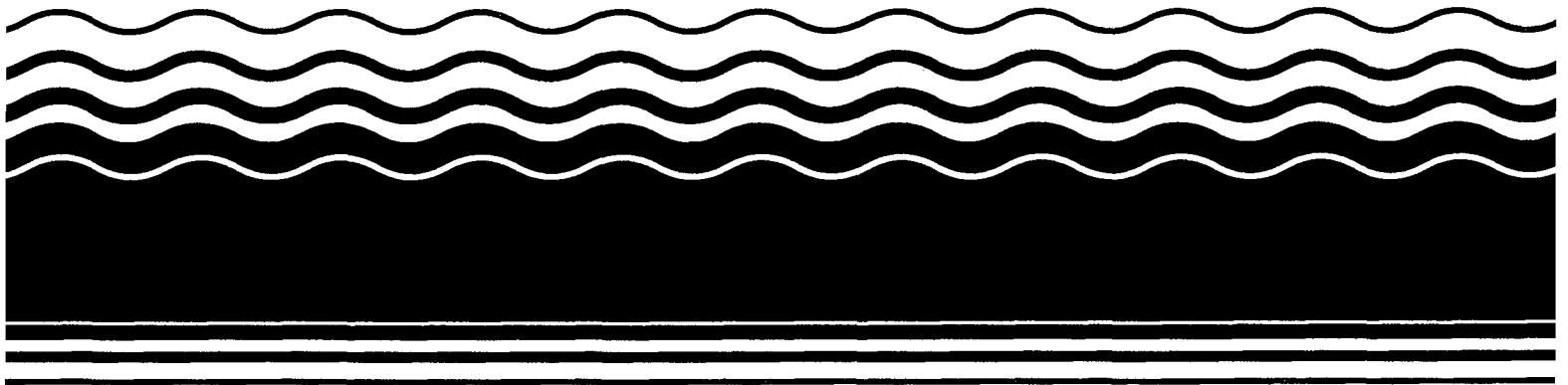


**PB96-964301
EPA/ROD/R07-96/082
August 1996**

**EPA Superfund
Record of Decision:**

**Cherokee County Superfund Site,
Cherokee County, KS
7/29/1996**



RECORD OF DECISION

GALENA RESIDENTIAL SOILS, OPERABLE UNIT #07
GALENA SUBSITE
CHEROKEE COUNTY SUPERFUND SITE
CHEROKEE COUNTY, KANSAS

Prepared by:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION VII
KANSAS CITY, KANSAS

JULY 1996

RECORD OF DECISION

DECLARATION

SITE NAME AND LOCATION

Galena Residential Soils, Operable Unit #07
Galena Subsite, Cherokee County Superfund Site
Cherokee County, Kansas

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the mining wastes at Operable Unit #07 of the Galena Subsite, which is part of the Cherokee County Superfund Site in Cherokee County, Kansas. 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). The State of Kansas and the local community concur with the selected remedy. This decision is based on the Administrative Record for this Site. The Administrative Record file is located in the following information repositories:

Galena Public Library	U.S. Environmental Protection Agency
Municipal Building	Region VII Docket Room
315 West 7th Street	726 Minnesota Avenue
Galena, Kansas	Kansas City, Kansas

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

The U.S. Environmental Protection Agency (EPA) believes the selected remedy appropriately addresses the principal current and future risks to human health and the environment. The selected remedy includes actions for residential soils impacted by mining wastes and includes the following components:

- Excavation and disposal of residential soils impacted by mining wastes;

- Health education for the general community and medical professionals;
- Institutional controls to guide future development in residential areas impacted by mining wastes;
- Treatability studies to evaluate the effectiveness of phosphate stabilization as a future alternative; and
- Operation and maintenance of all remedy aspects including, but not limited to, health education, institutional controls, and long-term monitoring.

The Cherokee County Superfund Site is divided into several operable units that address different areas, impacted media, and risks within the six subsites that comprise the Site. This remedy is specifically tailored to the impacted residential soils in the Galena area, designated as Operable Unit # 07. Additional media such as groundwater and surface water, as well as other types of impacts such as ecological, are or will be addressed by the other Cherokee County operable units.

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 (or resource recovery) technologies to the maximum extent practicable. However, because treatment of the principal threats of the Site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element. Treatment may prove viable in the future pending completion of phosphate stabilization treatability studies.

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 the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.



Dennis Grams, P.E.
Regional Administrator
U.S. EPA, Region VII

7-29-96

Date

RECORD OF DECISION

DECISION SUMMARY

GALENA RESIDENTIAL SOILS, OPERABLE UNIT #07
GALENA SUBSITE
CHEROKEE COUNTY SUPERFUND SITE
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DECISION SUMMARY

1.0 Background

The Cherokee County Superfund Site is located in the southeast corner of the State of Kansas and is part of the Tri-State Mining District. The Tri-State District is an inactive lead and zinc mining area that encompasses approximately 500 square miles in southeastern Kansas, northeastern Oklahoma, and southwestern Missouri. The Tri-State District was one of the most productive lead and zinc mining areas in the United States and was mined from the late 1800s to the early 1970s. The District produced more than 500 million tons of mining wastes. Approximately 100 million tons of wastes remain in the area at the present time. The primary contaminants of concern that are present in the mining wastes include lead, zinc, and cadmium.

The U.S. Environmental Protection Agency (EPA) placed the Cherokee County Superfund site on the National Priorities List (NPL) in 1983 pursuant to Section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §9605. The site encompasses about 115 square miles in southeastern Kansas, including the towns of Galena, Baxter Springs, Treece, and Riverton. EPA separated the Cherokee County Site into six subsites to expedite the field investigations and remediation of the contaminant sources. The six subsites are designated as Galena, Baxter Springs, Treece, Badger, Lawton, and Waco (Figure 1).

The Galena subsite is the largest of the six subsites which make up the Cherokee County Superfund Site and consists of an approximate 25 square mile area. This Record of Decision (ROD) is focussed on Operable Unit #07 (OU-7) of the Galena subsite. OU-7 encompasses the mining impacted residential areas of Galena and is depicted on Figure 2.

The Galena subsite has been contaminated with hazardous substances as a result of the mining, milling, and smelting of lead and zinc ores. Hazardous substances including lead, zinc, and cadmium are found in residential soils and mining wastes within the subsite and more specifically within OU-7.

2.0 Community Participation

EPA provided the Proposed Plan and supporting documents in the Administrative Record file for public review and comment with regard to the preferred remedial alternative. In order to provide the community with an opportunity to submit written or

oral comments, EPA established a public comment period from May 13, 1996, to June 11, 1996 and conducted a public meeting on May 28, 1996 at the Galena City Hall. At this meeting, representatives from EPA, the Kansas Department of Health and Environment (KDHE), the Cherokee County Health Department, and the Agency for Toxic Substances and Disease Registry (ATSDR) answered questions about 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 operable unit is based on the information contained in the Administrative Record file which is located in the repositories discussed in the earlier ROD Declaration section.

3.0 Scope and Role of Operable Units

The six subsites were initially divided into seven operable units consisting of the following: OU-1, Alternate Water Supply (Galena Subsite); OU-2, Spring River; OU-3, Baxter Springs; OU-4, Treece; OU-5, Groundwater/Surface Water (Galena Subsite); OU-6, Badger, Lawton, and Waco; and OU-7; Galena Residential Soils (Galena Subsite). OU-2 and OU-4 have subsequently been eliminated as they are encompassed by actions at the other operable units and thus no longer require a separate approach.

With regard to the Galena Subsite, EPA initiated the first response in 1984 which consisted of a Remedial Investigation and Feasibility Study (RI/FS). Subsequent remedial actions at the Galena Subsite were selected in two RODs issued in 1987 and 1989. The 1987 ROD required installation of a public water supply for approximately 400 subsite residences and the 1989 ROD required remediation of the groundwater and surface water as follows:

- Selective placement of surface mine wastes to reduce human exposure and migration of contaminants into groundwater and surface streams;
- Surface water diversions to prevent stream capture by mine shafts and subsidences;
- Surface recontouring to reduce surface water infiltration and ponding; and
- Inspection of wells penetrating the Roubidoux aquifer, and plugging or lining of these wells as necessary to protect the deep aquifer.

EPA implemented the remedial actions for the public water supply and the groundwater/surface water cleanup using Superfund monies. The public water supply and groundwater/surface water cleanups are complete and have been designated as OU-1 and OU-5, respectively, as discussed above. These operable units were conducted as EPA lead actions.

This ROD addresses the final operable unit of the Galena Subsite (OU-7) and is concerned with soil remedial activities in residential areas impacted by mining wastes. An RI/FS was recently completed by Sverdrup Environmental in May 1996 as an EPA lead action. The Proposed Plan was issued in June 1996 and Remedial Design/Remedial Action (RD/RA) will begin in the fall of 1996 as an EPA lead effort. EPA will receive funds for a small portion of the OU-7 work from one responsible party that is currently in bankruptcy proceedings. At this time, EPA does not intend to pursue enforcement actions against other potentially responsible parties (PRPs) for the OU-7 effort.

The two remaining operable units requiring future action at the Cherokee County Site are OU-3, Baxter Springs/Treece, and OU-6, Badger, Lawton, and Waco. The RI/FS for OU-3 is complete and a ROD is forthcoming. OU-6 is at the pre-RI/FS stage. The OU-3 work to date has been conducted by PRPs and it is anticipated that the remaining activities will also be PRP actions. It is also anticipated that the OU-6 effort will be PRP lead.

Although OU-1 and OU-5 are completed as discussed above, EPA is currently pursuing cost recovery for this work. The PRPs are an overlapping group that are also involved in portions of the other Cherokee County operable units as well as the adjacent Jasper County, Missouri work. As mentioned above, one PRP is currently in bankruptcy proceedings.

4.0 Summary of Site Risks

Lead is the only demonstrated human health risk at the OU-7 Site. However, cadmium has the potential to create an unacceptable risk resulting from the ingestion of vegetables. Vegetables have been demonstrated to readily uptake cadmium and thus pose a potential health threat. Numerous studies conducted in the Tri-State Mining District have indicated that several media are negatively impacted by metals as a result of past mining, milling, and smelting practices. Residents of Galena, Kansas have demonstrated blood lead levels that are statistically significantly elevated above typical background ranges from control groups established in the local area (Neosho and Goodman, Missouri). Levels of lead in Galena soils were also statistically significantly higher than control area soils.

5.0 Remedial Action Objectives

A single Remedial Action Objective (RAO) was developed during the RI/FS process to address the unacceptable risks associated with exposure to contaminated residential soils. The RAO is a goal for remediation that can be addressed through either reduction of exposures and/or reduction of contaminants. The RAO developed for OU-7 consists of the following: reduce

public exposure, and particularly children's exposure, to residential soils with elevated lead and cadmium resulting from past mining, milling, and smelting activities.

The RAO was developed from the extensive amount of site specific information obtained during various phases of work conducted at the Cherokee County Site as well as the entire Tri-State Mining District. The OU-7 RI/FS provided site characterization information detailing the nature and extent of soil contamination, the transport and exposure pathways of the contaminants, and the detailed physical properties and nature of the impacted media and metals contaminants. The Administrative Record file for OU-7 contains the information upon which this decision is based.

The RAO is designed to prevent direct human contact with the wastes and thus eliminates inhalation, ingestion, or dermal absorption of the site specific contaminants of concern. The elimination of the direct contact threat will ensure that the human health risks are reduced or eliminated. Specifically, the RAO is designed to prevent elevated blood lead levels greater than 10.0 micrograms per deciliter (ug/dl) for more than five percent of the child population. Currently, approximately 10.5% of children age 6-71 months have blood lead levels greater than 10 ug/dl as based on a 1995 ATSDR exposure study in Galena.

6.0 Description of the Alternatives

Two alternatives were developed to address the RAO in the RI/FS process and they were analyzed based on the nine criteria for remedy selection as specified in the NCP. These two alternatives consisted of Phosphate Stabilization with Institutional Controls (designated as Alternative 2 in the RI/FS) and Excavation and Disposal with Health Education and Institutional Controls (designated as Alternative 3 in the RI/FS). The No Action Alternative was designated as Alternative 1.

Alternative 2, Phosphate Stabilization with Institutional Controls, consists of treating contaminated soils with phosphate to reduce the bioavailability of lead and cadmium. Phosphate stabilization binds metals so they are not absorbed into the body when ingested. Institutional controls would also be established to regulate construction of new homes in contaminated areas. Phosphate stabilization requires additional studies to demonstrate its effectiveness at reducing the bioavailability of lead and cadmium in Cherokee County soils. Treatability studies would thus be required before this treatment alternative could be implemented. These studies would consist of laboratory chemical tests of actual site soils, bioavailability tests using live species, and actual field test plots for evaluating the methods and means of applying the phosphate.

Alternative 3, Excavation and Disposal with Health Education and Institutional Controls, consists of the removal of contaminated soils, placement of excavated soils into dry mine shafts or depression/mine waste areas located on the Cherokee County Site, replacement of the contaminated soils with clean fill soils, and revegetation of the excavated/filled yards. In addition, a health education program would be established to inform residents of the hazards associated with contaminated soils and to monitor the blood lead levels of children. Institutional controls would also be established, at the local level, to regulate the construction of new homes in contaminated areas.

The selected remedy is a combination of the two alternatives described above. Under the selected approach, excavation and disposal of contaminated soils will initially begin at the most impacted residential yards and progress to lesser impacted areas. Phosphate treatability studies will be conducted concurrently in order to determine if phosphate treatment is a future viable option. If phosphate treatment is proposed as a result of the treatability studies, the public, State, and additional EPA entities (laboratories, headquarters, work groups etc.) will be provided with the opportunity to evaluate and comment on the new approach. If phosphate treatment is deemed appropriate, excavation/disposal will be discontinued and phosphate stabilization initiated. However, excavation and disposal will continue if phosphate stabilization is not demonstrated to be a viable option as a result of the treatability studies. Health education and institutional controls are also a remedy component, to varying degrees, under both options. The selected remedy is described in detail in Section 8 below.

7.0 Evaluation of the Selected Remedy and Comparison of Alternatives

The National Contingency Plan (NCP), 40 C.F.R. Section 300 et seq., requires EPA to evaluate selected remedial alternatives against nine criteria. A selected, or preferred 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. However, compliance with ARARs may be "waived" if site-specific circumstances warrant such a "waiver" as described in Section 300.430(f)(1)(ii)(C) of the NCP, 40 C.F.R. § 300.430(f)(1)(ii)(C).

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. The local community and the State of Kansas have accepted and concurred with the selected remedy.

7.1 Overall Protection of Human Health and the Environment

This criterion addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

The selected remedy, a combination of Alternatives 2 and 3, will provide protection of human health by remediating current residential yards situated on or near mining, milling, or smelting wastes if these yards exceed health based action levels. Residents will also be protected through the implementation of health education and institutional controls which will educate/inform the community and health professionals on preventing/assessing exposures and prohibit building on soils or mine wastes which exhibit elevated metals concentrations. This would achieve the RAO by preventing direct human contact with, ingestion, and/or inhalation of the site specific metals contaminants and also reduce blood lead levels.

7.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), requires that all remedial actions comply with ARARs under federal and state environmental laws. The selected remedy must comply with the ARARs or justification for a waiver must be provided. ARARs are classified by the following three categories: chemical-specific; action-specific; and location-specific. Chemical-specific ARARs are risk based ambient concentration limits for site specific contaminants, action-specific ARARs are technology based restrictions determined by the type of site specific remedial alternative contemplated, and location-specific ARARs are based upon the actual site location with respect to the selected alternative and site contaminants.

The applicable ARARs for the OU-7 selected alternative are depicted on Table 1. EPA and KDHE have determined that chemical-specific ARARs are not available, but EPA and state guidance will be utilized for effectiveness evaluations of the selected alternative. The selected remedy, which is a combination of Alternatives 2 and 3, satisfies all applicable ARARs.

7.3 Long-Term Effectiveness and Permanence

This criterion addresses residual risk and the ability of a remedy to maintain protection of human health and the environment over time, after remedial action goals have been completed. Factors that are considered include both the magnitude of residual risk remaining after implementation as well as the adequacy and reliability of controls used to manage treatment residuals or untreated wastes.

The selected remedy will provide permanent, effective long-term protection of human health by eliminating human exposure to the impacted residential soils through excavation and replacement of the upper one foot of contaminated materials. The implementation and maintenance of institutional controls (ICs) and a health education program, in addition to clean soil backfill at the surface, will provide permanence and long-term effectiveness for impacted soils that remain in place at depth. If deemed feasible by ongoing treatability studies, phosphate stabilization of metals impacted soils would also be a permanent, effective long-term solution. Phosphate stabilization would also include some degree of ongoing ICs and health education, although at a reduced level from the strictly excavation approach.

7.4 Reduction in Toxicity, Mobility, or Volume Through Treatment

This criterion addresses the degree to which a remedy employs recycling or treatment to reduce toxicity, mobility, or volume of the contaminants present at the Site. This also includes how treatment is used to address the principal threats posed by the Site.

The initial phase of the selected remedy does not utilize treatment technologies to reduce toxicity or volume of the wastes, but will, however, reduce the mobility of contaminants by capping lower impacted soils with clean backfill material. The second phase of the remedy, if deemed viable, will utilize treatment to reduce toxicity and mobility of wastes, but not volume. The possible second phase consisting of phosphate stabilization must undergo several initial treatability studies, and comment by several entities, prior to implementation.

7.5 Implementability

This criterion addresses the technical and administrative feasibility of the selected remedy, including the availability of materials and services. The difficulty of undertaking additional action, if necessary, is also assessed.

The selected remedy is anticipated to be fully implementable. Excavation and disposal involves standard earth moving, capping, and construction techniques commonly employed. ICs and health education are commonly used at Superfund mining

sites due to the unusually large volume of wastes requiring cleanup and the large areas contaminated by past mining practices. EPA will assist in implementation of the ICs and health education program by providing advice to local communities, the Cherokee County Health Department, and KDHE.

The phosphate stabilization component of the selected remedy is not currently implementable. The selected remedy, as a whole, is fully implementable since phosphate treatment is only an option to be exercised in the future if deemed appropriate. Phosphate treatability studies will be ongoing as the conventional excavation and backfilling are being implemented.

7.6 Short-Term Effectiveness

This criterion addresses the period of time needed to achieve the remedial action, and any adverse impacts to human health and the environment that may be posed during implementation of the remedy.

It is anticipated that the proposed remedial action would be completed in approximately 1.5 to 2.0 years followed by continued long-term operation and maintenance. Any potential short-term risk to workers, the communities, and the environment would be readily preventable.

The selected remedy has minor short-term risks associated with the respective proposed actions, such as increased exposure to workers performing the remedial action. However, it is anticipated that all short-term risks associated with the alternatives can be reduced through construction controls in order to prevent harm.

7.7 Cost

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.

A detailed cost analysis of the selected remedy is provided in the RI/FS and Proposed Plan which are contained in the Administrative Record file. The alternative is estimated to cost approximately \$6.15 million. Annual operation and maintenance (O&M) is estimated to cost \$89,500 per year. These costs exclude the phosphate treatment component.

Costs for phosphate stabilization, as a component of excavation and disposal, represent a cost reduction and range from \$2.0 million to \$4.0 million, depending on the number of yards excavated prior to the completion of successful treatability studies. Another factor in the cost range is the type of phosphate application method determined to be feasible.

The selected remedy is less expensive than Alternative 3 (excavation) since it allows for the possible implementation of phosphate stabilization which will reduce the level of ongoing ICs and health education. Alternative 2 (phosphate treatment) is less expensive than the selected remedy, however; this treatment method is currently not implementable. Alternative 1 (no action) was the least expensive alternative but is not protective. The selected remedy, a combination of Alternatives 2 and 3, provides the optimum cost and technology balance. A cost summary is provided in Table 2.

7.8 State/Community Acceptance

This criteria addresses the state/community preferences or concerns about the selected remedy. EPA is the lead Agency and has coordinated all site activities with KDHE and the local community throughout this project. KDHE has stated that it concurs with the selected remedy; a copy of the KDHE concurrence letter is attached. Community acceptance of the selected remedy was evaluated following a public meeting held at 7:00 pm on May 28, 1996, at the Galena City Hall, Galena, Kansas. The results of this evaluation are presented in the attached Responsiveness Summary.

8.0 Description of the Selected Remedy

The selected remedy is a combination of Alternatives 2 and 3 as discussed above. The components of the selected remedy are described below.

Excavation/Disposal Component

The selected remedy consists of excavation of residential yards with soil lead concentrations greater than 800 parts per million (ppm) or cadmium concentrations greater than 75 ppm in addition to a health education program and implementation of ICs. Concentration values greater than 800 ppm lead or 75 ppm cadmium in yard soils will trigger the excavation activities which will continue until a cleanup level of 500 ppm lead or 25 ppm cadmium is achieved or until a maximum excavation depth of one foot is achieved. Additionally, garden soils exceeding 500 ppm lead or 75 ppm cadmium will be removed to mitigate the risks associated with the consumption of impacted garden vegetables. Excavations will be initially conducted in yards with the highest concentrations above 800 ppm lead and progress to the lower impacted areas.

Yards will be excavated to a maximum depth of one foot while gardens will be excavated to a depth of two feet. Raised bed gardens may also be established depending on home owners wishes. If yard soils at a depth of one foot exceed 1,500 ppm lead, a geotextile warning barrier (plastic mesh) will be placed in the excavation prior to backfilling. Replacement soil meeting a

criteria of 240 ppm lead and 25 ppm cadmium will be used for yard and garden backfill material. This criteria is the State of Missouri any-use soil levels and is also acceptable to the State of Kansas.

EPA estimates that 500 yards and 60 gardens will require remedial action. A limited amount of additional sampling will be conducted as excavations proceed in order to identify additional yards exceeding 800 ppm lead or 75 ppm cadmium. It should be noted that all past residential excavations conducted under the removal program were triggered by elevated soil lead values, in no instances has cadmium been a trigger constituent for excavations. The greatest concern with regard to cadmium is the potential uptake in garden vegetables. The general site area is fairly well characterized as a result of recently completed studies. Yards will be seeded or sodded at the completion of backfilling based on home owner input. The excavated soils will be placed in dry mine shafts located in various locations within the Cherokee County Site.

Health Education Component

The health education component will be targeted to the local community and health professionals in order to reduce and treat exposures that could potentially cause adverse health effects. The educational components will address the risks associated with interior paint and dust, consumption of garden vegetables, and residual levels of lead and cadmium in soils below 800 ppm and 75 ppm, respectively. This program will be coordinated between EPA, KDHE, ATSDR, and the Cherokee County Health Department. The health program will include, but is not limited to, the following: child blood lead screening; professional educational seminars; community education; and the use of screening equipment. Education will also deal with concerns related to the consumption of vegetables from impacted gardens.

Child blood lead screening will serve to monitor and assess the effectiveness of the cleanup. Children less than seven years of age are the primary target group for the negative effects of elevated blood lead values. Blood lead screening conducted during and after implementation of the remedy, in comparison with historic pre-remedy values and frequencies, will serve to provide an evaluation of the effectiveness of the remedy. The ultimate goal of the remedy is to reduce blood lead levels in children. This screening will continue during the operation and maintenance (O&M) period to provide a measure of the continued effectiveness and long-term permanence of the remedy. Five year reviews will also provide a comprehensive evaluation of the remedy while O&M reports will be provided annually.

Professional educational seminars will be held to guide physicians or medical workers through the diagnosis, treatment, and surveillance of illnesses in people, especially children,

exposed to heavy metals. Annual professional education is needed to maintain an adequate level of awareness among medical professionals about the local contaminants and to provide updates regarding new therapies or treatment regimens.

Community education will occur on a variety of levels such as through local school districts, Lamaze and pre-natal groups, hospital birthing centers, scouting groups, or other groups. These organizations will allow the distribution of information on risks and sources of lead exposure to the local community.

Equipment is needed for the enhancement of environmental assessment capabilities and to assist in the removal of possible indoor dust contaminants. A high efficiency particulate vacuum cleaner (HEPAVAC) will be supplied to the local health department in order to allow properly trained individuals to reduce the levels of lead dust in certain residences. The Cherokee County Health Department will continue to utilize an x-ray fluorescence (XRF) spectrophotometer to perform indoor assessments of lead in paint and dust and perform removal of indoor dust contaminants using the HEPAVAC.

The educational components will address the potential health effects of consuming garden vegetables grown in contaminated soils. Residents will be advised against raising vegetables in contaminated soils and will be encouraged to grow vegetables in raised bed gardens containing clean soils and to thoroughly wash all vegetables.

EPA or ATSDR will fund the health education component during implementation of the remedy and for one year after remedy completion. The State will assume O&M responsibilities following the one year period after completion, when the remedy is deemed operational and functional. O&M components are described below.

Institutional Controls Component

EPA and the State of Kansas will work closely with local governments to establish ICs to guide future residential development in lead contaminated areas. The ICs will be implemented under the authority of local governments and are required for the excavation/disposal remedy, as well as for a potential phosphate stabilization approach, in order to prevent children's exposure to unacceptable levels of lead resulting from future residential development.

ICs will include, but are not limited to, the following: zoning restrictions and long-term zoning plans; special building codes; health ordinances covering construction of residential homes; and deed restrictions. Residential development ICs may include, but are not limited to, the following actions prior to construction: soil sampling; excavation; phosphate treatment; capping; and obtaining permits. The future construction ICs

would only apply to projects where there is potential to impact child receptors such as day-care centers, parks, schools, and residences (homes, apartments, trailers). Industrial and commercial development is not subject to ICs because exposure to contaminated soils under these scenarios does not provide an unacceptable human health risk.

ICs will also apply to the long-term soil disposal areas which include the following: dry mine shafts; subsidence areas; and surficial mine waste areas. EPA and the State will also work with local governments to establish procedures and areas to dispose of lead contaminated soils excavated from areas of new residential development. Given the relatively large number of open shafts in the area, this should not be a major issue. However, if phosphate stabilization is demonstrated as viable or capping is utilized, the need for available disposal areas will lessen or become unnecessary.

Phosphate Stabilization Component

Treatability studies will be conducted concurrently as the excavation and disposal activities progress. Treatability studies are estimated to require approximately one year to complete and are necessary in order to determine the viability of utilizing phosphate treatment as a future alternative to excavation. If the studies indicate that phosphate stabilization is viable, the excavation and disposal component will be discontinued and phosphate treatment will be utilized as the remedial approach. The public, State, and additional EPA entities (laboratories, headquarters, work groups etc.) will be provided with an opportunity to evaluate and comment on the phosphate treatment approach prior to switching to this remedial method of cleanup. If phosphate treatment is not deemed effective, excavation and disposal will continue until all applicable yards are remediated.

The treatability studies will consist of laboratory bench-scale studies followed by bioavailability and field tests. If deemed appropriate, phosphate treatment will utilize 500 ppm lead as an action level in order to reduce the reliance on ICs and health education during long-term O&M. The effectiveness of phosphate stabilization will be evaluated by continuing a blood lead monitoring program for children under seven years old and by performing ongoing chemical tests on treated soils. Initially, the blood lead monitoring will measure the effectiveness of the remedy and determine if it is operational and functional. Once the RAO has been achieved, the blood lead monitoring will become part of the ongoing O&M process and will also be evaluated during the five year review processes to ensure effectiveness and permanence of the remedy.

Operation and Maintenance Component

The O&M program will address soil disposal areas, health education, ICs, and monitoring. Specifically, the O&M program will maintain and assess all soil disposal areas (mine shafts, subsidence areas, and areas of surficial mine wastes) and will also ensure and evaluate the implementation of ICs and health education.

Disposal area maintenance activities may include monitoring and correction of erosional problems, grading/seeding, and provision of access. The O&M program will also establish and maintain new areas for ongoing soil disposal as the local need arises.

Additional O&M activities include implementation and evaluation of a monitoring program to ascertain the effectiveness of the remedy. The monitoring program will assess reductions in blood lead concentrations of certain children in the areas where cleanup occurs and will include soil chemistry monitoring if the phosphate remedy is exercised. The current blood lead screening program is performed by the Cherokee County Health Department and is supported by ATSDR. This program 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 monitoring data to assist in determining long-term effectiveness and permanence of the selected remedy.

The O&M program will ensure the implementation of ICs and assess effectiveness. ICs will be implemented at the local level and include such items as deed restrictions, special building codes, ordinances, and zoning restrictions designed to prevent future exposure to, and disturbance of, mining wastes and preserve the integrity of the remedy.

The continuation of the health education program is a component of O&M and includes such actions as providing educational materials, seminars, and other such activities. The education program will continue to reduce residual risks by the provision of educational materials. The current program may be modified as necessary during and after implementation of the remedy.

O&M reports will evaluate and ensure the continued effectiveness of all remedy aspects. These reports will be completed annually by the State and provided to EPA. EPA will perform O&M tasks during implementation of the selected remedy and for one year after remedy completion. The State will assume O&M responsibilities after the one year period from completion,

when the remedy is anticipated to be deemed operational and functional. Specific O&M components may be modified in order to achieve the intent in the most effective and efficient manner.

Five-Year Review Component

A five-year review is required at sites where contamination remains above health based criteria. The review will be conducted in accordance with applicable guidance and Section 121⁶ of CERCLA, 42 U.S.C. §9621(c), as amended. The five-year review of the selected remedy will be conducted to ensure that the remedy is effective and accomplishes the goals of the remedial action and will include a review of ICs, health education, disposal areas, and all analytical data.

Cost Component

As discussed above, a detailed cost analysis of this remedy is provided in the RI/FS and Proposed Plan. The selected remedy is estimated to cost approximately \$6.15 million (capital cost) with an annual O&M cost of \$89,500; assuming that phosphate treatment is not utilized. The cost ranges from \$2.0 million to \$4.0 million if phosphate treatment becomes a viable remedial option.

9.0 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 the Site must comply with applicable or relevant and appropriate environmental standards established under 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 reduces the volume, toxicity, or mobility of hazardous wastes as their principal element. The following discusses how the selected remedy meets these statutory requirements.

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, health education, and ICs. Existing human health risks due to potential lead and cadmium exposure from soils and mine wastes will be reduced by remediating residential yards/gardens situated on or near mine wastes. Future risks to

human health will be reduced by implementation of institutional controls that will control residential construction on soils or mine wastes with contaminant levels in excess of health based levels. Health education will also reduce future human health risks.

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

The selected remedy complies with the applicable or relevant and appropriate chemical-, action-, and location-specific ARARs. The remedy specific ARARs are described in Table 1 and categorized as either applicable, relevant, or appropriate. Compliance with ARARs is required of the selected remedy unless a waiver of an ARAR is justified. No waiver is required for the selected remedy.

Chemical-specific ARARs are associated with the site specific contaminants of concern, which are lead and cadmium. There are no federal or state applicable relevant or appropriate requirements that pertain to these contaminants in soil. EPA has identified guidance and other criteria to be considered during implementation of the remedy as identified on Table 1.

Location-specific ARARs are based on the location of the Site and the effect of hazardous substances on the environment. The selected remedy will attain location-specific ARARs for endangered species, archeological areas, and historic preservation as identified on Table 1.

Action-specific ARARs are based on activities and technologies to be implemented at the Site. The selected remedy will attain the action-specific ARARs identified on Table 1.

Cost Effectiveness

The selected remedy is cost effective because it will provide overall effectiveness proportional to its costs. The selected remedy is the least expensive remedy that is protective of human health and the environment and complies with ARARs. Although Alternatives 1 and 2 are less costly than the selected remedy, the No Action Alternative (Alternative 1) is not protective and the treatment component of Phosphate Stabilization with ICs (Alternative 2) is not currently implementable. Alternative 3, Excavation and Disposal with Health Education and ICs, is the most expensive alternative since it does not include a provision for phosphate treatment and relies more heavily on long-term health education and ICs. The selected remedy provides the greatest cost effectiveness and protectiveness.

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 a cost effective manner for this remedial action. The remediation of residential yards on or near mine wastes with contamination above health-based levels will permanently eliminate risk to children who live in such residences. The evaluation, and possible subsequent use, of phosphate stabilization represents the use of an alternative treatment technology to the maximum extent practicable.

Preference for Treatment as a Principal Element

The selected remedy effectively reduces risks through a combination of engineering measures, institutional controls, and health education and thus does not initially satisfy the statutory preference for treatment as a principal element. However, treatment may become an option depending on the results of ongoing phosphate stabilization treatability studies.

10.0 Documentation of Significant Changes

There are no significant changes from the proposed plan in this ROD.

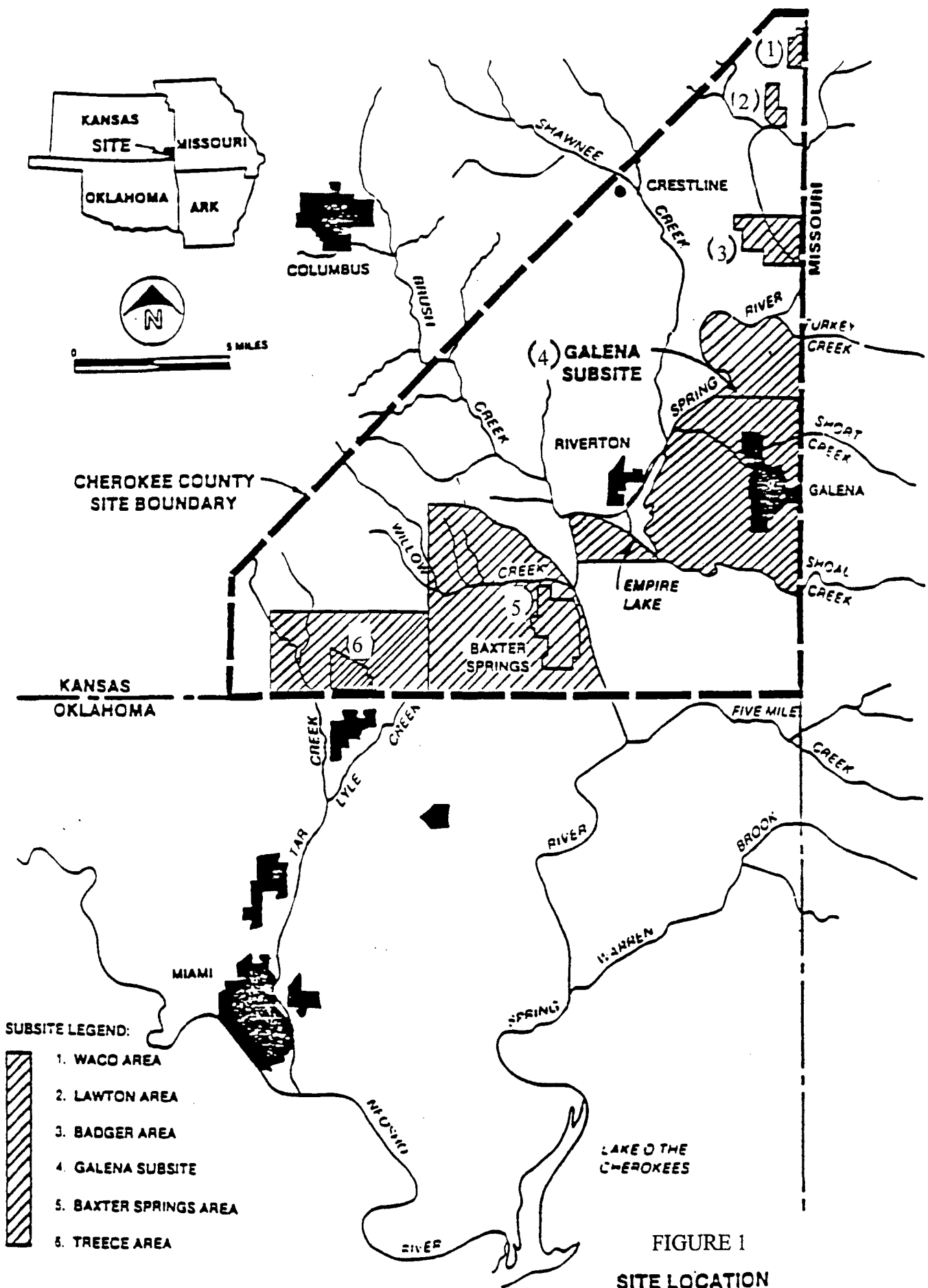
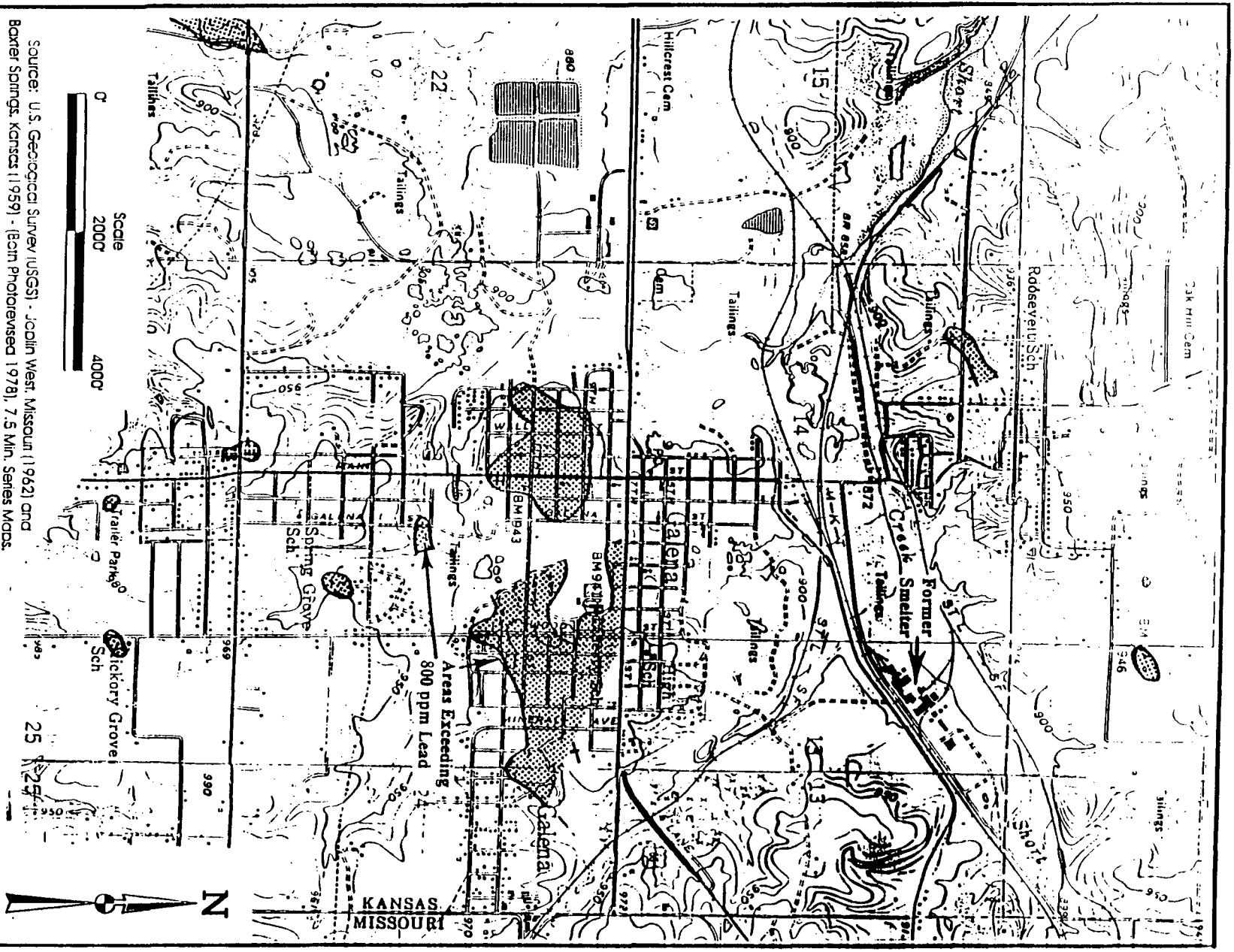


FIGURE 1
 SITE LOCATION
 CHEROKEE CO., KANSAS
 GALENA SUBSITE



Source: U.S. Geological Survey (USGS) - Joplin West, Missouri (1962) and Baxter Springs, Kansas (1959) - (Bain Photo revised 1978), 7.5 Min. Series Maps.

Cherokee County
Superfund Site

Pb Isoconcentration Map of
Galena Area
from XRF

FIGURE 2

TABLE 1
FEDERAL CHEMICAL SPECIFIC ARARS

	Citations	Prerequisite	Requirement
A. Applicable Requirements	RCRA	Solid Waste Regulations Bivel Amendments	LDR TCLP
B. Relevant and Appropriate	None		
C. To Be Considered			
1. Agency for Toxic Substances and Disease Registry (ATSDR) 1996 Health Study	"Lead and Cadmium Exposure Study, Galena, Kansas", January 1996	Evaluates the health of young children due to current site exposures.	Recommends environmental exposures in the site area be reduced. This includes reductions in soil, dust and paint.
2. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA 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.

TABLE 1
FEDERAL CHEMICAL SPECIFIC ARARS

	Citations	Prerequisite	Requirement
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 µg Pb/dl blood in children; and 2) reduce the amount of lead introduced into the environment.
4. Soil-Lead Contamination Health Consultation	Agency for Toxic Substances 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. Cherokee County Health Screenings and Evaluations	Ongoing health screenings which include blood tests and comprehensive in home evaluations by the local Cherokee County Health Department.	Evaluates health of young children due to current site exposures. Evaluates living conditions and other risk factors for increased lead exposure.	Recommends exposure to lead contaminated soil and other risk factors be reduced. Emphasizes the need for lead education.

**TABLE 1
STATE CHEMICAL SPECIFIC ARARS**

	Citation	Prerequisite	Requirement
A. Applicable Requirements	None		
B. Relevant And Appropriate	None		
C. To Be Considered	None		
1. Kansas Interim Remedial Guidelines for Soil	KDHE, Bureau of Environmental Remediation, Draft Version dated November 1994	Establishes Interim Remedial Guidelines for soil to help Remedial Project Manager make scientific and health based remedial decisions in absence of other health risk data or models	This guidance recommends using 400 mg/kg for lead in residential areas and 1000 mg/kg for lead in industrial areas.

**TABLE 1
FEDERAL LOCATION 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 CFR §6.301, 36 CFR 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.	Archeological and Historic Preservation Act; 16 U.S.C. 469, 40 CFR 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. 1531-1543; 50 CFR Parts 17, 401, 40 CFR 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.
B. Relevant and Appropriate Requirement	None		
C. To Be Considered	None		

TABLE 1
STATE LOCATION SPECIFIC ARARS

	Citation	Prerequisite	Requirement
A. Applicable Requirements			
1. State Endangered Species or Threatened Species	Kansas Wildlife and Parks	Determination of the presence of endangered or threatened species.	Remedial alternatives will be designed to conserve Kansas endangered or threatened species and their habitat.
2. Kansas Historic Preservation Act	KSA 75-2715-2725	Provides for protection and preservation of sites and buildings listed on the State and Federal Historic Registries.	Remedial alternatives will be designed to minimize effect on historic landmarks.
B. Relevant and Appropriate Requirement	None		
C. To Be Considered	None		

TABLE 1
CONTROLS FOR CONTAMINATED RESIDENTIAL SOILS

Control or Technology	Description	Screening Comment
Institutional Controls	Public-health education and access restrictions.	Least expensive alternative, excluding no action.
Excavation & Disposal	Physical removal and disposal of impacted soils.	Waste is physically removed.
Capping	Creates a barrier for humans and most weathering elements.	Waste remains but a barrier is added.
Chemical Stabilization	Surficial chemical treatment of soils to fixate lead to reduce its bioavailability via metallic complexing.	Waste remains but bioavailability is eliminated.

TABLE 1
FEDERAL ACTION SPECIFIC ARARs

	Citation	Prerequisite	Requirement
<p>A. Applicable Requirements</p>			
<p>1. Disposal of Solid Waste in mine subsidences and voids.</p>	<p>Subtitle D of RCRA, Section 1008, Section 4001, <u>et seq.</u>, 42 U.S.C. §6941, <u>et seq.</u></p>	<p>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.</p>	<p>Contaminated residential soils will be consolidated from yards throughout the site. The disposal of this waste material should be in accordance with regulated solid waste management practices.</p>
<p>2. Disposal of Hazardous Waste in the mine subsidences and voids.</p>	<p>Subtitle C of RCRA, Section 3001 <u>et seq.</u>, 42 U.S.C. §6921, <u>et seq.</u>, and implementing regulations at 40 C.F.R. §261.4</p>	<p>RCRA provides an exclusion from regulation as a hazardous waste the mining waste generated from the extraction, beneficiation 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.</p>	<p>Residential yard soils may be consolidated in the mining shafts and subsidences as solid wastes if they are mining wastes, such as chat. The area of consolidation is not a RCRA regulated hazardous waste management unit.</p>

**TABLE 1
FEDERAL ACTION SPECIFIC ARARs**

	Citation	Prerequisite	Requirement
3. Disposal of Hazardous Waste in mine subsidences and voids and Designation as a Corrective Action Management Unit (CAMU).	Subtitle C of RCRA, Section 3001 <u>et seq.</u> , 42 U.S.C. §6921, <u>et seq.</u> , 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 action 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 wastes 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. Residential yard soils contaminated from smelter fall out are not excluded from regulation under the RCRA exclusion for extraction, beneficiation and mineral processing. Therefore, yard soils exhibiting a RCRA toxicity characteristic would be regulated under Subtitle C of RCRA. However, because of the CAMU regulation, these residential soils are remediation wastes and may be disposed of without triggering RCRA disposal requirements. The remedial action will comply with the requirements of the CAMU 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 the disposal areas where waste materials come into contact with storm water.
2. Transportation of excavated soils.	DOT Hazardous Material Transportation Regulation, 49 C.F.R. Parts 107, 171-177	Regulates transportation of hazardous wastes.	Relevant and appropriate for the excavation alternative which would transport wastes on-site. However, off-site disposal regulations would not apply.
C. To Be Considered	None		

**TABLE 1
STATE ACTION 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.	K.A.R. 28.19	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 as to control fugitive emission, 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.
2. Kansas Solid Waste Management	K.A.R. 28.29, Part II	State Solid Waste plans to control disposal of solid waste.	Contaminated residential soils would be consolidated from yards throughout the Galena area. The disposal of this waste material into on-site mining voids should be in accordance with solid waste management practices.
B. Relevant and Appropriate Requirements.			
1. Kansas Clean Water Law, NPDES Storm Water Discharge for Permanent Repository.	Kansas Water Pollution Control Regulations, K.A.R. 28.16	Regulates the discharge of constituents from any point source, including storm water, 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 disposal areas where waste materials come into contact with storm water.

**TABLE 1
STATE ACTION SPECIFIC ARARS**

	Citation	Prerequisite	Requirement
C. To Be Considered			
	Kansas Storm-water Regulations	Establishes permitting process and discharge regulation for storm water. A state permit would not be required because the repository would be conducted off-site, however, substantive requirements of the storm-water controls would be required.	Remedial actions would use "Best Management Practices" for land disturbance including practices of procedures that reduce the amount of soil available for transport in accordance with this Kansas regulation.
2. Siting of the subsidences and voids for disposal, Kansas Hazardous Waste Management regulations K.A.R. 28.31.	RCRA Hazardous Waste Program as implemented by the State of Kansas through its Hazardous Waste Program: 40 C.F.R. Section 264.14 40 C.F.R. Section 264.15 40 C.F.R. Section 264.18 (a) and (b); 10 C.S.R. 25.7-264(1)(N)1.A. 40 C.F.R. Section 264.37 40 C.F.R. Section 264.55, 264.56; 10 C.S.R. 25-7.264 (2)(D) 40 C.F.R. Section 264.111 40 C.F.R. Section 264.116; 10 C.S.R. 25-7.264(2)(G)3 40 C.F.R. Section 264.118 40 C.F.R. Section 264.310	Security General Inspection Requirements Locations Standards Arrangements with Local Authorities Contingency Plan Closure Performance Standard Survey Plant/Deed Notice Post-closure Plan Closure and Post-closure Care	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 Kansas Hazardous Waste Program regulations will be considered during the remedial design of the disposal areas consisting of on-site mine subsidences and voids.

**TABLE 2
 COST SUMMARY FOR EXCAVATION AND DISPOSAL
 WITH HEALTH EDUCATION AND INSTITUTIONAL CONTROLS**

WORK ITEM	ESTIMATED QUANTITY	ASSUMED UNIT PRICE	TOTAL EST. COST FOR ITEM
RESIDENTIAL YARD EXCAVATION			
1. Mobilization		\$30,000	\$30,000
2. Property Access. Contaminant Assessment	500	\$500	\$250,000
3. Material Movement (excavation, transport, backfill)	500	\$10,000	\$5,000,000
4. Post Cleanup Reports	500	\$400	\$200,000
Subtotal			\$5,480,000
MINE SHAFTS			
1. Design(site I.D./access agreements)		\$5,000	\$5,000
2. Material Placement	83,000 cy	\$1.20	\$99,600
3. Vegetative Cover/Shaft Erosion Controls	5 acres	\$2,000/acre	\$10,000
Subtotal			\$114,600
CONTINGENCIES (= 10% of subtotals)			\$559,460
TOTAL COSTS			\$6,154,060
OPERATION AND MAINTENANCE			
1. O&M of Filled Mine Shafts			\$1,000
2. Health Education Activities, excludes first year purchase of HEPAVAC (see Table 2)			\$78,500
3. Monitoring of Institutional Controls			\$10,000
TOTAL ANNUAL O&M			\$89,500

TABLE 2
HEALTH EDUCATION FOR CHEROKEE COUNTY

WORK ITEM	ESTIMATED COST
Initial Purchase of Equipment (HEPAVAC)	\$1,000
Annual maintenance of equipment (exist. XRF & new hepa.)	\$2,500
Educational material	\$7,000
Personnel and facility for blood lead screening (1 nurse & .5 tech)	\$65,000
Professional education	\$4,000
ANNUAL HEALTH EDUCATION COSTS	\$78,500
TOTAL FOR FIRST YEAR (includes initial equip. purchase)	\$79,500

TABLE 2
COST ANALYSIS FOR PHOSPHATE STABILIZATION

WORK ITEM	ESTIMATED QUANTITY	ASSUMED UNIT PRICE	TOTAL EST. COST
1. Mobilization/Demobilization	1	\$5,000	\$5,000
2. Treatability Studies	1	\$200,000	\$200,000
3. Residential Yard Sampling	100 residential yards	\$200	\$20,000
4. Remedial Design	1	\$50,000	\$50,000
5. Phosphate Stabilization (includes lawn restoration)	700 residential yards	\$500 to \$4,000	\$350,000 to \$2,800,000
Subtotal			\$625,000 to \$3,075,000
Contingencies (20% of subtotal)			\$125,000 to \$615,000
TOTAL PHOSPHATE STABILIZATION			\$750,000 to \$3,690,000
ANNUAL OPERATION AND MAINTENANCE			
1. Soil Chemistry Monitoring	5 samples	\$1,000	\$5,000
2. Blood-Lead Monitoring (yrs. 1-5 only), also reduced health ed.		\$50,000	\$40,000
TOTAL O&M			\$45,000

**RESPONSIVENESS SUMMARY FOR THE RECORD OF DECISION
GALENA RESIDENTIAL SOILS, OU-7
CHEROKEE COUNTY, KANSAS**

This responsiveness summary addresses comments received during the public meeting conducted on May 28, 1996. No written comments were received during the public comment period, May 13 - June 11, 1996. This portion of the ROD will provide a summary of the commentors' major concerns followed by responses to those concerns. The questions, comments, and responses are summarized below.

Question: Several citizens asked why the soil lead contamination is erratic. Why are some yards contaminated above the cleanup level while adjacent properties may be below levels of concern. Why are some yards cleaned up while adjacent yards are not addressed.

Response: There are a number of reasons why the lead contamination is erratically dispersed to some degree. As a whole, the distribution is not erratic given the fact that the highest concentrations in soil are located closest to the former smelter and in the downwind location. With increasing distance from the smelter, the soil concentrations generally decrease, with some exceptions, and they also are lower in the upwind direction as compared to the downwind direction. While the complete distribution is somewhat predictable, there are areas where erratic levels occur.

The erratic levels are a result of several factors which include the following: varying wind conditions; importation of mine wastes and fill materials; moving or reworking native soils; and locations of naturally occurring ore bearing bedrock units. These factors are discussed below.

* Varying wind conditions are responsible for the deposition of air borne contaminants into different locations over time. While the general location of wind deposited materials is predictable, differences in wind conditions (direction and velocity over time) can vary, and during these variable periods, materials are deposited in locations that would not be predicted when evaluating the entire area. Another factor in this scenario is the variability of the smelting process. Different grades and types of ore will produce varying emissions with varying lead content. Emissions are even variable over time as equipment is upgraded and modified. The variability of wind processes in combination with variable smelter effluent concentrations represent one reason for the somewhat erratic soil lead values.

* Importation of mine wastes and fill materials represent processes that introduce variability into the natural system. As outside materials are brought into an area for a variety of reasons (construction, landscaping, utility backfill), natural lead impacted soils are moved and disturbed. When soils are moved, re-distributed, and combined with outside materials, the concentration of lead is also modified. The surficial lead content may decrease if fill soils are from clean areas and are mixed with native impacted soils or used as cover or grade material over impacted areas. In other instances, native soils could be contaminated to a greater degree if

outside soils contain mining wastes or have higher concentrations of lead than native soils and are brought into an area. These factors contribute to soil lead concentration variability.

* Moving and reworking native soils without importing any outside material also is a factor that contributes to lead concentration variability. Native soils are reworked for a variety of reasons (construction, landscaping, drainage), and this re-distribution of native materials will cause variability in lead content.

* Ore and mineral deposits are contained within bedrock units in a somewhat random manner. While ore bodies and deposits are mappable, they are typically randomly oriented in a spatial manner due to the natural processes that formed the minerals. Mineral bearing rocks may be present at or near the surface in random fashion which serves to yield varying measurements of lead from residential areas, especially in situations where a thin soil veneer is present. This is yet another contributing factor to the heterogeneous distribution of lead, to some degree, in the residential areas of Galena.

Question: Several citizens wanted to know if their yards were targeted for cleanup, and if so, when would their yards be addressed.

Answer: A soil cleanup trigger level of 800 parts per million (ppm) lead has been selected in addition to a level of 75 ppm cadmium. In all instances to date, lead has been the primary driver for initiating cleanup action. Yard concentration values greater than 800 ppm lead or 75 ppm cadmium will trigger excavation activities that will continue until a cleanup level of 500 ppm lead and 25 ppm cadmium is achieved or until a maximum excavation depth of one foot is achieved. Additionally, garden soils exceeding 500 ppm lead and 75 ppm cadmium will be removed to the same cleanup levels or until an excavation depth of two feet has been achieved. Raised bed gardens may also be established depending upon home owners wishes.

The yards will be completed on a priority basis with the highest lead impacted yards being completed initially, followed by systematically cleaning up ever lower concentration areas. The work will be grouped in general areas of the highest levels in order to efficiently perform the excavations and therefore, in some instances, lower concentration yards grouped in a high concentration area, will be cleaned up first in order to more efficiently perform the work. The work will thus not strictly be performed on a numerical basis but will also consider groupings of high concentration yards. These groups may also contain lower level properties that will also be addressed at the same time rather than returning to the same area at a later point in time.

Question: One citizen asked if the soil would be re-tested during excavation activities.

Answer: The soil will be tested in several areas of the yards as excavations proceed. This is necessary to determine the depth and area of excavations and to also determine the need to place a geotextile warning barrier in the excavation prior to backfilling. The warning barrier will be placed if soil lead levels are greater than 1,500 ppm after one foot of soil has been excavated. The barrier is designed to be a warning during any future digging or excavation activities.

Question: Some citizens asked about having their yards initially tested in the future.

Answer: We are compiling a list of people who would like to have their yards tested in the future. EPA will evaluate the list in the fall when we are back in the area to perform additional work. In some instances, it will not be necessary to test certain people who request testing since they may be in an area that has been sufficiently characterized and determined to be an area with lead levels below the cleanup criteria. In other instances, testing may be warranted and the residents will be contacted by EPA to arrange for such testing. All individuals on the list will receive a response. Additionally, when we are back working in Galena we will have a field office with a telephone number for people to call. Citizens may also phone our Office of External Programs, attention Hattie Thomas, at 1-800-223-0425 or 1-913-551-7003.

Question: Several questions regarding phosphate treatment were asked. The questions can be summarized to include the following: does the treatment consist of pure phosphate; how does the phosphate work or bind the lead; how will the phosphate be applied; and when will the phosphate treatment begin.

Answer: Phosphate treatability studies are necessary in order to determine if this type of treatment will work in Galena. The studies will be completed concurrently as excavations proceed. The public, State of Kansas, and other EPA offices, laboratories, and personnel will be provided with an opportunity to comment on the results of the phosphate treatability studies prior to switching to this method if it is deemed viable. The following paragraphs contain responses to the various questions regarding phosphate treatment.

* The treatment does not consist of pure phosphate and it is not recommended that home owners attempt to purchase and spread phosphate independently. The phosphate mixture consists of additional compounds that may require special formulation based on site-specific chemistry of the local soils.

* In the laboratory, the phosphate compound chemically binds with the lead and cadmium thus making these metals non-bioavailable. The metals are still present but may not be uptaken by the body. Lead and cadmium that are not chemically treated are readily absorbed into the body or bloodstream and are bioavailable. Phosphate stabilization will not physically remove the lead and cadmium, as in an excavation scenario, but if the bioavailability studies prove successful, the toxic metals will be changed to a non-toxic form which is relatively harmless.

* The optimum method of phosphate application is yet to be determined. Once the early treatability studies successfully indicate that phosphate treatment of the site specific soils is a viable option, application studies will begin. There are several potential methods of application which include the following: dry granular spreading; wet mixture spraying; and wet or dry methods applied after tilling or aerating the soil. The treatability studies will determine the optimum method of phosphate application and will include the varied placement of phosphate on test plots in the Galena area.

* The earliest point that the phosphate treatment method could potentially be implemented is during the summer of 1997. There are several types of treatability tests that must be completed, in addition to public, State, and additional EPA input, prior to the implementation of a phosphate stabilization remedy. The possibility also exists that phosphate treatment may not be demonstrated to be a viable option at the Galena site and excavations would simply continue.

Question: A citizen asked if the soils in the Operable Unit #05 (OU-5) area were going to be re-tested in the future. An inquiry was also made regarding any prohibitions on residential development in the OU-5 area.

Answer: Although this ROD addresses the actions for the impacted residential soils in Galena, designated as Operable Unit # 07 (OU-7), an answer is provided since the entire site is interrelated. EPA has no plans to perform additional sampling in the OU-5 area. Limited additional sampling, primarily surface water and sediment, will be performed by the State of Kansas as part of the Operation and Maintenance (O&M) activities for this operable unit.

The OU-5 area was cleaned up prior to the OU-7 work which was the focus of the recent public meeting and this ROD. The OU-5 area was not cleaned up to the same action level as the current OU-7 work. Most of the OU-5 area is rural/undeveloped and consists of outlying areas around town. Institutional Controls are the primary method of dealing with future residential development at the OU-5 area. Institutional Controls are implemented at the local level and consist of items such as building codes, zoning restrictions, and building ordinances.

Question: A citizen made a statement that snakes were becoming a major problem in the local area and questioned if the apparent increase in the snake population could be attributed to past remedial actions.

Answer: The citizen was referring to past work conducted at OU-5 which consisted of several hundred undeveloped acres. It is possible that the actions in OU-5 are related to the apparent increase in the snake population, however; there is no conclusive evidence to indicate that the snake population is truly increased or if the past actions would be related to such an increase. There is currently not enough information to answer the question or to confirm that a problem exists.

Question: A citizen asked if the yards that were cleaned up would be re-tested and if any follow up blood testing of children would be performed.

Answer: The yards will not be re-tested after being excavated and backfilled. The excavation is permanent and the backfill soils will be tested prior to use to ensure that they meet the criteria of 240 ppm lead and 25 ppm cadmium. If phosphate stabilization is used as a future remedy, some yards will be re-tested to evaluate the long-term permanence aspects of the phosphate treatment method. Long-term blood testing will continue under both an excavation/backfill or phosphate stabilization remedial approach. Blood testing will be included in the health education component of the long-term operation and maintenance period. Blood tests and in-home

assessments are currently being performed by the Cherokee County Health Department. More information may be obtained by contacting Deloris Mulnix at 316-429-3087.

Question: A citizen asked if EPA was going to advertise in the paper prior to initiating activities in the fall so people would be aware of impending work and have a contact and phone number if they wanted to inquire about their yards or request testing. The citizen also suggested that both the Galena and Joplin newspapers be utilized since most people read one or the other.

Answer: EPA will establish a local field office when the work begins in the fall of 1996 as was the case for the past work performed. There will be a local phone number and an EPA representative in Galena as the work progresses. EPA will either advertise the initiation of the field activities in both the Galena and Joplin newspapers (Galena Sentinel-Times and Joplin Globe) or present this information at a Galena City Council Meeting which will also be advertised in both newspapers.

Question: A citizen asked if vacant lots were going to be tested.

Answer: EPA currently has no plans to test or remediate vacant lots. The question of future building of residential dwellings falls under the institutional controls aspect of the remedy. Local institutional controls should be established in order to regulate construction in residential areas. It is anticipated that these controls would provide or require some type of testing prior to construction and may also include zoning restrictions or ordinances that would regulate or restrict home construction in certain areas.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

JUL 29 1996

MEMORANDUM

SUBJECT: Concurrence on Attached Record of Decision for the
Cherokee County Superfund Site
Cherokee County, KS

FROM: Michael J. Sanderson, Director
Superfund Division *Michael J. Sanderson*

TO: Dennis Grams, P.E.
Regional Administrator

Please review the attached Record of Decision (ROD) for the cleanup of lead contaminated residential yard soils resulting from mining and smelting activities in Cherokee County, Kansas and provide your concurrence signature on the ROD. The Kansas Department of Health and Environment has been involved in the drafting of this document and has indicated its support for this ROD.

If you have any questions regarding the ROD, please contact me or Dave Drake, the project manager for this site, at extension 7626.

Attachment

