 2.5. The EE/CA also documents water quality exceedences and elevated metals conditions in surface waters occurring during snowmelt/runoff conditions and during storm events (EE/CA, Sections 3.3.2, 3.3.3, 3.3.5, and 3.4.2).

(v) The unavailability of other appropriate federal or state response mechanisms to respond to the release.

The Forest Service is using its authority under CERCLA on lands within the NFS to initiate this removal and to pursue the performance of work and reimbursement of costs from potentially responsible parties.

B. Threats to the Environment

The EE/CA area presents risk to ecological receptors due to potential exposure to surface water, stream sediments and surface soils at the site. A primary threat to the environment is the potential for failure of the Mike Horse dam. Evaluations of the stability of the dam have identified that there is potential for overtopping during high flow events and the potential for internal dam failure due to piping. Another dam failure would result in another release of metal-enriched tailings into downstream areas including surface waters and floodplain areas. Potential for damage to the water treatment wetland cells and damage to private property exists.

(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

Aquatic surface water quality standards are exceeded either regularly or periodically in most of the stream areas at the site (Tables 3-6, 3-10, 3-14, EE/CA Appendix B). There are also widespread exceedences of ecological Soil Screening Levels, particularly cadmium, copper, lead and zinc, that pose risk to aquatic and terrestrial organisms. The findings of the risk analysis indicate that hazard quotients for plants, invertebrates, birds and mammals exceed or greatly exceed 1.0 for arsenic, copper, lead and zinc in the tailings impoundment and along the Blackfoot River, lower Mike Horse Creek and Beartrap Creek drainage bottoms (Tables 4-9, 4-10, 4-11, 4-12, and 4-13 Final EE/CA Appendix B).

(ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems;

Surface water monitoring data has identified water quality standards for aquatic life over many years, in numerous locations, during different periods of the year. Primary metal contaminants include iron, cadmium, lead, zinc, copper, aluminum and manganese (Tables 3-3, 3-6, 3-10 and 3-14, EE/CA, Appendix B). The Blackfoot River is a native bull trout and westslope cutthroat trout fishery. Bull trout are a listed threatened species protected under the Endangered Species Act (ESA) and westslope cutthroat trout are listed by the Forest Service as a Montana sensitive species.

(iii) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate;

Waste sampling at the surface has identified that the tailings and mine waste have already been mobilized within the site through erosion off steep slopes into perennial water courses including Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River. Tailings from the Mike Horse impoundment area are documented to have been released in 1975 and eroded and deposited downstream in numerous areas. Metals levels in these wastes consistently show elevated concentrations for lead, zinc, cadmium, aluminum, manganese, copper and iron. Average metal concentrations in the impounded tailings, for example, include lead 3,653 mg/K, zinc 4,168 mg/Kg, aluminum 7,246 mg/kg, manganese 7,242 mg/Kg (Table 3-1, EE/CA Appendix B). Average metal concentrations for wastes adjacent to Lower Mike Horse Creek for these metals are similar, if not higher, and include lead 6,779 mg/Kg, zinc 6,809 mg/Kg, aluminum 4,938 mg/Kg and manganese 3,890 mg/Kg (Table 3-5, EE/CA Appendix B).

Mobilization of metals from the waste piles into the stream system is apparent and samples from stream sediments show that they are impacted by mine wastes and to some extent have higher metals concentrations. Beartrap Creek stream sediments show metals concentrations, as compared to the surface wastes identified above, include metals concentrations for lead ranging from 8,618 to 9,812

mg/Kg, zinc 8,668 to 19,662 mg/Kg, and manganese 6,945 mg/Kg. These levels have resulted in hazard quotients exceeding 1.0 as described above.

Macroinvertebrate sampling was conducted in 2004 at two sites on the Blackfoot River at the upper and lower ends of the removal area. This sampling was conducted to develop a baseline condition from which to assess the effects of remediation efforts. The sampling identifies reduced variety and numbers of expected aquatic macroinvertebrates and that these sites are partially supportive of aquatic life uses (Marshall, 2004).

(iv) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

A release of an estimated 100,000 cubic yards of tailings from the Mike Horse impoundment area has already occurred at the site in 1975 as a result of a spring storm/runoff event, as described above and in the EE/CA, Section 2.5. The EE/CA also documents water quality exceedences and elevated metals conditions in surface waters occurring during snowmelt/runoff conditions and during storm events (EE/CA, Sections 3.3.2, 3.3.3, 3.3.5, and 3.4.2).

The unstable condition and metals contents of the surface wastes has resulted in the lack of development of a protective soil cover and vegetation on much of the wastes at this site making them highly accessible to birds and mammals at the site. Forest Service employees have observed regular evidence of ungulate use within the area, particularly deer, elk and moose.

(v) The unavailability of other appropriate federal or state response mechanisms to respond to the release.

The Forest Service is using its authority under CERCLA on lands within the NFS to initiate this removal and to pursue the performance of work and reimbursement of costs from potentially responsible parties.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the Removal Action selected in this Action Memorandum, may present an imminent and substantial endangerment to human health and the environment at the Mike Horse Dam and Impounded Tailings, Lower Mike Horse Creek, Beartrap Creek and Upper Blackfoot River Floodplain removal areas.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed Action Description

The preferred alternative for this site is Site Wide Alternative 4 as described in the Final EE/CA in Section 6.3.4. Site Wide Alternative 4 includes removal of wastes and placement into a within drainage repository. Specifically, Site Wide Alternative 4 includes: 1) Option 4 for the Mike Horse Dam and Impounded tailings Sub Area, Option 3 for Lower Mike Horse Creek, Option 4 for Beartrap Creek and Option 4 for the Blackfoot River. The preferred repository site is the Paymaster Repository. Should the

Paymaster Repository prove unsuitable, the First Gulch Repository would be the alternate repository site. The preferred alternative is described generally below, by sub area and by option.

Mike Horse Dam and Impounded Tailings Sub-area

The preferred alternative for the Mike Horse Dam and Impounded Tailings sub-area is Option 4 – Total Removal of tailings and the dam structure from the Beartrap Creek valley bottom and placement of the wastes into a within drainage repository. This alternative is designed to maximize use of a nearby repository site within the Upper Blackfoot area (in-drainage repository) and thus reduce costs and ancillary impacts due to out of drainage waste hauling. The preferred repository site is a repository located at the Paymaster Area because of uncertainties related to groundwater conditions at the West Impoundment location and uncertainties about the capacity of a repository at that location. Should more capacity become necessary, a site outside of the Upper Blackfoot drainage (First Gulch), or the Horsefly Creek repository area on private lands outside of the Upper Blackfoot drainage will be considered. Total amount of waste to be removed from this sub area is approximately 375,000 cubic yards.

Lower Mike Horse Creek Sub-area

The preferred option for removal in the Lower Mike Horse Creek sub-area is Option 3 – complete removal of mine waste and placement in the Paymaster Repository. The amount of waste to be removed from this sub area is approximately 10,000-15,000 cubic yards.

Beartrap Creek Sub-area

The preferred option for removal in the Beartrap Creek sub-area is Option 4 - removal of all concentrated tailings, removal of intermixed tailings within the active stream channel migration corridor, and placement of removed materials in the Paymaster Repository. The amount of waste to be removed from this sub area is estimated at 32,500 cubic yards.

Upper Blackfoot River Sub-area

The preferred option for removal in the Upper Blackfoot River sub-area is Option 4 - Complete Mine Waste Removal and Placement in the Paymaster Repository. The amount of waste to be removed from this sub-area is estimated at 45,000 cubic yards.

A description of general work items for Site Wide Alternative 4 is itemized below.

- *Diversion of Beartrap Creek* – Beartrap Creek will be diverted in 2007 as part of pre-implementation activities to begin drying out the tailings within the Mike Horse impoundment.

- *Dewatering of impounded tailings* – dewatering would follow Beartrap Creek diversion and includes installation of dewatering trenches, pumping, and potentially chemical treatment of tailings water.
- *Preparation of repository site(s)* - includes detailed engineering evaluation of sites, including additional test pit excavation, materials testing and installation of monitoring wells. Following the design of the repository, the site would be cleared, excavated and prepared for waste placement, including engineering controls. Backfill material would be stockpiled for use at removal sites. Appropriate cap material installation would occur following waste placement and compaction, as well as run on and run off controls and monitoring features.

- *Clearing and Grubbing* – Removal of undergrowth, and duff prior to topsoil and cover soil salvage and stockpiling in areas of excavation.
- *Road Upgrades and Construction* – Road upgrades and construction would be necessary. There are existing roads to the dam and impounded tailings area. Short road segments will be needed to access the repository area. The culvert crossing on the county road at Shave Gulch will likely need upgraded to allow access to the site with construction equipment. New roads will be reclaimed following waste removal. A traffic control plan would be prepared for the project.
- *Sediment Controls* – Sediment will be controlled by installing silt fence and hay bales at locations downhill (and downstream, where applicable) of the removal areas. Other stormwater runoff controls would be installed as identified in stormwater control plan.
- *Reroute Mike Horse mine adit treatment water pipeline* - The pipeline from the Mike Horse adit treatment ponds that is buried under the main county road may need to be rerouted temporarily or in the longer term should road reconstruction activities warrant its relocation.
- *Excavate, Load, and Haul Waste* - About 375,000 bcy of tailings and dam materials, (including up to two feet of overexcavated native soil below the waste), will be removed from the two sites and transported to one of the preferred repository sites. Ongoing sampling to ensure target metals levels are achieved would be conducted during excavation activities.
- *Place and Compact Waste in Repository* - Waste will be placed and compacted in one of the preferred repository sites along with other wastes removed from the site.
- *Haul and Place Backfill* - Cover soil and engineered fill materials would be placed over removal areas, and repository areas, and appropriate engineering materials would be used for runon-runoff ditches and stream reconstruction segments.
- *Reconstruct Streambanks* - Streambanks would be reconstructed and revegetated where waste removal resulted in loss of banks and adjacent floodplain areas.
- *Regrade/Revegetate Disturbed Areas* – All disturbed areas within the construction boundaries will be regraded and revegetated after construction is completed. Revegetation prescriptions may include amount and types of organic matter, fertilizer, seeding, mulching, erosion control blankets, and planting of tree seedlings.
- *Monitoring and Maintenance* - Following implementation of the removal activities, followup maintenance and monitoring will be conducted to evaluate performance of the removal response and to determine if further responses are needed. Maintenance activities would include, but are not limited to, items such as ensuring revegetation success, noxious weed control, fence repairs, and responses to erosion issues, if needed. Monitoring items would include, but are not limited to such items as surface and groundwater monitoring, and stability inspections of removal areas and repository areas for stability.

<u>Address Identified Human Health and Environmental Threats</u>

Removing the Mike Horse dam and impounded tailings, and removing wastes from Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River floodplain will eliminate risks to human health and the environment if the Preferred Alternative 4 is implemented.

Justification for Proposed Alternative

The USDA Forest Service has selected Site Wide Alternative 4 because this alternative provides the best combination of remedy effectiveness, implementability, and cost effectiveness of the alternatives evaluated. Alternative 4 includes Option 4 for the Mike Horse Dam and Impounded Tailings, Option 3 for Mike Horse Creek, Option 4 for Beartrap Creek and Option 4 for the Blackfoot River. The Paymaster Repository is the preferred repository site for Alternative 4.

The rationale for Alternative 4 is presented by the sub-area options.

Mike Horse dam sub-area

At the Mike Horse Dam and Impounded Tailings sub area, Option 1 does not meet removal action objectives. It is unresponsive to long term effectiveness as the dam would remain in service. Option 2 would remove the threat of failure of the dam in the short term, however, it ranks lower for long term effectiveness and permanence due to the large amount of waste left in the valley bottom, the continued potential for future failure and the need for frequent operation and maintenance activities. In addition, the current dam structure was never built as a true earthen dam. It was constructed as lifts of tailings. Option 3 for the dam and impounded tailings ranks moderate for overall effectiveness and permanence. While the dam would be removed from service, the unknowns regarding groundwater and its potential to leak into the capped tailings from the west slope and seasonal saturation of the lower tailings left in placed would require long term maintenance of engineering controls for the toe of the slope above Beartrap Creek in order to ensure proper function of the repository result in increased risks. Options 4 and 5 would result in a high overall effectiveness rating as all of the tailings and dam materials from the valley bottom of Beartrap Creek would be removed and placed in a capped repository. Long term effectiveness and permanence for Option 4 is high using the Paymaster repository. The P:aymaster site shows suitable subsurface and slope conditions based on test pits and groundwater monitoring which would result in reduced need for long term maintenance and monitoring. Option 4 for the dam and impounded tailings is also adaptable to the results of diversion and dewatering that will be conducted in 2007. Option 5 rates high for overall effectiveness due to the certainties of an engineered repository location and the removal of all of the tailings and dam material from an active mountain drainage area. However, safety concerns of hauling waste out on a public highway and the distance and costs to haul the wastes to the repository locations makes this option less feasible for implementation.

Lower Mike Horse Creek sub-area

Option 3 for Lower Mike Horse Creek results in a higher long term effectiveness as no wastes would remain in this high gradient and high sideslope drainage. This option also removes the sulfide waste from water and thus provides more opportunity for improvement of water quality. Option 2 results in a lower effectiveness due to the remaining sulfide wastes that would be left in place along relatively steep slopes. Option 1 would not meet removal action objectives.

Beartrap Creek sub-area

Option 1 does not meet removal action objectives. Option 2, removal of selected wastes, results in low-moderate long-term effectiveness and the potential for downstream migration of remaining contaminants during runoff and high flow events. Option 3 was eliminated from further study following issuance of a technical memorandum describing potential conceptual alternatives for the site (Hydrometrics, 2004). Options 4 and 5 result in a high effectiveness as all of the wastes that contribute to contamination would be removed and floodplain function would result. Option 4 addresses the reactive fine tailings materials and also eliminates contact between the creek and the less reactive intermixed tailings and alluvium. Downcutting of the Beartrap Creek channel has resulted in creation of

a new, lower floodplain for Beartrap Creek that would be reconstructed to provide for a 100-year flood event. Option 5 would remove the wastes lying outside the new 100 year floodplain and would not result in an increase in responsiveness.

Upper Blackfoot River sub-area

Option 1 does not meet removal action objectives. Option 2 would remove the largest and most accessible of the identified tailings deposits located on public lands and would, in general, leave the Blackfoot River in its current channel location. This results in a moderate long term effectiveness as dispersed tailings located within the 100 year floodplain would not be removed and the river channel would remain in a location that was established during a flood event and in response to the Mike Horse dam across Beartrap Creek. Option 4 results in a high effectiveness rating as virtually all of the wastes would be removed and the river channel would be located based on the removal of the dam and hydrology that would result.

Site Wide Alternatives

Implementability for all of the Site Wide Alternatives is generally moderate to high with the exception of Alternatives 1 and 2. Alternative 1 rates low for administrative feasibility due to need for continued regulatory oversight and preparedness for emergencies. Alternatives 2-5 include known construction practices and methodologies, however, construction parameters tied to dewatering of the impounded tailings will not be fully understood until the activity takes place, starting in 2007. In all alternatives besides Option 1, the tailings have some dewatering. Options 2 and 3 would have lesser amounts and effort.

The cost variation between the Alternatives is largely tied to the amount of waste material that is identified for removal, and the repository haul distance. Conceptual engineering designs and costs have been developed; however, the evaluation of the alternatives incorporates the unknowns of the removals, particularly the west side of the tailings impoundment, and the status of the engineering information available for the suite of repository options. Performance of the Alternatives with respect to effectiveness criteria and removal action objectives is directly tied to the costs.

Technical Feasibility and Probable Effectiveness

The recommended action within Site Wide Alternative 4 is both technically and administratively feasible. Key project components such as equipment, materials, and construction expertise, although distant from the site, are available and would allow the implementation and successful execution of the alternative. Implementing Site Wide Alternative 4 for the sub areas is expected to eliminate the risks associated with the dam and the wastes within an active, mountain environment. Implementing partial removal of the wastes along Beartrap Creek is expected to reduce to a great extent the risks associated with these wastes. The Paymaster repository site on ASARCO property is currently being used as a repository and is expected to be able to contain the removed wastes with Site Wide Alternative 4 by inclusion of engineering controls based on test pit information and groundwater monitoring wells. The First Gulch repository site would be the contingency plan if the Paymaster runs out of capacity or for some other unforeseen issue.

Further Information

No further information is needed to select the proposed action.

Verify Extent of Contamination

Final contours, visual observations and materials testing will be used to determine when to stop excavating tailings waste and dam materials. Native material underlying the tailings will be over excavated by two feet, and floodplain wastes would be over excavated one foot, or more if warranted, to ensure any leaching of metals into native soil is removed. Samples from the base of the excavation will be collected, analyzed and evaluated to verify that contaminant levels in native material below the waste are at acceptable concentrations.

In the Blackfoot River area, select sampling shows that contamination includes concentrated and dispersed tailings. Additional sampling in 2007 will further refine the distribution of the wastes with respect to clean material which could be utilized for cover or other construction purposes. Modifying the location of the Blackfoot River could result in the discovery of additional wastes that would be removed as part of that activity. As in almost all mine site areas, unanticipated additional wastes could be discovered during the removal activities and would need to be evaluated and an appropriate response conducted. This is consistent with the Forest Service's adaptive management approach.

Sensitive Environments

The Blackfoot River is a native bull trout and westslope cutthroat trout fishery. Bull trout are a listed threatened species protected under the Endangered Species Act (ESA) and westslope cutthroat trout are listed by the Forest Service as a Montana sensitive species. All efforts to minimize sedimentation and downstream impacts during construction activities will be implemented. Disturbances will be revegetated with native species. Formal notification from the U.S. Fish and Wildlife Service has been received in support of Site Wide Alternative 4.

Uncertainties

There are uncertainties regarding whether or not groundwater in the vicinity of the west side of the tailings impoundment is tied to reservoir levels behind the dam, or, ambient groundwater levels. This information will not be known until dewatering of the tailings occurs, starting in 2007. The options for the dam and impounded tailings and costs described in the EE/CA incorporate the uncertainties of this component. There are site specific parameters of each of the in drainage and out of drainage repository sites and waste areas that will not be fully known until design scale engineering evaluation is conducted. These are considered refinements of the more conceptual options and alternatives presented in the EE/CA.

Institutional Controls

At the removal areas, temporary fencing may be installed to protect revegetation for several years. Fencing will be removed following this period. Repository sites may be fenced for a longer duration, depending on the location and potential for livestock grazing, recreation or vandalism.

Off-Site Disposal

All contaminated material will be handled and disposed of in onsite repositories. The Paymaster Repository would be owned and operated by ASARCO, the current landowner of the property, under the oversight of the State of Montana. The First Gulch repository site, if warranted, is on lands within the NFS.

Post-Removal Site Controls

Post-removal site control will be implemented at the removal areas. Post-removal site controls will involve monitoring to identify any problems with revegetation, erosion or run on and runoff controls, and possibly fencing.

Changes Resulting from Public Comments

Appendix J in the Final EE/CA (attached), presents the comments received on the internal review draft and the public draft, and provides a responsiveness summary. Changes were made to the preferred alternative based on the comments received, including removal of the West Impoundment as a preferred repository site for Alternative 4, incorporation of two out-of-drainage repositories for consideration for Alternatives 4 and 5, and total removal of wastes in Option 4 for the dam and impounded tailings.

Comments received largely supported the selection of the Options 4 or 5 for the Mike Horse dam and impounded tailings, and for the total removal options for Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River sub areas (Site wide Alternatives 4 or 5). The State of Montana agreed generally with Site Wide Alternatives 4 and 5 but has reservations regarding sequencing of these removals in light of their ongoing efforts to get a responsible party to conduct removal efforts upstream of lands within the NFS. The USDA Forest Service recognizes that, if an action is imminent on upstream private land prior to initiating removal activities downstream, then it may be practical to sequence the actions and consider the upstream activities in the design and implementation of downstream removal work on lands within the NFS. The State of Montana and Trustees for the Natural Resources Damage Trust on the Clark Fork River objected strongly to the use of the West Impoundment Repository due to the unknowns of groundwater on the west slope of the impoundment, the risk associated with leaking under the cap if it ever occurred, and the reclaimed tailings slope stability. As a result of these concerns, Option 4 was revised to take all waste to the Paymaster Repository. There are no human health risks to recreational visitors on those portions of the tailings site that lie on lands within the NFS.

A stability analysis of the tailings and construction parameters was conducted in response to comments from ASARCO and Atlantic Richfield regarding the constructability of the Options 3 and 4. A construction and sequencing description has also been included in the Appendices to respond to their comments regarding implementability. It is worth noting that a similar type of project at a larger scale is currently being conducted with conventional technology at a nearby site. Clarifications have also been made to the streamline risk evaluation Section 4.0 in response to comments by Atlantic Richfield.

2. Short-Term Impacts

There are identified potential short-term impacts with implementing Site Wide Alternative 4. While diversion of Beartrap Creek and dewatering the tailings will be ongoing starting in 2007, and sediment controls will be implemented as part of construction activities, the amount of material to be excavated and handled, and in-stream work in Lower Mike Horse, Beartrap Creek and Upper Blackfoot River will result in some contribution of sedimentation to the river system and effects to downstream fish populations. These removal activities are also expected to occur over more than one construction season. Short term effectiveness is described as moderate in Table 7.1 in the EE/CA for this Alternative as a result.

There will also likely be short term impacts to the surrounding community, residents, and wildlife involving increased vehicle traffic. Increased business in the Lincoln community could also result. An

increase in traffic will occur during mobilization and demobilization of construction equipment. Increased traffic may impact wildlife by either changing their daily migration patterns or exposing them to a higher potential for injury or death due to collisions with vehicles. If the First Gulch repository site is utilized, traffic control activities and road improvements would result in short term delays on U.S. Highway 200.

3. Contribution to Remedial Performance

The Removal Action described herein is one of several actions that are either ongoing or will be conducted in the greater UBMC site. Other projects being conducted at the site include construction of a new water treatment system on private land by ASARCO, completion of waste placement and capping at the initial waste cell at the Paymaster Repository, and completion of the removal and stabilization of Upper Mike Horse Creek wastes. The State of Montana will be conducting an RI/FS (Remedial Investigation/Feasibility Study) in 2007-8 to identify remaining sources of contaminants at the Site and develop a plan for their remediation. This Removal Action will address the threat of the Mike Horse dam and impounded tailings, and remove contaminants contributing to degradation of Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River. Upstream contaminants on private land will not be addressed with this action. Implementing the preferred alternative will not prevent or inhibit any further response actions that may need to be taken at these sites in the future and coordination with other actions at the site will occur to the extent practicable. However, if additional contamination is found, the Forest Service will initiate actions in accordance with its adaptive management approach.

4. Description of Alternative Technologies

Removal technologies and process options potentially capable of achieving response action objectives and goals for mining wastes on lands within the NFS at the UBMC were screened in the Alternatives Technical Memoranda (Hydrometrics, 2005; USDA Forest Service, 2006) and in the EE/CA (2007). These technologies included institutional controls, engineering controls, waste disposal, and partial in-situ treatment.

Institutional Controls

Institutional controls include land use and access restrictions. Institutional controls by themselves will not prevent migration of the contaminants off-site through groundwater, surface water, or air. Therefore, institutional controls as a separate alternative were not considered. However, institutional controls are included as components of other alternatives.

Engineering Controls

Engineering controls limit the release or threat of release of hazardous substances generally by limiting mobility through isolation, and/or by limiting physical processes necessary for mobility. These measures included removal, in-situ containment, stream reconstruction as a floodway, and covering wastes with a capping system and soil. These measures were incorporated into alternatives considered in the EE/CA for the dam, tailings and waste rock.

Waste Disposal

Waste disposal is used as a source control measure by placing contaminated media in an engineered, controlled environment. Waste control measures evaluated in the EE/CA include removal to in drainage engineered repository(s) or removal to an out of drainage, engineered repository. In situ amendment

was identified in the Technical Alternatives Memorandum for Floodplain Wastes (Hydrometrics, 2005) and discarded from consideration in the EE/CA due to the relatively small floodplain areas involved.

Miscellaneous Alternatives

Technology types and process options were screened to eliminate those technologies that are obviously unfeasible, while retaining potentially effective options. General response actions and process options were applied to the mitigation of contaminants at the site. An evaluation of surface water treatment as part of tailings dewatering is included in the EE/CA. An evaluation of groundwater treatment was not conducted because source control technologies are considered the first step in cleaning up mining-related impacts. Removal of tailings and other wastes presumes that some reduction in contaminant concentrations will occur in surface water, groundwater, and streambed sediments as a result of removing or controlling the primary sources of contamination.

5. Engineering Evaluation/ Cost Analysis (EE/CA)

An EE/CA that details site characteristics and identifies and develops alternatives was prepared. The USDA Forest Service analyzed the effects of the alternatives identified in the EE/CA, and considered public comments. The Forest Service then identified a preferred alternative. A copy of the Final EE/CA is attached (Hydrometrics, 2007).

6. Applicable or Relevant and Appropriate Requirements (ARARs)

Section 300.415(i) of the National Contingency Plan (NCP) and guidance issued by the EPA require that removal actions attain Applicable or Relevant and Appropriate Requirements (ARARs) under federal or state environmental laws or facility siting laws, to the extent practicable considering the urgency of the situation and the scope of the removal (EPA, 1993). In addition to ARARs, the lead Agency may identify other federal or state advisories, criteria, or guidance to be considered for a particular release. ARARs were identified in the Removal Action for lands within the NFS at the UBMC.

ARARs are either applicable or relevant and appropriate. Applicable requirements are those standards, requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, or contaminant found at a site and would apply in the absence of a CERCLA cleanup. Relevant and appropriate requirements are those standards, requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that are not applicable to a particular situation but apply to similar problems or situations, and therefore may be well suited requirements for a response action to address.

ARARs are divided into contaminant specific, location specific, and action specific requirements. Contaminant specific ARARs are listed according to specific media and govern the release to the environment of specific chemical compounds or materials possessing certain chemical or physical characteristics. Contaminant specific ARARs generally set health or risk based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.

Location specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of cleanup activities because they are in specific locations. Location specific ARARs generally relate to the geographic location or physical characteristics or setting of the site, rather than to the nature of the site contaminants.

Action specific ARARs are usually technology or activity based requirements or limitations on actions taken with respect to hazardous substances.

Only the substantive portions of the requirements are ARARs. Administrative requirements are not ARARs and do not apply to actions conducted entirely on-site. Provisions of statutes or regulations that contain general goals expressing legislative intent but are non-binding are not ARARs. In addition, in instances like the present case where the cleanup is proceeding in stages, a particular phase of the remedy may not comply with all ARARs, so long as the overall remedy does meet ARARs.

Under Section 121 of CERCLA, 42 U.S.C. §9621, only those state standards that are more stringent than any federal standard are considered to be an ARAR provided that these standards are identified by the State in a timely manner. To be an ARAR, a State standard must be "promulgated," which means that the standards are of general applicability and are legally enforceable.

A complete list of the ARARs and their applicability to this action is found in Appendix D of the Final EE/CA.

Surface Water ARARs

Surface water ARARS include established aquatic life and human health water quality standards which specify concentrations of a specific constituent deemed protective of human health and the environment. The human health water quality standards assume that 2 liters of water per day are consumed and that fish are consumed at the national average fish consumption rate over a lifetime. These assumptions result in much higher levels of exposure and therefore much lower human health standards than those determined for the fisherman scenario in the human health risk screening (EE/CA Section 4.2.3.2). For certain constituents, including some UBMC contaminants of concern (CoC's) the aquatic life standards include both acute and chronic criteria. The chronic criteria are applicable for long-term exposure and were selected for the ARAR evaluation for this project. The more stringent of the applicable human health or aquatic water quality standards is taken to be the ARAR-based goal for surface water. The ARAR-based goals for surface water are listed in Table 5-1 in the Final EE/CA.

Groundwater ARARs

Groundwater at the site is not currently used as a drinking water source, nor is it likely to be used as such in the future based on the undeveloped nature of the site, and the fact that all areas address in the EE/CA are on lands within the NFS. Although the removal actions addressed through this EE/CA do not specifically address groundwater (since groundwater poses no direct risk), the removal actions have the potential to improve groundwater quality through removal of potential sources of groundwater contamination. ARAR-based goals for groundwater are the State of Montana human health standards. ARAR-based goals for groundwater are listed in the Final EE/CA in Table 5-2.

7. Project Schedule

Diversion of Beartrap Creek and dewatering of the impounded tailings will commence in 2007. The Removal Action for the Lands within the NFS at the UBMC will be conducted following successful negotiation with potentially responsible parties, and/or funding as determined through the bankruptcy proceedings of ASARCO. The bankruptcy proceedings are scheduled for Fall, 2007. The Forest Service will coordinate activities to the extent practicable with other State – led and ongoing ASARCO actions.

8. References

Hydrometrics, 2001a, Mike Horse Mine Tailings Impoundment Investigation. Memorandum submitted to U.S. Forest Service and Montana Department of Environmental Quality. August 20, 2001.

Hydrometrics, 2004, 2003 Monitoring Activities Report for the Upper Blackfoot Mining Complex, Lewis and Clark County, Montana. Prepared for ASARCO, Incorporated.

Hydrometrics, 2005, Alternatives Technical Memorandum for Mine Waste Removal at the Upper Blackfoot Mining Complex, Lewis and Clark County, Montana. Prepared for ASARCO, Inc. January 2005.

Hydrometrics, Inc., 2007, Final EE/CA for the Mike Horse Dam and Impounded Tailings, Lower Mike Horse Creek, Beartrap Creek and Upper Blackfoot River Floodplain Removal Areas, Upper Blackfoot Mining Complex, Lewis and Clark County, Montana. Prepared for USDA Forest Service and ASARCO LLC, June 2007.

Marshall, Brett D., 2005, Baseline Benthic Macroinvertebrate Survey of the Headwaters of the Upper Blackfoot River, Montana, February 25, 2004. A report prepared for Hydrometrics, Inc.

Montana Department of Environmental Quality (MDEQ). Circular DEQ-7 Montana Numeric Water Quality Standards, Planning, Prevention and Assistance Division, Standards and Economic Analysis Section, January.

USFS, 2005, Evaluation of the Mike Horse Dam, A Report prepared for the USDA Forest Service by Stephen Romero, USFS Missoula. January 2005

USFS, 2006, Draft Concept Alternatives Technical Memorandum for the Mike Horse Dam and Impounded Tailings, Upper Blackfoot Mining Complex, Lewis and Clark County, MT. Prepared by the Helena National Forest. February 21, 2006.

B. Estimated Costs

Table 1 lists the estimated costs to implement Site Wide Alternative 4, the selected Removal Action. Costs include removal construction activities, monitoring and maintenance for a 100 year period, engineering oversight, agency oversight and 25% contingency for implementing Site Wide Alternative 4.

TABLE 1
REMOVAL ACTION ESTIMATED COSTS
For SITE WIDE ALTERNATIVE 4
Including Mike Horse Dam and Impounded Tailings, Lower Mike Horse Creek, Beartrap Creek and Upper Blackfoot River Floodplain removal areas

Cost Item	Mike Horse Dam and Impounded Tailings Option 4	Lower Mike Horse Creek Option 3	Beartrap Creek Option 4	Upper Blackfoot River Option 4
Mobilization, Demobilization, Contingency	2,704,300	142,900	292,600	431,700
Surface water and sediment control, road construction and improvements, road relocation	189,500	6,000	25,000	146,250
Waste Removal-excavate and haul tailings/waste rock and underlying soils (includes backfill), place clean fill	6,889,800	313,000	616,750 (does not include Flossie/Louise- $20,100)	863,750
Repository Construction-clear and grub, compact, place cap and cover soil	1,521,110	117,110	157,852	193,555
Revegetation, replace stream channel, amendments	66,750	45,750	100,500	243,000
Post Closure Monitoring and Maintenance (100 year net present value)	204,377	307,592	345,228	264,973
Project Admin, Engineering, Construction Management	2,162,000	163,000	317,000	490,000
Subtotal by Removal Option- (See EE/CA Appendix I)	13,737,837	976,633	1,854,930	2,633,228
Agency Oversight (Direct Costs 26%; Indirect Costs 13%)	5,357,756	380,887	723,423	1,026,959
SUBTOTAL	19,095,593	1,357,520	2,578,353	3,660,187
TOTAL - Site Wide Alternative 4 $26,691,653				

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

If no action is taken to stabilize wastes and isolate wastes from the public, surface water, and groundwater, the sites will continue to be degraded and present a risk to human and ecological receptors.

VII. OUTSTANDING POLICY ISSUES

None

VIII. ENFORCEMENT

The USDA Forest Service is exercising its delegated CERCLA enforcement authority and will be the "lead agency" for all response actions occurring on lands within the National Forest System, as defined by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR part 300, and all response actions will be undertaken in a manner consistent with the NCP.

IX. RECOMMENDATION

This decision document identifies, describes and explains the preferred Removal Action for removal and disposal of the Mike Horse dam and impounded tailings, wastes in Lower Mike Horse Creek, wastes in Beartrap Creek and the Upper Blackfoot River on NFS land located within the UBMC site. The project is situated on the Lincoln Ranger District of the Helena National Forest. This document was developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision is based on the administrative record for the site. Conditions at the site meet the NCP section 300.415(b)(2) criteria for a removal and I recommend your approval of the proposed removal action.

By Bethany A. Ihle — 7-23-07

Bethany A. Ihle — Date
On-Scene Coordinator (OSC), Forest Service

****

I concur with the recommendation to implement the proposed alternative as described in this Action Memorandum and attached Engineering Evaluation/Cost Analysis for Lands within the NFS within the UBMC.

July 23, 2007

Kevin T. Riordan — Date
Forest Supervisor
Helena National Forest

I concur with the recommendation to implement the proposed alternative as described in this Action Memorandum and attached Engineering Evaluation/Cost Analysis for Lands within the NFS within the UBMC.

7-23-2007

Bob Kirkpatrick — Date
CERCLA Coordinator
Northern Region

I approve the proposed alternative as described in this Action Memorandum and attached Engineering Evaluation/Cost Analysis for Lands within the NFS adjacent to and incorporated within the UBMC.

7/23/2007

Thomas L. Tidwell — Date
Regional Forester
Northern Region