PROPOSED PLAN

for

MINE WASTE REMEDIATION
OPERABLE UNITS 1 & 2

NEWTON COUNTY MINE TAILINGS SUPERFUND SITE
NEWTON COUNTY, MISSOURI

Prepared by:

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1.0 Introduction

This Proposed Plan has been developed by the United States Environmental Protection Agency (EPA) to address the mine and mill waste in Operable Units 1 and 2 of the Newton County Mine Tailings Superfund Site (Site) located in Newton County, Missouri. This plan is published in accordance with the requirements of section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also referred to as the Superfund Law), 42 U.S.C. § 9617.

EPA has coordinated the development of this Proposed Plan with the Missouri Department of Natural Resources (MDNR). EPA is the lead agency and the MDNR is the support agency.

2.0 Purpose of the Proposed Plan

The primary purpose of the Proposed Plan is to present to the public a clear explanation of EPA's Preferred Alternative for addressing mine and mill waste at this Site. The public is encouraged to review and comment on the proposed action. The public is also encouraged to review and comment on the supporting documents in the Administrative Record (AR). The AR is a collection of all the documents and information EPA relied on in developing the Proposed Plan.

A 30-day review and comment period opens on February 1, 2010 and will close on March 5, 2010. A public meeting will be held on February 9, 2010, at 6:30 pm at the Lampo Center, located at 500 East Spring Street in Neosho, Missouri. This Proposed Plan and supporting documents in the AR are available for review during normal business hours at the following locations:

Granby City Hall
302 North Main
Granby, Missouri 64844

Neosho Public Library
201 West Spring Street
Neosho, Missouri 64850

Environmental Protection Agency
Region VII Docket Room
901 North 5th Street
Kansas City, Kansas 66101

After the public comment period is over, EPA will review all comments and make a final decision for cleanup of the mine and mill wastes at the Site. The community's preferences are an extremely important factor and will help determine the final decision on the cleanup, therefore, we encourage the public to provide comments to EPA. EPA's final decision will be explained in a document called a Record of Decision (ROD). Included in the ROD will be a responsiveness summary that responds in writing to significant comments EPA received from the public during the comment period.

3.0 Site Background Information

The Site is located in the northern half of Newton County, Missouri, and is part of the Tri-State Mining District which encompasses approximately 2,500 square miles of Missouri, Kansas, and Oklahoma. The Tri-State Mining District's historic lead and zinc production ranked as one of the highest in the world with total ore production estimated to have been slightly more than 500 million short tons. The Missouri portion of the district accounted for approximately 200 million short tons of the ore production. Mining at the Site was conducted from around 1850 to 1970. The majority of the mining was conducted by underground methods where the mined ore was hoisted from the underground workings and was treated at mills on the surface. At the mills, the crude ore was crushed and sized to less than 5/8 inch, and then concentrated using gravity separation processes, or froth-flotation after about 1920. The wastes, produced from milling of the ore, primarily consisted of the following two types of material depending on the milling process used:

- Chat, which is sand- and gravel-sized particles produced by dry gravity separation processes.

- Tailings, which are sand- and silt-sized particles produced by froth flotation which were slurried to diked impoundments.

After 150 years of mining activities, the presence of chat piles, tailing impoundments, waste mine rock piles, and subsistence ponds resulting from the collapse of underground mined areas are common features of the landscape in Newton County. Much of the total volume of surface mine wastes has been removed and reused over the past few decades. However, there are still hundreds of acres of mining and milling wastes that remain. Much of the wastes are contaminated with residual heavy metals and have the potential to contaminate surface soils, groundwater, surface water, and stream sediments.

The Site is a concern because of the mining and milling wastes remaining on the surface throughout the county. The wastes constitute a significant source of heavy metals contamination with potential for exposure to people and environmental receptors. Past mining and milling practices have also resulted in the contamination of surface soil, sediments, surface water, and groundwater in the shallow aquifer. The primary contaminants of concern are lead, cadmium, and zinc.

EPA placed the Newton County portion of the Tri-State Mining District on the National Priorities List (NPL) on September 29, 2003. The NPL is a national list of superfund sites that prioritizes cleanups in order of the most serious contamination problems and greatest threats to human health and the environment. The Site includes wastes in and around 14 mining camps located within approximately 300 square miles of Newton County. These locations have been grouped into five subdistricts described below. A map of the Site indicating the location of the waste areas is shown on Figure 1.

Spring City/Spurgeon Subdistrict

The Spring City/Spurgeon Subdistrict is located in the west and northwest portions of Newton County. In this subdistrict there are three known mine waste areas: SCS-1, SCS-2, and SCS-3; and two suspected mine waste areas: SCS-4 and SCS-5.

Diamond Subdistrict

The Diamond Subdistrict is located in the north central portion of Newton County. There are three known mine waste areas in this subdistrict: D-1, D-2, and D-3.

Granby Subdistrict

The Granby Subdistrict is located in the east central portion of Newton County. There are three known tailings areas in this subdistrict: G-1, G-2, and G-3.

Stark City Subdistrict

The Stark City Subdistrict is located in the southeast portion of Newton County. There are two known tailings areas in this subdistrict: SC-1 and SC-2.

Wentworth Subdistrict

The Wentworth Subdistrict is located in the northeast portion of Newton County and the southwest portion of Lawrence County. There are four known mine waste areas in this subdistrict: W-1, W-2, W-3, and W-4.

4.0 Scope and Role of the Cleanup Action

As mentioned in the previous section, the investigation and study of the Site included the mining wastes in five subdistricts located within about 300 square miles of Newton County. EPA designated two Operable Units (OUs) for cleanup activities due to the location of the mine and milling wastes and the location of mining operations by various Responsible Parties who are liable for cleanup actions. OU1 is the Diamond, Spring City, and Granby subdistricts, and contains the locations of mines and mills owned or operated by Responsible Parties. OU2 encompasses the remainder of Newton County where no viable Responsible Parties have been identified. This Proposed Plan addresses OU1 and OU2, and includes all subdistricts where mining and milling wastes are located. The perennial, Class P streams that flow through the Site are being assessed as part of the overall Spring River drainage basin in the Tri-State that includes streams in Jasper County as well as Cherokee County, Kansas, and Ottawa County, Oklahoma and are therefore not included in this action.

A preliminary assessment was conducted in the Granby area in 1986 revealing elevated levels of cadmium, lead, and zinc significantly above background concentrations in soil and

groundwater. In 1989, the MDNR reconfirmed elevated lead levels in surface water and soil. An expanded site assessment was conducted in 1995 around Granby, Wentworth, and Stark City that focused on determining heavy metals concentrations in mining and milling wastes, surface soils, surface water, and stream sediments. The discovery of an elevated blood-lead level in a child living in the Spring City area in 1995 resulted in further assessment activities of residential yard soil and private drinking water wells in and around Spring City. As a result of these assessments, EPA expanded its investigations of private water wells and residential yard soil in known mining areas throughout the county.

Due to the large number of private residential drinking water wells identified with high levels of lead and cadmium throughout the Site, EPA began providing bottled water to homes in 1998. This action served as a temporary response action while public water supply systems were designed and constructed as part of the CERCLA removal action to replace the contaminated wells. EPA began construction of the public water supplies in 2003 which is expected to be completed this year. In total, over 100 miles of new public water supply mains will be installed throughout the Site to serve areas with contaminated residential wells. Additionally, approximately 100 individual deep-aquifer drinking water wells have been installed for homes where it was not feasible to install public water supply mains.

In 1999, EPA began a removal action for lead-contaminated residential yard soil in approximately 100 properties in the OU2 portion of the Site. Meanwhile, the Responsible Parties removed lead-contaminated residential yard soil in approximately 300 properties in the OU1 portion of the Site, mostly in the city of Granby, under an Administrative Order on Consent.

Upon completion of the contaminated residential yard soil removal and the installation of public water supplies to replace the private residential water wells, the immediate health risks to people will have been addressed. The remaining exposure risks at the Site result from the presence of the mining and milling wastes located throughout the county. In 2008, EPA conducted a Remedial Investigation (RI), which focused on these wastes and associated soil. After completion of the RI, EPA conducted a Feasibility Study (FS), which was completed in September 2009. The FS assessed the information about the nature and extent of contamination in the subdistricts and developed alternatives for the remedial action for the entire Site. The remedial alternatives developed and evaluated in the FS form the basis of this Proposed Plan.

The cleanup of mining and milling wastes under this Proposed Plan is needed to mitigate the principal threat of exposure from mining and milling wastes to aquatic and terrestrial ecosystems through soils, sediments, and surface water. Additionally, the cleanup of the wastes will mitigate the risks to people living near or recreating on the waste piles. The main component of the proposed remedy is excavation of source materials with disposal in selected on-site mine subsidence pits or constructed on-site repositories. This remedial action is essential to provide long-term protection of human and ecological health from exposure to the mining and milling wastes. The proposed remedy will significantly enhance the effectiveness of earlier OU removal actions by removing the source materials causing the contamination within the Site.

5.0 Site Characteristics

The Site is located in the northern portion of Newton County in southwest Missouri. Approximately 50,000 people live in the area. The climate is continental with moderate winters and long, hot summers. The annual precipitation is about 40 inches. All watersheds of the Site are within the Spring River drainage basin, a 2,600 square-mile basin in southwest Missouri, southeast Kansas, and northeast Oklahoma, and that drains to the Grand Lake of the Cherokees. The principal tributaries of the Spring River in the Site are Shoal Creek, which flows through the central portion of the Site, and Lost Creek, which flows through the southwestern portion of the Site. These two streams are typical Ozark streams where base flows are sustained by springs from limestone in the headwater areas.

Water quality in the Spring River and its tributaries is influenced by runoff and seepage from milling wastes, sediment migration from mining source areas into the streams, runoff from agricultural and urban areas, and wastewater discharge. Surface water chemistry is influenced by groundwater from nonpoint and point sources, mine shafts, and mine subsidence pits. Water quality in the Spring River and its tributaries is regulated by the state of Missouri for various designated uses: (1) livestock watering, (2) irrigation, (3) protection of aquatic life, (4) drinking water supply, (5) whole body contact, (6) boating, and (7) industrial water supply.

Two major aquifers underlie the Site: a shallow Mississippian aquifer and a deep Ozark aquifer. The two aquifers consist of fractured and karst limestone in the shallow aquifer, and the Roubidoux sandstone in the deep aquifer. The two aquifers are separated by a 400-foot-thick sequence of shale and limestone that yields little or no water to wells. This sequence of shale and limestone acts as an impermeable confining layer or semi-confining layer between the two aquifers. The shallow aquifer generally exhibits unconfined or water-table conditions except where the Pennsylvanian shale is present above the limestone. The shallow aquifer hosts the lead-zinc ores. Many private wells tap the shallow aquifer for drinking water and are contaminated with cadmium, lead, and zinc. Public water supplies are drawn from the deep aquifer and from Shoal Creek.

Land use in Newton County is currently dominated by agriculture. The landscape consists of several types of terrestrial communities that include woodlands, grasslands, pastures, old fields, and mine-related areas. Residential, urban, and commercial/industrial areas combined cover about 30 percent of the area. The streams that flow through the Site contain a variety of temperate species, and are characterized by alternating pools and riffles, and mixed sand, gravel, and boulder bottoms.

Approximately 2.8 million cubic yards of mining and milling wastes are located within the Site on approximately 260 acres. The Granby Subdistrict contains approximately 1.5 million cubic yards of waste on 128 acres. The Spring City/Spurgeon Subdistrict contains approximately 1.2 million cubic yards of waste on 126 acres. The Stark City Subdistrict contains approximately

37,000 cubic yards of waste on 3.3 acres. The Wentworth Subdistrict contains approximately 8,000 cubic yards of waste on 1.3 acres. The Diamond Subdistrict contains approximately 1,000 cubic yards of waste on 3 acres.

6.0 Summary of Site Risks

EPA prepared a baseline risk assessment for human health in 1995 and an ecological risk assessment in 1998 for the Oronogo-Duenweg Mining Belt Superfund Site in Jasper County, Missouri. That site is adjacent to the Newton County Mine Tailings Site, and the nature and source of the environmental contamination, patterns of land use and habits, and the prevailing ecological communities are nearly the same, as both sites are part of the Tri-State Mining District. Therefore, the exposure and toxicity components of those risk assessments are also relevant to the Newton County Mine Tailings Superfund Site. Only minimal additional risk characterization was performed for the Newton County Site during the RI phase. Thus, both risk assessments for the Oronogo-Duenweg Mining Belt Site and the additional information gathered specific to Newton County form the basis for decisions made herein regarding human health and ecological risk. A summary of the site risks for Newton County is presented in the sections below.

In general, EPA has determined that the principal threat from mining and milling wastes throughout the Tri-State Mining District is the ecological risks to aquatic biota caused by surface water containing the contaminants of concern (COCs), which are cadmium, lead, and zinc, in concentrations exceeding Missouri's Aquatic Life Criteria (ALC), and potential risks to terrestrial vermivores that may be caused by ingesting metals from soils exceeding threshold criteria. There is also a significant risk to people living on or near the mining wastes, and to trespassers and those who recreate on the waste piles through ingestion and inhalation. The purpose of this Proposed Plan, therefore, is to document EPA's preferred remedial actions to mitigate the unacceptable human and ecological risks. As discussed further in Section 7, the objective is to achieve significant reductions in COC loadings to surface waters as well as reducing risks to terrestrial vermivores. Moreover, the objective is to rely on the engineering and institutional control components of this Proposed Plan to protect residents from the human health risks from exposure to mining and milling wastes.

6.1 Human Health Risk Assessment

The Human Health Risk Assessment (HHRA) addresses exposures to people from inhalation and ingestion of lead, cadmium and zinc, and summarizes both quantitative and qualitative risk. Estimated metal intakes were compared to toxicity values in order to characterize noncarcinogenic effects. For estimating carcinogenic effects, estimated intakes and chemical-specific dose-response data were used to calculate the probabilities of an individual developing cancer over a lifetime. Human exposures to lead were assessed separately from cadmium and zinc, through the use of the Integrated Exposure Uptake Biokinetic Model (IEUBK). The risk assessment identified potential noncancer health risks for children and adults

who live on and near mill wastes, particularly those who also consume backyard garden produce. Human exposure to cadmium and lead in soils, mill wastes, and garden produce accounted for most of the numeric calculated health risk. The assessment showed an unacceptable risk for people living on soils or mine waste with lead levels exceeding 800 parts per million (ppm) lead or 75 ppm cadmium. Since the completion of the Jasper County HHRA, adjustments have been made to the IEUBK model. Applying the current model IEUBK parameters and appropriate site specific information, the residential soil lead concentration that represents an unacceptable risk for people living on lead-contaminated soil or mining wastes would be lowered to 400 ppm.

6.2 Ecological Risk Assessment

The ecological risk analysis for Oronogo-Duenweg Mining Belt Site evaluated potential exposures and risk to aquatic and terrestrial systems at the Site. The evaluation addressed risks to aquatic vegetation, aquatic invertebrates, and fish by comparing the COC concentrations in water samples to water quality criteria and standards and conservative toxicity criteria. As determined in RI Report analysis, concentrations of cadmium, lead, and zinc in surface water do not exceed Missouri's ALC. However, concentrations of cadmium, lead, and zinc in stream sediment exceed sediment toxicity criteria. In addition, cadmium and zinc surface water concentrations in some streams exceed aquatic vegetation toxicity values, and cadmium and zinc sediment concentrations in some stream segments exceed sediment toxicity benchmarks for fish.

Risks to soil function were addressed by comparing COC concentrations to toxicity benchmarks from the literature for plants, earthworms, and other soil invertebrates. Comparisons to phytotoxicity reference values indicate that most mine-impacted soils contain COCs at concentrations that could be expected to adversely affect plant growth. Comparisons to conservative earthworm and other soil invertebrate toxicity benchmarks in the evaluation indicated that mining-related soils contain COCs at concentrations that could be expected to adversely affect earthworm and other soil invertebrate populations.

The analysis evaluated risk to terrestrial receptors by comparing COC concentrations in soil to ecological soil screening levels for specific feeding guilds (i.e., herbivores, vermivores and carnivores) within the terrestrial environment. Comparisons to the feeding guild specific screening levels in the evaluation indicated that mining-related soils contain COCs at concentrations that could be expected to adversely affect populations of terrestrial vertebrates within all feeding guilds examined. The highest risk to adverse effects appears to be associated with terrestrial vertebrates that consume earthworms (i.e., avian and mammalian vermivores) in soils with elevated COC concentrations. The concentrations of metals in soil that would represent an unacceptable risk to terrestrial vertebrates were determined to be 800 ppm lead, 40 ppm cadmium, and 6,400 ppm zinc.

7.0 Remedial Action Objectives

Remedial action objectives (RAOs) for the Site are presented in this section. RAOs are quantitative, medium-specific goals for protecting human health and the environment. RAOs specific to source materials and sediments are presented separately in this section.

7.1 Source Material RAO

The source material RAO is designed to address the potential risks associated with direct exposure to COCs in the mining wastes, chat and tailings, and in the affected transition zone soils. The source material RAO is as follows:

- Control ecological and human health risks from exposure to COCs from mining and milling wastes and affected soils within the Site.

- The action level for terrestrial soils for the source material areas are:
  Lead - 400 parts per million (ppm)
  Cadmium - 40 ppm
  Zinc - 6,400 ppm

7.2 Sediment RAO

Contaminated sediments currently located in the Class P streams will be addressed under a separate OU after remediation of the source materials. The tributaries of the Class P streams will be addressed as part of this remedial action. For purposes of this RAO, sediment source areas are defined as mining and milling wastes that are subject to erosion and those that have already been transported and exist as streambed deposits in the intermittent tributaries, miner's ditches, and wetlands.

Sediments represent a unique category of source materials that have been transported, or may be transported in the future to aquatic environments where they potentially affect water quality and streambed substrate, thereby posing risks to aquatic biota. The sediment RAO is as follows:

- Prevent risks to aquatic biota in Class P streams by controlling the transport of mining and milling wastes from source areas and tributaries to waters of the state.

- The action level for sediments in the intermittent tributaries are:
  Lead - 219 parts per million (ppm)
  Cadmium - 17 ppm
  Zinc - 2,949 ppm

8.0 Summary of Alternative Cleanup Plans Evaluated

EPA developed and evaluated three remedial action alternatives during the FS. The No Action alternative was also evaluated; however, EPA believes that the No Action Alternative is not protective of ecological or human health and does not consider it a viable option. Additionally, each of the alternatives would require, to varying degrees, institutional controls (ICs) to protect and augment the remedy. The three action alternatives focus on mining and milling wastes and affected soils, along with sediments in intermittent tributaries that drain the source areas. Each also entails excavation to remove soils and mining wastes from the floodplains of Shoal Creek and Lost Creek and upland areas and consolidation of these materials in on-site waste containment cells. The primary differences among these alternatives are in the design and construction of the on-site containment cells. The perennial streams, Class P streams that flow through the Site are being assessed as part of the overall Spring River drainage basin in the Tri-State that includes the streams in Jasper County, as well as Cherokee County, Kansas, and Ottawa County, Oklahoma. Sediments in the Class P streams are not addressed under this plan, but will be covered by subsequent remedial decisions once the watershed assessments have been completed and remedial goals have been established. The No Action alternative and the three action alternatives are described below.

8.1 Remedial Alternatives

1. No Further Action – This alternative prescribes no new remedial actions but recognizes and takes into consideration the removal actions already completed at the Site, and the existing institutional control for the installation of new residential water wells.

2. Source Consolidation, In-Place Containment Through Revegetation Using Biosolids – This alternative is a comprehensive alternative that relies on revegetation of source materials inplace as the primary containment method. The actions under this alternative include removal of source materials from the floodplain and upland areas and consolidation of these materials in on-site waste containment cells. The actions would result in numerous disposal areas throughout the Site. Long-term actions include the use of biosolids to treat, revegetate, and stabilize the consolidated mill wastes as well as the unconsolidated upland mill waste deposits that remain on site. These long-term treatment and containment actions are designed to reduce metal loadings to surface water, and sediment transport. EPA studies confirm that biosolids are effective in reducing the bioavailability of metals in plants and facilitating plant growth on metals-contaminated soils and wastes, thereby stabilizing the wastes in terms of the surface water pathway. Biosolids include sludge from municipal waste water treat facilities, poultry and cattle manure, and plant material such as hay or sawdust. Environmental covenants implemented under state law will be implemented to provide long-term protection of the waste containment cell and erosion control features constructed under this alternative.

This alternative would include the following actions:

- Excavation and removal of mining wastes and contaminated soils from floodplains
- Disposal of the excavated mining wastes and soils on existing mining waste piles in upland areas
- Installation of erosion control features around disposal areas to control storm water runoff
- Application of biosolids to the upland mining wastes and contaminated soils to promote vegetation growth
- Seeding of biosolids covered areas with native grasses
- Implement environmental covenants for properties where mining waste and contaminated soils are disposed

3. Source Consolidation, In-Place Containment Using Simple Soil Covers and Revegetation – The remedial actions are essentially the same under this alternative as under Alternative 2. However, instead of using biosolids applications, this alternative reduces the time frame for remedial actions by using simple vegetated soil covers to contain consolidated mill wastes. This alternative further proposes disposing of all source materials into one central repository. Environmental covenants implemented under state law will be implemented to provide long-term protection of the waste containment cell and erosion control features constructed under this alternative. Institutional controls will not be required in the excavation areas since these areas will be remediated to unrestricted soil use levels.

This alternative would include the following action:

- Excavation and removal of mining wastes and contaminated soils from floodplains and upland areas
- Disposal of the excavated mining wastes and soils in one central repository located on an existing mining waste piles in an upland area
- Installation of erosion control features around disposal area to control storm water runoff

- Cap the disposed wastes with an 18-inch simple clay and topsoil cover
- Seed the cap area with native grasses
- Implement environmental covenants for repository property

4. Source Removal and On-Site Disposal in Above Ground Repositories – Alternative 4 prescribes the same degree of excavation and disposal as Alternative 3. However, the source materials are consolidated and disposed in above ground repositories with composite soil covers designed to nearly eliminate infiltration and seepage. ICs will be limited to environmental covenants to protect the repository covers from human disturbances. This remedy would include all the same actions as Alternative 3 except the cap for the disposed wastes would be constructed as an engineered geocomposite low permeability cover. The cap would consist of a lower drainage layer, covered with a low permeable geosynthetic clay layer, then an upper vegetated soil layer.

8.2 Institutional Controls

This section provides information on institutional controls (ICs) that may be required in addition to the engineering actions to preserve the integrity of the remedy after completion. ICs are defined as nonengineered access or land use restrictions designed to reduce or prevent the potential for human exposure to contamination and/or protect the integrity of a response action. ICs may be useful for controlling human and environmental exposures and improving long-term protectiveness of engineering controls.

The ICs under consideration are various types of land use restrictions. Land use restrictions are useful for controlling exposures to on-site waste disposal areas, which would be capped. Also, these types of controls can be useful to protect engineered remedial components such as shaft plugs, diversion ditches, and stream channel and bank stabilization techniques. The community acceptance criteria that EPA uses to fully evaluate this Proposed Plan will provide additional information at the conclusion of the public comment period and will focus the Selected Remedy on any one or more of the following proposed ICs to control capped disposal areas:

- Access controls to prevent human exposure to mill wastes or to protect the engineered components of remedial actions from human disturbance or destruction: Access controls include physical barriers such as fencing and warning signs; and surveillance, including site security systems, guards, or alarms. Any or all of these controls may be implemented to prevent access to the capped disposal areas.

- Dedication of land for public uses such as park land, open space, public recreation, or other public uses: Public acquisition of real property interests may be an

appropriate means of ensuring long-term maintenance, management, and protection of the disposal areas and their caps because the public entity that acquires the interest may be best equipped to control public access and uses of the disposal areas. Also, public funds can be expended to manage or maintain the areas in exchange for the benefit the public receives from public ownership or access. EPA is generally supportive of public ownership of lands to control access and protect human health and the environment provided some engineering controls are utilized in such projects to adequately prevent releases or exposures to hazardous substances. However, EPA generally does not purchase properties for such purposes. Therefore, purchase of land would require private funding or the donation of the property to the local government. Local government would enforce any requirements attached to the land to protect the caps and prevent exposures.

- Land use restrictions that run with the land to ensure long-term protection of the disposal pits or waste repositories: Land use restrictions could include deed restrictions, easements, and other agreements affecting real property interests. Such arrangements could be enforced by the local government under state property laws.

9.0 Summary of the Comparative Analysis of Alternatives

The National Contingency Plan (NCP), 40 CFR section 300, requires EPA to evaluate remedial alternatives against nine criteria to determine which alternative is preferred for clean up. EPA performs this analysis during the FS. The detailed analysis in the FS Report provides an in-depth analysis of the four alternatives compared against the nine criteria. An alternative must satisfy all nine criteria before it can be selected. The first step is to meet the threshold criteria, which are overall protection of public health and the environment and compliance with applicable, relevant, and appropriate requirements (ARARs). In general, alternatives that do not satisfy these two criteria are rejected unless an ARAR waiver is granted.

The second step is to compare the alternatives against a set of balancing criteria. The NCP establishes five balancing criteria which include long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through treatment; implementability; short-term effectiveness; and cost. The third and final step is to evaluate the alternatives on the basis of modifying criteria, which are state and community acceptance.

9.1 Threshold Criteria

The following presents a brief description of how the alternatives satisfy the threshold criteria of overall protection of public health and the environment and compliance with ARARs.

9.1.1 Overall Protection of Human Health and the Environment

This criterion provides an overall assessment of whether an alternative meets the requirement that it is protective of human health and the environment. The overall assessment of

protection is based on a composite of factors from other criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs. A comparative analysis of the remedial alternatives with respect to the overall protection of human health and the environment is given in Table 1.

Alternative 1 (No Action) is not considered protective of human health or the environment because of the continued risks to people and aquatic and terrestrial biota living at the Site. None of the RAOs identified for the Site are consistently met under this alternative. Some or all of the residual wastes will exceed the threshold criteria for humans and wildlife and continue to pose exposure issues for an indefinite time period.

Alternative 2 provides protection of the aquatic environment through early response actions coupled with long-term actions designed to address the sediment RAO. The initial response actions include excavating floodplain/upland barren chat and consolidating these materials in upland areas outside the Federal Emergency Management Agency (FEMA)-designated 100-year floodplains of the Class P streams and undesignated floodplains of the tributary drainages. Interim storm water management measures, including best management practices (BMPs), would be implemented to control runoff and prevent surface erosion on consolidated and upland barren chat deposits.

Long-term actions designed to address the sediment RAO consists of applying biosolids to consolidated tailings, excavated sediments, and vegetated chat to stabilize the metals and promote the establishment of vegetative covers. These actions are expected to reduce dissolved and particulate metal loadings to Class P streams and their tributaries.

Alternative 2 addresses the source material RAO primarily by deep tilling vegetated chat to reduce metals concentrations below the site-specific threshold criteria. In addition, the consolidated materials, upland tailings, and vegetated chat will be treated with biosolids with the intent of reducing the mobility and bioavailability of metals. EPA studies confirm that biosolids are effective in reducing the bioavailability of metals in plants and facilitating plant growth on metals-contaminated soils and wastes, thereby stabilizing the wastes in terms of the surface water pathway.

Applying biosolids and directly revegetating source materials such as tailings and barren chat will not achieve the threshold criteria because simply adding biosolids will not significantly reduce metal concentrations. Human health risks associated with incidental ingestion and direct contact will remain unchanged since no barrier to prevent direct contact with source materials will be provided. Alternative 2 will not meet the source material RAO in areas where tailings and barren chat have been directly revegetated using biosolids based on these criteria.

Alternative 3 will be protective of aquatic resources by addressing the principal surface water threats in the Site through the initial actions of source material removal and capping. The removal of source materials from the floodplains is expected to result in an immediate reduction

in metal loadings to surface waters by containing the source materials and preventing erosion. Alternative 3 would likely achieve protectiveness in the tributaries over a very long time frame.

The use of simple soil covers will allow an aggressive schedule for addressing the RAOs. The local supply of soil for construction of the prescribed soil covers is readily available, so the time frame for completing the remedial actions is not dependent on the availability of biosolids, like Alternative 2. The soil covers prescribed under Alternative 3 are designed to stop erosion and prevent the future transport of mill wastes to surface waters, but will allow some infiltration through the wastes that may result in transport of metals due to seepage from the piles. Nevertheless, the seepage from the capped wastes deposits is expected to be reduced compared with uncapped or directly revegetated mill wastes.

The source materials RAOs are addressed under Alternative 3 by consolidating and capping floodplain/upland source material and upland tailings and barren chat. Upland vegetated chat would be left in place, deep tilled, and revegetated. These engineering actions are expected to achieve the source material RAOs after completion of the remedial action at the Site. In addition, the effectiveness of soil covers is readily measured because effectiveness is directly related to the depth and integrity of the cover soils.

Alternative 4 will be protective of human health and the environment. The proposed remedial actions will nearly eliminate the surface water transport and source material exposure pathways existing under current conditions. The source materials and sediment RAOs would be achieved in an aggressive time frame of two to three years. Compared with current conditions, above ground disposal of source materials will significantly reduce surface water loadings from mining-related sources. This is due to surface runoff and sediment transport to Class P streams and their tributaries being nearly eliminated. In addition, infiltration resulting in mill waste seepage will be significantly reduced compared with current conditions due to the impermeable cover design used to cap the waste repositories.

9.1.2 Compliance With ARARs

This criterion is used to decide how each alternative meets federal and state ARARs, as defined in CERCLA section 121. Compliance is judged with respect to chemical-specific, action-specific, and location-specific ARARs as well as "to be considered" (TBC) requirements that include nonpromulgated criteria, advisories, guidance and proposed standards issued by Federal or State governments. A list of ARARs identified for each alternative is in the FS report. A comparative analysis of remedial alternatives with respect to compliance with ARARs is given in Table 2.

Chemical-Specific ARARs

A list of potential federal and state chemical-specific ARARs is given in Table 3. A principle risk addressed in this Proposed Plan is the exposure of people living on or near the

source materials and to aquatic life from COCs in surface waters. The principle, chemical-specific ARARs with which the Preferred Alternative must comply are the standards and criteria established under the Clean Water Act (CWA) for protection of aquatic life. These standards are established by EPA and state and tribal governments pursuant to CWA regulations at 40 CFR part 131.

The identification of chemical-specific ARARs for surface water in the Site is complex because divergent federal and state water quality standards and criteria exist. Although Missouri's water quality criteria (WQC) may be relevant and appropriate, chemical-specific requirements for surface waters within Newton County, presently the federal criteria are more stringent and more protective. Thus, the remedial alternatives must comply with the federal criteria under CWA regulations. In addition, the federal chronic ALC are also considered relevant and appropriate for Class P streams within the Site because the Class P streams identified as part of the remedial actions flow into Kansas, and Kansas has adopted the federal chronic ALCs for the streams into which the Site's Class P streams flow. In the Class P streams and their tributaries, the federal chronic ALCs are considered relevant and appropriate for purposes of the comparative analysis of compliance with ARARs.

The actions prescribed under Alternative 2 are expected to result in achieving the chemical-specific ARARs under most conditions.

The initial response actions prescribed under Alternative 3 are expected to result in achieving the chemical-specific ARARs in most cases. Under Alternative 3, the federal chronic ALCs in some of the tributaries may not be achieved in the near term. However, they may be achieved over a very long time frame as vegetation matures in disturbed areas and Site conditions return to a state of chemical equilibrium.

The actions prescribed under Alternative 4 are expected to result in achievement of the chemical-specific ARARs in both the Class P streams and their tributaries in a relatively short time frame following implementation.

Action-Specific ARARs

All of the candidate alternatives, except the No Action Alternative, are equally capable of meeting the action-specific ARARs identified for the individual alternatives. A list of potential federal and state action-specific ARARs is given in Table 4.

Regulations governing the land application of biosolids under 40 CFR part 503 are key action-specific ARARs under Alternative 2. Biosolids applications in Newton County would adequately protect vermivores and can be done in compliance with 40 CFR part 503. Hence, this alternative is capable of complying with the substantive requirements of these regulations.

Alternatives 2, 3, and 4 will comply with other action-specific ARARs specifically identified for this alternative, including the federal and state storm water discharge regulations.

The solid waste disposal regulations promulgated under the Resource Conservation and Recovery Act Subtitle D (40 CFR part 257: Criteria for Classification of Solid Waste Disposal Facilities and Practices) are identified as action-specific ARARs. These regulations require that solid waste facilities be located, constructed, and operated in such a manner as to prevent alteration of floodplains and washout of wastes by flood waters that would pose risks to human health, wildlife, land or water resources. In addition, these regulations state that solid waste facilities shall not discharge pollutants to surface waters in violation of the National Pollution Discharge Elimination System (NPDES) under section 402 of the CWA, shall not cause a discharge of dredged or fill materials to waters of the U.S. in violation of section 404 of the CWA, shall not cause nonpoint source pollution of waters of the U.S. in violation of the legal requirements of section 208 of the CWA, and shall not contaminate an underground drinking water source beyond the solid waste boundary. The engineering controls prescribed under Alternatives 2, 3, and 4 are designed specifically to meet or exceed the requirements of the applicable solid waste regulations by consolidating chat deposits outside the designated 100-year floodplains, controlling point and nonpoint source discharges. Hence, Alternatives 2, 3, and 4 are each expected to comply with the action-specific ARARs.

Location-Specific ARARs

All of the candidate action alternatives are equally capable of meeting the location-specific ARARs identified for the individual alternatives. A list of potential federal, state, and local location-specific ARARs is given in Table 5.

To Be Considered

Alternatives 3 and 4 are expected to meet the TBCs identified in Tables 3 through 5. Alternative 2 will not meet the site-specific threshold criteria for all soils and source materials. Simply adding biosolids will likely not reduce COC concentrations in soils or source materials enough to meet the criteria.

9.2 Balancing Criteria

The following presents a brief description of how the alternatives developed in the FS satisfy the balancing criteria.

9.2.1 Long-Term Effectiveness

This criterion addresses the permanence of a cleanup action after the goals of the cleanup have been met. The primary focus of this evaluation is to determine the extent and effectiveness of the controls that may be required to manage the risk posed by treatment residuals

and/or untreated wastes. A comparative analysis of remedial alternatives with respect to long-term effectiveness and permanence is given in Table 6.

Magnitude of Residual Risks

The volume and acreage of mill waste left on Site and the engineering controls prescribed for stabilizing or containing the wastes at full implementation provides a means of comparing the magnitude of residual risks remaining under each of the remedial alternatives. Alternative 1 provides no engineering controls to manage the residual risks associated with approximately 260 acres of land affected by mill wastes. Under Alternative 1, residual risks to human health and to terrestrial vermivores and aquatic biota would remain at or near current levels.

Under Alternative 2, risks associated with source materials will be managed by consolidating the materials outside the FEMA-designated 100-year floodplains of the Class P streams and outside the undesignated floodplains of the tributary drainages. An estimated 170,000 cubic yards of mill wastes will be consolidated, treated with biosolids, and directly revegetated. An additional 1,255,000 cubic yards of source material will be left in place on 194 acres and treated with biosolids and directly revegetated. Approximately 39 acres of upland vegetated chat are anticipated to be deep tilled to reduce metal concentrations below threshold criteria. Hence, the environmental threats, i.e., risks to aquatic and terrestrial wildlife, will be effectively managed. However, residual risks associated with direct contact to source materials will remain.

The use of biosolids and revegetation to stabilize mill waste deposits under Alternative 2 will reduce infiltration and transport of mill wastes by surface runoff by enabling the deposits to be revegetated. Biosolids application alone is not expected to reduce metal concentrations below the threshold criteria in the consolidated and upland tailings and chat deposits. These criteria are based on total metals concentrations that will not be affected by applying biosolids.

ICs will be required for long-term management of residual risks under Alternative 2. However, land area subject to institutional controls is reduced compared to the No Further Action alternative by removing and consolidating chat from approximately 65 acres. Removing the mill wastes from these 65 acres will allow landowners greater flexibility in determining future land uses by reducing the acreage subject to long-term access controls or restrictions on future development. Nevertheless, an estimated 194 acres will remain permanently occupied by mill wastes and will be subject to ICs needed to protect the vegetative covers from human disturbance and prevent future development on the revegetated mill wastes.

Under Alternative 3, source consolidation, coupled with in-place containment using vegetated soil covers, will result in a reduction in residual risk. The use of soil covers on consolidated and upland tailings, barren chat, and vegetated chat will effectively reduce risks to terrestrial vermivores. Under this alternative, an estimated 49 acres of land will be permanently occupied by mill wastes subject to ICs such as access controls and land use restrictions. The

remaining 210 acres of the site will be free from mine waste. Capped mill wastes pose risks to future residents if disposal sites are developed without adequate preventative measures. Alternative 3 will rely on ICs for managing these residual human health risks.

Under Alternative 4, residual materials will remain on-site and above ground. Approximately 1,675,000 cubic yards of mill waste will remain on-site in consolidated, above ground repositories. These repositories will be confined to roughly 58 acres, leaving 201 acres of the site free from mine waste. Risks from the waste materials left on-site will be controlled by placing the wastes in engineered repositories capped with geocomposite cover systems designed to permanently isolate the wastes from the environment. As long as the engineered repositories are protected and maintained through institutional controls on ongoing erosion maintenance of the cap, the residual risks will be controlled.

Adequacy and Reliability of Engineering Controls

The comparison of alternatives with respect to the adequacy and reliability of controls is based on a variety of factors such as treatability testing results, technology literature reviews, modeling results, and engineering judgment.

Alternative 2 prescribes consolidating floodplain and upland source materials which will adequately and reliably meet sediment RAOs by removing the mill wastes from the transport pathway. The initial response actions will result in an immediate reduction in metal loading sources through physical removal and on-site containment. Biosolids applications and revegetation of the consolidated and upland tailings and vegetated chat is partially adequate and reliable for reducing infiltration, controlling runoff, and sediment transport. In addition, studies on the effectiveness of vegetation in reducing erosion and sediment transport from mill waste deposits in the Tri-State Mining District indicates that establishing vegetation on barren mill waste deposits is effective in reducing soil loss and sediment transport. Nevertheless, some erosion and transport of metals by surface runoff will continue to occur under Alternative 2 under full implementation.

Under Alternative 2, an estimated 194 acres will be permanently occupied by mill wastes that will require institutional controls to manage the long-term residual risks and control use. These ICs are expected to include access controls and land use restrictions through environmental covenants. These controls or restrictions will be adequate for ensuring the long-term reliability of the remedy by preventing disturbance of remediated waste deposits. For example in Jasper County, Missouri, the county regulates future land use by county ordinance, which prohibits residential development on mine waste areas unless the waste is addressed prior to building. It is possible under this Alternative that Newton County may consider a county-wide ordinance to allow residential construction under specific controls. Without these access controls and restrictions, the long-term reliability of engineered remedial actions and protection of future residents from exposure to COCs in currently undeveloped areas is uncertain.

Under Alternative 3, soil covers are expected to be a reliable means of addressing the sediment and source material RAOs for the Site. The principle human health risks associated with incidental ingestion and direct contact with mine waste would be effectively mitigated. Soil covers are durable and should be protective in perpetuity unless disturbed by human activities. To prevent future potential disturbance of the capped deposits, institutional controls such as access controls or restrictions on new development would need to be implemented.

The geocomposite covers proposed for use under Alternative 4 will essentially eliminate infiltration of incident precipitation and seepage of metal-contaminated water from the capped repositories. The repository cover systems will be reliable in preventing runoff and sediment transport to surface waters from the surficial mill waste deposits. ICs will be limited to deed restrictions to protect the repository covers from human disturbances.

9.2.2 Short-Term Effectiveness

This criterion addresses the effects of the alternative during the construction until the cleanup is completed and the selected level of protection has been achieved. A comparative analysis of remedial alternatives with respect to short-term effectiveness and permanence is given in Table 7.

Risks to the Local Communities

Short-term community protection concerns are similar under all Alternatives, except No Action, and include possible traffic safety risks, fugitive dust emissions, and heavy metal ingestion. Transporting large volumes of mill wastes on county roads in large, slow-moving vehicles will increase the potential for traffic accidents. These traffic safety risks can be partially mitigated by using on-site haul roads to transport excavated materials. Fugitive dust emissions can be readily mitigated through implementation of conventional dust control measures such as wetting or applying dust suppressants to haul road or material piles. Ingestion of heavy metals can be mitigated by excluding nonworkers from active remediation sites and by implementing effective dust control around nearby residences.

Potential risks to local communities from biosolids applications under Alternative 2 may be negligible provided biosolids are applied in accordance with the requirements specified under state and federal land application regulations, i.e., 40 CFR part 503. However, the local community may perceive the potential risks as high, especially if biosolids are applied near residential areas. The public's perception of risks may be difficult to mitigate and could become an obstacle to the implementation of this alternative. Biosolids can be composted or dried prior to transport to the Site to eliminate any potential for disease transmission, although this may not convince the public that the risks have been reduced, and composting biosolids would be costly.

Risks to Workers

Worker protection issues under all the alternatives include increased traffic safety risks, heavy equipment operations, dust inhalation, and ingestion of heavy metals. Risks are inherent in operating heavy earthmoving equipment. Although these risks can be reduced through worker safety training programs, they cannot be completely eliminated. In addition, site hazards such as subsidence pits and open shafts may increase the probability of accidents. A site safety program will be essential to controlling and reducing risks to workers under this and all alternatives.

Risks associated with inhaling dust include heavy metal intake and possible respiratory illness such as silicosis. Workers during remedial action activities may be exposed to increased risks from both heavy metals and respiratory illness. These risks can be mitigated through dust monitoring and suppression and use of appropriate personal protective equipment (PPE), as warranted by monitoring results.

Both heavy metal ingestion risks and the handling of biosolids under Alternative 2 can be mitigated through the use of appropriate PPE and reasonable personal hygiene.

Potential Environmental Impacts

Under Alternative 2, improper or excessive biosolids applications could potentially result in impacts to surface waters as a result of nitrogen and phosphorous loading. Composting the biosolids prior to application will reduce the potential impact; however, composting the biosolids will significantly increase the cost of the remedy. Other methods of mitigating the potential surface water impacts associated with biosolids applications include disking the biosolids into the mill wastes, making multiple low-rate applications instead of single high-rate applications, and avoiding applications within 10 meters of surface water bodies as required under the federal biosolids regulations under 40 CFR part 503.

Removing sediments from stream channels, riparian areas, and wetlands may damage sensitive aquatic ecosystems. Proper timing of sediment removal activities will minimize this damage. For example, removing sediments during seasonal dry periods can be employed to avoid disruption of mating, nesting, and migrating behaviors of sensitive species.

The waste repositories prescribed under each alternative will occupy land to the exclusion of other land uses, including habitat for most wildlife, agriculture, residential, or commercial development. Alternative 2 prescribes 194 acres of repository. However, under Alternatives 3 and 4, the repositories will only occupy an estimated 49 and 58 acres respectively, compared with more than 259 acres currently affected by mill wastes. In comparison with current conditions, the loss of usable land under Alternative 3 and 4 is more than offset by the remediation of lands currently covered by mill wastes.

Time Until RAOs Are Achieved

Alternative 2 is expected to take between five and eight years to complete, depending on the availability of biosolids sources. Alternatives 3 and 4 are expected to take two to three years to complete.

9.2.3 Reduction of Toxicity, Mobility, or Volume Through Treatment

This criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the contaminants. A comparative analysis of remedial alternatives with respect to reduction in toxicity, mobility, or volume through treatment is given in Table 8.

Alternative 2 focuses on containment, not treatment, to reduce the mobility of contaminants. However, the prescribed biosolids applications also have a treatment effect. The biosolids will be added, in part, to reduce potential risks to vermivores by reducing the mobility and bioavailability of metals. Revegetation of the mine wastes will also reduce the potential for movement through erosion.

Alternates 3 and 4 focus on containment of the contaminants, not treatment, to reduce the mobility of contaminants. The prescribed soil cap will effectively mitigate the potential for source materials to travel through erosion.

9.2.4 Implementability

This criterion addresses the technical and administrative feasibility of implementing a cleanup and the availability of various services and materials required during its implementation. All the alternatives are readily constructable. A comparative analysis of remedial alternatives with respect to implementability is given in Table 9.

The implementation of all the action alternatives will require varying degrees of coordination between EPA, state and local agencies, and landowners. Under any circumstance, administrative implementability is expected to be complicated by the fact that none of the parties that would be implementing the remediation own the land that would be involved in the remedy. Many individual access agreements and easements will be needed to implement all the actions proposed under this alternative. Procuring easements/deed restrictions to protect the capped waste containment cells could prove difficult due to private property issues, as land uses will likely be limited in areas permanently occupied by mill wastes. The coordination and cooperation between the agencies and chat owners needed to implement the final disposal of the remaining chat is expected to be difficult due to private property issues. These issues may become obstacles to implementation of this alternative.

Alternative 2 is technically implementable. Nevertheless, some constructability issues related to revegetation using biosolids applications may be found. Although biosolids promote revegetation of mill waste, biosolids applications alone provide no additional structure to the mill wastes. As a result of this lack of structure, minor disturbances can damage the cover vegetation. Hence, future use of the revegetated mill waste areas would have to be severely restricted, at least in the near term. In addition, biosolids applications alone are not expected to reduce metals concentrations below the threshold criteria. If the remedy under Alternative 2 fails to meet the RAOs, additional remedial actions could be readily implemented. For example, if biosolids prove ineffective in reducing bioavailability or establishing sustainable vegetation cover, soil covers could be used to supplement the initial remedy.

Successful implementation of Alternative 2 will require authorization by EPA under 40 CFR part 503 to apply biosolids to mill waste deposits within the Site. Ordinarily, land application of biosolids requires a formal permit process with public hearings. EPA expects to expedite this process by invoking its CERCLA permit waiver authority under section 300.400(e)(1) of the NCP.

All the materials and services needed to implement Alternative 2 are available. However, the supply of biosolids available within 100 miles of the Site may be a limiting factor. It is anticipated that biosolids will not be located locally and will need to be transported more than 50 miles.

The engineering actions proposed under Alternative 3 and 4 are readily implementable. However, the amount of soil needed to construct the soil covers prescribed under these alternatives is a possible obstacle to its implementability. Topsoil within the county is valued as a nonrenewable resource and is the subject of concerted conservation efforts. It may be difficult to find enough landowners in proximity to the waste deposits willing to supply large volumes of soil. The farther the soil borrow areas are located from the waste deposits, the more costly this alternative would become.

9.2.5 Cost Effectiveness

This criterion addresses the direct and indirect capital cost of the remedy. Operation and maintenance costs incurred over the life of the project, as well as present worth costs, are also evaluated. A comparative analysis of remedial alternatives with respect to cost is given in Table 10.

The total capital cost of implementing Alternative 2 is $8,471,888 with operating and maintenance costs of $177,336.

The total capital cost of implementing Alternative 3 is $19,355,917 with operating and maintenance costs of $177,336.

The total capital cost of implementing Alternative 4 is $29,819,730 with operating and maintenance costs of $177,336.

Alternative 3 is considered the most cost-effective alternative. Although the present worth cost of Alternative 2 is significantly less than Alternative 3, Alternative 2 is considered less effective, may not meet the RAOs, and may be difficult to implement given the significant problems associated with biosolids such as availability and community acceptance. The significant increase in costs for Alternative 4 is not justified in increases of protectiveness or effectiveness over Alternative 3.

9.3 Modifying Criteria

The two modifying criteria of community and state acceptance are intended to assess the views of both groups regarding various cleanup approaches. EPA has held numerous meetings with the MDNR and the Environmental Task Force of Jasper and Newton Counties to discuss the effectiveness of this type of remedy as it was implemented in Jasper County, Missouri. To date, all these stakeholders have agreed with this technology for the Preferred Alternative. However, full assessment of both the state and community acceptance of the Preferred Alternative for Newton County will be made at the completion of the public comment period.

10.0 Preferred Alternative

This section presents the detailed description of EPA's Preferred Alternative which is Alternative 3 in the FS. Alternative 3 is a remedial alternative based on excavating and disposing of source materials in on-site containment cells for addressing the principal threats. This alternative relies on excavation and on-site disposal, containment and capping of source materials to attain the RAOs. In addition, the time frame for this alternative is relatively short, two to three years, because the schedule is not dependent on the availability of biosolids or the time required to construct clay caps on numerous waste containment cells. Detailed costs associated with the implementation of Alternative 3 are presented in Table 11. The total cost estimated for this alternative is $19,355,917 for construction, with an estimated operating and maintenance cost of $177,336.

The detailed description of Alternative 3 is presented in the following subsections.

10.1 Alternative 3 Rationale

Under Alternative 3, initial response actions are prescribed to address the principal surface water threats within the Site coupled with consolidation, containment with soil covers and revegetation to address RAOs over the long term. Alternative 3 uses simple soil covers, constructed of clay and topsoil, to allow an aggressive remediation schedule, as the soils needed for in-place containment are readily available in the County. However, the adequate sources of topsoil may be located at some distance from the cap areas which may increase the costs due to

greater transportation distances. In addition, Alternative 3 prescribes a high degree of waste consolidation to reduce the amount of borrow material needed to construct the simple soil covers. Under Alternative 3, reductions in surface water transport of COCs will be achieved through initial response actions such as consolidating floodplain and upland chat and tailings in upland waste containment cells and capping with simple vegetated soil covers. Sediments in the intermittent tributaries will be removed and placed in the disposal areas along with the chat and tailings. Vegetated soil covers are expected to reduce infiltration and seepage through the source materials. Contaminated sediments in the perennial streams, as well as widespread floodplain contamination in Class P floodplains if present, will be addressed at a later date under a separate OU once the source materials and sediments in the intermittent tributaries have been remediated.

10.2 Detailed Description of Alternative 3

Specific actions implemented under Alternative 3 would include the following:

- As an initial response to the principal surface water threats, floodplain and upland chat and tailings would be excavated and removed from FEMA-designated 100-year floodplains and the undesignated floodplains of small tributary stream channels within the Site. Sediments located in the intermittent tributaries draining the source areas will be removed to the mouth of the tributary at the confluence with the downstream Class P stream as the sources located in the drainages are remediated.

- All barren chat deposits removed from the floodplain and upland areas would be consolidated in upland deposits. These consolidated chat deposits would be stabilized through a variety of basic interim engineering controls to reduce erosion and sediment transport caused by storm water runoff such as installing silt fences, earthen berms, or straw-bale erosion barriers. These interim measures would be consistent with the BMPs required under the CWA.

- Upland barren chat would be left in place, but the deposits would be stabilized to reduce erosion by installing silt fences, earthen berms, or other types of erosion barriers until all other remedial activities are completed.

- All floodplain and upland tailings and vegetated chat would be excavated and consolidated in upland waste containment cells. To the extent possible, these upland waste containment cells would be located on land outside any floodplains that is already affected by existing milling waste deposits. The wastes in these cells would be contoured and capped with soil covers to reduce infiltration and seepage, control erosion, and sediment transport. Upland tailings would also be excavated and consolidated in upland waste containment cells and capped with simple soil covers. The capped tailings deposits would be revegetated by planting with an appropriate seed mix selected through a site revegetation plan. The revegetation plan will be designed primarily to enhance the long-term protection of the remedy by selecting species that will thrive under the site-specific conditions and create an effective, long-lasting, and low

maintenance vegetative cover. EPA's preference with regard to site revegetation is to restore all disturbed areas and waste containment cells to native habitat using a drought resistant, warm season, native prairie seed mix. However, the landowners' preferences for revegetation based on current or future projected land uses will be taken into consideration provided the landowners' preferences meet the requirements and expectations of the revegetation plan.

- Upland vegetated chat exceeding threshold criteria would be deep tilled and revegetated. Deep tilling would be performed for the purpose of improving soil structure and moisture retention characteristics by blending the grain-size distribution and organic matter content of different soil horizons as well as reducing contaminant concentrations to reduce risks and improve soil function. If needed, the tilled soils would be amended with appropriate nutrients to supplement the soil organic matter content and facilitate revegetation.

- Caps will be constructed by covering the source material with 12 inches of clean clay followed by 6 inches of clean topsoil for a total cap thickness of 18 inches. Although a large volume of soil would be required to implement this alternative, an aggressive time frame (three years) is possible under this alternative because the supply of soils needed for capping the milling wastes is available within the county.

- BMPs monitoring will be performed in accordance with the current Missouri and/or Phase II federal storm water regulations at remedial action locations where land disturbances of one acre or more occur. BMP monitoring will take place during or shortly after runoff events and monitoring will be limited to qualitative evaluations of the effectiveness of storm-water and erosion control measures. Site-specific monitoring requirements will be determined during remedial design incorporating the size, physical characteristics, and specific remedial actions undertaken at a particular location. Sampling will take place in the major receiving streams as part of remediation monitoring described below.

- For remediation monitoring, a surface water monitoring plan will be developed and implemented. The purpose of this plan will be to establish the monitoring network and procedures necessary to monitor the effects of remedial actions on surface water quality in the major receiving streams by comparing pre-, interim-, and post-remediation water quality at established monitoring points where historical data are available. Sampling procedures will be consistent with those used during the RI to characterize low-flow and high-flow water quality.

- Environmental covenants implemented under state law will be implemented to provide long-term protection of the waste containment cells and erosion control features constructed under the remedy. EPA will rely primarily on environmental covenants implemented under state law for control of the containment cell areas. Institutional controls will not be required in the excavation areas since these areas will be remediated to unrestricted soil use levels.

- An operation and maintenance (O&M) program would be established to maintain the caps on the disposal areas after disposing of mining wastes and to maintain other engineering components of the Preferred Alternative, e.g., areas where wastes were left in place, and revegetated areas. The state will be responsible for the O&M of the actions conducted by EPA beginning one year after the completion of the remedial action. The Responsible Parties will be responsible for O&M of the areas of the Site where they conduct remedial actions. The O&M responsibilities will include a monitoring program to assess the effectiveness of the ICs. The monitoring program will provide annual reports to EPA detailing the development in areas of concern to protect engineering components. Monitoring requirements would be assessed during the five-year review process and may be modified or reduced as appropriate based on data collected as part of the reviews.

11.0 Summary

Based on the information currently available, EPA (as the lead agency) and MDNR (as the support agency) believe the Preferred Alternative, Alternative 3, meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA section 121(b): (1) be protective of human health and the environment, (2) comply with ARARs, (3) be cost effective, and (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

The support agency, MDNR, has been consulted in the preparation of this Proposed Plan, and is in agreement with the recommended alternative in this Proposed Plan. Additionally, EPA has worked closely with the Natural Resource Trustees for the Site, which are also in agreement with the Preferred Alternative. Full assessment of the state, trustees, and the community's acceptance of the Proposed Plan will be made at the conclusion of the public comment period.

12.0 Public Participation

The public is encouraged to review the supporting documents contained in the Administrative Record, which are available for review at the Granby City Hall, the Neosho Public Library and the EPA, Region 7 office. EPA has established a 30-day public comment period, which starts on February 1, 2010, and closes March 5, 2010. A public meeting to present, answer questions, and receive comments on EPA's Preferred Alternative will be held on February 9, 2010, at 6:30 pm at the Lampo Center, 500 East Spring Street in Neosho, Missouri. The public may submit oral comments at the public meeting or written comments anytime during the 30-day comment period by the following means:

Mail:	Ms. Debbie Kring Office of Public Affairs U.S. Environmental Protection Agency 901 North 5th Street Kansas City, Kansas 66101
E-Mail:	kring.debbie@epa.gov
Phone:	1-800-223-0425

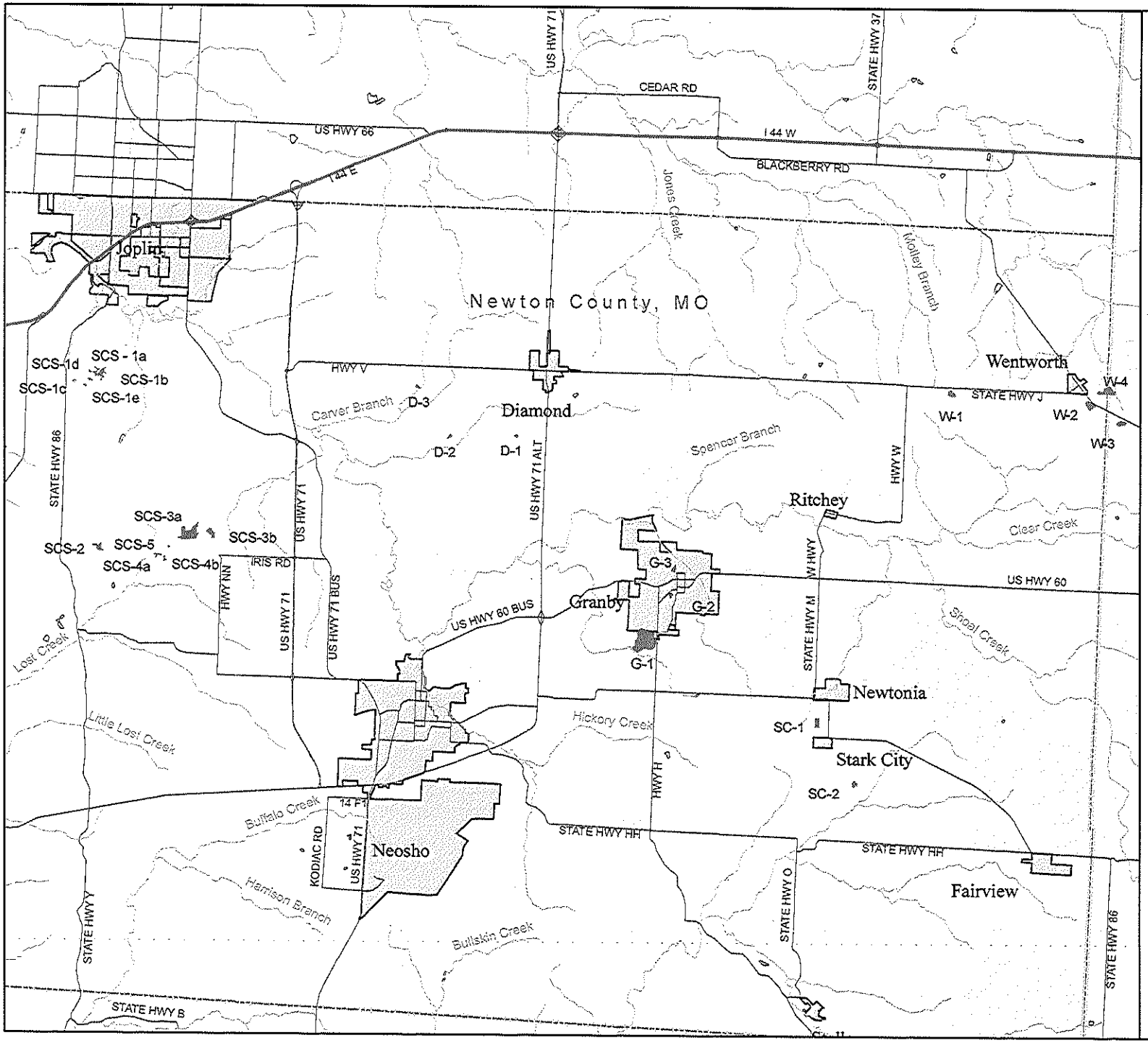

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Figure 1-1
Site Location Map
Newton County Mine
Tailing Site
Newton County, Missouri

Table 1 Comparative Analysis of Remedial Alternatives with Respect to Overall Protection of Human Health and the Environment

Criterion	Alternative 1 No Further Action	Alternative 2 Source Consolidation, In-Place Containment through Revegetation Using Biosolids	Alternative 3 Source Consolidation, In-Place Containment Using Simple Soil Covers, Revegetation	Alternative 4 Source Removal and On-Site Aboveground Disposal
• Overall Protection of Human Health and the Environmental	• Source materials RAOs are not met because large areas remain affected by mill wastes exceeding action levels for the site. Risks to terrestrial vermivores may actually increase as more excavated barren chat areas become vegetated. • Alternative 1 would not be capable of achieving the metal loading reductions needed to meet the surface water RAOs	• Direct revegetation of mill wastes is the least protective containment option of any action alternative. • Source materials exceeding RBCs remain on Site under Alternative 2. The source material RAO may not be fully met if biosolids applications prove ineffective in reducing metals bioavailability. Residual risks to vermivores are higher than other action alternatives • Direct revegetation of mill wastes using biosolids is expected to be the least adequate, permanent or reliable of any of the prescribed containment options	• Alternative 3 provides human health protections by capping mill waste with soil covers. These covers would be protective of human health. . • The source material RAO is expected to be met under Alternative 3. • Simple soil covers are considered more permanent than direct revegetation, but less adequate or reliable than the engineered repositories prescribed under Alternatives 4.	• The disposal and capping method prescribed under Alternative 4 would be fully protective of human health. Only 58 acres would be subject to institutional controls needed for long-term protection of remedial facilities. • Source material RAOs are met under Alternative 4, the same as Alternative 3. • The engineered repositories prescribed under Alternative 4 are more permanent than soil covers and rely less on institutional controls.

Table 2 Comparative Analysis of Remedial Alternatives with Respect to Compliance with ARARs

Criterion	Alternative 1 No Further Action	Alternative 2 Source Consolidation, In-Place Containment through Revegetation Using Biosolids	Alternative 3 Source Consolidation, In-Place Containment Using Simple Soil Covers, Revegetation	Alternative 4 Source Removal and On-Site Aboveground Disposal
• Compliance with Chemical-Specific ARARs	• Under Alternative 1, exceedances of chemical-specific ARARs are expected to occur in Class P stream and regularly in some tributaries and miner's ditches during high flow conditions.	• Alternative 2 is expected to meet chemical specific ARARs under most conditions.	• Same as Alternative 2.	• Same as Alternate 2
• Compliance with Action-Specific ARARs	• No action specific ARAR's are identified as action-specific ARARs for this alternative.	• Alternate 2 will comply with potential action-specific ARARs identified which include: Storm water regulations, requirements of 40 CFR Part 503 for biosolids applications, Federal and State NPDES storm water requirements, and the dredge and fill requirements of Section 404 of the CWA for excavating mill wastes and sediments from stream channels.	• Same as Alternate 2, except biosolid ARARs are not applicable to this alternative.	• Same as Alternate 2, except biosolid ARARs are not applicable to this alternative.
• Compliance with Location-Specific ARARs	• Alternative 1 complies with location specific ARARs.	• Alternative 2 complies with location specific ARARs.	• Same as Alternative 2.	• Same as Alternate 2..
• Compliance with Other Criteria, Advisories, and Guidance (TBCs)	• No TBC's are identified for this alternative.	• Alternative 2 complies with TBC's	• Same as Alternative 2.	• Same as Alternate 2.

Table 3 Potential Federal and State Chemical-Specific ARARs and Guidance to be Considered

Standard, Requirement, Criteria, or Limitation	Citation	Description	Potential ARARs	To Be Considered
AIR				
FEDERAL REQUIREMENTS				
Clean Air Act	40 CFR Part 50	The Clean Air Act and implementing regulations define air quality criteria for protecting human health, including standards for particulate matter and lead.	X	
STATE REQUIREMENTS				
Missouri Air Conservation Law	RSMo 643.010 10 CSR 10-6.010	Set ambient air quality standards for a variety of constituents, including particulate matter and lead.	X	
SOURCE MATERIALS AND SOILS				
FEDERAL REQUIREMENTS				
Newton County Mine Tailing Site Remedial Investigation Report	Black and Veatch 2008	Establishes site specific Preliminary Remediation Goals for source materials at the Newton County Site. Source materials and soil criteria include cadmium: 40 ppm; lead: 400 ppm; and zinc: 6,400 ppm. These criteria are not legal or regulatory standards but should be considered in the evaluation of alternatives.		X
Superfund Lead-Contaminated Residential Sites Handbook	OSWER 9285.7-30, August 2003	Handbook developed by EPA to promote nationally consistant decision making process for assessing and managing risks associated with lead contaminated residential sites across the country		X
Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities.	OSWER Directive No. 9355.4-12, July 14, 1994	Recommends a screening level of 400 ppm for lead in residential soils. Describes a methodology for developing site-specific preliminary remediation goals and media cleanup standards. Describes a plan for soil lead cleanup at sites with multiple sources of lead. In general, human exposure in OU-1 is expected to be minimal. Nevertheless, this directive provides guidance for evaluating the extent to which proposed remedial actions might enhance protection of human health.		X
WATER				
FEDERAL REQUIREMENTS				
Safe Drinking Water Act	40 CFR Parts 141 and 143	Establishes primary maximum contaminant levels (MCLs) and MCL goals (MCLG's) that are health based standards for public drinking water systems, as well as secondary MCLs and MCLGs that are standards for constituents that effect aesthetic qualities of drinking water only.	X	

Table 3 Potential Federal and State Chemical-Specific ARARs and Guidance to be Considered

Standard, Requirement, Criteria, or Limitation	Citation	Description	Potential ARARs	To Be Considered
Clean Water Act – Water Quality Standards, Chronic Aquatic Life Criteria	40 CFR Sec. 131	Establishes non-enforceable standards to protect aquatic life.		X
STATE REQUIREMENTS				
Missouri Clean Water Law – Water Quality Standards	RSMo 644.006 – 564 10 CSR 20-7.031	The Federal chronic ALCs are more stringent than the WQS established by Missouri under this law. Missouri is currently revising its WQS for streams and tributaries located within the Site. In the event that Missouri's new WQS are approved by EPA and no longer less stringent than the Federal ALCs, the WQS may become ARARs for the Site if they are adopted prior to ROD issuance. In assessing the remedy at the five-year reviews, the EPA will consider new information, such as new State WQS or site-specific standards in determining the protectiveness of the remedy.	X	

Table 4 Potential Federal and State Action-Specific ARARs and Guidance to be Considered

Standard, Requirement, Criteria, or Limitation	Citation	Description	Potential ARARs	To Be Considered
FEDERAL ARARs				
National Ambient Air Quality Standards (NAAQS)	42 USC Sec. 7412. 40 CFR 50.6 and 50.12	These regulations establish ambient air quality standards for emissions of lead and particulate matter. Remedial actions taken under any of the alternatives (except no action) are likely to result in release of airborne lead and dust. These regulations are applicable to "major sources" as defined under the Clean Air Act. Remediation sites in Newton County are not expected to be major sources.	X	
Resource Conservation and Recovery Act (RCRA), Subtitle D, Solid Waste Regulations	42 USC Sec. 6941 40 CFR Part 257, Criteria for Classification of Solid Waste Disposal Facilities and Practices	This section of the RCRA regulations requires the closure of existing solid waste facilities, design of new landfills, and disposal of solid wastes to be in accordance with various standards and criteria. These standards are applicable to solid waste disposal facilities, including mining and mill waste facilities. Among other things, these regulations require that facilities be maintained to prevent wash out of solid wastes and that the public not be allowed uncontrolled access.	X	
RCRA, Subtitle C, Identification and Listing of Hazardous Wastes	RCRA Section 3001(b)(3)(A)(iii), Beville exclusion of mineral extraction and beneficiation wastes. 40 CFR Part 264.2, Definition of solid waste and 40 CFR Part 261.4 (b) (7)	Mill waste within the Site is specifically excluded from regulation as hazardous wastes under the Beville exclusion because they are wastes resulting from mineral extraction and beneficiation. Therefore, the RCRA Subtitle C regulations are not ARARs. However, these regulations are TBCs because of the guidance they provide regarding the mining and milling waste exclusion.		X
RCRA, Subtitle C, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	RCRA Section 3001 *et seq.* 42 USC Sec. 6921, *et seq.* 40 CFR Part 264.552, Disposal Of Hazardous Wastes In Designated Corrective Action Management Units (CAMUs). 40 CFS Part 264.554(D)(1)(i) and (ii) Staging Piles	The section defines Corrective Action Management Units (CAMUs) to be used in implementing corrective actions at Superfund Sites. A CAMU is defined as a disposal site used for consolidation or placement of remediation wastes within the contaminated areas of the site. Under these regulations, placement of wastes in a CAMU does not constitute land disposal of hazardous waste and does not constitute creation of a unit subject to the RCRA land disposal restrictions and minimum technology requirements (40 CFR Part 268). This Section of RCRA is not an ARAR because of the Beville exclusion, but certain substantive requirements related to design, operation and closure of disposal sites should be considered. This subsection describes standards and design criteria for establishing staging piles within a CAMU. The design criteria to be developed for each staging pile should be consistent with the following: • The staging pile must facilitate a reliable, effective and protective remedy. • The staging pile must be designed so as to prevent or minimize		X

Table 4 Potential Federal and State Action-Specific ARARs and Guidance to be Considered

Standard, Requirement, Criteria, or Limitation	Citation	Description	Potential ARARs	To Be Considered
		releases of hazardous wastes and hazardous constituents into the environment, and minimize or adequately control cross-media transfer, as necessary to protect human health and the environment (for example, through the use of liners, covers, run-off/run-on controls, as appropriate).		
Toxic Substances Control Act – Strategy for Reducing Lead Exposures	EPA, February 21, 1991	Presents strategies for reducing lead exposures by reducing the amount of lead in the environment, as well as reducing blood lead levels, especially in children.		X
Surface Mining Control and Reclamation Act (SMCRA)	30 USC Secs. 1201-1328 30 CFR Part 816	SMCRA regulations govern coal exploration and active coal mining. Hence, these regulations are not applicable to remedial actions taken at the Newton County Site. Nevertheless, some of the surface mining standards found in 30 CFR Part 816 are relevant and appropriate requirements because they address circumstances that are similar to those found at the Newton County Site. The relevant and appropriate requirements include Part 816.45, Sediment Control Measures; Part 816.46, Siltation Structures; Part 816.102, Grading Requirements; and Part 816. 111, Revegetation.	X	
DOT Hazardous Materials Transportation Regulations	49 CFR Parts 107, 171-177	Regulates transportation of hazardous materials. Would be relevant and appropriate for the transport of excavated materials within the site.	X	
Clean Water Act - Dredge or Fill Requirements (Section 404)	33 USC Secs. 1251-1376 40 CFR Parts 230, 231	Regulates discharge of dredged or fill material into navigable waters.	X	
Clean Water Act - Effluent Discharge Standards	40 CFR Sec. 125.100 40 CFR Sec. 122.41	Requires that best management practices be maintained by the operator of a facility that discharges pollutants directly into the environment and requires that point source discharges be monitored to assure compliance with effluent discharge limits.	X	
Standards for the Use or Disposal of Sewage Sludge	40 CFR Part 503	Establishes regulations for land application of bio-solids.	X	
NPDES Storm Water Discharge for Permanent Repository	40 CFR Sec. 122.26	Establishes discharge regulations for storm water. Requires management of repository where waste materials come in contact with storm water. Also required during construction activities.	X	
EPA Mine Waste	EPA Region 7 Fact Sheet, February 2003	Provides public guidance on mine waste usage in the states of Missouri and Kansas. Provides a list of uses for mine waste that is not likely to present a threat to human health or the environment.		X

Table 4 Potential Federal and State Action-Specific ARARs and Guidance to be Considered

Standard, Requirement, Criteria, or Limitation	Citation	Description	Potential ARARs	To Be Considered
STATE REQUIREMENTS				
Missouri Fugitive Particulate Matter Regulations	10 CSR 10-6.170	The Missouri fugitive particulate matter regulations contain restrictions on the release of particulate matter to ambient air. These regulations are applicable to any dust emissions that occur as a result of remedial actions taken at the Site.	X	
Missouri Clean Water Law – Storm Water Regulations	10 CSR 20-6.200	These regulations define Best Management Practices for land disturbances, including practices or procedures that would reduce the amount of metals in soils and sediments available for transport to waters of the state. Permits would not be required for actions taken under CERCLA, but the substantive provisions of these regulations would be applicable. The Missouri standards would be considered ARARs only if they are more stringent than the federal standards.	X	
Missouri Well Drillers' Law	RSMo 256.600 – 640 10 CSR 23	Sets fees and standards to be followed in installing, maintaining, and abandoning water wells and monitoring wells. Also covers well plugging and proper isolation of possible sources of contamination from existing wells to protect the quality of groundwater aquifers that provide safe drinking water.	X	
Missouri Solid Waste Disposal Law	RSMo 260.225 10 CSR 25-5.262	Regulates facilities used for the disposal of nonhazardous industrial, commercial, agricultural, infections, and domestic wastes. Does not apply to the disposal of overburden, rock, tailings, matte, slag, or other waste material resulting from mining, milling, or smelting. However, the regulations are considered relevant and appropriate.	X	
Missouri Hazardous Waste Management Law	RSMo 260.350 – 434 10 CSR 25	Regulates the generation, identification, treatment and disposal of hazardous wastes. These regulations are not applicable, relevant or appropriate to mining and beneficiation wastes or to wastes generated from the reclamation of mined lands. However, certain substantive requirements related to design, operation and closure of disposal sites should be considered.		X
Missouri Metallic Minerals Waste Management Act	RSMo 444.350 – 380 10CSR 45	Regulates disposal of waste from active metallic mineral mining, beneficiation, and processing. The regulations also contain technical guidelines, permitting, and closure requirements. Because these regulations contain closure standards for active metal mines, they are not ARARs but may be reviewed and considered during the design of removal actions. They are considered TBCs.		X

Table 5 Potential Federal, State, and Local Location-Specific ARARs and Guidance to be Considered

Standard, Requirement, Criteria, or Limitation	Citation	Description	Potential ARAR	To Be Considered
FEDERAL REQUIREMENTS				
Archaeological and Historic Preservation Act	16 USC Sec. 469 40 CFR Sec. 6.301(c)	Establishes procedures to provide for preservation of historical and archaeological data which might be destroyed through alteration of terrain as a result of a federally licensed activity or program.	X	
Archaeological Resources Protection Act	16 USC Secs. 470 aa - mm	Requires permits for any excavation or removal of archaeological resources from public or Indian lands. Provides guidance for federal land managers to protect such resources.		X
National Historic Preservation Act	16 USC Sec. 470 40 CFR Sec. 6.301(b) 36 CFR Part 800 Executive Order 11593, May 3, 1971	Requires Federal agencies to take into account the effect of any Federally assisted undertaking or licensing on any district, site, building, structure, or object that is included in or eligible for Register of Historic Places.	X	
Historic Sites, Buildings, and Antiquities Act	16 USC Secs. 461-467 40 CFR Sec. 6.301(a)	Requires federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts on such landmarks.	X	
Fish and Wildlife Coordination Act	16 USC Secs. 661-666 40 CFR Sec. 6.302(g)	Requires any federal agency or permitted entity to consult with the U.S. Fish and Wildlife Service and appropriate state agency prior to modification of any stream or other water body. The intent of this requirement is to conserve, improve, or prevent loss of wildlife habitat and resources.	X	
Fish and Wildlife Conservation Act	16 USC Secs. 2901 - 2912	Requires federal agencies to utilize their statutory and administrative authority to conserve and promote conservation of non-game fish and wildlife species.	X	
Endangered Species Act	16 USC Secs. 1531-1544 50 CFR Parts 17, 402 40 CFR Sec. 6.302(h)	Requires that federal agencies insure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat.	X	
Federal Migratory Bird Act	16 USC Secs. 703 - 712	Requires remedial actions to conserve habitat and consultation with the Department of Interior if any critical habitat is affected.	X	
Executive Order on Floodplain Management	Executive Order No. 11988 40 CFR Sec. 6.302(b) and Appendix A	Requires federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid, to the maximum extent possible, the adverse impacts associated with direct and indirect development of a floodplain.		X

Table 5 Potential Federal, State, and Local Location-Specific ARARs and Guidance to be Considered

Standard, Requirement, Criteria, or Limitation	Citation	Description	Potential ARAR	To Be Considered
Executive Order on Protection of Wetlands	Executive Order No. 11990 40 CFR Sec. 6.302(a) and Appendix A	Requires federal agencies to avoid, to the maximum extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid new construction in wetlands, if a practicable alternative exists.		X
Farmland Protection Policy Act	7 USC Sec. 4201 *et. seq.* 40 CFR Sec. 6.302 (c)	Protects significant or important agricultural lands from irreversible conversion to uses that result in its loss as an environmental or essential food production resource.		X
RCRA – Location Standards for Hazardous Waste Facilities	42 USC Sec. 6901 40 CFR 264.18	Requires that any hazardous waste facility located within the 100-year floodplain be designed, constructed, operated, and maintained to avoid washout. Also, contains requirements for locating facilities away from seismically active zones.	X	
Rivers and Harbors Act	33 CFR Secs. 320 - 330	Requires preapproval of the US Army Corps of Engineers prior to placement of any structures in waterways and restricts the placement of structures in waterways.		X

Table 6 Comparative Analysis of Remedial Alternatives with Respect to Long-Term Effectiveness and Permanence

Criterion	Alternative 1 No Further Action	Alternative 2 Source Consolidation, In-Place Containment through Revegetation Using Biosolids	Alternative 3 Source Consolidation, In-Place Containment Using Simple Soil Covers, Revegetation	Alternative 4 Source Removal and On-Site Aboveground Disposal
• Magnitude of Residual Risks	• Approximately 259 acres of land require institutional controls to manage residual human health risks. • Residual risks to vermivores are highest under Alternative 1 because large areas of mill waste. The source material RAO is not achieved. • Residual risks to aquatic life are highest under Alternative 1 because the RAOs are not achieved.	• Under Alternative 2, approximately 194 acres of land require institutional controls. • Adding biosolids will not reduce the COC concentrations in the soil. Hence, the source material RAO will not be met, and residual risks will still exist.	• Under Alternative 3, approximately 49 acres of land require institutional controls to manage residual human health risks at full implementation. • In contrast to Alternatives 1 and 2, the source material RAO is achieved under Alternative 3 because potential exposure pathways are addressed.	• At full implementation, approximately 58 acres are subject to institutional controls to manage residual human health risks. • Source material RAOs are fully achieved. Residual risks to terrestrial vermivores and aquatic life are negligible.
• Adequacy and Reliability of Controls	• The extent of risk management under Alternative 1 is inadequate for achieving the RAOs. • Alternative 1 affords no institutional control for the protection of human health. • No long-term management or maintenance is required under Alternative 1.	• Infiltration and seepage from the mill wastes directly revegetated using biosolids is higher under this alternative than the cover options prescribed under any other action alternatives. • Direct revegetation, as prescribed under Alternative 2 is considered the least permanent or reliable cover option of any action alternatives. • Deep tilling of vegetated chat and transition zone soils is considered adequate for reducing metal concentrations.	• Less infiltration and seepage results from the waste piles capped with simple soil covers under Alternative 3 than the directly revegetated piles under Alternative 2. However, simple soil covers are less effective at preventing infiltration than the composite cover systems prescribed under Alternatives 4. • Simple soil covers are considered a more durable, permanent, and reliable containment option than Alternatives 1 and 2, but less permanent and reliable than the engineered repositories prescribed under Alternatives 4. • No long-term maintenance of capped waste piles, except institutional controls, is required at full implementation.	• The composite cover system installed on the repositories is the most effective cover option, as it nearly eliminates surface infiltration into the disposed mill wastes • Source material disposal in repositories, as prescribed under Alternative 4 is considered the most permanent and reliable method available for the long-term management of mill wastes. • Long-term management of the capped repositories consists of restricting future land uses an estimated 58 acres.

Table 7 Comparative Analysis of Remedial Alternatives with Respect to Short-Term Effectiveness

Criterion	Alternative 1 No Further Action	Alternative 2 Source Consolidation, In-Place Containment through Revegetation Using Biosolids	Alternative 3 Source Consolidation, In-Place Containment Using Simple Soil Covers, Revegetation	Alternative 4 Source Removal and Above Ground Disposal
• Protection of the Community During Remedial Actions	• Risks to the community are the same as under current conditions.	• Potential risks to the community under Alternative 2 are the same as under all other action alternatives. These potential risks are readily mitigated through appropriate traffic safety, dust control, and public involvement measures. • Risks to local communities caused by biosolids applications may be negligible, if application complies with existing EPA regulations. However, the public's perception of risks may be high.	• A larger amount of source materials are hauled under Alternative 3 than under Alternative 2 . Truck traffic and dust generation are more intense. Potential risks to the local community will be higher during this period than under Alternatives 2.	• Same as Alternate 3.
• Protection of Workers During Remedial Actions	• No additional risks to workers are experienced under the no further action alternative.	• Risks to workers are the same under Alternative 2 as under all other action alternatives. These risks can be reduced through appropriate worker health and safety training, design, and planning.	• Same as Alternative 2.	• Same as Alternate 2.

Table 7 Comparative Analysis of Remedial Alternatives with Respect to Short-Term Effectiveness

Criterion	Alternative 1 No Further Action	Alternative 2 Source Consolidation, In-Place Containment through Revegetation Using Biosolids	Alternative 3 Source Consolidation, In-Place Containment Using Simple Soil Covers, Revegetation	Alternative 4 Source Removal and Above Ground Disposal
• Potential Environmental Impacts Caused by the Remedial Actions	• Risks to the environment are the same as under current conditions.	• The potential environmental impacts caused by excavating mill wastes and sediments from riparian areas and wetlands are the same under this alternative as under all other action alternatives. • Excessive nutrient loading to Site surface waters is a potential environmental impact unique to Alternatives 2 and 3. This potential impact can be mitigated by composting, multiple applications, and avoiding applications near surface water bodies. • Alternative 2 remediates an estimated 65 acres of land to usable condition by consolidating and deep tilling source materials.	• The potential environmental impacts caused by excavating mill wastes and sediments from riparian areas and wetlands are the same under this alternative as under all other action alternatives. • Alternative 3 remediates an estimated 210 acres of land to usable condition by consolidating and recycling source materials.	• The potential environmental impacts caused by excavating mill wastes and sediments from riparian areas and wetlands are the same under this alternative as under all other action alternatives • Alternative 4 remediates an estimated 201 acres of land to usable condition by disposing of source materials in above ground repositories.

Table 8 Comparative Analysis of Remedial Alternatives with Respect to Reduction of Toxicity, Mobility, or Volume Through Treatment

Criterion	Alternative 1 No Further Action	Alternative 2 Source Consolidation, In-Place Containment through Revegetation Using Biosolids	Alternative 3 Source Consolidation, In-Place Containment Using Simple Soil Covers, Revegetation	Alternative 4 Source Removal and On-Site Aboveground Disposal
• Treatment Process Used and Materials Treated	• Chat recycling may result in treatment, but uncontrolled recycling and use of chat, as currently practiced, is not considered effective or reliable treatment.	• In-place containment through revegetation would not result in TMV reductions through treatment. This alternative relies on containment rather than treatment.	• Alternative 3 does not rely on treatment to reduce TMV, as in Alternative 2.	• On-site aboveground disposal would not result in TMV reductions through treatment.
• Amount of Materials Treated	• None.	• None.	• None.	• None.
• Effectiveness and Irreversibility of Treatment	• None.	• No treatment is prescribed under Alternative 2. • Revegation for containment is considered the least effective and irreversible of the action alternatives.	• No treatment is prescribed under Alternate 3 • Soil cap are more effective than revegetation for containment by providing some physical barrier.	• No treatment is prescribed under Alternate 4 • Composite caps are the most effective option for containment.
• Treatment Residuals Generated	• No treatment residuals are generated under Alternative 1.	• No treatment residuals are generated under Alternative 2.	• No treatment residuals are generated under Alternative 3.	• No treatment residuals are generated under Alternative 4.

Table 9 Comparative Analysis of Remedial Alternatives with Respect to Implementability

Criterion	Alternative 1 No Further Action	Alternative 2 Source Consolidation, In-Place Containment through Revegetation Using Biosolids	Alternative 3 Source Consolidation, In-Place Containment Using Simple Soil Covers, Revegetation	Alternative 4 Source Removal and Above Ground Disposal
• Technical Feasibility – Constructibility and Reliability of Prescribed Technologies	• All the actions described under Alternative 1 are implementable.	• Engineering controls prescribed under Alternative 2 are as technically feasible and readily constructible as the actions prescribed under all other alternatives. • Additional remedial measures are readily implementable, if needed, under Alternative 2.	• Same as Alternative 2.	• Same as Alternative 2.
• Administrative Feasibility	• No institutional controls are called for under this alternate.	• Landowner access agreements and easements are needed under Alternative 2. • Alternative 2 allows less flexibility of future land uses compared with Alternatives 3 and 4. • Approximately 194 acres will require institutional controls to limit future uses of the land.	• Approximately 49 acres of land are subject to institutional controls. Alternatives 3 and 4 requires the same administrative coordination. • Landowner access agreements and easements are needed under Alternative 3.	• Approximately 58 acres of land are subject to institutional controls. Alternatives 3 and 4 requires the same administrative coordination. • Landowner access agreements and easements are needed under Alternative 4.

Table 9 Comparative Analysis of Remedial Alternatives with Respect to Implementability

Criterion	Alternative 1 No Further Action	Alternative 2 Source Consolidation, In-Place Containment through Revegetation Using Biosolids	Alternative 3 Source Consolidation, In-Place Containment Using Simple Soil Covers, Revegetation	Alternative 4 Source Removal and Above Ground Disposal
• Availability of Labor and Materials	• All services and materials are readily available.	• Bio-solids are not readily available locally.	• A large quantity of soil is needed to implement Alternative 3. While the soils are available locally, using such large quantities of this non-renewable resource may deplete the locally available supplies.	• Same as Alternate 3.

Table 10 Comparative Analysis of Remedial Alternatives with Respect to Cost

Criterion	Alternative 1 No Further Action	Alternative 2 Source Consolidation, In-Place Containment through Revegetation Using Biosolids	Alternative 3 Source Consolidation, In-Place Containment Using Simple Soil Covers, Revegetation	Alternative 4 Source Removal and Above Ground Disposal
Capital Costs	None	$8,471,888	$19,355,917	$29,819,730
Operating and Maintenance Costs	None	$177,336	$177,336	$177,336
Present Worth Cost	**$0**	**$8,649,225**	**$19,533,253**	**$29,997,066**

Table 11
Cost Estimate Summary

Alternate 3

Item Description	Units	Estimated Quantity	Unit Price	Capital Cost	Present Worth Costs - 7% Discount Rate
CAPITAL COSTS					
Geochemical remediation					
Mobilization					
Contractor Mobilization/De-mobilization	LS	1	$ 100,000	$100,000	
Excavation and consolidation of source materials					
Excavation and consolidation of source materials	CY	1,425,000	$ 9	$12,825,000	
Restore excavation area					
Grade excavation to promote drainage	Acres	171	$ 1,000	$171,000	
Revegetate excavated area	Acres	171	$ 1,800	$307,800	
Erosion and sediment control	LS	1	$ 40,000	$40,000	
Cap consolidated source material					
Install soil cap	CY	118580	$ 12	$1,422,960	
Vegetate cap area	Acres	49	$ 1,800	$88,200	
Erosion and sediment control	LS	1	$ 100,000	$100,000	
Deep till upland vegetated chat					
Deep till upland vegetated chat	Acres	39	$ 3,500	$136,500	
Revegetate tilled area	Acres	39	$ 1,800	$70,200	
Erosion and sediment control	LS	1	$ 30,000	$30,000	
Reporting					
Draft Completion Report, Final Completion Report	LS	1	$ 9,460	$9,460	
SUBTOTAL				$15,301,120	
Contingency (15% of capital costs)				$2,295,168	
SUBTOTAL				$17,596,288	
Prime Contractor Fee (10% of capital costs)				$1,759,629	
TOTAL Capital Cost				**$19,355,917**	

ANNUAL O&M COSTS						
O&M - Inspections, Maintenance and Repairs	1	EA	$ 30	$ 5,000.00	$	140,187
SUBTOTAL					$	140,187
Contingency (15% of annual O&M)					$	21,028
SUBTOTAL					$	161,215
Contractor Fee (10% of annual O&M)					$	16,121
TOTAL Annual O&M Cost					**$**	**177,336**

TOTAL PRESENT WORTH COST	**$ 19,533,253**