RECORD OF DECISION

BIG RIVER MINE TAILINGS SUPERFUND SITE
ST. FRANCOIS COUNTY, MISSOURI
CERCLIS ID#: MOD981126899
OPERABLE UNIT – 1

Prepared by:

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Region VII
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RECORD OF DECISION

I. DECLARATION

A. SITE NAME AND LOCATION

Big River Mine Tailings Site, Operable Unit 1 (OU 1)
Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) ID #: MOD981126899
St. Francois County, Missouri

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents the Selected Remedy for addressing lead-contaminated residential and high child exposure area soil at the Big River Mine Tailings site (Site), OU 1. 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, and to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record (AR) for the Site. The AR is located at the following information repositories:

St. Francois County Health Center
1025 West Main Street
Park Hills, Missouri

U.S. Environmental Protection Agency,
Region 7 Records Center
901 North 5th Street
Kansas City, Kansas 66101

The United States Environmental Protection Agency (EPA) has coordinated the selection of this remedial action with the Missouri Department of Natural Resources (MDNR). The state of Missouri concurs with the Selected Remedy.

C. ASSESSMENT OF THE SITE

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

D. DESCRIPTION OF THE SELECTED REMEDY

The Selected Remedy focuses on the remediation of lead contaminated mine ore processing waste in residential areas of OU 1. For the purposes of this ROD, the term residential properties includes properties that contain single- and multi-family dwellings, apartment complexes, vacant lots in residential areas, schools, daycare centers, playgrounds, parks, and green ways. This cleanup action is one part of the EPA's overall efforts to cleanup environmental contamination resulting from historic lead mining operations at the Site. Cleanup activities of the original tailings piles (source areas) have already occurred and are nearly complete. The EPA believes that the Selected Remedy is protective of human health and the environment.

The Selected Remedy includes the excavation of residential soil until lead concentrations are below 400 parts per million (ppm) in the top 12 inches, or below 1,200 ppm below 12 inches down to 24 inches below ground surface (bgs), transportation of contaminated soil to on-site soil repositories, replacement of contaminated soil with clean backfill and vegetative cover and institutional controls (ICs). Any properties with lead-levels remaining above 1,200 ppm at depth would be subject to ICs. Further detail on the Selected Remedy can be found in Section I in the Decision Summary.

E. STATUTORY DETERMINATIONS

The Selected Remedy is protective of human health and the environment, is expected to comply with the chemical-, location-, and action-specific 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 to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining on OU 1, a review will be conducted within five years to ensure that the remedy continues to provide adequate protection of human health and the environment.

F. ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary of this ROD. Additional information can be found in the AR for this Site.

- Chemicals of concern and their respective concentrations
- Baseline risk represented by the chemicals of concern
- Cleanup levels established for chemicals of concern and the basis for these levels
- How source materials constituting principal threats are addressed
- Current and reasonably anticipated future land use assumptions
- Potential land use that will be available at the Site as a result of the selected remedy
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected
- Key factors that led to selecting the remedy

G. AUTHORIZING SIGNATURE

Cecilia Tapia, Director
Superfund Division

9/30/11
Date

II. DECISION SUMMARY

A. SITE NAME, LOCATION, AND BRIEF DESCRIPTION

The Site (CERCLIS ID #: MOD981126899) is located in southeastern Missouri entirely within St. Francois County, approximately 70 miles southwest of St. Louis (Appendix A, Figure 1). The first recorded mining in St. Francois County occurred at Mine-a-Gabore between 1742 and 1762. Discoveries of disseminated lead in the Bonne Terre, Leadwood, and Flat River areas occurred in 1864. The introduction of the diamond drill in 1869 facilitated the discovery of additional reserves and output from the mines increased dramatically in the late 1800s. Mine output from St. Francois County peaked in 1942 when the concentrate equivalent of 197,430 tons of lead was produced. Mining ceased in the county in 1972 with the closing of St. Joe Lead Company's Federal mine.

The Site resides within the Old Lead Belt, which is on the northeastern edge of the Precambrian igneous core of the St. Francois Mountains. This area is one of the world's largest lead mining districts, having produced more than nine million tons of pig lead. It has been estimated that some 250 million tons of mill waste tailings and chat were produced in the Old Lead Belt from ore milling and beneficiation processes. The chat has been used extensively as aggregate for ballast in railroads, aggregate in concrete and asphalt, and fill. Some chat is used today as aggregate and fill. Tailings have been used as agricultural amendments due to the lime content.

Chat deposits include sand- to gravel-sized material resulting from the crushing, grinding, and dry separation of the ore material. Tailings deposits include sand- and silt-sized material resulting from the wet washing or flotation separation of the ore material. The mine waste contains elevated levels of lead and other heavy metals which pose a threat to human health and the environment. These deposits may have contaminated soils, sediments, surface water, and groundwater. These materials also may have been transported by wind and water erosion or manually relocated to other areas throughout the county. It has been reported that mine waste may have been used on residential properties for fill material and private driveways, used as aggregate for road construction, and placed on public roads around St. Francois County to control snow and ice in the winter.

The EPA is the lead agency and MDNR is the support agency. The source of cleanup monies is mixed funding from potentially responsible party (PRP) settlements and the Superfund trust fund.

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

To date, eight source areas of mine waste have been identified within the Site. These areas are shown on Figure 1 in Appendix A and are listed below:

- Desloge Pile (Big River Pile)
- National Pile
- Leadwood Pile
- Elvins Pile
- Bonne Terre Pile
- Federal Pile (St. Joe State Park)
- Doe Run Pile
- Hayden Creek

Part of EPA's overall strategy for the Site and St. Francois County was to address source control to reduce the continued transportation of mine waste. The sources of most of the lead contamination in the Site are the large mine waste piles listed above. For this reason EPA, with cooperation from some of the PRPs, began addressing the mine waste piles as removal actions before beginning remediation of residential properties.

Desloge Pile (Big River Pile)

In 1887, the Desloge Lead Company acquired the Bogy Tract (formerly Mine-a-Joe) near Desloge, Missouri, and commenced its operations under the name Desloge Consolidated Lead Company. In 1890 operations began in Shaft No. 1, originally sunk in 1873, by Bogy to a depth of 224 feet, and in 1893 the mill was started. By 1924, three shafts were operating with a fourth mill shaft being sunk so that ore could be hoisted directly into the crushing plant. The St. Joseph Lead Company took over the property in 1929 and operated it until 1958, when the Desloge mill shut down.

EPA and The Doe Run Resources Corporation entered into an Administrative Order on Consent in 1994 for a removal action to stabilize the Desloge Pile. Stabilization work on the Desloge Pile (Big River Pile) was mostly completed by 2000. Part of the site was left open for a Corrective Action Management Unit to store lead-contaminated soils on-site.

National Pile

In May 1898, the St. Louis Smelting and Refining Company (SLS&RC), a subsidiary of National Lead Company, purchased a block of land located near the Flat River station on the Mississippi River and Bonne Terre (MR&BT) railroad. The block included a working mine of the Flat River Lead Company (1,295 acres) and the old Taylor mines (900 acres). Shaft No. 1, sunk in 1893 by the Flat River Lead Company, was abandoned by SLS&RC. Shaft No. 2 was sunk in 1898, followed by Shaft No. 3 in 1899; and, the first SLS&RC ore produced from the property came in 1900. A state-of-the-art electric powered mill with a capacity of 1,200 tons per day was completed in 1901. Ore obtained from the mine (shafts) and several other small producers was milled, and concentrates were shipped to National Lead Company's Collinsville, Illinois, smelter. By 1910, four shafts had been sunk on the property. The property was sold to the St. Joseph Lead Company in 1933. St. Joseph Lead Company operated the National mine for several more years after the purchase but hauled the ore underground to the Federal mill.

EPA issued a Unilateral Administrative Order (UAO) in 2006 to the city of Park Hills, Missouri; The Doe Run Resources Corporation; NL Industries, Inc; and, the Park Hills Chamber of Commerce. The purpose of the UAO was for a time-critical-removal action to stabilize the National Pile. This work is ongoing and is projected to be completed by June 2012.

Leadwood Pile

The St. Joseph Lead Company's mining operations at Leadwood commenced in the Leadwood area as early as 1894. During 1903-1904, St. Joseph Lead Company constructed the Hoffman mill in Leadwood near Shafts Nos. 12 and 14, with a capacity of 1,000 to 1,200 tons per day. A concise description of the Hoffman concentrating plant operation is given in the Initial RI (Fluor Daniel 1995, page 2-74). Other

St. Joseph Lead Company mines in the area included Shaft No. 10 at Gumbo and Shaft No. 11, known as the Hunt, at the northeast edge of Leadwood near the Big River. The Leadwood mill was modernized periodically but ultimately closed by a strike in 1962.

EPA issued a Unilateral Administrative Order in 2006 to The Doe Run Resources Corporation for a removal action to stabilize the Leadwood Pile. The major earthwork at Leadwood was complete in June 2011. Remaining work includes the construction of passive bioreactors to treat dissolved zinc in groundwater seeps located at the east seep and erosion area and at the Leadwood Dam.

Elvins/Rivermines Pile

Flat River, Missouri, was the site of several mines and small concentrating works. A partial list of some of the companies with mining interests in the Flat River area (including the historic towns of Elvins, Central, St. Francois) included the Flat River Lead Company, Central Lead Company, The Doe Run Lead Company, Columbia Lead Company, Federal Lead Company, and Commercial Lead Company. In the early years, the milling operations were small and conducted at various locations. In 1891, The Doe Run Lead Company commenced mining in the Flat River area and subsequently acquired the properties of the Columbia Lead Company and Commercial Lead Company. By 1909, The Doe Run Lead Company controlled 6,548 acres in the Flat River area and carried on mining in seven shafts. In 1911, The Doe Run Lead Company consolidated its mill operations at Elvins to a 1,500 to 2,000 tons per day plant. The mill ceased operation in 1934. The property was acquired by St. Joe Minerals Corporation in 1936 when The Doe Run Lead Company was dissolved.

EPA issued a Unilateral Administrative Order in 2005 to The Doe Run Company for a time-critical-removal action to stabilize the Elvins/Rivermines Pile. All major earthwork was complete in June 2009. Remaining work includes the construction of passive bioreactors to treat dissolved zinc in a groundwater seep on the south end of the pile.

Bonne Terre Pile

The St. Joseph Lead Company was organized in 1864 and began mining operations at Bonne Terre in 1865 after purchasing the La Grave property. A mill was constructed and several shafts were sunk thereafter. In 1883, the Bonne Terre mill and associated works were destroyed by fire, after which a new and larger plant was constructed. The adjoining Desloge Lead Company mill, in operation since 1877, burned in 1884 and was subsequently purchased by the St. Joseph Lead Company. The smelter at Herculaneum was completed in 1892, and the furnaces from Bonne Terre were moved there. All Bonne Terre ore was smelted at Herculaneum thereafter.

EPA and The Doe Run Company entered into two Administrative Orders on Consent for the removal actions at the Bonne Terre Pile. The first was issued in 2001 and addressed the Western Portion of Bonne Terre. The second was issued in 2003 and addressed the Eastern Portion of Bonne Terre. All construction was complete in 2007.

Federal Tailings Pile

The Federal Lead Company, the corporate predecessor of the American Smelting and Refining Company (ASARCO), began operations in 1902 after acquiring various properties from the Irondale Lead Company, the Derby Lead Company, the Central Lead Company, the

Missouri Lead Fields Company, the Union Lead Company and others. In 1907, the Federal Lead Company constructed a large mill with a capacity of 3,000 tons per day (what is now the No. 3 mill at St. Joe State Park). A detailed inventory of shafts or mines operated by the Federal Lead Company (Buckley 1908) is presented in the Initial Remedial Investigation (Fluor Daniel 1995, page 2-58). By 1908, there were seven producing mines at the Federal Tailings Pile site and at least nine shafts, and by 1910, Federal Lead Company controlled 16,000 acres in St. Francois and Washington counties and was one of three major producers in the district with St. Joseph Lead Company and Doe Run. Milling operations were consolidated at the Federal mill in 1911. The Federal mill burned in 1912 and was reconstructed. In October 1923, the St. Joseph Lead Company purchased all of the Federal Lead Company holdings, including at least 12 shafts and the mill, which at that time was treating 4,800 tons per day. The Federal mill was permanently closed in 1970 when the mining operations in the area shifted to the Viburnum trend or New Lead Belt. St. Joe Minerals Corporation donated 8,561 acres to the state of Missouri for use as a park in 1975. The successor to the St. Joe Minerals Corporation was renamed The Doe Run Resources Corporation in 1994 and currently does business as The Doe Run Company.

EPA entered into an Administrative Settlement Agreement and Order on Consent for Removal Action with The Doe Run Resources Corporation and the state of Missouri Department of Natural Resources, Division of Parks in 2011 for stabilization of the Federal Pile. Work will be completed at Federal in 2013.

Doe Run Pile

The Doe Run Lead Company was organized in 1886 or 1887 and began operations in the town of Doe Run on the old Wm. R. Taylor tract. The Doe Run Lead Company sank two shafts, one 110 feet and the other 47 feet deep at the Doe Run property. About 1890, The Doe Run Lead Company acquired a tract of land in the Flat River area, and in 1907 acquired additional properties formerly owned by the Union Lead Company and the Columbia Lead Company. As of about 1908, The Doe Run Lead Company operated four shafts, two in the town of Doe Run and two in the Flat River area. By 1910, The Doe Run Lead Company had eleven shafts in the Flat River area. The property was acquired by St. Joe Minerals Corporation in 1936 when The Doe Run Lead Company was dissolved. St. Joe Minerals Corporation sold the site of the Doe Run Pile to an individual in 1977. The Doe Run Pile is approximately 24 acres in a rural area immediately south of the town of Doe Run.

The Doe Run pile has not been addressed. EPA plans to address this pile as part of Operable Unit 02 (OU 2).

Hayden Creek Mine

The Hayden Creek mine is located one mile southwest of the town of Frankclay. St. Joe Minerals Corporation discovered the ore body by random drilling in 1943. Underground development of the Hayden Creek or No. 22 Mine started in 1949 with the sinking of the shaft. Further development was undertaken in 1951 with limited mining in 1952. Mine production averaged about 1,000 tons of ore per day. A 1,200 ton-per-day magnetic separation mill was constructed but failed to operate satisfactorily; eventually all ore produced was trucked to St. Joseph Lead Company's Leadwood mill for processing. The Hayden Creek mine was closed in 1958, and the facilities were demolished.

Most material at Hayden Creek was addressed under the 2006 Unilateral Administrative Order for the Removal Action at Leadwood described above; however, Hayden Creek will be further assessed under OU 2 to determine if additional work is required to mitigate ecological risk.

Operable Units (OUs)

Currently there are four OUs designated at the Site that organize the work into logical elements based on removal criteria. This ROD addresses OU 1, lead contaminated mine ore processing waste in residential areas. Final RODs for the other OUs will be issued in the future.

OU 00 consists of the removal activities at the pile locations (Bonne Terre, Desloge, Leadwood, Federal, Elvins, and National).

OU 1 consists of the stabilization of the Desloge Pile (stabilized in 2000) and remediation of residential properties and high child exposure areas exceeding lead levels in residential soil of 400 ppm in St. Francois County and focuses on properties in the towns of Park Hills, Desloge, Bonne Terre, Leadwood, Leadington, and Doe Run; this also includes the rural residential properties surrounding these communities.[1]

OU 2 includes the remedial action to address terrestrial ecological risks and impacted watersheds associated with the mine wastes. OU 2 will also include future work on the Doe Run Pile.

OU 3 consists of the Interim Program and Halo Removal Action to address elevated blood lead at the Site. This included time-critical residential properties and high child exposure areas (i.e., playgrounds and daycare facilities).

History of Investigations

Over 100 years of lead mining left behind large piles of mine waste that dwarfed the towns of St. Francois County. Historical photos depicting mine waste piles are included in Appendix A as Figures 2 and 3. Mining operations in St. Francois County are estimated to have produced over 250 million tons of mine waste. Much of this waste was located in the eight major mine waste areas, identified above. Over twenty years ago, when EPA and the state of Missouri began investigations in St. Francois County, the mine waste piles were predominately barren of vegetation. Access to the waste piles was unrestricted. The waste piles were unstable and subject to wind erosion. A 1988 EPA inspection documented that dust from the Desloge Pile "created a suspended particulate plume" of lead-contaminated dust (Figure 4). Before the removal actions and stabilization of the mine waste piles, the Desloge Pile was 600 acres in size and up to 100 feet deep; Elvins was 149 acres and 170 feet higher than surrounding area; Bonne Terre (eastern portion) was 306 acres and up to 50 feet deep, Bonne Terre (western portion) was approximately 39 acres and about 160 feet higher than the surrounding area; the Federal tailings pile covers over 1,000 acres; and the Leadwood Pile was approximately 563 acres in size.

[1] The city of Park Hills was created recently when the former towns of Flat River, Esther, Rivermines, Frankclay, Wortham, and Elvins Combined.

EPA and the Missouri Department of Health and Senior Services (MDHSS) began investigating the Site in 1988. These investigations focused on the effects of the mine waste from the Desloge (Big River) Pile which was located adjacent to the Big River and as a result of rain fall and erosion had released lead mine waste into the Big River (Figure 5). In order to investigate a broader area, EPA performed a Listing Site Inspection in 1991 and a Site Assessment in 1992, which resulted in the Site listing on the National Priorities List (NPL) in 1992. The NPL is a national list of Superfund sites that prioritizes cleanups in order of the most serious contamination problems and greatest threats to human health and the environment.

The Site inspection and Site assessment identified potential sources of mine ore processing waste in the Big River watershed, determined the composition of these sources, and determined that there had been a release of mining-related contaminants (heavy metals) to media within the Big River watershed. The Site inspection and Site assessment also identified uses of mine waste in the area and provided analytical data on soil, tailings, sediment, air, surface water, and groundwater near the mine waste piles. Geographically, the Site investigation included the entire Site. A limited number of samples were collected from mine waste, groundwater, sediment, and soil, and were analyzed for heavy metals. Overall, the results indicated elevated concentrations of a number of heavy metals in samples of mine waste, groundwater, sediment, and soil.

Studies conducted by MDHSS including a Preliminary Public Health Assessment in 1994 and a lead exposure study in 1997 concluded that 17 percent of children tested in the mining area of St. Francois County had elevated levels of lead in their blood. A comparable city (Salem, Missouri) with similar aged housing stock was also studied and found to have an EBL rate of only 3 percent. As a result of the elevated blood lead levels in children, in 1997 and 1998, MDHSS followed the Exposure Study with the St. Francois and Jasper Counties Lead Intervention Study in 2000 as an effort to reduce the percentage of elevated blood leads in children at the Site.

In 1997, EPA entered into an Administrative Order on Consent for the development of the Remedial Investigation/Feasibility Study (RI/FS) with The Doe Run Resources Corporation and ASARCO Incorporated. The RI//FS was completed and released in 2011. The FS developed the alternatives for the remedial action for the residential properties. As part of the FS, an investigation of lead contamination in the subsurface soils was conducted. This investigation focused on the subsurface soils at 58 residential properties in the mining areas. Soil core samples were collected in 6-inch intervals, moving down in the soil profile to 30 inches bgs. The Subsurface Soil Report concluded that 7 percent of the yard quadrants after a 12 inch bgs excavation would have confirmation subgrade soil lead concentrations greater than 1,200 ppm.

The results of this Subsurface Investigation are part of the FS. The remedial alternatives developed and evaluated in the FS form the basis of this ROD. The FS is located in the AR for this Site.

In 2000, EPA entered into an Administrative Order on Consent with The Doe Run Resources Corporation, for implementation of a soil testing and removal program and blood lead testing and control program within the Site. This Order, called the Interim Program, provided that these programs would end when either EPA issued a ROD for residential yards or after four years. At the end of the Interim Program (March 30, 2004), 1,955 residential yards had been sampled and 563 homeowners had refused sampling, for a 78 percent sampling rate.

In 2004, EPA entered into another Administrative Order on Consent with The Doe Run Resources Corporation for a Removal Action to replace the expiring 2000 Interim Program. The 2004 Administrative Order was called the Halo Removal Order. The Halo Removal Order designated six of the mine waste areas in St. Francois County: National; Elvins; Bonne Terre; Federal; Desloge; and, Leadwood. The Halo Removal Order required removal actions within the halo around each of these waste areas. The halo was defined as the area within 500 feet of chat and tailings waste, 1,000 feet from four identified smelters/calciners, and 100 feet from mine shafts.

Under the Halo Removal Order 69 additional yards were sampled; of these 3 were parks, 5 were childcare facilities or school playground facilities, 29 were sampling refusals during the Interim Action, 17 were not within the Halo but were sampled due to the presence of a child with elevated blood lead levels, and the remaining 15 yards were primarily new construction within the Halo. Of the total yards sampled, 387 were completely remediated (all areas < 400 ppm) and 188 were partially remediated (part of the yard remains > 400 ppm).

EPA has also remediated seven schools, sixteen daycares, and two parks under removal authority.

C. COMMUNITY PARTICIPATION

The EPA issued the Proposed Plan for OU 1 on July 22, 2011, and provided a 30-day review and comment period opening on July 22, 2011. The public comment period was extended an additional 30 days and closed on September 21, 2011. A public meeting to present the plan and receive comments was held August 4, 2011, at the Mineral Area College from 6:00 pm to 8:00 pm. Included in this ROD in Appendix C is a Responsiveness Summary that addresses in writing the significant comments the EPA received from the public during the comment period.

D. SCOPE AND ROLE OF OPERABLE UNIT-1

This ROD sets forth the Selected Remedy for the response action and represents EPA's approach to address OU 1, residential properties and high child exposure areas at the Site. OU 1 includes lead-contaminated surface soils present at residential properties across the Site that have been contaminated as a result of migration of metal-bearing materials from past mining and ore processing practices via natural erosional processes, wind-blown mine waste, and human activities. EPA proposes to address the residential properties as the first remedial action to expedite cleanup of the areas that pose the greatest and most immediate threat to human health. This first remedial action for the Site is a continuation of the residential soil removal actions that have been ongoing in St. Francois County since the 2000 Interim Action. Additional remedial actions at the Site to address residual risk, such as actions for protection of the Big River watershed and stabilization of the Doe Run pile, will be addressed under future Proposed Plans and RODs.

The estimated total number of residential properties with lead-contaminated soil that will be addressed under this remedial action is approximately 4,000. This estimate is based upon the 1,000 contaminated properties sampled during the Interim Action that require remediation and an additional estimated 3,000 properties that have not been sampled but that potentially could exceed 400 ppm lead in soil.

As set forth below, the action level for lead in residential soil, 400 ppm, is based on the site-specific Human Health Risk Assessment (HHRA) and the site-specific blood lead study. This action level also assumes lead is measured in the bulk soil sample taken from the mid yard area with a X-Ray Spectrometer (XRF).

E. SITE CHARACTERISTICS

The Site is located within the Salem Plateau section of the Ozark physiographic province. The topography is hilly with several hundred feet of relief with altitudes ranging from about 700 to 1,000 feet above mean sea level. The climate in St. Francois County is continental with cold winters and hot summers. Annual precipitation is approximately 40 inches with a rainy season in fall and winter. Average annual snowfall is 13.7 inches. Prevailing winds are from the south.

The Site is located on the flanks of the St. Francois Mountains, a positive topographic structure in the southeast portion of the county composed of Precambrian granite and volcanic rocks. Cambrian sedimentary rocks are present above the Precambrian rocks and are, from oldest to youngest, the Lamotte Sandstone, Bonneterre Formation, Davis Shale, Derby-Doe Run Dolomite, Potosi Dolomite, and Eminence Dolomite.

The Bonneterre Formation is host to most of the ore bodies and is composed mostly of dolomite in the Old Lead Belt. The Bonneterre is 200 to 400 feet thick. The dolomite occurs as halos around igneous knobs that extend into or through the Bonneterre. Away from these igneous paleo-topographic highs, the Bonneterre is composed of unmineralized limestone. The lower 100 feet contain a variety of depositional structures where the richest ore was concentrated. The most abundant sulfide minerals in the Bonneterre Formation are galena, sphalerite, chalcopyrite, pyrite, and marcasite. Sphalerite (zinc ore) is restricted to certain areas of the district and is much less common than in the Tri-State Mining District of northeast Oklahoma, southwest Missouri, and southeast Kansas.

As indicated previously, past mining operations have left at least 8 identified major mine waste areas in the form of tailings and chat deposits from smelting and mineral processing operations in St. Francois County. Five of the mine waste deposits have been stabilized in place and there are plans in place to address the remaining areas. The mine waste contains elevated levels of lead and other heavy metals which pose a threat to human health and the environment. These deposits have contaminated soils, sediments, surface water, and groundwater. These materials may also have been transported by wind and water erosion or manually relocated to other areas throughout the county. It has been reported that mine waste may have been used on residential properties for fill material and private driveways, and as aggregate for road construction.

F. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The primary land use within St. Francois County is agricultural crop and pasture land since mining operations have ended. Industrial activities consist of light manufacturing, aggregate production, and construction. The 2000 census indicated that the population of St. Francois County is 55,641 with most (55 percent) of the population living in Farmington, Park Hills, Desloge, and Bonne Terre. The city of Park Hills and the smaller towns of Leadwood, Leadington, and Doe Run are in the affected area. Future land use is expected to be primarily residential.

G. SUMMARY OF SITE RISKS

A Baseline HHRA was conducted for the Site by EPA in 2009 The HHRA assesses the potential risks to humans, both present and past, from Site-related contaminants present in environmental media including surface soil, indoor dust, sediment, surface water, groundwater, and fish tissue. The HHRA assumes that no steps are taken to remediate the environment or to reduce human contact with contaminated environmental media. The results of the HHRA are intended to inform risk managers and the public about potential human health risks attributable to site-related contaminants and to help determine if there is a need for action at the Site.

The HHRA identified lead as the primary contaminant of concern (COC) for OU 1. Other metals (zinc and cadmium) were identified in nonresidential soil and stream sediment and are considered COCs along with lead in OU 2. The focus of this ROD is the risk associated with lead because it is the primary COC for residential properties at OU1. For further information, please refer to the HHRA in the AR. Young children (typically defined as seven years of age or below) are the most sensitive population group potentially exposed to lead contamination at the Site. Young children are most susceptible to lead exposure because they have higher contact rates with soil and dust, absorb lead more readily than adults, and are more sensitive to the adverse effects of lead than older children and adults. The effect of exposure to lead contamination of greatest concern in children is impairment of the nervous system, including learning deficits, lowered intelligence, and adverse effects on behavior.

The risk for adverse health effects from exposure to lead contamination is evaluated using a different approach than for most other metals. Because lead is widespread in the environment, exposure can occur by many different pathways. Thus, the risk of exposure to lead is based on consideration of total exposure (all pathways) rather than just site-related exposure. In addition, because most studies of lead exposures and the resultant health effects in humans have traditionally been described in terms of the resulting level of lead in the blood (expressed in micrograms/deciliter [µg/dl]), lead exposures and risks are typically assessed using mathematical models.

In determining the acceptable level to clean up soil in residential yards at the Site, the HHRA used EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children to estimate the distribution of blood lead levels in a population of residential children exposed to lead at the Site. As set forth above, the focus of a risk assessment for lead in a residential setting is on children because they are a more sensitive population than older children or adults. Thus, the IEUBK model was used to evaluate the risks posed to young children (6 to 84 months) as a result of exposure to lead contamination at the Site.

EPA's health protection goal is that there should be no more than a 5 percent chance of exceeding a blood lead level of 10 µg/dl in a given child or group of similarly-exposed children. The basis for this goal is the Center for Disease Control and Prevention and EPA analyses demonstrating health effects at or above a blood lead level of 10 µg/dl.

The IEUBK model uses site-specific and default inputs (e.g., soil concentration, indoor dust concentration, bioavailability) to estimate the probability that a child's blood lead level might exceed 10 µg/dl.

For a residential child, the IEUBK model used available Site-specific data, including lead concentrations in residential property soil, indoor dust, and groundwater. In addition, testing was performed to estimate the relative bioavailability of the lead present at the Site. Bioavailability testing measures the amount of lead absorbed into the body following incidental ingestion of soil. The results indicate that bioavailability of lead at the Site is greater than the IEUBK model default value of 30 percent. Based on results of Site-specific measurements of *in vivo* bioavailability and *in vitro* bioaccessibility, the bioavailability of lead in soil and dust was estimated as 37 percent.

Exposure Pathways and Exposed Populations

Figure 6 presents the Conceptual Site Model (CSM) which shows a variety of exposure pathways by which Site-related COCs may migrate from on-site mine waste piles or contaminated surface soils acting as sources of contamination for other environmental media such as soil and indoor dust.

Risk Estimates for Residents from Soil

The IEUBK model was used to assess lead exposures to young children at the Site and within each community. Based on Site-specific information, EPA's IEUBK model predicts that a young child residing at the Site will have greater than a 5 percent chance of having a blood lead level exceeding 10 µg/dl if the lead soil concentrations to which he or she is exposed are above 337 ppm under the assumed exposure conditions. This is based on a Site-specific absolute bioavailability of 37 percent.

In addition to the modeling performed by EPA, one of the potentially responsible parties for the Site performed a Site-Specific Blood Lead Study. This study paired actual blood lead level measurements of 162 children with the corresponding residential yard soil lead concentrations. The study plotted actual blood lead levels with projected blood lead levels based on the Site-specific absolute bioavailability of 37 percent. The study also plotted the blood lead levels based on the default absolute bioavailability of 30 percent. The Blood Lead Study showed that a cleanup level of 400 ppm lead in residential soils would reduce risk to children to less than a 5 percent chance of having a blood lead level exceeding 10 µg/dl . Therefore, EPA has concluded that 400 ppm lead in residential yard soil will be the cleanup level of the remedial action as measured in the bulk soil fraction (sieving the soil sample with a #10 mesh sieve to obtain particles less than 2 millimeters) based on analysis with an XRF. Based upon this cleanup level, an estimated 4,000 homes at the Site are of potential health concern with regard to lead contamination to yard soil. This number is based on existing data which shows that 79 percent of properties sampled have lead levels greater than 400 ppm.

Risk Estimates for Residents from Groundwater

During the RI, 189 wells were sampled. Many of these wells were located close together in clusters. The results of this testing show no consistent lead contamination at these clusters and suggest no wide-spread impacts from lead mining at the Site to groundwater. Instead, elevated lead concentrations (lead > 15 µg/l) occur sporadically and were limited to 4 wells and could not be linked to the mining activities at the Site.

Further, groundwater concentrations fall within the range of those typical for drinking water in the area. Fifty-four percent of the wells tested were found to be at or below a lead concentration of 1 µg/l, and 85 percent were at or below the IEUBK model default of 4 µg/l. Further, 97 percent of the wells tested were at or below 15 µg/l, the level at which municipal supplies must attempt to reduce lead exposure.

Significantly elevated risks due to exposure to lead in groundwater appear to be limited to a small number of domestic well locations.

Summation

In past experience at Superfund sites where lead is the contaminant of concern, EPA generally selects a residential soil cleanup level within the range of 400 ppm to 1,200 ppm for lead, based on the IEUBK model results and the nine criteria analysis included in this ROD and in accordance with the NCP. As described above, the IEUBK modeling results for the Site along with the Site-Specific Blood Lead Study recommend a lead soil concentration of 400 ppm to ensure that a child has less than a 5 percent probability of having a blood lead level exceeding 10 µg/dl.

This ROD only addresses human health risk at residential properties within the Site. Since this ROD only addresses human health, a summary of the Ecological Risk Assessment has not been included in the Selected Remedy. The Ecological Risk Assessment identified significant risk to ecologically sensitive areas and the natural environment. For example, elevated lead and zinc in the sediments and surface waters of Big River and Flat River Creek pose a significant risk to aquatic biota. Because of the lack of sensitive ecological receptors in the residential areas, the risk to the Big River, Flat River Creek and other identified risks to human health and the environment will be addressed in future cleanup decisions. For example, future EPA actions for OU 2 will address risk to ecological receptors and human health from lead-impacted non-residential soil, surface water, and sediment.

H. REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) consist of quantitative goals for: reducing human health and environmental risks; and/or, meeting established regulatory requirements at Superfund sites. RAOs are identified by reviewing: site characterization data; risk assessments; applicable or relevant and appropriate requirements (ARARs); and, other relevant site information. This ROD addresses the risk to human health resulting from exposure to residential soils contaminated with lead mine waste.

Based on current Site data and evaluations of potential risk, lead was identified as being a COC. The primary cause of human health risk from residential property soils at the Site is through direct ingestion (by mouth). Thus, the RAO for the residential property soils at the Site is to:

> **Reduce the risk of exposure of young children (children under seven years old) to lead such that an individual child or group of similarly exposed children have no greater than a 5 percent chance of exceeding a blood lead level of 10 µg/dl.**

Site-specific information, EPA's IEUBK model and the Site-Specific Blood Lead Study predict that a young child residing at the Site will have greater than a 5 percent chance of having a blood lead level exceeding 10 µg/dl if the lead soil concentrations to which he or she is exposed are above 400 ppm lead under the assumed exposure conditions. Thus, 400 ppm lead in soil will be the cleanup level of the remedial action as measured in the bulk soil fraction using an XRF instrument. As the lead agency, it is the current judgment of EPA that the Selected Remedy identified in this ROD is necessary to protect public health from actual or threatened releases of lead.

I. DESCRIPTION OF ALTERNATIVES

The FS evaluated three remedial action alternatives. The No Action alternative was evaluated; however, EPA believes that the No Action Alternative is not protective of human health and does not consider it a viable option. Each of the other two alternatives would require institutional controls to protect the remedy. The two action alternatives require sampling, excavation and disposal of lead contaminated residential yard soils with replacement of soil and reseeding of residential properties. The primary difference between the two action alternatives is the depth of the excavation. As set forth below, Alternative 3 is EPA's Selected Remedy. Each alternative is presented in much greater detail in the FS, which is part of the AR for the Site. The remedial alternatives developed to address the RAO previously identified in this ROD for the Site are presented below.

Alternative 1: No Action

Estimated Total Capital Cost: $0
Estimated Annual O&M Cost Range: $0
Estimated Present Worth Cost: $0
Estimated Construction Time Frame: zero months
Estimated Time to Achieve RAO: Infinite, RAO unachievable

The NCP requires that EPA consider a no-action alternative against which other remedial alternatives can be compared. Under this alternative, no further action would be taken to monitor, control, or remediate the threat of lead contamination in residential property soil at the Site. Alternative 1 would not meet the RAO because it does not minimize or eliminate the existing or future human health risk at the Site.

Alternative 2: Soil Removal with 12 inch Subgrade Barrier and Institutional Controls

Estimated Total Capital Cost: $ 118.3 million
Estimated Annual O&M Cost Range: $0
Estimated Annual Health Education Cost: $20 thousand
Estimated Present Worth Cost: $ 97.72 million
Estimated Construction Time Frame: 7 years
Estimated Time to Achieve RAO: 7 years

Under this alternative, residential properties with at least one quadrant sample testing greater than or equal to (≥) 400 ppm for lead will have that quadrant, and if applicable the drip zones, remediated. The drip zones would be remediated if the lead concentrations in the drip zone are ≥ 400 ppm. Residential properties where no quadrant samples exceed 400 ppm lead would not be addressed under this alternative. Under this alternative, EPA estimates that as many as 4,000 residential properties may contain lead soil concentrations greater than 400 ppm and will require remediation. This estimate is based on data from properties that have already been sampled. It is estimated that the soil at 4,540 residential properties at the Site has not been sampled for lead contamination. Under this alternative, all residential properties within the Site will be sampled for lead contamination. For more information please refer to the FS in the AR.

This alternative includes excavation and removal of lead-contaminated soil, backfilling the excavation with clean soil, and seeding. Excavation of a residential property would be triggered when the highest recorded soil sample for any defined area of the property contains ≥ 400 ppm lead. Soil would be

excavated using excavation equipment and hand tools in the portions of the property where the surface soil is ≥ 400 ppm lead. Excavation will continue until either the underlying soil at the bottom of the excavation is less than 400 ppm lead; or to a maximum depth of 12 inches bgs, except for garden areas, where the maximum depth of excavation will be 24 inches bgs.

EPA will not intentionally address naturally occurring lead ores in their undisturbed state as part of this action. Although the Site has been heavily mined in the past, it may be possible to encounter naturally occurring lead ores during residential property excavation. Section 104(a)(3)(A) of CERCLA states that removal or remedial actions shall not be provided in response to a release or threat of release "of a naturally occurring substance in its unaltered form, or altered solely through natural processes or phenomena, from a location where it is naturally found." Naturally occurring lead ores could be found at the bedrock interface. Another indicator of the presence of naturally occurring lead ores could be a high density of galena crystals in soils or unusually high concentrations of lead in excavated soils. When these conditions are encountered, they will be documented, excavation will stop, and backfilling will be initiated.

If at 12 inches bgs the lead soil concentration is ≥ 400 ppm, placement of a visual barrier will be required. The barrier placed will be a highly visible plastic barrier that is permeable, wide meshed, and will not affect soil hydrology or vegetation, such as an orange-mesh plastic sheet. The physical barrier will function as a warning that digging deeper will result in exposure to soils contaminated with lead at a level that EPA has determined to be a human health concern. A minimum of 12 inches of clean soil would be used as an adequate soil barrier for the protection of human health. The rationale for establishing a minimum clean soil thickness of 12 inches is that the top 12 inches of soil is considered available for direct human contact. Clean fill and topsoil would be used to replace soil removed after excavation, returning the residential property to its original elevation and grade.

Based on EPA's previous soil removal activities at the Site, EPA estimates that a total of approximately 1,247,000 cubic yards (yd^3) of soil would be required for excavation, disposal, and replacement. This alternative uses this quantity to develop the cost estimate.

Excavated soils will be transported in covered trucks to the soil repositories located at the Desloge (Big River) Pile and the Leadwood Pile (Figures 7 and 8, Appendix A). The contaminated soil will be placed in the soil repositories, capped with a clean 12 inch layer of soil, and revegetated with an appropriate seed mix. The placement of the contaminated soil will improve conditions at each of these mine waste piles by reducing the amount of wind-blown lead contaminated dust transported off the piles. It will also reduce water infiltration of the piles. The capacity of the soil repositories has not been determined but will be determined during the Remedial Design (RD). The O&M at the Big River Mine Tailings Pile will be implemented per the conditions of the 1994 Administrative Order on Consent (Docket # VII-94-F-0015). The O&M at the Leadwood Mine Tailings Pile will be implemented per the conditions of the 2006 Unilateral Administrative Order (Docket # CERCLA-07-2006-0272).

After replacement of topsoil at each residential property, the property will be hydroseeded to restore the vegetation. Hydroseeding is preferred over sodding for its ease of initial maintenance and significant cost reduction. However, sod may be used in areas of properties with steep slopes that would be subject to erosion before the vegetation can be established.

Health education is required under this alternative to reduce potential adverse health effects. An active educational program would be conducted in cooperation with EPA, the Agency for Toxic Substances

and Disease Registry (ATSDR), MDNR, MDHSS, and the St. Francois County Health Department. The educational activities would primarily be conducted by the St. Francois County Health Department. The following activities are examples of the types of education activities that may be conducted as part of this alternative:

- Extensive community-wide blood-lead monitoring.
- In-home assessments for children identified with elevated blood lead levels.
- Distribution of prevention information and literature.
- HEPA Vacuum cleaner loan program to houses subject to remediation.
- Outreach activities directed to area physicians.
- Community education meetings; and distribution of literature at such presentations at civic clubs, schools, nurseries, pre-schools, churches, fairs.
- Family assistance.
- Special projects to increase awareness of heavy metal health risks.

Institutional Controls (ICs): Alternative 2 requires institutional controls because lead contamination will remain at unlimited concentrations below 12 inches bgs. Based on the FS, approximately 12 percent, or 544, of the residential properties at the Site would remain contaminated with lead at levels above 400 ppm at 12 inches bgs. Additionally, 543 properties that were remediated during the Interim Program and Halo Removal Action remain contaminated above 400 ppm at 12 inches bgs and have barriers in place. Therefore, a total estimate of 1087 properties would be $\geq$ 400 ppm at 12 inches bgs and would be subject to ICs under Alternative 2.

EPA has historically required ICs to ensure a remedy's long-term protectiveness. At present, there are no applicable zoning ordinances in St. Francois County for residential properties. However, there are potential IC's that could be utilized. These include but are not limited to the following:

- Establishment of a registry of residential properties that have greater than 400 ppm lead in soil at 12 inches bgs with the St. Francois County Health Department.
- Yards subject to the ICs will also be extensively evaluated during each 5-year review to ensure protectiveness. This will ensure the remedy has remained protective.
- Building permit requirements that would involve pre-screening properties for lead.
- Builder and developer education programs for dealing with heavy metal soil contamination and best management practices for construction workers.
- Deed restrictions such as covenants or easements.

Future land use of the remediated residential properties is assumed to be residential. Under this alternative, land use will be enhanced because lead-contaminated soil will be removed from the remediated properties.

Alternative 3: Soil Removal with 24 inch Excavation with limited Institutional Controls

Estimated Total Capital Cost: $130.3 million
Estimated Annual O&M Cost Range: $0
Estimated Annual Health Education Cost: $20 thousand
Estimated Present Worth Cost: $107.62 million
Estimated Construction Time Frame: 7 years
Estimated Time to Achieve RAO: 7 years

Alternative 3 requires remediation of residential properties where a quadrant sample result shows ≥ 400 ppm lead. Excavation of a residential property would be triggered when the highest recorded soil sample for any defined area of the property contains ≥ 400 ppm lead. The entire drip zone will be remediated if the lead concentration in the drip zone is greater than 400 ppm. Residential properties where quadrant samples are < 400 ppm lead would not be addressed under this alternative.

Under this alternative, EPA estimates that approximately 4,000 residential properties may contain a quadrant with lead soil concentrations greater than 400 ppm and will require remediation. In contrast to the requirements for excavation in Alternative 2, Alternative 3 will require further excavation if the lead concentration is above 1,200 ppm at 12 inches. Excavation will continue until either a maximum depth of 24 inches; or underlying soils at the bottom of the excavation are below 1,200 ppm lead.

EPA will not intentionally address naturally occurring lead ores in their undisturbed state as part of this action. Although the Site has been heavily mined in the past, it may be possible to encounter naturally occurring lead ores during residential property excavation. Section 104(a)(3)(A) of CERCLA states that removal or remedial actions shall not be provided in response to a release or threat of release "of a naturally occurring substance in its unaltered form, or altered solely through natural processes or phenomena, from a location where it is naturally found." Naturally occurring lead ores could be found at the bedrock interface. Another indicator of the presence of naturally occurring lead ores could be a high density of galena crystals in soils or unusually high concentrations of lead in excavated soils. When these conditions are encountered, they will be documented, excavation will stop, and backfilling will be initiated.

Based on the Subsurface Investigation, which is included in the AR, approximately 7 percent of the properties that are estimated to be above the action level, or 280, may be contaminated with lead at concentrations greater than 1,200 ppm at 12 inches bgs. For the Selected Remedy, the FS estimates that a total of approximately 1,280,000 yd^3 of soil would require excavation, disposal, and replacement. This estimate is used as the basis for the cost estimate for this alternative. As compared with Alternative 2, the excavation of an additional 33,000 yd^3 of soil at depth would result in a reduction of approximately 200 properties requiring some form of future IC. Alternative 3 requires placement of a visual barrier if at 24 inches bgs the lead soil concentration is greater than 1,200 ppm. The barrier placed will be an obvious plastic barrier that is permeable, wide meshed, and will not affect soil hydrology or vegetation, such as an orange-mesh plastic sheet. The physical barrier will function as a warning that digging deeper will result in exposure to soils contaminated at a level that EPA has determined to be a human health concern.

The application of the action level requires consideration of the depths of excavation and other risk management elements. Due to the distribution of lead contamination in the soil profile at the Site, EPA has determined that backfilling of excavated areas to original grade with clean material after reaching a

residual soil lead level less than 400 ppm in the upper 12 inches bgs, or a residual concentration of less than 1,200 ppm at a depth greater than 24 inches bgs, combined with other elements of the selected remedy, is protective of human health. These cleanup criteria are based upon a risk-management determination made by EPA in consideration of site-specific conditions at the Site and the experience gained in remediating thousands of properties using this strategy.

The 1,200 ppm cleanup level at depth is protective for occupational exposure of utility workers or other construction workers that could potentially contact subsurface soils following soil remediation. Disturbances could include installing or repairing water, sewer or natural gas lines, underground electrical, television or phone cables, fence and mail box posts, basketball poles and similar activities. It also could include planting trees or shrubs. For these types of disturbances, EPA's underlying premise is reasonable and would be protective of public health. The Selected Remedy is more protective than regulations promulgated under 40 CFR Part 745, which require:

> ...under the new standards, lead is considered a hazard when equal to or exceeding 40 micrograms of lead in dust per square foot on floors, 250 micrograms of lead in dust per square foot on interior window sills, and 400 ppm of lead in bare soil in children's play areas or 1,200 ppm average for bare soil in the rest of the yard.

In addition, Alternative 3 is consistent with the recommendations of the Superfund Lead-Contaminated Residential Sites Handbook (OSWER 9285.7-50, 2003). Five-year review procedures will apply to any eligible properties where soil remediation does not achieve the action or cleanup levels specified in this ROD.

As set forth above, EPA estimates that approximately 4,540 residential properties have not been sampled for lead contamination. Under this alternative, all residential properties within the Site will be sampled for lead contamination to determine if they have been impacted by mining-related activities. If a soil sample for a property quadrant has a lead concentration greater than 400 ppm, the property will be included in the remedial action.

ICs: ICs would be required on properties greater than 1,200 ppm lead at 24 inches bgs. The FS estimated that ICs would be applicable to approximately 2 percent, or 80 properties. Approximately 320 additional properties that were previously remediated to 12 inches bgs are $\geq$ 1,200 ppm and would be subject to ICs. Therefore, approximately 400 properties would be subject to ICs under Alternative 3. ICs are the same as Alternative 2 described above.

The repositories, vegetation restoration, and health education are the same as Alternative 2. Future land use for the Site under Alternative 3 is expected to be similar to Alternative 2.

J. COMPARATIVE ANALYSIS OF ALTERNATIVES

Summary of the Comparative Analysis of Alternatives

The NCP, 40 CFR. part 300, requires EPA to evaluate remedial alternatives against nine criteria to determine which alternative is preferred. This analysis is performed during the FS. The detailed analysis in the FS provides an in-depth analysis of the three alternatives compared against the nine criteria. The

FS is available in the AR for the Site. An alternative must satisfy all nine criteria before it can be selected. The first step is to meet the threshold criteria, which are overall protection of public health and the environment and compliance with ARARs. In general, alternatives that do not satisfy these two criteria are rejected.

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

Threshold Criteria

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

Overall Protection of Human Health and the Environment

This criterion provides an overall assessment of whether an alternative meets the requirement that it is protective of human health and the environment. This criterion considers whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment. This ROD focuses on risk to human health. Ecological risk will be addressed under OU 2.

Alternative 1 does not provide protection for human health and the environment at the Site because of the continued risk to residents of the Site. Alternative 1 does not meet the RAO identified for this Site. Lead contaminated residential soil will continue to pose exposure risk for an indefinite period.

Alternative 2 provides protection to human health by removing the significant exposure pathway associated with contaminated residential property soils. Alternative 2 would meet the RAO for the Site once excavation, soil replacement, and revegetation is complete, and the removed soils are properly disposed, enforceable ICs are implemented, and an effective health education program is implemented. Risks associated with lead-contaminated residential property soil will be mitigated.

Alternative 3 is protective of human health by addressing the risks associated with lead contaminated residential soil. Alternative 3 is more protective of human health than Alternative 2 because Alternative 3 requires removal of soil below 12 inches bgs if the soil is contaminated above 1,200 ppm lead. Alternative 3 requires removal of contaminated soil to a maximum depth of 24 inches bgs. Alternative 3 would also meet the RAO for the Site. Alternative 3 would reduce the number of properties that would require ICs by an estimated 587 properties. ICs are potentially difficult to implement on residential properties. The FS showed that by excavating beyond 12 inches bgs and to a maximum depth of 24 inches bgs, approximately 98 percent of the properties that have not yet been addressed will have safe lead concentrations and will not be subject to ICs. Because there are fewer residential properties contaminated at depth below 12 inches, fewer visual barriers would be required to be installed under Alternative 3.

Compliance with ARARs

This criterion is used to determine whether an alternative meets federal and state ARARs as defined by section 121 of CERCLA, 42 U.S.C. § 9611. Compliance is judged with respect to chemical-specific, action-specific, and location-specific ARARs as well as to be considered (TBC) requirements that include nonpromulgated criteria, advisories, guidance and proposed standards issued by federal or state governments. The ARARs for this ROD are included in attached Tables 2 through 4.

Alternative 1 does not comply with ARARs because this alternative does not take any action to mitigate the risk associated with lead. Compliance with ARARs would be met if EPA assumes that no disturbance of contaminated soil occurs in the future; however, this would be an unreasonable assumption due to the maintenance and construction activities that are routine practice at residential areas.

In contrast, Alternative 2 and Alternative 3 would comply with chemical and location-specific ARARs because they both address the risk by eliminating the direct exposure to lead-contaminated soil.

Alternatives 2 and 3 will also meet the action-specific ARARs. Action-specific federal and state ARARs would be achieved by making sure all soil above the cleanup level is excavated, transported, and disposed of properly. Storm water runoff will be kept to a minimum during excavation, soil replacement, and hydroseeding using best management practices, thus keeping local streams free of additional sediment. Dust suppression will be used during all phases of construction and time spent at each residence will be kept to a minimum to minimize exposure to the residents. All precautions will be considered at each location to ensure that excavation will not hinder or interfere with wildlife and local streams.

Balancing Criteria

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

Long-term Effectiveness and Permanence

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.

Alternative 1 provides no long-term effectiveness or permanence for the protection of human health and the environment. Alternative 1 provides no controls to manage residual risk associated with lead contamination to soil at residential properties. Under Alternative 1, residual risks to human health would remain at or near current levels.

Under Alternative 2 and Alternative 3, the residual risks (the risk remaining after implementation) would be significantly reduced. Under both Alternative 2 and Alternative 3, the residual risk is the lead contamination left in place at depth after the completion of the remedy. This risk is managed by clean soil cover and use of a visual barrier to warn of the remaining contamination. While both Alternative 2

and Alternative 3 manage the residual risk in this manner, Alternative 3 would provide the most long-term effectiveness and permanence because any remaining lead contamination (>1,200 ppm) would be covered with a 24 inch barrier of clean soil compared to the 12 inch barrier of clean soil in Alternative 2.

A significant aspect of Alternative 2 and Alternative 3 is the placement of the contaminated soils at the Desloge Pile (Big River Pile) and Leadwood Pile Soil Repositories. The repositories would require storm water controls and other design and engineering controls for long-term stability.

Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment

This criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the contaminants. This criterion evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

Under Alternative 1 there is no reduction in the toxicity, mobility, or volume of contamination because lead contaminated soils are left in place.

Alternatives 2 and 3 would significantly reduce the mobility of the COC by transporting and consolidating the lead contaminated soils from the residential yards and high child exposure areas at the Desloge Pile (Big River Pile) and Leadwood Pile Soil Repositories. Contaminated soil would be placed at the repositories in designated areas that are not prone to erosion. After placement, the contaminated soil would be capped with clean soil, less than 400 ppm, and revegetated. The cap thickness and seed mix for revegetation will be determined during the final design. Although the exposure pathway would be eliminated or minimized, the toxicity and volume of the material would not be reduced by these alternatives. Proper long-term maintenance of the designated repositories is an important component of Alternatives 2 and 3 to ensure the significant reduction of heavy metal mobility.

Alternatives 2 and 3 do not utilize treatment to address the threats posed by the residential property soils. The residual waste found in the residential soils is considered a low-level threat waste, which is defined as surface soil containing contaminants of concern that generally is relatively immobile in air or ground water in the specific environmental setting (Office of Solid Waste and Emergency Response (OSWER), Publication 9380.3-06FS, 1991).

Additionally, no treatment technologies were identified that have definitively demonstrated the ability to reliably provide short- and long-term effectiveness, permanence, and meet the other NCP criteria. Various phosphate compounds have been used at the Viburnum Tailings Pile site and the Oronogo-Duenweg Mining Belt site to treat mine waste and lead-contaminated soil. In both cases the phosphate compounds were shown to be an ineffective and unfeasible alternative when compared to soil removal and replacement.

Short-term Effectiveness

This criterion addresses the effects of the alternative during the construction until the remedial action is completed and the selected level of protection has been achieved.

Alternative 1 does not create any short term risk to the local community or workers because no work will be performed under Alternative 1. Alternative 1 also does not create any short term risk of environmental impact during construction since there is no construction under this alternative. Exposure pathways for the public and environment would remain.

Alternatives 2 and 3 have increased risks to the local communities and workers, as well as the environment from excavation and transportation of lead contaminated soil. Short-term community protection concerns are similar under both Alternative 2 and 3, and include possible fugitive dust emissions and heavy metal ingestion. Disturbed contaminated soil could enter the ambient air during excavation and transportation. Dust suppression would be implemented for the protection of the community and workers during the remedial action. Alternatives 2 and 3 would require a minimum of 7 years to implement for all affected residences. However, the length of time at any one residence during excavation would be minimal. Therefore, the residential exposure to dust would be minimal.

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.

Alternative 1 does not require any implementation.

Alternative 2 and Alternative 3 are readily implementable because they are technically feasible from an engineering perspective. Excavation methods, backfilling, and revegetation are typical engineering controls. The experience gained from previous Site removal actions conducted by EPA at this and other lead mining Superfund sites has shown that Alternative 2 and Alternative 3 are readily implementable.

Cost

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

No capital or O&M costs would be associated with Alternative 1 because no remedial actions would be conducted.

The present worth cost for Alternative 2 is estimated to be $97.72 million.

The present worth cost for Alternative 3 is estimated to be $107.62 million.

For the cost estimates for both Alternative 2 and 3, capital costs are spread over a period of 30 years. A 7 percent discount rate was used to calculate the present worth. These estimates are approximate and made without detailed engineering data. The actual cost of the remedial action would depend on the final scope of the remedial action, actual length of time required to implement the alternative, and other unknown factors.

The historical average amount of soil removed from each property is 305.19 yd^3, on a 12 inch excavation. These estimates are averages of past construction activities on this Site but future costs could well vary. Annual costs of $20,000 are estimated for public health education. Additional information on cost can be found in Tables 5 and 6 of Appendix B.

Modifying Criteria

The two modifying criteria of community and state acceptance are intended to assess the views of both groups regarding the Alternatives. EPA conducts meetings with representatives from MDNR, MDHSS, ATSDR, St. Francois County Health Department, news media, visiting academics and students, and local citizens to address activities and policies at the Site on a regular basis.

State/Support Agency Acceptance

MDNR supports the Selected Remedy (Alternative 3) proposed by EPA. MDNR has commented on and concurs with the Selected Remedy.

Community Acceptance

During the public comment period, the community expressed its support for Alternatives 2 and 3. A Responsiveness Summary (which captures public comments) is included in Appendix C.

K. PRINCIPAL THREAT WASTE

Principal threat wastes are source materials that require remediation based on toxicity, mobility, and the potential to create unacceptable human health or ecological risks. The NCP establishes a preference that treatment will be used to address principal threat wastes when practical.

The eight mine waste piles are the source deposits and constitute the principal threat to human health and the environment. This threat is being addressed by stabilizing the mine waste deposits in place, which includes regrading and covering the mine waste deposits with clean rock and/or soil. The eight mine waste piles either are, or are in the process of being, covered with clean soil and revegetated as part of removal actions at the Site. In place stabilization of the mine waste deposits provides adequate protection when combined with ICs, such as site access restrictions (fences, rock barriers, etc.). In addition, removal or treatment of the very large mine waste deposits (>5,000,000 cubic yards) is impracticable.

The residual waste found in the residential soils is considered a low-level threat waste, which is defined as surface soil containing contaminants of concern that generally are relatively immobile in air or ground water in the specific environmental setting (OSWER, Publication 9380.3-06FS, 1991). However, the residual waste in soil has the potential to be a principal threat waste when it is mobilized by mechanical means, therefore, remediation is necessary to mitigate the potential risk.

L. SELECTED REMEDY

The Selected Remedy is Alternative 3 — Excavation of soil until lead concentrations are below 400 ppm in the top 12 inches; or below 1,200 ppm below 12 inches down to 24 inches bgs; transportation of contaminated soil to on-Site soil repositories; replacement of contaminated soil with clean backfill, vegetative cover and limited institutional controls.

The Selected Remedy was chosen over the other alternatives by EPA based on the nine NCP criteria set forth above. The Selected Remedy provides the best balance of trade-offs and achieves the RAO. A primary consideration is the significant reduction in the number of properties that would require difficult to implement ICs as a result of the more extensive excavation (to a depth of 24 inches bgs) which would be required at a relatively small number of properties.

M. STATUTORY DETERMINATIONS

EPA expects the Selected Remedy to satisfy the following statutory requirement of section 121(b) of CERCLA: (1) be protective of human health and the environment, (2) comply with ARARs, (3) be cost-effective, (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and (5) satisfy the preference for treatment as a principal element or explain why the preference for treatment will not be met. The following sections discuss 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 at remediated residential properties by achieving the RAO through conventional engineering measures. Risks associated with lead-contaminated residential soils at the Site are caused by the potential for direct contact with contaminated soils. The Selected Remedy eliminates this direct exposure pathway through excavation and replacement of lead-contaminated soils at the residential properties. Contaminated soils will be removed from residential properties, permanently eliminating this identified source of exposure. The implementation of the Selected Remedy will not pose unacceptable short-term risks or cross-media impacts.

Compliance with ARARs

In general, Selected Remedies should comply with ARARs unless waivers are granted. The Selected Remedy is expected to meet all chemical-specific, action-specific, and location-specific ARARs and does not involve any waivers. The ARARs for this ROD are included in Tables 2 through 4 in Appendix B.

Cost Effectiveness

The Selected Remedy is a cost-effective solution to lead-contaminated residential soils at the Site. The Selected Remedy relies on conventional engineering methods that are easily implemented. Contaminated soils are removed and replaced, thereby providing a permanent remedy for remediated residential soils which will not be subject to future costs.

Utilization of Permanent Solutions and Alternate Treatment Technologies

The Selected Remedy utilizes a well-demonstrated remediation approach to lead-contaminated soils that will provide a permanent remedy for residential properties. Removal and replacement of contaminated residential soils permanently removes heavy metal contaminants as a potential source of exposure. Since all contaminated soil will remain on-site, lead stabilization treatment is not required to prevent the soils from failing the Toxicity Characteristic Leaching Procedure (TCLP) test. The Selected Remedy best satisfies the statutory mandates for permanence.

Preference for Treatment

The Selected Remedy does not utilize treatment to address the threats posed by the residential property soils. The residual waste found in the residential soils is considered a low-level threat waste, which is defined as surface soil containing contaminants of concern that generally is relatively immobile in air or ground water in the specific environmental setting (OSWER, Publication 9380.3-06FS, 1991).

Additionally, no treatment technologies were identified that have definitively demonstrated the ability to reliably provide short- and long-term effectiveness, permanence, and meet the other NCP criteria. Various phosphate compounds have been used at the Viburnum Tailings Pile site and the Oronogo-Duenweg Mining Belt site to treat mine waste and lead-contaminated soil. In both cases the phosphate compounds were shown to be an ineffective and unfeasible alternative when compared to soil removal and replacement.

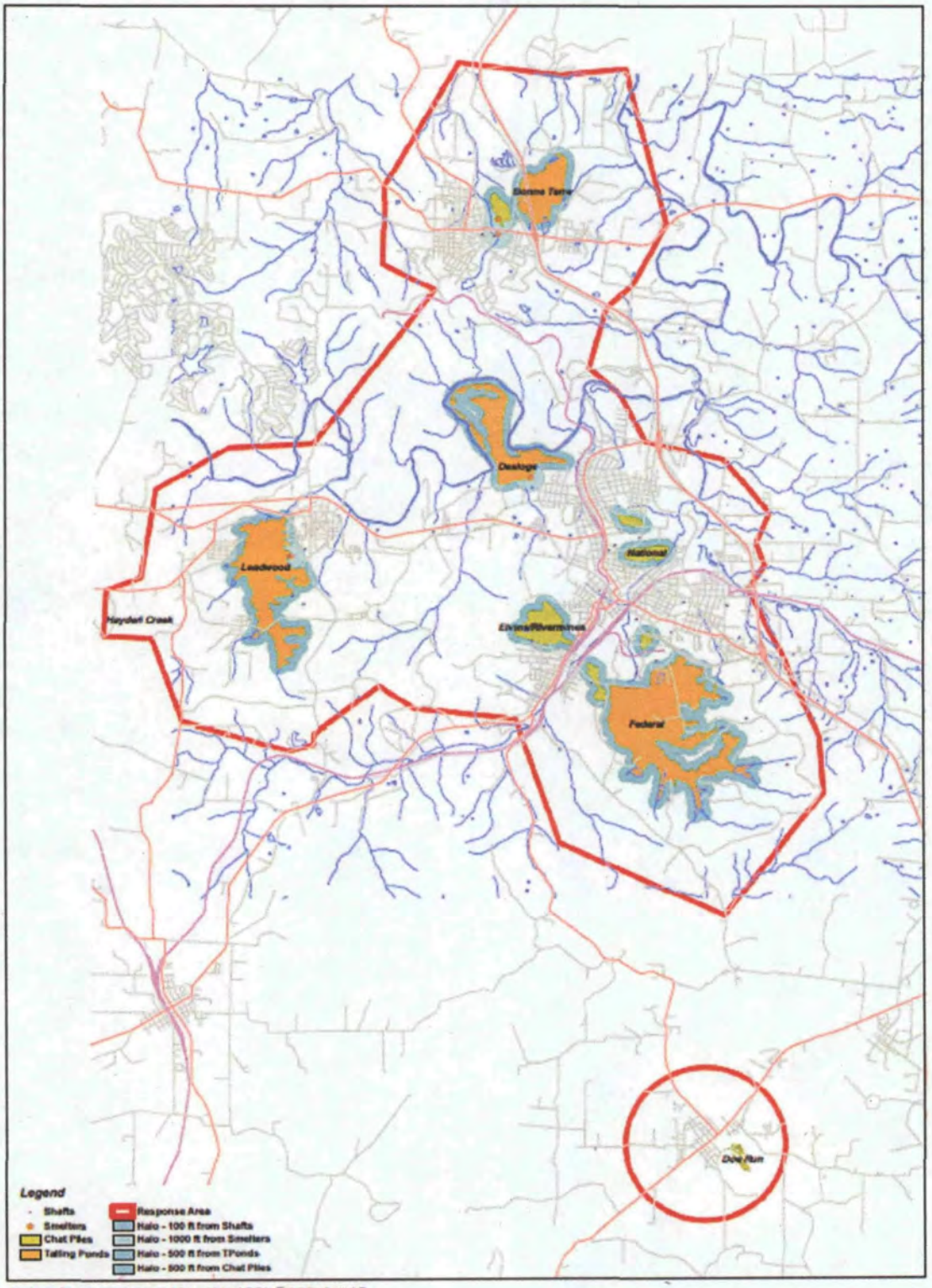
Under the Selected Remedy for this Site, contaminated soil will be placed on the existing repositories located at the Desloge Pile (Big River Pile) and Leadwood Pile. The contaminated soil will be placed on the repositories, capped with a clean 12 inch layer of soil, and revegetated with a site-specific seed mix. The placement of the contaminated soil will improve conditions on the mine waste piles by reducing the amount of wind-blown lead contaminated dust transported off the piles and will also reduce water infiltration of the piles. Since contaminated soil will remain on-Site, treatment is not required to prevent the soils from failing the TCLP test.

Five-Year Review Requirements

The selected remedy is subject to periodic five-year reviews in accordance with Section 121(c) of CERCLA and the NCP. Although mining wastes will be removed from the residential yards and placed in the existing repositories, waste will remain onsite at elevated levels in a small amount of the yards below 24 inches bgs and in the repositories. The status and effectiveness of the ICs will be evaluated during the 5-year review process.

APPENDIX A

FIGURES



Source: Figure reconstructed from Halo AOC's Exhibits A and B

N

0 3,000 6,000 12,000 18,000 24,000 Feet

Figure 1
Response Area and Halo
St. Francois Co. Mined Areas

Figure 2. National Pile Before Remediation

Figure 3. Bonne Terre Pile Before Remediation

Figure 4. Visible Mine Waste blowing off the Desloge Pile

Figure 5. Visual erosion of Mine Waste into Big River

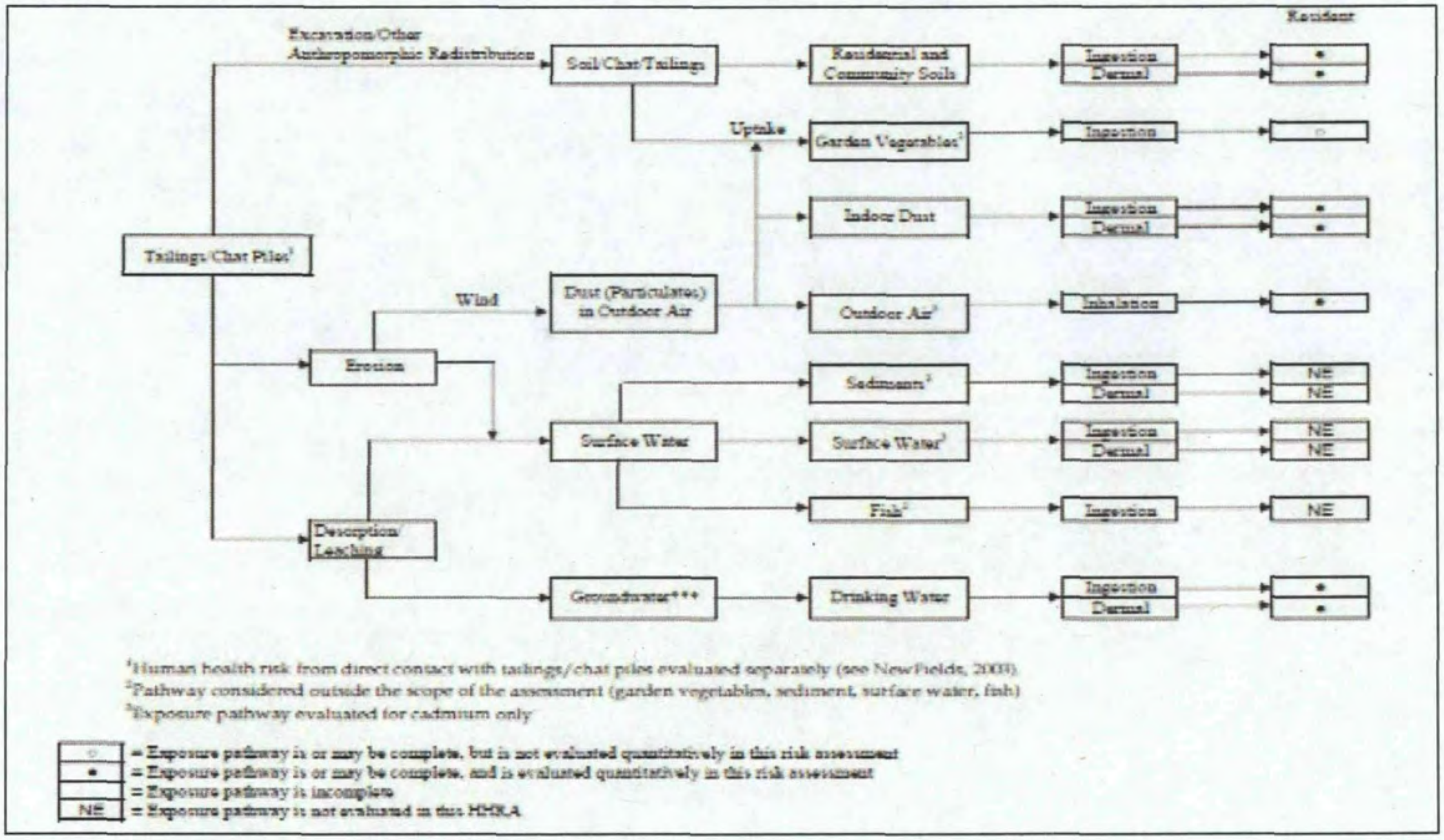


Figure 6. Conceptual Site Model

Figure 7. Big River (Desloge) Repository

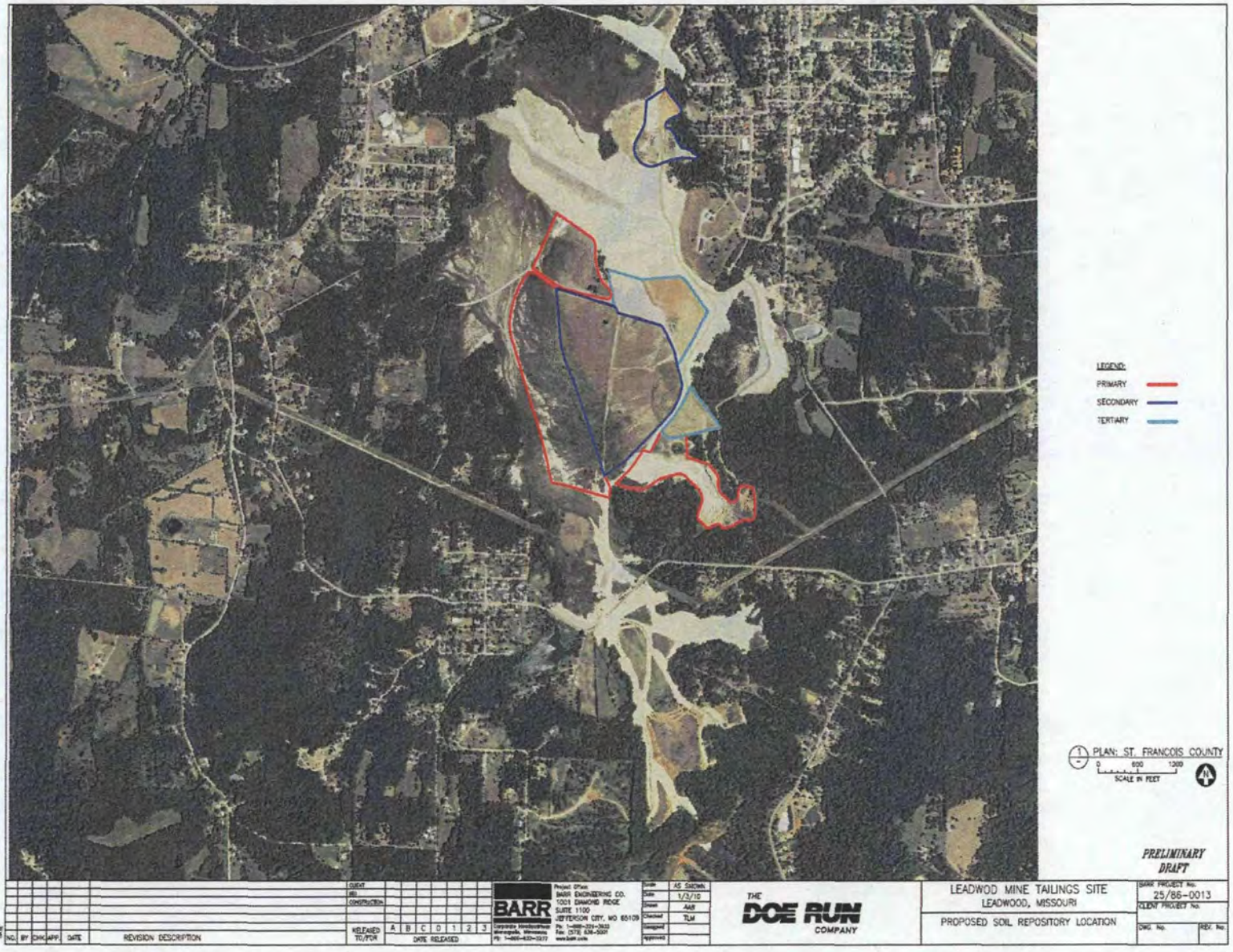


Figure 8. Leadwood Repository

APPENDIX B

TABLES

TABLE 1. ST. FRANCOIS COUNTY 2000 CENSUS INFORMATION

City/Community	Population
Farmington	13,924
Park Hills	7,861
Desloge	4,802
Bonne Terre	4,039
Bismarck	1,470
Leadwood	1,160
Iron Mountain Lake	693
Leadington	206
Balance of St. Francois County	21,486

Source: United States Census Bureau, 2001

TABLE 2. FEDERAL AND STATE CHEMICAL SPECIFIC ARARs

Standard, Requirement or Criteria	Applicable	Relevant and Appropriate	Citation	Description	Comment
FEDERAL					
Hazardous Waste Criteria	Potentially	--	40 CFR 264	Establishes criteria for use in determining hazardous wastes and disposal requirements. Excavated soil would be classified as D008 hazardous waste if the lead concentration from the TCLP test was greater than 5.0 mg/L.	Would be applicable if hazardous wastes are generated and disposed of off-site at a RCRA Facility. All excavated yard soils would be disposed of in an onsite CAMU. This regulation would potential apply if any of the wastes were disposed of off-site.
National Ambient Air Quality Standards (NAAQS)	No	Yes	40 CFR Part 50	Establishes ambient air quality standards for certain "criteria pollutants" to protect public health and welfare. Standard is: 0.15 microgram lead per cubic meter ($\mu g/m^3$) maximum – arithmetic mean averaged over a rolling 3 month average.	NAAQS are implemented through the New Source Review Program and State Implementation Plans (SIPs). The Federal New Source Review Program addresses only major sources. Emissions associated with the remedial action would be limited to fugitive dust emissions associated with earth moving activities during construction. These activities will not constitute a major source. Therefore, attainment and maintenance of NAAQS pursuant to the New Source Review Program are not applicable. However, the standards relating to lead are relevant and appropriate.
STATE					
Missouri Ambient Air Standards	Yes	--	Missouri Code of State Regulations (CSR) 10 CSR 010-06.010	Missouri uses the NAAQS as the state standards for airborne emissions. The NAAQS air quality standards for particulates, as PM10, are 50 $\mu g/m^3$ (annual geometric mean) and 150 $\mu g/m^3$ (24 hour), as PM2.5 they are 15 $\mu g/m^3$ (annual geometric mean) and 65 $\mu g/m^3$ (24 hour). The NAAQS emission limit for lead is 0.15 $\mu g/m^3$ averaged over a rolling 3 month average.	Relevant and appropriate to actions that generate fugitive dust at individual properties and the staging area.

TABLE 3. LOCATION - SPECIFIC ARARs

Standard, Requirement or Criteria	Applicable	Relevant and Appropriate	Citation	Description	Comment
FEDERAL					
Archaeological and Historic Preservation Act	No	No	16 USC Sec. 469	Establishes procedures to provide for preservation of historical and archaeological data that might be destroyed through alteration of terrain as a result of a Federally licensed activity or program.	Area to be part of soil remedial activities is not believed to contain any historical or archaeological resources due to residential nature of Site and shallow depth (<2 ft) of excavation activities to be performed (if necessary).
Archaeological Resources Protection Act	No	No	16 USC Secs. 470 aa - mm	Requires permits for any excavation or removal of archaeological resources from public or Indian lands. Provides guidance for federal land managers to protect such resources.	Activities will not take place on public land or Indian land.
National Historic Preservation Act	No	No	16 USC Sec. 470 36 CFR Part 800 Executive Order 11593, May 3, 1971	Requires Federal agencies to take into account the effect of any Federally assisted undertaking or licensing on any district, site, building, structure, or object that is included in or eligible for Register of Historic Places.	Area to be part of soil remedial activities is not believed to contain any feature that would be eligible for registration as a historic place due to residential nature and location of Site.
Historic Sites, Buildings, and Antiquities Act	No	No	16 USC Secs. 461 - 467, 470h-2(f)	Requires Federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts on such landmarks.	Area to be part of soil remedial activities is not believed to contain any National Natural Landmarks due to residential nature and location of Site.
Fish and Wildlife Coordination Act	No	No	16 USC Secs. 661 - 666	Requires any Federal agency or permitted entity to consult with the U.S. Fish and Wildlife Service and appropriate state agency prior to modification of any stream or other water body. The intent of this requirement is to conserve, improve, or prevent loss of wildlife habitat and resources.	Area to be part of soil remedial activities is not believed to directly impact any stream or water feature. However, streams adjacent to properties could be potentially affected by runoff from remedial activities.
Fish and Wildlife Conservation Act	No	No	16 USC Secs. 2901 - 2912	Requires Federal agencies to utilize their statutory and administrative authority to conserve and promote conservation of non-game fish and wildlife species.	Area to be part of soil remedial activities is not believed to directly impact any stream or water feature. However, streams adjacent to properties could be potentially affected by runoff from remedial activities.

Standard, Requirement or Criteria	Applicable	Relevant and Appropriate	Citation	Description	Comment
Endangered Species Act	No	No	16 USC Secs. 1531-1544 50 CFR Parts 17, 402	Requires that Federal agencies ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat.	Area to be part of soil remedial activities is not believed to directly impact any critical habitat. Remedial activities will be restricted to residential properties and are not expected to adversely impact listed species.
Federal Migratory Bird Treaty Act	No	No	16 USC Secs. 703 - 712	Prohibits taking of any migratory bird.	Area to be part of soil remedial activities is not believed to directly impact any critical habitat. Remedial activities will be restricted to residential properties and not expected to adversely impact migratory birds.
Executive Order on Floodplain Management	No	No	Executive Order No. 11988	Requires Federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid, to the maximum extent possible, the adverse impacts associated with direct and indirect development of a floodplain.	Remedial activities to be performed are comprised of restoration of residential properties. As such, no additional development within the floodplain is anticipated beyond that previously performed during the original development of the property.
Executive Order on Protection of Wetlands	No	No	Executive Order No. 11990	Requires Federal agencies to avoid, to the maximum extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid new construction in wetlands, if a practicable alternative exists.	Remedial activities to be performed are comprised of restoration of residential properties. As such, no adverse impacts on wetlands are anticipated.
Farmland Protection Policy Act	No	No	7 USC Sec. 4201 *et. seq.*	Protects significant or important agricultural lands from irreversible conversion to uses that result in its loss as an environmental or essential food production resource.	Remedial activities to be performed are comprised of restoration of residential properties and are not expected to impact agricultural lands. As such, no loss of environmental or essential food production resources is anticipated.

Standard, Requirement or Criteria	Applicable	Relevant and Appropriate	Citation	Description	Comment
RCRA – Location Standards for Hazardous Waste Facilities	Potentially	–	42 USC Sec. 6901 40 CFR 264.18	Requires that any hazardous waste facility located within the 100-year floodplain be designed, constructed, operated, and maintained to avoid washout. Also, contains requirements for locating facilities away from seismically active zones. Because most mining and mill wastes are explicitly excluded from RCRA regulations, these requirements are only TBCs for the Site.	All excavated yard soils will be disposed of in an onsite CAMU – BRMTS Repository. This unit, located on a designated mine area, is managed in accordance with the CAMU Approval Memorandum dated December 12, 2001 and the Operation Manual (NewFields 2003).
Rivers and Harbors Act	No	No	33 CFR Secs. 320 - 330	Requires preapproval of the US Army Corps of Engineers prior to placement of any structures in waterways and restricts the placement of structures in waterways.	Area to be part of soil remedial activities is not believed to directly impact any navigable stream or water feature or necessitate placement of any structures within these features.
STATE					
Missouri Hazardous Waste Regulations	--	Potentially	10 CSR 25-7.264 - 270	Hazardous waste disposal areas shall not be placed within a 100-year floodplain or wetland. Provisions related to placement and management of hazardous waste units.	Relevant and appropriate to actions that generate hazardous waste. All excavated yard soils will be disposed of in an onsite CAMU – BRMTS Repository. This unit, located on a designated mine area, is managed in accordance with the CAMU Approval Memorandum dated December 12, 2001 and the Operation Manual (NewFields 2003).
Missouri Metallic Minerals Waste Management Act	–	Yes	10 CSR 45	Actions involving placement of metallic mineral waste shall be performed according to permit.	All excavated yard soils will be disposed of in an onsite CAMU – BRMTS Repository. This unit, located on a designated mine area, is managed in accordance with the CAMU Approval Memorandum dated December 12, 2001 and the Operation Manual (NewFields 2003).

Standard, Requirement or Criteria	Applicable	Relevant and Appropriate	Citation	Description	Comment
Missouri Solid Waste Regulations	Potentially	--	11 CSR 80-11.010	Actions involving solid waste disposal areas shall not cause degradation to wetlands or jeopardize existence of endangered or threatened species protected under the Endangered Species Act of 1973 or violate any requirement under the Marine Protection, Research, and Sanctuaries Act of 1972.	Relevant and appropriate to actions that generate solid waste. All excavated yard soils will be disposed of in an onsite CAMU – BRMTS Repository. This unit is managed in accordance with the CAMU Approval Memorandum dated December 12, 2001 and the Operation Manual (NewFields 2003).

TABLE 4. FEDERAL AND STATE ACTION - SPECIFIC ARARs

Action	Applicable	Relevant and Appropriate	Citation	Description	Comment
FEDERAL					
Hazardous and Solid Waste: Criteria for Classification of Solid Waste and Disposal Facilities and Practices	Yes	--	40 CFR Part 257	Establishes criteria for use in determining solid wastes and disposal requirements.	Excavated soil is a solid waste.
1. Criteria for Classification of Hazardous Waste and Disposal Facilities and Practices	Potentially	--	40 CFR Part 264	Establishes criteria for use in determining hazardous wastes and disposal requirements.	All excavated yard soils will be disposed of in an onsite CAMU – BRMTS Repository. This unit, located on a designated mine area, is managed in accordance with the CAMU Approval Memorandum dated December 12, 2001 and the Operation Manual (NewFields 2003). This regulation would potential apply if any of the wastes were disposed of off-site.
2. Hazardous Materials Transportation Regulations	Potentially	--	49 CFR Parts 107, 171-177	Regulates transportation of hazardous materials.	Applicable only if the remedial action involves off-site transportation of hazardous materials. The regulations affecting packaging, labeling, marking, placarding, using proper containers, and reporting discharges of hazardous materials would be potential ARARs.

Action	Applicable	Relevant and Appropriate	Citation	Description	Comment
Air Emission Control:					
1. National Ambient Air Quality Standards (NAAQS)	No	Yes	40 CFR Part 50	Establishes ambient air quality standards for certain "criteria pollutants" to protect public health and welfare. Standards are: 150 $\mu g/m^3$ for particulate matter for a 24 hour period; 50 $\mu g/m^3$ for particulate matter – annual arithmetic mean; 0.15 $\mu g/m^3$ maximum – arithmetic mean averaged over a 3 month rolling average.	NAAQS are implemented through the New Source Review Program and State Implementation Plans (SIPs). The federal New Source Review Program addresses only major sources. Emissions associated with the remedial action would be limited to fugitive dust emissions associated with earth moving activities during construction. These activities will not constitute a major source. Therefore, attainment and maintenance of NAAQS pursuant to the New Source Review Program are not applicable. However, the standards relating to particulate matter and to lead are relevant and appropriate.
STATE					
Hazardous and Solid Waste:					
1. Solid waste determination	Yes	--	Missouri Solid Waste Regulations 11 CSR 80-11	A solid waste is any discarded material that is not excluded by Regulation.	Applicable to soil excavated from residential yards.
2. Determination of hazardous waste.	Potentially	--	Missouri Hazardous Waste Regulations 10 CSR 25-7.264 - 270	If an extract from a solid waste, tested using the Toxicity Characteristic Leaching Procedure (TCLP, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods", EPA publication SW 846), contains concentrations of any of the materials above the listed level (5 mg/L for lead), the waste is considered hazardous.	Applicable to soil excavated from residential yards and disposed of offsite. All excavated yard soils would be disposed of in an onsite CAMU.

Action	Applicable	Relevant and Appropriate	Citation	Description	Comment
3. Transportation of Hazardous Waste	Potentially	--	Missouri Solid Waste Regulations 11 CSR 80-11	Rules regarding Transportation of Hazardous Substances.	Applicable only if the remedial action involves off-site transportation of hazardous materials. The regulations affecting packaging, labeling, marking, placarding, using proper containers; and reporting discharges of hazardous materials would be potential ARARs.
Air Emission Control:					
1. Particulate emissions during excavation and backfill.	Yes	--	Missouri Code of State Regulations 10 CSR 010-06	Missouri air pollution regulations require persons that emit fugitive particulates to minimize emissions through use of all reasonable precautions. In addition, no visible fugitive dust transport is allowed beyond the lot line of the property where the emissions originate.	Applicable to actions that entail excavation, moving, storing, transportation of redistribution of soil.
2. Ambient Air Standard for Total Suspended Particulate Matter	No	Yes	Missouri Code of State Regulations 10 CSR 010-06	Missouri uses the NAAQS as the state standards for airborne emissions. The NAAQS air quality standards for particulates, as PM_{10}, are 50 $\mu g/m^3$ (annual geometric mean) and 150 $\mu g/m^3$ (24 hour), as $PM_{2.5}$ they are 15 $\mu g/m^3$ (annual geometric mean) and 65 $\mu g/m^3$ (24 hour).	Remedial activities will not constitute a major source and therefore regulations are not applicable. Relevant and appropriate to actions that generate fugitive dust at individual properties and the staging area.
3. Ambient Air Standards	No	Yes	Missouri Code of State Regulations 10 CSR 010-06	Missouri uses the NAAQS as the state standards for airborne emissions. Excavation and backfill of soils could potentially cause emission of hazardous air pollutants. The NAAQS emission limit for lead is 0.15 $\mu g/m^3$ averaged over a rolling 3 month average.	Relevant and appropriate to actions that generate fugitive dust at individual properties and the staging area.

Action	Applicable	Relevant and Appropriate	Citation	Description	Comment
Storm water Controls:					
1. Storm water NPDES Permit	No	Yes	Missouri Clean Water Commission 10 CSR 020-06	Missouri has established General NPDES Storm Water Permit for a land disturbance site such as would be encountered during the soil remedial action at the Site. The permit requires the establishment of best management practices (BMP) to control runoff.	This project is being performed under CERCLA as an Emergency Removal Action and therefore does not require a permit. However, the substantive requirements of the Missouri General Permit will be implemented at the site including CBMP, routine inspections and record keeping.

Table 5

Detailed Cost Estimate
Alternative 2 - Soil Removal with 12-Inch Subgrade Visual Barrier
St. Francois County Mined Areas - Residential Feasibility Study

Item/Description		Quantity		Est. per each costing unit	Costing Unit Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS								
Sampling								
Sampling and Analysis								
Access		4,540	properties		148	days	$680.00	$100,640
Education Materials		4,540	properties		4,540	property	$1.50	$6,810
Sampling		3,587	properties		180	days	$1,700.00	$306,000
Sampling Analysis					36	days	$1,700.00	$61,200
XRF					1	XRF	$15,500.00	$15,500
Calibration Samples to Analytical Laboratory		897	samples		897	sample	$28.00	$25,116
Data Management		4,540	properties		227	hours	$95.00	$21,565
Result Letter Mailing		3,587	properties	150 letters per	24	mailings	$711.00	$17,064
Best Effort Letters for Sampling Refusal		954	properties	48 letters per	20	mailings	$909.00	$18,180
SUBTOTAL DIRECT CAPITAL COSTS - Sampling								***$572,075***
Sampling								
Mob/Demob							10%	$57,208
Engineering/Administration Costs							10%	$57,208
Health & Safety							3%	$17,162
SUBTOTAL INDIRECT CAPITAL COSTS - Sampling								***$131,577***
TOTAL ESTIMATED CAPITAL COST SAMPLING								**$703,662**
Removal								
Interim Action Sampled Yards (Known Yards)								
Removal Access		1,001	properties					
Access and Property Documentation	100%	1,001	properties		1,001	properties	$75.00	$75,075
Best Effort Letters for Refusals	14%	140	letters		140	letters	$5.50	$770
Excavation & Placement of Clean Fill		1,001	properties	Even though 14% of all yards are expected to refuse access, the cost assumes 100% participation				
Yard Quadrants/Areas		2,471						
One Quad		218	properties	3,000	654,000	SF	$2.87	$1,876,980
Two Quads		242	properties	6,000	1,452,000	SF	$2.11	$3,063,720
Three Quads (yards reduced by 2011 yards)		295	properties	9,000	2,655,000	SF	$2.11	$5,602,050
Four Quads (yards reduced by 2011 yards)		221	properties	12,000	2,652,000	SF	$1.63	$4,322,760
Driveway								
With yard quads								
One Quad		18	areas	1,000	18,000	SF	$2.87	$51,660
Two Quads		16	areas	1,000	16,000	SF	$2.11	$33,760
Three Quads (yards reduced by 2011 yards)		18	areas	1,000	18,000	SF	$2.11	$37,980
Four Quads (yards reduced by 2011 yards)		25	areas	1,000	25,000	SF	$1.63	$40,750
Only		15	areas	1,000	15	LS	$2,870.00	$43,050
Garden (assumes 24 inch depth excavation)		Gardens are assumed to be located in excavated quads in properties with more than two quads removed; therefore,						
With yard quads		Only 12 to 24 inch excavation included when 3 or 4 yard quadrants are remediated						
One Quad		6	areas	625	3,750	SF	$5.74	$21,525
Two Quads		8	areas	625	5,000	SF	$4.22	$21,100
Three Quads (yards reduced by 2011 yards)		15	areas	625	9,375	SF	$2.11	$19,781
Four Quads (yards reduced by 2011 yards)		18	areas	625	11,250	SF	$1.63	$18,338
Only		4	areas	625	4	LS	$2,870.00	$11,480
Play Area								
With yard quads		Play areas are assumed to be located in excavated quads in properties with more than two quads removed						
One Quad		15	areas	150	2,250	SF	$2.87	$6,458
Two Quads		27	areas	150	4,050	SF	$2.11	$8,546
Only		5	areas	150	5	LS	$2,870.00	$14,350
Final Close-out documentation		1,001	properties		1,001	properties	$75.00	$75,075
Lawn Watering (Known Yards)		1,001	properties	7,420,050 SF	2,315,056	gallons	$2.60 /1000 gal	$6,019
Non-Interim Action Sampled Yards (Potential)		Percent estimates based on the above known yards						
Removal Access		3,012	properties	Assumes 84% of sampled properties will require some soil removal				
Access and Property Documentation	100%	3,012	properties		3,012	properties	$37.50	$112,950
Best Effort Letters for Refusals	14%	421	letters		421	letters	$5.50	$2,316
Excavation & Placement of Clean Fill		3,012	properties	Even though 14% of all yards are expected to refuse access, the cost assumes 100% participation				
Yard Quadrants/Areas		8,581	quads					
One Quad (17%)	17%	512	properties	3,000	1,536,000	SF	$2.87	$4,408,320
Two Quads (19%)	19%	572	properties	6,000	3,432,000	SF	$2.11	$7,241,520
Three Quads (26%)	26%	783	properties	9,000	7,047,000	SF	$2.11	$14,869,170
Four Quads (38%)	38%	1,144	properties	12,000	13,728,000	SF	$1.63	$22,376,640
Driveway								
With yard quads								
One Quad	8%	40	areas	1,000	40,000	SF	$2.87	$114,800
Two Quads	7%	40	areas	1,000	40,000	SF	$2.11	$84,400
Three Quads	8%	62	areas	1,000	62,000	SF	$2.11	$130,820
Four Quads	11%	125	areas	1,000	125,000	SF	$1.63	$203,750
Only	1.2%	36	areas	1,000	36,000	SF	$2.87	$103,320
Garden (assumes 24 inch depth excavation)		Gardens are assumed to be located in excavated quads in properties with more than two quads removed; therefore,						
With yard quads		Only 12 to 24 inch excavation included when 3 or 4 yard quadrants are remediated						
One Quad	3%	15	areas	625	9,375	SF	$5.74	$53,813
Two Quads	3%	17	areas	625	10,625	SF	$4.22	$44,838
Three Quads	5%	28	areas	625	17,500	SF	$2.11	$36,925
Four Quads	8%	45	areas	625	28,125	SF	$1.63	$45,844
Only	0.3%	9	areas	625	9	LS	$2,870.00	$25,830
Play Area								
With yard quads		Play areas are assumed to be located in excavated quads in properties with more than two quads removed						
One Quad	7%	35	areas	150	5,250	SF	$2.87	$15,068
Two Quads	11%	62	areas	150	9,300	SF	$2.11	$19,623
Only	0.4%	12	areas	150	12	LS	$2,870.00	$34,440

Table 5

Detailed Cost Estimate
Alternative 2 - Soil Removal with 12-Inch Subgrade Visual Barrier
St. Francois County Mined Areas - Residential Feasibility Study

Item/Description	Quantity		Est. per each costing unit	Costing Unit Quantity	Unit	Unit Cost	Total Cost
Final Close-out documentation	3,012	properties		3,012	properties	$75.00	$225,900
Lawn Watering (Potential Additional Yards)	3,012	properties	25,759,350 SF	8,036,917	gallons	$2.60 /1000 gal	$20,896
SUBTOTAL DIRECT CAPITAL COSTS - Known Yards							$15,351,226
SUBTOTAL DIRECT CAPITAL COSTS - Potential Additional Yards							$50,171,181
SUBTOTAL DIRECT CAPITAL COSTS - Removal							***$65,522,407***
Interim Action Sampled Yards (Known Yards)							
Mob/Demob						10%	$1,535,123
Engineering/Administration Costs						10%	$1,535,123
Construction Management Costs						10%	$1,535,123
Health & Safety						3%	$460,537
Non-Interim Action Sampled Yards (Potential)							
Mob/Demob						10%	$5,017,118
Engineering/Administration Costs						10%	$5,017,118
Construction Management Costs						10%	$5,017,118
Health & Safety						3%	$1,505,135
SUBTOTAL INDIRECT CAPITAL COSTS - Known Yards							$5,065,905
SUBTOTAL INDIRECT CAPITAL COSTS - Potential Additional Yards							$16,556,490
SUBTOTAL INDIRECT CAPITAL COSTS - Removal							***$21,622,394***
Scope and Bid Contingencies - Removal only						35%	$30,500,680
TOTAL ESTIMATED CAPITAL COST REMOVAL							**$117,645,481**
TOTAL ESTIMATED CAPITAL COST (SAMPLING AND REMOVAL)							***$118,349,133***
ANNUAL O&M COSTS							
None							
PERIODIC COSTS							
Five-Year Review							$75,156
Sampling and Analysis = resampling surface soils at remediated properties (5 years x 574 yards/yr) at a 5% rate						$20,156	
Access	144	properties	1	days	$680.00	$680.00	
Sampling	144	properties	8	days	$1,700.00	$13,600.00	
Sampling Analysis			2	days	$1,700.00	$3,400.00	
Calibration Samples to Analytical Laboratory	36	samples	36	sample	$28.00	$1,008.00	
Data Management	144	properties	8	hours	$95.00	$760.00	
Result Letter Mailing	144	properties	1	mailings	$708.14	$708.14	
Summary of Removal Action to date						1	$55,000
Remedial Action Report						$75,000	$75,000
TOTAL ESTIMATED PERIODIC COST							***$150,156***
TOTAL NON-DISCOUNTED COST							***$118,499,289***
TOTAL PRESENT WORTH (7% rate of return, 30 year period)							***$97,719,000***

NOTES:

Cost Assumptions are provided in Appendix A

Total Present Worth calculation presented in Table A-1

Table 6

Detailed Cost Estimate
Alternative 3 - Soil Removal with 24-Inch Excavation
St. Francois County Mined Areas - Residential Feasibility Study

Item/Description		Quantity		Est. per each costing unit	Costing Unit Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS								
Sampling								
Sampling and Analysis								
Access		4,540	properties		148	days	$680.00	$100,640
Education Materials		4,540	properties		4,540	property	$1.50	$6,810
Sampling		3,587	properties		180	days	$1,700.00	$306,000
Sampling Analysis					36	days	$1,700.00	$61,200
XRF					1	XRF	$15,500.00	$15,500
Calibration Samples to Analytical Laboratory		897	samples		897	sample	$28.00	$25,116
Data Management		*4,540*	*properties*		227	*hours*	*$95.00*	$21,565
Result Letter Mailing		3,587	properties	150 letters per	24	mailings	$711.00	$17,064
Best Effort Letters for Sampling Refusal		954	properties	48 letters per	20	mailings	$909.00	$18,180
SUBTOTAL DIRECT CAPITAL COSTS - Sampling								***$572,075***
Sampling								
Mob/Demob							10%	$57,208
Engineering/Administration Costs							10%	$57,208
Health & Safety							3%	$17,162
SUBTOTAL INDIRECT CAPITAL COSTS - Sampling								***$131,577***
TOTAL ESTIMATED CAPITAL COST SAMPLING								**$703,652**
Removal								
Interim Action Sampled Yards (Known Yards)								
Removal Access		1,001	properties					
Access and Property Documentation	100%	1,001	properties		1,001	properties	$75.00	$75,075
Best Effort Letters for Refusals	14%	140	letters		140	letters	$5.50	$770
Excavation & Placement of Clean Fill		1,001	properties	Even though 14% of all yards are expected to refuse access, the cost assumes 100% participation				
Yard Quadrants/Areas		2,471						
One Quad		218	properties	3,000	670,350	CF	$2.87	$1,923,905
Two Quads		242	properties	6,000	1,488,300	CF	$2.11	$3,140,313
Three Quads (yards reduced by 2011 yards)		295	properties	9,000	2,721,375	CF	$2.11	$5,742,101
Four Quads (yards reduced by 2011 yards)		221	properties	12,000	2,718,300	CF	$1.63	$4,430,829
Driveway								
With yard quads								
One Quad		18	areas	1,000	18,450	CF	$2.87	$52,952
Two Quads		16	areas	1,000	16,400	CF	$2.11	$34,604
Three Quads (yards reduced by 2011 yards)		18	areas	1,000	18,450	CF	$2.11	$38,930
Four Quads (yards reduced by 2011 yards)		25	areas	1,000	25,625	CF	$1.63	$41,769
Only		15	areas	1,000	15,375	CF	$2.87	$44,126
Garden (assumes 24 inch depth excavation)		Gardens are assumed to be located in excavated quads in properties with more than two quads removed; therefore,						
With yard quads		Only 12 to 24 inch excavation included when 3 or 4 yard quadrants are remediated						
One Quad		6	areas	625	7,500	CF	$2.87	$21,525
Two Quads		8	areas	625	10,000	CF	$2.11	$21,100
Three Quads (yards reduced by 2011 yards)		17	areas	625	10,625	CF	$2.11	$22,419
Four Quads (yards reduced by 2011 yards)		41	areas	625	25,625	CF	$1.63	$41,769
Only		4	areas	625	4	LS	$2,870.00	$11,480
Play Area								
With yard quads		Play areas are assumed to be located in excavated quads in properties with more than two quads removed						
One Quad		15	areas	150	2,306	CF	$2.87	$6,619
Two Quads		27	areas	150	4,151	CF	$2.11	$8,759
Only		5	areas	150	5	LS	$2,870.00	$14,350
Final Close-out documentation		1,001	properties		1,001	properties	$75.00	$75,075
Lawn Watering (Known Yards)		1,001		7,420,050 SF	2,315,056	gallons	$2.60 /1000 gal	$6,019
Non-Interim Action Sampled Yards (Potential)		Percent estimates based on the above known yards						
Removal Access		3,012	properties					
Access and Property Documentation	100%	3,012	properties		3,012	properties	$37.50	$112,950
Best Effort Letters for Refusals	14%	421	letters		421	letters	$5.50	$2,316
Excavation & Placement of Clean Fill		3,012	properties	Even though 14% of all yards are expected to refuse access, the cost assumes 100% participation				
Yard Quadrants/Areas		8,581	quads					
One Quad (17%)	17%	512	properties	3,000	1,574,400	CF	$2.87	$4,518,528
Two Quads (19%)	19%	572	properties	6,000	3,517,800	CF	$2.11	$7,422,558
Three Quads (25%)	26%	783	properties	9,000	7,223,175	CF	$2.11	$15,240,899
Four Quads (37%)	38%	1,144	properties	12,000	14,071,200	CF	$1.63	$22,936,056
Driveway								
With yard quads								
One Quad	8%	40	areas	1,000	41,000	CF	$2.87	$117,670
Two Quads	7%	40	areas	1,000	41,000	CF	$2.11	$86,510
Three Quads	8%	62	areas	1,000	63,550	CF	$2.11	$134,091
Four Quads	11%	125	areas	1,000	128,125	CF	$1.63	$208,844
Only	1.2%	36	areas	1,000	36,900	CF	$2.87	$105,903
Garden (assumes 24 inch depth excavation)		Gardens are assumed to be located in excavated quads in properties with more than two quads removed; therefore,						
With yard quads		*Only 12 to 24 inch excavation included when 3 or 4 yard quadrants are remediated*						
One Quad	3%	15	areas	625	18,750	CF	$2.87	$53,813
Two Quads	3%	17	areas	625	21,250	CF	$2.11	$44,838
Three Quads	5%	28	areas	625	17,500	CF	$2.11	$36,925
Four Quads	8%	45	areas	625	28,125	CF	$1.63	$45,844
Only	0.3%	9	areas	625	9	LS	$2,870.00	$25,830
Play Area								
With yard quads		Play areas are assumed to be located in excavated quads in properties with more than two quads removed						
One Quad	7%	35	areas	150	5,381	CF	$2.87	$15,444
Two Quads	11%	62	areas	150	9,533	CF	$2.11	$20,114
Only	0.4%	12	areas	150	12	LS	$2,870.00	$34,440

Table 6

Detailed Cost Estimate
Alternative 3 - Soil Removal with 24-Inch Excavation
St. Francois County Mined Areas - Residential Feasibility Study

Item/Description	Quantity		Est. per each costing unit	Costing Unit Quantity	Unit	Unit Cost	Total Cost
Final Close-out documentation	3,012	properties		3,012	properties	$75.00	$225,900
Lawn Watering (Potential Additional Yards)	3,012	properties	25,759,350 SF	8,036,917	gallons	$2.60 /1000 gal	$20,896
SUBTOTAL DIRECT CAPITAL COSTS - Known Yards							$15,754,487
SUBTOTAL DIRECT CAPITAL COSTS - Potential Additional Yards							$51,410,366
SUBTOTAL DIRECT CAPITAL COSTS - Removal							***$67,164,854***
Interim Action Sampled Yards (Known Yards)							
Mob/Demob						10%	$1,575,449
Engineering/Administration Costs						15%	$2,363,173
Construction Management Costs						15%	$2,363,173
Health & Safety						3%	$472,635
Non-Interim Action Sampled Yards (Potential)							
Mob/Demob						10%	$5,141,037
Engineering/Administration Costs						15%	$7,711,555
Construction Management Costs						15%	$7,711,555
Health & Safety						3%	$1,542,311
SUBTOTAL INDIRECT CAPITAL COSTS - Known Yards							$6,774,430
SUBTOTAL INDIRECT CAPITAL COSTS - Potential Additional Yards							$22,106,458
SUBTOTAL INDIRECT CAPITAL COSTS - Removal							***$28,880,887***
Scope and Bid Contingencies - Removal only						35%	$33,616,009
TOTAL ESTIMATED CAPITAL COST REMOVAL							**$129,661,751**
TOTAL ESTIMATED CAPITAL COST (SAMPLING AND REMOVAL)							***$130,365,403***
ANNUAL O&M COSTS							
None							
PERIODIC COSTS							
Five-Year Review							$75,156
Sampling and Analysis = resampling surface soils at remediated properties (5 years x 574 yards/yr) at a 5% rate						$20,156	
Access	144	properties	1	days	$680.00	$680.00	
Sampling	144	properties	8	days	$1,700.00	$13,600.00	
Sampling Analysis			2	days	$1,700.00	$3,400.00	
Calibration Samples to Analytical Laboratory	36	samples	36	sample	$28.00	$1,008.00	
Data Management	144	properties	8	hours	$95.00	$760.00	
Result Letter Mailing	144	properties	1	mailings	$708.14	$708.14	
Summary of Removal Action to date						1 $55,000	
Remedial Action Report						$75,000	$75,000
TOTAL ESTIMATED PERIODIC COST							***$150,156***
TOTAL NON-DISCOUNTED COST							***$130,515,559***
TOTAL PRESENT WORTH (7% rate of return, 30 year period)							***$107,618,000***

NOTES:

Cost Assumptions are provided in Appendix A

Total Present Worth calculation presented in Table A-2

APPENDIX C

RESPONSIVENESS SUMMARY

Big River Mine Tailings Superfund Site

OU-1

Responsiveness Summary

This Responsiveness Summary has been prepared to present a summary of comments and EPA's responses to comments regarding the Proposed Plan for the Big River Mine Tailings Superfund Site, Operable Unit 1. The Proposed Plan was released for public comment on July 22, 2011. The public comment period ended on September 21, 2011. A public meeting was held on August 4, 2011. A transcript of the public meeting was prepared and is part of the Administrative Record. The response to comments offered in this Responsiveness Summary should be considered collectively. EPA attempted to strike a balance between repeating responses to recurring elements that appeared in many individual comments, and providing a detailed response to each element in a single location. This Responsiveness Summary has been prepared with the goal of assuring the public clearly understands the EPA's position on the issues raised in the comments received, and the rationale that supports EPA decision-making for the Selected Remedy for the Big River Mine Tailings Superfund Site.

The Responsiveness Summary consists of the following sections: Comments/Questions received during the public hearing on August 4, 2011; comments received from the Missouri Department of Natural Resources (MDNR); comments received from the general public; comments received from political subdivisions of the state of Missouri; and comments received from business and industry. A complete set of comments by business and industry is attached.

A. Comments/Questions Received During Public Hearing on August 4, 2011

The following questions/comments concerning the proposed remedy were raised during the public meeting held at the Mineral Area College on August 4, 2011. Other questions and comments raised during that public meeting which did not directly concern the proposed plan for OU-1 are not included in this responsiveness summary. There appeared to be acceptance of the Proposed Plan by those in attendance.

QUESTION: From Mr. Norm Lucas. I was just curious as to how the decision was arrived at to go with the 24 inch deep cover rather than the 12 inch cover since all the areas with yards appear to be in cities that have planning and zoning where institutional controls could include some things about digging deeper than 12 inches.

EPA RESPONSE: It was based on a subsurface investigation that was done which was part of the feasibility study. It showed by going down further than 12 inches, we could eliminate the need for institutional controls. Actually about 98 percent of the properties that were evaluated were less than 1,200 at 24 inches and we felt that that would be the best thing to do. We wouldn't have the residual risks.

QUESTION: From Mrs. Elois Hartsel. My name's Elois Hartsel. I was just curious. How are you going to get the message out to the families and the parents that the children need to be retested or tested again?

EPA RESPONSE: We are going to do community outreach along with the local health department. Not just the local health department, also the Agency for Toxic Substances and Disease Registry along with the state Health Department and the local health department to do community outreach and try to get more blood-lead analyzed in the county. We will focus on that next year.

QUESTION: From Mr. Larry Mathis. My name's Larry Mathis and I was wondering why the blood levels were just limited to children.

EPA RESPONSE: We see the most health effects in the children as far as permanent damage. Ages seven and less is when most of the development is going on in a child, and that's where lead usually has the most effect. That's the focus here. Adults can definitely get their blood-lead analyzed as well, but we focus on the younger children because that's where we see the main health effects. Now, if you want to get into more detail about that, there's a few experts here that can give you more detail that are from the health department.

QUESTION: From Mr. Bobby Hartsel. I'm Bobby Hartsel. I was just wondering is it going to be a mandatory type cleanup, or what type of cleanup are you proposing like voluntary?

EPA RESPONSE: We will request access for sampling and we have to request access for cleanup as well. That's the first step we take.

QUESTION: From Mr. Bobby Hartsel. So what if my neighbor doesn't want to get his done, and I get mine done, and it all blows back towards me? What's going to keep it from blowing back on me?

EPA RESPONSE: Well, then it gets complicated and that's actually a legal issue, and our site attorney, Julie, will be working on that. I do see your point, and that can be an issue. We've had that happen before, and we do our best to try to keep it from going on. That's really all I can tell you right now though until we get the legal issues broken down. We hope that people will grant us access, and they usually do.

EPA Follow Up Response: CERCLA section 104 gives EPA the authority to order access.

QUESTION: From Mr. David Hull. But didn't they run into a problem like at Lake Timberline of people not wanting them to come on their property? I mean, they had an issue out there of contamination, and some people didn't want to take care of the problem.

EPA RESPONSE: I'm not sure about Lake Timberline because I don't work on that site, but as far as St. Francois County in the past, just to give you an idea, we've had an 80 percent success rate for getting access, which is pretty good. I mean, that's better than a lot of the sites we've worked on in the past. So usually we'll get access.

QUESTION: From Ms. Donna Bidgood. It's been at least rumored that in the municipality if we don't grant access that when the property is sold, at that point, the city may require that that property be remediated at our -- at the owner's cost or at the buyer's cost, only because I think you're going to get compliance if that's true at all and the people --

EPA RESPONSE: I don't know about the rumor. I haven't heard anything.

QUESTION: Ms. Shirley Politte. My name's Shirley Politte, and I did have my yard done a few years ago. In fact, you have it on your picture up there, the one that was completed with the grass. That was my yard, and they did tell me -- I said, "What if I don't let you do it?" And he said, "If you don't, then we will have a lien over at the court house, and if your house, your property, is sold, you could have to replace it then or" –

EPA RESPONSE: It's possible it could come back on the landowner if you don't have it done. It's a good idea to have it done.

QUESTION: Mr. David Hull: Does your property hold some type of paperwork once it's done, and then you have to do this disclosure type thing if you decide to sell, or what is it?

EPA RESPONSE: I work on the excavation, the remediation part of it. What happens is we will come to your property and do a pre-remediation site sketch sheet. We will have a picture of your yard showing the existing contamination at the existing grade. We take photos of everything, and do a pretty complicated site walk with you also to do an inspection of your property to make sure that we don't damage anything. When we get through, we'll excavate. Then we'll take our samples at the base of the excavation. If you're clean at 12 inches, then we'll stop. We'll have that data with your post-remediation site sketch, and you'll have all that data as well. That will be yours to keep. Every piece of data we pick up at your property has to be transferred to you. And you'll have all that in your record, and we keep it on record too.

QUESTION: From Mr. Norm Lucas: Did I understand correctly that if the contamination ends at 12 inches of depth, the excavation also stops at 12 inches?

EPA RESPONSE: Right.

QUESTION: From Mr. Norm Lucas. So the 24 inch in Alternative 3 is only in the necessary cases?

EPA RESPONSE: Right. It's not automatic. We haven't come up with an exact work plan for this work. We may do a six inch lift and test and go another six inch lift. That's what we've done at past sites.

QUESTION: From Mr. David Hull. Your remediation process, help me understand. How does that eliminate water leaching into the groundwater affecting everyone's wells and even though this mine site is hundreds of yards from my home, I still have a well there. And there's still livestock in that area and things like that.

EPA RESPONSE: What we typically see in the wells in St. Francois County is a high level of dissolved zinc that comes off these piles. We're trying to put treatment systems in. They're passive bio-reactors that are basically wetlands, and we have them at the Elvins pile, and then we're going to build one at Leadwood as well for dissolved zinc. What we don't see is dissolved lead in the water, not very often at least. So I think the 189 wells, plus all the municipal water supplies in the county have been tested, and we haven't seen elevated lead in hardly any of them. So it's not been a major concern. There is a lot of limestone around here. So that keeps the water with a higher pH and keeps the lead from dissolving.

QUESTION: From Mr. Bobby Hartsel. If they decide to go with this proposal and stuff, say, for the city of Bonne Terre, where would they take the waste to?

EPA RESPONSE: Most all the waste in this proposed plan is going to go to either Leadwood or Desloge.

QUESTION: From Mr. Bobby Hartsel. So the stuff that they took from like Lake Timberline, it went to Bonne Terre, right?

EPA RESPONSE: It went to the Bonne Terre east side. That was just for that Lake Timberline stuff because it was so far for them to travel down to Desloge and to Leadwood. And there was an area over there that needed the cover anyway, and that's why we decided to place it over there.

QUESTION: From Mr. Bobby Hartsel. So what's going to keep it -- that contamination from getting into any of the wells basically?

EPA RESPONSE: Well, it's not gotten into any wells yet around Bonne Terre, and that's our primary reason for doing this, which stabilized it in place because it doesn't tend to leach into the water.

QUESTION: From Mr. Bobby Hartsel. Why would the EPA step up to the plate to take care of the responsibility that's really not theirs?

EPA RESPONSE: We are stepping up to the plate based on information we have, and as far as any types of negotiations with responsible parties, those will occur in the future. We'll have to go to the table with any potentially responsible parties.

QUESTION: From Ms. Shirley Politte. All right. I was born and raised here in Elvins. I played with lead, chunks of lead. My dad worked on the drills. He brought home ores, the rock, where they had drilled for lead. I played with those. We had lead paint in the house, and nothing was ever mentioned about it being contaminated. I guess I didn't get it because I'm still here and I'm 72 years old. So everybody is not going to get it.

EPA RESPONSE: You're right. It won't affect everybody. But it does affect some people.

QUESTION: From Ms. Donna Bidgood. I too would like to say it's not totally out of proportion because same experience. We had a sandbox that was that chat from the chat dump. Our dad would go and shovel buckets full of it, and we would climb on it. And we swam in that water coming directly out of that overflow, you know, with that in it. And while I don't want to minimize the danger or have any other children exposed more than necessary, I don't think it's a cause for panic among those of us who did survive it to this point.

EPA RESPONSE: That's why we address the highest risk first. The source piles are getting addressed and the yards are where the children are spending most of their time and that's where the most likelihood of getting an elevated blood lead.

QUESTION: From Mrs. Pamela Watkins. We have one more. This is Pam Watkins, and I'm actually a renter. I haven't been here that long, and my question on this is, what would happen if you come and test my property and I would like for you to do the cleanup, but my landlord says he doesn't want it done?

EPA RESPONSE: It's an agreement with the landowner.

B. Comments/Questions Received from MDNR

The MDNR concurred on the preferred remedial action alternative in the Proposed Plan by letter dated August 2, 2011. This letter also included two comments that merit formal recognition and response.

MDNR Comment #1: Operable Unit 01 (OU1) includes Residential Action and Source Control; however, there is no language in the Proposed Plan that addresses Source Control as part of the remedial action for OU1. The PP does not contain any remedial action objectives for Source Control. The Record of Decision (ROD) should evaluate whether and/or to what extent the non-time-critical removal action achieves Remedial Action Objectives (RAOs) for OU1. An evaluation to determine whether or not additional remedial action work would be required on the pile(s) itself to meet RAOs should be included.

EPA RESPONSE: The comment refers to the eight source areas of mine waste. Of these, the Desloge (Big River), Leadwood, Elvins, Bonne Terre and Hayden Creek piles or areas have been stabilized. Work is ongoing at the National and Federal piles. The Doe Run pile will be stabilized under a future, as yet undetermined, action. With the exception of the Doe Run pile, the piles have been addressed under Removal Authority. EPA does not agree that the piles should be addressed as part of the ROD because the focus of the remedial action is lead contaminated mine ore processing waste in residential areas. Source control of the piles will be evaluated as part of the requirements of the existing orders for the Removal Actions.

MDNR Comment #2: MDNR feels that cleaning up the residential yard soil to a level of 400 ppm should be included as a Remedial Action Objective (RAO).

EPA RESPONSE: The RAO for the residential property soils at the Site is to:

> *Reduce the risk of exposure of young children (children under seven years old) to lead such that an individual child or group of similarly exposed children have no greater than a 5 percent chance of exceeding a blood lead level of 10 µg/dL.*

Based on Site-specific information, EPA's IEUBK model predicts that a young child residing at the Site will have greater than a 5 percent chance of having a blood lead level exceeding 10 µg/dL if the lead soil concentrations to which he or she is exposed are above 400 ppm under the assumed exposure conditions. Thus, 400 ppm lead in soil will be the cleanup level of the remedial action as measured in the bulk soil fraction using an XRF instrument.

The RAO is the primary goal. To achieve this goal, EPA will use 400 ppm to trigger the remedial action at each property.

C. Comments/Questions Received from the General Public

No comments or questions were received from the general public other than those listed in Section A above.

D. Comments/Questions Received from Political Subdivisions of the State of Missouri

No comments or questions were received from the political subdivisions of the state of Missouri.

E. Comments/Questions Received from Business and Industry

Comments were received from The Doe Run Resources Corporation (Doe Run) on September 21, 2011. A number of the issues raised in these comments were repetitive, and in some instances EPA addressed an issue only once in its response. Portions of Doe Run's comments are set out below followed by EPA's response. The complete set of Doe Run's comments is attached.

Comment 1. Page 2, Paragraph 2 continuing onto Page 3, Paragraph 1.

EPA has identified eight sources of mine waste in the former mining area of St. Francois County.[2] Since 1994, Doe Run has investigated and stabilized six of these large tailings Piles and a portion of the small Hayden Creek pile to minimize any further releases from those Piles. We understand EPA plans to address the Doe Run Pile, not associated with The Doe Run Resources Corporation, as part of another operable unit. Beginning in 2000, Doe Run began sampling and, where appropriate, remediating residential properties and child high-use areas (CHUAs). In 2004 Doe Run began remediating all residential properties and CHUAs with yard soil concentrations greater than 400 ppm located within 500 feet from each of the six major mill piles, 1,000 feet from the four identified smelters and 100 feet from the mine shafts identified in the Remedial Investigation. Additionally, Doe Run sampled and remediated yards where elevated blood-lead levels in children (EBLs) were detected, regardless of their distance from the Piles. As of January 2011, Doe Run has sampled a total of 2,057 residential properties and child high-use areas, and conducted total or partial removals at 586 of those properties.[3] Finally, Doe Run conducted the Focused Remedial Investigation efforts and the prepared the Feasibility Study as directed by EPA. Doe Run proactively did this work in response to EPA's requests regardless of the lead source.

Concurrent with these efforts, the State and County Departments of Health launched extensive educational programs both in the area and statewide directed to risks associated with lead and how to reduce exposure, particularly of young children, to lead from all sources, including in particular lead-based paint (LBP). As shown in Figure 5, infra, the occurrence of EBLs in St. Francois County has fallen substantially since 1997. In fact, the Missouri Department of Health and Senior Services (MDHSS) reports those occurrences of EBLs in St. Francois County have been less than 5 percent since 2006. In 2010, the rate of occurrence was reported to be 1 percent[4] In other words, the rate of occurrence in St. Francois County has already been reduced to a level consistent with EPA's Remedial Action Objective, and to a level less than the national average of EBL.

EPA RESPONSE:

EPA agrees that Doe Run has completed investigations of the following six large mine waste/ tailings piles in St. Francois County: Desloge; Bonne Terre; Elvins/Rivermines; Leadwood; National; and Federal. EPA also agrees that Doe Run has completed stabilization of the Desloge; Bonne Terre; Elvins/Rivermines; and Leadwood piles. EPA does not agree that stabilization is complete at either the

National or Federal piles. The work at Desloge; and Bonne Terre; as well as the upcoming work at Federal, were undertaken pursuant to a negotiated consent order. The work at Elvins/Rivermines; Leadwood; and the work to be completed at National, were all pursuant to Unilateral Orders issued by EPA.

EPA agrees that Doe Run entered into consent agreements in 2000 and 2004 for a soil testing and removal program and blood lead testing at the Site. EPA agrees that Doe Run entered into a consent agreement in 1997 to perform the RI/FS. The RI was completed in 2006; and the FS was completed in 2011.

EPA agrees that blood lead levels in St. Francois County have declined as a result of these actions. However, EPA does not agree that the reduction of reported blood lead levels means that work at St. Francois County is complete. The fact that the rate of elevated blood lead levels (EBLL) is declining is one important indicator that the actions being taken to address lead contaminated properties in St. Francois County are having the desired effect.

However, a measured EBL rate of 1 percent in St. Francois County is not consistent with EPA's Remedial Action Objective. A measured EBL rate of 1 percent means that of all children who are tested for blood lead levels in St. Francois County, 1 percent have a blood level of greater than 10 ug/dl. EPA's remedial action objective is based on a soil lead concentration that would result in a probability that no child or similarly exposed child would have greater than a 5 percent chance of having a blood lead level greater than 10 ug/dl based on the IEUBK modeling. The remedial action objective is not related to the total percentage of children with elevated blood lead levels; it is related to the probability that a child would have an elevated blood lead level if that child is exposed to lead contamination in residential soil. EPA remedial action objective does not mean that if less than 5 percent of children in St. Francois County have an elevated blood lead level then the remedial action objective is met, as Doe Run seems to suggest.

It should also be noted that ATSDR's position is that there is no safe lead level in blood.

Comment 2. Page 3, Paragraph 2:

This Operable Unit presents highly complex issues with regard to the nature and extent of the contamination and the potential risks resulting from it. These issues relate to the lack of correlation between EBLs and identified mine waste source areas; the large volume of mine chat and tailings and their varied uses; the widespread, yet unaccounted-for occurrence of LBP in residences in the area; and the abundance of naturally occurring lead in the area. These complex issues warrant very careful scrutiny in determining the appropriate use of CERCLA statutory authorities and resources.

EPA RESPONSE:

The 1997 Lead Exposure Study concluded the following:

- 17 percent of the children tested in the Response Area (around the piles) had EBLL's. The Response Area was compared to a control area (Salem, MO.) with regard to similar aged housing stock and prevalence of Lead-Based Paint (LBP). In the control area, EBLL rates were 3 percent. This finding triggered the actions on the mine waste piles and Halo area.

EPA does not agree that there is no correlation between EBLs and identified mine waste source areas; nor does EPA agree that the occurrence of lead based paint in residences was "unaccounted-for" in the investigation of the Site and development of the remedial action. The Human Health Risk Assessment evaluated indoor lead dust in residences.
The Conceptual Site Model included in the ROD as Figure 6 evaluated the indoor dust pathway. This pathway was found to be complete and the concentration of lead in the indoor dust includes a contribution from Lead-Based Paint (LBP). The dust sampling effort also justified using the default parameters of the IEUBK Model. EPA also conducted a Lead Speciation Study on residential soils and the tailings piles of St. Francois County. The Lead Speciation Study concluded the following:

- Lead in residential soils from the Big River area were primarily the result of activities associated with mining/milling operations and included some minor contribution from pyrometalurgical activity and LBP.

- The strong, galena-cerussite association found in the residential soil samples indicated that the tailings piles were the most likely source of contamination, however; small fractions (<2 percent RM Pb) of the bulk lead are also traceable to LBP and some pyrometalurgical activity (smelting).

- Neither LBP nor gasoline appeared to be significant lead contributors to the Site.

Based on the Lead Speciation Study, LBP was not considered a significant source of lead in the mid-yard.

On a particle concentration weighting basis, the median proportions observed in indoor dust taken from 235 residences were 21 percent from mining waste, 23 percent from paint, 8 percent from soil, and 29 percent could not be identified. EPA recognizes that LBP is part of the overall exposure but mine and smelter wastes are the most significant contribution to the overall exposure in residential soil at the Site.

Comment 3. Page 3, Paragraph 3 continuing onto Page 4:

Doe Run maintains that in a rush to complete the Feasibility Study EPA has failed to consider pertinent analysis of the data provided by Doe Run. In issuing its Proposed Plan with undue haste, EPA made unfounded and arbitrary assumptions regarding the source of contamination, disregarded serious questions regarding the associated potential risk, and disregarded the limits of EPA's CERCLA authorities to respond to conditions at the Site. As a result, EPA now proposes a remedy that 1) is beyond the scope of its CERCLA response action authorities to the extent it addresses naturally-occurring contamination, lead from building materials, including LBP, consumer products in consumer use, and normal fertilizer use; 2) has not demonstrated to be necessary to protect human health and the environment; and 3) is otherwise inconsistent with Section 121 of CERCLA and the National Contingency Plan ("NCP"). Accordingly, Doe Run urges EPA to take additional time as needed to carefully evaluate the source of the contamination, evaluate the extent to which unrelated sources, including sources over which EPA does not have CERCLA response action authority, are the true cause of EBLs, and more carefully evaluate the true nature of any remaining risk to human health resulting from mining activities. Only then can EPA develop a remedy that responds more directly to any remaining risk, presents a better balance of trade-offs and is consistent with CERCLA and the NCP.

EPA RESPONSE:

EPA does not agree that the investigation of the Site was "rushed" or that the Proposed Plan was issued with "undue haste." Doe Run entered into a consent agreement to complete the RI/FS in 1997. The work on the RI was not completed by Doe Run until 2006. Doe Run did not complete the FS until 2011, some fourteen years later. EPA does not agree that it is a rush to complete the Record of Decision some five years after the RI completion.

Nor is it true that EPA acted with undue haste in its work in St. Francois County. The development of the Proposed Plan is a result of over twenty years of experience in St. Francois County. When EPA began investigation of the Site, the mine waste piles were literally mountains of mine waste that dwarfed the towns of St. Francois County. The mine waste piles were uncovered and access to the mine waste piles was unrestricted.

EPA does not consider the proposed date of the Record of the Decision of September 30, 2011, to be an accelerated pace. Observed air releases of lead contaminated tailings dust from the mine waste areas in St. Francois County have been documented by EPA as early as 1988 (see Photos from the Listing Site Inspection included as Attachment A). The dust from the piles created a suspended particulate plume of lead contaminated dust that extended offsite for up to one mile. These observed air releases and the releases of lead contaminated mine waste into the Big River were the primary supporting documentation for the eventual listing of the Site on the National Priorities List.

EPA prioritized the work to stabilize the six major tailing piles using removal authority to expedite the work due to the ongoing exposures created by these air releases and the exposure to their deposition in residential areas in interior dust and surface soils. For decades the owners and former operators of the mine waste piles, including Doe Run, were well aware of these ongoing air releases as evidenced by the snow fencing shown in the photo included in Attachment A, which was used to reduce the migration of the lead contaminated fine tailings to nearby communities.

EPA carefully evaluated all data in the development of the Proposed Plan and followed the appropriate steps in selecting the final remedy for Operable Unit-1 (OU-1). EPA's decision is based on the risk that is associated with lead-contaminated residential soil at the Site. A Human Health Risk Assessment was conducted at the Site that, along with Doe Run's Site-Specific Blood Lead Study, showed an unacceptable risk at residential areas where lead contamination was present at or greater than 400 parts per million lead (ppm).

The fact that the rate of elevated blood- lead levels is declining is one important indicator that the actions being taken to address lead contaminated properties in St. Francois County are having the desired effect.

However, a measured EBL rate of 1 percent in St. Francois County is not consistent with EPA's Remedial Action Objective. A measured EBL rate of 1 percent means that of all children who are tested for blood lead levels in St. Francois County, 1 percent have a blood level of greater than 10 ug/dl. EPA's remedial action objective is based on a soil lead concentration that would result in a probability that no child or similarly exposed child would have greater than a 5 percent chance of having a blood lead level greater than 10 ug/dl based on the IEUBK modeling. The remedial action objective is not related to the total percentage of children with elevated blood lead levels; it is related to the probability that a child would have an elevated blood lead level if that child is exposed to soil lead contamination in

residential soil. EPA remedial action objective does not mean that if less than 5 percent of children in St. Francois County have an elevated blood lead level then the remedial action objective is met, as Doe Run seems to suggest.

Comment 4. Page 4, Section I.

I. EPA Erroneously Assumed the Piles/Mining Waste are Only Source and Principal Threat.

The NCP requires that EPA properly scope the project to ensure the RI/FS is properly designed. 40 CFR § 300.430(a)(2). "The investigative and analytical studies should be tailored to site circumstances so that the scope and detail of the analysis is appropriate to the complexity of the problems being addressed. 40 CFR § 300.430(b) EPA is required to develop a conceptual understanding of the site, or a conceptual site model. 40 CFR § 300.430(b)(2). Section 104(a)(3)(A) and (B) of CERCLA 40 CFR § 300.430(b)(1) and (2) specifically prohibit EPA from responding to a release of a naturally occurring substance or products that are part of the structure or result in exposure to residential buildings or business or community structures. Additionally, Section 101(9) and (22) of CERCLA exclude consumer products in consumer use and the normal use of fertilizer from EPA's response action authorities.

EPA RESPONSE:

EPA does not agree that the RI/FS was not properly designed. Nor does EPA agree that the lead contamination is naturally occurring. Further, Doe Run's recent depth data study refutes the claim that the contamination is naturally occurring. The Subsurface Soil Report found, when sampling was extended to depths greater than 12 inches that the contamination declined with depth in the vast majority of cases (98 percent) and was not present when native material was encountered. Much of the contamination was in the form of tailings and the result of mining and milling operations and not naturally occurring. It is well-documented in the RI that significant amounts of mine wastes have been mechanically moved for use on residential properties as well as by local communities for traction on icy roads. A recent EPA Removal Action at Central Middle School was indicative of this finding. When the obvious tailings material was removed to the native soil horizon, the lead levels dropped significantly. Additionally, the background lead level used for comparison in the RI for St. Francois County soil was 62 mg/kg, which is much lower than the proposed cleanup level. The lead levels found in the Response Area are considerably higher than the background levels.

Comment 5. Page 5, paragraph 2 and 3:

In its conceptual site model, EPA identified historic mining wastes as the only source of contamination at the Site. [5] *In violation of its obligation under the NCP, the Agency erroneously failed to consider alternative sources for contamination in yards, including LBP, other consumer products, the normal use of fertilizer and naturally-occurring lead. While EPA's conceptual site model does recognize human movement of chat from the piles, much of that use, including but not limited to the use of chat as agricultural lime, represents consumer use of a consumer product and/or normal fertilizer use over which EPA has no authority to conduct a response action.*

In its Proposed Plan, EPA ignores these sources, stating that Operable Unit 1 includes "lead-contaminated surface soils present at residential properties across the site that have been contaminated as a result of migration of metal-bearing materials from past mining practices via natural erosional processes, windblown mine waste and human activity." The Proposed Plan "addresses the risk to

human health and the environmental resulting from exposure to residential soils contaminated with lead mine waste." It further states, "(t)he eight mine waste areas are the source deposits and constitute the principal threat to human health and the environment," and that "(t)he sources of most of the lead contamination in the site are the large mine waste piles...." In fact, EPA's conceptual site model overestimates the extent of air dispersion from the Piles. This, coupled with EPA's arbitrary disregard of other sources for lead, result in a remedy that reaches outside the scope of EPA's response action authorities and without regard to the true cause of the risk the remedial action is intended to address.

EPA RESPONSE:

EPA disagrees with this comment to the extent that it states that EPA violated its obligations under the NCP to consider alternative sources of lead contamination in yards. The investigation of the Site supports EPA's finding that the primary source of lead contamination in residential areas is the large mine waste piles.

The listing of the Site on the National Priorities List in 1992 was based on the observed release of wind-blown tailings creating a suspended plume of lead contaminated fine particles migrating to the town of Desloge, Missouri (see Attachment A). The Desloge (Big River) pile and the other mine waste piles were the primary sources of residential lead contamination via wind, water, and anthropogenic movement of material. The uncontrolled migration though wind and water erosion and the uncontrolled mechanical movement of chat and tailings from the mine waste areas and piles does not constitute a consumer product in consumer use. These piles were considered the primary source due to uncontrolled movement of chat and tailings. Specific types of migration are listed below:

Transport via wind
During the January 1988 Site reconnaissance for the HRS Scoring, blowing of lead-laden dust was observed to be a serious problem. A dust plume originating from the Site appeared to be transporting dust at least one mile to the southeast. Wind speeds on that day included gusts up to 35 miles an hour. A photograph of the tailings blowing off-site is included in Attachment A.

Transport via water
Erosion to the Big River and its tributaries has been an issue with all the piles. The Site was listed on the National Priorities List due in part to an estimated 50,000 cubic yards of tailings that slumped into Big River during a high rainfall event in 1977. Tailings are presently in continuous contact with the Big River and its tributaries. The mine waste material has been transported downstream into the floodplain, where it can affect human and ecological receptors.

Transport via anthropogenic movement
The mine waste piles have been a continuous source of mine waste contamination via anthropogenic movement. Mine waste was used for traction control during the winter, agricultural lime, and aggregate. Access to the mine waste source piles was unrestricted for many years. Additionally, Doe Run allowed and profited from the inappropriate use of contaminated mine waste materials even though it was aware of the lead content and its potential negative impacts on human health and the environment. Despite the fact that the Site was listed on the National Priorities List in 1992, Doe Run did not cease its sale of mine waste until it was ordered to do so by EPA in 2003.

Other Sources
A Site-specific speciation study was done on residential yards which showed that in the mid-yard areas, <2 percent of the lead in soil samples could be attributed to LBP. Other sources such as leaded gasoline could have contributed a small amount in the road-side areas, but were not a significant factor in the mid-yard areas.

EPA's response action authorities are intended to address residential and child high-exposure areas that are above the Site specific action level determined by Doe Run's Site-specific Blood Lead Study and the HHRA.

Comment 6. Page 6 Section A. continuing to the first Paragraph of Page 8:

A. The RI Data Demonstrates that Air Dispersion Releases from the Piles are Limited to 200 Feet, and any Risk Associated with These Releases already have been Protectively Addressed.

EPA's first technical error is its assumption that wind dispersion from the Piles resulted in widespread contamination. The Proposed Plan states, "The mine waste ha(s) contaminated soil, sediment, surface water and groundwater. Mine waste also has been transported by wind and water erosion and manually relocated to other areas throughout St. Francois County. It has also been reported that mine waste has been used on residential properties for fill material and private driveways, used as aggregate for road construction."

1. RI data demonstrates that air dispersion releases from the piles are limited to a 200-foot area surrounding piles.

No studies conducted to date show a correlation between the residential properties yard soil lead concentrations and the processes of wind and erosion from the piles. As part of the Focused RI (NewFields 2006), the impact of particulate deposition from the mill waste piles was investigated. Shallow soil samples were collected along upwind transects and downwind transects at five large piles. Lead concentrations in near-pile soils in the downwind transects were found to be higher than background concentrations in a narrow "affected" zone about 200 feet wide around the piles, and then averaged beyond the 200 feet 180 mg/kg lead.

In concert with the RI near-pile sampling, EPA requested Idaho National Engineering and Environmental Laboratory (INEEL) to perform air dispersion and deposition modeling of airborne lead associated with mill waste piles, ***Air Dispersion Modeling of Mine Waste in the Southeast Missouri Lead Belt*** *(Abbott 1999). The air dispersion model was used to predict maximum lead concentrations in air and downwind soil lead concentrations, and to place the downwind transects. The model and soil sample results were matched and used to predict geometric mean lead concentrations assuming 80 years of deposition accumulating in a 2-inch soil column already containing 65 mg/kg lead. Predicted lead concentrations range from 300 – 500 mg/kg within 200 meters of the mill waste piles, and from 125 – 175 mg/kg out to 1 kilometer. The model-predicted soil lead concentrations apply only to the upper two inches of soil and to "generally undisturbed surface soils which have not been subjected to significant tillage, excavation, landscaping or flooding." (Abbott 1999). The model-predicted soil concentrations are generally consistent with the near-Pile soil sampling results. (Abbott 1999, NewFields 2006).*

It is also important to note that lead ambient air emissions in the Site area have been monitored for many years by Doe Run and other government agencies, beginning before the Piles were stabilized. Doe Run operated the "Big River Network" in the Site area from 1996 until 2005. The monitored lead ambient air concentrations for all monitors were well below the then applicable 1.5 ug/m3 lead NAAQS standard and in most all respects were also below the now much more stringent 0.15 ug/m3 lead NAAQS standard. More recent air monitoring conducted by Doe Run and MDNR within the Site area show consistent compliance with the 0.15 ug/m3 standard. [6]

These predicted soil lead concentrations do not explain the observed lead concentrations in yard soils. In fact, lead concentrations averaged above 700 mg/kg in the residential yard sampling programs conducted. Therefore, the Focused RI concluded that particulate deposition of lead from the mill waste piles was not the major contributor to lead in yard soils.

EPA RESPONSE:

EPA agrees the elevated lead levels in St. Francois County cannot entirely be attributed to wind-blown mine waste, but it's evident that wind-blown mine waste is a very significant factor. It is evident from the speciation study and by visual observation that the primary source of lead exposure is from the mine waste. The Record of Decision will address soil that has been impacted by mine waste. The RI showed that the lead levels were elevated well beyond 200 feet from the piles. For instance, the Bonne Terre East transect had lead levels of up to 376 mg/kg at 550 feet from the pile. The Desloge East transect had lead levels of up to 447 mg/kg at 1,150 feet from the pile. The Elvins Northeast transect had lead levels of up to 411 mg/kg at 650 feet from the pile. Some of the piles showed decreased contamination beyond 200 feet from the piles, but in most cases transects had lead levels above the background lead level of 62 mg/kg (mean concentrations of 180 mg/kg).

Comment 7. Page 8, Subsection 2.

2. Interim Action and Halo Removals Reached Beyond Potential Risk Posed by Air Dispersion from Waste Piles.

EPA RESPONSE:

EPA disagrees with the comment because the evidence shows that average residential soil lead contamination is higher in the Halo, which by definition is closer in proximity to the mine waste piles. The average soil lead concentration in the Halo was 718 mg/kg lead, which is well above background concentrations for St. Francois County.

Comment 8. Page 9, Subsection 3 continuing onto Page 11.

3. Interim Action and Halo Removal Data Shows No Correlation Between Lead Levels and Proximity to Piles.

Figure 1 presents the average yard soil lead concentrations relative to distance to the closest Pile. This figure demonstrates that there is no correlation of yard soil lead concentrations to the Piles. Furthermore, Figure 2, drip zone soil lead concentrations relative to distance from the closest Pile, also shows no correlation or trend indicating that the drip zone lead concentrations likely are not derived from an airborne source.

Sampling of the drip zone soil and screening for outdoor lead-based paint (LBP) conducted during the Interim Action was reported in the ***Removal Action Report for Interim Action.*** [9] *The report stated that drip zone soils would be greater than 400 ppm lead in 93 percent of the homes with measurable outdoor LBP. 33 percent of those homes' drip zone soils would be greater than 2,000 ppm (NewFields 2004).*

EPA RESPONSE:

EPA disagrees with the comment because the evidence shows that average residential soil lead contamination is higher in the Halo, which by definition is in closer proximity to the mine waste piles. The average soil lead concentration in the Halo was 718 mg/kg lead, which is well above the background soil lead concentration for St. Francois County. Eighty-four percent of these properties are elevated in the mid-yard areas outside of the drip zone. The Lead Speciation Study showed very little evidence that the lead contamination in the mid-yard areas could be attributed to LBP.

While EPA is not addressing residential properties that have only a drip zone exceedance of the Site-specific cleanup level for lead, it should be recognized that the drip zone lead concentration is most likely to be a combination of decades of mine waste deposition along with a contribution from those homes with deteriorating exterior LBP.

Comment 9, Page 11, Subsection 4.

> ***4. Even within the "Halo" the data show no correlation between the Blood Lead Levels and the Proximity to piles.***

EPA RESPONSE:

EPA does not agree that there is no correlation between EBLs and the proximity to the identified mine waste source areas. See response to Comment 2.

Comment 10. Page 14, Subsection 5, continuing onto page 16, Paragraph 1:

> ***5. Blood Lead Levels in St. Francois County Have Already Been Reduced to Levels Below EPA's Remedial Action Objective.***

The Missouri Department of Health and Senior Service ("MDHSS"), formerly Missouri Department of Health ("MDOH"), has maintained a data set of children, less than six years of age, who have been tested for BLLs since 1997. Note the percent of the population with elevated BLL identified in the Lead Exposure Study and the Interim Action cannot be compared directly to the MDHSS yearly statistics as these studies' statistics range over multiple years and are limited only to the study participants and therefore probably do not completely represent the area's unbiased population. The MDHSS data set is reported by county and may include the same child in multiple years due to possible yearly or biyearly testing. Figure 5 presents the percent of EBL children compared to the cumulative number of complete[11] *yard soil removals conducted in the Response Area. As seen in this figure, the decline in St. Francois County's child EBL percentage dropped dramatically prior to majority of the yard soil removals.*

Blood lead levels among US children age 1 to 5, the population at the highest risk for lead exposure and effects, have been monitored and reported by the CDC and EPA and have declined steadily since surveillance began in 1976. Early (1976-1980) study reported a geometric mean BLL of 14.9 µg/dL just over 88 percent of this high-risk population had EBLs. Data collected from 1991 to 1994 showed that the geometric mean BLL for children was 2.7 µg/dL, with 4.4 percent of the children having EBL. Children age 1 to 5 whose blood was sampled as part of the 2007-2008 survey had a geometric mean BLL of 1.5 µg/dL, with 0.9 percent of the children having EBLs. The data for St. Francois County presented in Figure 5 are consistent with national averages and the decline in the child BLLs with time. The discontinued use of LBP and leaded gasoline, as well as the decrease of lead in food and toys, are the primary contributing factors to these drops in BLLs. Performance of yard soil removals within the County does not appear to affect the natural downward decrease in the County's BLL for children, which further indicates the EBLs had been caused by sources other than mining waste.

EPA RESPONSE:

The fact that the rate of elevated blood lead levels is declining is one important indicator that the actions being taken to address lead contaminated properties in St. Francois County are having the desired effect.

However, a measured EBL rate of 1 percent in St. Francois County is not consistent with EPA's Remedial Action Objective. A measured EBL rate of 1 percent means that of all children who are tested for blood lead levels in St. Francois County, 1 percent have a blood level of greater than 10 ug/dl. EPA's remedial action objective is based on a soil lead concentration that would result in a probability that no child or similarly exposed child would have greater than a 5 percent chance of having a blood lead level greater than 10 ug/dl based on the IEUBK modeling. The remedial action objective is not related to the total percentage of children with elevated blood lead levels; it is related to the probability that a child would have an elevated blood lead level if that child is exposed to soil lead contamination in residential soil. EPA's remedial action objective does not mean that if less than 5 percent of children in St. Francois County have an elevated blood lead level then the remedial action objective is met, as Doe Run seems to suggest.

It should also be noted that ATSDR's position is that there is no safe lead level in blood.

The action level for lead in residential soil, 400 ppm lead is based on the Site-Specific Blood Lead Study and the Site-Specific Human Health Risk Assessment. The data shows that the action level is exceeded in 84 percent of the properties sampled (drip zones excluded). EPA's remedial action objective is based on a soil lead concentration that would result in a probability that no child or similarly exposed child would have greater than a 5 percent chance of having a blood lead level greater than 10 ug/dl based on the IEUBK modeling and the Site-Specific Blood Lead Study.

Comment 11. Page 16, Section B

B. EPA Failed to Identify, Characterize or Otherwise Consider Building Materials, Including LBP, as a Source of Lead Contamination or EBLs.

Section 104(a)(3)(B) expressly prohibits EPA from using its CERCLA response authorities to address releases from LBP. EPA's own directive states "Lead-based paint can be a significant source of lead exposure and needs to be considered when determining the most appropriate response action. Interior

paint can contribute to elevated indoor dust lead levels. In addition, exterior paint can be a significant source of recontamination of soil."[12] *Yet EPA has refused to acknowledge LBP's role as a source of contamination, much less evaluate the extent to which it is a source for contamination. EPA's refusal to do so is particularly arbitrary given the data at the Site that indicates LBP is a major source of contamination and a major cause of EBLs.*

EPA RESPONSE:

EPA disagrees with the comment. Doe Run misinterprets the prohibition in CERCLA Section 104(a)(3)(B), 42 U.S.C. § 9603(a)(3)(B), which prohibits response actions to a release from products that are part of the structure of, and result in exposure within residential buildings. CERCLA section 104(a)(3)(B) does not prohibit CERCLA response to releases of LBP in residential yards. The prohibition is for products that are part of the structure of a residence and where the release results in exposure within the residence. EPA acknowledges that LBP may be a significant source of indoor lead contamination at the Site. The Selected Remedy includes a HEPA vacuum loan out program to houses subject to remediation but does not include remediation of indoor lead contamination.

Comment 12. Page 17, Subsection 1 continuing onto Page 18, Figure 6

1. Significant amount of LBP was detected during the Interim Action

As reported in the Removal Action Report for Interim Action (NewFields 2004) and the Focused RI (NewFields 2006), many of the highest soil lead concentrations measured in the Interim Action sampling were in the drip zone. [13] *Specifically, more than 42 percent of the drip zone samples had higher lead concentrations than the corresponding yard soil lead concentrations. Drip zone samples were commonly (39 percent) over 1.5 times the average yard lead concentration, indicating the lead source to the drip zone was potentially different or closer to the drip zone source.*

Figure 6 presents a comparison of average lead soil concentrations in residential yards with (≥1 mg/cm^2) and without (<1 mg/cm^2) lead-based paint made in the Interim Action (NewFields 2004). The comparison shows that drip zone soil lead concentrations are influenced by the presence of LBP. Paint chips were observed in some drip zone samples. Many homes in the area have had exterior painted surfaces covered with vinyl siding, and therefore, may be incorrectly identified in the "houses without lead paint" category and thus the concentrations for this category have a higher uncertainty than the "houses with lead paint."

EPA RESPONSE:

EPA agrees that drip zone lead concentrations are often higher than mid yard soil lead concentrations. This is because drip zone soil lead concentrations are a result of both LBP and airborne mine waste deposition. All airborne mine waste depositions that land on the roof or siding of a structure is concentrated in the drip zone as it is washed off by rain or snow, because of this, drip zones are likely to have higher concentrations than mid-yard soils. The graph included in the comment as Figure 6 on page 18 illustrates that houses without LBP have additional contamination in the drip zone and that the average drip zone concentrations are higher than the average mid yard.

Comment 13. Page 19, Subsection 2 continuing onto Page 20, Paragraph 2:

> *2. More than 65.5 percent of homes in St. Francois County were constructed prior to 1978 and thus potentially contain LBP.*

Available age-of-housing data in the incorporated communities within the Response Area (see Table 1 and 2) indicated the housing within the Site is over 65.5 percent pre-1970's and therefore have a high potential for LBP. 15 The identification of outdoor LBP during the Interim Action and Halo Removals may underestimate its occurrence since many homes have been re-sided with vinyl siding, thus masking, but not eliminating, the presence of outdoor LBP. When EPA surveyed 22 homes for LBP as part of its speciation study, 16 of 22 homes had vinyl siding (73 percent). [16] Of the four yards where paint was surveyed, three detected outdoor LBP (primarily on the house versus other outdoor structures).

With the exceptions of Leadwood and Leadington, the percentage of EBL children correlates better to the percentages of measurable outdoor LBP than to any of the elevated yard soil lead concentrations. It should also be noted that the presence of outdoor LBP is probably an indicator of potential indoor LBP.

EPA RESPONSE:

EPA agrees that lead based paint may contribute to lead contamination in residential yard soils in St. Francois County. EPA has always recognized the potential contribution of lead-based paint to soil and dust lead levels at the Site and the speciation studies performed have indicated the presence of lead-based paint in yard soils and interior dust samples analyzed. This is because the speciation studies were designed to determine whether there were other sources of lead contamination present in residential soils and interior dust that contributed to the elevated lead levels in residential soils. The speciation studies performed at the Site clearly show that mining related wastes were present in both residential soils and interior dust. The speciation study also shows that mining related waste was the predominate source of lead in mid-yard samples (>90 percent Relative Mass) and was detected in significant quantities in drip zone samples and interior dust samples from the Site. The commenter fails to recognize that mid-yard samples at homes where lead-based paint was not present contained elevated lead levels and that very little lead-based paint (<2 percent Relative Mass) was detected in mid-yard samples in general.

Further, the conclusion drawn by the comment that one would expect higher EBLs where there is greater LBP is not supported by the evidence. In Table 2, Leadwood has the highest percentage by far of housing stock built prior to the 1970s (82.8 percent) and the highest percentage of homes with measurable outdoor LBP but the lowest number of EBLs identified during the interim action (5.7 percent of children tested had elevated blood lead levels). With the exception of Leadington, the two highest EBL rates (18.2 percent in Bonne Terre and 10.6 percent in Park Hills) also correspond to the two highest mid-yard sampling (92.0 percent and 90.0 percent, respectively).

It should also be noted that the city of Salem, Missouri was used as a control for the 1997 Exposure Study performed by MDOH for ATSDR. Salem has a similar housing stock but no history of mining. The EBLL rate in children from Salem was 3 percent compared to 17 percent from the Site.

Comment 14. Page 20, Subsection 3.

Conceptual model assumes indoor dust derives from mining waste. But the Lead Exposure Study indicates LBP is also a significant source of indoor dust.

EPA RESPONSE:

The EPA believes the Conceptual Site Model in the HHRA is appropriate for this Site. EPA agrees that LBP may be a significant source of indoor lead contamination. Interior dust is being addressed under the Selected Remedy through health education and distribution of HEPA vacuum cleaners to residents. While, EPA acknowledges that LBP is a significant source of indoor lead contamination, mine waste was also a significant source (21 percent on a particle concentration weighting basis). Additionally, the RI states that an estimated 36 percent of the lead contaminated dust found in vacuums in St. Francois County was derived from outdoor soil.

However, The IEUBK Model default soil to dust transfer was considered the most appropriate value for this assessment. The presence of elevated lead in indoor dust was evaluated in the HHRA but there was not enough indoor dust data in the RI to determine a Site specific parameters for dust for use as an IEUBK Model input.

Comment 15. Page 22, Section C.

C. Chat from Mining was Widely Used by Residents in St. Francois County and Other Areas as Fertilizer.

For a number of reasons, granular mine tailings ("chat"), when used as agricultural lime fertilizer, cannot and should not be addressed in EPA's Proposed Plan. Agricultural lime is not regulated under federal or state law with respect to contaminant remediation levels. More importantly, EPA does not have jurisdiction over this product because it is exempted from CERCLA: (1) because chat used as fertilizer is exempted from the definition of "release" under CERCLA; and (2) because the consumer use of chat as fertilizer exempts the product from the definition of "facility" under CERCLA. Because of these factors, EPA does not have the authority to respond to or conduct a remedial action to address releases from chat used as fertilizer.

EPA RESPONSE:

EPA does not agree with this comment that EPA does not have authority under CERCLA to address mine waste in St. Francois County because some mine waste was historically used as agricultural lime.

EPA agrees that the definition in CERCLA Section 101(22) of "release" exempts the "normal application of fertilizer." 42 U.S.C. § 9601(22). However, EPA does not agree that this provision of CERCLA prohibits EPA's authority to address lead contamination in residential yards under the Superfund. The remedial action does not address agricultural areas. The purpose of the remedial action is to address mine waste that has been transported by wind and erosion and manually transported to residential properties. Further EPA does not agree that all lead contaminated mine waste is exempt from regulation.

EPA also agrees that the definition in CERCLA Section 101(9) of "facility" excludes "any consumer product in consumer use." 42 U.S.C. § 9601(9). However, EPA does not agree that all mine waste that has come to be located in residential yards may not be addressed under EPA authority under the Superfund. The definition of "facility" under CERCLA provides in part that a facility includes "any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located..." 42 U.S.C. § 9601(9). The site inspection and site assessment for this Site identified potential sources of mine ore processing waste and established that the hazardous substance, lead, was present in elevated concentrations in samples from mine waste, groundwater, sediments and soil throughout the Site.

Further, Doe Run has known since the late 1980's that EPA considered the releases of mining wastes from the mine waste piles by wind and water erosion to be significant enough to warrant listing the Site on the National Priorities List of the highest priority sites for action in the country. Doe Run was also well aware of the negative health impacts to human health and the environment that result from lead exposure. Even with this knowledge, it was necessary for EPA in 2003 to order Doe Run to end the practice of providing lead contaminated tailings for sale as an agricultural amendment. Doe Run's assertion that because there was no regulation regarding lead contamination levels in the sale of a "product", it is necessarily exempt from Superfund authority, is incorrect.

Comment 16. Page 26, Section D.

D. Naturally Occurring Lead is Abundant throughout St. Francois County

Section 104(a)(3)(A) and 40 CFR § 300.430(b)(1) specifically prohibit EPA from using its CERCLA authorities to respond to a release of naturally occurring substances. Yet, EPA has arbitrarily refused to evaluate the extent to which naturally occurring lead is contributing to the detected contamination. As a result, EPA's proposed remedy requires response action with respect to all lead detected, regardless of its source. This result is inconsistent with CERCLA and the NCP.

EPA RESPONSE:

EPA agrees that CERCLA section 103(a)(3)(A) prohibits response actions to a release of a "naturally occurring substance in its unaltered form". However, EPA disagrees that EPA has failed to evaluate the extent to which naturally occurring lead contributes to lead contamination in residential yards.

The Subsurface Soil Investigation showed that lead levels drop significantly from the surface down to 30 inches below ground surface (bgs) in 98 percent of the samples. This investigation covered the entire response area, which is outlined in Figure 1 of the ROD. Additionally, the background soil lead level used in the RI was 62 mg/kg. The lead levels found in the Response Area were much higher than this level.

EPA acknowledges the possibility of naturally occurring lead ores. EPA has addressed this comment by adding the following language to the ROD, "EPA will not intentionally address naturally occurring lead ores in their undisturbed state as part of this action. Although the Site has been heavily mined in the past, it may be possible to encounter naturally occurring lead ores during residential property excavation. Section 104(a)(3)(A) of CERCLA states that removal or remedial actions shall not be provided in response to a release or threat of release "of a naturally occurring substance in its unaltered form, or altered solely through natural processes or phenomena, from a location where it is naturally

found." Naturally occurring lead ores could be found at the bedrock interface. Another indicator of the presence of naturally occurring lead ores could be a high density of galena crystals in soils or unusually high concentrations of lead in excavated soils. When these conditions are encountered, they will be documented, excavation will stop, and backfilling will be initiated."

Comment 17, Page 31, Section E.

E. The EBL Data Shows no Correlation with the Mine Waste Sources or with Lead Detections in Yards.

1. The arbitrary nature of EPA's assumptions is supported by the Interim Action Report, the RI and the subsurface soil study, all of which show no correlation between BLLs and the piles or yard levels.

EPA RESPONSE:

EPA disagrees with this comment. See responses to Comments 2 and 5.

Comment 18. Page 38, Section II.

II. EPA's Proposed Cleanup Levels for Subsurface Soils and Their Application to Non-Residential Properties are Unsupported by the Data.

The risks in the HHRA are calculated based on the average soil lead level in a residential yard (consistent with lead risk assessment guidance) (EPA, 2009, see page 4-6). However, the Proposed Plan calls for excavation of any quadrant with a sample above 400 mg/kg even if the yard average (average of all quadrants) is below 400 mg/kg. This remediation strategy is not consistent with how the risk assessment was done, and requires more remediation than needed in order to achieve the Remedial Action Objective (RAO) (stated in the Proposed Plan) to: "Reduce the risk of exposure of young children (children under seven years old) to lead such that an individual child or group of similarly exposed children have no greater than a 5 percent chance of exceeding a blood lead level of 10 ug/dL."

Note that when a cleanup level represents a target average concentration for a property, the remediation should be conducted such that the post-remediation property average will be at or below the cleanup level. If every yard quadrant that exceeds the cleanup level is remediated, this may over-achieve the cleanup level on average. At the soil cleanup level of 400 mg/kg selected in the Proposed Plan, evaluating the need for remediation on the basis of risk (average concentration) rather than on the exceedance of a single sample would likely reduce the number of properties requiring remediation while still achieving the RAO. It will also serve to relieve homeowners of intrusion of unnecessary yard removals.

EPA RESPONSE:

EPA disagrees with this approach because it could potentially underestimate the risk, especially if a child uses one area of the yard more than others, such as play areas. Using yard wide averages could result in a scenario in which the yard wide average would be below 400 ppm lead, even where one quadrant is highly contaminated, for example: assuming four quadrants in which results are; 1200 ppm lead; 50 ppm; 50 ppm; and, 50 ppm; the yard wide average would be 337 ppm. In this example no

removal action would be conducted at the property because 337 ppm is less than 400 ppm. However, this situation would leave an entire quadrant contaminated with lead at the surface at 1200 ppm which is the default value for EPA to take prompt action in residential soils (OSWER 9285.7-50, Superfund Lead-Contaminated Residential Sites Handbook, 2003).

In addition, the sampling process for residential properties uses composite sampling which is an averaging technique. Performing additional averaging of composite results has the potential to mask higher detected concentrations and is not recommended (or can result in the above example being repeated).

Comment 19. Page 38, Section III, Subsection A.

III. The Boundary Area of the Proposed Remedy is not clearly defined and May Arbitrarily Extend Beyond Defined Response Area.

A. The EPA Must Clarify that the Proposed Remedy Pertains only to the Defined Response Area.

EPA RESPONSE:

The Response Area has been clearly defined by the RI/FS, however the definition of "facility" under CERCLA includes those areas where a hazardous substance comes to be located. The Selected Remedy will require additional sampling. At present, the Selected Remedy focuses on the Response Area but may move outside the Response Area based on further investigations.

The Selected Remedy is based on a large data set and provides a reasonable estimate of the extent of the number of contaminated properties that will require cleanup. At large lead mining and processing sites, it is not possible or necessary to sample every property and the site boundaries could grow as a result of future sampling as part of the design and implementation of the remedy. The same criteria will be used to determine the ultimate Site boundary as were used to make the estimate. Any property with mid-yard lead concentrations above the Site-specific cleanup level will be a candidate for action. The frequency of detections above the Site-specific cleanup level in a given area of the county will be used to establish the final boundary. It must be recognized that this material has migrated to residential properties by a combination of wind and water erosion and uncontrolled anthropogenic means.

Comment 20. Page 39, Section B.

B. EPA's Broad Definition of "Residential Properties" is unsupported by the Record.

For the purpose of the this proposed remedy, EPA broadly defines "residential property" as "properties that contain single- and multi-family dwellings, apartment complexes, vacant lots in residential areas, schools, daycare centers, playgrounds, parks and green ways." This definition is overly broad for several reasons. First, by including vacant lots and greenways, EPA is including potentially many more parcels than were included in the cost estimates for the remedial alternatives, thus invalidating the evaluation of those alternatives in light of the nine CERCLA criteria, particularly cost-effectiveness. The costs estimates were based on the number of residences provided by EPA. Additionally, EPA's proposal to apply its cleanup levels to these parcels is unsupported by the record and would be arbitrary and capricious.

The Feasibility Study Report states, "On April 14, 2010, EPA provided an estimate of '7,036 occupied houses total, not counting the houses in Doe Run,' based on the most recent census data for each city in the Response Area." 93 yards were added for the town of Doe Run, resulting in a total of 7,129 yards. By adding an unknown number of undefined "vacant lots" and "green ways" to the remedial action will greatly affect the costs and fundamentally alter and invalidate EPA's evaluation of the remedial alternatives, particularly with regard to the cost-effectiveness of the proposed remedy. The Focused RI defined "residential yards" to be the area within 200 feet of the house on each property. The Proposed Plan offers no such definition for vacant lots or green ways, which can and in fact do, encompass many acres throughout the Response Area and St. Francois County.

EPA RESPONSE:

EPA disagrees with this comment. The cost estimate for the Selected Remedy is based on the EPA Guidance ("A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" OSWER 9355.0-75, 2000) which states that costs are to be developed such that accuracy of the estimates are anticipated to fall within the acceptable range for typical feasibility study evaluations of +50 percent to -30 percent.

It is appropriate to include vacant lots in the definition of residential properties. Vacant lots are potential future residential yard and current play areas. They would not be the highest priority for action but will be addressed in otherwise (or areas zoned) residential areas. Further, vacant lots will not significantly affect the cost of the Selected Remedy.

Comment 21. Page 40, Section C.

C. EPA's Proposed Cleanup Levels for Vacant Lots, Parks and Green Ways is Unsupported by the Record and Contrary to Guidance.

EPA RESPONSE:

EPA disagrees with this comment. The definition of residential properties is in accordance with EPA guidance. Residential properties are defined in the Handbook (OSWER 9285.7-50, Superfund Lead-Contaminated Residential Sites Handbook, 2003) as any area with high accessibility to sensitive populations, and includes properties containing single- and multiple-family dwellings, apartment complexes, vacant lots in residential areas, schools, day-care centers, community centers, playgrounds, parks, green ways, and any other areas where children may be exposed to Site-related contaminated media.

Comment 22. Page 41, Section D.

D. EPA's Application of Residential Cleanup Levels to Non-Residential Properties is Contrary to HUD Guidance.

EPA RESPONSE:

Please see response to comment 18 above. EPA is addressing only residential properties as defined in the Handbook.

Comment 23. Page 42, Section A.

A. EPA misstated Alternative 2 as it was presented in the FS.

In its description of Alternative 2, EPA erroneously states that a visual barrier will only be place if subgrade soils are greater than 1,200 ppm rather than greater than 400 ppm as stated in the FS. Alternative 2 as set forth in the FS, is consistent with the yard soil removals that have been conducted in St. Francois County since 2000 under the Interim Action and Halo Removals. EPA's Plan states that only 7 percent or 280 yards would require these barriers and the accompanying institutional controls. However, the FS stated that under Alternative 2, up to 94 percent (approximately 3,760 yards), or potentially as few as 12 percent (approximately 480 yards) if barrier placement is based on 6-inch vertical subgrade composites rather than subgrade surface samples, would be required under Alternative 2 (NewFields 2011).

EPA RESPONSE:

Since the development of the FS, EPA has determined that lead concentrations below 1,200 ppm based on a 6 inch depth sample at greater than 12 inches below ground surface is protective. EPA has reflected this decision in the ROD. This is consistent with other mining sites in Region 7. The placement of orange-mesh plastic barrier on properties greater than 400 ppm would not significantly increase the protectiveness of Alternative 2 because it would not limit the concentration at 12 inches bgs. However, EPA has updated the ROD to reflect this comment.

Comment 24, Page 42, Section B.

B. EPA Ignored Aspects of Alternative 3 that do not compare favorable to Alternative 2.

EPA RESPONSE:

EPA believes that Alternative 3 is the most protective. EPA realizes there are negative aspects of all the alternatives and they are described in the ROD. EPA disagrees that the additional 32,700 cubic yards of waste soil will place a burden on the repository sites; each of the repository sites have enough capacity to accommodate the additional waste soil. The additional volume of top soil required for Alternative 3 is not significant in light of the total soil required for the remedy. Further, the additional required haul trips are not significant in light of the number of trips required overall for the remedy. While EPA agrees that the time for removals will increase for those properties that require additional excavation based upon a finding of lead contamination greater than 1,200 ppm at 12 inches, this is predicted to affect only approximately 280 properties and therefore should not increase the overall timeframe of the remediation beyond the goal of 7 years. EPA agrees that mixing could occur. The application of the action level requires consideration of the depths of excavation and other risk management elements. Due to the distribution of lead contamination in the soil profile at the Site, EPA has determined that backfilling of excavated areas to original grade with clean material after reaching a residual soil lead level less than 400 ppm in the upper 12 inches bgs, or a residual concentration of less than 1,200 ppm at a depth greater than 24 inches bgs, combined with other elements of the selected remedy, is protective of human health. These cleanup criteria are based upon a risk-management determination made by EPA in consideration of site-specific conditions at the Site and the experience gained in remediating thousands of properties using this strategy.

Comment 25, Page 43 Section C.

C. EPA Arbitrarily Disregarded ATSDR's recommendation regarding Maintenance of "One-Call" Database for Notification Purposes.

EPA RESPONSE:

The "One Call" Database has been evaluated at other sites and is not considered a viable alternative to cleanup. The nature of the visual barrier is unlike a buried electrical line or underground piping system in that it can cover an entire area of a property at varying depths and past inquiries with "one call" providers have not been successful with this type of problem. The region will seek to work with local agencies to provide records of contamination left in place for future development as informational controls.

Comment 26, Page 44, Section D.

D. EPA's evaluation against the Nine Criteria was flawed.

EPA RESPONSE:

- Alternative 1 would not be protective because it would not achieve the RAO based on the action level.

- Alternative 2 would be less protective than Alternative 3 because lead would remain at unlimited concentrations at 12 inches below ground surface (bgs). Alternative 3 would address lead levels greater than or equal to 1,200 ppm down to 24 inches bgs.

- Regarding contamination below 12 inches bgs, EPA agrees that 7 percent of remaining properties may be an underestimate. EPA based this on the only reliable data that has been collected based on 6 inch intervals; however, EPA has included all previously remediated properties greater than or equal to 1,200 ppm at 12 inches below ground surface in the ROD property counts.

- EPA agrees that Alternative 2 would be protective if there was a guarantee that there was no future disturbance of the overlying soil. Alternative 3 would go one step further to protect the residents even if disturbance occurred. This is explained in further detail in the ROD.

Comment 27, Page 47, Section V.

V. The Proposed Plan has numerous misstatements of facts and key omissions of fact.

EPA RESPONSE:

Subsection 1

1. There appears to be significant overlap between these OUs, and it is unclear how each operable unit relates to the others, or to this Proposed Plan, which is identified as addressing only OU 1. For example, as described in the Proposed Plan, OU-00, OU-1 and OU-3 all address residential properties

and CHUAs. The record is unclear as to how each Operable Unit is distinguished from the other, the extent to which this proposed remedy addresses risks being addressed in other OUs, and the extent to which this proposed remedy addresses residential risks in connection with the other OUs. EPA should clarify its record in its regard.

- **EPA has corrected the Operable Unit descriptions in the ROD.**

Subsection 2

2. The Proposed Plan states on Page 2 that mine wastes have contaminated soil, sediment, surface water and groundwater. Yet on Page 12, EPA concedes that elevate lead concentrations in groundwater (less than 15 ug/l) occur "sporadically and were limited to four wells and could not be linked to the mining activities at the Site." Any statement about mining waste contaminating groundwater should be removed from the Proposed Plan and any decision document.

- **Elevated lead levels were found in shallow groundwater around the Big River Mine Tailings Pile. Additionally, elevated zinc levels in groundwater can be attributed to mine waste. This statement does not affect the Selected Remedy.**

Subsection 3

3. The Proposed Plan (page 7) discusses the 1998 Lead Exposure Study conducted by MDOH and the high percentage of children in St. Francois County with elevated blood lead levels (17 percent). However, the plan does not discuss the most recent blood lead levels for the county that were reported in the FS, "Missouri Department of Health and Senior Services (MDHSS) reports that the percent of elevated blood lead in children less than 6 years of age in St. Francois County has dropped from 12 percent reported in the 2000 calendar year to 1 percent in the 2010 calendar year (MDHSS 2003, 2011b)." While we understand EPA's argument that the IEUBK model and the potential for high bioavailability for lead in yard soils predicts the potential for the children in St. Francois County to have elevated blood leads, the statistics for the county demonstrates the county's child EBL levels are dropping either without the benefit of soil yard remediation as proposed by EPA and are likely due to an improved education of lead issues.

- **This comment was addressed previously on page 7.**

Subsection 4

4. Page 7 of the Plan states, "the Subsurface Soil Report concluded that 93 percent of the elevated lead concentrations were found in the upper 12-inches of soil." This is a misrepresentation of the Subsurface Soil Report which actually concluded that "Seven (7) percent of the yard quadrants after a 1 foot excavation would have confirmation subgrade soil lead concentrations greater than 1,200 ppm." The FS uses this conclusion to assess the potential for an excavation to require further excavation under Alternative 3 (the EPA selected alternative). We find using this statistic as a conclusion regarding percentage of elevated lead concentrations confusing and misleading.

- **EPA agrees with the recommended language and has included the language in the ROD.**

Subsection 5

5. The Proposed Plan (page 7) states that the 2004 removal action (Halo) is ongoing and then (on page 10) states that 1,000 properties remain to be addressed under the Halo Removal Action. These are the yards sampled under the Interim Action but were not included in the Halo Removal Action as they were beyond the Halo (typically between 500 to 1000 feet from the piles). These 1000 yards appear to be in the 4000 yards that are covered under the Proposed Plan with the exception of this statement. As we (Doe Run) are implementing the Halo Removal Action and we find these statements confusing, we are unclear as to what EPA is trying to relay to the public by these statements.

- **EPA agrees with the comments and has updated the ROD accordingly.**

Subsection 6

6. Page 8 of the Plan states, "(a)t the end of the Interim Action (March 30, 2004), 1,955 residential yards had been sampled and 563 homeowners had refused sampling. Under the Halo Removal Order, 27 additional yards have been sampled; of these yards 22 were sampling refusals during the Interim Action, two were not within the Halo but were sampled due to the presence of a child with elevated blood-lead levels, and two were childcare facilities." It is unclear where EPA derived the statistics for yards sampled under the Halo Removal Action. The FS states, "At the end of the Interim Action (March 30, 2004), 1,955 yards had been sampled and 563 homeowners had refused sampling, for a 78 percent sampling rate. As of January 31, 2011, 2,057 residential yards and 12 CHUAs had been sampled and 532 property owners had refused yard soil sampling with a final residential yard sampling refusal rate of 21 percent." Using these statistics and noting that 45 yards were sampled as part of the Subsurface Soil Investigation, an additional 69 yards/CHUAs were sampled as part of the Halo Removal Action. Of these 69 yards and CHUAs, 3 were parks, 5 were child care or school playground facilities, 29 were previous residential yard refusals (all but one located within the Halo), 17 were non-Halo residential yards sampled due to the presence of a child with elevated blood-lead levels, and the remaining 15 yards were primarily new construction within the Halo.

- **EPA agrees with this comment and has updated the ROD accordingly.**

Subsection 7

7. The Plan makes the statement "The communities of Farmington, Bismarck and Iron Mountain Lake are outside of the mining area but will be included in future investigations." It is unclear what the purpose of this sentence is and its relation to the Site. As stated above, the FS, including cost estimates, were based on the Response Area only. These communities lie outside the Response Area. If EPA contemplates including them or other locations outside the Response Area, it will render the cost estimates inaccurate, as well as EPA's evaluation of the cost-effectiveness of the proposed remedy.

- **This comment was addressed previously on Page 21.**

Subsection 8

8. This Plan is confusing as to what would make a residence qualify for inclusion in the remedy. The Plan states on pages 14 and 16 that "Residential properties where no quadrant samples exceed 400 ppm lead would not be addressed under this alternative [2-3]". And then later in Alternative 2 on page 14

states, "Excavation of a residential property would be triggered when the highest recorded soil sample for any defined area of the property contains greater than or equal 400 ppm lead." Alternative 3 does not include this statement. However the cost tables included in the Proposed Plan are from the FS and they show driveway only, garden only, and play area only yards in both alternative costs.

- **EPA agrees with this comment and has updated the ROD accordingly.**

Subsection 9

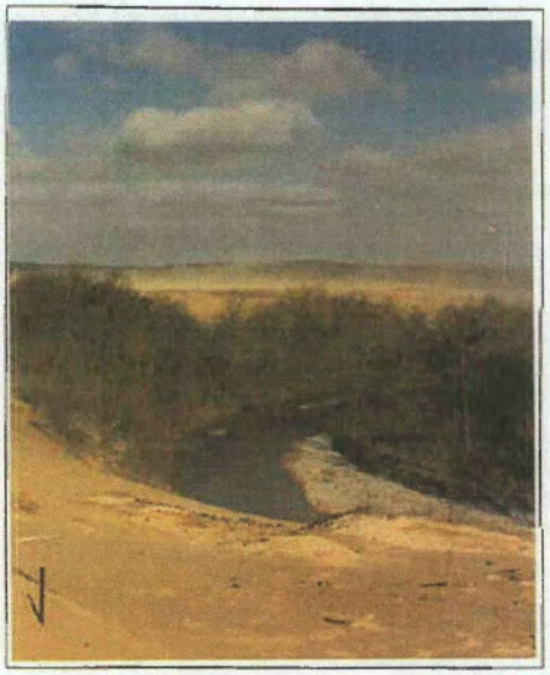
9. The Plan states "The physical barrier will function as a warning that digging deeper will result in exposure to soils contaminated with lead at a level that EPA has determined to be a human health concern." The concentration for which a visual barrier is placed under the Proposed Plan is 1,200 ppm. However, in the HHRA summary and discussion the plan states on page 12 that "a lead soil concentration of 400 ppm to ensure that a child has less than a 5 percent probability of having a blood-lead level exceeding 10 ug/dL." And the only mention of the 1,200 ppm in the HHRA is in the statement "In past experience at Superfund sites where lead is the contaminant of concern, the EPA generally selects a residential soil cleanup level within the range of 400 ppm to 1,200 ppm for lead..." The RAO section of the Proposed Plan (pages 12-13) makes it clear that exposures above 400 ppm lead under the assumed exposure conditions would create an unacceptable risk for a child. We believe EPA needs to clearly state its rationale for the acceptance of soil lead concentrations between 400 an d1200 ppm lead at depth; as mentioned above we do not necessarily agree with EPA's interpretation of the ATSDR document especially in regard to the lack of institutional controls under these conditions.

- **EPA agrees with this comment and has updated the ROD accordingly.**

ATTACHMENT A

Ecology and Environment, Inc.

PHOTOGRAPHIC RECORD



SITE NAME: Big River Mine Tailings

SITE LOCATION: Desloge, Missouri

TDD/PAN#: F-07-9004-011/FM00616XA

No: 3
Subject

Tailings migrating via wind erosion. Proximity of site to Big River on east side of site.

Photographer
Overfelt

Witness
Gene Gunn

Date/Time
January 1988

Direction
Northwest

No: 4
Subject

Dune features migrating west to east in east central meander area.

Photographer
Overfelt

Witness
Willians

Date/Time
7/26/90
1540 hours

Direction
North

COMMENTS ON THE BIG RIVER MINE TAILINGS SITE OPERABLE UNIT NO. 1

JULY, 2011 PROPOSED PLAN

The Doe Run Resources Corporation offers the following comments in response to the Proposed Plan issued in July 2011 by the U.S. Environmental Protection Agency Region 7 ("EPA") for Operable Unit No. 1 at the Big River Mine Tailings Site ("Site") in St. Francois County, Missouri. EPA issued the Proposed Plan for a 30-day public comment period on July 22, 2011, and extended the comment period an additional 30 days until September 21, 2011. In its Plan, EPA proposes to address potential risk to human health posed by lead mining wastes in residential yards. Specifically, EPA proposes a remedy that includes excavating soil in residential properties with surface soil lead detected at levels greater than or equal to 400 parts per million ("ppm") to a depth of 12 inches, greater than or equal to 1200 ppm lead to a depth of 24 inches, and installing a visual barrier at 24 inches where lead greater than or equal to 1200 ppm is detected at that depth. EPA estimates the proposed remedy will address approximately 4,000 residential properties at an estimated present worth cost of $107.62 million.[1]

The Doe Run Resources Corporation conducts metals mining and processing activities in Missouri, where it employs approximately 3,000 people. As an active employer and member of the Missouri Lead Belt community, Doe Run has worked closely and cooperatively with EPA since the early 1990s to investigate and remediate residual contamination from historic mining activities in the Region in order to ensure that any risks are appropriately addressed. Since 1994, Doe Run has spent approximately $62 million on response actions in St. Francois County. It has devoted significant

[1] For cost estimating purposes, the Feasibility Study assumed 4,540 yards would be addressed. The FS estimated a present worth cost of the proposed Alternative 3 at $108.68 million.

resources and expertise to identifying and defining potential risks to human health and the environment that may exist as result of historic mining activities in the County, and has conducted extensive removal actions to cooperation with EPA, the State and St. Francois County.

EPA has identified eight sources of mine waste in the former mining area of St. Francois County.[2] Since 1994, Doe Run has investigated and stabilized six of these large tailings Piles and a portion of the small Hayden Creek pile to minimize any further releases from those Piles. We understand EPA plans to address the Doe Run Pile, not associated with The Doe Run Resources Corporation, as part of another operable unit. Beginning in 2000, Doe Run began sampling and, where appropriate, remediating residential properties and child high-use areas ("CHUAs"). In 2004 Doe Run began remediating all residential properties and CHUAs with yard soil concentrations greater than 400 ppm located within 500 feet from each of the six major mill piles, 1,000 feet from the four identified smelters and 100 feet from mine shafts identified in the Remedial Investigation. Additionally, Doe Run sampled and remediated yards where elevated blood-lead levels in children ("EBLs") were detected, regardless of their distance from the Piles. As of January 2011, Doe Run has sampled a total of 2,057 residential properties and child high-use areas, and conducted total or partial removals at 586 of those properties.[3] Finally, Doe Run conducted the Focused Remedial Investigation efforts and the prepared the Feasibility Study as directed by EPA. Doe Run proactively did this work in response to EPA's requests regardless of the lead source.

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[2] The Proposed Plan identifies eight areas, collectively referred to herein as the "Piles:" Desloge Pile, National Pile, Leadwood Pile, Elvins/Rivermines Pile, Bonne Terre Pile, Federal Pile (St. Joe State Park), Doe Run Pile and Hayden Creek.

[3] These numbers are from the Feasibility Study. The numbers contained in the Proposed Plan are incorrect.

Concurrent with these efforts, the State and County Departments of Health launched extensive educational programs both in the area and statewide directed to risks associated with lead and how to reduce exposure, particularly of young children, to lead from all sources, including in particular lead-based paint ("LBP"). As shown in Figure 5, infra, the occurrence of EBLs in St. Francois County has fallen substantially since 1997. In fact, the Missouri Department of Health and Senior Services ("MDHSS") reports that occurrence of EBLs in St. Francois County have been less than 5% since 2006. In 2010, the rate of occurrence was reported to be 1%[4] In other words, the rate of occurrence in St. Francois County has already been reduced to a level consistent with EPA's Remedial Action Objective, and to a level less than the national average of EBL.

This Operable Unit presents highly complex issues with regard to the nature and extent of the contamination and the potential risks resulting from it. These issues relate to the lack of correlation between EBLs and identified mine waste source areas; the large volume of mine chat and tailings and their varied uses; the widespread, yet unaccounted-for occurrence of LBP in residences in the area; and the abundance of naturally occurring lead in the area. These complex issues warrant very careful scrutiny in determining the appropriate use of CERCLA statutory authorities and resources.

Doe Run maintains that in a rush to complete the Feasibility Study EPA has failed to consider pertinent analysis of the data provided by Doe Run. In issuing its Proposed Plan with undue haste, EPA made unfounded and arbitrary assumptions regarding the source of contamination, disregarded serious questions regarding the associated potential risk, and disregarded the limits of EPA's CERCLA authorities to respond to conditions at the Site. As a result, EPA now proposes a remedy that 1) is beyond the scope of its

[4] See Exhibit 1. MDHSS 2010 Calendar year Blood Lead Testing Data.

CERCLA response action authorities to the extent it addresses naturally-occurring contamination, lead from building materials, including LBP, consumer products in consumer use, and normal fertilizer use; 2) has not been demonstrated to be necessary to protect human health and the environment; and 3) is otherwise inconsistent with Section 121 of CERCLA and the National Contingency Plan ("NCP"). Accordingly, Doe Run urges EPA to take additional time as needed to carefully evaluate the source of the contamination, evaluate the extent to which unrelated sources, including sources over which EPA does not have CERCLA response action authority, are the true cause of EBLs, and more carefully evaluate the true nature of any remaining risk to human health resulting from mining activities. Only then can EPA develop a remedy that responds more directly to any remaining risk, presents a better balance of trade-offs and is consistent with CERCLA and the NCP.

I. EPA ERRONEOUSLY ASSUMED THE PILES/MINING WASTE ARE ONLY SOURCE AND PRINCIPAL THREAT.

The NCP requires that EPA properly scope the project to ensure the RI/FS is properly designed. 40 C.F.R. § 300.430(a)(2). "The investigative and analytical studies should be tailored to site circumstances so that the scope and detail of the analysis is appropriate to the complexity of site problems being addressed. 40 CFR § 300.430(b). EPA is required to develop a conceptual understanding of the site, or a conceptual site model. 40 CFR § 300.430(b)(2). Section 104(a)(3)(A) and (B) of CERCLA and 40 CFR § 300.400(b)(1) and (2) specifically prohibit EPA from responding to a release of a naturally occurring substance or products that are part of the structure or result in exposure to residential buildings or business or community structures. Additionally,

Section 101(9) and (22) of CERCLA exclude consumer products in consumer use and the normal use of fertilizer from EPA's response action authorities.

In its conceptual site model, EPA identified historic mining wastes as the only source of contamination at the Site.[5] In violation of its obligation under the NCP, the Agency erroneously failed to consider alternative sources for contamination in yards, including LBP, other consumer products, the normal use of fertilizer and naturally-occurring lead. While EPA's conceptual site model does recognize human movement of chat from the piles, much of that use, including but not limited to the use of chat as agricultural lime, represents consumer use of a consumer product and/or normal fertilizer use over which EPA has no authority to conduct a response action.

In its Proposed Plan, EPA ignores these sources, stating that Operable Unit 1 includes "lead-contaminated surface soils present at residential properties across the site that have been contaminated as a result of migration of metal-bearing materials from past mining practices via natural erosional processes, windblown mine waste and human activity." The Proposed Plan "addresses the risk to human health and the environmental resulting from exposure to residential soils contaminated with lead mine waste." It further states, "(t)he eight mine waste areas are the source deposits and constitute the principal threat to human health and the environment," and that "(t)he sources of most of the lead contamination in the site are the large mine waste piles...." In fact, EPA's conceptual site model overestimates the extent of air dispersion from the Piles. This, coupled with EPA's arbitrary disregard of other sources for lead, result in a remedy that reaches outside the scope of EPA's response action authorities and without regard to the true cause of the risk the remedial action is intended to address.

[5] *See* 2009 EPA Human Health Risk Assessment.

A. The RI Data Demonstrates that Air Dispersion Releases from the Piles are Limited to 200 Feet, and any Risk Associated with These Releases already have been Protectively Addressed.

EPA's first technical error is its assumption that wind dispersion from the Piles resulted in widespread contamination. The Proposed Plan states, "The mine waste ha(s) contaminated soil, sediment, surface water and groundwater. Mine waste also has been transported by wind and water erosion and manually relocated to other areas throughout St. Francois County. It has also been reported that mine waste has been used on residential properties for fill material and private driveways, used as aggregate for road construction."

1. RI data demonstrates that air dispersion releases from the piles are limited to a 200-foot area surrounding piles.

No studies conducted to date show a correlation between the residential properties yard soil lead concentrations and the processes of wind and erosion from the piles. As part of the Focused RI (NewFields 2006), the impact of particulate deposition from the mill waste piles was investigated. Shallow soil samples were collected along upwind transects and downwind transects at five large piles. Lead concentrations in near-pile soils in the downwind transects were found to be higher than background concentrations in a narrow "affected" zone about 200 feet wide around the piles, and then averaged beyond the 200 feet 180 mg/kg lead.

In concert with the RI near-pile sampling, EPA requested Idaho National Engineering and Environmental Laboratory (INEEL) to perform air dispersion and deposition modeling of airborne lead associated with mill waste piles, *Air Dispersion Modeling of Mine Waste in the Southeast Missouri Lead Belt* (Abbott 1999). The air dispersion model was used to predict maximum lead concentrations in air and downwind

soil lead concentrations, and to place the downwind transects. The model and soil sample results were matched and used to predict geometric mean lead concentrations assuming 80 years of deposition accumulating in a 2-inch soil column already containing 65 mg/kg lead. Predicted lead concentrations range from 300 – 500 mg/kg within 200 meters of the mill waste piles, and from 125 – 175 mg/kg out to 1 kilometer. The model-predicted soil lead concentrations apply only to the upper two inches of soil and to "generally undisturbed surface soils which have not been subjected to significant tillage, excavation, landscaping or flooding." (Abbott 1999). The model-predicted soil concentrations are generally consistent with the near-Pile soil sampling results. (Abbott 1999, NewFields 2006).

It is also important to note that lead ambient air emissions in the Site area have been monitored for many years by Doe Run and other government agencies, beginning before the Piles were stabilized. Doe Run operated the "Big River Network" in the Site area from 1996 until 2005. The monitored lead ambient air concentrations for all monitors were well below the then applicable 1.5 ug/m3 lead NAAQS standard and in most all respects were also below the now much more stringent 0.15 ug/m3 lead NAAQS standard. More recent air monitoring conducted by Doe Run and MDNR within the Site area show consistent compliance with the 0.15 ug/m3 standard.[6]

These predicted soil lead concentrations do not explain the observed lead concentrations in yard soils. In fact, lead concentrations averaged above 700 mg/kg in the residential yard sampling programs conducted. Therefore, the Focused RI concluded

[6] See Exhibit 2. Various Information Regarding Ambient Lead Monitoring Stations and Lead Monitoring Results in and Around the Response Area.

that particulate deposition of lead from the mill waste piles was not the major contributor to lead in yard soils.

2. *Interim Action and Halo Removals Reached Beyond Potential Risk Posed by Air Dispersion from Waste Piles.*

Based on its long-held assumption that wind dispersion from the Piles were the principal source of contamination, EPA determined that sampling and soil removal of yards near the Piles was necessary to protect human health. In response, Doe Run agreed in 2000 to conduct soil sampling, blood lead sampling and soil removals from residential yards in the near vicinity of the Piles.[7] This work was done under the 2000 "Interim Action" administrative order on consent, and was continued in 2004 under the "Halo" administrative order on consent. These removal actions included work that was consistent with Alternative 2 in the Feasibility Study.[8]

Under the 2000 Interim Action, extensive surface soil sampling was performed at residential yards surrounding the Piles, and was designed to identify residences where soil removal or other actions might be required. At that time, yards and areas within yards with soil lead concentrations greater than 2,000 ppm were removed. The Halo Removal Action, which began in 2004, was conducted within the areas jointly called the "Halo" around the six major Piles located in St. Francois County. The Halo Removal Action included sampling of yards within the Halo that had not previously been sampled during the Interim Action and sampling of any identified yard outside of the Halo but within the Response Area at which an EBL child resided.

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[7] These activities also were conducted in areas located within 1000 feet of the smelters and 100 feet from identified shafts.

[8] The Proposed Plan misrepresents Alternative 2 in the Feasibility Study to the extent it describes the alternative as placing the visual barrier only if the subgrade soils are greater than or equal to 1,200 ppm rather that greater than or equal to 400 pm, as was proposed in the FS's Alternative 2, and as has been conducted for 10 years as part of the Interim Action and Halo Removals.

In the Interim Action and Halo Removals, if a portion of the yard qualified for yard soil removal, the soil was removed to a depth of one foot. The subgrade soils were screened with an XRF; and if subgrade soil lead concentrations were above 400 ppm, then a visual barrier was placed across the subgrade. The excavation was backfilled with clean soil (less than 240 ppm lead). Remedial Alternative No. 2 in the Feasibility Study is consistent with the removal methodology used in the Interim Action and Halo Removals.

To date, 387 yards have been completely remediated (all surface yard soil greater than 400 ppm have been removed). 55 homeowners within the Halo have refused yard removal, and 71 homeowners within the Halo have refused yard sampling. Of these 387 remediated yards, a visual barrier has been placed in at least some portion of 369 yards or almost 95%. The purpose of the visual barrier is to provide notice and reminder to property owners of the potential presence of lead at depth, so ensure that exposure to soil can be properly managed. An additional 188 residential yards have had some partial yard soil removal and almost 95% of those yards also have a visual barrier. Therefore, 543 yards within the Response Area or Site have existing visual barriers.

As of January 31, 2011, 2,057 residential yards and 12 Child High-Use Areas ("CHUAs") had been sampled. 532 property owners had refused yard soil sampling, resulting in a final residential yard sampling refusal rate of 21 percent. Some portion of the yard soils (yard quadrant, drive way, garden, play area, or drip zone) was above 400 ppm lead in 87 percent of all yards sampled (up through January 2011), or 84 percent when elevated drip zones only yards are excluded.

3. *Interim Action and Halo Removal Data Shows No Correlation Between Lead Levels and Proximity to Piles.*

Figure 1 presents the average yard soil lead concentrations relative to distance to the closest Pile. This figure demonstrates that there is no correlation of yard soil lead concentrations to the Piles. Furthermore, Figure 2, drip zone soil lead concentrations relative to distance from the closest Pile, also shows no correlation or trend indicating that the drip zone lead concentrations likely are not derived from an airborne source.

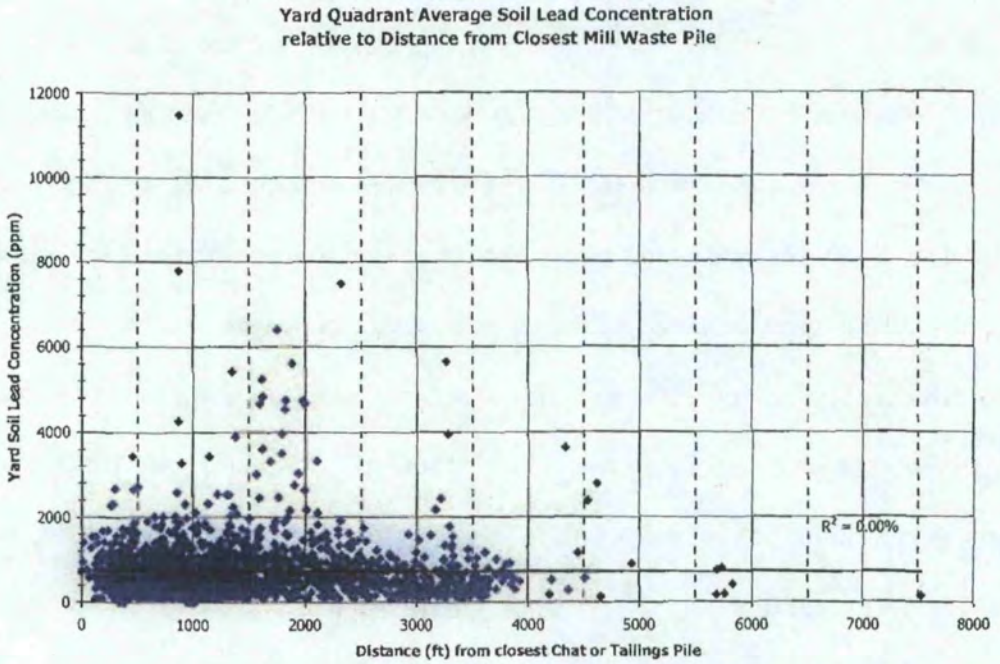


Figure 1 Average Yard Soil Lead Concentrations in the yard quadrants relative to Distance from the Closest Mill Waste Piles

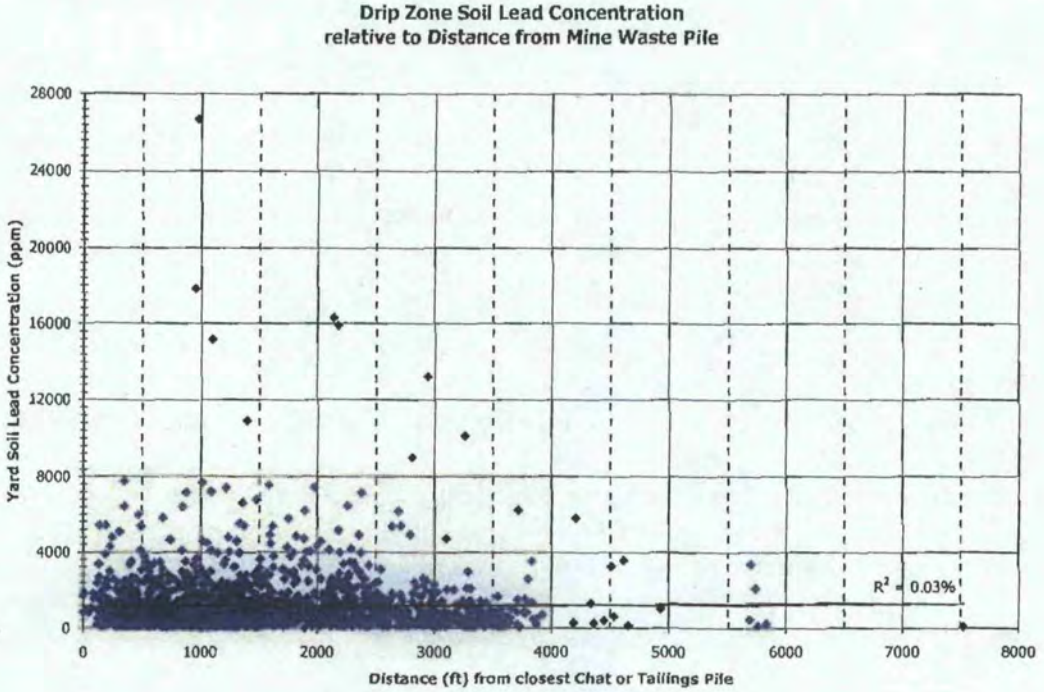


Figure 2 Drip Zone Soil Lead Concentrations relative to Distance from the Closest Mill Waste Piles

Sampling of the drip zone soil and screening for outdoor lead-based paint (LBP) conducted during the Interim Action was reported in the *Removal Action Report for Interim Action.*[9] The report stated that drip zone soils would be greater than 400 ppm lead in 93% of the homes with measureable outdoor LBP. 33% of those homes' drip zone soils would be greater than 2,000 ppm (NewFields 2004).

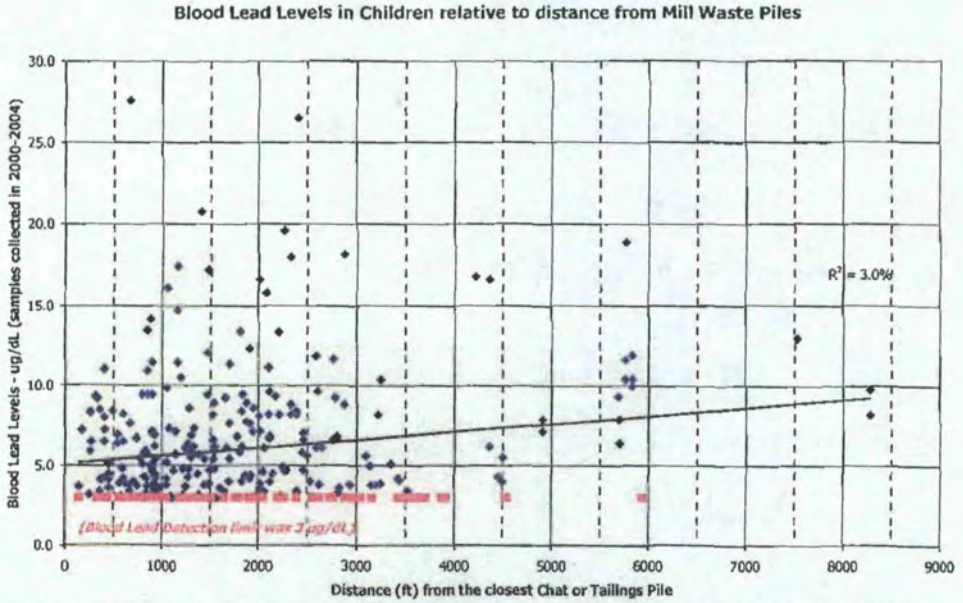
4. Even within the "Halo," the data show no correlation between the Blood Lead Levels and proximity to piles.

More than 300 children's blood lead levels ("BLLs") were sampled during the Interim Action's blood lead sampling program. Approximately 29% of the qualifying children (less than 84 months of age) identified within the Response Area were sampled. The average BLL in the Interim Action Response Area was 5.8 µg/dL. Of the children sampled, 11% had elevated EBLs greater than 10 µg/dL. These statistics are probably

[9] See Exhibit 3. *Removal Action Report Interim Action Removal* (Newfields 2004).

biased by the high rate of sample refusal (71%). Many of the program's blood lead sampling refusals were due to previous testing (most would not retest if a previous testing was found to be low) or parents deciding to have the child's doctor or health department tested the child (non-elevated results were unlikely to be, and were not reported to the study program as yard soil would not need to be addressed).

Of the children tested during the Interim Action, 32 resided in homes within the Halo (within 500 feet of the Piles). (See Figure 3). Of these, only one child was found to have an EBL. Notably, this child's corresponding yard soil lead concentrations were below 400 ppm in all parts of the yard (NewFields 2004). All other EBL children identified in the Interim Action, as well as any EBL children identified post-Interim Action, resided in homes with yards outside the Halo.



No child is represented more than once on the data set - blood lead concentration is either the initial blood draw or if a child less than one year that was sampled previously was resampled (a minimum of a year later) and the no action had occurred in the yard, the second sample result was included. Multiple children residing at one location, if sampled, are included in the data set. (NewFields and Gradient March 9, 2010)

Figure 3 Blood Lead Levels in Children (less than 84 months of age) relative to Distance from the Closest Mill Waste Piles

The lack of EBL yards within the Halo further supports the Interim Action's findings that BLL could not be correlated or appeared to have a direct relationship to yard soil lead concentrations. Figure 4 presents the soil lead data grouped into two data sets, elevated and non-elevated BLL. There is essentially no difference between the two groups except that the average lead concentration in drip zone soils is slightly higher in the elevated BLL subset.

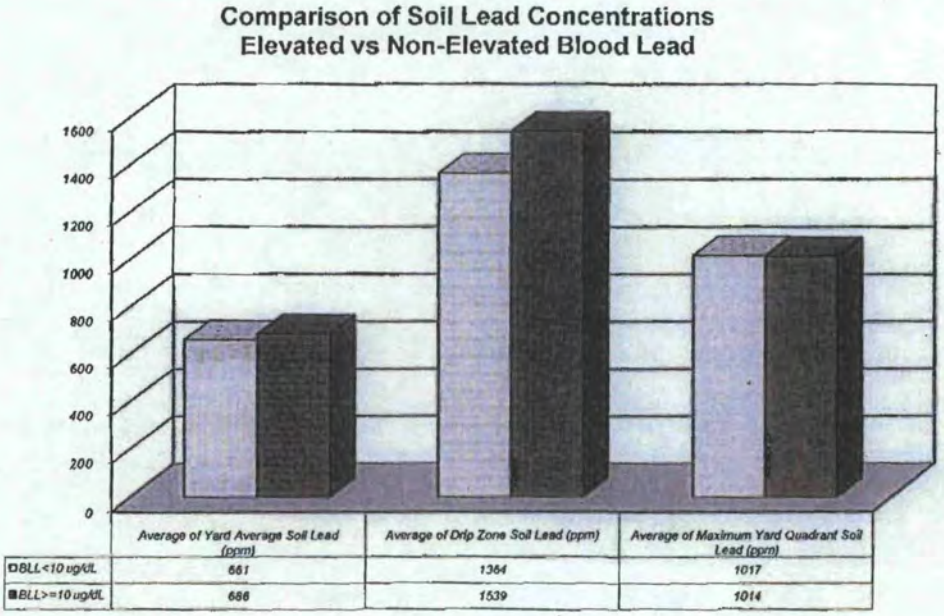


Figure 4 Comparison of Yard Soil Lead Concentrations and BLLs measured during the Interim Action

Correlation analyses were conducted using paired data sets to evaluate the relationship between BLL and play area maximum soil lead, yard average soil lead, drip zone soil lead, driveway soil lead and outdoor LBP. The correlation coefficients (R^2) for each sample population are listed below in order of increasing magnitude.

Blood Lead Correlations

BLL vs. Play Area Maximum Soil Lead	R^2=0.00
BLL vs. Yard Average Soil Lead	R^2=0.01
BLL vs. Drip Zone Soil Lead	R^2=0.01

BLL vs. Driveway Soil Lead	R^2=0.11
BLL vs. Outdoor Lead-Based Paint	R^2=0.145

The correlation coefficients are low for all the sample populations tested. For the regression BLL vs. Outdoor LBP, assays of lead that were greater than or equal 1 mg/cm^2 were taken as an indicator of LBP. These correlations were presented in the *Removal Action Report for the Interim Action.*[10]

Average blood lead concentrations from the Interim Action compare well to the previous blood lead study conducted in St. Francois County. The Lead Exposure Study in St. Francois County (MDOH 1998) found the average BLL to be 6.52 µg/dL with 17 percent of the population with elevated BLL. The Interim Action, conducted 3 to 5 years later in the same general area, found a decrease in BLLs with 5.8 µg/dL average BLL with 11% of the sample group with elevated BLL. The participation rate during the two studies was approximately 30%.

5. *Blood Lead Levels in St. Francois County Have Already Been Reduced to Levels Below EPA's Remedial Action Objective.*

The Missouri Department of Health and Senior Services ("MDHSS"), formerly Missouri Department of Health ("MDOH"), has maintained a data set of children, less than six years of age, who have been tested for BLLs since 1997. Note the percent of the population with elevated BLL identified in the Lead Exposure Study and the Interim Action cannot be compared directly to the MDHSS yearly statistics as these studies' statistics range over multiple years and are limited only to the study participants and therefore probably do not completely represent the area's unbiased population. The MDHSS data set is reported by county and may include the same child in multiple years

[10] See also Exhibit 4. Blood Lead Levels Measured during the Interim Action (2000-2004) by City and Distance to the Closest Pile, Railroad, and Highway.

due to possible yearly or biyearly testing. Figure 5 presents the percent of EBL children compared to the cumulative number of complete[11] yard soil removals conducted in the Response Area. As seen in this figure, the decline in St. Francois County's child EBL percentage dropped dramatically prior to majority of the yard soil removals.

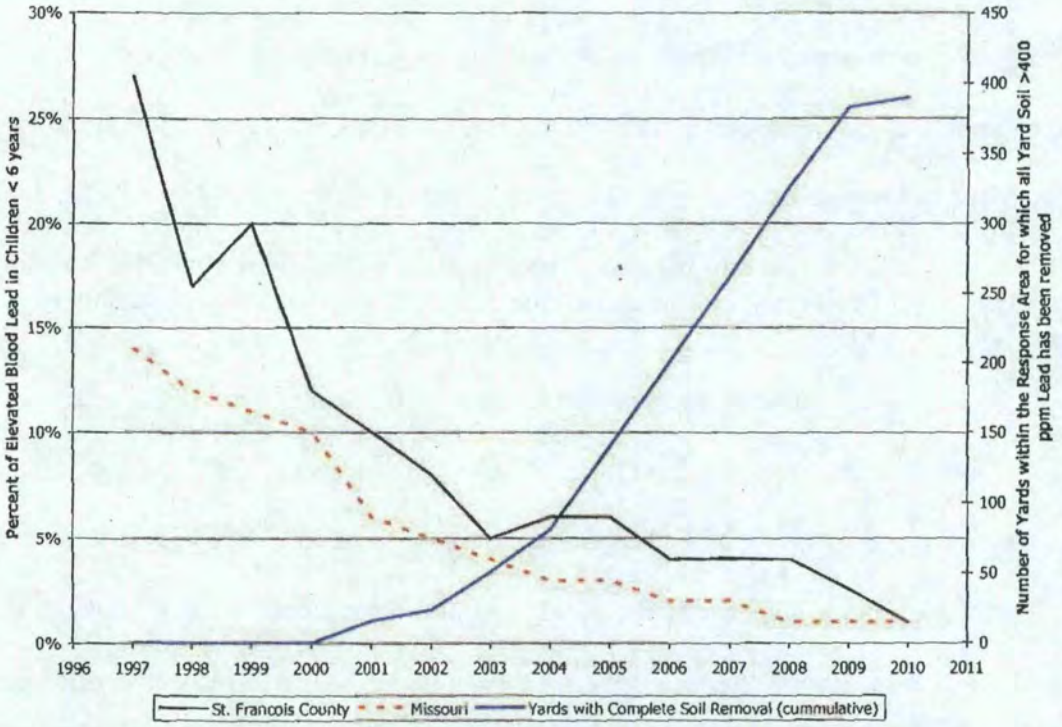


Figure 5 St. Francois County and Missouri yearly elevated blood lead percentages and cumulative complete yard soil removals

Blood lead levels among US children age 1 to 5, the population at the highest risk for lead exposure and effects, have been monitored and reported by the CDC and EPA and have declined steadily since surveillance began in 1976. Early (1976-1980) study reported a geometric mean BLL of 14.9 µg/dL just over 88% of this high-risk population had EBLs. Data collected from 1991 to 1994 showed that the geometric mean BLL for children was 2.7 µg/dL, with 4.4% of the children having EBL. Children age 1 to 5

[11] "Complete" yard soil removal is defined as all surface soil with lead concentrations greater than 400 ppm have been removed. "Partial" yard soil removal indicates that all surface soil with lead concentrations greater than 2,000 ppm have been removed.

whose blood was sampled as part of the 2007-2008 survey had a geometric mean BLL of 1.5 μg/dL, with 0.9% of the children having EBLs. The data for St. Francois County presented in Figure 5 are consistent with national averages and the decline in the child BLLs with time. The discontinued use of LBP and leaded gasoline, as well as the decrease of lead in food and toys, are the primary contributing factors to these drops in BLLs. Performance of yard soil removals within the County does not appear to affect the natural downward decrease in the County's BLL for children, which further indicates the EBLs had been caused by sources other than mining waste.

B. EPA failed to Identify, Characterize or Otherwise Consider Building Materials, Including LBP, as a Source of Lead Contamination or EBLs.

Section 104(a)(3)(B) expressly prohibits EPA from using its CERCLA response authorities to address releases from LBP. EPA's own directive states "Lead-based paint can be a significant source of lead exposure and needs to be considered when determining the most appropriate response action. Interior paint can contribute to elevated indoor dust lead levels. In addition, exterior paint can be a significant source of recontamination of soil."[12] Yet EPA has refused to acknowledge LBP's role as a source of contamination, much less evaluate the extent to which it is a source for contamination. EPA's refusal to do so is particularly arbitrary given the data at the Site that indicates LBP is a major source of contamination and a major cause of EBLs.

The Lead Exposure Study (MDOH 1998) identified both outdoor and indoor LBP at the Site and reported 64% of the homes had detectable outdoor LBP, 55% of the homes had detectable indoor LBP, and more than 51% of the homes in the study were older than

[12] Revised Interim Soil Lead Guidance for CERCLA sites and RCRA Corrective Action Facilities, OSWER Directives No. 9355, 4-12, August 1994.

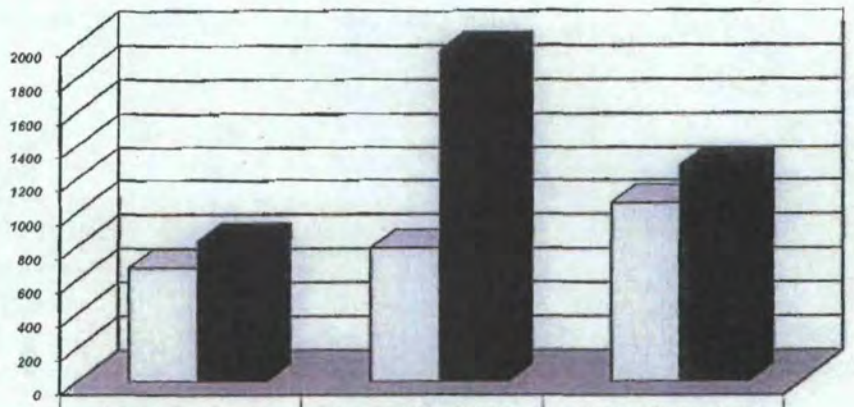
1970. The study noted that the strongest correlation of BLLs in the study area was to lead in dust on the floor, followed by indoor paint lead levels, and then lead on the window sills. Further correlations indicate that both indoor and outdoor LBP contributes to dust lead concentrations.

1. Significant amount of LBP was detected during the Interim Action

As reported in the Removal Action Report for Interim Action (NewFields 2004) and the Focused RI (NewFields 2006), many of the highest soil lead concentrations measured in the Interim Action sampling were in the drip zone.[13] Specifically, more than 42% of the drip zone samples had higher lead concentrations than the corresponding yard soil lead concentrations. Drip zone soil samples were commonly (39%) over 1.5 times the average yard lead concentration, indicating the lead source to the drip zone was potentially different or closer to the drip zone source.

Figure 6 presents a comparison of average lead soil concentrations in residential yards with ($\geq$1 mg/cm^2) and without (<1 mg/cm^2) lead-based paint made in the Interim Action (NewFields 2004). The comparison shows that drip zone soil lead concentrations are influenced by the presence of LBP. Paint chips were observed in some drip zone samples. Many homes in the area have had exterior painted surfaces covered with vinyl siding, and therefore, may be incorrectly identified in the "houses without lead paint" category and thus the concentrations for this category have a higher uncertainty than the "houses with lead paint."

[13] Drip zone is defined as the area within 2.5 feet of the house .



	Average of Yard Average Soil Lead	Average of Drip Zone Soil Lead	Average of Maximum Yard Quadrant Soil Lead
Houses w/o Lead Paint	670	787	1046
Houses w/ Lead Paint (>1mg/cm2)	828	1955	1276

Figure 6 Comparison of Yard Soil Lead Concentrations with measurable LBP (data set from the Interim Action)

Regardless of the uncertainty in the houses without outdoor LBP, the correlation between outdoor LBP and the drip zone samples indicates that LBP is a source of lead to yard soils. As discussed in Section 2.1, without an air-deposition source, the elevated lead concentrations in the drip zone soil would not be associated with airborne materials washing off the roof but rather an in-yard source. This same relationship of elevated drip zone soils to outdoor LBP was identified in the Lead Exposure Study (MDOH 1998).

Studies of LBP in urban soils with no mining influences indicate paint undergoes a relatively rapid transformation and redistribution with consequent loss of its potentially distinctive individual particle identity (Johnson and Hunt 1995).[14] The lead adsorption to ion and manganese phases in soil makes the degraded LBP resemble the soil matrix

[14] See Exhibit 5. Johnson, D.L. and A. Hunt, 1995. "Analysis of Lead in Urban Soils by Computer Assisted SEM/EDX- Method Development and Early Results", *Lead in Paint, Soil and Dust: Health Risks, Exposure Studies, Control Measure, Measurement Methods and Quality Assurance. ASTM STP 1226.* Michael E Beard and SD Allen Iske, Eds., American Society for Testing and Materials, Philadelphia 1995, pp 283-302.

material. Thus only within soils near the LBP source might the lead derived from LBP be easily identified.

In EPA's speciation study of yard soil, the sampling methodology recognized the high potential for LBP within the soils. Yard soil samples were specifically selected such that "(n)o samples were collected from within approximately 10 feet of on-site structures, in order to avoid the potential for soil-lead concentrations being influenced by lead-based paint." (HGL & Drexler 2006). This speciation study went on to conclude that "paint is unlikely to be a major source to the residential yard, as a whole," when the "whole" yard had not been characterized by the sampling methodology. The EPA sponsored study was designed to bias the study's ability to identify LBP within the yard soil. Having intentionally designed its study to avoid detection of LBP, EPA cannot validly conclude that LBP is not a major contributor to soil contamination.

2. *More than 65.5% of homes in St. Francois County were constructed prior to 1978 and thus potentially contain LBP.*

Available age-of-housing data in the incorporated communities within the Response Area (see Table 1 and 2) indicate the housing within the Site is over 65.5% pre-1970's and therefore have a high potential for LBP.[15] The identification of outdoor LBP during the Interim Action and Halo Removals may underestimate its occurrence since many homes have been re-sided with vinyl siding, thus masking, but not eliminating, the presence of outdoor LBP. When EPA surveyed 22 homes for LBP as part of its speciation study, 16 of the 22 homes had vinyl siding (73%).[16] Of the four yards where

[15] The Consumer Product Safety Commission banned the use of lead-based paint in housing effective in 1978.

[16] See Exhibit 6. "Table 3-1 Summary of Screening Results from Locations Where Samples were Collected," Speciation and Bioaccessability of Anomalous Lead Concentrations in Soils, Big River Mine Tailings Site (HGL & Drexler, 2006).

paint was surveyed, three detected outdoor LBP (primarily on the house versus other outdoor structures).

Table 1
Percentage of Age of Housing in the Incorporated Cities and Towns of the Response Area and St. Francois County

Incorporated City:	Bonne Terre	Desloge	Park Hills	Leadington	Leadwood	County Wide
Built 2005 or later	0.8%	1.9%	2.6%	1.1%	0.0%	3.0%
Built 2000 to 2004	7.0%	7.5%	6.5%	14.2%	2.9%	10.3%
Built 1990 to 1999	7.0%	16.6%	10.0%	40.4%	4.2%	17.7%
Built 1980 to 1989	10.3%	14.6%	10.4%	12.0%	5.9%	14.1%
Built 1970 to 1979	9.4%	11.0%	14.6%	5.5%	4.2%	15.4%
Built 1960 to 1969	7.2%	13.2%	7.1%	10.9%	6.6%	8.2%
Built 1950 to 1959	12.9%	9.2%	8.1%	2.2%	7.8%	9.1%
Built 1940 to 1949	11.4%	12.3%	7.8%	1.6%	18.8%	6.6%
Built 1939 or earlier	34.0%	13.7%	32.9%	12.0%	49.6%	15.7%
Pre 1970's	65.5%	48.4%	55.9%	26.7%	82.8%	39.6%

Source: 2005-2009 American Community Survey 5-Year Estimates, http://factfinder.census.gov/servlet/ADPGeoSearchByListServlet?_lang=en&_ts=332956084339

Table 2
Age of Housing and Yard Soil and Outdoor LBP in the Incorporated Cities and Towns of the Response Area and St. Francois County

Census City/Town	Homes Built Pre-1970's	Yards Tested	Yards with Elevated Yard Quadrants	Yards with Elevated Drip Zones	Homes with Measurable Outdoor LBP	EBL Children (Identified During the Interim Action)
Bonne Terre	65.5%	10.2%	92.0%	85.9%	34.4%	18.2%
Desloge	48.4%	20.2%	72.8%	62.5%	15.2%	6.9%
Park Hills[a]	55.9%	23.5%	90.0%	79.0%	34.2%	10.6%
Leadwood	82.8%	51.3%	73.3%	73.8%	42.6%	5.7%
Leadington	26.7%	1.1%	100.0%	0.0%	0.0%	25.0%

With the exceptions of Leadwood and Leadington, the percentage of EBL children correlates better to the percentages of measureable outdoor LBP than to any of the elevated yard soil lead concentrations. It should also be noted that the presence of outdoor LBP is probably an indicator of potential indoor LBP.

3. *Conceptual model assumes indoor dust derives from mining waste. But the Lead Exposure Study indicates LBP is also a significant source of indoor dust.*

Even though the Lead Exposure Study indicated that children's BLLs were more likely influenced and thus impacted by indoor dust and indoor LBP, EPA arbitrarily continues to ignore this source of lead contributing to the EBLs. EPA does not include any other source expect the "Tailings/Chat Piles" in the Conceptual Site Model in the Human Health Risk Assessment for the Site.[17]

MDOH's Lead Exposure Study assessed the source contribution of lead in house dust from mine waste. It was noted that paint contributed at least 23% of the lead in household dust, mine waste contributed 21%, and soil contributed 37% (Sterling, et al., 1998). The authors went on to state their belief that the soil lead was from the mine waste; therefore, the contribution of mining waste to indoor soil was greater than paint. Location of the homes relative to the Piles was not presented in the Lead Exposure Study, but a later speciation study conducted by HGL and John Drexler (2006) on soils within the Site did provide soil sample locations. HGL and Drexler's conclusion that "tailings piles are the most likely source of contamination" was based on samples collected from 4 yards (5 out of the 21 samples examined) which were located within the Halo and 3 of the 4 yards have undergone a complete soil removal (fourth yard refused soil removal). The remaining 16 samples were overwhelmingly dominated by natural soil-forming minerals with no significant relationship to chat. [18] Of the 16 yards from which the 21 speciation samples were collected, all but one yard were located within the Halo.

Despite being obligated under the NCP to do so, EPA has made no effort to study the identified and abundance presence of LBP and all the various exposure pathways within homes that would affect child BLLs. In fact, using the speciation study as an

[17] See Exhibit 7. Figure 3.2 Conceptual Site Exposure Model, EPA Human Health Risk Assessment, 2009.
[18] HGL and Drexler (2006).

example, EPA appears to be going out of its way to exclude any evidence of LBP. EPA's failure in this regard is arbitrary, capricious and inconsistent with 40 CFR § 300.430(b).

C. Chat from Mining was Widely Used by Residents in St. Francois County and Other Areas as Fertilizer.

For a number of reasons, granular mine tailings ("chat"), when used as agricultural lime fertilizer, cannot and should not be addressed in EPA's Proposed Plan. Agricultural lime is not regulated under federal or state law with respect to contaminant remediation levels. More importantly, EPA does not have jurisdiction over this product because it is exempted from CERCLA: (1) because chat used as fertilizer is exempted from the definition of "release" under CERCLA; and (2) because the consumer use of chat as fertilizer exempts the product from the definition of "facility" under CERCLA. Because of these factors, EPA does not have the authority to respond to or conduct a remedial action to address releases from chat used as fertilizer.

The sale of Old Lead Belt ("OLB") chat as agricultural lime ("ag-lime") began in 1925. The volume sold was huge, roughly estimated at 35 million tons, or about one-third by volume of all chat sales. For decades, it was sold both locally and by the train-load for use in farm fields in some 10 different central states. Not until August 1, 2003 were ag-lime sales actually stopped, as part of the clean-up negotiations on the Elvins/Rivermines Chat Pile.[19]

As an initial matter, no federal law specifies contaminant levels for OLB ag-lime. See "Background Report on Fertilizer Use, Contaminants and Regulations," U.S. Environmental Protection Agency, EPA 747-R-98-003, January 1999, pp. i-ii, 60, 62 and

[19] See Exhibit 8. "Engineering Evaluation/Cost Analysis Report, Elvins/Rivermines Tailings Site" ("Elvins/Rivermines EE/CA"), Barr Engineering, June 2003, pp. 1-2.

64. Moreover, all chat and its products, such as ag-lime, are exempt from regulation as hazardous waste. 40 C.F.R. § 261.4(b)(7).[20]

Similar to federal law, Missouri's Agricultural Liming Materials Act, Section 266.500, R.S.Mo. et seq., and its implementing regulations, 6 CSR § 250-1.020, et seq., set no contaminant levels for ag-lime. The section on "Quality Standards of Agricultural Liming Materials" address correction of soil acidity, furnishing calcium or magnesium as plant nutrients, and meeting minimum specifications for calcium carbonate equivalent and fineness of grind. Section 266.525, R.S.Mo.[21] Furthermore, in 1976 the Agricultural Liming Materials Act and its implementing regulations created a certification process for ag-lime. For over 25 years, the OLB ag-lime was listed as being provided by registered producers and as properly meeting all state standards.[22]

In support of this lack of regulation regarding contaminant remedial action levels, during all the years chat was used as ag-lime, no studies called for any cessation in sales. See, e.g., "Further Characterization and Use of Tailings and Chat from Missouri's Old Lead Belt as Agricultural Lime," B.G. Wixson and B. E. Davies, in Trace Substances in Environmental Health XVIII (1984), p. 260; and "A Study on the Possible Use of Chat and Tailings from the Old Lead Belt of Missouri for Agricultural Limestone", B.G. Wixson, N.L. Gale and B.E. Davies, University of Missouri-Rolla, (December 1983), pp. 92-93. In the end, as noted above, EPA shut down the sale of OLB tailing as part of clean-up negotiations, not based upon any scientific studies on its actual use as ag-lime.

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[20] EPA has confirmed that chat from lead mining in the Tri-State Mining District "is a 'Bevill-exempt" waste and is not subject to regulation under RCRA Subtitle C." 72 Fed. Reg. 39325, July 18, 2007, p. 39334.

[21] Similarly, the ASTM Standard Specification for Agricultural Liming Materials requires calcium carbonate equivalent, percentage moisture, percentage calcium and magnesium, and sieve analysis. ASTM C602-07, June 15, 2007.

[22] "Missouri Agricultural Liming Materials Report," Agricultural Experiment Station, University of Missouri-Columbia, 1976-2003.

Regardless of whether the constituents of ag-lime are regulated in terms of contaminant remediation levels, ag-lime used as fertilizer is not subject to jurisdiction under CERCLA, as evidenced by the definition of "release." The CERCLA exemption for "normal application of fertilizer" is found in the definition of "release":

> The term "release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment..., **but excludes...(D) the normal application of fertilizer.**

42 USC § 9601(22) (Emphasis added).

Because "normal application of fertilizer" is not defined in CERCLA, the terms should be construed in accordance with their ordinary meaning. U.S. v. Telluride, Co., 146 F.3d 1241, 1245 (10th Cir. 1998):

> "Normal" - 1. usual; regular; or typical state, degree or form.
>
> ****
>
> "Application" - the act of applying to a particular purpose or use . . . the act of putting something, such as a lotion or paint, into a surface.
>
> ****
>
> "Fertilizer" - any substance, such as manure or a mixture of nitrates, added to soil to increase its productivity.

"Collins English Dictionary." (10th ed.)

EPA itself, in discussing the application of the CERCLA fertilizer exemption to SARA reporting, stated that the exemption would "eliminate reporting of fertilizers...and other chemical substances when applied, administered or otherwise used as part of routine agricultural activities....". 52 Fed. Reg. 38344, 38349 (October 15, 1987) (emphasis added) (considering ag-lime to be a "chemical," because its active ingredients are $CaCO_3$

and $MgCO_3$, which are clearly chemicals). Even EPA's "Background Report on Fertilizer Use, Contaminants and Regulations" specifically combines liming materials with fertilizers and refers to them both as "fertilizers." Supra, at "Executive Summary," p. i.

Even if the use of chat as agriculture lime was not considered "normal use of fertilizer" within the meaning of Section 101(22) of CERCLA, to the extent it is used by property owners for that purpose, it is a consumer product in consumer use, and thus is excluded from the definition of "facility" under Section 101(9) of CERCLA. Similar to the definition of "normal application of fertilizer," the term "consumer product in consumer use" is not defined in CERCLA. Uniroyal Chem. Co., Inc. v. Deltech Corp., 160 F.3d 238, 243 (5th Cir. 1999). Following the ordinary meanings of the terms, courts have found that "[t]he sale of a hazardous substance for a purpose other than its disposal does not expose defendant to CERCLA liability." Dayton Indep. School Dist. v. U.S. Mineral Prod. Co., 906 F.2d 1059, 1065 (5th Cir. 1990) (citing cases) (stating that "Congress did not intend CERCLA to target legitimate manufacturers or sellers of useful products"); See also Kane v. United States, 15 F.3d 87, 89 (8th Cir. 1994) (agreeing with the Fifth Circuit's holding in Dayton, stating that Congress "intended to provide recovery only for releases or threatened releases from inactive or abandoned waste sites, not releases from useful consumer products") (quoting Dayton at 1066). Because consumers used chat in St. Francois County and other areas as a fertilizer product, the product is exempt from the definition of "facility" under CERCLA and is thus not subject to CERCLA jurisdiction.

The effect of the two exclusions discussed above is the same: EPA does not have the statutory authority under CERCLA to take or compel response action with respect to releases that result from these or other consumer uses of chat.[23] Further, federal and state laws excluding ag-lime from specific contaminant-level regulations further indicate that ag-lime should not be managed under CERCLA. EPA's proposal to require remediation of lead contamination resulting from the use of chat as ag-lime, or by consumers for other consumer uses, is prohibited by statute and is arbitrary and capricious.

D. Naturally Occurring Lead is Abundant throughout St. Francois County

Section 104(a)(3)(A) and 40 CFR § 300.400(b)(1) specifically prohibit EPA from using its CERCLA authorities to respond to a release of naturally occurring substances. Yet, EPA has arbitrarily refused to evaluate the extent to which naturally occurring lead is contributing to the detected contamination. As a result, EPA proposed remedy requires response action with respect to all lead detected, regardless of its source. This result is inconsistent with CERCLA and the NCP.

Centuries before the first chat was piled, before St. Joe Lead Company was formed, before any settlers arrived, and before even the first European explorers paddled on the Mississippi, Native Americans in this area were gathering the lead mineral, galena, off the ground. Reportedly, during the Cahokia mound building era, circa 1200-1300 C.E., the shiny galena with its cubic shapes were collected as keepsakes, decoration or to fashion art objects.

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[23] It is well documented that other chat was used in the Site area on a widespread basis for other consumer uses, including foundation fill, asphalt mix, road de-icing and gravel driveways. See for example, Exhibit 9. "Waste Products in Missouri with Potential Highway Applications." Missouri Department of Highway and Transportation. 1982.

Once the local Native Americans observed the value that Europeans placed on lead, they would even crudely smelt the galena. The mineral would be thrown onto a burning pile of wood. When the galena melted, the lead would separate, sink down and run out onto the ground. In Bonne Terre, one of these early Native American furnaces was found, surrounded by tons of slag, from which the lead had been melted.

The name of the town itself, Bonne Terre, is a graphic example of this area's long history with lead. Early French explorers and settlers noted that a certain band of soil, which stretched a half-mile to a mile long and several hundred yards to a half a mile wide, ran through portions of what is now Bonne Terre. This soil was so rich in lead ore that it was called "good earth," or Bonne Terre for the amount of lead to be dug out.

As for how the early digging was done, a pick, a wooden shovel and a bucket were the only tools. Anyone would be a miner, depending on time of year or inclination. The Spanish and French did not generally require the legalities of mining claims, as it was more important to obtain the lead, so that it could then be taxed. Farmers would dig, when crops had been harvested. Hunters would mine, between hunts or when game was scarce. The more well-to-do would send their slaves to mine. Middle-men would drive wagons around the diggings, purchase whatever lead ore had been unearthed by individuals, then haul the lead ore to the nearest smelter or rail line, and sell it for a profit.

Generally, the depth of the digging was determined by where the ore stopped, the depth became too great to throw out dirt, or bedrock was hit, whichever was first. Tools to drill into or explore bedrock did not exist. Deep mines with related mills did not occur prior to the Civil War, so chat piles did not exist. Instead of digging down, the diggings would spread out laterally. For example, at Mine-a-Joe (aka Bogy Mine), first discovered

circa 1735 just west of Desloge, the diggings eventually covered an expanse a mile long and a hundred yards wide.

By the early 1800's, in addition to the diggings at Bonne Terre and Mine-a-Joe, other diggings in the area included;

- Flat River Mines (Park Hills area), with 15 hands and rich ore yields of 65%;
- Gumbo (aka Grunbo) Mines (Gumbo area), at one time thought to be the best mines in the neighborhood;
- Yankee Diggings (Leadwood area) with 28 hands and mineral yield of 60%;
- McKee Mines (Leadwood area); and,
- Butcher Diggings (Park Hills area, in or around Missouri Mines State Historic Site/St. Joe State Park)

In 1864, St. Joe Lead Company bought property in Bonne Terre and subsequently began deep mining, using shafts to haul up ore and mills to process that ore. Only then, did chat come into being, as what was left after the milling process.

This history illustrates the fundamental truth, ignored by EPA, that lead is abundantly naturally occurring throughout the Old Lead Belt. The only basis in the record on which EPA relies is the 2006 Soil Speciation Study (HGL 2006). But that study failed to even mention the possibility of naturally occurring lead, much less evaluate it as a potential source. More specifically, that study was flawed in that

- The study's conclusions only allege that residential soils "have lead forms that are common to the Big River tailings piles". There is NO discussion of how such residential soils might compare to naturally occurring lead.
- The study does not even mention naturally occurring lead as one of the "numerous sources of lead in the site area."
- The study contained numerous other flaws, some of which are discussed, supra, including
  - Only 20 yards were sampled over a 34,200 acre area, in which the agency estimates 4,500 yards are affected.
  - The study asserts that 31 residential samples were speciated for lead. However, the table that is cited for the speciation results only reports on 21 residential samples. Ten (10) samples from 5 houses are missing.
  - A galena-cerussite mineral association is alleged to be representative of the chat piles. However, significant evidence of such an association was only found in 4 yards of the 20 sampled.
  - Speciation from the other 11 reported houses were overwhelmingly dominated by natural soil-forming minerals, with no significant relationship to chat.
  - Of the 20 houses were sampled, the results for five houses are missing. 11 houses had no significant mineral association with chat. Only four yards, 20% of those sampled, had significant evidence of indicating a link to chat.

- Even for these four houses, the alleged galena-cerussite association is actually no proof of chat in these yards. This same galena-cerussite association of minerals also represents the weathering of naturally occurring lead.

In other words, this study provides insufficient support for EPA's far-reaching assumption that mining waste from the Piles is the primary source of lead contamination at the Site.

Although EPA has ignored the issue of naturally occurring lead in St. Francois County, it did not do so when facing a similar residential soil remediation project in adjacent Washington County, Missouri. Specifically, In EPA's July 2, 2010 Proposed Plan for Residential Property Soils in the Washington County Lead District,[24] EPA stated that it "will not intentionally address naturally occurring lead ores in their undisturbed state as part of this action. Although the Site has been heavily mined in the past, it may be possible to encounter naturally occurring lead ores during residential property excavation. Section 104(a)(3)(A) of CERCLA states that removal or remedial actions shall not be provided in response to a release or threat of release 'of a naturally occurring substance in its unaltered form, or altered solely through natural processes or phenomena, from a location where it is naturally found'. . . . When these soil conditions are encountered, they will be documented, excavation will stop, and backfilling will be initiated." Proposed Plan for Residential Property Soils – Operable Unit 1, at the Washington County Lead District Old Mines Superfund Site in Washington County, Missouri, p. 11.

[24] See Exhibit 10. Proposed Plan, Washington County Lead District – Old Mines Superfund Site, July 2, 2010.

Attached as Exhibit 11 is summary of references on the natural occurrence of surficial soils with lead at the Site. This information shows that the area where the upper Bonne Terre formation meets the surface, surface soils have high levels of naturally occurring lead without manmade interference. As a result, true background within the Response Area is higher than it will be outside the Response Area. Also included as Exhibit 12 is a map depicting the existence of naturally occurring lead-bearing minerals in soils in the vicinity of the Site.

The high percentage of samples with greater than 400 ppm lead in areas near where pre-Civil War surface digging occurred shows lead is naturally occurring in the surface soils in those areas.

CERCLA and the NCP require that EPA fully evaluate the occurrence of naturally occurring lead at the Site and develop a remedial alternative that appropriately excludes it from its scope so as not to require response action with respect to such materials. EPA's failure to acknowledge, much less evaluate and characterize the extent to which naturally occurring lead contributes to lead detected in yards, is arbitrary, capricious, inconsistent with the NCP and contrary to CERCLA.

E. The EBL Data Shows no Correlation with the Mine Waste Sources or with Lead Detections in Yards.

1. The arbitrary nature of EPA's assumptions is supported by the Interim Action Report, the RI and the subsurface soil study, all of which show no correlation between BLLs and the piles or yard levels.

From the beginning of its response actions at the Big River Mine Tailings Site, EPA has assumed that all lead detected was related to the mill waste Piles associated with the mining activities of the late 1800 and 1900s. At no point in its investigation and characterization of the Site has EPA given any regard to, or made any effort to

characterize the extent to which other sources of contamination exist. As the Site characterization progressed, it became apparent that a proper analysis of the data must be done to determine whether other sources of lead were contributing to soil contamination and to the occurrence of EBLs in and around the Response Area. It became indisputable that EPA's failure to comply with its obligation under the NCP to evaluate other sources would result in a remedial action that exceeded its statutory and regulatory authority and that was not necessary to protect human health and the environment. Yet, when Doe Run presented its analyses of the data to EPA, first in the 2004 Interim Action Removal Report, and later in the 2010 draft Feasibility Study and the 2011 Draft Subsurface Investigation Reports, EPA ignored the data. In fact, with regard to the draft Feasibility Study and Subsurface Investigation Reports EPA went further and compelled Doe Run to remove any discussion of alternative sources or analysis of data that suggested a lack of correlation between EBLs and mine waste. Remarkably, with regard to the Feasibility Study, EPA stated :

> Much of this section appears to argue that high lead concentrations in subsurface soils and soils away from the tailings piles may be the result of naturally occurring mineralization or processes or sources unrelated to mining. The entire area contained a highly industrialized complex of many mine, mill processing, transportation and other facilities in addition to the waste disposal area, all of which could be sources of soil contamination away from the tailing piles and subsurface soil. Therefore, generalized conclusions about contamination sources should be avoided in the FS."[25]

In addition, Doe Run's 2011 Draft Subsurface Soil Investigation in Residential Areas[26] presented an assessment of potential sources for the elevated lead concentrations in residential soil, using both the thickness of elevated lead concentrations detected in the

[25] See Exhibit 13. Letter to Doe Run from Jason Gunter, EPA, dated July 9, 2010, and enclosed comments and report.
[26] See Exhibit 14. Draft Subsurface Soil Investigation in Residential Areas (NewFields 2011).

58 yard soil vertical sampling profiles as well as the relationship of lead concentrations to distance from the identified potential sources (the Piles, railroad ballast, highway de-icing). EPA demanded this analysis be removed from the final Report, stating it believed the analysis was "a lot of speculative language which is uncharacteristic of a technical report...and revise...how the data will be used based on the purpose and objectives of the study." [27] EPA failed to consider that one of the objectives of the Sampling and Analysis Plan – Subsurface Soil in Residential Area, St. Francois County Mined Areas included "potentially identifying the source or cause of elevated lead concentrations that are found in the subsurface (especially if lead concentrations are found at higher concentrations at depth compared to the surface)."

The discussion that EPA identified as "speculative" was prepared to address this objective and was highly relevant to development of an accurate conceptual site model. As discussed above, the question of the "source or cause of elevated lead concentrations" is complex due to both naturally-occurring and man-made nature of the sources for and transportation of lead at the Site. This data was presented to further understand the nature of this complexity and the resulting uncertainties. Yet EPA arbitrarily refused even to allow it in the record, much less give it any consideration. By refusing to allow Doe Run to include such information in its reports, or give the analysis any consideration, EPA has failed to identify all potential sources as required by the NCP.

The data presented in the Interim Action Removal Report (NewFields 2004) demonstrate that the BLLs measured in St. Francois County's Mined Areas (Response Area) have no correlation to yard soil lead concentrations or distance from the Piles. As seen in Figure 7, the distribution of the elevated lead concentrations within the surface

[27] See Exhibit 15. Letter to Doe Run from Jason Gunter, EPA, dated June 22, 2011.

soils does not appear primarily attributable to natural transport processes (wind or water) but continues to confirm the Focused RI assessment that elevated lead in residential yards is due primarily to mechanical redistribution by man and LBP and naturally occurring mineralization, and is widely distributed over the residential areas.

Figure 2 of the Subsurface Soil Report 11x17

Figure 7 Average Surface Soil Lead Concentrations in Yard Quadrant Samples

The lack of correlation between soil lead detections and known sources of mining waste, and the lack of correlation between EBLs and known sources, demonstrates that EPA has insufficiently evaluated or addressed the complexities of this Site, particularly with regard to evaluating the extent to which LBP, the use of chat as agriculture lime and naturally occurring lead, have contributed and are continuing to contribute to contamination at the Site, and thus contributing to the potential risks at the Site.

This fundamental failure is reinforced by the fact that for the past five years, BLLs in St Francois County have been below the level sought by EPA in its Remedial Action Objective. As a result, EPA is proposing a remedy that 1) it has not demonstrated to be necessary to protect human health; 2) responds to and would require remediation of contamination over which EPA has no authority under CERCLA; and 3) is inconsistent with the NCP.

The following presents the entire dataset from the Interim Action, Halo and Draft Subsurface Soil Investigation correlation charts showing the relationship of average yard lead concentration and BLLs (as measured during the Interim Action) versus distance from the Piles, from railroads (historic and active), and from major highways (previous Figures 1 and 3 have been repeated for ease of comparison).

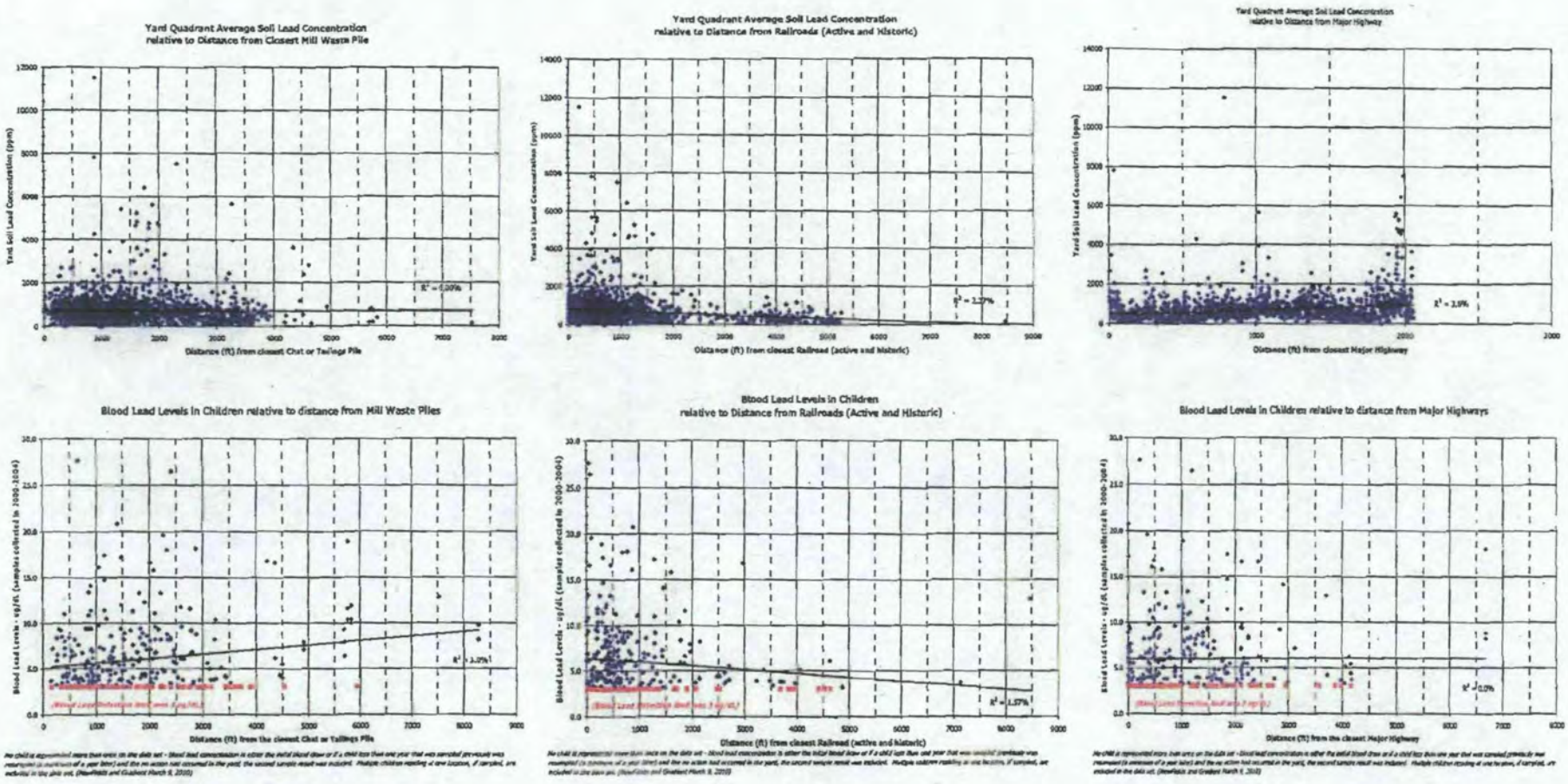

Figure 8 Correlation of Average Yard Soil Lead Concentrations and BLLs to closest Mill Waste Pile, Railroad, and Major Highway

II. EPA'S PROPOSED CLEANUP LEVELS FOR SUBSURFACE SOILS AND THEIR APPLICATION TO NON-RESIDENTIAL PROPERTIES ARE UNSUPPORTED BY THE DATA.

The risks in the HHRA are calculated based on the average soil lead level in a residential yard (consistent with lead risk assessment guidance) (EPA, 2009, see page 4-6). However, the Proposed Plan calls for excavation of any quadrant with a sample above 400 mg/kg even if the yard average (average of all quadrants) is below 400 mg/kg. This remediation strategy is not consistent with how the risk assessment was done, and requires more remediation than needed in order to achieve the Remedial Action Objective (RAO) (stated in the Proposed Plan) to: "Reduce the risk of exposure of young children (children under seven years old) to lead such that an individual child or group of similarly exposed children have no greater than a 5% chance of exceeding a blood lead level of 10 µg/dL".

Note that when a cleanup level represents a target average concentration for a property, the remediation should be conducted such that the post-remediation property average will be at or below the cleanup level. If every yard quadrant that exceeds the cleanup level is remediated, this may over-achieve the cleanup level on average. At the soil cleanup level of 400 mg/kg selected in the Proposed Plan, evaluating the need for remediation on the basis of risk (average concentration) rather than on the exceedance of a single sample would likely reduce the number of properties requiring remediation while still achieving the RAO. It will also serve to relieve homeowners of intrusion of unnecessary yard removals.

III. THE BOUNDARY AREA OF THE PROPOSED REMEDY IS NOT CLEARLY DEFINED AND MAY ARBITRARILY EXTEND BEYOND DEFINED RESPONSE AREA.

A. EPA Must Clarify that the Proposed Remedy Pertains only to the Defined Response Area.

The Interim Action and Halo administrative orders on consent defined the "Response Area" to include generally the distances from the Piles discussed above and the historic mining area of St Francois County. The Response Area, which is depicted in Figure 1 in the Proposed Plan, is the area designated by EPA to be studied for the purpose of planning a remedial action. The Focused RI gathered data from within the Response Area. The cost estimates presented and evaluated in the Feasibility Study are based on the number of residences within the Response Area. The evaluation of remedial alternatives in light of the nine criteria was based on the Response Area representing the boundary of OU 1.

Yet the Proposed Plan is unclear as to the geographic scope of the OU 1 proposed remedy. The Plan states that the "communities of Farmington, Bismarck and Iron Mountain Lake are outside the mining area but will be included in future investigations." It is unclear whether EPA intends that such investigation occur as part of this proposed remedy. Including in this remedy any areas outside the Response Area will invalidate the cost estimates for the alternatives, and thus will render the evaluation of the nine criteria required by CERCLA and the NCP invalid and arbitrary.

B. EPA's Broad Definition of "Residential Properties" is unsupported by the Record.

For the purpose of this proposed remedy, EPA broadly defines "residential property" as "properties that contain single- and multi-family dwellings, apartment complexes, vacant lots in residential areas, schools, daycare centers, playgrounds, parks and green ways." This definition is overly broad for several reasons. First, by including vacant lots and greenways, EPA is including potentially many more parcels than were included in the cost estimates for the remedial alternatives, thus invalidating the evaluation of those alternatives in light of the nine CERCLA criteria, particularly cost-effectiveness. The costs estimates were based on the number of

residences provided by EPA. Additionally, EPA's proposal to apply its cleanup levels to these parcels is unsupported by the record and would be arbitrary and capricious.

The Feasibility Study Report states, "On April 14, 2010, EPA provided an estimate of '7,036 occupied houses total, not counting the houses in Doe Run,' based on the most recent census data for each city in the Response Area.'" 93 yards were added for the town of Doe Run, resulting in a total of 7,129 yards. By adding an unknown number of undefined "vacant lots," and "green ways" to the remedial action will greatly affect the costs and fundamentally alter and invalidate EPA's evaluation of the remedial alternatives, particularly with regard to the cost-effectiveness of the proposed remedy. The Focused RI defined "residential yards" to be the area within 200 feet of the house on each property. The Proposed Plan offers no such definition for vacant lots or green ways, which can and in fact do, encompass many acres throughout the Response Area and St. Francois County.

C. EPA's Proposed Cleanup Levels for Vacant Lots, Parks and Green Ways is Unsupported by the Record and Contrary to Guidance.

In addition to the cost uncertainties, EPA relies on its Human Health Risk Assessment in support of its proposed cleanup levels. The Risk Assessment is based on exposure scenarios that do not apply to vacant lots, parks and green ways, resulting in an arbitrary and capricious decision with regard to those properties. There is no information in the administrative record to support EPA's conclusion that applying the proposed cleanup levels to these properties is necessary to protect human health. Children may not be exposed to vacant lots, parks, or greenways every day of the year, or obtain 100% of their daily soil/dust ingestion from an area that is visited for only a portion of the day. Therefore, exposures in these areas are not accurately described by using a residential scenario, and risks should be evaluated using a recreational scenario. There is no data or other basis in the record for determining that these parcels warrant

remediation. Even if there were, separate cleanup levels should be derived for these non-residential areas as a cleanup level of 400 mg/kg is not be appropriate for areas with a lower frequency of contact.

D. EPA's Application of Residential Cleanup Levels to Non-Residential Properties is Contrary to HUD Guidance.

US Department of Housing and Urban Development, which has primary responsibility over abatement of lead in households, has issued guidance on soil-lead hazardous for play areas. Specifically, the HUD Guidance states the "soil-lead hazard for play areas frequented by children under six years of age is bare soil with lead equal to or exceeding 400 parts per million." 24 CFR § 35.1320(b)(2)(ii)(A). However, for the remainder of the yard, no soil lead hazard exists where bare soil does not total more than 9 square feet per property with lead "equal to or exceeding an average of 1,200 parts per million." 24 CFR § 35.1320(b)(2)(ii)(B). In applying its proposed cleanup levels to vacant lots, parks and green ways without regard to existence of bare soil or child impact, EPA has ignored this guidance, and done so without any site-specific justification. The result is an arbitrary and capricious application of cleanup levels without regard to whether they are necessary to protect human health or the environment.

IV. EPA's PROPOSED SELECTION OF ALTERNATIVE 3 DOES NOT PRESENT THE BEST BALANCE OF TRADE-OFFS AND IS INCONSISTENT WITH SECTION 121 AND THE NCP.

Section 121 of CERCLA and 40 CFR § 300.430(e)(9) identify criteria against which EPA must evaluate alternatives for remedy selection. EPA must also identify other pertinent advisories, criteria or guidance in a timely manner. The Agency must do a detailed analysis consisting of an assessment of individual alternatives against each of the nine evaluation criteria and a comparative analysis that focuses upon the relative performance of each alternative against those criteria. The following are the nine criteria EPA is required to evaluate:

1. Overall protection of human health and the environment

2. Compliance with ARARs

3. Long-term effectiveness and permanence

4. Reduction in toxicity, mobility and volume through treatment

5. Short-term effectiveness

6. Implementability

7. Cost

8. State Acceptance

9. Community Acceptance

In its Proposed Plan, EPA offered a flawed evaluation of the remedial alternatives in support of its decision to select Alternative 3.

A. EPA misstated Alternative 2 as it was presented in the FS.

In its description of Alternative 2, EPA erroneously states that a visual barrier will only be placed if subgrade soils are greater than 1,200 ppm rather than greater than 400 ppm as stated in the FS. Alternative 2 as set forth in the FS, is consistent with the yard soil removals that have been conducted in St Francois County since 2000 under the Interim Action and Halo Removals. EPA's Plan states that only 7% or 280 yards would require these barriers and the accompanying institutional controls. However, the FS stated that under Alternative 2, up to 94% (approximately 3,760 yards), or potentially as few as 12% (approximately 480 yards) if barrier placement is based on 6-inch vertical subgrade composites rather than subgrade surface samples, would be required under Alternative 2 (NewFields 2011).

B. EPA Ignored Aspects of Alternative 3 that do not compare favorably to Alternative 2.

Under Alternative 3, the excavations would be as deep as 24 inches and visual barriers would be placed where the subsurface soil exceeds the 1,200 ppm lead. The following aspects of this alternative do not compare favorably with Alternative 2:

- Alternative 3 generates an additional estimated 32,700 cubic yards of (untreated) waste soil that would place a burden on the repository sites;
- Alternative 3 requires a matching volume of additional topsoil for fill;
- Transport of the additional volumes requires an estimated 5,460 extra haul trips, increasing the risk of traffic accidents and fatalities and increasing road damage from heavy trucks on county streets and roadways;
- Time to excavate and test at the 12" depth would potentially lengthen yard removals and therefore may lengthen the overall time frame beyond 7 years and may prompt decisions to make further excavation decisions with XRF *in situ* or horizontal composite sampling of the subgrade versus a 6 inch depth profile. This could significantly increase the number of removals at depth than predicted by the final Subsurface Soil Investigation analysis increasing the predicted waste production, clean soil consumption, and truck haul mileage being used to justify Alternative 3; and
- The use of visual barriers only for soils exceeding 1,200 ppm lead may allow exposure and transport to the surface of subsurface soils that, even when mixed with surface soils, will exceed the 400 ppm lead.

C. EPA Arbitrarily Disregarded ATSDR's recommendation regarding Maintenance of "One-Call" Database for Notification Purposes.

The Agency for Toxic Substances and Disease Registry ("ATSDR") issued a Health Consultation for the Omaha Lead Site (ATSDR 2000) that recommends the location of **all**

remediated yards where surface and subsurface soils greater than 400 ppm remain in place be maintained in a countywide database and be accessible for "one-call" type notification (a form of institutional control) so that if large excavations occur in the yard the homeowner is aware of the possible recontamination.[28] Adherence to ATSDR's recommendation would be a reasonable and implementable form of institutional control, coupled with the visual barriers, that would alert the excavator to these controls.

D. EPA's evaluation against the Nine Criteria was flawed.

With regard to protection of human health and the environment, EPA's analysis of this criterion was fundamentally flawed. First, EPA summarily concluded that the "no action" alternative would not be protective. Based on the information set forth above, particularly the reduction of EBLs in the Response Area, which has occurred despite, not because of the yard removal work, and in fact is more related to reduction in LBP, lead gas, lead in toys, etc., and to the State and County educational efforts, it is unclear that extensive additional yard remedial work will provide the presumed risk reduction. The record does not support EPA's conclusion that "no action" with respect to yards would not be protective. In other words, the data shows that EPA's Remedial Action Objective can be achieved without expenditure of more than $100 million in yard soil remediation.

With regard to protectiveness, the only distinction EPA draws between Alternatives 2 and 3 is that Alternative 3 would be less reliant on institutional controls. First, EPA's conclusion is flawed in that it underestimates the number of yards that will require further action at 12 inches. EPA makes no mention of the uncertainty behind its estimate that only 7 percent of yards would have greater than 1200 ppm at the 12 inch subgrade. The June 13, 2011 Draft Subsurface Soil Investigation in Residential Areas, St. Francois County Mined Areas (Draft Subsurface Soil

[28] Exhibit 16. Health Consultation for Omaha Lead Site. ATSDR 2000.

Report) provided a comparison of subgrade data for the benefit of assessing the uncertainty of this statistic. This statistic, as presented in both versions of the Subsurface Soil Report as well as mentioned in the Proposed Plan, is based on 58 yards out of the estimate of 7,036 yards in the Site or less than 1 percent. The Draft Subsurface Soil Report stated that "one point per yard may predict a highly optimistic view that only 7 percent of yards would actually require further action at a 12-inch subgrade. An assumption of 27 percent based on previously remediated yards with multiple yard quadrants should be considered as a reasonable conservative assumption for the purposes of the Feasibility Study regarding required action at 12 inches." In comments on this draft EPA stated that all conclusions should be stated in terms of the 58 sampling locations and that the discussion was "speculative" and should be removed from the report. While Doe Run disagreed that a discussion was "uncharacteristic of a technical report," it removed the discussion as well as other conclusions to which EPA took exception. Much of the discussion and the resulting conclusions presented the uncertainty behind using statistics exclusively from the 58 sampling locations rather than comparisons to all the subgrade data that had been collected over the last 10 to 11 years of yard soil removals. This was another example of EPA's prejudice to the belief that the mine waste piles within the county are the sole source of the lead and that elevated lead concentrations in residential yards will decrease with relative distance from the waste piles. The Draft Subsurface Soil Report provided both a discussion of the uncertainty of the subgrade statistics as well as a discussion of potential other source relationships to residential yards.

Also with regard to protectiveness, EPA had already made the determination, in conjunction with the Interim Action and Halo Removals, that the removal methodology presented in Alternative 2 was protective. EPA has provided no support in the record for determining it is no longer protective, and that Alternative 3 is warranted instead, or that

Alternative 3 presents enough added protectiveness to justify the estimated minimum of $10 million in added costs associated with that alternative.

Finally, in 2010 EPA determined, in connection with the Washington County Lead District – Old Mines Superfund Site in Washington County, Missouri that a remedial alternative substantially equivalent to Alternative 2 would be protective.[29] EPA offers no explanation for why it would be protective in Washington County, but somehow less so in St. Francois County.

With regard to short-term and long-term effectiveness, Doe Run disagrees with EPA's conclusion that excavating to 24 inches will be more effective. On the contrary, placement of a visual barrier at 12 inches will serve as a constant reminder to property owners of the potential presence of lead below that level. Moreover, if combined with a "one-call" type database, as recommended by ATSDR, this alternative would be more protective in the long-term.

With regard to cost, Alternative 3 comes at a significantly higher cost, but with no corresponding added protection to justify the expenditure of an estimated extra $10 million. In addition, because Alternative 3 involves excavation to a greater depth than was done in the Interim Action and Halo Removals, Alternative 3 appears to require that those yards be revisited. The significant cost that would be associated with that work is not included in the estimate for Alternative 3.

But most significantly with regard to cost-effectiveness, as demonstrated in these comments, EPA has failed to show that the lead from mining wastes, and not other sources, continues to pose an unacceptable risk to human health. Nor has EPA shown that expenditure of $100 million in additional yard removal is the most cost-effective means of addressing whatever residual risk may remain as a result of mining waste.

[29] See Exhibit 10.

V. THE PROPOSED PLAN HAS NUMEROUS MISSTATEMENTS OF FACTS AND KEY OMISSIONS OF FACT.

The Proposed Plan contains several key errors and/or omission of key facts that warrant correction and clarification for the record. These errors and omissions further demonstrate the arbitrary and capricious nature of EPA's proposed remedy selection.

1. The Proposed Plan's description of the Site's Operable Units ("OUs") is confusing, particularly in terms of how each operable unit relates to the others, and the extent to which they appear to overlap. The Proposed Plan identifies the OUs as follows:

- OU- 00 – Consists of the removal actions at the pile locations (Bonne Terre, Leadwood, Federal, Elvins and National), time-critical residential properties, and high child exposure areas (i.e. playgrounds, daycare facilities).
- OU-1 – consists of the stabilization of the Desloge Pile (stabilized in 2000) and remediation of residential properties and high childe exposure areas exceeding screening levels of 400 ppm in St Francois County. OU-1 also focuses on properties in the towns of Park Hills, Desloge, Bonne Terre, Leadwood, Leadington, and Doe Run. This also includes the rural residential properties surrounding these communities.
- OU-2 - includes the remedial action to address terrestrial ecological risks and impacted watersheds associated with the mine wastes. OU-2 will also include future work on the Doe Run Pile.
- OU-3- consists of the Interim Program and Halo Removal Action to address elevated Blood lead at the site. The final ROD for the other OUs will be issued in the future.

There appears to be significant overlap between these OUs, and it is unclear how each operable unit relates to the others, or to this Proposed Plan, which is identified as addressing only OU 1. For example, as described in the Proposed Plan, OU-00, OU-1 and OU-3 all address residential properties and CHUAs. The record is unclear as to how each Operable Unit is distinguished from the other, the extent to which this proposed remedy addresses risks being addressed in other OUs, and the extent to which EPA anticipates additional records of decision to address residential risks in connection with the other OUs. EPA should clarify its record in this regard.

2. The Proposed Plan states on Page 2 that mine wastes have contaminated soil, sediment, surface water and groundwater. Yet on Page 12, EPA concedes that elevate lead concentrations in groundwater (less than 15 ug/l) occur "sporadically and were limited to four wells and could not be linked to the mining activities at the Site." Any statement about mining waste contaminating groundwater should be removed from the Proposed Plan and any decision document.

3. The Proposed Plan (page 7) discusses the 1998 Lead Exposure Study conducted by the MDOH and the high percentage of children in St. Francois County with elevated blood lead levels (17 percent). However, the plan does not discuss the most recent blood lead levels for the county that were reported in the FS, "Missouri Department of Health and Senior Services (MDHSS) reports that the percent of elevated blood lead in children less than 6 years of age in St. Francois County has dropped from 12 percent reported in the 2000 calendar year to 1 percent in the 2010 calendar year (MDHSS 2003, 2011b)." While we understand EPA's argument that the IEUBK model and the potential for high bioavailability for lead in yard soils predicts the potential for the children in St. Francois County to have elevated blood leads, the statistics for

the county demonstrates that the county's child EBL levels are dropping either without the benefit of soil yard remediation as proposed by EPA and are likely due to an improved education of lead issues.

4. Page 7 of the Plan states, "the Subsurface Soil Report concluded that 93 percent of the elevated lead concentrations were found in the upper 12-inches of soil." This is a misrepresentation of the Subsurface Soil Report which actually concluded that "Seven (7) percent of the yard quadrants after a 1 foot excavation would have confirmation subgrade soil lead concentrations greater than 1,200 ppm." The FS uses this conclusion to assess the potential for an excavation to require further excavation under Alternative 3 (the EPA selected alternative). We find using this statistic as a conclusion regarding percentage of elevated lead concentrations confusing and misleading.

5. The Proposed Plan (page 7) states that the 2004 removal action (Halo) is ongoing and then (on page 10) states that 1,000 properties remain to be addressed under the Halo Removal Action. These are the yards sampled under the Interim Action but were not included in the Halo Removal Action as they were beyond the Halo (typically between 500 to 1000 feet from the piles). These 1000 yards appear to be in the 4000 yards that are covered under the Proposed Plan with the exception of this statement. As we (Doe Run) are implementing the Halo Removal Action and we find these statements confusing, we are unclear as to what EPA is trying to relay to the public by these statements.

6. Page 8 of the Plan states, "(a)t the end of the Interim Action (March 30, 2004), 1,955 residential yards had been sampled and 563 homeowners had refused sampling. Under the Halo Removal Order, 27 additional yards have been sampled; of these yards 22 were sampling refusals during the Interim Action, two were not within the Halo but were sampled due to the

presence of a child with elevated blood-lead levels, and two were childcare facilities." It is unclear where EPA derived the statistics for yards sampled under the Halo Removal Action. The FS states; "At the end of the Interim Action (March 30, 2004), 1,955 yards had been sampled and 563 homeowners had refused sampling, for a 78 percent sampling rate. As of January 31, 2011, 2,057 residential yards and 12 CHUAs had been sampled and 532 property owners had refused yard soil sampling with a final residential yard sampling refusal rate of 21 percent." Using these statistics and noting that 45 yards were sampled as part of the Subsurface Soil Investigation, an additional 69 yards/CHUAs were sampled as part of the Halo Removal Action. Of these 69 yards and CHUAs, 3 were parks, 5 were child care or school playground facilities, 29 were previous residential yard refusals (all but one located within the Halo), 17 were non-Halo residential yards sampled due to the presence of a child with elevated blood-lead levels, and the remaining 15 yards were primarily new construction within the Halo.

7. The Plan makes the statement "The communities of Farmington, Bismarck and Iron Mountain Lake are outside of the mining area but will be included in future investigations." It is unclear what the purpose of this sentence is and its relation to the Site. As stated above, the FS, including cost estimates, were based on the Response Area only. These communities lie outside the Response Area. If EPA contemplates including them or other locations outside the Response Area, it will render the cost estimates inaccurate, as well as EPA's evaluation of the cost-effectiveness of the proposed remedy.

8. This Plan is confusing as to what would make a residence qualify for inclusion in the remedy. The Plan states on pages 14 and 16 that "Residential properties where no quadrant samples exceed 400 ppm lead would not be addressed under this alternative [2-3]". And then later in Alternative 2 on page 14 states, "Excavation of a residential property would be triggered

when the highest recorded soil sample for any defined area of the property contains greater than or equal 400 ppm lead." Alternative 3 does not include this statement. However the cost tables included in the Proposed Plan are from the FS and they show driveway only, garden only, and play area only yards in both alternatives costs.

9. The Plan states "The physical barrier will function as a warning that digging deeper will result in exposure to soils contaminated with lead at a level that EPA has determined to be a human health concern." The concentration for which a visual barrier is placed under the Proposed Plan is 1,200 ppm. However, in the HHRA summary and discussion the plan states on page 12 that "a lead soil concentration of 400 ppm to ensure that a child has less than a 5 percent probability of having a blood-lead level exceeding 10 ug/dL." And the only mention of the 1,200 ppm in the HHRA is in the statement "In past experience at Superfund sites where lead is the contaminant of concern, the EPA generally selects a residential soil cleanup level within the range of 400 ppm to 1,200 ppm for lead..." The RAO section of the Proposed Plan (pages 12-13) makes it clear that exposures above 400 ppm lead under the assumed exposure conditions would create an unacceptable risk for a child. We believe EPA needs to clearly state its rationale for the acceptance of soil lead concentrations between 400 and 1200 ppm lead at depth; as mentioned above we do not necessarily agree with EPA's interpretation of the ATSDR document especially in regard to the lack of institutional controls under these conditions.

VI. CONCLUSIONS

Doe Run has worked cooperatively with EPA since the early 1990s to respond to potential risks to human health and the environment that might have been posed as a result of historic mining activities in the Old Lead Belt. As a member of that community, Doe Run places a high priority on the health and welfare of its residents. Since 1994, Doe Run has spent

approximately $62 million toward stabilization of the Piles, investigation and remediation of residential yards, and BLL sampling in children. Doe Run has been fully responsive to EPA's demands with regard to response actions at the Site.

At the same time, EPA has continually refused to consider, much less evaluate the extent to which sources of lead other than mining wastes are contributing to the potential threat to human health and the environment, including, in particular, blood lead levels. Doe Run does not disagree with EPA's desire to reduce BLLs in children. The efforts of EPA, HUD and state and local governments to reduce lead levels in children are important and worthwhile. However, EPA's continuing resistance to consider and evaluate the extent to which sources other than mining wastes are contributing to blood lead levels is a mis-application of its CERCLA authorities.

The significant amount of work already performed at the Site has already substantially abated much, if not all the potential risk from historic mining wastes. State and local programs directed to lead education and lead paint remediation have been dramatically successful both nationwide and locally, as shown by the significant reduction in blood lead levels in the Old Lead Belt area. But it must be noted that these reductions appear unrelated to the yard cleanup work that has been performed to date. This, coupled with the lack of correlation between identified mining waste sources and BLLs, calls into doubt EPA's assumptions that spending another $100 million to conduct removals at more than 4,000 yards will provide substantial additional protection.

Based the foregoing, Doe Run strongly urges EPA to take additional time to more carefully evaluate the available data and more carefully evaluate the extent to which mining waste, and not other sources of lead, contribute to the risk. Only then can EPA select a remedy

that more accurately presents the best balance of trade-offs as required by CERCLA, is protective with regard to the risk actually posed, and is implementable and cost effective.