Return to Start Page

Clark Fork River Operable Unit

of the Milltown Reservoir/Clark Fork River Superfund Site

Record of Decision

Part 1: Declaration

U.S. Environmental Protection Agency Region 8

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April 2004

Contents

Section **Page**

1 Declaration 1-1
1.1 Site Name and Location 1-1
1.2 Statement of Basis and Purpose 1-1
1.3 Assessment of Site 1-1
1.4 Description of Selected Remedy 1-1
1.5 Statutory Determinations 1-7
1.6 Data Certification Checklist 1-9
1.7 Authorizing Signatures 1-10

Exhibits

1-1 Location Map 1-2
1-2 Sources of Copper to Surface Water at Turah, 1998 1-5

Part 1: Declaration

Site Name and Location

Site Name:	Clark Fork River Operable Unit of the Milltown Reservoir/Clark Fork River Superfund Site (OU #3)
CERCLIS Identification Number:	MTD980717565
Site Location:	Missoula, Granite, Powell, and Deer Lodge Counties, Montana

Statement of Basis and Purpose

This decision document presents the Selected Remedy for the Clark Fork River Operable Unit (Clark Fork River OU) of the Milltown Reservoir/Clark Fork River Superfund Site, in Montana, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record file for this site.

The State of Montana concurs with the Selected Remedy.

Assessment of Site

The response action selected in this *Record of Decision* is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

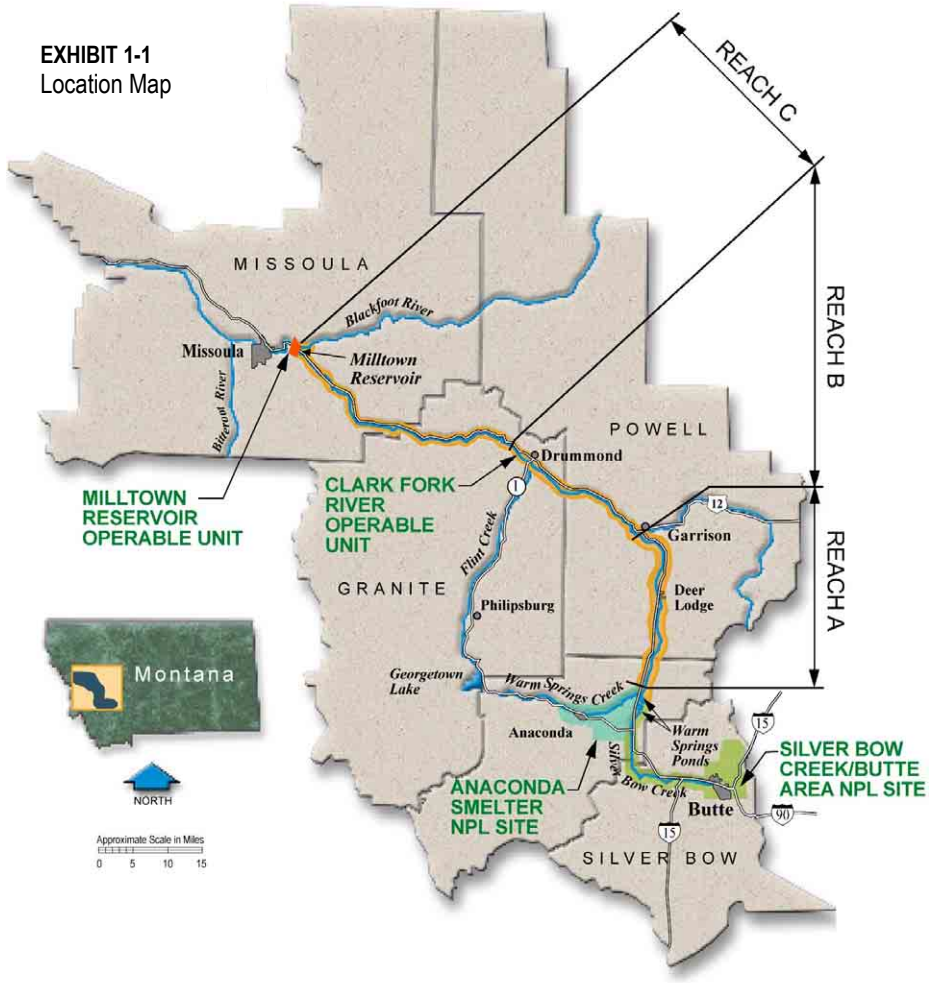
Description of Selected Remedy

The Environmental Protection Agency's (EPA's) selected remedy for the Clark Fork River OU combines portions of three alternatives that were analyzed. The following is the Selected Remedy for Reach A and for limited areas within Reach B. No action is proposed for Reach C (see Exhibit 1-1, *Location Map*):

- The *Record of Decision* defines exposed tailings areas. Exposed tailings will be removed, and the excavated area revegetated, with a limited exception. The limited exception is for exposed tailings that are 400 square feet or less, less than approximately 2 feet in depth, and contiguous with impacted soils and vegetation areas. When this exception is present, in-situ treatment will be done.

- The *Record of Decision* defines areas of impacted soils and vegetation. In most instances, areas of impacted soils and vegetation will be treated in place, using careful lime addition and other amendment as appropriate, soil mixing, and re-vegetation.
- Some impacted soils and vegetation areas (impacted areas) will be removed where depth of contamination prevents adequate and effective treatment in place, where saturated conditions make in-situ treatment unimplementable, or where post treatment arsenic levels, after one re-treatment attempt, remain above the human health action level for the current or reasonably anticipated land use. Further definition of the exceptions for depth and saturation is contained in Part 2, Sections 13.3 and 13.6 of this *Record of Decision*.
- The Clark Fork River Riparian Evaluation System (CFR RipES) process will be used in remedial design to identify exposed tailings and impacted areas, and areas where the exceptions to removal or in-situ treatment will apply.
- Streambanks will be stabilized primarily by "soft" engineering (with limited hard engineering where conditions warrant) for those areas classified, through the use of the CFR RipES process, as Class 1 or Class 2 streambanks, and an approximate, flexible 50-foot riparian buffer zone will be established on both sides of the river. This will lessen the high rate of erosion and contaminant input from streambanks, prevent or reduce the

EXHIBIT 1-1
Location Map



uncontrolled release of contaminants, and partially address potential stream braiding as a result of overbank flows. Stream stabilization techniques are further described in the *Record of Decision*, and include an emphasis on protecting against shear stresses on unstable banks. Subsequent remedial design activities and the CFR RipES process will define the streambank classifications, the most practical and effective methods, and the exact locations for streambank stabilization. The riparian buffer zone width will be flexible, depending on landowner needs and the nature of the stream at a given location.

- Opportunity Ponds will be used for disposal of all removed contamination.
- Weed control for in-situ treatment, streambank stabilization, and removal areas is a major component of the Selected Remedy. It is further described in Part 2, Section 13.10 of this *Record of Decision*.
- Best Management Practices (BMPs) will be used throughout Reach A and in limited areas of Reach B to protect the remedy. BMPs are to be contained in landowner specific plans, and will be used to ensure land use practices are compatible with the long-term protection of the Selected Remedy.
- Institutional Controls (ICs) and additional sampling, maintenance, and possible removal or in-situ treatment of contamination will be required to protect human health. The trestle area in Deer Lodge is a recreational area that will be addressed under the *Record of Decision*. Specific ICs identified as necessary are as follows: continued county zoning regulations, deed restrictions and permanent funding for Arrowstone Park, and a groundwater sampling program and use controls to prevent domestic consumption of contaminated groundwater until the groundwater reaches cleanup levels.
- Monitoring during construction, construction BMPs, and post-construction environmental monitoring are required.
- Because the National Park Service has specific cleanup needs and responsibilities under the laws that govern National Historic Sites, such as the Grant-Kohrs Ranch National Historic Site, the Selected Remedy is modified and expanded in this *Record of Decision* for this area. Those components of the *Record of Decision* are described in Part 2, Section 13.7.

Role of the Clark Fork River Operable Unit

The Clark Fork River OU is one of three OUs in the Milltown Reservoir/Clark Fork River Superfund Site. The other OUs are the Milltown Water Supply OU and the Milltown Reservoir Sediments OU.

The Clark Fork River OU will address principal and low level unacceptable threats to human health and the environment for the Clark Fork River. The Deer Lodge Valley Historically Irrigated Lands Time Critical Response Action is a removal action within the Clark Fork River OU being implemented to address threats to human health in areas near Deer Lodge, Montana, by cleaning up known yards and fields that exceeded risk-based criteria for arsenic in soils. It will become part of the Clark Fork River OU Selected Remedy. The Milltown Reservoir Sediments OU and the related Milltown Water Supply OU are a separate geographical area located downstream of the Clark Fork River OU.

Description of Contaminants of Concern and Source Areas

The heavy metals and arsenic in the Clark Fork River OU, listed below, are from historic mining, milling, and smelting processes linked primarily to the Anaconda Copper Company operations in Butte and Anaconda:

- Cadmium
- Arsenic
- Lead
- Copper
- Zinc

Copper contamination is emphasized in the Selected Remedy because it is present in significant concentrations within the mining and smelting wastes, it has a large and consistent data set, it is the most toxic of the metals to aquatic life in this river system, it can be toxic to plants in the floodplain, and it is used as an indicator for other contaminants. In addition, specific soil cleanup levels for arsenic, the major contaminant affecting human health and a potential contributor to risks to aquatic life, are set forth in this *Record of Decision* in Part 2, Section 13.11. Performance standards address all of the contaminants of concern.

The primary sources of contamination in Reach A are tailings and tailings mixed with soil in streambanks and the historic floodplain. These sources provide pathways to plant and animal life, and to humans who come in contact with the soils. Contaminants move from tailings and impacted soils through the process of erosion, directly into the river and other surface waters. This movement provides pathways to terrestrial and aquatic life. In addition to erosion of tailings and impacted soils, metals are leached directly from the tailings into groundwater and surface water.

Following is a list of exposure pathways of concern at the Clark Fork River OU:

1. **Surface water**: Surface water runoff from tailings and contaminated soils into the river transports both dissolved and particulate-bound metals and arsenic to aquatic life and creates surface water contamination. Erosion of banks also provides contaminants to surface water and aquatic life.

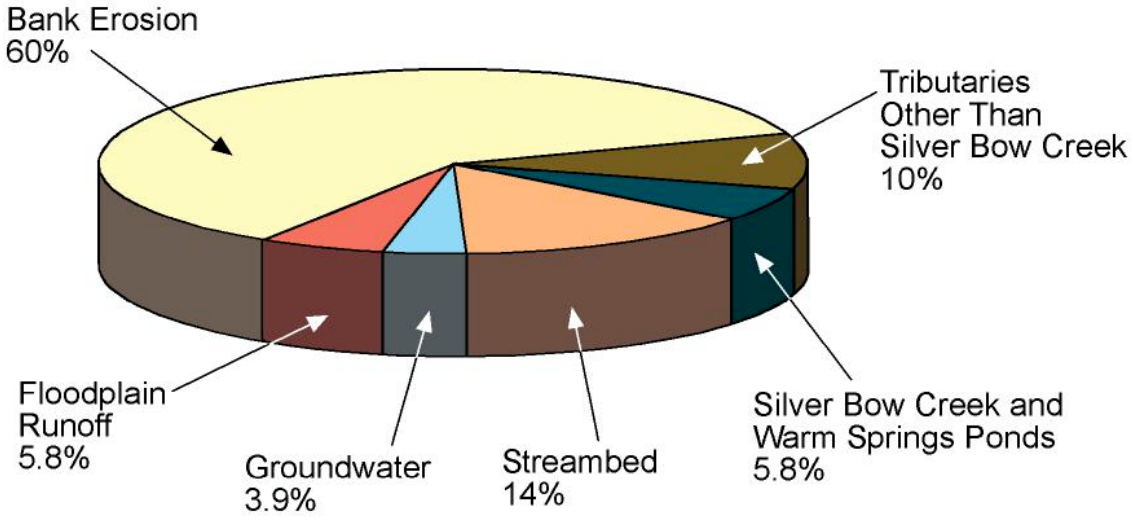
2. **Groundwater**: Movement of groundwater through tailings and contaminated soil causes groundwater to become contaminated.

3. **Streambed sediments**: Stream sediments receive surface water contaminants and contain metal contamination.

4. **Historically irrigated fields**: Irrigation ditches and fields historically irrigated with Clark Fork River water have been contaminated by surface water contaminants. Arsenic from this deposition may create unacceptable human health risks for residences near or on such fields. Sediments in irrigation channels may also present risks to certain workers, particularly at the Grant-Kohrs Ranch National Historic Site.

5. **Biological resources**: Contaminant uptake in plants is a well-documented occurrence that prevents or limits the establishment of vegetation on the land. Aquatic plants and animals receive the contaminants through direct consumption of contaminated sediment, contaminated food sources, or through absorption in water. Wildlife may receive contamination through soil, plant, and animal ingestion.

EXHIBIT 1-2
Sources of Copper to Surface Water at Turah, 1998



6. **Air resources:** Fugitive dust and air impacts are unlikely, including during earthwork and transporation.

The floodplain is severely impacted by the presence of mining wastes. Tailings materials present in the root zone of riparian area soils are toxic to terrestrial plants. The most obvious instances of this toxicity are slickens areas—areas of exposed tailings that generally lack vegetation.

During normal hydrologic conditions, the largest source of copper to surface water in Reach A of the Clark Fork River is bank erosion (see Exhibit 1-2, *Sources of Copper to Surface Water at Turah, 1998*). Exhibit 1-2 shows that floodplain runoff is responsible for only 5.8 percent of the total copper load (primarily dissolved copper). However, it is this source of copper during pulse events (thunderstorms that create runoff into the river) that EPA believes to be the most harmful of all sources of copper to fish and other aquatic life. These estimates represent copper loading during normal hydrologic conditions and do not account for the additional erosion that occurs as a result of floodplain runoff. During overbank flows, it is likely that bank erosion and floodplain runoff increase in significance and volume for contaminant release. Copper loading from both bank erosion (particulate copper) and overland runoff (dissolved copper) must be significantly reduced in order to achieve protectiveness and meet or come close to meeting applicable or relevant and appropriate requirements (ARARs). Streambed sediments make up 14 percent of the copper loading—the second highest source.

Based on these findings and the entire administrative record, EPA has determined that eroding and sparsely vegetated streambanks in Reach A and limited portions of Reach B, and areas of exposed tailings or slickens in the same area, constitute the principal threat waste at the Clark Fork River OU. Other areas, called impacted soils and vegetation areas in the *Feasibility Study*, also present a risk. These areas of impacted soils and vegetation are due to buried tailings and contaminated soils.

Additional Discussion of Vegetation Impacts and Project Sequencing

The lack of floodplain vegetation is caused primarily by metal contamination and related acid generation. This fundamental problem at the Clark Fork River OU leads to a host of other impacts:

- Accelerated bank erosion and channel migration, causing unacceptable chronic risks to aquatic life and land use problems
- Vulnerability of floodplain to destabilization
- Potential and actual environmental hazards to terrestrial and aquatic life, especially from pulse and flood events
- Degraded groundwater quality
- Poor agricultural productivity
- Degraded surface water as a result of metals and sediments loading

To eliminate or reduce these impacts and the other impacts and risks of concern, EPA must address the problem of stressed or absent vegetation and the resulting surface water contamination.

The Selected Remedy is protective and complies with ARARs or is ARAR waiver compliant, reflects a fair balance among the long-term permanence and effectiveness, short term effectiveness, reduction of mobility, toxicity, or volume, and implementability balancing criteria established by the NCP, and takes into account State and community concerns and acceptance. Removal of slickens, in most cases, and removal of impacted soils and vegetation areas as appropriate, reduces reliance on long-term BMPs, ICs, and operation and maintenance. Use of in-situ treatment for significant portions of the impacted soils and vegetation areas will lessen short-term safety risks for workers and the community, lessen environmental impacts, and allow for a faster remedial action construction period. ARAR waivers for copper in surface water and State floodplain and solid waste regulations for waste removal are justified. During implementation, EPA and the Montana Department of Environmental Quality (DEQ) will address concerns regarding the length of time and the intrusiveness of remediation by focusing on sequencing actions to allow for cleanup at various areas and on applying a combination of techniques in a given area.

The five main areas for action and general priority and preference for the type of remedial action in each area is as follows:

1. **Class 1 Streambanks**: Removal of mining contamination, and reconstruction and revegetation of streambanks where chemical conditions do not allow the effective establishment of woody and herbaceous vegetation.
2. **Exposed Tailings or Slickens areas**: Removal of exposed tailings with the limited exception. The limited exception is for exposed tailings that are 400 square feet or less, less than approximately 2 feet in depth, and contiguous with impacted soils and vegetation areas. When this exception is present, in-situ treatment will be done.

3. **Class 2 Streambanks**: Revegetate streambanks where chemical conditions (demonstrated by some level of woody and herbaceous vegetation) allow effective establishment of vegetation. Reconfiguring banks (e.g., scalloping or selective removal) could be required where other treatments may not be effective.
4. **Impacted Soils Areas with Impacted Vegetation**: Perform either in-situ treatment or removal, to be decided by the criteria described in this *Record of Decision* in Part 2, Section 13.6.
5. **Class 3 Streambanks**: Continue or apply BMPs on all other streambanks with deep binding woody vegetation and root-mass that maintains bank stability as appropriate. BMPs are described in this *Record of Decision* in Part 2, Section 13.9.

CFR RipES is a decision making tool described in Part 2, Section 13.6, of this *Record of Decision* that will be used to clearly identify areas for action. For example, the CFR RipES score for each area will help determine whether a streambank area is Class 1, 2, or 3; which areas have impacted soils and vegetation; and which areas have exposed tailings. CFR RipES will be developed so that it will accurately reflect the removal and in-situ treatment criteria set forth in the Selected Remedy. Additionally, BMPs will be necessary for all of Reach A and portions of Reach B addressed in this action. EPA and DEQ plan to work cooperatively with landowners and the Conservation District to establish and maintain these plans.

While the general approach will be to work from the headwaters down, the agencies believe remediation can be done more quickly and effectively and with less threat to river stability by working on discontinuous stretches of the river.

The Selected Remedy calls for remediating Class 1 streambanks as the top priority. Once the Class 1 streambank segments are identified, the adjacent exposed tailings and impacted soils and vegetation areas will be evaluated for necessary remediation and be remediated at the same time on a property-by-property basis. Where slickens or buried channel deposits are present, they will be cleaned up at the same time. Likewise, areas with impacted soils and vegetation will be evaluated for treatment or removal and done at the same time. This will minimize disruption to the floodplain and each individual landowner.

Exposed tailings isolated from streambanks would also be a priority and will be remediated as described above. Class 2 streambanks would be third on the priority list for action. Fourth on the list of priorities for action are the impacted soils and vegetation areas that require in-situ treatment or removal as described above.

Timing of the remedial actions is an important implementation issue. One objective is to minimize the inconvenience to individual landowners. The overall project timeline for the 43 miles of river in Reach A and portions of Reach B is projected to be up to 10 years. This estimate may change during the design and construction phase. Individual landowner operating needs, availability of irrigation water, and the end land use determinations will also impact project schedules and timing.

Statutory Determinations

The Selected Remedy is protective of human health and the environment, is cost-effective, uses permanent solutions and alternative treatment technologies to the maximum extent

practicable, and complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action except for the waivers listed below and described in additional detail in this *Record of Decision*:

- A waiver of the State's WQB7 water standard for copper is invoked for this remedy. The proposed waiver is based on the technical impracticability from an engineering perspective described at section 121(d)(4)(C) of CERCLA. EPA's analysis and basis for this determination is the current modeling projections indicating that none of the alternatives proposed, including total removal of all exposed and buried tailings, would achieve complete compliance with the standard. The substitute standard will be the Federal water quality criteria for copper. The performance standard goal for this replacement standard is to be in compliance during all conditions (low, normal, and high flow, as well as ice conditions) throughout the Clark Fork River.
- State of Montana floodplain and solid waste ARARs require removal from the floodplain of any treated or actively managed mine waste (tailings and soils mixed with tailings) unless a CERCLA waiver condition is invoked. For certain wastes in the floodplain, EPA is invoking the use of the technical impracticality waiver found in CERCLA Section 121(d)(4)(c). The waiver would apply to either exposed tailings areas or impacted soils and vegetation areas designated for in-situ treatment in the selected remedy description. EPA has determined that there exists sufficient uncertainty regarding the technical practicability from an engineering perspective for the very large-scale removal of all mining wastes and contaminated soils, because the heterogeneity and distribution of the contamination would not provide for reliable removal of all the contamination and would not allow the remedy to be implemented within a reasonable time frame. The waiver does not apply to those contaminated areas designated for removal in the Selected Remedy.

The Selected Remedy also satisfies the statutory preference for treatment as a principal element of the remedy (that is, it reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment), by utilizing the in-situ treatment technology for the impacted soils and vegetation areas.

Because the Selected Remedy will result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, statutory reviews will be conducted within 5 years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

Data Certification Checklist

The following information is included in the *Decision Summary* section of this *Record of Decision*. Additional information can be found in the Administrative Record file for this site.

Information Item	Page Numbers in *Record of Decision*
Chemicals of concern and their respective concentrations	2-22 to 2-33
Baseline risk represented by the chemicals of concern	2-17, 2-18, 2-26, 2-27, 2-39 to 2-47
Cleanup levels established for chemicals of concern and the basis for these levels	2-49, 2-50, 2-87 to 2-91, 2-126 to 2-137, 2-143 to 2-145
How source materials constituting principal threats are addressed	2-75, 2-76, 2-79, 2-81 to 2-86, 2-89 to 2-91
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater use in the baseline risk assessment and the *Record of Decision*	2-35 to 2-37
Potential land and groundwater use that will be available at the site as a result of the Selected Remedy	2-35, 2-36, 2-139 to 2-144; especially Section 13
Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected	2-138, 2-143, 2-156
Key factor(s) that led to selecting the remedy (that is, describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision	Sections 7 to 11, 2-81, 2-82, 2-89 to 2-91, Section 14

Authorizing Signatures

The U.S. Environmental Protection Agency (EPA), as the Lead Agency for the Clark Fork River Operable Unit of the Milltown Reservoir/Clark Fork River Superfund Site (MTD980717565), formally authorizes this *Record of Decision*.

Max H. Dodson — 4/29/04

Max H. Dodson
Assistant Regional Administrator
Ecosystems Protection and Remediation
EPA Region 8

Date

The State of Montana Department of Environmental Quality (DEQ), as the Supporting Agency for the Clark Fork River Operable Unit of the Milltown Reservoir/Clark Fork River Superfund Site (MTD980717565), formally concurs with this *Record of Decision*. DEQ has prepared a separate concurrence letter, which is attached to the *Record of Decision* as Appendix F.

Tom Livers — 4/29/04

for Jan Sensibaugh, Director
State of Montana
Department of Environmental Quality

Date