April 2003
United States Environmental Protection Agency
Montana Department of Environmental Quality

Superfund Program Clean-up Proposal
Milltown Reservoir Sediments Operable Unit
of the Milltown Reservoir/Clark Fork River Superfund Site

Introduction

The cleanup proposed for the Milltown Reservoir Sediments Operable Unit, as well as the other alternatives evaluated, are described in this document.

The U.S. Environmental Protection Agency (EPA) and the Montana Department of Environmental Quality (DEQ) are proposing to address the risks to public health and the environment, regulatory compliance, and other issues posed by the contaminated sediments behind the Milltown Dam through the following measures:

- Removing the most heavily contaminated sediments—approximately 2.6 million cubic yards (mcy)—from the Milltown Reservoir.
- Placing removed sediments away from the river in a lined, solid waste disposal facility (outside the 100 year flood plain) less than one mile downstream from the dam.

You're invited to review and comment on this Proposed Cleanup Plan!

The **public comment period** runs from **April 15, 2003** to **June 20, 2003.** During this time, please send written comments to:

Milltown Comments
Russ Forba
EPA, Region 8, Montana Office
10 West 15th Street, Suite 3200
Helena, MT 59626

Send comments by e-mail to:
milltown@epa.gov

You are also encouraged to comment in person "for the record" at the public meetings:

Wednesday, May 7, 2003 from 7:00-10:00 pm at
Bonner School, 9045 Hwy 200
Bonner, Montana

Thursday, May 8, 2003 from 7:00-10:00 pm at
Urey Lecture Hall, University of Montana
Missoula, Montana
(parking available behind Mansfield Library)

For more information, please call Diana Hammer, EPA, 406-457-5040; or toll-free at 1-866-457-2690

Artist's rendition of post-remedy confluence, looking upstream from the bluff above Milltown Dam.

- Removing the spillway and radial gate section of the Milltown Dam. (The powerhouse would not be removed under EPA's cleanup plan but may be removed, altered or preserved as part of restoration and redevelopment activities.)
- Redesigning the Clark Fork River channel and banks to ensure that contaminated sediments left in place are secured and adequately vegetated
- Continuing the replacement water supply program and implementing temporary groundwater institutional controls until the Milltown aquifer recovers using monitored natural recovery, which is expected to take about 4 to 10 years after dam removal
- Conduct long-term operation and maintenance for the sediment repository and another smaller repository previously established by the owner of the dam.

It should be noted that this conceptual design may change as a result of public comments or during the remedial process. The proposed cleanup plan, if implemented, would result in the following:

- Permanent, long-term protection of public health and the environment
- Recovery of a drinking water aquifer
- Substantial elimination of contaminant release from ice-scouring and catastrophic events

Other related and important benefits from this proposed cleanup are as follows:

- Return of two major waterways—the Clark Fork and Blackfoot rivers—to a free-flowing state
- Unrestricted fish passage
- Substantial improvement in the native and recreational fisheries, especially for trout
- Laying the groundwork for possible future restoration and redevelopment of the project area, through use of restoration or other funds in conjunction with this project

EPA believes there is widespread, but not unanimous, support of this proposed remedy from the State of Montana, the Confederated Salish and Kootenai Tribe, the U.S. Fish and Wildlife Service (FWS), local governments (city and county), several community organizations and the general public. To date, EPA Region 8 has received nearly 10,000 public comments endorsing the dam and sediment removal remedy.

The cost of the Preferred Remedy is estimated to be about $95 million. This figure represents the net present value (NPV) for the project (discounted by 3 percent per year for the estimated life of the project) including a construction contingency.

Contents of the Proposed Plan

EPA will work closely with area residents, the State and other natural resource trustees to design the cleanup so it is compatible with the restoration and future redevelopment goals identified by the natural resource trustees and the community.

Based on information currently available, EPA believes the Proposed Action meets the threshold criteria and provides the best balance of trade-offs with respect to balancing and modifying criteria as compared to the other alternatives (see the *Summary and Evaluation of Alternatives* section). EPA expects the Proposed Action to satisfy the following statutory requirements of CERCLA Section 121(b):

1. Be protective of human health and the environment
2. Comply with ARARs or justify a waiver
3. Be cost effective
4. Utilize permanent solutions and alternative treatment technologies to the maximum extent practicable
5. Satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met

Overview

The Milltown Dam is located just east of Missoula, Montana (Exhibit 1), at the confluence of the Clark Fork and Blackfoot rivers and is adjacent to the small, unincorporated communities of Milltown and Bonner (see Exhibit 2). The historic mining communities of Butte and Anaconda are upstream. During the past century, mine waste materials have washed downstream, creating some

Acronyms

ARAR: Applicable or Relevant and Appropriate Requirements for cleanup, such as regulatory requirements.

BMPs: Best Management Practices

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act; also known as the Federal Superfund law

CFRTAC: Clark Fork River Technical Assistance Committee

cfs: cubic feet per second

DEQ: Montana Department of Environmental Quality

EPA: U.S. Environmental Protection Agency

ESA: Endangered Species Act

FEMA: Federal Emergency Management Agency

FERC: Federal Energy Regulatory Commission

FS: Feasibility Study; initial study to evaluate alternatives for groundwater cleanup

Focused FS: Focused Feasibility Study; additional study to evaluate alternatives for addressing surface water risks

Combined FS: Combined Feasibility Study; combined the FS and Focused FS alternatives to evaluate a comprehensive set of alternatives for site cleanup

FWS: U.S. Fish and Wildlife Service

MCCHD: Missoula City/County Health Department

mcy: million cubic yards

MFWP: Montana Fish, Wildlife, and Parks

mg/kg: milligrams per kilogram

mg/L: milligrams per liter

NPL: National Priorities List; the Superfund list of sites

NPV: Net Present Value

PRAO: Preliminary Remedial Action Objective

RI: Remedial Investigation

ROD: Record of Decision

SAA: Sediment Accumulation Area

TRV: Toxicity Reference Values developed for the Upper Clark Fork River

µg/L: micrograms per liter

USACE: U.S. Army Corps of Engineers

USGS: U.S. Geological Survey

6.6 mcy of contaminated sediment accumulation behind the Milltown Dam. The Milltown Reservoir Sediments / Clark Fork River Superfund Site was listed on the National Priority List (NPL, or Superfund) in 1983.

Lead and Support Agencies and Document Purpose

EPA and DEQ are proposing a cleanup plan to address the public health and ecological risks posed by contaminated sediments located behind the Milltown Dam. EPA is the lead agency for the Milltown Reservoir Operable Unit of the Milltown Reservoir / Clark Fork River Superfund Site, and DEQ is the support agency. Numerous entities, including other government agencies, local governments, the Confederated Salish and Kootenai Tribes, public interest groups, area residents and members of the general public have been active participants in the Superfund process. Their contributions have helped guide EPA in developing this proposed cleanup plan. The State, the Tribes, and FWS concur with and strongly support the Proposed Action.

EXHIBIT 1
Milltown Reservoir/Clark Fork River Superfund
Site and Operable Units

The agencies' identification of the proposed remedy is the culmination of the Remedial Investigation / Feasibility Study (RI / FS) process for the Milltown Reservoir Sediments Operable Unit.

Additional detailed information regarding the Milltown Reservoir Sediments Operable Unit and the cleanup alternatives for the Site can be found in the Combined FS released by EPA on December 6, 2002, and other documents in the EPA Administrative Record.

The Responsible Parties are the Atlantic Richfield Company and the NorthWestern Energy Corporation. NorthWestern Energy Corporation may have a partial liability exemption under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), but retains significant responsibilities and interests at the Site. EPA sent notice letters to these parties or their predecessors pertaining to their Superfund liability in the late 1980s. The Atlantic Richfield Company conducted many of the Site RI / FS activities and studies, with oversight by EPA and DEQ. Final RI / FS documents were released only after incorporation of EPA comments and EPA approval.

This proposed cleanup plan is offered under the CERCLA, also known as Superfund. This plan presents the cleanup strategy proposed by EPA Region 8 for the Milltown Reservoir Sediments Operable Unit to the public for review, consideration, and comment. This fulfills

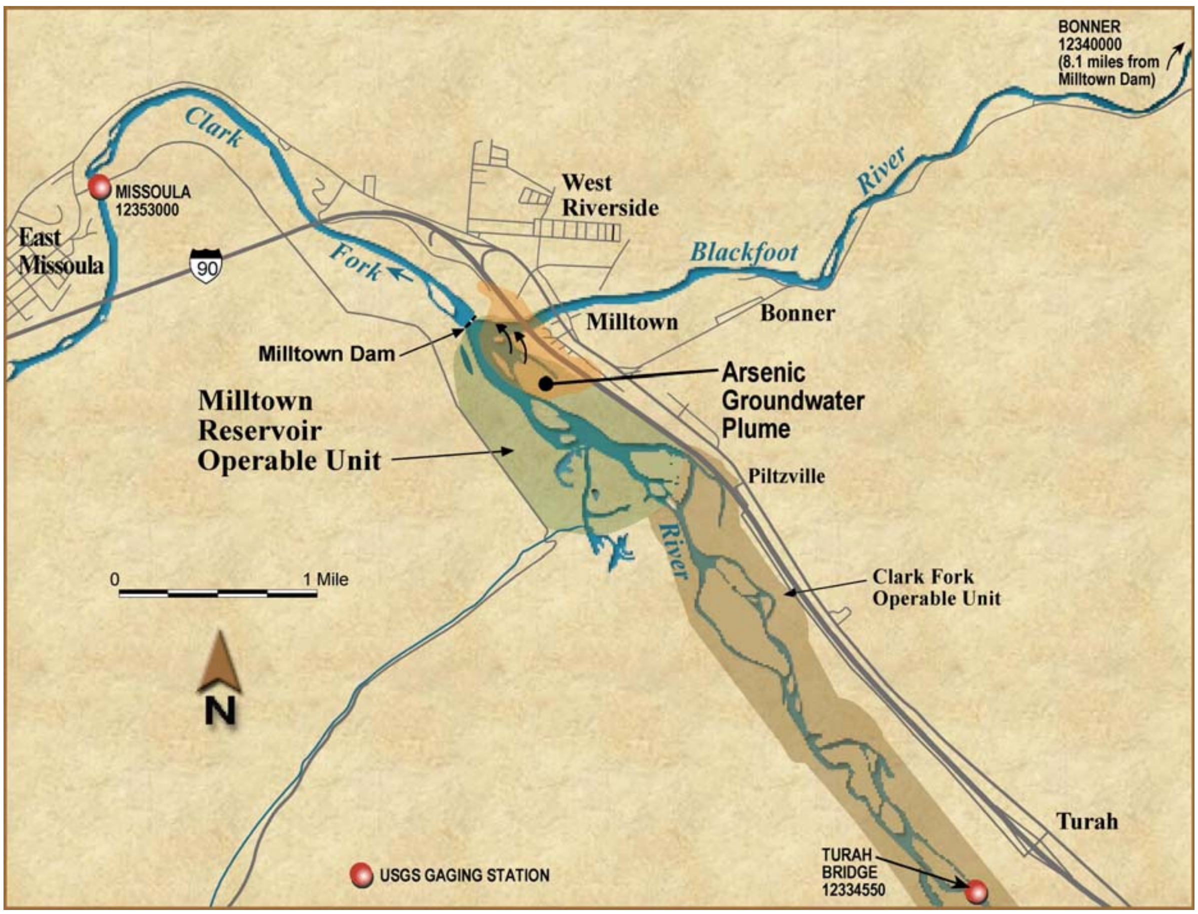


EXHIBIT 2
Milltown Reservoir Sediments
Operable Unit Site Map

EPA's requirements under 117(a) of CERCLA and Section 300.430(f)(2) of the National Contingency Plan. EPA and DEQ request public comment on the proposed plan, the alternatives, and the supporting documentation in the administrative record.

One primary purpose for the release of a proposed plan is to facilitate public participation in the remedy selection process. The Proposed Action identified in this document is an initial recommendation. Changes in the proposed remedy may be made if public comment or additional information indicates a more appropriate remedy for the Milltown Reservoir Sediments Operable Unit. EPA and DEQ will consider all public comments received before issuing a Record of Decision (ROD). The ROD will document the final cleanup plan for the Milltown Reservoir Superfund Site.

Site Background

This Proposed Plan focuses on the reservoir created by Milltown Dam and the impounded contaminated sediments, including metals and arsenic. This contamination originates from more than 100 years of upstream mining activity, primarily by the Anaconda Mining Company, which merged with the Atlantic Richfield Company in 1977. Geochemical conditions within the reservoir have contributed to arsenic contamination of groundwater under Milltown, Montana. Groundwater historically served as the community drinking water supply. A safe replacement water supply was provided to the people of Milltown in 1984 and 1985, but the groundwater remains contaminated. There are also risks to downstream aquatic life, primarily from copper, during ice scouring events or, potentially, if a catastrophic dam failure caused a release of sediments. If left in place, significant upgrades to the dam to meet safety (earthquake and flood) and fish passage requirements will be needed. Full compliance with the Endangered Species Act (ESA) requirements associated with Bull Trout Recovery, including fish passage requirements, will also be necessary.

The **Milltown Reservoir Sediments Operable Unit** is one of three operable units within the Milltown Reservoir / Clark Fork River Superfund Site. The other operable units are the Milltown Water Supply and Clark Fork River. The reservoir cleanup plan as proposed would permanently solve the contaminated groundwater problems in Milltown. The Clark Fork River operable unit is being addressed under a coordinated, but separate, cleanup action with a ROD scheduled for 2003.

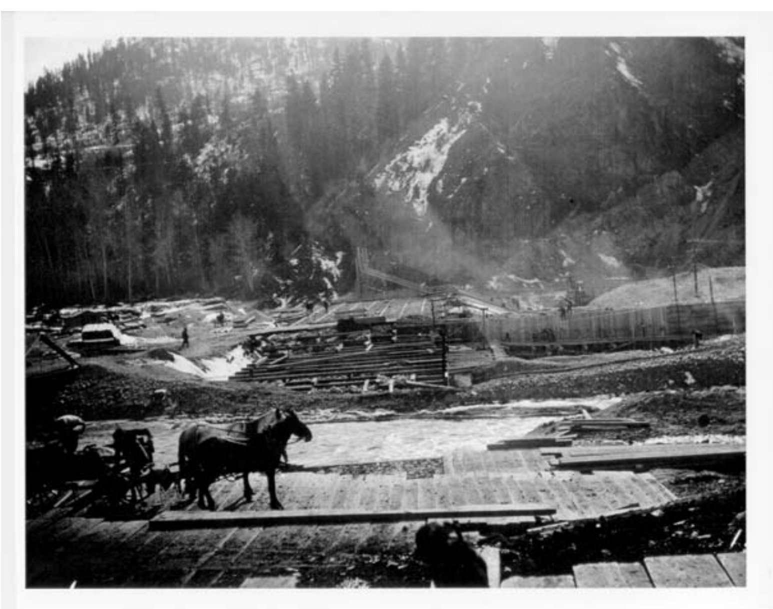
Site Chronology

The following is a chronological summary of important events related to the Milltown Reservoir Operable Unit Site:

- 1864 to 1970s: Essentially uncontrolled releases of mining and milling wastes occurred in the upper Clark Fork River basin. Periodic flooding and storm events caused sediments to be deposited in Milltown Reservoir after the dam was built in 1907.
  - 1906-7: Milltown Dam was constructed to provide hydroelectric power.
  - 1908: Largest flood on record for the Clark Fork River was caused by a rain-on-snow event. Vast amounts of mining and milling wastes and sediments were

washed downstream into the Milltown Reservoir.

- 1980s: Large scale mining in Butte and mineral processing operations in Anaconda ceased and environmental investigations began.
  - 1981: Arsenic was found by local public health authorities in Milltown drinking water wells. Levels exceeded Federal drinking water standard (then 0.05 mg/L, lowered in 2001 to 0.01 mg/L arsenic).
  - 1983: Milltown Reservoir Site was added to Superfund list as the first Montana NPL Site.
  - 1984: Response Action installed a new drinking water system for Milltown. No institutional controls have been put in place.
- 1990s and 2000s: Remedial investigations and studies.
  - 1993: Milltown Remedial Investigation, Baseline Human Health, Ecological, and Continued Releases Risk Assessments were completed. Groundwater contamination was recognized as the principal problem to be remedied.
  - 1996: Draft FS, regarding groundwater, was released by Atlantic Richfield Company. That same year, climatic conditions cause an ice scour event, which sent never-before-measured levels of metals-contaminated surface waters down river. EPA expanded the scope of the FS and conducted further risk assessments related to ice scour and other high flow events.
  - 1998: Bull trout were listed as threatened under the ESA.
  - 2000: Milltown Reservoir Baseline Ecological Risk Assessment Addendum was released for public review. Federal Energy Regulatory Commission (FERC) re-classified the dam as “High Hazard Potential,” and initiated dam safety review.
  - 2001: Focused FS was released by Atlantic Richfield Company, which examined alternatives for addressing surface water quality. The draft Combined FS was prepared and submitted to EPA. This report combined key alternatives from the original 1996 FS with those of the Focused FS. NorthWestern Energy acquired certain Montana Power assets and liabilities, including Milltown Dam and Reservoir.
  - 2002: Combined FS was finalized and released by EPA. The Combined FS analyzed comprehensive cleanup plans for the Milltown Reservoir Sediments



Milltown Dam Construction, 1906

Operable Unit. Additionally, an extended drawdown of the Milltown Reservoir allowed a brief look at downstream river water quality and potential impacts on fish resulting from this activity. EPA collected additional sediment and water samples within the reservoir footprint to refine the costs of this proposed remedy. The Milltown Reservoir Operable Unit was chosen by EPA as a national Superfund redevelopment pilot. This action provides $40,000 to facilitate redevelopment planning activities associated with the Superfund site.

Site Characteristics

The Milltown Reservoir boundary is defined as the area inundated by the maximum pool elevation of 3,263.5 feet, which is an area of about 540 acres. The reservoir is divided into two sections: the upper reservoir and lower reservoir. The dividing line is at Duck Bridge. The boundary extends approximately 2 miles up the Clark Fork Valley from Milltown Dam. The actual Superfund Operable Unit boundaries are larger and include both the reservoir sediment area and the groundwater plume area as shown on Exhibit 2.

Historically, sediments carried into the reservoir by the Clark Fork and Blackfoot Rivers settled because of the backwater conditions created by the reservoir. Low flow rates in the backwater area cause the coarse-grained, sandy sediments to be deposited first, settling in the upper reservoir. The fine, clay- and silt-type sediments are transported further by the water and settle closer to the dam in the lower reservoir. Higher metals and arsenic concentrations are typically associated with the finer fraction of sediment (clay and silt). For example, average copper concentrations ranged from 83 milligrams per kilogram (mg/kg) in sand-sized sediment to more than 5,000 mg/kg in silt- and clay-sized sediment. Older, deeper sediments also tend to have higher levels of metals and arsenic than the more recently deposited sediments found in the upper layers.

The Milltown Reservoir is considered a “run of the river” reservoir, meaning the flow rate of water leaving the reservoir to the Clark Fork River is equal to the flow rates of the Clark Fork and Blackfoot Rivers entering the reservoir. The average discharge for the Clark Fork River, measured 2.8 miles downstream of Milltown Dam at the U.S. Geological Survey (USGS) gauging station at East Missoula, is 2,973 cubic feet per second (cfs). The 1908 flood had an estimated peak discharge of 48,000 cfs and resulted in the transport of large volumes of mining wastes and sediments down the Clark Fork River. Historic maps, air photo interpretation, and sediment deposition patterns (stratigraphy) show the historic Clark Fork River channel mostly filled by

Tailwaters of Milltown Dam

upstream sediments containing historic mining and milling wastes transported by the 1908 flood. Contamination of the reservoir continued after this event—during floods, storms and normal flows. A Federal Emergency Management Agency (FEMA) study estimating the magnitude of potential flood events for the Clark Fork and Blackfoot Rivers indicated the 1908 event was larger than a 100-year flood.

In February 1996, an extended period of severely cold weather created thick ice on the Clark Fork and Blackfoot Rivers near and upstream of Milltown. This was followed by a period of rapid warming with rainfall that melted the lower-elevation snow pack. Flows in the rivers increased and began breaking up the ice. Ice jams soon formed in both rivers. A particularly large ice jam near Bonner caused the water to back up to 16 feet above flood level; as the ice began to move downstream, bridges and other nearby structures were damaged. To protect Milltown Dam from damage by the ice, the operator rapidly lowered the reservoir water level by about 8 feet, which placed the existing, thick reservoir ice cover directly on much of the previously submerged reservoir sediments. As the ice pushed through the reservoir with its lowered water level, it

Ice blocks behind dam

scoured large quantities of metals-contaminated sediments that were transported downstream in the Clark Fork River. During this event, mean daily flow measured downstream at the USGS gauge at East Missoula on February 9 reached 12,400 cfs, compared to normal seasonal flows of 1,800 to 2,000 cfs. Water quality samples taken downstream during this event indicated much larger concentrations of total and dissolved copper and other metals compared to any previously taken samples. Based on these sample results, EPA directed Atlantic Richfield Company to undertake an additional Focused FS for the Milltown Site.

Surface Water Transport of Contaminants

Water quality data from the Clark Fork and Blackfoot rivers near the Milltown Reservoir have been collected for many years by USGS, DEQ, NorthWestern Energy Company, Montana Power Company, Atlantic Richfield Company, Montana Fish, Wildlife, and Parks (MFWP), Missoula County, and others. The USGS data set is the most comprehensive. It includes results of frequent suspended sediment sampling, and total and dissolved metals concentrations collected periodically (6 to 8 times) during the year. The water quality summary statistics for locations downstream of the reservoir indicate that water quality, in general, does not often exceed water quality standards during normal flow conditions.

Surface water quality downstream of Milltown Reservoir can be affected by the addition of contaminant concentrations from upstream that then pass through the reservoir, as well as by contaminated sediments released or scoured from the reservoir itself. Several conceptual models were developed to illustrate the primary conditions likely to influence deposition or scour of sediments in the reservoir. The 1996 ice scour event and 1997 high flow event demonstrated that such events significantly increase downstream contamination to levels well above state standards.

EPA risk assessors found no significant risks to downstream surface water during low flow periods with the reservoir at normal pool elevation. The risk assessment also found that certain conditions can trigger sediment scour and could adversely affect water quality downstream. For example, typical late spring snowmelt runoff, other high flow events (greater than 16,000 cfs), or ice scour from shallow portions of the reservoir during normal pool levels could release metals-laden sediments downstream.

If the dam were ever to fail, catastrophic environmental effects would occur from the release of contaminated sediments into the Clark Fork River.

Sediment and Groundwater Investigations

Investigation of the reservoir sediments and groundwater has included monitoring wells with well-water sampling and chemical analysis, core sediment sampling and chemical analysis, a cone penetrometer survey, cross-sectional topographic surveys, sediment pore water sampling and analysis, sequential extraction and mineralogical analyses, and air photo interpretation. Many additional monitoring wells were also installed and sampled in areas outside the reservoir sediments in strategic locations to better define the arsenic plume and local hydrogeology.

View of the Milltown Reservoir during drawdown in August 2002.

As shown on Exhibit 2, the 0.01 milligram per liter (mg/L) arsenic concentration contour extends to the north and east under portions of Milltown and northwest of the Blackfoot River, an area about 325 acres. Arsenic moves from the sediments into the groundwater because of geochemical and hydrogeological conditions in the sediments. Arsenic moves from the sediments into the water within the sediments (called "pore water"), then down into the alluvial aquifer (groundwater). Once in groundwater, arsenic concentrations begin to decrease because of dilution, geochemical reactions, and physical adsorption that remove arsenic from solution. This process is called natural attenuation.

Based on the results of groundwater quality monitoring (1990-2001), EPA and DEQ have drawn the following conclusions:

1. The average arsenic concentration throughout the groundwater plume area is 0.42 mg/L, forty-two times the Federal standard of 0.01 mg/L.
2. The average arsenic concentration in groundwater upgradient of the reservoir and plume area is 0.0044 mg/L—less than half the federal standard of 0.01 mg/L.

3. Downgradient of the arsenic plume, the average arsenic concentration is also 0.0044 mg/L.

4. Below the plume area, the arsenic concentrations drop significantly because of natural attenuation.

5. The reservoir sediments are the primary source of arsenic to the contaminated groundwater. However, only a portion of the sediments significantly contribute to the high levels of arsenic contamination.

Biological Setting

Wetlands. The FWS identified jurisdictional wetlands in the reservoir area during the summer of 1990. The existing wetlands were formed by deposition behind the man-made dam; the new, replacement wetlands associated with a free flowing river will be of higher quality. A total of 297 acres of jurisdictional wetland, 125 acres of shallow water habitat, and 45 acres of deep-water habitat were identified under normal operating pool levels. Diverse wetland habitat types are distributed throughout the Site.

Fisheries and Macroinvertrebrates. Fisheries resources in the Milltown section of the Clark Fork River, including the reservoir, have been monitored since 1979. Salmonids are present, with rainbow and brown trout as the dominant species in the recent past. Rainbow trout are more common below the dam, as are largescale and longnose suckers, mountain whitefish, northern pikeminnow, longnose dace, and sculpins. In contrast, brown trout are more abundant in the Clark Fork River just above the reservoir. Bull trout, cutthroat trout, and brook trout have also been identified in the Clark Fork River drainage. The shallow and weedy backwaters of the reservoir also provide good spawning and rearing habitat for a healthy population of northern pike. These pike, an exotic and predatory species, are a severe nuisance fish that feed on trout species. Pike now dominate the reservoir and prey heavily on salmonids, including bull trout.

Bull Trout

DEQ has conducted annual surveys of macroinvertebrates within the Clark Fork River since 1986, including sites upstream and downstream of the Milltown Dam. At the Turah Bridge site upstream of Milltown Dam, river health (biointegrity) has been rated as nonimpaired since 1992, except during the high water event in 1997. Below Milltown Dam, the biointegrity has been rated as slightly impaired, except for years 2000 and 2001 when the station was unimpaired. Biointegrity in years 1990 and 1997 below the Milltown Dam have the lowest rating; moderately impaired in 1990 and slightly impaired in 1997.

During the same period, the USGS has been monitoring metal concentrations in streambed sediment and assessing the effects of the metals on macroinvertebrates within the Clark Fork River. The data show that macroinvertebrates from the Clark Fork River, including the Milltown Reservoir area, are accumulating metals and have elevated metals relative to nearby reference tributaries.

Wildlife. The reservoir area provides habitat for a variety of wildlife species. Big game species include white-tailed

River confluence at Milltown looking up the Blackfoot River

deer and elk. Small fur-bearing animals include beaver, muskrat, and mink, with an occasional river otter. Small mammals include house mice, deer mice, and the masked shrew. The FWS conducted bird surveys at the reservoir in 1990. Active breeders that use the area throughout the year include waterfowl, such as grebes, herons, swans, ducks, cormorants, and mergansers; raptors such as hawks, eagles, osprey, and kestrels; and song birds and other bird species, such as doves, pheasants, hummingbirds, and woodpeckers.

Threatened and Endangered Species. Bald eagles and bull trout are present in and around the reservoir area and are the threatened and endangered species of concern. Bald eagles are present and are commonly seen along the Clark Fork River. Bull trout migration through this area is considered important for recovery of the species in the Clark Fork River and upstream migration is presently blocked by the Milltown Dam. During migration season, some of the bull trout that gather below the dam are captured, transported upstream of the dam, and released. From 1998 to 2002, three to eleven bull trout per year were captured and transported through this program. The FWS questions the long-term efficacy of this technique and has begun a Section 7 consultation process with FERC regarding interim actions by FERC. The FWS has indicated additional consultation would be necessary for any license renewal.

The Section 7 consultation process between EPA and FWS has also been initiated and a Biological Assessment has been submitted to FWS. This document indicates that the bull trout would benefit from the proposed remedy because dam removal would restore fish passage and eliminate sediment release during ice scour events and spawning runs. Removal of the dam would also reduce the non-native northern pike population in the reservoir, which prey heavily on bull trout and other native fish. The measures proposed to address the short-term impacts of the construction activities on bull trout are also outlined in the Biological Assessment. Any necessary measures would be included in the cleanup design. Potential impacts to bald eagles will be minimized.

Additional information about current FERC licensing and ESA activities associated with the *Proposed Action* is included on page 22 of this document.

Summary of Site Risks

Baseline risk assessments were completed in the early 1990s for the Milltown Site and evaluated the following:

1. Human health risks associated with contaminated reservoir sediments and soils, reservoir biota, and the groundwater plume
2. Ecological risks associated with exposure to contaminants in the reservoir sediments, reservoir biota, and surface water

3. Human health and ecological risks downstream of the reservoir associated with catastrophic releases of sediments from the reservoir

Subsequent agency concerns about fisheries and aquatic life as a result of events like the February 1996 reservoir ice jam incident resulted in the collection of additional biological, toxicological, and water quality data. EPA then conducted additional ecological evaluations of aquatic risk downstream of the reservoir. This *Ecological Baseline Risk Assessment Addendum* was completed in 2000.

Human Health Risks

Significant risks to human health from contaminants at the Site stem primarily from arsenic found in the drinking water aquifer. The arsenic levels are significantly higher than the drinking water standard. Groundwater monitoring does not show the arsenic plume to be expanding significantly; however, with the arsenic source left in place, it would take many centuries for the arsenic concentration to decrease naturally.

Historically, the water in the community of Milltown was supplied by individual wells. In 1981, Missoula City/County Health Department (MCCHD) determined that four of the wells contained water with arsenic concentrations ranging from 0.22 to 0.51 mg/L. At the time, the Federal drinking water standard for arsenic was 0.05 mg/L; it has since been lowered to 0.01 mg/L. Studies were conducted and reservoir sediments were determined to be the source of the arsenic. Based on these findings, EPA temporarily solved the problem in 1984 by constructing the Milltown community water supply system.

The baseline *Human Health Risk Assessment* (1993) for the Milltown Reservoir Sediments Operable Unit was prepared to assess potential risks at the Site using standard EPA health risk assessment methods for residential and recreational uses. Local residents, the EPA, the State of Montana, Atlantic Richfield Company, and MCCHD also performed surveys and supplied information on potential exposures. Where information was still incomplete after these efforts, conservative assumptions were used to quantify potential exposures so that risks to public health would not be underestimated. Components of the risk assessment included the following:

- Exposure Assessment—Calculated a daily dose of arsenic and cadmium, per body weight, as a result of exposure to impacted soils, sediments, surface water, drinking water, game,

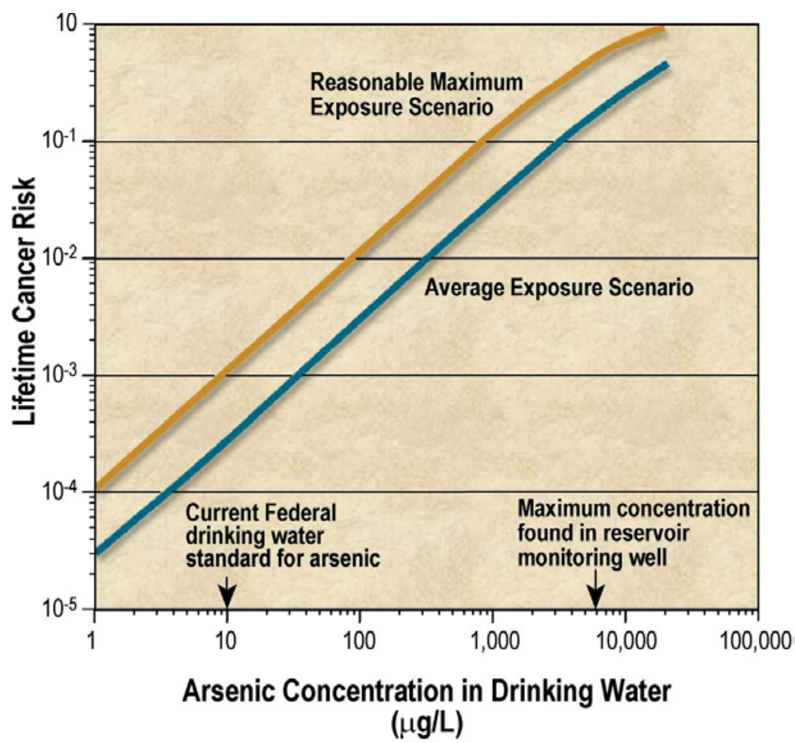


EXHIBIT 3
Cancer Risk from Arsenic

and edible plants. Doses were calculated independently for each route of exposure and each population at risk, under average and reasonable maximum exposure for current and future land-use conditions.

- Toxicity Assessment—Examined the potential for each contaminant to cause adverse effects and provided an estimate of the dose-response relationship between the extent of exposure to a particular constituent and adverse effects, including non-carcinogenic and carcinogenic outcomes.
- Risk Characterization—Chemical exposure estimates were used to develop quantitative cancer and non-cancer health risk estimates for exposure to contaminants.

Non-carcinogenic and carcinogenic risks within the Milltown Reservoir Superfund Site were estimated to be highest for ingesting arsenic-contaminated groundwater. The cancer risk from drinking groundwater contaminated with arsenic was found to be outside of EPA's acceptable risk range. The "acceptable range" for risk of additional cancer incidents from exposure to arsenic has a target of 1 in 1,000,000 (10^{-6} risk). Cancer risks associated with drinking polluted groundwater with arsenic concentrations exceeding 0.010 mg/L could be greater than 1 chance in 1,000 (a 10^{-3} risk), as shown on Exhibit 3, *Cancer Risk from Arsenic*.

Other exposure pathways for humans were determined to be not significant because they do not show risks outside of the acceptable risk range for cancer and non-carcinogenic risks. This included residential use for existing homes near the reservoir and recreational use of the land surrounding it. If the land use immediately surrounding the reservoir changed to residential, human health risks to such exposures would be unacceptable, but this use is not considered likely. Long-term exposures at the Site, other than through consumption of polluted groundwater, would not be associated with a greatly increased non-cancer and cancer risk outside of EPA's acceptable risk range.

Ecological Risks

There are significant risks to aquatic life (fish and macro-invertebrates) from the ice scouring of sediments containing elevated levels of metals (particularly copper) or from potentially catastrophic releases of sediments if the dam were to fail during a flood or earthquake. In its present condition, the dam does not meet the high hazard standards set by FERC, and, in order to meet these required standards, the dam would have to be significantly upgraded. The EPA *Ecological Risk Assessment Addendum* prepared in response to the February 1996 ice scour event indicated a moderate, acute risk to trout species during high flow and ice scour event releases. During the 1996 ice scour event, the dissolved copper concentration measured in the Clark Fork River below the dam was 30 micrograms per liter (µg/L). By comparison, the Federal water quality criteria for protection of aquatic life is 13 µg/L for acute and 9 µg/L for chronic effects (at a water hardness of 100 mg/L). Total recoverable copper concentrations of 770 µg/L were also measured during this event, compared to the state water quality standard of 14 µg/L for acute and 9.3 µg/L for chronic effects. Concentrations were likely higher during the peak of this event but, unfortunately, samples could not safely be collected during the peak.

Rainbow and brown trout populations dropped 62 percent and 57 percent, respectively, between the summers of 1995 and 1996. Juvenile trout populations dropped 70 percent to 85 percent. Bull trout (a threatened species under ESA) and rainbow trout are believed to have similar tolerance levels for metals, and while it is not possible to make actual estimates (because of the small numbers in the Clark Fork River below the dam), it is believed that bull trout populations were also reduced. Recovery of the trout populations takes several years after such an event. It is very difficult to predict the frequency of this type of scouring event, but anecdotal information indicates that a significant ice scouring event has occurred about every 5 to 10 years (1974, 1981, 1986, and 1996).

The original baseline ecological risk assessment addressed risks to aquatic and terrestrial wildlife that may be exposed to contaminants within Milltown Reservoir. Without recognizing the risks from ice scour or high flow events, these original studies found minimal risk to the environment as a result of the existing levels of metals and arsenic contamination found in the reservoir sediments, and no acute risks were identified. The terrestrial and wetland wildlife are diverse and appear to be healthy. The ecological studies of Site-wide terrestrial habitats indicated "a lack of observable impacts to terrestrial or aquatic communities, including vegetation, small mammals, muskrats and beaver, waterfowl, songbirds, and deer." Visual observations indicated good species abundance of aquatic plants and amphibians, and relatively healthy and diverse wetland habitats. Further, surface water toxicology tests indicated no acute effects to exposed amphibians. Macroinvertebrates, 90 percent of which are metals pollution-tolerant species, do not appear to have decreased in abundance.

It is the judgment of both EPA and DEQ that the Proposed Action identified in this Proposed Plan is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment at or from the Milltown Reservoir.

Remedial Action Objectives

EPA and DEQ met on numerous occasions with local governments, residents, and other interested parties to listen to their concerns and suggestions relative to cleanup goals and objectives for the Milltown Reservoir Sediments Operable Unit. Below are the preliminary remediation goals and preliminary remedial action objectives (PRAOs), resulting from this process.

Preliminary Remediation Goals

The preliminary remediation goals for the Milltown Reservoir Sediments Site are to:

- Restore the groundwater to its beneficial use within a reasonable time period using monitored natural recovery.
- Protect downstream fish and macroinvertebrate populations from releases of contaminated reservoir sediments, which occur with ice scour and high flow events.
- Provide permanent protection from catastrophic release through dam failure.
- Provide compliance with ESA and wetland protection through consultation with the FWS, the Confederated Salish and Kootenai Tribes, and the relevant State agencies.

Groundwater PRAOs

For groundwater, the main PRAOs are to:

- Return contaminated groundwater to its beneficial use within a reasonable timeframe, and prevent ingestion until drinking water standards are achieved.
- Comply with State groundwater standards, including nondegradation standards.
- Prevent groundwater discharge containing arsenic and metals that would degrade surface waters.

Surface Water PRAOs

For surface water, the main PRAOs are to:

- Achieve compliance with surface water standards, unless a waiver is justified.
- Prevent ingestion of or direct contact with water posing an unacceptable human health risk.
- Achieve acute and chronic Federal Ambient Water Quality Criteria.

Applicable or Relevant and Appropriate Requirements

The applicable or relevant and appropriate requirements (ARARs) are the basis for most preliminary remediation goals. Specific ARARs for surface water are provided in Exhibit 4, and ARARs for groundwater are provided in Exhibit 5.

Overall, the proposed action is predicted to comply with most ARARs for this Site. In certain circumstances, an ARAR may be waived at a site. A waiver must be invoked for each ARAR that will be exceeded or not attained.

EXHIBIT 4
Surface Water ARARs – Montana WQB-7 Standards (total recoverable – 100 mg/L hardness)

	Acute* Aquatic	Chronic* Aquatic	Human Health
Arsenic	340 µg/L	150 µg/L	10 µg/L (MCL/ anticipated WQB-7)
Cadmium	2.1 µg/L	0.3 µg/L	5 µg/L
Copper	14 µg/L	9.3 µg/L	1,300 µg/L
Iron	1,000 µg/L	--	--
Lead	82 µg/L	3.2 µg/L	15 µg/L
Zinc	120 µg/L	120 µg/L	2,100 µg/L

* Federal Ambient Water Quality Criteria are also ARARs. They are identical to the Montana WQB-7 acute and chronic standards except they are for dissolved rather than total recoverable analyses.

EXHIBIT 5
Groundwater ARARs (Dissolved) (More Stringent of Federal or State Standards)

Arsenic	10 µg/L
Cadmium	5 µg/L
Copper	1,300 µg/L
Lead	15 µg/L
Zinc	2,100 µg/L

Groundwater standards would be expected to be met in all areas within a reasonable period of time following completion of remedial action construction. Where production rates are suitable for water supply purposes, groundwater standards are expected to be met within 4 to 10 years following sediment and dam removal. No waiver of groundwater standards is proposed for this action. There may be limited areas where sediments are left in place and pore water within these sediments exceeds groundwater ARARs, but these areas would not contribute significant amounts of contamination to the underlying aquifer. The measured points of compliance will be within the aquifer beneath residential, commercial, agricultural, and recreational areas surrounding the present reservoir, and the area beneath and near the disposal unit.

For surface water, the Proposed Action for this operable unit is not expected to achieve compliance at all times with the State's WQB-7 standards because of continued contaminant loading originating upstream of the reservoir which is outside the scope of this operable unit and cleanup. The proposed action does include removal of sediments behind the dam, and this action will reduce the contribution of contaminants of concern to the Clark Fork River that originates from the reservoir area and will likely eliminate the potential for negative impacts on aquatic life during ice scour events.

Upon completion, the Proposed Action is expected to address the contaminant loading to surface water from this operable unit in a manner that prevents this operable unit from contributing directly to exceedances of the water quality standards. The upper Clark Fork River is being addressed under a separate cleanup action, and that action will not achieve full compliance with WQB-7 standards or affect contaminant loading from much of the upper river below Reach A. Therefore, the number of exceedances of the WQB-7 standards at the Milltown Operable Unit is expected to be similar to the number seen directly upstream of the operable unit. Neither the Proposed Action nor any of the alternatives can change this. Attainment of ARARs or application of ARAR waivers for upstream contamination will be addressed under the upstream operable unit cleanup actions.

Implementation of the Proposed Action would require the use of best management practices (BMPs) and temporary replacement standards during construction (see the *Compliance with ESA During Construction* subsection under *Detailed Description of the Preferred Remedy* which begins on page 30 below).

Exhibit 12, in the *Detailed Description of Preferred Remedy* section, lists temporary standards to be used during implementation of the project. State (WQB-7) standards would be waived during construction, and temporary standards would be put in place of these standards. The proposed waiver is based on Section 121(d)(3)(A) of CERCLA, which provides for the waiver of standards on an interim basis. This waiver is consistent with 75-5-308 and 318 MCA, sections of the State's Clean Water Act, which allow for temporary standards during response actions. Effluent associated with dredge water may require a temporary waiver of discharge standards in a similar fashion, with treatment required if temporary standards cannot be met. EPA has worked cooperatively with the State agencies on these issues.

Such short-term exceedances during construction are low risk, and these measures are expected to result in overall long-term benefits and meeting ARARs in the future by removing the source of contamination. For example, removing sediment and the dam means that the potential for significant water quality impacts from ice scour events will no longer exist. Also, 4 to 10 years after sediment and dam removal, groundwater ARARs are expected to be met in areas within the alluvial aquifer where production rates are suitable for water supply purposes. Eventually, EPA expects that all groundwater will achieve ARAR standards, except possibly for limited sediment pore water in locations in Sediment Accumulation Areas 4 and 5.

The handling and disposal of wastes from the remedial activities will comply with solid waste ARARs for excavated waste and the constructed waste repository. Soils with low levels of contaminants left in place will be primarily out of the floodplain after dam removal and the remedial action is completed. State floodplain and solid waste ARARs do not apply to this material.

Summary and Evaluation of Alternatives

Three major Feasibility Studies during the past 6 years evaluated various cleanup options:

- **Original Draft FS (1996)—**Evaluated cleanup alternatives for the identified groundwater plume contamination to address identified human health risks. A total of 23 alternatives were considered and 8 alternatives were evaluated in detail. Because of the ice scour event of February 1996 and resulting surface water quality impacts, EPA decided it was necessary to prepare a supplemental Focused FS.
- **Focused FS (2001)—**Evaluated cleanup alternatives to mitigate potential risks to downstream aquatic life resulting from ice and flood sediment scouring. A total of 10 alternatives to mitigate surface water impacts were evaluated in detail following standard EPA guidance. In addition, the Focused FS considered all FERC-mandated dam upgrades and fish passage for any alternatives involving retaining the dam.
- **Combined FS (2002)—**The Combined FS incorporates the most effective components of the groundwater cleanup from the original 1996 FS with the alternatives proposed for mitigating surface water impacts in the 2001 Focused FS. Eleven final alternatives were evaluated in detail and are summarized in Exhibit 6, denoting various cleanup actions involving the dam, reservoir sediments and channel, and the groundwater plume, where applicable.

As described in Exhibit 6, many remedial action alternatives have been carefully evaluated. These alternatives range from "No Action," to various scenarios for modifying the dam, to scenarios for leaving the dam in place and removing varying amounts of sediments, to still other scenarios of dam and sediment removal.

The alternatives were evaluated according to the National Contingency Plan (40 CFR Part 300.430 [a][1][i]). The process entailed comparing the relative performance of each alternative with each of the seven threshold and balancing evaluation criterion, as listed in the sidebar box on page 19. Exhibit 7 shows the relative ranking of each alternative against the criteria.

The objective of this comparison is to identify the advantages and disadvantages of each alternative relative to the others and consider the tradeoffs. This evaluation found that Alternative 1 clearly did not meet the threshold criteria and Alternatives 2B, 3A and B, 5, 6A and B, 7A1 and 7B had significant shortcomings under the ARAR compliance or modifying criteria (e.g., long-term effectiveness, cost, or implementability).

Of the remaining alternatives, two have received the most extensive review and consideration during the remedy selection process: **Alternative 2A: Modification of Dam and Operational Practices plus Groundwater Institutional Controls,** and **Alternative 7A2: Dam Removal with Partial Sediment Removal of the Lower Reservoir plus Groundwater Institutional Controls and Natural Attenuation within the Groundwater Plume.**

While EPA believes both alternatives (2A and 7A2) would be protective of down-stream aquatic life in the short term (protecting against release of contaminated sediments), only Alternative 7A2 is a permanent solution; and only Alternative 7A2 would restore the Milltown drinking water aquifer in accordance with ARAR compliance and the Superfund directive to restore aquifers when feasible. This remedy would have the additional benefits of returning the Blackfoot and Clark Fork rivers to a free-flowing state and improving the fishery.

EPA's Evaluation Criteria

Threshold Criteria—Must be Addressed

1. Overall Protection of Human Health and the Environment—*Must be protective of human health and the environment.*
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)—*Includes state and federal regulations; where ARARs cannot be met, a waiver is required.*

Balancing Criteria—Must be Considered

1. Long-Term Effectiveness and Permanence
2. Reduction of Toxicity, Mobility, and Volume
3. Short-Term Effectiveness
4. Implementability
5. Capital and Operating and Maintenance Cost

Modifying Criteria—Must be Considered after Issuance of Proposed Plan

1. State Acceptance
2. Community Acceptance

EXHIBIT 6
Cleanup Options Considered in the Combined Feasibility Study

Alternative	Action to Dam*	Action to Channel and Floodplain Sediments	Action to Groundwater Plume
1—No Further Action	Dam Safety Upgrade. Add Fish Passage	None	Maintain Replacement Water Supply
2A—Modification of Dam and Operational Practices plus Groundwater Institutional Controls (GW ICs)	Dam Safety Upgrade. Add Fish Passage. Add Inflatable Rubber Dam (IRD)	None	Maintain Replacement Water Supply. Add Controlled GW Area
2B—Modification of Dam and Operational Practices plus GW ICs and Containment and Natural Attenuation within the Aquifer Plume	Dam Safety Upgrade. Add Fish Passage. Add IRD	None	Add Slurry Wall, add controlled GW area, maintain replacement water supply
3A—Modification of Dam and Operational Practices with Scour Protection plus GW ICs	Dam Safety Upgrade. Add Fish Passage. Add IRD	*Channel*: Add Soft Stream-bank Stabilization *Floodplain*: Add Revegetation	Maintain Replacement Water Supply. Add Controlled GW Area

EXHIBIT 6
Cleanup Options Considered in the Combined Feasibility Study

Alternative	Action to Dam*	Action to Channel and Floodplain Sediments	Action to Groundwater Plume
3B—Modification of Dam and Operational Practices with Periodic Removal and Channelization plus GW ICs and Containment and Natural Attenuation within the Aquifer Plume	Dam Safety Upgrade. Add Fish Passage. Add IRD	*Channel*: Do Limited Sediment Removal and Channelization with Armoring plus Periodic Sediment Removal	Add Slurry Wall, Maintain Replacement Water Supply. Add Controlled GW Area
5—Dam Removal, Partial Sediment Removal with Channelization and Leachate Collection/Treatment, plus GW ICs and Natural Attenuation within the Aquifer Plume	Dam Removal	*Channel*: Limited Sediment Removal in Channels. Armor Channels *Floodplain*: None	Add Leachate Collection and Treatment. Maintain Replacement Water Supply. Add Controlled GW Area
6A—Modification of Dam and Operational Practices with Initial Total Sediment Removal of the Lower Reservoir and Periodic Sediment Removal Thereafter, plus GW ICs and Natural Attenuation in the Aquifer Plume	Dam Safety Upgrade. Add Fish Passage. Add IRD	*Channel*: Removal *Floodplain*: Total Sediment Removal below Duck Bridge	Source Removal. Maintain Replacement Water Supply. Add Controlled GW Area. Natural GW Quality Improvement
6B—Modification of Dam and Operational Practices with Total Sediment Removal of the Entire Reservoir plus GW ICs and Natural Attenuation within the Aquifer Plume	Dam Safety Upgrade. Add Fish Passage. Add IRD	*Channel*: Total Sediment Removal of Lower Reservoir *Floodplain*: Total Removal below Duck Bridge	*Same as 6A, above*
7A1—Dam Removal with Total Sediment Removal of the Lower Reservoir plus GW ICs and Natural Attenuation within the Aquifer Plume	Removal	*Same as 6B, above*	*Same as 6A, above*
7A2—Dam Removal with Partial Sediment Removal of the Lower Reservoir plus GW ICs and Natural Attenuation within the Aquifer Plume	Removal	*Channel*: Total Sediment Removal of Lower Reservoir *Floodplain*: Total Removal of Sediment Accumulation Area I	*Same as 6A, above*
7B—Dam Removal with Total Sediment Removal of the Entire Reservoir plus GW ICs and Natural Attenuation within the Aquifer Plume	Removal	*Channel*: Sediment Removal from Entire Reservoir/Channel Reconstruction *Floodplain*: Sediment Removal	*Same as 6A, above*

*Dam modifications: upgrading the dam to withstand the probable maximum flow; installing fish ladders; and installing an inflatable rubber dam to replace the existing stanchion/flashboard assembly. It should be noted that all upgrades of the dam for safety reasons or fish passage are dictated under FERC's authority, not Superfund authority. These items (i.e., upgrades, fish passage) have been included in the FS for cost comparison only.

Alternative 2A is a less expensive alternative, easier to implement during construction, and has fewer short-term impacts on the community and downstream aquatic life. However, Alternative 2A is not a permanent solution and it does not address groundwater pollution and the cleanup does not meet groundwater ARARs . In addition, it does not provide permanent protection from impacts of catastrophic dam failure and ice scour.

When weighing the relative strengths and weaknesses of these two remedies, EPA and DEQ found that Alternative 7A2 provided:

1. Better overall protection of human health and the environment.
2. ARAR compliance within the contaminated aquifer.
3. Better long-term effectiveness and permanence by fully addressing potential catastrophic releases and the associated risks to aquatic life.

EXHIBIT 7
Comparative Analysis of Alternatives for the Milltown Reservoir Combined Feasibility Study

	Comparative Analysis of Remedial Alternatives*						
	Threshold Criteria		Balancing Criteria				
Alternatives	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, and Volume Through Treatment	Short-Term Effectiveness	Implementability	Capital/ Operating and Maintenance Cost
1	Not Protective	NR	NR	NR	NR	NR	NR
2A	M-H	M	M	L-M	H	H	H
2B	M	M	M	M	M-H	M	M-H
3A	M-H	M	M	L-M	H	M-H	M-H
3B	M	M	M	M	M	M	M
5	M	M	L-M	M	M	M	L-M
6A	M	M-H	M-H	M-H	L-M	M	L-M
6B	M	M-H	M-H	M-H	L	M	L
7A	M-H	M	H	M-H	L-M	M	L-M
7B	M-H	M	H	M-H	L	L-M	L

Notes:

*Alternatives are scored based on relative achievement of the criterion compared to other alternatives using the following ranking system: L = low achievement; L-M = low to moderate achievement; M = moderate achievement; M-H = moderate to high achievement and H = high achievement.

4. Increased surface water ARAR compliance which does not rely on long-term operation and maintenance of the dam and the potential uncertainties of the FERC dam licensing processes.

Additionally, the lack of reliable institutional controls to prevent groundwater use at Milltown over the long term was influential in evaluating the two potential remedies. EPA and DEQ recognize the potential for negative short-term impacts to aquatic life and issues associated with actually removing the dam and sediments; however, EPA and DEQ believe these impacts will be short-term in nature occurring only during construction. EPA and DEQ believe these short-term impacts can be reduced and successfully managed through careful design of the remedy. In this regard, EPA has worked closely with the Army Corps of Engineers (USACE), the FWS, and state agencies to identify BMPs and temporary standards. Finally, EPA considered the strong state and community support for the dam and sediment removal option. There has been substantial community input to date, and a large segment of the surrounding population and the City and County governments of Missoula strongly urged EPA to select the dam and sediment removal option. EPA will more fully consider community acceptance after the public comment period ends. Additional rationale for the selection of Alternative 7A2 as the Proposed Action is provided in the *Proposed Action* section.

During the development of the proposed plan, Region 8 also received some comments advocating sediment removal and leaving the dam in place. This option did not score highly in the Combined FS because it is costly and does not provide a permanent remedy since numerous dam upgrades and periodic dredging would be required. It is also less likely to result in complete aquifer restoration because it does not remove the hydraulic pressure created by the elevated reservoir surface; pressure that forces contaminants into the aquifer.

Proposed Action

The EPA Proposed Action is a derivation of Alternative 7A2 (subsequently referred to as the "Preferred Remedy" or "Proposed Plan"), which was described in the previous section.

The proposed cleanup plan would remove 2.6 mcy of the most highly contaminated sediments and the dam. The features of the key sediment accumulation areas (SAAs) in Milltown Reservoir are listed on Exhibit 8, and the extent of the areas is shown on Exhibit 9. Removal of the primary contaminant source area contributing to the groundwater arsenic plume and removal of the dam, which reduces the hydraulic head pushing the contaminants into the aquifer, would allow the aquifer to recover 4 to 10 years after removal of the dam.

The replacement water supply program and implementation of temporary groundwater institutional controls are necessary to protect human health until the recovery of the aquifer is complete.

Downstream impacts on aquatic life during ice scouring events would also be reduced by removing the most highly contaminated sediments and by installing erosion control measures (such as revegetation, other engineered controls, bank protection, and grade control). The potential for catastrophic release of sediments and the associated impacts on aquatic life would also be eliminated by the removal of the dam.

The removal area is designated as SAA-1, shown in Exhibit 10, *Major Features of the Proposed Action*. EPA estimates that 85 percent of the sediments would be hydraulically dredged and transported by slurry line to a lined downstream repository located about 4,000 feet from the primary removal area and outside the 100 year flood plain. The remaining mechanically-removed surface sediments would be mulched, then slurried to the downstream repository or transported across the river to the repository by rail, truck, or conveyor system. EPA expects that fill materials for the channel and floodplain reconfiguration would come from the excavation of the downstream repository.

Sheet piling or coffer dams would be used as the primary method to prevent sediment re-suspension from SAA-1. Dredge water treatment would be provided, if necessary, to control discharge of dissolved metals and total suspended solids. The spillway and radial gate portion of the dam would be removed. The remainder of the powerhouse will not be removed as part of the Superfund cleanup but could be removed under restoration or redevelopment activities. Grade control will be necessary to protect bridges and prevent unacceptable upstream headcutting.

Significant community, county, State, and trustee involvement is planned for restoration and redevelopment of the Site through a separate but coordinated process. In July 2002, EPA announced a Superfund Redevelopment Award to be used by the community for redevelopment planning. As a result of this Superfund Redevelopment Award, a community working group is forming to help guide site redevelopment and restoration efforts. The Site has also been nominated as a candidate for the joint EPA and USACE "Urban Rivers Restoration Demonstration Program. "The trustees and county have discussed potential restoration and redevelopment options with EPA. Ideas presented to date include fish and wildlife habitat development along the Clark Fork River channel, off-stream wetlands development, a more natural Clark Fork River

EXHIBIT 8
Characterization of Sediment Accumulation Areas

Description	See Note	Area Designation				
		I	II	III	IV	V
Sediment Thickness (feet)	1	10-25	3-18	5-10.5	2-12	3-12
Area (acres)	2	86	44	51	207	166
In-place Volume (million cubic yards)	3	2.6	0.76	0.86	1.2	1.52
Avg. Arsenic in Sediments (mg/kg)	1	320	71	34	200	125
Avg. Arsenic in Sediments (mg/L)	1	2.43	0.006	0.063	0.014	0.010
Avg. Cu in Sediments (mg/kg)	1	2,300	400	232	1,303	940

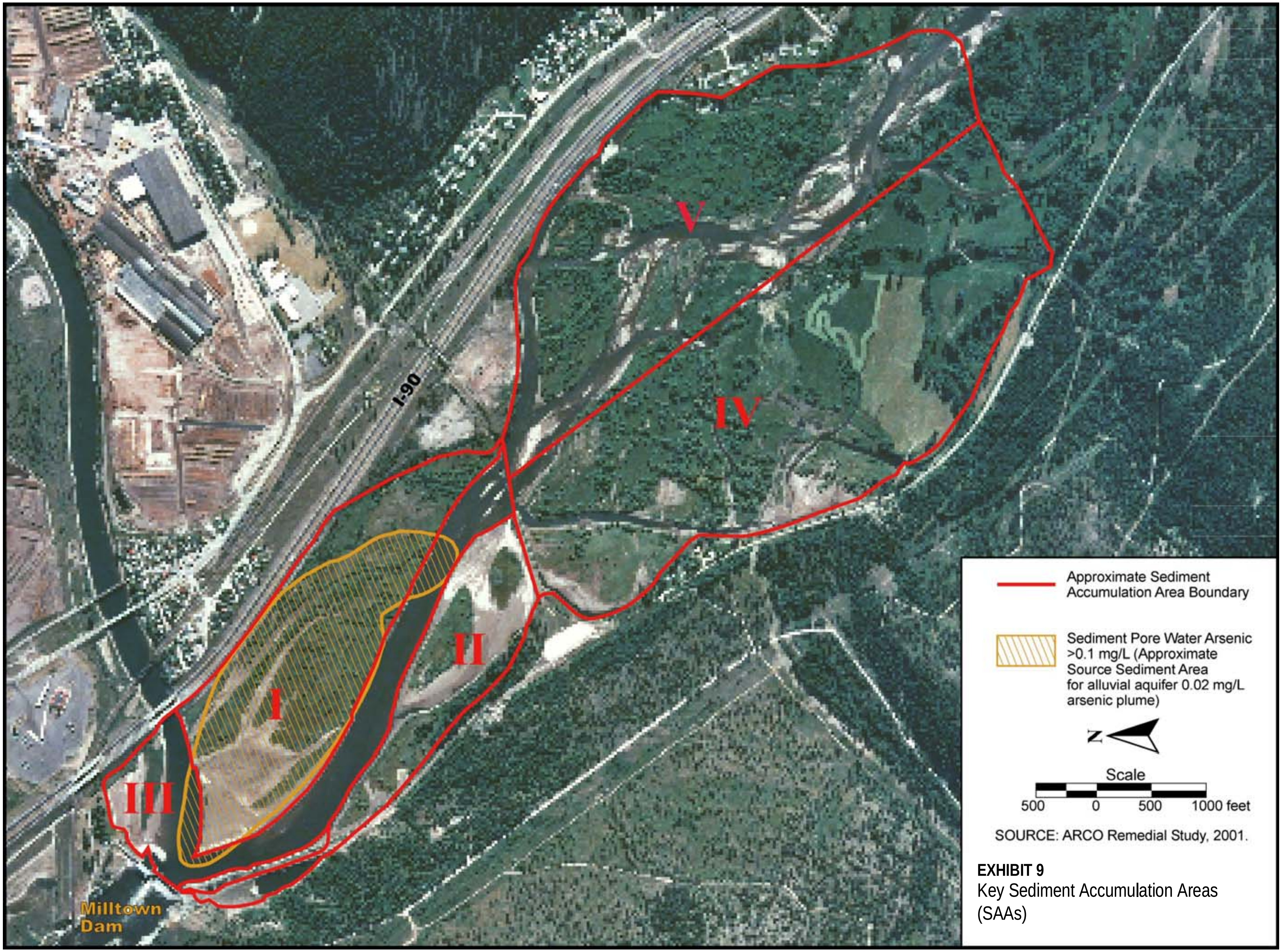


EXHIBIT 9
Key Sediment Accumulation Areas (SAAs)

Draft Conceptual Remediation Plan

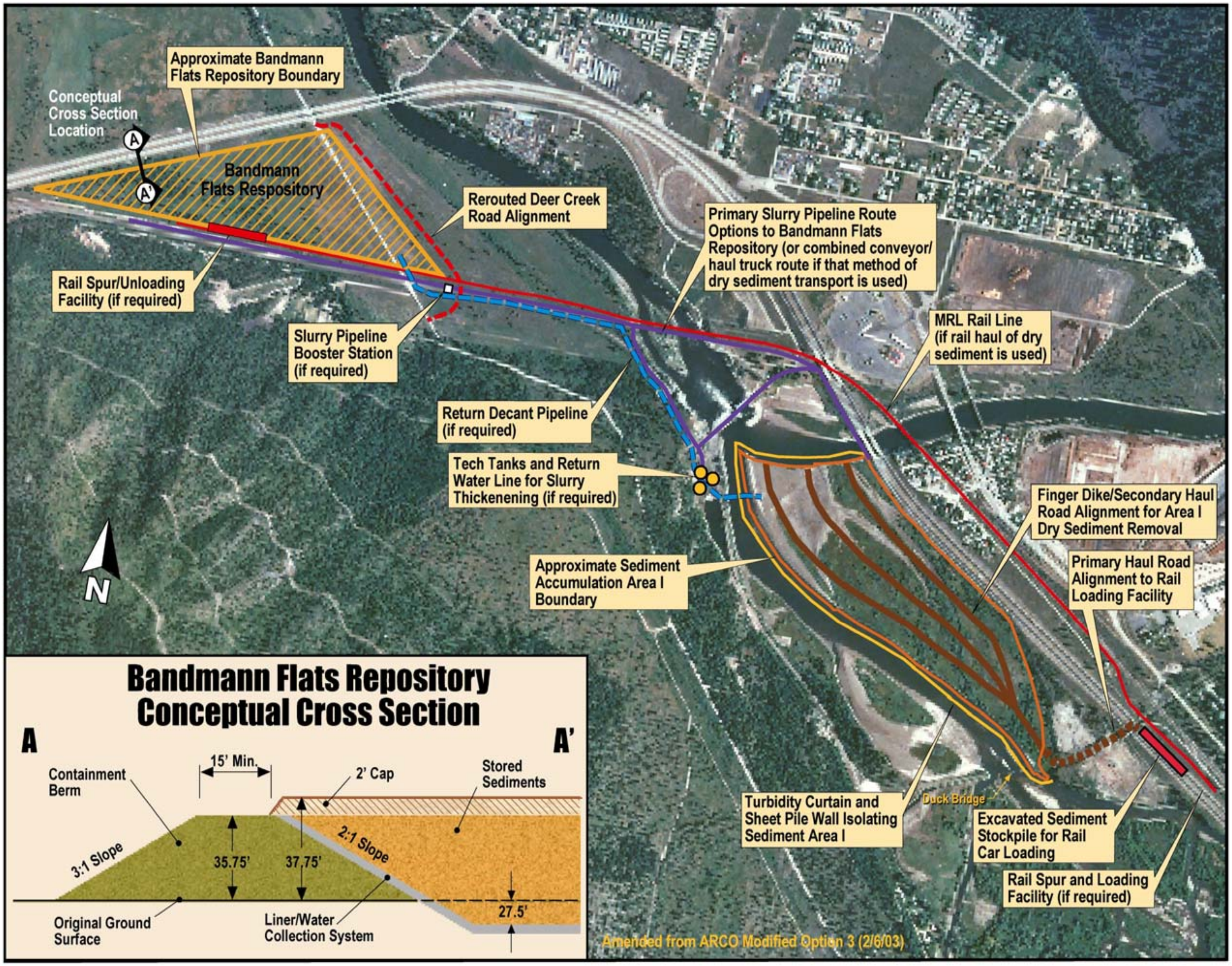


EXHIBIT 10
Major Features of the Proposed Action
**The conceptual plan may change after the public comment period or during the remedial design process.*

channel, park development, development of the Blackfoot River channel as a whitewater recreational area, completion of the trail system in the area (including a pedestrian bridge to tie the Clark Fork/ Missoula trails with the Bonner area communities and the Blackfoot River corridor) and the possible creation of a museum with certain powerhouse features. Any such restoration and redevelopment activities would be funded independently of the Superfund remedial cleanup.

Coordination with the Federal Energy Regulatory Commission

EPA has worked closely with the Federal Energy Regulatory Commission or FERC to coordinate the licensing of the Milltown Dam under the Federal Power Act and EPA's Superfund proposed plan to remove the Milltown Dam as part of the cleanup of the MRS operable unit. After the release of this Proposed Plan, NorthWestern Energy Corporation and its subsidiary will submit an application for surrender of NorthWestern's Federal Power Act FERC license (FERC No. P-2543) for the Milltown Dam.

The license surrender application will be subject to action by FERC, after the conclusion of the public comment period on both the proposed plan and the surrender application. If granted, FERC's order accepting surrender of the Milltown Dam license may describe, among other things, NorthWestern's operating obligations while the Milltown Reservoir Sediments Operable Unit cleanup goes forward. Actual surrender of the license by NorthWestern would occur when the dam is removed under the CERCLA process – estimated to be 2009.

NorthWestern's license surrender application will rely in part on the extensive EPA investigations and studies and alternatives analysis of the Milltown Dam area contained in the MRS Operable Unit Remedial Investigations and Feasibility Studies and the EPA administrative record for the MRS operable unit, to satisfy the National Environmental Policy Act requirements for consideration of the surrender application by FERC. Additional information on the surrender application can be obtained at the FERC Website (www.ferc.fed.us; view Docket No. P-2543)

Further Rationale for Selection of Proposed Action

EPA is proposing this remedy because it best meets EPA's threshold criteria and offers the best opportunity to provide a permanent solution to address the human health and ecological risks posed by the contaminated sediments currently stored behind the Milltown Dam. Reasons for choosing this remedy include the following:

- Recovery of a drinking water aquifer and the ability to meet groundwater ARARs in a reasonable amount of time (4 to 10 years after sediment and dam removal)
- Elimination of the potential for negative impacts to downstream aquatic life from contaminant release associated with ice-scouring, high flow rates, and catastrophic events
- Return of two major waterways (the Clark Fork and Blackfoot Rivers) to their free-flowing state in the project area and allow for unrestricted fish passage
- Substantial improvement of the local trout fishery
- Strength of the state and public support for this approach

This cleanup plan complies with groundwater ARAR standards relevant to Milltown's aquifer which is used for domestic consumption. Implementation of the preferred remedy will allow recovery of the Milltown aquifer within a much shorter time period versus Alternative 2A.

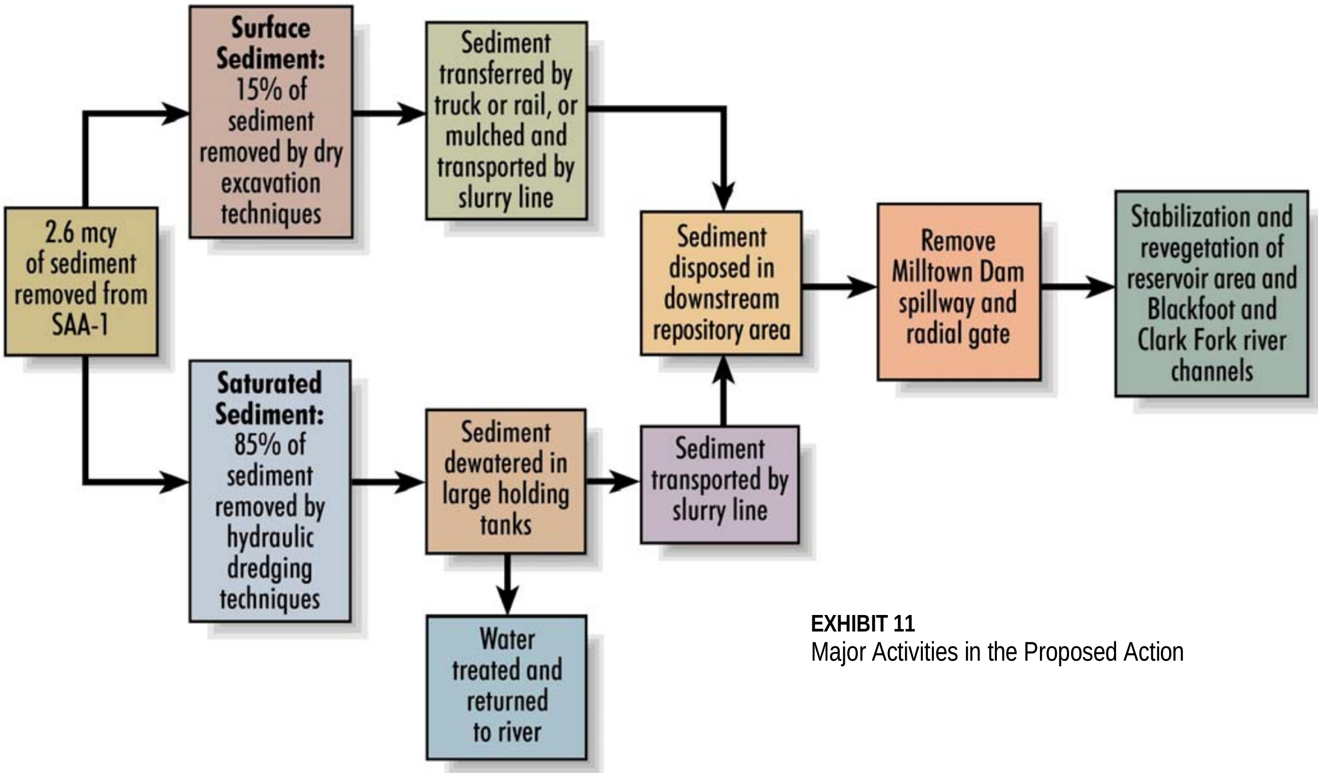


EXHIBIT 11
Major Activities in the Proposed Action

Recovery of the Milltown aquifer is much quicker under the preferred remedy because the major source of groundwater contamination, the reservoir source sediment, and the hydraulic head driving the arsenic into the alluvial aquifer, are significantly changed and greatly reduced. The preferred remedy scored high in long-term effectiveness and permanence in the FS process because it does not require significant ongoing maintenance since the dam and contaminated sediments are removed. It does not rely solely on permanent groundwater institutional controls for protection of human health, which are opposed by the State and county. The proposed cleanup plan is also favored by other federal agencies, the State, and the Tribes, as well as the larger Missoula area community, including local officials, organizations and the general public.

The score for short-term effectiveness for this alternative in the FS process was low-moderate, as compared to alternatives that left the sediment and dam in-place, because of potential negative impacts on downstream aquatic life during dredging. This alternative also scored low-moderate for costs as compared to the sediment and dam in-place option. EPA considers any possible short-term impacts during dredging and the additional expense as acceptable given the long-term benefits to public health and the environment.

Detailed Description of Preferred Remedy

Exhibit 10 depicts the major features of the proposed action and Exhibit 11 shows a general flow chart of the remedy steps. This description of the remedy reflects how the government agencies would implement the remedy, based on current knowledge of the site. If the responsible parties implement the remedy, or if additional information is received during the public comment period or during remedial design, EPA approved alternate designs may be possible. For example, the disposal location, exact removal technique, or transportation methods may be altered.

Sediment Removal, Dewatering, Transportation, and Disposal

The reservoir sediments are divided into two sections: the upper and lower reservoir sediment areas (the Duck Bridge forms the dividing line). These sections were further delineated into sub-areas based on sediment accumulation features (see Exhibits 8 and 9). The lower reservoir is comprised of Sediment Accumulation Area (SAA) I, II, and III. The upper reservoir encompasses SAA IV and V. Removal of the source sediment in SAA-1 is the foundation of the proposed action. Sediments in Areas II, III, IV, and V will be left in place. The sediment deposition area comprising SAA-I contains about 2.6 mcy and is approximately 4,300 feet long by an average of 800 feet wide. It forms an elongated wedge of partially submerged land bounded by the Clark Fork River to the southwest, Duck Bridge to the south, Interstate 90 to the east, and the Blackfoot River channel to the north. This area is oriented southeast to northwest (closest to Milltown Dam) within Milltown Reservoir. Sediment thickness increases in the same orientation from approximately 14 feet in the south, to 20 to 25 feet in the north. Prior to removal activities, sediment in SAA-I will be isolated from the active Clark Fork and Blackfoot Rivers by a wall of interlocking sheet piling driven into the underlying alluvium and extending around the area.

Surface sediment removal, as presently proposed, will be initiated through mechanical means such as tracked excavators or dragline to remove approximately 15 percent of the sediments (about 0.4 mcy) in SAA-I. The excavated materials will be transported to the downstream repository located outside the 100-year floodplain on the south side of the Clark Fork River about 4,000 feet from the primary removal. Transport will be by one of the following:

1. Truck
2. Rail car
3. Slurry line after mulching
4. Conveyor

The decision about how best to transport materials will be made in the design process considering the cost and technical features of the various transportation options.

The remaining lower saturated sediments (about 2.2 mcy) in SAA-I, which comprise about 85 percent of the total sediment volume, could be removed predominantly by using hydraulic dredging techniques-such as cutterhead suction dredges. These dredges are suitable for removing grain sizes from saturated fine sediment to coarse, sand-sized material. Debris encountered during the dredging process will require the use of specialized equipment such as clamshell dredging, if significant quantities are encountered. Hydraulically dredged materials will be pumped as slurry to the downstream repository. Debris and oversized materials that cannot be slurried will be hauled to the repository by truck or rail prior to placement in the dredge ponds and repository.

Removing water from the dredged sediments (“dewatering”) could occur either onsite or at the disposal site after transport using a slurry pipeline. For the proposed action, EPA anticipates that some sediment dewatering will occur in sedimentation tanks with subsequent transport by slurry pipeline to the disposal site. Effluent from removed material may be directed back into the dredge area or may be treated separately for metals and arsenic, if warranted, and discharged back into the river. An analysis of the dredge water quality after settling and other factors done by the USACE indicates that dredge water treatment may not be necessary before discharging it back to the river. Monitoring will be conducted and, if the impacts of returning dredge water to the river are harmful or temporary standards are exceeded, the water will be treated before discharge to the river.

The downstream repository site has a usable footprint of about 80 acres and an engineered capacity of approximately 3 mcy. The disposal site topography, distance from the Clark Fork River channel and groundwater (greater than 50 feet), and proximity to Milltown Reservoir (4,000 feet downstream) make it an ideal local repository site. A detracting characteristic of this site is the relative ease with which materials can pass through the underlying soils. This makes it necessary to install a synthetic liner and leachate collection system. The other detracting feature of the site is the overland access if trucking of materials to the disposal site is necessary. This would entail a route through the Bonner / Milltown community. In contrast, access by pipeline and rail is excellent. At this time, it is anticipated that most of the sediment could be slurried and conveyed to the repository through a pipeline. Several pipeline corridor options were proposed. They included a moveable / floating pipeline that crosses the Clark Fork River above the Dam and follows the west side of the river to the downstream repository site. A second option would cross the Blackfoot River at the Interstate Bridge and the Clark Fork River at the dam and through the railroad tunnel or cross the Clark Fork on the existing railroad trestle below the Milltown Dam structures before extending to the repository site.

The repository would be capped in accordance with State solid waste standards. Long-term operation and maintenance of this repository and the smaller repository created by the Montana Power Company upstream of the dam would be required, with monitoring, and periodic evaluation.

A key technical issue in implementing the proposed action will be to control, contain, and prevent the release of sediment during removal activities to protect downstream water quality and aquatic resources. The sediment management program that will be implemented to accomplish this considers OSWER Directive 9285.6-08, *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites.*

An important part of the sediment management program will be to monitor the Site during and after sediment remediation to assess and document the effectiveness of the cleanup. To accomplish this, water quality and biological studies will be conducted during and after Site remediation activities to monitor for potential adverse effects on aquatic habitat and organisms. A water quality monitoring station will continuously monitor turbidity on the Clark Fork River downstream of the Milltown Dam Site at the Deer Creek Bridge. Total suspended solids and dissolved and total recoverable metals sampling will be conducted daily. EPA and DEQ have established temporary construction standards to protect human health and prevent acute impacts to the downstream fishery and bull trout. These standards will apply to the river during the construction process. The point of compliance for these standards is proposed at the Deer Creek

Bridge, located about 2.8 miles downstream of Milltown Dam and the site of a current USGS sampling station (Station No. 12340500). Additional BMPs and control actions would be considered if these standards were exceeded or if in-situ bioassays (caged fish) indicated the need. The construction standards established for this project are shown in Exhibit 12.

Biological monitoring will be conducted downstream of Milltown Dam and at control stations to assess whether or not Site cleanup activities may be affecting aquatic life. Caged fish bioassays will be used to assess the protectiveness of the temporary construction standards, while seasonal or annual measurements of fish and benthic macroinvertebrate communities will be used to assess longer-term impacts. Results from these monitoring activities will be used to adjust construction activities or BMPs to avoid acute impacts on fish.

Compliance with ESA During Construction

The minimization methods proposed during construction of this remedy include use of a sheet pile system and / or silt curtains to isolate and control sediment and metals release; dredge water treatment, if necessary, to control the discharge of dissolved metals; other BMPs such as controlling reservoir pool level to minimize scouring; and timing and sequencing activities to minimize impacts. EPA will coordinate and conduct cleanup activities in a manner that will facilitate fish passage while the dam is in place. In the long term, it is considered beneficial to fishes to implement cleanup and dam removal quickly and in an environmentally safe manner. Therefore, time sensitive actions related to cleanup and dam removal may hold priority over fish passage needs. Even though extensive minimization methods are proposed, there is still a chance that bull trout will be negatively impacted by the construction

EXHIBIT 12
Milltown Reservoir Sediments Site
*Proposed Temporary Construction Related Water Quality Standards**

Cadmium—Acute AWQC	2 µg/L	short-term (1 hour)
Copper—80% of the TRV (dissolved) (at hardness of 100 mg/L)	25 µg/L	short-term (1 hour)
Zinc—Acute AWQC (dissolved)	117 µg/L	short-term (1 hour)
Lead—Acute AWQC (dissolved) DWS (dissolved)	65 µg/L 15 µg/L	short-term (1 hour) long-term (30-day average)
Arsenic—Acute AWQC (dissolved) DWS (dissolved)	340 µg/L 10 µg/L	short-term (1 hour) long-term (30-day average)
Iron—AWQC (dissolved)	1,000 µg/L	short-term (1 hour)
Total Suspended Solids (TSS)	550 mg/L 170 mg/L 86 mg/L	short-term (day) mid-term (week) long-term (season)

*All hardness related AWQC values assume a hardness of 100 mg/L.
TRV = Toxicity Reference Value, used in proposed plan for the Clark Fork River Operable Unit.
AWQC = Federal Ambient Water Quality Criteria.
DWS = Federal Drinking Water Standard.

activities and could result in "incidental take" of individual bull trout. FWS' Biological Opinion is expected before the ROD for this Site is issued. Bald eagles will be protected through appropriate consultation and minimization measures.

Channel Reconstruction

Upon completion of sediment removal, a new channel with an associated floodplain will be constructed. In the conceptual design, the new channel will align with a historic channel that runs adjacent to the Interstate. *Please note that an alternate design could be adopted during the restoration planning process*.

EPA estimates that reconstructing the floodplain and channels consistent with the upstream template will require approximately 0.9 mcy of floodplain backfill, and construction and shaping of approximately 6,700 feet of new channel (5,400 feet of Clark Fork River channel and 1,300 feet of Blackfoot River channel). When completed, the existing Clark Fork River channel will be protected, backfilled, and re-graded into floodplain for the new channel.

Control structures will be constructed on the Blackfoot River at the Interstate end of the reconstructed channels to mitigate upstream headcutting associated with dam removal and the resultant drop in river base level. A number of different types of control structures could be used to mitigate the potential for headcutting. Structures that use more natural gradients and vegetative armoring are available and create a more natural-appearing channel.

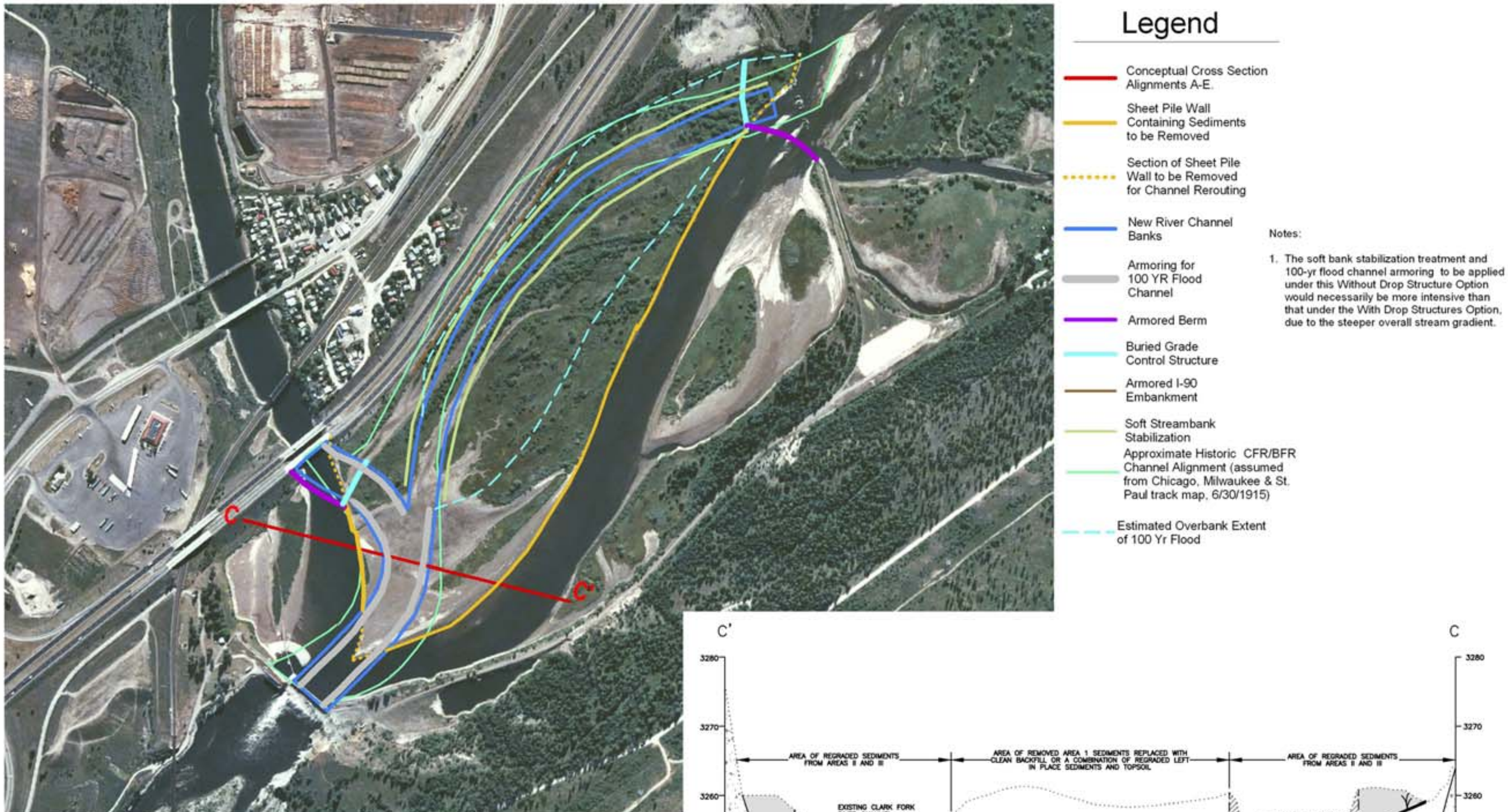
EPA anticipates that the reconstructed Clark Fork and Blackfoot River channels will be approximately 150 to 222 feet wide, with a typical water depth of approximately 4 feet under average flow conditions. Native alluvium exposed after the removal of the overlying sediments is assumed to be acceptable as bed material for the reconstructed channels. Stream banks will be constructed at a "bank full height" that allows for flow over the banks every 1.5 to 2 years. Bank stabilization of the reconstructed channels will be necessary to maintain geomorphic stability. Stabilization could include softer bioengineering approaches using vegetation, degradable fabrics, and deformable toe protection using smaller-sized rock riprap. To minimize the amount of channel grading and floodplain backfill required, it is assumed that the centerlines of the reconstructed channels will generally follow the line of minimum elevation in the post-removal exposed alluvium surface. Exhibit 13 presents a conceptual plan view and cross-section of the reconstruction and alignment of the post-remedy Clark Fork River Channel and confluence with the Blackfoot River. This portion of the channel is designed to accommodate a 100 year flood event and is not designed for a 1.5 to 2 year overbank flow.

Milltown Dam Removal

Dam removal will be completed after the sediment removal and channel/control structure construction work. Because of the potential for scouring and high levels of suspended solids, dam removal would be staged to minimize impacts on the downstream fisheries and users. EPA estimates one construction season will be needed to complete dam removal.

Replacement Water Supply Program/Temporary Groundwater Institutional Controls

EPA and DEQ are aware that some temporary groundwater institutional controls may be necessary during and immediately after construction to address



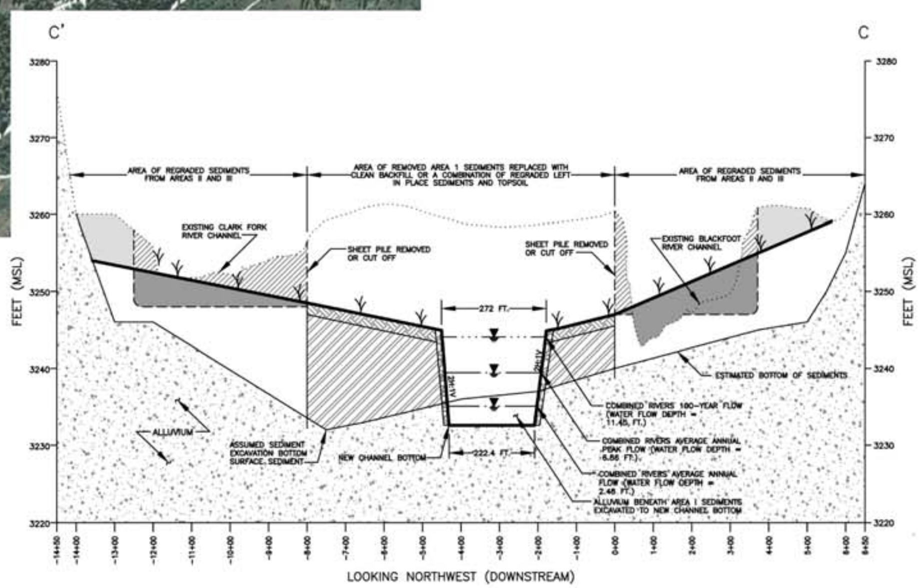


EXHIBIT 13
Conceptual Plan View and Cross Section of Stream Channel/Floodplain Remedial Reconstruction of Milltown Reservoir Site

potential human health risks by limiting the use of the groundwater until the aquifer recovers through natural attenuation. Groundwater institutional controls during construction and until the aquifer recovers (4 to 10 years after dam removal) include the following:

- Providing continued funding for maintaining the existing replacement water supply for Milltown residents
- Making contingency funds available to reconfigure, expand, or update replacement water supplies
- Establishing a temporary controlled groundwater area to ban future wells within or immediately adjacent to the arsenic plume

Several institutional controls are already in effect, routinely enforced, and currently contribute to the protection of public health and the environment. These controls include the following:

- Missoula County land use plans
- Missoula County subdivision regulations
- Missoula County Zoning
- Missoula County development regulations for utility service extensions
- Missoula Valley Aquifer Protection Ordinance-Controls well use in the county as well as private land use controls

Some of these, or similar controls, may need to be developed or refined to ensure appropriate land use where wastes are left in place and where the repositories are located.

Implementation of the Proposed Action

The basic approach to implementing the proposed action is as follows:

- Issue ROD
- Implement public planning process for redevelopment conceptual design
- Complete preliminary and final remedial design packages for the remedial action which will include a detailed work breakdown structure with schedule addressing the following:
  - Acquisition of any necessary property or environmental permits (no permits are expected)
  - Design of solid waste repository
  - Sediment isolation, removal, loading and conveyance facilities
  - Accommodations for interim fish passage
  - Water management plans; water treatment facilities (if needed)
  - Water quality monitoring programs
  - Design of new channel / floodplain / control structures and preparation of plans and specifications for construction
  - Coordination of restoration and redevelopment activities with the public.

A potential sequence of events for implementation of the design and construction of the project might proceed as follows:

- Construct waste repository, slurry pipeline, and dry material loading and unloading rail facilities.

- Concurrently install sheet pile walls around SAA-I and prepare waste excavation area and removed sediment staging area.
- Initiate the early stages of a water quality monitoring plan for both the Clark Fork River and the Milltown alluvial aquifer.
- Excavate sediments mechanically, by hydraulic dredge, or by a combination of technologies as needed.
- Transport sediments to the repository.
- Construct a new channel for the Clark Fork River in alignment with the historic channel; construct control structures at appropriate locations along the Blackfoot and Clark Fork Rivers. Upon completion, redirect the Clark Fork River into the new channel.
- Backfill the old channel and finish re-contouring and stabilizing the new floodplain.
- Remove the spillway and radial gate portion of the dam.
- Close and maintain the repository.

Implementation Schedule

The potential schedule for implementation of the proposed remedy is summarized below. This schedule is likely to change based on public participation activities, final design components and sequencing, and yearly variations in hydrologic conditions.

2003	Record of Decision
2003-2004	Planning and Remedial Design
2005	Contracting and Infrastructure Construction
2006-2008	Sediment Removal
2009-2010	Dam Removal and Channel Stabilization and Revegetation Activities
2011	Restoration and Redevelopment Activities
2011 - Future	Operation and Maintenance and 5-year reviews

Community Participation and Public Support of the Cleanup

There is a rich history of stakeholder involvement at the Milltown Reservoir Sediments Site. Area residents first became involved in 1981 when the MCCHD found levels of arsenic above the Federal drinking water standard in Milltown drinking water wells. Now, some 20 years later, local interest has never been higher.

Throughout the years, EPA has worked closely with the local community members and organized groups, as well as the Clark Fork River Technical Assistance Committee (CFRTAC). For example, through a broad-based group called the Milltown Endangerment Assessment Committee, members of the public were actively involved in developing the Human Health and Ecological Risk Assessments. Similarly, the public was informed and involved during the development of the Continued Releases Risk Assessment. CFRTAC and other stakeholders (for example, the Clark Fork Coalition, Trout Unlimited, Bonner Development Group, Bonner-Milltown Community Forum, members of the public, the State, Confederated Salish and Kootenai Tribes, City and County of Missoula, Mountain Water, USACE, and FWS) regularly attended and participated in meetings of the Feasibility Study Development Group. These stakeholders reviewed and provided input into the *Ecological Risk Assessment Addendum*, the Focused FS, and the Combined FS. Recently, EPA has held public meetings, open houses, posted flyers, issued fact sheets and postcards, held numerous meetings (with property owners, community groups and local elected officials), made presentations, made TV appearances, issued press releases and public service announcements, participated in media interviews, posted comprehensive information on the internet, and is updating the Community Involvement Plan for the Site.

The State of Montana strongly supports dam and sediment removal. Four different departments within the State of Montana (DEQ, MFWP, Department of Natural Resources and Conservation, and the Department of Justice—Natural Resource Damages Program) involved in the Milltown Superfund project have expressed support for dam and sediment removal, citing the importance of cleaning up a drinking water aquifer, providing a permanent remedy that does not rely on perpetual operation and maintenance of an old dam, restoring the native and recreational trout fisheries, and returning the Clark Fork and Blackfoot Rivers to their natural, free-flowing state. Montana's Governor voiced the support of her office for a sediment and dam removal remedy in her State of the State address on January 21, 2003. Montana's Attorney General also supports dam and sediment removal, saying, "the waste can be cleaned up, the dam removed, and the Clark Fork and Blackfoot rivers returned to their natural courses." The two other natural resource trustees at the Site, the Confederated Salish and Kootenai Tribes and the FWS, are both on record strongly in support of dam and sediment removal. All of these parties concur with the Proposed Action. In addition, Missoula city and county governments have both passed resolutions calling for dam and sediment removal and restoration of the Clark Fork and Blackfoot rivers. EPA has received more than 10,000 public comments. To date, 99 percent of these comments support dam and sediment removal.

This is an important time to express your opinion about what type of cleanup you'd like to see for the Milltown Reservoir Sediments Site.

The public comment period runs from April 15, 2003 to June 20, 2003.

Please Comment!

For more information:
http://www.epa.govregion8/superfund/sites/milltowndamou.html

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