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1996

EPA Superfund
Record of Decision:

ORONOGO-DUENWEG MINING BELT
EPA ID: MOD980686281
OU 02
JASPER COUNTY, MO
08/01/1996

RECORD OF DECISION
DECLARATION

SITE NAME AND LOCATION

Oronogo-Duenweg Mining Belt Site. Operable Units 2 and 3
Jasper County, Missouri

STATEMENT OF BASIS AND PURPOSE

The U. S. Environmental Protection Agency (EPA) has prepared this decision document to present the selected remedial action for residential yard soils in smelter and mining areas of the Oronogo-Duenweg Mining Belt Site located in Jasper County, Missouri. This decision was chosen in accordance with the Comprehensive Environmental Response. Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record for this Site. The Administrative Record file is located in the following information repositories:

1. Joplin Public Library
   300 Main
   Joplin, Missouri

2. Webb City Public Library
   101 South Liberty
   Webb City, Missouri

3. Carl Junction City Hall
   105 North Main
   Carl Junction, Missouri

4. U. S. Environmental Protection Agency
   726 Minnesota Avenue
   Kansas City, Kansas

The EPA has coordinated selection of this remedial action with the Missouri Department of Natural Resources (MDNR) and the Missouri Department of Health. The State of Missouri concurs on the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This selected remedy deals with cleanup of contaminated soils in residential yards in areas of historic smelting operations and in areas contaminated with mining and milling wastes. This cleanup action is one part of the EPA's overall efforts under Superfund to deal with environmental contamination resulting from historic mining and smelting operations in Jasper County. Residential yards contaminated solely from other sources, such as lead-based paint, are not going to be addressed by this cleanup action. In the future additional cleanup actions for the Site will deal with (1) contaminated ground water and drinking water supplies and (2) mining and milling waste in areas other than residential yards. This phased approach to cleanup is being used for this Site in order to clean up the contamination which poses the greatest health threat first. The EPA believes that the selected remedy will be consistent with future cleanups that will be done at the Site.

The major components of selected remedy are:

- Excavation and replacement of residential yard soils
- Construction of a repository for excavated soil
- Sampling of additional residential yard in mining and smelter areas
- Establishing institutional controls for residential and day care center development
- Continuation of the ongoing health education program
- Conducting a phosphate stabilization treatability study
- Phosphate stabilization of yard soils if treatability study results are positive

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element (if phosphate stabilization is proven effective). If phosphate is not utilized to treat soils, then treatment of principal threats is not otherwise practical and this remedy does not satisfy the statutory preference for treatment as the principal element.

Because this remedy will result in hazardous substances remaining on the Site above health-based levels a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

<IMG SRC 0796086>

RECORD OF DECISION

RESIDENTIAL YARD AND MINE WASTE YARD SOILS
OPERABLE UNITS 02 AND 03
ORONOGO-DUENWEG MINING BELT SITE
JASPER COUNTY, MISSOURI

Prepared by:

U.S. Environmental Protection Agency
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Kansas City, Kansas 66101

June 1996

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Responsiveness Summary

1.0 Site Name, Location, and Description

This Record of Decision (ROD) has been developed by the United States Environmental Protection Agency (EPA) to select a remedial alternative for the cleanup of residential yard soils in the Oronogo-Duenweg Mining Belt Site in Jasper County, Missouri (commonly known as the Jasper County Site, herein the "Site"). This ROD 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.

Residential yards addressed by this ROD are located within the Jasper County Site, which is part of the Tri-State Mining District. The district covers hundreds of square miles in southwestern Missouri, southwestern Kansas, and northeastern Oklahoma. Mining, milling, and smelting of lead and zinc ore and concentrates date back to 1850 and continued in the district until the 1970s. Mining, milling, and smelting activities generated several types of waste materials, including mine wastes (waste rock, development rock, and overburden); mill wastes (chat and fine tailings); and smelter-related materials (slag, clinker, flux, and air emissions). The wastes from mining/milling and smelter operations contain residual metals, particularly lead, cadmium, and zinc. Approximately nine million tons of mining/milling and smelter wastes remain on the surface at the Site. Additionally, air emissions from historic smelters resulted in contaminated soil surrounding the smelters.

The Tri-State district's historic lead and zinc production ranked as one of the highest in the world, with a total ore production of more than 0.5 billion short tons. The Missouri portion of the district accounted for more than 0.2 billion short tons of ore, 80 percent of which was produced in Jasper County. According to the Dames & Moore reports, processing of the ore resulted in approximately 150 million short tons of wastes, of which approximately 9 million short tons remain today. The wastes contain residual metals, particularly lead, cadmium, and zinc. Mining and milling using gravity-separation techniques occurred throughout the region while smelting lead concentrates was, for the most part, conducted at smelters located in the towns of Galena, Kansas and Joplin Missouri. Historically, up to seventeen smelters were located in Jasper County. By the turn of the century, only the Eagle-Picher smelter in northwest Joplin remained in operation.

2.0 Site History and Enforcement Activities

The EPA added the Site to the National Priorities List (NPL) in 1990. The NPL is the EPA's list of sites which have the greatest contamination and pose the greatest threat to human health and the environment. The Site has been decided into 11 separate areas for investigation because of its large area, about 270 square miles. In 1991, the EPA began cleanup studies of the Site with some work being conducted by the potentially responsible parties (PRPs) under EPA oversight. The EPA recently completed studies of the nature and extent of contamination in residential yards, and an evaluation of different cleanup alternatives. The results of these studies are described below. Additional studies on groundwater and the mining/milling wastes in areas other than residential yards are ongoing.

The Missouri Department of Health (MDOH) conducted an exposure study to evaluate health effects on residents in the Site, titled the Jasper County, Missouri Superfund Site Lead and Cadmium Exposure Study. The study, which was released in May 1994 concluded that 14 percent of children under the age of seven years in the study area had elevated blood-lead concentrations resulting in elevated blood-lead levels was residential yard soils.

Following release of the health study in 1994, the EPA developed an overall strategy to prioritize cleanup at this Site and the adjacent Cherokee County Superfund Site. Initial work done under the strategy identified numerous daycare centers and residences as having high soil lead concentrations at levels requiring immediate cleanup. Therefore, the EPA issued a "Time- Critical Removal Action" decision in January 1995 which commenced cleanup of these daycare centers and residential yards.

The Time-Critical Removal Action included residences where children were observed with high blood-lead concentrations (above 15 micrograms per deciliter (ug/dl) lead in the blood) or where soil lead levels exceeded 2500 ppm (the level which the health agencies believe may cause blood-lead levels to exceed 15 ug/dl), and daycare centers with soil lead levels above 500 parts per million (ppm). The EPA performed cleanup at approximately 303 residential yards and seven daycare centers under this action, which concluded in March 1996. The majority of daycares and homes identified for cleanup were around the Eagle-Picher smelter in Joplin. Generally, these residences had the highest levels of lead contamination in their yards. The initial cleanup activities consisted of excavating and removing soils, replacing the soil with clean backfill, and resodding the yards.

The selected remedy will follow-up on the residential yard cleanups that have already been done by cleaning up the remaining yards at the Site which have lead and cadmium at levels that present a health

threat.

3.0 Highest of Community Participation

The EPA provided the Proposed Plan and supporting documents in the Administrative Record file and encouraged public review and comment on the Proposed Plan during the public comment period. The EPA established the public comment period from May 6 to June 7, 1996. A public meeting was also held on May 16, at 7:00 p.m. at the North Middle School in Joplin, Missouri, to present the Proposed Plan, accept written and oral comments, and to answer questions concerning the Preferred Alternative. At this meeting, representatives from the EPA and MDNR answered questions about the Site and the remedial alternatives under consideration. Responses to the comments received during the public comment period are included in the Responsiveness Summary, which is part of this ROD. The decision for this Site is based on the information contained in the Administrative Record file. The Administrative Record file is located in the following information repositories:

1. Joplin Public Library
   300 Main
   Joplin, Missouri

2. Webb City Public Library
   101 South Liberty
   Webb City, Missouri

3. Carl Junction City Hall
   105 North Main
   Carl Junction, Missouri

4. U.S. Environmental Protection Agency
   726 Minnesota Avenue
   Kansas City, Kansas

4.0 Scope and Role of Operable Unit

The selected remedy deals with cleanup of contaminated soils in residential yards in areas of historic smelting operations and in areas contaminated with mining and milling wastes. This cleanup action is one part of the EPA's overall efforts under Superfund to deal with environmental contamination resulting from historic mining and smelting operations in Jasper County. Residential yards contaminated solely form other sources, such as lead-based paint, are not going to be addressed by this cleanup action. In the future, additional cleanup actions for the Site will deal with (1) contaminated ground water and drinking water supplies and (2) mining and milling wastes in areas other than residential yards. This phased approach to cleanup is being used for this Site in order to cleanup the contamination which poses the greatest health threat first. The EPA believes that the selected remedy will consistent with future cleanups that will be done at the Site.

The EPA has established four operable units (OUs) to deal with risks to human health and the environment caused by metals contamination at the Site. The EPA initiated the first operable unit (OU 1: Mining and Milling Waste) investigations at the Site in 1991. The responsible parties entered into an AOC with the EPA to conduct the investigation. OU 1 originally focused on cleanup of mining and milling wastes to remedy risks posed to the environment. Currently, the RI and the Human Health Risk Assessment (HHRA) have been completed for OU 1. The Ecological Risk Assessment (ERA) will be completed in the near future. The FS for OU 1 will be initiated when the ERA is compete.

OU 2, Residential Yard Soils (yards located in smelter areas), and OU 3, Mine Waste Yards (yards located in the vicinity of mining and milling wastes), were established after completion of the MDOH exposure study which documented elevated blood-lead concentration in children in Jasper County. The focus of these OUs is to reduce exposure of children to heavy metals at the Site. Since the MDOH study concluded that the most significant cause of high blood-lead concentrations in children was exposure to contaminated soil, these OUs focus on cleanup of yard soil. OU2 was established to cleanup residential yards in the smelter areas. OU 3 was established to cleanup residential yards located on or near mining and milling wastes. Cleanup in the smelter will be conducted by the EPA. The EPA anticipates that cleanup in the mining areas will be conducted by the PRPs.

OU 4 was established to deal with contaminated private residential water wells identified during the RI for OU 1. Currently the PRPs are preparing an FS for OU 4 which will analyze remedial alternatives for a safe drinking water supply to the homes in the mining areas where a public water supply is not currently available.

The remedial action objective for the OUs 2 and 3 is to cleanup residential yards soils to prevent current and future human, primarily children, exposure to the contaminated soils. The selected alternative and the remedial action objective for these OUs are compatible with the overall objectives for the Site. This ROD supports the overall strategy for addressing contamination and the release of hazardous substances within the Site that threatens human health and the environment.

5.0 Site Characteristics

The initial Site investigations focused primarily on identifying contamination associated with mining and milling wastes. Samples of ground water, surface water, soil, air, and mining and milling wastes were collected during the investigation. Results indicates that ground water, surface water, and soils have been contaminated with lead, cadmium, and zinc from mining and milling wastes. Additionally, the most immediate problems identified, with respect to human health risks, are due to homes built on mining and milling or smelter wastes or where people are drinking contaminated ground water form private water wells.

Subsequent investigations that focused on residential soils indicate the most contaminated residential yard soils are around the Eagle-Picher smelter in northwest Joplin. The contamination extends predominantly in a southeasterly direction from the smelter to a distance of at least 2 1/4 miles as shown on Figure 1. The investigations indicated that lead and cadmium are the principal contaminants of concern at the Site. The sampling results indicate the highest levels of lead contamination are within a few city blocks of the smelter and decrease with distance. Homes built on or near mining wastes lie within the designated areas show on Figure 2.

The RIs performed by the PRPs from 1991 through 1995 focused primarily on identifying contamination associated with mining and milling wastes piles. Ground water, surface water, soil, air, and mining and milling wastes were investigated. Results of the investigation indicated the ground water, surface water, and soils have been contaminated with lead, cadmium, and zinc from mining and milling wastes. Additionally, the RI indicated that the most immediate problems with respect to human health were homes built on mining and milling wastes.

In 1994, the PRPs submitted to the EPA the Residential Yard Assessment Report prepared by Dames & Moore. That report concluded that homes built on or near mining and milling wastes were less likely to exceed target levels (500 ppm) for lead than those built in historic smelter areas. Roughly 50 percent of the yards located on mill wastes exceeded target levels, while yards locate in mill waste transition zones (within 200 feet of mill waste pile) showed a 25 percent exceedence rate. In contrast approximately 85 percent of the yards surveyed in the smelter exceeded target levels.

During 1995, the EPA sampled approximately 1,250 residential yards within a 3/4 mile radius of the Eagle-Picher smelter in northwest Joplin. The results of that sampling effort indicate that 86 percent of those yards had concentrations of lead exceeding 500 ppm. Additional sampling around the other, more minor, smelters in Jasper County (58 yards sampled) indicate that approximately 55 percent exceeded 500 ppm lead.

In the fall of 1995, the EPA characterized the extent of the lead contamination around the Eagle-Picher smelter. The EPA sampled approximately 450 residential yards distributed throughout the contaminated areas. They determined that the contamination extended predominantly in a southeasterly direction to a distance of approximately 2 1/4 miles as shown on Figure 1. The sampling results indicate the highest levels of lead contamination are within a few city blocks of the smelter and decrease with distance. The results of residential yard sampling conducted to date are included in the Administrative Record Addendum.

6.0 Summary of Site Risks

A human health risk assessment was conducted for the Jasper County Site by the MDOH using data gathered during the environmental studies done at the Site. The risk assessment evaluated the health threats that the Site would cause if no cleanup work was done. The contaminants which were determined to be causing risk to human health at the Site are lead and cadmium. Exposure to lead and cadmium cause adverse systemic (non-cancer) effects. Available reference doses (the level which does not cause any adverse effects in people) for cadmium were used to evaluate health effects from exposure to cadmium. The Integrated Exposure Uptake Biokinetic Model (IEUBK) was used to evaluate health effects from exposure to lead.

The IEUBK predicts that an unacceptable health risk for young children is posed from exposure to lead at this Site. The model shows that more than 5 percent of the children in both scenarios (residents and recreational users) would have blood lead levels exceeding 10 ug/dl, with 12 percent of those living on designated area or transition zone soils (near waste piles) and 25 percent of those living on mine/mill wastes predicted to exceed 10 ug/dl. According to EPA policy, Superfund action to reduce lead exposure should be taken when more than 5 percent of the children in a population have blood lead levels greater than 10 ug/dl.

In general, both the actual blood-lead data from children who live at the Site and the risk assessment concludes that health risks may be present for residents at the Site primarily because of the exposure to lead and cadmium in soils and locally grown produce. The health risks are most prevalent for children under the age of seven years. If contaminated residential soils and garden soils are not addressed by cleanup, the lead and cadmium in these soils present unacceptable risks to human health and welfare.

7.0 Remedial Action Objectives

The remedial action objective (RAO) for residential soils in the Jasper County Site is a cleanup goal for reducing human health risks. One RAO has been developed for residential soils: reduce public exposure, and particularly children's exposure, to residential soils with elevated lead and cadmium concentrations resulting from historic mining and smelting activities

8.0 Description of the Alternatives

Two alternatives were developed to address the RAOs in the FS Report. Additionally, the No Action Alternative was assessed as required by the NCP, 40 C.F.R. §200.430(e)(6). The No Action Alternative may be appropriate at some sites where a removal action has already occurred that mitigates risks to human health and the environment. Although a time-critical removal action has already occurred at the Site, residual risks to human health remain at the Site as shown in the HHRA. The concentrations of metals in residential yard soils remain at levels (for example, lead concentrations greater than 500 ppm) that present some risk to human health and the environment particularly for young children residing at the Site. The two action alternatives, in addition to the No Action Alternative (Alternative 1), were Alternative 2, Phosphate Stabilization with Institutional Controls and Alternative 3, Excavation and Disposal with Health Education and Institutional Controls.

In general, Alternative 2 involved treating contaminated soils with phosphate to reduce the bioavailability of lead and cadmium to children. Research indicates that treating soils with phosphate may bind up metals so they are not absorbed into the body when ingested. Additionally, local ordinances or regulations need to be established to regulate construction of new homes i contaminated areas. The feasibility study points out that phosphate treatment is a new technology that appears promising to reduce bioavailability but has not yet been proven effective. Therefore, a study to determine the effectiveness would be required before the treatment alternative could be implemented.

Alternative 3 consisted of excavation and removal of contaminated soil, construction of a repository to dispose of the contaminated soils, replacement of the contaminated soil with clean soil and revegetating the excavated yards. In addition, a health education program would be established to inform residents in the Site of the hazards associated soils, and to monitor the blood-lead levels of children. Local ordinances or regulations would also be established under the excavation alternative to regulate construction of new homes in contaminated areas.

9.0 Comparative Analysis of the Alternatives

The National Contingency Plan (NCP), 40 C.F.R. Part 300, requires EPA to evaluate selected remedial alternatives against nine criteria. A selected alternative must satisfy all nine criteria before it can be implemented. The first step is to ensure that the selected remedy satisfies the threshold criteria. The two threshold criteria are overall protection of public health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs). In general, alternatives that do not satisfy these two criteria are rejected and not evaluated further.

The second step is to compare the selected remedy 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 selected remedy on the basis of modifying criteria. The two modifying criteria are state and community acceptance. These final two criteria cannot be evaluated fully until the state and public have commented on the alternative and their comments have been considered.

The following compares the alternatives considered against the nine criteria for remedy selection and discuss the key advantages or disadvantages of the two alternatives considered.

9.1 Overall Protection of Human Health and the Environment

This criterion provides a final check to assess 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 assessed under the evaluation criteria especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

Protection of human health and the environment is addressed to varying degrees by the two alternatives. Both provide protection of human health through reducing exposure to metals in contaminated soils. Phosphate Stabilization (Alternative 2) provides protection by in-situ treatment that immobilizes lead, and other metals such as cadmium and zinc, to effectively reduce the bioavailability. However, this conclusion is only supported by laboratory bench scale data. A treatability study is necessary to determine if the treatment is effective at the Site. Institutional controls would not be necessary except for future development in residential areas.

Excavation and Disposal (Alternative 3) provides protection by removing the contaminated soils from the exposure pathway and installation of a soils and sod barrier between residents and underlying contaminated materials (at depth of 12 inches). This alternative addresses concerns of exposure through direct contact with soil contaminants of tracking contaminated yard soil into homes as a source of house dust. This alternative provides for individual responsibility and community responsibility through the implementation of institutional controls to address the exposure pathways of local garden produce, household dust, and future residential development.

In general, permanence of remedial action is greatest for the Alternative 2 with its essentially complete immobilization of contaminants in the soils, providing the treatability study supports the laboratory data regarding the bioavailability of the lead. Soil excavation and disposal also provides permanence through complete removal of contaminated soils at or above 800 ppm lead concentrations, but this alternative relies on a greater need for institutional controls, which may be less permanent.

9.2 Compliance With ARARs

This criterion is used to decide how an alternative meets applicable or relevant and appropriate federal and State requirements, as defined in CERCLA Section 121. Compliance is judged with respect to chemical-specific, action-specific and location-specific ARARs as well as appropriate criteria, advisories and guidance.

Both Alternatives 2 and 3 meet federal and State Missouri ARARs. The chemical- and location-specific ARARs are identified in Tables 1 through 4. Federal and State action-specific ARARs are identified in Tables 5 and 6. Both alternatives had the same associated ARARs as the selected remedy. These ARARs are described in Section 11.2, Attainment of ARARs.

9.3 Long-Term Effectiveness

This criterion addresses the results of a cleanup action in terms of the risk remaining at the Site 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.

The residual risks form contaminants remaining at the Site after remediation is significantly reduced by the cleanup actions of Alternative 2. The residual risks may be somewhat greater with Alternative 3, but both alternatives reduce risks. Alternative 2 effectively reduces risks (assuming the treatability study and long-term monitoring confirms laboratory data) without the significant institutional controls required by Alternative 3. Alternative 2 reduces risks for homes using effective engineering controls with soil concentrations of lead at or above 800 ppm lead and relies on greater use of institutional controls and public education for controlling residual risks for residents with soil concentrations below 800 ppm lead.

Excavation of all soils with lead levels greater than 500 ppm was considered but eliminated due to the large number of residential yards exceeding 500 ppm. The EPA believes excavating the yards that exceed 800 ppm lead and establishing a health education program is a more cost effective approach to remediating the contamination than excavating all residential yards with lead levels greater than 500 ppm given the relatively low risk associated with soil lead levels between 500 and 800 ppm.

Both alternatives also require the use of institutional controls to reduce residual risks for the permanent repository and the removal repository. Both alternatives rely on institutional controls to reduce risks from future development in residential areas. In general, ICs are less effective than engineering controls at controlling the risk from contamination that remains at the Site.

9.4 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. Both Alternatives 2 and 3 are similarly effective in the short-term for protection of the public and remedial action workers. The excavation and disposal alternatives would require a longer time to implement. Also, the excavation and disposal alternative involves more risks to remedial action workers due to more direct exposure to contaminates soil while removing, hauling and disposing of soil.

9.5 Reduction of Toxicity, Mobility, or Volume

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. Alternative 2 would significantly reduce toxicity and mobility for residences with soils at concentrations of 500 ppm lead or above (assuming the treatability study confirms the laboratory data). Alternative 3 would significantly reduce mobility for residences with soils at concentrations of 800 ppm lead or above. Institutional controls would be required to manage residual risks for residences with less than 800 ppm lead concentrations in the soils under the excavation alternative. Therefore, Alternative 2, treatment with phosphate, is preferred because it significantly decreases the toxicity and increases the amount of contamination that is immobilized at the Site.

9.6 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. Both Alternatives 2 and 3 are readily implementable. The extent or degree to which the remediation is applied does vary significantly between the two active response measures, treatment or excavation, because of the different action levels. The excavation alternative is a well-developed technology. However, the treatment alternative technology is not well developed. The treatability study would determine the effectiveness of this effort. Both alternatives are technically feasible from a engineering perspective, but the level of effort associated with each is different.

Alternative 3 also relies to a greater extent on institutional controls which to a certain degree are less effective and more difficult to implement than engineering controls because they rely on local government entities for long-term implementation and enforcement. In general, Alternative 2 is more implementable than Alternative 3 because the technology (if effective) is like typical lawn maintenance and because of the reduced need for institutional controls. When comparing Alternative 3 (excavation with heavy equipment, backfilling, sodding or seeding, construction or the repository, and institutional controls), to Alternative 2, phosphate stabilization is more implementable.

9.7 Cost Effectiveness

This criterion addresses the direct and indirect capital cost of the proposed remedy. Operation and maintenance costs incurred over the life of the project, as well as present worth costs, are also evaluated.

Alternative 3 is considered cost effective in that health education and institutional controls would be used to offset excavation costs for yards below 800 ppm. Alternative 2, if the treatability study shows reductions in bioavailability, would allow for reducing risk from contaminated soils without the relatively high costs associated with excavation and disposal. Therefore, Alternative 2 is more cost effective than Alternative 3.

9.8 State Acceptance

This criteria addresses MDNR's preferences or concerns about the Site remedial action alternatives. The EPA is the lead Agency and has coordinated all Site activities with MDNR throughout this project. MDNR, as the EPA's support agency, concurs with the selected remedy.

9.9 Community Acceptance

This criteria reflects EPA's perception of the community's preferences or concerns about the selected alternative. The EPA held a public comment period on the Proposed Plan from May 6 through June 7, 1996. The EPA received numerous comments form the public. In general, the community accepted the Proposed Plan. The responsiveness summary, which addresses the significant comments received from the public during the comment period is included with this ROD as Attachment 1.

10.0 Description of the Selected Remedy

The EPA's selected remedy is a combination of the Alternatives 2 and 3 described above. Under the cleanup approach selected by EPA, excavation and disposal of contaminated soil from residential yards is expected to begin in the fall of 1996, beginning with the residential yards that present the highest risks. At the same time, the EPA will proceed with the additional treatability studies that are necessary in order to determine if the phosphate treatment can effectively reduce health risks presented by the contaminated soils. The studies are expected to take approximately 10-14 months to complete. If the studies show that phosphate treatment is effective, the excavation and disposal cleanup program will be discontinued once the studies are complete, and the residential yard cleanup will be completed using phosphate treatment. If the studies show that phosphate treatment will not be effective, then the excavation and disposal program will continue until cleanup of the residential yards is complete. Health education and institutional controls to provide construction of future residential homes in contaminated areas are also components of the selected remedy.

There are a number of reasons why EPA believes the selected remedy is the best cleanup approach. Although phosphate treatment costs far less than excavation and disposal, it will be at least a year before the studies are done which will determine if phosphate treatment will be an effective cleanup approach. The EPA feels that it is important to begin cleanup of the yards that present the highest risks as soon as possible, and that cleanup of the highest risk yards should not be delayed while the additional studies are ongoing. Therefore, the EPA believes the best way to proceed is to begin with excavation and disposal, and then switch to phosphate treatment if and when the studies show that it will be effective. This approach begins reducing risks as soon as possible, yet still allows an opportunity to take advantage of the potential cost savings to be realized by using phosphate treatment and to meet the NCP preference for treatment. Additionally, the selected remedy, if phosphate stabilization proves successful, allows more yards to be cleaned up for the same amount of money, may be less intrusive to affected neighborhoods, is easier to implement, addresses lead paint contamination in soil, reduces the need for a repository, and is potentially more protective than excavation alone.

The following is a detailed description of each part of this proposed cleanup: excavation and disposal, phosphate treatment, health education, and institutional controls.

10.1 Excavation and Disposal

The selected remedy includes excavation of residential yards with soil concentrations that exceed action levels of 800 ppm lead or 75 ppm cadmium. If a residential yard exceeds the action level of 800 ppm lead in any portion of the yard, then all soils in the yard exceeding 500 ppm will be removed. Existing garden soils exceeding 500 ppm lead, even where located in yards that do not exceed the 800 ppm lead action level, will be removed to reduce the risk associated with ingestion of vegetables from contaminated gardens. Cleanups activities will begin with the residential yards that present the highest risks first. To date, very few yards have been identified that exceed the cadmium action level of 75 ppm. Those that do exceed for cadmium also significantly exceed for lead.

The EPA estimates that approximately 2,400 residential yards contain soil exceeding 800 ppm lead. Figure 1 shows the approximate extent of soil contamination in the Eagle-Picher smelter area exceeding 800 ppm lead. Additional sampling is required to define the extent of soil contamination and the number of residential yards affected by mining areas shown on Figure 2. Excavation would be conducted in yards in the smelter zone and near mining waste where the highest recorded sample for the yard exceeds 800 ppm lead.

This alternative involves the removal of soil to a maximum depth of 12 inches in affected areas of a selected yard, replacing the soil with clean topsoil, and restoring the lawn. Soil will be excavated using hand tools and light weight excavation equipment. If soils at a depth of one foot exceed 1,500 ppm lead, physical barrier consisting of a heavy plastic mesh will be placed over the soil prior to backfilling to alert home owners to the contamination remaining at depth in the event of any future digging or construction. Clean fill (less than 240 ppm lead, and 25 ppm cadmium which are the levels established by the MDOH as acceptable for any use) and topsoil will be used to replace soil removed during excavation, raising the soil to its original grade. After topsoil has been replaced the yard will be seeded or sodded, as appropriate in consideration of the home owners' preferences.

Residential yards identified as containing vegetable gardens during the remedial design will have clean soil supplied for the re-construction of existing gardens to a depth of 18 to 24 inches or until soil in the excavation was 500 ppm lead or less. All gardens with soils over 500 ppm lead and 75 ppm cadmium will be addressed. Any residents who create a new, or expand an original vegetable garden after EPA's cleanup action is complete will supply their own clean soil for a raised bed. A conservative estimate of the number of residential properties that will require garden soil is 260.

10.2 Soil Repository

The selected remedy requires construction of an on-site repository. Approximately 500,000 cubic yards of soil will require disposal covering approximately 65 acres. The exact location of the repository, which will be determined by EPA and MDNR, is dependent on the cooperation of existing landowners. It is anticipated that the repository will be constructed in the corridor of the proposed Highway 71 Bypass, on the east side of the Site between Duenweg and Carterville. The EPA is coordinating with the Missouri Highway and Transportation Department (MHTD) on the location and construction requirements for the repository. The repository will be constructed so that the highway can be placed over the top of the repository, thus greatly reducing not only human exposure to the pile, but the need for long-term operation and maintenance of the pile. In the event the highway is routed such that it does not cover the pile, the MHTD has stated they will use soil from the pile as fill or cover material within the highway corridor. The EPA will construct the disposal facility, and MDNR will be responsible for any long-term operation and maintenance that may be required.

10.3 Additional Soil Sampling

As stated above, the EPA has not yet fully identified all residential yards that require cleanup. An extensive sampling program will be conducted to identify all residential yards, parks, school play grounds, and other areas frequented by children that exceed 500 ppm lead and 75 ppm cadmium as a result of mining, milling and smelting activities. The sampling will be conducted in all identified smelter and mining areas. Where possible, residential yards, parks, and play grounds that contain transported mining wastes or transported contaminated soil will also be identified and sampled. However, the EPA anticipates it will be very difficult to identify all areas where transported mining wastes have been placed. The potential scope of the problem of identifying transported mining wastes eliminates the consideration of any organized, comprehensive sampling effort to identify transported wastes.

10.4 Health Education

Health education for the community and medical professionals in the area is needed to reduce and treat exposures that could potentially cause adverse health effects. An active educational program will be conducted in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR), MDNR, MDOH, and the Jasper County and Joplin City Health Departments.

Professional educational seminars will be held to guide the physician or medical professional through the diagnosis, treatment, and surveillance of illness in people, especially children exposed to heavy metals. Annual professional education is needed to maintain an adequate level of awareness among the medical professionals about the contaminants in the area and to provide updates about the most current therapies or treatment regimens.

Community education will occur on a variety of levels including local school districts, Technical Assistance Groups, Community Advisory Groups, Lamaze and pre-natal groups, hospital birthing centers, scouting programs, or other groups that request educational materials. These organizations will allow information regarding risk and sources of lead exposure to be disseminated to the community.

Equipment is needed for the enhancement of the environmental assessment capabilities and to assist in the removal of possible indoor dust contaminants. In order to perform adequate environmental assessments in the home, an x-ray fluorescence (XRF) spectrophotometer will be supplied to the local health departments. Also, high efficiency particulate vacuum (HEPAVAC) cleaners will be supplied to the local health departments allow properly trained individuals to reduce the levels of lead dust in residences.

Extensive education on the potential health effects of eating vegetables grown in contaminated soils will be provided. Residents will be advised against raising vegetables in contaminated soils. They will be encouraged to grow vegetables only in raised beds with uncontaminated soils and to thoroughly wash any vegetables consumed. Additional information related to garden vegetables will require negligible additional effort and expense.

In addition to the health education program, an early childhood blood-lead screening program is included in the Selected Remedy. The screening program is to monitor and assess the effectiveness of the cleanup. Such monitoring will measure the success of the various components of the Selected Remedy including, excavation of yards at or above 800 ppm lead in the soil, phosphate treatment of yards at or above 500 ppm, and the health education program. Frequent blood-lead screening during and shortly after implementation of the remedy will alert the EPA and the State to a potential remedy failure. Screening will continue during operation and maintenance (O&M) to provide a measure of the continued effectiveness of the remedy for the required five year reviews. Completion of the remedy and initiation of O&M will be

after the remedy has achieve the RAO and the remedial design, and is operational and functional as determined by EPA and the State.

To date. ATSDR has worked closely with the MDOH and the Jasper County and Joplin Health Departments and has funded to the Jasper County Health Department to provide child blood-lead screening and health education activities as described above. The EPA and ATSDR will continue to work with these state and local agencies to provide blood-lead screening and health education to deal with the risks associated with soil contamination below 800 ppm, interior dust and lead-based paint, and future vegetable gardening. ATSDR has established funds to conduct these activities for approximately two more years (through 1998). The EPA will supplement these funds to insure the activities are conducted until one year after the remedy is determined to be operational and functional. The EPA anticipates approximately five years will be required after initiation of the remedial action to make that determination. Continued health education activities after that time will be funded by the State of Missouri as part of the Operation and Maintenance. The EPA and MDNR, in consultation with ATSDR and MDOH, will assess the scope of health education if phosphate stabilization is implemented.

10.5 Phosphate Treatability Study

The EPA will initiate a treatability study to determine the effectiveness of phosphate stabilization on reducing the bioavailability of lead. Assuming the results of the study show a reduction of the bioavailability to levels protective of human health (particularly for young children as demonstrated by the IEUBK model), all residential yards and areas highly accessible to children (parks and playgrounds) with lead concentrations in the soil exceeding 500 ppm lead will be treated with phosphate.

The treatability study consists of an initial bench scale and bioavailability test to determine the effect that phosphate addition to soils under ideal laboratory conditions has on reducing the bioavailability of lead in soils at the Site. The second part of the study, assuming initial findings are positive, entails testing of field application methods and rates to lower the metals bioavailability in the soil. The fields test plot will be located on vacant land in the smelter area that exhibits typical contamination of the area.

The bioavailability test will be conducted using the Swine Model developed by the EPA, and conducted by the University of Missouri. The EPA will evaluate the success of phosphate stabilization using the IEUBK model and the bioavailability number generated from the treatability study to calculate a new "safe level" number for soil that has been treated with phosphate. All soils between 500 ppm and the newly calculated Site specific "safe level" will be stabilized with phosphate. All residential soils exceeding the "safe level" for lead will be excavated. The public and additional EPA entities (laboratories, Headquarters, lead work groups, etc.) will be provided with the opportunity to evaluate and comment on the phosphate treatability study results before switching to this remedial method of cleanup.

10.6 Phosphate Stabilization

The EPA estimates that approximately 5,000 residential yards contain soil that exceeds 500 ppm lead. Approximately 2,000 to 2,500 yards are in the range of 500 ppm to 800 ppm lead. Additional sampling, as described above, is required to define the extent of soil contamination exceeding 500 ppm lead and to identify the number of residential yards affected by mining and milling wastes. The stabilization action would be conducted in yards where the highest recorded sample exceeds 500 ppm lead in the smelter zone and in yards that are situated on or near mining waste.

Assuming the treatability studies demonstrate that Site-specific application of phosphate reduces bioavailability of lead in soils, then the phosphate treatment cleanup option will diminish the need for a Site-specific health education program since all residential yards with lead concentrations exceeding 500 ppm will be cleaned up. Also, only a small soil repository is necessary for the immediate excavation needs. Thus, long-term operation and maintenance of the soil repository will be significantly reduced if the phosphate treatment is implemented.

A long-term monitoring program will be instituted id phosphate stabilization is utilized to assess the effectiveness of the treatment. The program will continue blood-lead monitoring for children six years and younger. Initially the blood-lead monitoring will measure the effectiveness of the remedy and determine if it is operational and functional. Once the remedial action goal has been achieved, the blood-lead monitoring will become part of the five-year review process for this Site to ensure effectiveness and permanence of the remedy.

Additionally, soil chemistry monitoring will be conducted to assess the effects of natural weathering on the newly formed lead-phosphate minerals from phosphate treatment. Monitoring] results on the soil collected as part of operation and maintenance will be assessed during each five-year review to ensure the effectiveness and permanence of the remedy.

The soil repository constructed as part of the Time-Critical Removal Action will also be treated with phosphate to reduce the bioavailability of the lead-contaminated soils in the top 12 inches of the pile. This treatment will be performed to reduce the availability of heavy metals to plants and animals living on the repository.

10.7 Institutional Controls

The EPA and the State will work closely with the local communities to establish institutional controls (ICs) to guide future residential development in lead-contaminated areas. EPA and State anticipate that ICs will be implemented under the authority of the local governments. ICs are required for both excavation and phosphate stabilization cleanup activities.

ICs are required to prevent exposure of children to unacceptable levels of lead in the soil in future residential developments. Under the selected remedy, only existing residential yards/gardens will be subject to cleanup. The ICs may include zoning restrictions, long term zoning plans, special building codes, health ordinances covering construction of residential homes, or deed restrictions depending on the desires of the community and local authorities. ICs for future residential development may require soil sampling, excavation, capping or even phosphate stabilization (if effective) prior to construction of new residential dwellings, daycare centers, schools, and parks. Commercial and industrial development need not be subject to ICs because the exposure to contaminated soils at these settings is not an unacceptable human health risk.

Additionally, the EPA and the State will work with local governments to establish a long-term repository for the purpose of disposing lead-contaminated soil excavated from areas of new residential development. The EPA will developed the area for a long-term repository for remedial action implementation. The EPA and the State anticipate that a long-term repository for future development may not be necessary in the event that local governments and the community prefer capping or phosphate stabilization (if effective) as opposed to excavation. Regardless of the location selected for the long-term repository, unless the MDNR grants an exemption to dispose the soil in an existing landfill as a Special Waste, the repository must be constructed on land with existing mining wastes. Additionally, the soil must be deposited on top of the mining wastes to comply with policy established under the Corrective Action Management Rule(CAMU). The CAMU allows exemptions to the requirements of the Resource, Conservation and Recovery Act (RCRA). Otherwise, the repository would be subject to the requirements of RCRA, including meeting land disposal restrictions, closure, and post closure requirements.

10.8 Operation and Maintenance

Operation and maintenance (O&M) of the selected remedy consists of three main components. Each is described below. Detailed descriptions of each O&M activity will be developed in the O&M Plan which will be prepared as part of the Remedial Design. Each O&M activity will be evaluated as part of the five-year review program and may be modified as appropriate after each five-year review as agreed to by the EPA and MDNR with consultation from ATSDR and MDOH.

10.8.1 Repositories

An O&M program will be established to maintain the repositories constructed at the Site for disposal of contaminated soil. Repositories requiring O&M include the removal action repository, the remedial action repository and the long-term repository for future development (if established). O&M of the repositories may include monitoring for erosion, providing access to the repository, proper grading, and other requirements for landfill operations, etc.

O&M of the remedial action repository will be conducted until such time that the repository is covered by the proposed Highway 71 Bypass. The O&M program for the removal repository is required for the expected life of such repositories.

The EPA will coordinate with MDNR and the local governments to provide for the long-term repository that will be operated for ten years following the completion of the remedial action. The ten year period will allow for development of other options. The MDNR is financially responsible ad part of the O&M for the Site, to ensure that the repository is properly operated and maintained for the ten year period. It is anticipated, however, that the MDNR may contact with a local government i.e., city or county, or a private entity to operate and maintain the repository. Several options exist to provide for

a long-term repository. These include establishing a user fee to maintain a formal repository, disposing contaminated soil as cover in existing landfills, or disposing contaminated soil on appropriate land currently covered with mining wastes and zoned industrial/commercial as use for fill before development. The exact details and design of the long-term repository will be completed as part of the remedial design and Operation and Maintenance Plan.

The EPA will perform O&M at all repositories during implementation of the selected remedy and for one year after completion of the remedy becomes operational and functional. The State will assume responsibility for O&M after that period. It is anticipated that the State will contract with local governments or other interested parties to actually perform O&M tasks, such as erosion control and landfill operations, etc., on the repositories.

10.8.2 Health Education

The O&M program will include the continuation of health education and blood-lead monitoring. Medical professionals and the greater child-care community (for example, schools and day cares) will need routine education to maintain awareness of the health risks that remain after completion of the Selected Remedy. O&M will include providing educational materials and seminars and other such activities. Whether excavation of phosphate stabilization is used, low levels of lead will remain in the soil (800 to 500 ppm lead or less). The O&M program for health education will continue to reduce the risks associated with the contamination remaining in the soil. Abbreviated educational activities are likely for lower lead levels (500 ppm or less) and will be possible if phosphate stabilization is used. Detailed health education activities will be defined in the Operation and Maintenance Plan. The program will be modified as necessary, with consultation with ATSDR and MDNR during the five-year review process and after completion of the remedial action.

In addition to health education, the O&M program will include maintenance of the HEPAVAC and the XRF equipment as well as a training program for individuals to operate such equipment. The O&M program will also include blood lead screening. The current screening program maintained by ATSDR may be modified as necessary during and after implementation of the remedy. Initial monitoring will be useful to assist in the determination that the remedial action objective and the remedial design have been achieved. Later, the O&M program will use the blood-lead monitoring data to assist in determining long-term effectiveness and permanence of the Selected Remedy.

The EPA will supplement the funds that have already been provided by ATSDR to insure the activities are conducted until one year after the remedy is determined to be operational and functional. The EPA anticipates approximately five years will be required after initiation of the remedial action to make the determination. Continued health education activities after that time will be funded by the State of Missouri as part of the O&M. The State will assure that health education and blood-lead monitoring are in place, reliable, and will remain in place after initiation of O&M as required by the NCP, 40 C.F.R. Section 300.510(c) (1).

10.8.3 Monitoring

The O&M responsibilities include a monitoring program to assess the effectiveness of the institutional controls for future residential development. Also, if phosphate stabilization is used as a cleanup action, a soil chemistry monitoring program will be established to ensure the phosphate minerals remain stable.

The monitoring program will provide annual reports to the EPA detailing the continuation of the health education program, any residential development in areas of concern, and soil chemistry data associated with the phosphate stabilization. Monitoring requirements will 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. Any modification to the monitoring requirements will be agreed to by the EPA and MDNR with consultation from ATSDR and MDOH.

10.9 Five-Year Review

A five-year review is required at sites where contamination remains above health-based criteria. The review will be conducted in accordance with Section 121 of CERCLA, 42 U.S.C. §9621(c), as amended, and applicable guidance and in a manner to assure the continued protection of the public health and environment.

The five-year review of the remedial action will be conducted to ensure that the remedy implemented is effective and accomplishes the goals of the remedial action. The review will include an assessment of the reduction in blood-lead levels in children in the areas of concern. The review also

includes a review of the institutional controls at the Site area, i.e. the enforcement of the controls on new residential construction, and further bioavailability and soil chemistry analyses.

10.10 Cost

The Remedial Alternative, without phosphate stabilization of yards after completion of the treatability study, is expected to cost $28,600,000, as shown on Table 7. This is based on the estimate of $10,000 per home for excavation, backfilling and sod/seeding. The overall cost includes $960,000 for construction of the permanent repository. Annual O&M, including health education (shown in Table 8) and monitoring of institutional controls, is $112,600. Cost for phosphate stabilization, as shown on Table 9, range from $3,366,000 to $24,366,000 depending on the method determined to be most effective for field application. The method under consideration range from simply spreading phosphate fertilizer on the lawn by hand to rototilling the phosphate into the top six to ten inches of the soil. O&M costs for stabilization for the first five years, which include soil chemistry monitoring along with blood-lead monitoring of children less than seven years of age, is $105,000. Annual O&M after the first years would consist of ICs, monitoring, of soil chemistry monitoring, and repository maintenance, and would cost approximately $50,000.

Therefore, the overall costs for the proposed alternative cannot be accurately determined until completion of the treatability study. Maximum cost is stated for excavation. If the treatability study shows significant reduction in bioavailability with surface application methods, the cost could be as low as $6 million to $7 million, depending on the number of yards excavated before completion of the treatability study, which is expected to take 12 to 18 months to complete. Annual O&M is also dependent on whether phosphate stabilization is proven effective.

11.0 Statutory Determinations

Under its legal authority, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this Site must comply with applicable or relevant and appropriate environmental standards federal and state environmental laws, unless a statutory waiver is justified. The selected remedy also must be cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

11.1 Protection of Human Health and the Environment

The selected remedy will protect human health and the environment by achieving the RAO through a combination of engineering measures and institutional controls. Existing human health risks due to potential lead exposure from soils will be reduced by remediating residential yards situated in smelter areas and on or near mining wastes with lead levels that exceed health based action levels. Future risks to human health will be reduced by implementation of institutional controls that will ensure proper construction of residential dwellings on soils or mine wastes with contaminant levels in excess of health-based levels. Implementation of a health education program will help to further reduce the risk of exposure to contaminated soil as well as other sources of lead, such as interior dust and lead-based paint.

There are no short-term threats associated with implementation of the remedy that cannot be readily controlled. In addition, no adverse cross-media impacts are expected from the remedy.

11.2 Attainment of Applicable or Relevant and Appropriate Requirements of Environmental Laws (ARARS)

The selected remedy will comply with all applicable or relevant and appropriate chemical-, action-, and location-specific ARARs, discussed below. Compliance with ARARs is required of the selected remedy unless a waiver of an ARAR is justified. No ARARs waivers are needed for this remedy. ARARs for the selected remedy are identified and categorized as wither "Applicable" or "Relevant and Appropriate" in Table 1 through 6. These tables also describe the requirements for each ARAR.

11.2.1 Chemical-Specific ARARs

The chemical-specific ARARs are identified and discussed in this section. The elements of concern in residential soils are lead and cadmium. There are no federal or state applicable, relevant or appropriate requirements that pertain to these metals in soil. However, the EPA has identified other

criteria and guidance that will be considered in implementation of the selected remedy, as identified in Tables 1 and 2, item C, "To be Considered".

11.2.2 Location Specific ARARs

The location-specific ARARs that will be attained by this remedial action are based on the location of the site and the effect of the hazardous substances on the environment. The response actions undertaken by the selected remedy will attain the location-specific ARARs for historic preservation, archaeological areas, and endangered species. These three location specific ARARs are identified in Table 3, items A1 through A3.

The location-specific ARARs for the established removal repository will be attained by the selected remedy. These ARARs are identified in Table 3, items A4 through A8, B1 and Table 4, A1.

11.2.3 Action-Specific ARARs

The action-specific ARARs are based on activities and technologies to be implemented at] the site. The cleanup activities taken to develop the soil repositories will attain the action-specific ARARs identified in Table 5 and in Table 6, item B2. The excavation and disposal activities undertaken by the selected remedy will attain the action-specific ARARs identified in Table 6, item A1.

11.3 Cost-Effectiveness

The selected remedy is cost-effective because it will provide overall effectiveness proportional to its costs. The selected remedy will achieve the remedial action objective, and thus effectively reduce unacceptable risks to human health and the environment, at an estimated cost of $29.8 million, if phosphate stabilization is not utilized. The selected remedy is the least expensive remedy that is protective of human health and the environment and complies with ARARs. Although phosphate stabilization is less costly, it is not yet a proven technology. Excavation of contaminated soil is required until the phosphate stabilization is proven protective of human health.

11.4 Utilization of Permanent Solutions and Alternative Treatment Technology (or Resource Recovery Technologies) to the Maximum Extent Practicable

The selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in cost-effective manner for this remedial action. The cleanup of residential yards in smelter areas and on or near mining wastes with contamination above health-based levels will permanently eliminate risk to children who live in such residences.

The other actions which are apart of the selected remedy, institutional controls and health education, are not as permanent as the engineering actions, but will still provide a high degree of long-term effectiveness.

11.5 Preference for Treatment as a Principal Element

The selected remedy effectively reduced risks through a combination of engineering and institutional controls, and includes treatment technology to the maximum extent possible. The treatment technology must be proven effective through treatability studies, however, before it can be utilized. The principal current human health threat posed by the Site is exposure to contaminated soils in residential yards. If proven effective, phosphate stabilization will reduce the risk of exposure by significantly reducing the bioavailability of the metals in the soil, allowing them to be left in place. Thus, the phosphate stabilization component of the selected remedy employs treatment as a principal element of the cleanup. However, if phosphate stabilization is not used, then the statutory preference for treatment will not be met.

12.0 Documentation of Significant Changes

There are no significant changes in the selected remedy from the remedy proposed in the Proposed Plan.

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TABLE 1

FEDERAL CHEMICAL-SPECIFIC ARARS

	Citations	Prerequisite	Requirement
A. Applicable Requirements	None		
B. Relevant and Appropriate	None		
C. To Be Considered			
1. Human Health Risk Assessment Report (HHRA)	"Area-Wide Human Health Risk Assessment for the Jasper County Superfund Site, Jasper County, Missouri" - prepared by Missouri Department of Health (MDOH), October 23, 1995.	Evaluates baseline health risk due to current site exposures and established contaminant levels in environmental media at the site for the protection of public health.	The risk assessment approach using this data should be used in determining cleanup levels because ARARs are not available for contaminants in soils.
2. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and ACRA Corrective Action Facilities	Office of Solid Waste and Emergency Response (OSWER) Directive 9355.4-12, July 14, 1994	Establishes screening levels for lead in soil for residential land use, describes development of site-specific preliminary remediation goals, and describes a plan for soil lead cleanup at CERCLA sites	This guidance recommends using the EPA Integrated Exposure Uptake Biokinetic Model (IEUBK) on a site-specific basis to assist in developing cleanup goals.
3. EPA Strategy for Reducing Lead Exposures	EPA February 21, 1991	Presents a strategy to reduce lead exposure, particularly to young children.	The strategy was developed to reduce lead exposure to the greatest extent possible. Goals of the strategy are to 1) significantly reduce the incidence above 10 ug pb'dl in children; and 2) reduce the amount of lead introduced into the environment.
4. Soil Lead Contamination Health Consultation	Agency Toxic Substance and Disease Registry (ATSDR), prepared by Denise Jordan-Izaguirre, April 8, 1995	Removal of contaminated soils.	Lead in soil appears to be responsible for blood lead levels in children increasing above background. Recommends exposure to lead in soil be reduced.
5. ATSDR/MDOH 1994 Health Study	"Jasper County Missouri Superfund Site Lead and Cadmium Exposure Study: Report to ATSDR"- May 4, 1994.	Evaluates of young children to current site exposures.	Recommends exposure to lead contaminated soil in area be reduced.
6. EPA Strategy for Response Actions in the Tri-State Mining District	"Proposed Strategy for Response Actions in the Oronogo-Duenweg Mining Belt Site, Jasper County, Missouri and Cherokee County, Kansas"	Presents a strategy to reduce human health exposure risks from mining and smelting wastes.	Recommends specific response actions for these sites to reduce human health risks.

TABLE 2
FEDERAL CHEMICAL-SPECIFIC ARARS

	Citation	Prerequisite	Requirement
A. Applicable Requirements	None		
B. Relevant and Appropriate Requirements	None		
C. To Be Considered			
1. Missouri Department of Health "Any-Use Soil Levels"	19 MO CSR 20-9.020 (proposed)	Recommends baseline levels for lead and cadmium in soil for residential or "any-use" land use.	Recommends cleanup levels for residential soils be established at 240 ppm for lead and 28 ppm for cadmium. However, extensive site specific data and analysis as described in the HHRA, supersede the applicability of these levels

TABLE 3
FEDERAL CHEMICAL-SPECIFIC ARARS

	Citation	Prerequisite	Requirement
A. Applicable Requirements			
1. Historic project owned or controlled by a Federal Agency	National Historic Preservation Act: 16 U.S.C. 470. et. seq; 40 C.F.R.§6.301.36 C.F.R. Part 800.	Property within areas of the Site is included in or eligible for the National Register of Historic Places.	The remedial alternatives will be designed to minimize the effect on historic landmarks.
2. Site within an area where action may cause irreparable harm, loss, or destruction of artifacts.	Archaeological and Historic Preservation Act; 16 U.S.C. 469.40 C.F.R. 6.301.	Property within areas of the site contains historical and archaeological data.	The remedial alternative will be designed to minimize the effect on historical and archaeological data.
3. Site located in area of critical habitat upon which endangered or threatened species depend	Endangered Species Act of 1973, 16 U.S.C. 1531-1543l 50 C.F.R. Parts 17, 401.40 C.F.R. 6.302. Federal Migratory Bird Act; 16 U.S.C. 703-712.	Determination of the presence of endangered or threatened species.	The remedial alternatives will be designed to conserve endangered or threatened species and their habitat, including consultation with the Department of Interior if such areas are affected.
4. Site located within a floodplain - JWI removal repository.	Protection of Floodplains, Executive Order 11988; 40 C.F.R. Part 6, Appendix A.	Remedial action will take place within a 100-year floodplan.	The remedial action will be designed to avoid adversely impacting the floodplain in and around the JWI removal repository to ensure that the action's planning and budget reflects consideration of the flood hazards and floodplain management.
5. Wetlands located in and around the JWI removal repository.	Protection of Wetlands; Executive Order 11990; 40 C.F.R. Part 6. Appendix A.	Remedial actions may affect wetlands	The remedial action will be designed to avoid adversely impacting wetlands wherever possible including minimizing wetlands destruction and preserving wetland values.
6. Structures in waterways in and around the JWI removal repository.	Rivers & Harbors Act.33 C.F.R. §§ 320-330.	Placement of structures in waterways is restricted to preapproval of the U.S. Army Corps of Engineers.	The remedial action will comply with these requirement
7. Waters in and around the JWI removal repository.	Clean Water Act, (Section 404 Permits) Dredge or Fill Substantive Requirements, 33 U.S.C. § 1251-1376: 40 C.F.R. §§ 230,231.	Capping, dike stabilization construction of berms and levees, and disposal of contaminated soil, waste material or dredged material are examples of activities that may involve a discharge of dredge or fill material.	Four conditions must be satisfied before dredge and fill is an allowable alternative: 1. There must be not practical alternative. 2. Discharge of dredged or fill material must not cause a violation of State water quality standards, violate applicable toxic effluent standards. jeopardize threatened or endangered species or injure a marine sanctuary. 3. No discharge shall be permitted that will cause or contribute to significant degradation of the water. 4. Appropriate steps to minimize adverse effects must be taken. Determine long-and short-term effects on physical, chemical, and biological components of the aquatic ecosystem.

8. Area containing fish and wildlife habitat in and around the JWI removal repository.	Fish and Wildlife Conservation Act of 1980, 16 U.S.C. §§ 2901 et seq: 50 C.F.R. Part 83 and 16 U.S.C. §661, et seq. Federal Migratory Bird Act, 16 U.S.C.§703.	Activity affecting wildlife and non-game fish and wildlife and their habitats.	Remedial action will conserve and promote conservation of non-game
B. Relevant and Appropriate Requirement			
1. 100-year floodplain	Location Standard for Hazardous Waste Facilities- RCRA; 42 U.S.C. 6901; 40 C.F.R. 264.18(b).	RCRA hazardous waste treatment and disposal.	Facility located in a 100 year floodplain must be designed, constructed, operated, and maintained to prevent washout during any 100 year 24 hour flood.
C. To Be Considered	None		

TABLE 4

FEDERAL CHEMICAL-SPECIFIC ARARS

	Citation	Prerequisite	Requirement
A. Applicable Requirements			
1. Wildlife Code of Missouri for areas in and around the JWI removal repository	3 C.S.R § 10-4 111	Determination of the presence of endangered or threatened species.	Provides for regulation of nongame wildlife and threatened and endangered species, and places restrictions on actions affecting protected species.
B. Relevant and Appropriate Requirements.	None.		
C. To Be Considered.	None.		

TABLE 5
FEDERAL CHEMICAL-SPECIFIC ARARS

	Citation	Prerequisite	Requirement
A. Applicable Requirements			
1. Disposal of Solid Waste in the Permanent Repository and closure of the Removal Repository at JWI	Subtitle D of RCRA, Section 1008, Section 4001, et seq., U.S.C. §6941. et seq.	State or Regional Solid Waste Plans and Implementing federal and state regulations to control disposal of solid waste. The yard soils disposed in the repository may not exhibit the toxicity characteristic and therefore, are not hazardous waste. However, these soils are solid waste.	Contaminated residential soils will be consolidated from yards throughout the site. The disposal of this waste material should accordance with regulated solid waste be in management practices.
2. Disposal of Hazardous Waste in the Permanent Repository.	Subtitle C of RCRA Section 3001 et seq., 42 U.S.C. §6921. et seq. and implementing regulations at 40 C.F.R. §261.4.	RCRA provides an exclusion from regulation as a hazardous waste the mining waste generated from the extraction, benefication and processing of ores and minerals even if such wastes may be characteristic hazardous wastes. Such mining wastes may be excavated from residential yards. If so, it is excluded from regulation as a hazardous waste under RCRA Subtitle C.	Residential yard soils may be consolidated in the permanent repository as solid wastes if they are mining wastes, such as chat. The repository is not a RCRA regulated hazardous waste management unit.
3. Disposal of Hazardous Waste in the Permanent Repository and Designation as a Corrective Action Management Unit (CAMU).	Subtitle C of RCRA, Section 3001 et seq., 42 U.S.C. §6921, et seq. and implementing regulations at 40 C.F.R. Subpart S. Correction action for solid waste management units and temporary units, 40 C.F.R. §264.522	RCRA defines Corrective Action Management Units (CAMUs) to be used in connection with implementing remedial measures for corrective actions under RCRA or at Superfund sites. Generally, a CAMU is used for consolidation or placement of remediation wastes within the contaminated areas at the facility. Placement of waste in a CAMU does not constitute land disposal of hazardous waste and does not constitute creation of a unit subject to minimum technology requirements.	The RCRA requirements of Subtitle C are not applicable to the disposal of residential yard soils in the repository. Residential yard soils contaminated from smelter fall out are not excluded from regulation under the RCRA exclusion for extraction, beneficitation and mineral processing. Therefore, yard soils exhibiting a RCRA toxicity characteristic would be regulated under Subtitle C RCRA However, because of the CAMU regulation, these residential soils are remediation wastes and may be disposed without triggering RCRA disposal requirements. The remedial action will comply with the requirements of theCAMU rule.
B. Relevant and Appropriate Requirements			
1. NPDES Storm Water Discharge for Permanent Repository.	40 C.F.R. Part 122. §122.26	Establishes permitting process and discharge regulations for storm water	Required management of repository where waste materials come into contact with storm water. Also required during construction of the repository.
2. Transportation of excavated soils.	DOT Hazardous Material Transportation Regulations, 49 C.F.R. Parts 107, 171-177	Regulates transportation of hazardous wastes.	Relevant and appropriate for the excavation which will transport wastes on-site. However, off-site disposal regulation would not apply.
C. To Be Considered	None		

TABLE 6
FEDERAL CHEMICAL-SPECIFIC ARARS

	Citation	Prerequisite	Requirement
A. Applicable Requirements			
1. Ambient Air conservation Law, and Restrictions of Particulate Matter to the Ambient Air Beyond the Premises of Origin.	Revised Statutes of Missouri, chapter 643 and Missouri Code of State Regulations, 10 C.S.R. Part 10 and 10 C.S.R. § 10-6.170	Requires that reasonable measures be used to prevent particulate emissions from leaving the premises. Also, sets ambient air quality standards for a number of air constituents.	Recommend that excavation of yard soils or tilling of yards in treatment alternative be handled in such a manner at to control fugitive emissions, such as use of a water spray during excavation, tilling or transportation. May be used in monitoring ambient air quality during implementation for lead and other particulates.
B. Relevant and Appropriate Requirements.			
2. Missouri Clean Water Law, NPDES Storm Water Discharge for Permanent Repository.	Missouri Water Pollution Control Regulations, 10 C.S.R. Part 20	Regulates of constituents from any point source, including stormwater, to surface waters of the state. Provides for maintenance and protection of public health and aquatic life uses of surface water and groundwater.	Required management of repository where waste materials cone into contact with storm water. Also required during construction of the repository.
	and		
	Stormwater Regulations, 10 C.S.R. Part 20-6 200	Establishes permitting process and discharge regulations for storm water. A state permit will not be required because the repository will be conducted on-site, however, substantive requirements of the storm water controls will be required.	Remedial actions will use "Best Management Practices" for land disturbance as including practices of procedures that reduce the amount of soil available for transport in accordance with this Missouri regulation.
C. To Be Considered			
1. Siting of the Permanent Repository and Closure of the Removal Repository.	RCRA Hazardous Waste Program as Implemented by the State of Missouri through its Hazardous Waste Program:		The RCRA regulation of remediation wastes will be in accordance with the CAMU rule as discussed above under Federal Action-Specific ARARs. The inclusion of the State of Missouri Hazardous Waste Program regulations will be
	40 C.F.R. Section 264.14		
	40 C.F.R. Section 264.15		
	40 C.F.R Section 264.18 (a) and (b); 25.7-264(i)(N)1.A 10 C.S.R.	General Inspection Requirements	Security considered during the remedial design of the permanent repository and the closure design of
	40 C.F.R. Section 264.37	Locations Standards	
	40 C.F.R. Section 264.55, 264.56; 25-7.264 (2)(D) 10 C.S.R.	Arrangements with Local Authorities	
	40 C.F.R. Section 264.111	Contingency Plan	
	40 C.F.R. Section 264 116, 10 C.S.R. 25-7.264(2)(G)3	Closure Performance Standard]	
	40 C.F.R. Section 264.118	Survey Plant/Deed Notice	
	40 C.F.R. Section 264.310	Post-closure Plan	
		Closure and Post-closure Care	

2. Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal-Sites.	Revised Statutes of Missouri, Section 260.440.	Allows the state to list unremediated residential properties with soil contamination that exhibits the toxicity characteristic and is a hazardous waste.	The State may not list residential properties under either alternative unless access for remediation is necessary in some cases (e.g. young children reside at the property).
3. Metallic Minerals Waste Management Law.	Revised Statutes of Missouri, Sections 444.350 to 444.362.	Requires a closure plan for capping mine and mill wastes and requires a designation for future use of such land.	May be considered for remedial action taken at the removal repository and for the permanent repository which will be essentially a cap of existing mine wastes.

TABLE 7
COST SUMMARY FOR EXCAVATION AND DISPOSAL
WITH HEALTH EDUCATION AND INSTITUTIONAL CONTROLS

WORK ITEM	ESTIMATED QUANTITY	ASSUMED UNIT PRICE	TOTAL EST. COST FOR ITEM
REMEDIAL DESIGN			
1. Contaminant Assessment	2,400	$450	$1,080,000
2. Repository Design		$90,000	$90,000
3. Yard Cleanup Design		$50,000	$50,000
TOTAL DESIGN COSTS			$1,220,000
RESIDENTIAL YARD EXCAVATION			
1. Mobilization		$50,000	$50,000
2. Property Access	2,400	$50	$120,000
3. Material Movement (excavation, transport, backfill)	2,400	$10,000	$24,000,000
4. Post Cleanup Reports	2,400	$400	$960,000
5. Repository Site preparation	65 acres	$4000/acre	$260,000
6. Material Placement in Repository	400,000cy	$1.20	$480,000
7. Repository Vegetative Cover	65 acres	$2000/acre	$130,000
Subtotal			$26,000.000
Contingencies (=10% of subtotal)			$2,600,000
TOTAL CONSTRUCTION COSTS			$28,600,000
OPERATION AND MAINTENANCE			
1. O&M of Time Critical Removal Repository			$5,000
2. O&M of Remedial Action Repository			$10,000
3. Health Education Activities (from Table 2) for first year including purchase if XRF and HEPAVAC			$77,600
4. Monitoring of Institutional Controls			$20,000
TOTAL ANNUAL O&M			$112,600

TABLE 8
HEALTH EDUCATION FOR JASPER COUNTY

WORK ITEM	ESTIMATED COST
Initial Purchase of Equipment (XRF, HEPAVAC)	$17,000
ANNUAL OPERATION AND MAINTENANCE	
Annual maintenance of equipment	$2,800
Educational material	$10,000
Personnel and facility for blood lead screening	$61,000
Professional education	$3,800
ANNUAL O&M	$77,600
TOTAL FOR FIRST YEAR	$94,600

TABLE 9
COST ANALYSIS FOR PHOSPHATE STABILIZATION

WORK ITEM	ESTIMATED QUANTITY	ASSUMED UNIT PRICE	TOTAL EST. COST
DESIGN			
1. Remedial Design	1	$50,000	$50,000
2. Residential Yard Sampling	4000 resident yards	$450	$1,800,000
TOTAL DESIGN			$2,250,000
PHOSPHATE STABILIZATION			
1. Treatability Study	1	$300,000	$300,000
2. Mobilization/Demobilization	1	$5,000	$5,000
3. Phosphate Stabilization (includes lawn restoration)	5000 residential yards	$500 to $4,000	$2,500,000 to $20,000,000
Subtotal			$2,805,00 to $20,305,000
Contingencies (20% of subtotal)			$561,000 to $4,061,000
TOTAL PHOSPHATE STABILIZATION			$3,366,000 to $24,366,000
OPERATION AND MAINTENANCE			
1. Annual O&M of Repositories			$10,000
2. Annual Soil Chemistry Monitoring	5 samples	$1,000	$5,000
3. Annual Blood-Lead Monitoring		$35,000	$35,000
TOTAL ANNUAL O&M (excluding treatability study)			$50,000

RESPONSIVENESS SUMMARY
RESIDENTIAL YARD SOILS
OPERABLE UNITS 2 AND 3
ORONOGO-DUENWEG MINING BELT SITE
JASPER COUNTY MISSOURI

Introduction

This Responsiveness summary has been prepared in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Contingency Plan (NCP) 40 CFR § 300.43(f). This document provides the United States Environmental Protection Agency's (EPA) response to all significant comments received on the Proposed Plan from the public during the 30-day comment period.

On May 6, 1996, the EPA released the Proposed Plan and Administrative Record File containing the Remedial Investigation, Human Health Risk assessment, Feasibility Study, and other pertinent documents for public review and comment. Th Proposed Plan discussed the EPA's proposed action to address residential yard soils contaminated with lead and cadmium. The public comment period was open from May 6 to June 7, 1996. The EPA held a public meeting on May 16 at the North Middle School in Joplin, Missouri to present the Prosed Plan and discuss results of investigations and feasibility study. A copy of the transcript from the public meeting is included in the Administrative Record File.

Comments Received from the Public and Responses

The following comments were received in writing during the comment period or verbally during the public meeting.

Two questions were received from the City of Carterville concerning the soil repository. These were whether the repository would contaminate ground water, and how the repository would be finished.

The repository will be constructed to cover existing mining and milling wastes. It will be graded and vegetated to prevent erosion of soil from the pile. Additionally, the EPA and the Missouri Highway and Transportation Department (MHTD) are coordinating to route the proposed highway 71 bi-pass over the pile or to use the soil pile for fill in the right-of-way. Remedial investigations at the site indicate that lead and other metals in mining and milling wastes and surface soils do not leach into ground water if surface runoff is controlled.

The Carterville Special Road District asked for more specific information of how the repository will maintained until it is covered by the highway 71 bi-pass.

The repository will be maintained for one year after completion of the cleanup by the EPA. After the first year of maintenance, the repository will be maintained by the Missouri Department of Natural Resources (MDNR). The repository will be constructed with proper runoff controls that prevent soils from migrating from the pile. In the case that the highway 71 bi-pass does not cover the pile, the MHTD has informed the EPA of their intention is to use the soil from the pile as fill or cover material for the construction of the bi-pass. Thus most, if not all of the pile would be removed and placed in the bi-pass right-of-way.

The City of Joplin raised several concerns regarding the long-term repository. These concern pertained primarily to who will maintain and is responsible for the repository.

The EPA will design and prepare the site(s) for the long-term repository. The MDNR is financially responsible, as part of the Operation and Maintenance (O&M) for the site, to ensure that the repository is properly operated and maintained. It is anticipated, however, that the MDNR may contact with a local government, i.e., city or county, or a private entity to operate and maintain the repository. Several options exist to provide for a long-term repository,. These include establishing a user fee, disposing contaminated soil as cover in existing landfills, or disposing contaminated soil on appropriate land currently covered with mining wastes and zoned industrial/commercial as use for fill before development. The exact details and design of the long-term repository will be completed as part of the remedial design and Operation and Maintenance Plan and will be coordinated by the EPA with the MDNR and local governments.

Regardless of the location selected for the long-term repository, unless the MDNR grants an exemption to dispose the soil in an existing landfill as a Special Waste, the repository must be constructed on land with existing mining wastes. Additionally, the soil must be deposited on top of the mining wastes to comply with policy established under the Corrective Action Management Rule (CAMU). The CAMU allows exemptions to the requirements of the Resource, requirements of RCRA, including meeting land disposal restrictions, closure, and post closure

Costs associated with the long-term repository in the Proposed Plan are only estimates. The EPA does not anticipate that the long-term repository will be extensively utilized. Therefore, the cost estimate for O&M is not significant. Actual costs will be developed during the design phase of the project. Actual O&M cost will be developed in the O&M Plan.

Several citizens wrote to express their concern that the cleanup proceed as quickly as possible and that their particular yards be remediated soon.

The EPA is anticipating that remediation activities will begin in early fall of 1996. Cleanup will begin at yard with the highest health risk first, i.e., those that contain the highest level of contamination, and continue to yards that present the least health risk. Yards that contain soil with levels exceeding 800 parts per million (ppm) will be excavated unless the treatability study proves that addition of phosphate will reduce the toxicity of lead in soil. If phosphate stabilization proves effective, the EPA will switch from excavation to treatment of yard soils and all soils exceeding 500 ppm will be treated.

Several citizens expressed their concern regarding the effectiveness of health education. Some stated they did not believe health education could reduce blood lead concentrations in children possibly resulting from yard soil containing up to 800 ppm lead, assuming phosphate treatment is not used as a cleanup method.

The EPA believes that health education can be an effective tool at reducing blood-lead concentrations in children if extensive programs are implemented and maintained. Regardless, the selected remedial action includes monitoring of blood-lead levels in children on a continuing basis. If during the five year reviews conduced for the site, the EPA determines that overall blood-lead concentrations have no decreased to acceptable levels, the EPA will reassess the remedy and will take further action to reduce blood-lead concentration. These actions may include additional excavation or treatment technologies to lower action levels.

The EPA, in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR), the Missouri Department of Health (MDOH), and the Jasper County and Joplin Health departments will make ever effort to implement an effective health education program, The health education program will reach as many parents as possible in the affected areas , and, physicians within the county.

Both the Jasper County and Joplin Health departments expressed concern that the funding for health education specified in the Proposed Plan may not be adequate to support activities necessary to protect human health. They also stated that a fund should be established to provide money for the program into the future.

The cost presented in the Prosed Plan and Record of Decision are only estimates of what the activities will cost, not the exact amount of funds that will be spent on health education. The EPA will coordinate with the ATSDR, MDOH and the Jasper County and Joplin Health departments to design an effective health education program that includes appropriate child blood-lead monitoring. The EPA will ensure that adequate funding is provided for the program until the remedy is effective at reducing exposure of children to lead and cadmium contamination in the soil. Effectiveness of the remedy may be measured by reduction in blood-lead concentrations in children. The State of Missouri will ensure adequate funding for the health education thereafter. Funding will be adjusted as appropriate to accomplish the goals of the program.

With respect to establishing a trust fund; the EPA believes that the Superfund Trust Fund is already established to provide money for remedial actions. Separate trust funds created on a site-by-site basis are unnecessary. The appropriate mechanism for the EPA to assist the State and local health agencies in carrying out health education, is a cooperative agreement between the EPA and the State or local government. The cooperative agreement allows the EPA to fund health education during implementation of the remedial design and remedial action. In accordance with the National Contingency

Plan (NCP) regulations, the EPA will continue to fund the health education program for at least one year after the remedy is determined to be operational and functional. After that time, the State is responsible for operating and maintaining and thus, funding, the health education program. When appropriate, the EPA may agree to extensions of the one year period for continued Federal funding of operation and maintenance prior ro the State taking responsibility for O&M. The EPA is considering such extensions for this site if the remedy is not yet operational and functional at the conclusion of the one year period.

The EPA is also considering the possibility of using funds obtained potentially responsible parties (PRPs) to implement the health education program. Certain funds may be obtained and placed in special accounts earmarked for site-specific response. If feasible, a trust fund may be created from such private parties money. However, the EPA is considering such a trust fund very carefully because the trustee, beneficiaries and uses of the trust fund money must be carefully identified and specified.

Both the Jasper County and Joplin Health departments express concern about liability and maintenance of HEPAVACS proposed to be housed in the health departments.

The EPA included issuing HEPAVACs to the health departments in response to requests from the departments, ATSDR, ad MDOH early in the feasibility study process. The EPA will work with the health department during development of the health education program to decide where the HEPAVACs will be housed and who will maintain them. The EPA anticipates the Jasper County Health Department will receive the unit for use by individual citizens on a site wide basis. The EPA will ensure, and fund, the health department to receive proper training on maintenance of the units and proper disposal of the dust collected in them. It is anticipated that If proper procedures are followed, minimal, if liability will be incurred by the department.

One citizen asked about the actual effect on the health of children of having high blood-lead levels. She questioned if the EPA has assessed such things as IQ levels, increased illnesses, birth defects, cancers etc.

Consultation with ATSDR and MDOH suggests that it is very difficult to obtain reliable results on effects to the population by measuring the items in questions. One tool the EPA has available to measure the effects of lead contamination on a population is blood-lead levels. The exposure study conducted by the MDOH and ATSDR released in 1994 concluded that the most significant cause of elevated blood-lead levels in children was exposure to lead contaminated soil.

One commenter suggested the EPA consider deed restrictions of institutional controls and require soil sampling prior ro sale of a home similar to a termite inspection.

The EPA has considered deed restrictions as an option. The type of deed restriction has been carefully considered and the EPA believes a notice on the deed filed at the County Recorder's Office may be sufficient. Such a notice may be filed on properties identified as having contamination above the action levels for cleanup where the owner refuses to allow the cleanup to proceed. However, deed notices on all potentially contaminated undeveloped properties is not practical because of the very large amount of contaminated land and numerous property owners. The EPA believes a better approach to controlling future development is through local government land use controls, such as an environmental building code to be enforced by the local health departments. Such a code could be a county or city ordinance and would require soil sampling prior to occupancy of newly constructed dwellings. In the event unsafe levels of contaminants are found in the soil, cleanup would be required prior to occupancy. If the local governments fail to enact such protective ordinances, or repeal them after enactment, the EPA may exercise its authority to identify undeveloped properties and place deed notices on the title if the properties are contaminated with hazardous substances in accordance with Section 107(1) of CERCLA, 42 USC § 6907(1).

The City of Joplin requested that the EPA released all soil sampling results for residential yards to date.

The EPA will release all results with the ROD. Additionally, the EPA will continue to provide data as it becomes available.

Several comments were received regarding institutional controls (ICs). These included questions on who would fund the ICs, in what areas they would be required, how they would be implemented, and what

specific types of controls would be required.

The EPA and MDNR will work closely with the local governments to establish the ICS for the site. ICS will be required only in the smelter zones and former mining areas. The EPA will provide a map to the local governments outlining these areas of concern. Additionally, ICS are required only for construction of new residential dwelling, daycare facilities, schools, or parks and playgrounds. The ICS are not necessary for commercial or industrial sites.

The EPA's preference is that the ICS be implemented at the County level since the areas of concern lie within several municipalities, and unincorporated portions of the county. It is anticipated that the ICS will be developed as a health ordinance that requires sampling of residential properties to show that lead levels are below 500 ppm prior to occupancy of the dwelling. Properties that contain lead concentrations greater than 500 ppm will require remediation. This could be accomplished by either excavating the contaminated soil until the levels at the surface are less than 500 ppm, or capping the contaminated soil with clean soil. In the case that the contaminated soil is capped, the thickness of clean soil is as follows; 500 ppm to 1000 ppm requires six inches, 1000 to 2500 requires twelve inches, and more than 2500 ppm requires eighteen inches. If the treatability study being conducted for phosphate stabilization provide acceptable results, the EPA will provide phosphate treatment criteria. At a minimum, one sample will be required for every 900 square feet (30 ft. by 30 ft.) of yard area. Sample analysis may be performed by x-ray diffraction (XRF) methods or by a reputable analytical laboratory.

The EPA will provide funding to establish and implement the ICS. For example, funding may be needed to draft the local ordinance and to obtain a legal opinion as to the validity of the ordinance, etc. Long-term O&M for the ICS will be assumed by the State of Missouri. Depending on exactly what types of ICS are implemented, it is anticipated that maintenance of the ICS will be funded through permit fees assessed to the home owner. For example, if a county health ordinance is adopted requiring sampling of yard soil the county may hire a firm to collect and analyze to soil, and bill the home owner. The process would be similar to hiring someone to conduct a termite inspection prior to sale of a home, or do a percolation test for installing a new septic system.

The Jasper County Health Department submitted two comments to the EPA concerning phosphate stabilization. These were that the technology should receive community support before it is utilized and that the Agency should test both mine waste soil, as well as, smelter zone soil.

The EPA intends to hold a public meeting once the treatability study is complete to present and discuss the results of the study and to solicit support from the community before proceeding with phosphate stabilization. During the initial study, only smelter zone soils will be tested, since this is the area of highest contamination and will be remediated first. However, the EPA plans to conduct testing of mining area soil in addition to the smelter zone soil as a second phase of the study.

The city of Joplin also made two comments concerning phosphate stabilization. These pertained to the large range of cost estimated for treatment, and allowing the Citizen's task force and the Technical Assistance Group (TAG) to have input into the study.

The EPA intends to provide the treatability study work plan to both the task force and the TAG for review and comment on study results.

The wide range of the cost estimate stems from the fact that this type of treatment as not been full tested to date to reduce bioavailability. The EPA is confident that phosphate stabilization can be used to reduce bioavailability if thoroughly mixed into soil by methods such as rototilling. However, rototilling, must first be proven to be effective, and second is relatively expensive since yards must then be re-sodded. The EPA also plans to test less invasive application method along with the rototilling. These methods are significantly less expensive, yet like rototilling, have to date not been proven to reduce bioavailability. Additionally, the EPA will also assess the depth of treatment that is the most cost effective, yet still protective of human health.

The City of Joplin asked how the EPA will acknowledge that the cleanup is complete.

The EPA will publish a Remedial Action Completion Report at the conclusion of the cleanup activities. This report will document all yards that were cleaned up, and will present any and all data the EPA has demonstrating the remedial action is protecting human health.

The City of Joplin asked how long the remedial action is expected to take and what assurances are in place to complete the action.

If phosphate stabilization is not used, the action will be completed in approximately five years. The EPA anticipates that the cleanup will be completed sooner if phosphate is used. Once the EPA issues the Record of Decision, it is committing to complete the entire remedial action. The EPA has $3 million to start to cleanup this year and has planned $7 million for 1997. Additional money will be incrementally added to the cleanup action until remediation is complete.

The City of Joplin asked how homes that refuse cleanup during the removal will be treated during the remedial action.

The homes that refused to participate during the removal action will be placed of the list for top priority during the remedial action since their yards now contain the highest levels of contamination. The EPA hopes they will publish the addresses of the yards that were not cleaned up, yet contain unacceptable levels of contamination, to protect potential future buyers of those properties. The EPA is also considering dead notices for the individual properties where the owner does not allow remediation.

The City of Joplin asked if the EPA will address some lead-based paint issues along with soil cleanup.

The EPA will clean up soil contaminated by lead-based paint in yards that are also contaminated from smelter or mining sources. However, the EPA will not remediate lead-based paint on the house itself. The EPA will advise the homeowner of the existing lead paint problem and counsel the owner on ways to abate the problems.

The City of Joplin asked how contractors will be selected to conduct the remedial action and encouraged use of local contractors.

The EPA intends to contract the remedial action to the U.S. Army Corp of Engineers (COE) through an interagency agreement as provided for in the National Contingency Plan. The COE has preplaced contractors that will be utilized to conduct the cleanup. However, equipment operators, haulers, laborers, etc., are expected to be hired from the local workforce.

The City of Joplin recommended using funds collected from the Eagle-Picher Company as part of a bankruptcy settlement for remedial actions, not to cover past cost incurred by the EPA, and the use should have public input.

The EPA intends to use funds collected from Eagle-Picher for remedial actions at the site. The EPA's claim in the bankruptcy included money to remediate soil in Eagle-Picher smelter zone and in the mining areas. In accordance with the bankruptcy settlement and court order, the EPA will utilize funds received in the most appropriate method possible to remediate soils in these areas of the site. An opportunity to submit comments on the EPA settlement with Eagle-Picher was available during a public comment period and public meeting held in 1995. Representatives of the City of Joplin attended the public meeting held on July 11, 1995 in Joplin, Missouri. The EPA responded to the City's concerns at that time. We reiterate here that the Agency intends to use funds to be received from Eagle-Picher for remedial actions at this site, and not for recovery of past costs.

The City of Joplin recommended that the EPA consider comprehensive remediation of all lead potential sources, including paint, water, and soil to create a "lead safe" environment. Additionally, the City recommended that the EPA correlate blood-lead data to soil data, and consider long-term measures that provide protection from chipping lead-based paint.

The EPA will issue a proposed plan later this year or early 1997 that provides for remedial action for contaminated ground water. The remedial action described in this Record of Decision deals with soil cleanup directly, and provides health education to reduce risk associated with lead-based paint. The Exposure Study published by the MDOH showed the strongest correlation to lead-based paint. The EPA recognizes that chipping lead-based paint may recontaminate a small portion of soil in the drip zone of a house. However, the EPA believes the most cost effective method to deal with the potential problem is through health education activities.

Several commenters were concerned that the EPA identify all residential yards and gardens that require remediation. Of particular concern were homes built in mining areas and homes built on transported mining wastes or transported contaminated soil.

The EPA has planned an extensive program to identify all homes that require cleanup. The sampling program will be designed to identify yards that exceed 500 ppm lead to allow focused health education and possibly phosphate stabilization. In the smelter zones, the program will continue sampling at the point where earlier characterization stopped until homes within the zone of contamination greater than 500 ppm lead have been identified. In the mining areas, the Potentially Responsible Parties (PRPs) under an agreement with the EPA identified all homes constructed on or near mining wastes in 1994 by comparing historic aerial photographs with aerial photographs obtained in 1991. The EPA will verify that this study was accurate and will characterize new homes built after 1991 in the mining areas. The EPA has not determined an adequate method for determining where homes have been built on transported mining wastes or transported contaminated soil. However, if such homes are identified and soil contamination exceeds the action levels, they will be included in the remedial action.

Additionally, the EPA will attempt to identify and sample existing gardens within the affected areas. Gardens that exceed 500 ppm lead and/or 75 ppm cadmium will be included in the remedial actions.

The Jasper County Superfund Site Coalition (JCSSC) commented that they believe the EPA has limited the sampling, cleanup levels and remedial action based on budgetary constraints.

The EPA has not limited Superfund response actions to meet perceived budget limitations. The EPA selects the least costly remedy that provides protection to human health and meets the statutory criteria. The remedy provides protection of human health with both engineering and institutional controls. The selected remedy is approximately 60 percent less expensive than using only engineering controls, i.e., excavating all homes with lead concentrations greater than 500 ppm.

The JCSSC commented that the remedy places unspecified requirements and costs on the local community.

The EPA will work with the local governments to establish ICS, health education programs and long-term repository. Financial responsibility for health education and the repository is the responsibility of the EPA and MDNR. The EPA anticipates that the State and local governments will provide that costs associated with maintaining the ICS will be the responsibility of the future home owners or developers. The local communities should not have any additional financial burden due to the ICS.

The JCSSC commented that the Proposed Plan did not contain a sampling plan or sampling schedule for yards and gardens.

Sampling plans and schedules are typically developed as part of the Remedial Design after the ROD is completed. The sampling plans will contain provisions to identify and sample all gardens, as well as yards in the affected areas.

The JCSSC questioned whether the EPA would remediate driveways containing mining wastes (chat).

The EPA will remediate chat driveways only at residential properties where soil remediation is conducted. Driveways on residential properties that contain soil with metals concentrations less than the action levels will not be addressed by the selected remedial action. Consultations between the EPA and the MDOH indicate the driveways, without high soil lead level are not anticipated to create a significant risk. The risk associated with driveways alone can be dealt with through education. Property owners will be advised to pave or otherwise cover chat driveways with clean material.

The JCSSC questioned whether the EPA will remediate vacant lots during the remedial action since they are typical playgrounds for neighborhood children.

The EPA does not agree that all vacant lots are typical playgrounds for children in the age group of concern and does not propose remediating all vacant lots that exceed levels within the affected areas as part of the selected remedy. However, the intent of the selected remedy is to remediate areas where small children (under the age of six years) congregate or spend a significant amount of time. The EPA will remediate a vacant lot(s) in the case where it can be shown that small children spend time at the

lot.

The JCSSC commented that they prefer the EPA remediate all garden soils exceeding the Missouri Any-Use Numbers of 240 ppm lead and 28 ppm cadmium, and the remedy, whether excavation or phosphate stabilization be applied to all gardens. Additionally, they requested the EPA conduct bioavailabilty studies on cadmium as well as lead.

The EPA with ATSDR and MDOH have determined that the site specific action levels for gardens of 500 ppm lead and 75 ppm cadmium are protective of human health. The EPA will remediate all gardens that are identified within the areas of concern that exceed action level using excavation initially and then phosphate if the treatability studies show it to reduce bioavailability.

The EPA has not developed a methodology for conducting bioavailability studies on cadmium. However, the data collected from the site indicates that cadmium rarely exceeds the action level of 75 ppm in existing yard soil sampled to date. Additionally, research conducted by others on using phosphate to reduce bioavailability in plants shows similar in cadmium after application as with lead.

The JCSSC requested clarification on the number on bioavailability tests, or more specifically, the number of feeding studies, to be conducted during the phosphate treatability study. Additionally, they questioned the amount of long-term monitoring to be conducted.

The EPA will initiate the study with bench scale testing to determine two to three optimum phosphate types and application rates to reduce bioavailability of lead. Effectiveness of the tests will be assessed using physical and chemical analyses such as scanning electron microscopy, x-ray diffraction, and in-vitro methods. At the completion of the bench study the most promising mixture will be analyzed in a feeding study. If the feeding study shows an adequate reduction in bioavailability, two to three methods developed on the bench scale will be applied to field test plots using different application methods. After the test plots have "cured," soils will be collected from the plots to conduct additional feeding studies(up to three) to assess the application methods effectiveness at achieving the reduction in bioavailability achieved in the feeding study from soils mixed on the bench. The EPA will hold a public meeting to discuss the results of the study and solicit public comment before switching to phosphate stabilization of residential yards.

Additional testing is planned for the future to assess long-term stability of the treated soils. The EPA will assess the stability of the treatment during each five-year review that is conducted for the site. A review is required every five years as long as contaminants remain on-site.

The JCSSC suggested that the EPA conduct studies on the uptake of metals by garden plants in phosphate treated soils, if the treatment is to applied to gardens.

The reduction in availability of lead, zinc, and other metals has already been well documented by other researchers from the U.S. Department of Agriculture and private industry. The EPA is not planning on reproducing these studies.

The JCSSC requested clarification on the criteria that will be used to determine that switching from excavation to stabilization will be protective of human health.

The EPA will evaluate the success of phosphate stabilization using the IEUBK model and the bioavailability number generated from the treatability study to calculate a new "safe level" number for soil that has been treated with phosphate. All soils between 500 ppm and the newly calculated site specific "safe level" will be stabilized with phosphate. All residential soils exceeding the "safe level" for lead will be excavated.

The JCSSC provided numerous comments from their advisors regarding development of the treatability study, proper data collection and analysis during the treatability study, and development of long-term monitoring.

The Treatability Study Work Plan is currently being developed. The EPA intends to involve the JCSSC's and the Jasper County EPA Citizens Task Force's advisors, as well as other technical experts both within the EPA and outside the Agency, in development and review of the treatability study and long-term monitoring program. The Work Plan will be distributed for review once the fist draft has been completed by MDNR and reviewed by the EPA.