

Health Consultation

EAST HELENA SUPERFUND SITE

EAST HELENA, LEWIS AND CLARK COUNTY, MONTANA

EPA FACILITY ID: MTD006230346

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation

Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR, which in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

Review of Preferred Cleanup
Alternatives 2R and 3R

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Prepared by:

U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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1 Statement of Issues

The Montana Department of Environmental Quality (MDEQ) requested that the Agency for Toxic Substances and Disease Registry (ATSDR) determine whether two proposed cleanup alternatives for lead contamination in residential areas of the East Helena Superfund site are protective of public health. These two cleanup alternatives, which are documented in the US Environmental Protection Agency's (EPA's) proposed plan for final cleanup [EPA 2007a], are referred to as

- Alternative 2R—Selected Soil Removal [1,000/500 parts per million (ppm) lead], Continuing Community Education, and Institutional Controls; and
- Alternative 3R—Selected Soil Removal (500 ppm lead), Continuing Community Education, and Institutional Controls.

ATSDR understands that a level of flexibility is needed to best respond to different site conditions, communities, and uncertainties at lead-contaminated residential sites. In this health consultation, ATSDR evaluates whether two of the proposed cleanup alternatives developed specifically for the East Helena Superfund site are protective of public health.

2 Background

The following background text will first provide information about lead, the primary contaminant of concern. Then, ATSDR provides a summary of the history and characteristics of the East Helena Superfund site as described in EPA's January 2007 proposed plan for final cleanup [EPA 2007a].

2.1 Lead

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing [ATSDR 2007c].

Lead can affect almost every organ and system in the body, although the main target for lead toxicity is the nervous system. Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomach-ache, muscle weakness, and brain damage. Unborn children can be exposed to lead through their mothers. Harmful health effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children [ATSDR 2007c].

Previously, the Centers for Disease Control and Prevention (CDC) responded to the accumulated evidence of adverse effects associated with lead exposures by lowering the blood lead level (BLL) of concern from 60 micrograms of lead per deciliter of blood ($\mu\text{g}/\text{dL}$) to 25 $\mu\text{g}/\text{dL}$. In 1991, CDC recommended lowering the level for individual intervention to 15 $\mu\text{g}/\text{dL}$ and implementing communitywide primary lead poisoning prevention activities in areas where many children have BLLs greater than 10 $\mu\text{g}/\text{dL}$. However, this level, which was originally intended to trigger communitywide prevention activities, has been misinterpreted frequently as a definitive toxicologic threshold. Although there is evidence of adverse health effects in children with blood lead levels

below 10 µg/dL, CDC has not changed its level of concern, which remains at levels greater than 10 µg/dL [CDC 2005].

Because there is no clear threshold for some of the more sensitive health effects, no guidelines for a safe dose of lead intake have been established. EPA has no reference dose (RfD) and ATSDR has no minimal risk level (MRL) to serve as a safe oral dose below which adverse health effects are unlikely to occur. However, lead cannot be entirely eliminated from soil so there will always be some residual levels following cleanup actions at lead-contaminated sites. When deriving a site-specific cleanup level for lead, EPA considers aspects such as site-specific variability in exposure, lead geochemistry, and projected land use. EPA can also factor in other considerations such as cost, technical feasibility, compliance with state and federal regulations, and community acceptance. These factors result in large variations in proposed cleanup levels at different lead-contaminated sites.

2.2 Site Characteristics

The East Helena Superfund site consists of an abandoned smelter and adjoining areas including all of the City of East Helena, nearby residential subdivisions, numerous rural developments such as farms and homes on small acreage plots, and surrounding undeveloped lands (see Figure 1, Appendix A).

The smelter operated from 1888 until April 2001. Asarco took ownership of the smelter in 1895 and continued to operate it until its closure in 2001. Asarco still owns the smelter grounds and much of the undeveloped lands surrounding East Helena. During its operation the smelter produced lead bullion, but also recovered copper, gold, silver, and platinum for refining at other Asarco facilities. Ores and concentrates were shipped to East Helena for smelting from mines as far away as Indonesia and South America.

Other facilities included a former zinc plant, constructed and operated by the Anaconda Minerals Company from 1927 through 1972. The company produced zinc oxide from the lead smelting by-product, slag. The American Chemet Corporation also began producing zinc-based paint pigments in 1947. American Chemet continues to operate, but has modified and upgraded its zinc and copper product lines numerous times over the years. Burlington Northern Railroad and Montana Rail Link also operate rail lines and own or lease property adjacent to the industrial complexes. All five of these companies have been named as potentially responsible parties at this Superfund site.

Operations by these five companies have contributed to the present contamination in East Helena; however, the major contribution came as air emissions from the lead smelting and zinc fuming operations. In addition, storm water runoff and Wilson Ditch (a major irrigation ditch) transported fine-grained concentrates and other contamination from the smelter to residential and undeveloped areas along Prickly Pear Creek and lands served by Wilson Ditch.

Investigations conducted as early as the mid-1980s (and continuing to the present) reveal substantially elevated levels of 18 to 20 elements. All of these elements are found naturally in the Earth's crust, but generally at much lower concentrations. Many of these elements are classified as hazardous substances at the concentrations measured in soils on

and around the smelter, and as far away as several miles downwind or downstream. Lead, arsenic, cadmium, copper and zinc are the elements of concern. Lead, however, is the element of greatest public health concern at the site. Figure 1, Appendix A, shows soils likely to have lead concentrations greater than 1,000 ppm, and between 1,000 ppm and 500 ppm. These boundaries are not clearly defined because over the course of 114 years of emissions, soil lead concentrations can vary depending upon land use, topography and other factors.

2.3 Land Use

Current land uses in East Helena include established residential areas and commercial businesses, newer residential subdivisions and acreage home sites, agricultural lands and open spaces, and industrial facilities (mainly the former Asarco smelter and American Chemet's operating plant). It is anticipated that future land use of existing residential properties will remain residential and that, based on historical growth patterns, new residential subdivisions will be developed on existing agricultural or undeveloped lands. Some of the agricultural lands will remain as productive agricultural resources. Some lands, such as the East Fields, will be used as a soil repository and, consequently, future development may be restricted there.

2.4 Superfund Involvement

In September 1984, EPA listed the site on the National Priorities List (NPL). Asarco conducted numerous investigations to identify soil, groundwater, and surface water impacted by past smelter operations. EPA and MDEQ provided oversight and direction.

In 1987, this large, diverse site was segregated into five operable units:

- Process Ponds and Fluids (including the process ponds and process fluids circuits),
- Surface Soils and Surface Water (including residential and agricultural soils, vegetation and livestock, fish and wildlife, Prickly Pear Creek, and Wilson Ditch),
- Ground Water (beneath the smelter property as well as beyond),
- Slag Pile, and
- Ore Storage Areas.

EPA divided the site into operable units partly to begin work on the process ponds while continuing to study other parts of the site. A Record of Decision (ROD) for the process ponds was issued by EPA in November 1989. Between 1990 and 1995, Asarco conducted the required remedial actions for the process ponds until another enforcement program under EPA's authority, the Resource Conservation and Recovery Act (RCRA) Program, became responsible for the process ponds, ground and surface water, the slag pile and former ore storage areas. The Superfund Program retained responsibilities only for residential soils and agricultural lands.

In March 1990, a comprehensive remedial investigation and feasibility study were completed by Asarco. With regard to residential soil sampling throughout the

community, the remedial investigation included a characterization effort involving sampling at the surface and at depth intervals, generally down to 32 inches. Based on these depth-intergraded samples, EPA concluded that (1) metals, particularly lead, were deposited primarily by aerial deposition, and (2) depth of penetration of the soil profile, by lead and all other elements of concern, generally approaches background concentrations at depths of 18 to 24 inches [EPA 2008d].

In March 1991, in response to EPA's request, Asarco produced a revised and more focused remedial investigation and feasibility study for residential soils, Wilson Ditch, and vegetation. In July 1991, EPA and Asarco entered into a formal agreement to conduct an expedited removal action for residential properties, parks and school playgrounds, unpaved streets and alleys, irrigation ditches and commercial areas. As the removal action proceeded, approximately 1,500 additional yards and other properties were sampled, but mostly surface soil samples were collected (0-1 inch) [EPA 2008d].

Asarco, with EPA and MDEQ oversight and direction, has been removing soils with high concentrations of lead and other contaminants from residential yards, parks, roads, alleys, and street aprons since 1991. Throughout the years, the direction and protocols have been changed to reflect changing and updated information and to expedite the cleanup in a safe and protective, yet cost-effective manner. A number of innovative and experimental approaches to this project have been incorporated into the cleanup.

From 1991 to 2006, the removal action resulted in the cleanup of the following: 620 existing residential yards; 450 sections of alleys, roads, and road aprons; 6 public parks; 2 school playgrounds; 45 commercial and public areas; 4,200 linear feet of irrigation ditch; 150 flood channel and ditch sections; and 36 vacant lots.

2.5 Lead Education and Abatement Program

The Lewis and Clark City-County Health Department provides staff for and administers the East Helena Lead Education and Abatement Program. The program was established in July 1995 and maintains an office in East Helena. It is a multi-pathway lead exposure prevention and risk abatement program. The program promotes environmental assessments in homes, including sampling of yard soil, interior dust, drinking water, and lead-based paint in order to identify all sources of and pathways for lead exposure.

The program provides broad-based education to the public, in homes, day-care centers and schools. Education efforts are focused on nutrition, personal hygiene, health monitoring (blood lead testing) of area children, "safe play" practices, and risk reduction and management. The program provides information to area residents on the need to avoid areas with elevated soil or dust lead levels and to maintain barriers inside and outside the house. It provides information to future purchasers and sellers of property, lending institutions, and realtors regarding both site-wide and individual property-specific conditions. Appendix C provides a copy of the East Helena Lead Education and Abatement Program, Second Program Evaluation [LCCCHD 2005].

2.6 *Community Involvement*

Since 1984, EPA's public involvement program has included multiple actions to educate local residents and government officials concerning site risks and to inform them about the progress of Superfund activities. Community involvement activities include:

- Regularly scheduled public meetings in East Helena to inform the public and to obtain public input;
- Meetings with the East Helena City Council and Lewis and Clark County Commissioners to provide updates;
- Informal meetings with affected residents concerning the cleanup of their yards;
- Meetings with the East Helena School Board, administrators and teachers, including classroom presentations;
- Regular meetings with two separate citizens' advisory groups;
- Preparation and distribution of fact sheets and educational materials;
- Assistance with blood lead screenings for area children; and
- Ongoing assistance to the Lead Education and Abatement Program.

2.7 *Blood Lead Screening*

Children's blood lead levels (BLLs) have been a high priority health concern in East Helena. Beginning as early as 1975, and continuing throughout the late 1980s and early 1990s, studies involving children living in and around East Helena demonstrated elevated levels of lead in their blood [CDC 1986, LCCCHD 2005]. Two-thirds of East Helena children tested in 1983 had blood-lead levels greater than 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$).

BLLs of East Helena children have been studied extensively since 1975. In the past, average blood lead values were high and the occurrence of values well above 10 $\mu\text{g}/\text{dL}$ was common (see Table 1, Appendix A). Over time, average levels and the frequency of values above 10 $\mu\text{g}/\text{dL}$ have declined significantly.

Figure 2, Appendix A, reveals a steady decline in East Helena children's BLLs. Since 2001, 531 children were tested and none have exceeded a blood lead level of 10 $\mu\text{g}/\text{dL}$. Of these children, 98% had BLL at or below 4 $\mu\text{g}/\text{dL}$ [EPA 2007a]. The decline of observed BLLs in East Helena children is attributable to several factors. The one most important factor was the continual reduction of airborne lead emissions from the Asarco Lead Smelter. In 1991, Asarco altered its operations, which resulted in a 61% drop in the average lead emissions from the smelter (i.e., reduced average lead emissions from 90,000 pounds per year to approximately 34,700 pounds per year). As particulates in air were significantly reduced in the early 1990s, BLLs also showed significant reductions. In 1999, Asarco again reduced the lead emissions an additional 21%, from 34,700 pounds per year to 16,400 pounds per year. Asarco made its final reduction in 2001, dropping the lead emissions another 18%, from 16,400 pounds per year to 0 pounds per year, and ultimately closed the smelter in April 2001.

Other activities that have helped with the decline in children's BLLs are the East Helena Lead Education and Abatement Program and the cleanup and soil excavation efforts initiated in 1991 that are still ongoing. Additional factors not illustrated in Figure 2, Appendix A, that have influenced children BLLs in East Helena are EPA's National Lead Abatement Program (i.e., national reduction of lead fuel in automobiles and lead paint and plumbing within residential and commercial properties) and a nationwide reduction of dietary lead found in market foods, as inferred by the NHANES III Survey [CDC 1997].

3 Proposed Plan for Cleanup of East Helena's Residential Soils

Since 1984, EPA's public involvement program has included multiple actions to educate local residents and government officials concerning site risks and to inform them about the progress of Superfund activities. As part of the community involvement program, a proposed plan for East Helena residential soils was previously issued in October 1997. However, a Record of Decision was, for several reasons, never finalized. As a result of the lapse in time, and in an effort to provide the community a renewed opportunity to participate in the selection of a final remedy, a new and revised proposed plan was issued in January 2007.

In January 2007, the EPA announced its recommendations and plans for cleaning up the remaining contaminated soils in residential areas within the East Helena Superfund site. Because this health consultation focuses on only two of the proposed alternatives, ATSDR has not summarized all of the potential cleanup alternatives in this section. The following text summarizes the overall components of Alternatives 2R and 3R.

3.1 Overview of Proposed Alternative 2R

Alternative 2R will complete the residential soil cleanup according to protocols that are currently in place for the ongoing removal action [EPA 2007a]. Yards and other properties within residential areas would qualify for cleanup whenever any one (or more than one) sampling section has a composite soil lead concentration above 1,000 ppm lead. Once a yard qualifies, all other sections greater than 500 ppm lead would also be cleaned up.

As has been the practice in East Helena for over 10 years, residential yard soil sampling followed a protocol that required "biased sampling" and incorporation of an "adjustment factor" to the raw analytical results [EPA 2008b]. Approximately 1,500 yards have been sampled using this sampling protocol [EPA 2008d]. Under Alternative 2R, EPA would use these available data to determine which yards to remediate. However, some additional yards may require further sampling efforts, which will follow these historical protocols. EPA did not provide ATSDR with the sampling and analysis plan describing these historical protocols; however, EPA did describe these protocols in several emails to ATSDR staff. These protocols would include [EPA 2008b, EPA 2008d]:

- **Sampling Location and Depth:** A "biased sampling" method will be used. Sample locations will be selected to locate the highest lead concentrations in each section of the yard. At least 3 of the 5 locations that make up the composite within each

section will be biased to detect the highest lead concentrations. Generally, surface soil samples will be collected (0-1 inch).

- **Yard Sections:** A five-point composite sample will be collected from each section. Small to medium yards will be divided into 4 sections. However, any yard larger than 14,400 square feet in area (about 1/3 of an acre) must be subdivided into 60 by 60 foot sections. It is estimated that the yards in East Helena's outlying subdivisions will have 8 to 12 sections. Some will have as many as 16 (or more) sections. Thus, in a yard divided into 12 sections, 60 individual soil samples will be taken and 36 or more of them must be biased for locating the highest lead concentrations.
- **Sample Analysis:** After the composited samples are analyzed, by standard laboratory procedures, the Montana Office will apply a statistical certainty factor, or "adjustment factor", to the raw analytical results. For example, a property with a raw reading for one section of 717 ppm could, after applying the adjustment factor to achieve the upper 95th percentile confidence, have a reported concentration of 836 ppm lead [EPA 2008b]. Reporting the 95th percentile results in a more conservative estimate of the soil concentration.

EPA indicated that Alternative 2R has these conservative practices "built in" and that they will be retained if Alternative 2R is selected as the remedial action [EPA 2008b].

Also under Alternative 2R, the county would continue to administer the East Helena Lead Education and Abatement Program for as long as necessary. In addition, institutional controls would be developed and administered by the local government to protect against recontamination of areas cleaned up and assure that protective regulations and policies are adhered to.

In January 2007, the Superfund Program estimated that approximately 100-110 existing residential yards would qualify for remediation under Alternative 2R. In its January 2007 proposed plan, EPA chose Alternative 2R as the preferred cleanup alternative for contaminated soils in existing residential areas. EPA recommended Alternative 2R because it is patterned after the residential soil removal action that has been in place since 1991. EPA believes that the removal action has proven to be safe, effective, and protective of children's health, and will satisfy applicable or relevant and appropriate legal requirements (ARARs). EPA stated that Alternative 2R represents a cost-effective approach to cleanup with the least amount of disturbance or environmental consequence [EPA 2007a].

For additional information regarding this cleanup alternative, as presented in EPA's January 2007 proposed plan for cleaning contaminated surface soils in East Helena, please refer to Appendix B.

3.2 Overview of Proposed Alternative 3R

For Alternative 3R, when soil sampling indicates that a parcel of residential property has an average soil lead concentration greater than 500 ppm, all soils of that property would be excavated. Under Alternative 3R, the same community education and institutional control components discussed for Alternative 2R would apply.

Although not stated in the January 2007 proposed plan, it is ATSDR's understanding that EPA first assumed Alternative 3R would follow the same sampling protocol as Alternative 2R (i.e., historical protocols) [ATSDR 2008d]; however, EPA is currently considering following the sampling protocols described in EPA's 2003 Superfund Lead-Contaminated Residential Sites Handbook instead [EPA 2008d]. All of the existing non-remediated residential properties within a radius of approximately 2.5 miles from the smelter would require additional sampling (see Figure 1, Appendix A, and note the probability of locating properties with soils greater than 500 ppm lead) [EPA 2007a]. According to the 2003 handbook, residential yard soil sampling protocols include [EPA 2003]:

- **Sampling Location and Depth:** One five-point composite of aliquots collected at equal spacing and from the same depth interval should be obtained from each section. Composite samples should be collected at 6 inch depth intervals, i.e., 0-6 inches, 6-12 inches, 12-18 inches, and 18-24 inches. Each aliquot should be collected away from influences of the drip zone and any other painted surfaces.
- **Yard Sections:** For residential yards with a total surface area less than 5,000 square feet, a five-point composite samples should, at a minimum, be collected from each of the following locations—the front yard, the back yard, and the side yard (if the size of the latter is substantial). For residential yards with a total surface area greater than 5,000 square feet, the property should be divided into four quadrants of roughly equal surface area. Properties over one acre in size should be divided into 1/4 acre sections. In addition, soil samples should also be collected from distinct play areas and gardens if they are present.
- **Sample Analysis:** Compositated samples will be analyzed by standard laboratory procedures.

In the January 2007 proposed plan, EPA estimated that approximately 900 existing residential yards would qualify for remediation under Alternative 3R. Although EPA considers Alternative 3R protective of public health, EPA did not choose Alternative 3R as the preferred cleanup alternative for contaminated soils in existing residential areas in its January 2007 proposed plan.

For additional information regarding this cleanup alternative, as presented in EPA's January 2007 proposed plan for cleaning contaminated surface soils in East Helena, please refer to Appendix B.

4 Discussion

East Helena residents are exposed to lead contaminated surface soil in their residential yards. Exposure to soil occurs primarily through dermal contact. In addition, people might accidentally ingest soil as well as dust that is generated from disturbing the soil. Preschool age children tend to swallow more soil or dust than do any other age group because they have more contact with soil through their play activities, they tend to exhibit mouthing of objects, and some exhibit pica behavior. Pica behavior refers to the intentional ingestion of non-food items, such as soil. Children in elementary school, teenagers, and adults tend to swallow much smaller amounts of soil or dust. The amount

of grass cover in an area, the amount of time spent outdoors, and weather conditions also influence people's exposure to soil.

For the East Helena Superfund site, there are elevated lead levels in soil. This health consultation evaluates two alternatives proposed by EPA for cleaning up the remaining lead-contaminated soil. In the following text, ATSDR evaluates several components of each alternative: community education and intervention, institutional controls, soil sampling protocols, and lead cleanup levels. Other considerations are also acknowledged, such as the impact of heavy construction on the community.

4.1 Community Education and Intervention

When lead contamination is identified at a site, remedial actions usually include community health education and intervention. It is difficult to document the impact of health education, by itself, since it is usually done in concert with source removal and abatement. Nevertheless, there is some evidence that community-wide education and intervention have been partly responsible for declines in community blood lead levels [Hilts et al. 1998].

Under both Alternatives 2R and 3R, the Lewis and Clark City-County-administered Lead Education and Abatement Program will continue to operate within the community for as long as needed to protect children from exposures to residual levels of lead. Currently, Asarco is funding this program, with county health professionals stationed within the community and its schools [EPA 2008a]. As described in Section 2.5, the program provides broad-based education to the public, in homes, day-care centers and schools. The focus of education is on nutrition, hygiene, continued health monitoring (blood lead testing) of the area's children, "safe play" programs, and continued risk reduction. Also as mentioned in Section 2.5, the program provides information to future purchasers and sellers of property, lending institutions, and realtors regarding both site-wide and individual property-specific conditions. Further details regarding this program can be found in Appendix C, which provides a copy of the East Helena Lead Education and Abatement Program, Second Program Evaluation [LCCCHD 2005].

In 1999 and 2005, the program's effectiveness was reviewed using door to door surveys, focus groups, and other evaluation methods [LCCCHD 2005]. During both reviews, the program received high grades for its performance. ATSDR's review found the program's goals and accomplishments to be comprehensive and far-reaching. For the East Helena community, there appears to be a heightened awareness regarding lead exposures. Although the most likely reasons for the substantial reduction in children's BLLs over the years were the reduction of airborne lead emissions and the subsequent closure of the Asarco Smelter, other actions that have helped with the decline include the Lead Education and Abatement Program's activities. ATSDR believes the program is effective because activities such as community health education are combined with other measures such as BLL testing and in-home environmental assessments (see Appendix C). Because there will always be residual levels of lead in East Helena, regardless of the cleanup alternative chosen, ATSDR finds the Lead Education and Abatement Program to be a critical and necessary component in the protection of public health as outlined in the January 2007 proposed plan for Alternatives 2R and 3R.

4.2 Institutional Controls

Institutional controls (ICs) are legal and administrative tools used to maintain protection of human health at sites. ICs are often a part of the remedy at a site. ICs can be used to restrict site use, modify behavior, and provide information to people. Because there may be residual contamination at the site, ICs are a way to insure the protection of public health [ATSDR 2007b].

As described in the January 2007 proposed plan, the ICs for the East Helena Superfund site are:

- Adopt and administer local regulations designed to reduce opportunities for recontamination of areas already cleaned up;
- Adopt and administer regulations that require, or policies that encourage, coordination of planning and zoning efforts (East Helena city government, Lewis and Clark County Health Board, Lewis and Clark County Planning and Zoning Commission);
- Continue to provide oversight of cleanup activities and monitor areas previously cleaned up; and
- Administer restrictions and requirements at the EPA-approved soils repository.

The Lewis and Clark City-County-administered Lead Education and Abatement Program will, after a final remedy is selected and a Record of Decision is issued, administer institutional controls and associated guidelines [EPA 2007a]. However, ATSDR cautions that the success of an IC is dependent on implementation, monitoring, and enforcement activities. Therefore, success depends on the commitment of the local government entities, who may have some overlapping responsibility for an IC, to work together. Provided that the local government entities work together to implement, monitor, and enforce appropriate and feasible regulations, ATSDR finds the general ICs to be a critical and necessary component in the protection of public health as outlined in the January 2007 proposed plan for Alternatives 2R and 3R.

4.3 Soil Sampling Protocols

For each residential yard, the overall goal of sampling is to estimate an average soil lead concentration that can be used to determine whether the yard, or a section of the yard, requires cleanup actions. During the development of its 2003 Superfund Lead-Contaminated Residential Sites Handbook, EPA reviewed various sampling designs historically employed at lead-contaminated residential sites and assessed the ability of these sampling designs to support the development of cleanup levels [EPA 2003]. In the 2003 handbook, EPA proposed a sampling strategy the agency felt would promote consistent procedures, criteria and goals in the investigation of lead-contaminated residential sites.

Although not described in the January 2007 proposed plan for East Helena, it is ATSDR's understanding that Alternative 3R might follow the same sampling protocol as outlined in EPA's 2003 handbook. As such, ATSDR finds that the sampling protocol of

Alternative 3R would support the identification of residential yards that may require cleanup actions due to elevated lead levels if the EPA 2003 handbook is followed.

Alternative 2R will follow the historical sampling protocols that have been in practice at the East Helena site for over 10 years. At this time, it is unclear to ATSDR whether Alternative 3R will follow these historical sampling protocols, although there is that possibility. The historical sampling protocols used in East Helena were developed and instituted before EPA released its 2003 handbook and therefore do not follow the 2003 handbook sampling protocols.

Based on the information provided to ATSDR for this health consultation, the major differences between the sampling protocols appear to be that the historical protocols require "biased sampling" and the incorporation of an "adjustment factor" to the raw analytical results whereas the 2003 handbook sampling protocols do not require these measures [EPA 2008b]. It also appears the historical sampling protocol results in more sections per yard than the 2003 handbook sampling protocol. In addition, historical protocols have concentrated sampling efforts on top soil (0-1 inch). ATSDR notes that people are generally exposed to only the top inches of soil [ATSDR 1994].

Overall, ATSDR believes that these differences in historical sampling protocols would most likely result in higher lead concentrations being found in top soil. Because Alternative 2R follows historical protocols, ATSDR finds that Alternative 2R's sampling protocol supports the identification of residential yards that may require cleanup actions due to elevated lead levels. Similarly, ATSDR finds that Alternative 3R's sampling protocol would support the identification of residential yards that may require cleanup actions due to elevated lead levels if historical protocols are followed.

4.4 Lead Cleanup Levels

As previously mentioned, neither ATSDR nor the EPA has developed a MRL or RfD for exposure to lead. Therefore, the usual approach of estimating exposure to an environmental contaminant and then comparing this dose to a health guideline (such as an RfD or MRL) cannot be used. Instead, exposure to lead is evaluated by using a biological model that predicts a blood lead concentration that would result from exposure to environmental lead contamination. The most widely used model for this purpose is EPA's Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) model.

The IEUBK model is designed to integrate exposure from lead in air, water, soil, dust, diet, paint, and other sources with pharmacokinetic modeling to predict blood lead concentrations in children 6 months to 7 years of age. The four main components of the current IEUBK model are: (1) an exposure model that relates environmental lead concentrations to age-dependent intake of lead into the gastrointestinal tract; (2) an absorption model that relates lead intake into the gastrointestinal tract and lead uptake into the blood; (3) a biokinetic model that relates lead uptake in the blood to the concentrations of lead in several organ and tissue compartments; and (4) a model for uncertainty in exposure and for population variability in absorption and biokinetics [EPA 1994].

The IEUBK model results can be a tool for the determination of site-specific cleanup levels. In this context, the model is viewed as a predictive tool for estimating changes in blood concentrations as exposures are modified [EPA 1994]. In setting a soil lead cleanup level at a site, EPA's goal is to "limit exposure to soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of exceeding a blood lead level of 10 $\mu\text{g}/\text{dL}$ " [EPA 1998].

The IEUBK model provides choices a user may make in estimating a child's blood lead concentration. These are referred to "user-specified" parameters or decisions. The reliability of the results obtained using the model is very dependent on the selection of the various coefficients and default values that were used.

The use of solely default parameters in the IEUBK model yields a soil lead level of about 400 ppm, which EPA recommends as a screening level for lead in soil at residential properties [EPA 1998]. Using a combination of default assumptions and site-specific information on lead relative bioavailability (RBA) and soil to dust ratios obtained at East Helena, the model-predicted lead level is estimated to be 520 ppm [EPA 2007b]. For this health consultation, the model-derived values are only one aspect considered when determining whether a cleanup level is protective of public health at East Helena. Other important aspects factored into ATSDR's evaluation of cleanup levels for the East Helena Superfund site include the site's history, BLL data, community education and intervention, and institutional controls.

Alternative 2R proposes cleanup of residential yards when any one section has soil lead greater than 1,000 ppm. Once a yard qualifies, all sections of the yard above 500 ppm will be cleaned up. Overall, with the continuation of the Lead Education and Abatement Program and the adoption and enforcement of appropriate and feasible institutional controls, ATSDR finds the lead levels that trigger cleanup in Alternative 2R protective of public health. The following text documents several factors considered in ATSDR's evaluation:

1. Site history: Beginning in 1991, Asarco altered its operations, which resulted in a 61% drop in the average lead emissions from the smelter. As particulates in air were significantly reduced in the early 1990s in East Helena, children's BLLs also showed significant reductions. Similarly, another smelter in Trail, British Columbia, showed a rapid decline in children's BLLs levels following reductions in air lead levels [Hilts 2003]. In 1999 and 2001, Asarco again reduced lead emissions. In April 2001, the smelter closed, thereby stopping a major source of lead contamination in East Helena.

Since 1991, there has been ongoing removal of soils with high concentrations of lead from residential yards. The lead levels that trigger cleanup proposed in Alternative 2R are the same as the levels used to trigger cleanup during past residential yard removal actions. Furthermore, the comprehensive Lead Education and Abatement Program, which was established in 1995, is an ongoing program. Overall, a review of the site's history has shown a continued decline in adverse impacts of lead-contamination on public health for the East Helena community. As long as all critical components of the January 2007 proposed plan are maintained in the final remedy, ATSDR finds that the site's history supports the

public health protectiveness of Alternative 2R's lead cleanup levels, which have been used to trigger cleanup actions at the East Helena site for many years.

2. Blood lead data: As stated in ATSDR's guidance, blood lead data, by itself, should not be the sole basis for determining whether lead contamination at a site poses a hazard [ATSDR 2007a]. Blood lead levels reflect exposure for the time period in which the children were tested, but it may not be representative of past or future exposures for different children. Therefore, when comparing the results of blood lead screening to estimated results from the IEUBK model, ATSDR considers items such as whether the blood lead data are representative of the community [ATSDR 2007a]. Although ATSDR did not perform its own review of the BLL data, an EPA analysis found that based on consideration of participation rates, narrowing bands of statistical uncertainty over time, spatial representativeness, and soil lead representativeness, a high level of confidence exists in the blood lead data generated by the County-administered program. The EPA analysis concluded that these long-term data are reliable and appropriate for use by risk managers and other health professionals in assessing conditions in East Helena and for setting a protective soil lead cleanup level [EPA 2007b].

Application of the IEUBK model indicates the recommended default parameters can over-predict BLLs when site-specific data are not used [von Lindern et al. 2003]. Alternative 2R's lead cleanup levels (1,000/500 ppm lead) are above the IEUBK model-derived default soil lead cleanup level of about 400 ppm. However, for East Helena, the average BLLs and the frequency of values above 10 µg/dL have declined significantly over time. Since 2001, 531 children were tested and no children have had blood lead levels above 10 µg/dL. Of these children, 98% had BLL at or below 4 µg/dL [EPA 2007a]. As mentioned previously, there is some evidence that community-wide education and intervention have been partly responsible for declines in community blood lead levels [Hilts et al. 1998]. As long as all critical components (like community education) are maintained in the final remedy, ATSDR finds that these BLL data support the public health protectiveness of Alternative 2R's lead cleanup levels, which have been used to trigger cleanup actions at the East Helena site for many years.

3. Community education and intervention: As described in Section 4.1, ATSDR found the Lead Education Abatement Program's goals and accomplishments to be comprehensive and far-reaching. For example, under the program, whenever blood lead tests of a child and a follow-up environmental assessment of a home demonstrate that exposure to lead in the soils of that yard is responsible for a blood lead level above 10 µg/dL, then that yard would qualify for immediate remedial action irrespective of the yard soil lead concentration [EPA 2007a]. Also, the program offers free BLL testing and free environmental lead hazard assessments (i.e. water, soil, dust, paint, hobbies) to all East Helena area residents upon request [EPA 2007b]. Overall, ATSDR finds that the public health protectiveness of Alternative 2R is greatly enhanced by the Lead Education and Abatement Program.

4. **Institutional controls:** As described in Section 4.2, ATSDR found that the general ICs outlined in the January 2007 proposed plan are protective of public health. According to the January 2007 proposed plan, these ICs could include regulations needed to (a) prevent disturbances of contaminated soils that remain in and around East Helena and (b) prevent exposures to interior household dust (attics, unfinished basements, heating ducts, etc.) during remodeling or demolition [EPA 2007a]. Overall, ATSDR finds that the public health protectiveness of Alternative 2R will be greatly enhanced by the adoption and enforcement of appropriate and feasible regulations.

Overall, as long as the aforementioned critical components are maintained in the final cleanup remedy, ATSDR finds the lead levels that trigger cleanup as outlined in the January 2007 proposed plan for Alternative 2R to be protective of public health.

Alternative 3R proposes cleanup of yards when soil sampling indicates that a residential property has an average soil lead concentration greater than 500 ppm. All soils of that property would be excavated. Under Alternative 3R, the same community education and institutional control components discussed for Alternative 2R would apply. Although Alternative 3R's lead cleanup level (500 ppm lead) is above the IEUBK model-derived default soil lead cleanup level of about 400 ppm, ATSDR believes the site's history and BLL data would also support the protectiveness of this alternative over time. Therefore, as long as all critical components of the January 2007 proposed plan are maintained in the final remedy, ATSDR finds the lead level that triggers cleanup of residential yards for Alternative 3R to be protective of public health as well.

4.5 Other Considerations

The choice between various cleanup alternatives is ultimately a risk management decision. At lead-contaminated residential sites, a variety of considerations are evaluated to determine the best site-specific alternative. For this health consultation, ATSDR evaluated specific environmental health aspects of Alternatives 2R and 3R to determine whether the alternatives are protective of human health. However, the agency acknowledges that many other considerations not evaluated in this health consultation must be addressed by risk managers in the final selection of a cleanup alternative. For example, ATSDR acknowledges that the heavy construction associated with cleaning up yards will impact the community. That is, the operation of heavy equipment, dump trucks, street sweepers, etc., in yards where young children reside can present a substantial risk to their physical safety, regardless of the cleanup alternative chosen.

Another consideration is the accuracy of the lead boundary lines noted in Figure 1, Appendix A. This figure, developed by EPA, shows soils likely to have lead concentrations greater than 1,000 ppm, and between 1,000 ppm and 500 ppm. However, EPA states that these boundaries are not clearly defined and that relatively little sampling has been done outside the red boundary line [EPA 2007a, EPA 2008d]. ATSDR finds that regardless of the cleanup alternative chosen, additional efforts to characterize the extent of lead contamination may be warranted.

Lastly, although ATSDR did not review original site documents in some instances, such as the historical sampling and analysis plan, the agency has assumed for the purpose of

this health consultation that the information provided by EPA to ATSDR in emails is accurate and reliable. ATSDR acknowledges that our analyses, conclusions, and recommendations are valid only if the information we received to evaluate are complete and reliable.

5 Child Health Considerations

ATSDR recognizes the unique vulnerabilities of children from exposure to hazardous substances in their environment. Children are at greater risk than are adults from certain kinds of exposures to hazardous substances because they often have greater exposure than do adults. For instance, children frequently play outdoors and are more likely to come in contact with soil than are adults. Children are more likely to get dirt on their hands, and are more likely to swallow some of that dirt if they do not wash their hands properly before eating. Children are also smaller than adults, resulting in higher doses of chemical exposure per body weight. Most important, children depend completely on adults for risk identification and management decisions, housing decisions, and access to medical care. Consequently, whenever soil is a pathway of concern—as it is in East Helena—children will have greater exposure to substances in the soil than will adults. For this reason, sampling and cleanup efforts in East Helena have been prioritized for yards where children resided.

As mentioned previously, children with soil pica behavior are of particular concern because they could possibly have significant exposures to lead-contaminated soil. Because there will always be residual levels of lead in East Helena, regardless of the cleanup alternative chosen, ATSDR finds the Lead Education and Abatement Program to be a critical and necessary component in the protection of children’s health for Alternatives 2R and 3R. The planned institutional controls are also a critical and necessary component in the protection of children’s health for Alternatives 2R and 3R. Overall, ATSDR finds Alternatives 2R and 3R protective of public health, including children, as long as these critical components are maintained in the final cleanup remedy.

6 Conclusions

ATSDR understands that a level of flexibility is needed to best respond to different site conditions, communities, and uncertainties at lead-contaminated residential sites. For this health consultation, ATSDR evaluated the environmental health aspects of proposed cleanup Alternatives 2R and 3R for the East Helena Superfund site to determine whether the alternatives are protective of human health. ATSDR has reached the following specific conclusions:

- Because there will always be residual levels of lead in East Helena, ATSDR finds that the Lead Education and Abatement Program is a critical and necessary component in the protection of public health as outlined in the January 2007 proposed plan for Alternatives 2R and 3R.
- Provided that local government entities work together to implement, monitor, and enforce appropriate and feasible regulations, ATSDR finds the general institutional controls are a critical and necessary component in the protection of

public health as outlined in the January 2007 proposed plan for Alternatives 2R and 3R.

- ATSDR finds the sampling protocols associated with Alternatives 2R and 3R support the identification of residential yards that may require cleanup actions due to elevated lead levels.
- As long as the aforementioned critical components are maintained in the final cleanup remedy, ATSDR finds the lead levels that trigger cleanup as outlined in the January 2007 proposed plan for Alternatives 2R and 3R to be protective of public health.
- Because relatively little sampling has been done outside the red boundary line (see Figure 1, Appendix A), ATSDR finds that regardless of the cleanup alternative chosen, additional efforts to characterize the extent of lead contamination may be warranted.

Overall, ATSDR concludes the proposed cleanup Alternatives 2R and 3R for lead contamination in existing residential areas are protective of public health.

7 Recommendations

1. Because ATSDR's evaluation of the protectiveness of both Alternatives 2R and 3R is dependent on the continuation of the Lead Education and Abatement Program and the adoption and enforcement of appropriate and feasible institutional controls, ATSDR recommends these critical components are maintained in the final cleanup remedy.
2. Because relatively little sampling has been done outside the red boundary line (see Figure 1, Appendix A), ATSDR recommends that additional efforts to characterize the extent of lead contamination be considered regardless of the cleanup alternative chosen.

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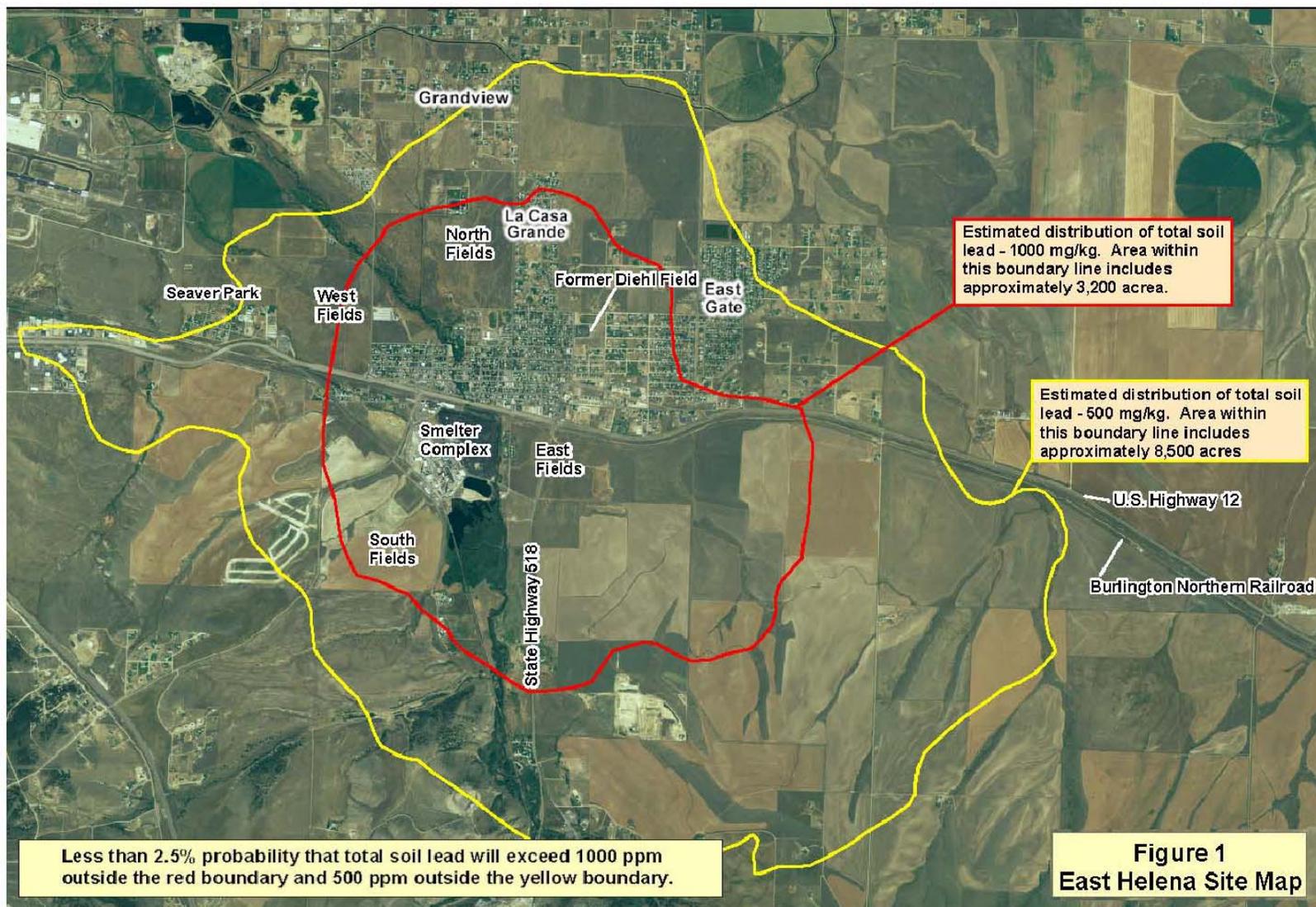
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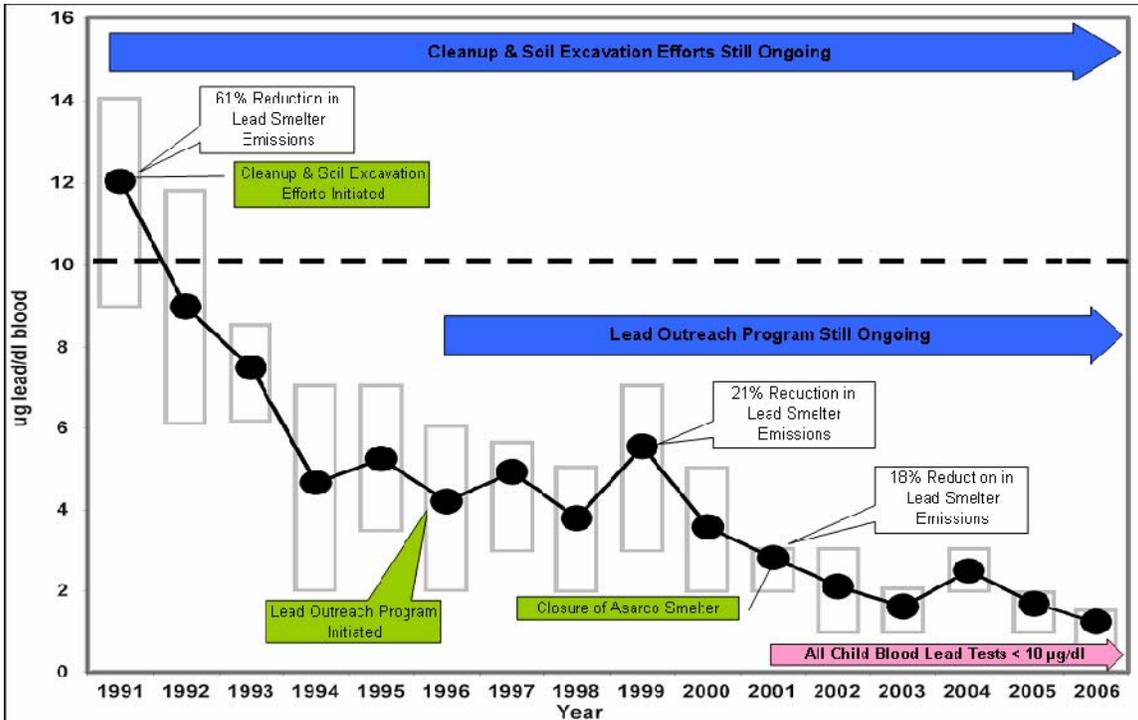
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Appendix A—Figures and Tables



Source: courtesy of EPA 2007a

Figure 2. Children’s Average (●) Blood Lead Concentrations from 1991 through 2006



Source: courtesy of EPA 2007a, LCCHD 2005

Figure notes:

Rectangles represent the central 50% of the concentration data

µg = micrograms

dL = deciliter

Table 1. Blood Lead Levels of East Helena Children 6 to 72 Months of Age (1975-2006)

Year	No. of children tested	No. with lead-in-blood levels 10 µg/dl or greater	Average (µg/dl)	Relative Prevalance (%) of blood lead levels greater than 10 µg/dl
1975	90	90	28	100
1983	98^a	87	14	88.4
1991-92	23	11	10.2	47.8
1993-94	38	2	5.5	5.8
1995-98	157	2	4.7	1.3
1997-98	165	7	4.2	3.8
1999-00	168	5	4.1	2.7
2001-02	130	0	2.8	0
2003-04	254	0	2	0
2005	10	0	1.7	0
2006	137	0	1.3	0
^aNinety-eight children residing within 1 mile of the smelter.				

Source: EPA 2007a

Table notes:

µg = micrograms

dL = deciliter

Appendix B—Cleanup Alternatives 2R and 3R

Cleanup Alternatives 2R and 3R

The following paragraphs provide documentation regarding yard remediation under the cleanup Alternatives 2R and 3R, as presented in EPA's January 2007 proposed plan for cleaning up lead and arsenic contaminated surface soils in East Helena, Montana [EPA 2007a].

Alternative 2R—Selected Soil Removal (1,000/500 ppm lead), Continuing Community Education, and Institutional Controls

Cost—\$ 10 million (net present value)

Time to Implement—2 years after EPA issues a Record of Decision

Under Alternative 2R, the remedy would consist of completing the residential soil cleanup according to protocols that are currently in place for the ongoing removal action. All remaining residential yards, vacant lots near residences, and unpaved areas such as streets and alleys within residential areas, that qualify under current protocols for the ongoing residential soil removal action, would be cleaned up. The county administered, community-wide education program, designed to monitor and protect children against exposures to residual lead, would be continued for as long as necessary. And, institutional controls would be developed and administered by local government to protect against recontamination of areas cleaned up and assure that protective regulations and policies are adhered to.

Under Alternative 2R, yards and other properties within residential areas would qualify for cleanup whenever any one (or more than one) sampling section, or quadrant, is above 1,000 ppm lead. Once a yard qualifies, all other sections (or quadrants) that are above 500 ppm lead would also be cleaned up.

The following further defines how Alternative 2R would be implemented.

- Where soil sampling indicates that any section or quadrant of a residential property qualifies that property for cleanup (i.e., at least one section greater than 1,000 ppm lead), all sections greater than 500 ppm lead would be excavated, placed into dump trucks that can be covered, hauled to the East Fields soil repository and disposed of by means of land application over ground that was severely impacted by past smelter emissions. Qualified yards where young children reside receive first priority each construction season.
- Unpaved roads, alleys and aprons that are adjacent to qualified properties would be excavated at the same time, under the same protocols.
- Soils would be excavated to a depth of 18 inches, or until all remaining lead concentrations, after excavation, are less than 500 ppm, whichever occurs first.
- Clean topsoil, generally mined from farmlands in the Helena Valley, would be used to backfill the areas from which soils are removed. Sod or reseeded,

replacement of shrubs, and other actions would be implemented in order to restore the property to its pre-response action condition.

- Whenever blood lead tests of a child and a follow-up environmental assessment of a home by health professionals demonstrate that exposure to lead in the soils of that yard is responsible for a blood lead level above 10 µg/dL, then that yard qualifies for immediate remedial action irrespective of the yard soil lead concentration.
- In the unlikely circumstances where a yard average soil arsenic concentration exceeds 176 ppm, but the yard does not otherwise qualify (e.g., no quadrant above 1,000 ppm lead), then the yard qualifies for remedial action.

An estimated 100 to 110 residential yards and 9 vacant lots, as well as their adjacent unpaved roads, aprons and alleys, are known to qualify for cleanup under Alternative 2R. It is anticipated that approximately 2 years would be required to clean up all remaining qualifying residential properties after EPA issues a Record of Decision.

Alternative 3R—Selected Soil Removal (500 ppm lead), Continuing Community Education, and Institutional Controls

Cost—\$38 million (net present value)

Time to Implement—5 to 7 years after EPA issues a Record of Decision

Under Alternative 3R, the remedy would consist of completing the residential soil cleanup according to revised, more stringent protocols than are currently in place for the ongoing removal action. All remaining residential yards, vacant lots, and unpaved areas such as streets and alleys, that would qualify under the revised protocols, would be cleaned up. The county administered, community-wide education program, designed to protect against exposures to residual lead, would continue for as long as necessary. Institutional controls would be developed and administered by local government to protect against recontamination of areas cleaned up and assure that protective regulations and policies are adhered to.

Under this alternative, yards and all other properties, including unpaved streets, alleys and open areas within residential areas, would qualify for cleanup whenever the property average lead concentration is above 500 ppm. Once a property qualifies under this alternative, the entire property would be cleaned up.

The following details further define how Alternative 3R would be implemented.

- Where soil sampling indicates that a parcel of residential property has an average soil lead concentration greater than 500 ppm, all soils of that property would be excavated, placed into dump trucks that can be covered, hauled to the East Fields soil repository and disposed of by means of land application over ground that was severely impacted by past smelter emissions.

- All unpaved roads, alleys, aprons, commercial areas, and vacant residential lots or open areas within residential areas, that have an average soil lead concentration above 500 ppm, would be cleaned up.
- Soils would be excavated to a depth of 18 inches, or until all remaining lead concentrations are less than 500 ppm, whichever occurs first.
- Clean topsoil, generally mined from farmlands in the Helena Valley, would be used to backfill the areas from which soils are removed. Sod or reseeding, replacement of shrubs, and other actions would be implemented in order to restore the property to its pre-response action condition.
- Whenever blood lead tests of a child and a follow-up environmental assessment of a home, performed by health professionals, demonstrate that exposure to lead in the soils of that yard is responsible for a blood lead level above 10 $\mu\text{g}/\text{dL}$, then that yard qualifies for immediate remedial action, irrespective of the yard soil lead concentration.
- In the unlikely circumstances where a yard average soil arsenic concentration exceeds 176 ppm, but the yard average soil lead concentration does not exceed 500 ppm, then the yard qualifies for remedial action.

It is estimated that approximately 900 yards, lots, and open areas would qualify for remedial action under Alternative 3R. This estimate has some associated uncertainty because all existing residential properties within a radius of approximately 2.5 miles from the smelter would require pre-sampling. (See Figure 1 in Appendix B and note the probability of locating properties with soils greater than 500 ppm lead.) Extensive additional pre-sampling and the estimated number of properties that are likely to qualify under Alternative 3R result in an estimated time of construction of 5 to 7 years, after a Record of Decision is issued by EPA.

Appendix C—East Helena Lead Education and Abatement Program, Second Program Evaluation

**EAST HELENA LEAD EDUCATION AND ABATEMENT PROGRAM
SECOND PROGRAM EVALUATION**

MAY 3, 2005

Prepared by:

**Lewis and Clark City/County Health Department
Resource Development Division and
East Helena Lead Education and Abatement Program**

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Lead Education & Abatement Program's 2nd Five-Year Review

1.3 From the last Five Year Review the program put together a Five Year Work Plan. The program continues to implement the following components of the Work Plan:

1. Health Intervention and Prevention Program

Identify children and others in East Helena area that may have a potential for negative effects as a result of exposure to environmental lead. The program staff continues to expand its efforts in finding children and pregnant women who are at risk of lead exposure.

Children 6 years and younger are at a greater risk to lead exposure than older children and adults and the program continues to try new methods of reaching these children. One such method involved the Women, Infants and Children (WIC) program.

In 2004, 298 postcards were sent out to all participants of the WIC program who lived in the East Helena Area. Approximately 17 % of all the postcards were returned due to change of address and no forwarding address in place. At the screenings many of the participants stated that they had received a postcard in the mail and that was how they learned of the screening. The program felt that the postcards sent were a good resource in reaching parents of young children and continues yearly outreach in this manner.

Monitor Blood Lead Levels in children. The program continues to input all information from the lead screenings held each year into a database. The information has been used in creating maps to determine if there are trends of participation rates for different areas of the community. Along with the participation rates the information is also used to determine the percentages for repeat screenings. The program continues to use the information from the database in creating maps and charts.

Coordinate with Montana Lead (CDC-funded) Program on childhood blood lead monitoring. The program reported all blood-lead levels to the Montana Lead Program. This blood-lead data was put into a larger database and the state analyzed the information to determine what kind of trends were happening statewide with regards to blood-lead levels in children.

The Montana Lead Program lost its funding in 2001 and has not received any additional funding at this time. The state laboratory continues to report all blood-lead levels in children to the Department of Public Health and Human Services (DPHHS). The DPHHS would like to have a tracking system in place for environmental health issues; which would include childhood blood lead levels. Funding for the new system has not been explored as of yet.

Coordinate with the Lead Awareness Program (HUD-funded) to raise community awareness of lead-related health issues. The program worked in conjunction with the Lead Awareness Program in promoting safety around lead. The two programs shared educational resources and presentations.

The Lead Awareness Program screened all children in Lewis & Clark County, while the East Helena Lead Education Program screened children in the East Helena Superfund area. The East Helena Program found five children with elevated blood lead levels through their screenings held in 2000. In contrast, the Lead Awareness Program found only one child with elevated blood lead levels in the two years they held screenings countywide. The Lead Awareness Program was a two-year grant from HUD. Lewis & Clark County was not eligible for additional funding.

Survey the various sectors of the community to determine the effectiveness of the program and make program adjustments as indicated. The program held four focus groups in December of 2004. The groups were broken into different target groups: East Helena residents, East Helena business owners, East Helena area residents (outside the City of East Helena) and East Helena elected officials. The results of these focus groups will be addressed in a separate chapter of this report.

Institutional Controls in the Superfund site. The program, at this time is not able to implement any Institutional Controls (ICs) for the East Helena Superfund Site. In order for the county to adopt any controls the EPA would have to incorporate the ICs in the Record Of Decision (ROD). The EPA has not released a ROD for East Helena at this time. The IC's are on hold until further decisions are made concerning the ROD.

Although the IC's are on hold the Program encourages citizens of East Helena to voluntarily dispose of excess soil from building projects to the East Fields, which is a designated repository for contaminated soils. The repository was created, by ASARCO, when remediation of East Helena yards began. ASARCO allows all citizens to use the repository at no charge.

Establish a system of tracking data related to residential soils and residents blood lead levels (intending to use a Geographic Information System). The program staff continues to use the database in creating maps depicting areas of high, medium and low soil lead concentrations and blood lead levels of children screened in those areas. The program staff currently is working on a map representing the location of all children screened over the past 10 years and locations of available soil lead levels.

Project Management, Organization and Schedule

Maintain a Program office, which is accessible to the public for information, and occasionally for blood lead screenings. Lewis & Clark City-County Health Department continues to maintain an office in the City of East Helena. This office provides ready access to the local residents.

Staff the Program appropriately to deliver consistent service to the community. The program has undergone a number of changes with regards to staffing. Currently the program employs two $\frac{3}{4}$ time Environmental Health Specialists who are available throughout the week. The number of staff working, at this time, is sufficient for the office to maintain consistent service to the public.

Explore additional funding streams leveraging current funding to enhance program activities. The program staff has continually investigated new grants, some of which are through the EPA and other Federal agencies. The program staff will continue to explore new grants and funding sources.

6.2.1 Community Outreach

In the last five years the program staff has continued its outreach programs. The program staff attends East Helena City/Council meetings; in doing so the staff has fostered a good working relationship with the Mayor and the East Helena City Council. Copies of the minutes from the Advisory Committee Meeting are sent to the Mayor and invitations for him to attend are also extended. There is a feeling of cooperation between the Program and the East Helena City Hall.

The program tracks all new babies born in the East Helena area and deliver "New Baby Packets" to all new parents in the East Helena area. Program staff sends out birthday cards once the children are a year old. The birthday cards reminds parents to have their children screened for blood lead.

School presentations for all first graders and kindergartners are given just before they are released for the summer. The presentations concentrate on where lead can be found and how to live and play safely around lead. The program staff has had positive feedback from parents of children participating in the presentations. School officials also are very positive about the presentations.

The program continues to participate in the East Helena Christmas stroll. The program's involvement with the stroll continues to increase each year. As in 2003, when the Program hosted Santa Clause. Continued participation in this event strengthens the Program's relationship with the citizens and businesses of East Helena.

In addition to the above-mentioned programs the program introduced a new outreach event, The Kiddie Parade. In 2002 the program started sponsoring a kiddie parade, which is on the Thursday before the East Helena Rodeo. Children are encouraged to dress up in western clothing or any other costume and walk in the parade.

The parade starts at the VFW and ends at the Main Street Park. After the parade children are given information packets and are treated to a picnic at the Park. The parade has been a wonderful way for the public to get to know the program staff and to participate in a community event.

Table 6.2.1 Summary of Community Outreach

Target Population	Event	Frequency	Number Affected
Parents of New Babies	New baby packets Follow up phone contacts Reminder postcard for screening when child is 1 year old.	Continually throughout the year	50-100 packets are distributed each year.
Day care providers	Phone calls and site visits	Annually	15-30
Kindergartner and first grade students, at Eastgate Elementary School	Presentation on how to live and play safely around lead. Approximately 30 minutes	Annually	Approximately 400 students per year
Entire Community	Christmas Stroll and Kiddie Parade	Annually	150-200 participants per year
City Officials	East Helena City Council Meetings	Bi-monthly	5-30 people per meeting
East Helena Residents with unremediated yards	Notification of the remediation guidelines	Annually	190 annually This number decreases each year with yearly remediation.
Day care providers	Training on lead sources, effects of lead and prevention methods	Annually	Approximately 80 daycare providers attend the training.
General public	Posters at paint and hardware supply stores.	9 retail stores in the Helena area	Unknown

6.2.2 BLOOD LEAD SCREENING

In accordance with the previous peer review, the program staff encourages participation and provides incentives for children to participate in blood lead screening events in the fall of each year. In the fall of 2002 the program was not allowed into the schools to hold their annual screening events during open house. The superintendent told the program that they were too controversial and hence would not be allowed to do any education in the schools. This was a set back to the program's educational and blood lead-screening plan. The superintendent left shortly thereafter.

Program staff approached the new superintendent and inquired if they could resume their presentations in the schools. The new superintendent (Ron Whitmoyer) granted permission for the program to give their presentations and hold screenings in the schools. The participation rates for blood lead screenings went up with the program being allowed back in the schools.

In the last five years the program has continued to expand its outreach for these events. In the fall of 2003 the program tried incentives as a way to increase the number of children being screened. Each child seven years and younger received a free large pizza and a \$20.00 bill. Children older than seven received a free large pizza.

The numbers increased dramatically from 44 children in 2002 to 205 children in 2003. The program had 4 screening events in 2003, two in January and two in the fall. Of these four screening events all but one were held in the school, one of which was the fall open house. Two hundred children participated in the two fall events, of those 211 children 179 were seven years and younger. The program has decided to continue the incentives as they have increased the number of children being screened greatly.

Table 6.2.2

1995 – 2004 BLOOD LEAD DATA FOR CHILDREN 0-72 MONTHS

YEAR	NUMBER	MEAN μG/DL	NUMBER NON- DETECT	NUMBER 1-4 μG/DL	NUMBER 5-9 μG/DL	NUMBER 10 –15 μG/DL	NUMBER 16-25 μG/DL
1995	82	5.6	0	37	38	7	0
1996	95	4.3	0	60	31	5*	0
1997	89	5.6	0	48	28	11	2*
1998	137	3.9	0	100	30	5	2
1999	66	6.6	1	25	37	5	0
2000	190	3.7	30	110	45	6*	0
2001	135	2.4	34	88	13	0	0
2002	44	2.0	18	26	0	0	0
2003	205	1.7	84	115	6	0	0
2004	123	2.4	12	104	7	0	0

*The same child had 2 tests done (split), one as a follow up to the first.

The blood-lead levels have continued to decline over the last five years. The last elevated blood-lead level the program reported was in 2000, since that time the program continues to see decreases in blood-lead levels. The smelter closure in the spring of 2001 might be a contributing factor in the continued decline in blood lead levels. Many children who had a parent working at the smelter also had elevated blood lead levels. Since the closure these children are now below the action level of 10 μg/dL. Continued education of the public on lead and its hazards has also contributed in the declining blood-lead levels.

In tables 2.3 through 2.7 first time screenings and subsequent repeat screenings are presented through the last five years.

Table 6.2.3

2000 Screenings

<i>Child's First Test</i>	147	79%
<i>Child's Second Test</i>	32	17%
<i>Child's Third Test</i>	2	1%
<i>Child's Fourth Test</i>	3	2%
<i>Child's Fifth Test</i>	2	1%
<i>Child's Sixth Test</i>	1	1%
<i>2000 Total</i>	187	

Table 6.2.4

2001 Screenings

<i>Child's First Test</i>	79	60%
<i>Child's Second Test</i>	39	30%
<i>Child's Third Test</i>	10	8%
<i>Child's Fourth Test</i>	2	1%
<i>Child's Fifth Test</i>	1	1%
<i>Child's Sixth Test</i>	0	0%
<i>2001 Total</i>	131	

Table 6.2.5

2002 Screenings

<i>Child's First Test</i>	36	84%
<i>Child's Second Test</i>	4	9%
<i>Child's Third Test</i>	0	0%
<i>Child's Fourth Test</i>	1	2%
<i>Child's Fifth Test</i>	0	0%
<i>Child's Sixth Test</i>	1	2%
<i>Child's Ninth Test</i>	1	2%
<i>2002 Total</i>	43	

Table 6.6.6

2003 Screenings

<i>Child's First Test</i>	165	80%
<i>Child's Second Test</i>	25	12%
<i>Child's Third Test</i>	9	5%
<i>Child's Fourth Test</i>	2	1%
<i>Child's Fifth Test</i>	1	.005%
<i>Child's Sixth Test</i>	2	1%
<i>Child's Seventh Test</i>	1	.005%
<i>2003 Total</i>	205	

Table 6.6.7

2004 Screenings

<i>Child's First Test</i>	66	54%
<i>Child's Second Test</i>	37	30%
<i>Child's Third Test</i>	16	13%
<i>Child's Fourth Test</i>	1	1%
<i>Child's Fifth Test</i>	2	2%
<i>Child's Seventh Test</i>	1	1%
<i>2004 Total</i>	123	

The tables above represent the number of children who are 6 years and younger at the time of each screening held in the last five years.

6.4.1 Lead Based Paint Abatement

The program continues to oversee the lead based paint abatement project. The program had seven houses from the second phase completed in 2000. Of these seven, three had exterior siding, windows and doors replaced. The remaining four houses had partial abatement done. Western States Abatement, Inc. was the contractor hired to do the work.

In 2002 four more houses were abated for lead based paint. Of those four, two had complete component replacement done and siding replaced. The other two had partial component replacement and paint removal completed. The contractor for these homes was Environmental Management Services.

The program had enough money left to complete one more house that was on the list to have abatement work done. The work on the house started in the fall of 2004 and will be completed in the spring of 2005. The contractor for this house was Safetech Inc. At this time there are no other homes slated to have lead based paint abatement work done.

6.5.1 Special Projects

Program staff started sampling interior dust in 12 houses, in 2002. Sampling took place for 14 months. The sampling was conducted in response to complaints from homeowners that lived along Valley Drive. Concerns were expressed that dust from the Dartman Property was contaminating their yards and homes. Prevailing winds come out of the west and blow dust onto the yards of residences along Valley Drive. ASARCO felt that the property was not contributing to increased lead in soils or interior dust; ASARCO asked the program to conduct the study. The study had four homes on Valley Drive, which is just east of the Dartman Property, four homes in the La Casa Grande subdivision and four homes in the East Helena Proper. The residences in East Helena served as the control group.

Sample locations were designated in each home (one location per home). The sampling sites were chosen where the dust would collect the most in a month's time. The dust sampling collection followed the Residential Sampling for Lead: Protocols for Dust and Soil Sampling Report put out by the EPA. The samples were sent to the State Environmental Laboratory to be analyzed. The program would get the results back in approximately two weeks.

The results were put into a spreadsheet and from the data, it does not appear that the Dartman Property is causing recontamination of yards or increasing lead in dust in homes.

This information was presented to representatives from Department of Environmental Quality and Environmental Protection Agency.

6.6.1 Focus Groups

The purpose of the focus group meetings was to receive input from the residents of East Helena on the effectiveness of the Lead Education and Abatement Program and what role it can play in improving the community to make it a better place to live and work.

Four general groups were chosen to represent the East Helena community, which included: city leaders & elected officials, business leaders, subdivision residents, and city of East Helena residents. The focus groups were given a list of the goals and objectives of the program and asked how well the program had done in accomplishing them. The primary goals and objectives covered three general areas including: health intervention & prevention, education, and program management. Specific projects were listed under each of those general areas for the focus groups to determine the effectiveness of the program and to offer additional input. Those objectives and goals along with the specific projects are as follows:

- I. Health Intervention and Prevention Program
 - A. Monitor blood-lead levels
 - Free blood-lead screenings are offered to all East Helena area residents - They can participate in the Lead Education and Abatement Program's annual blood-lead screening or schedule an appointment at the Helena Medical Lab in Helena to have an individual test ran free of charge anytime during the year.
 - B. Identify sources of lead in the environment that may affect blood-lead levels.
 - Free environmental lead hazard assessments (i.e. water, soil, dust, paint, hobbies) to all East Helena area residents upon request.
The Lead Program oversees all yard remediation projects.
 - C. Implement and monitor abatement actions where necessary.
 - Through additional funding from EPA, the Lead Program provides free exterior lead abatement procedures to East Helena area homes that have had their yards remediated.
- II. Education Program
 - A. Provide Lead-Safe information to the public.

- Provide presentations to schools, homes, daycares, and individuals or groups on various aspects of "How to Live Safely Around Lead".
- Publish a quarterly newsletter on Lead Safe Information.
- Distribute mother/baby packets for all new babies in the East Helena area.

III. Program Management

- A. Maintain program office that is accessible to the public for information and blood-lead screenings.
 - Provide information, assistance and lead education brochures and pamphlets at a staffed office in the East Helena area.
 - Free blood-lead screenings are available to all East Helena area residents.

- B. Staff the program appropriately to deliver consistent service to the community.
 - Two $\frac{3}{4}$ time personnel are available to assist the needs of the community 5 days a week.

Questions asked of the focus group participants and the results of each of the focus group meetings are listed below:

Given these objectives and what we have just discussed, do you think we have accomplished our goals?

Is anyone new to the area? What role has it played in influencing your decision buy a house in the area. For those that have lived in the area for a long time... have we got the word out about how to live safely around lead?

How can the lead program play a role in improving the community to make it a better place to live and work? (The Health department's role is not to spearhead economic development, but should it play a part? If so, what could it do to improve the business climate?

Do you read the quarterly newsletter? What kind of information would you like to see in it? Is the newsletter the best way to communicate with you, or is there another medium that we could use such as e-mail.

City Leaders/Elected Officials

Health Intervention and Prevention Program

Monitor blood lead levels with the goal of reducing blood lead levels in East Helena area residents to the national average.

All focus group participants stated the program had fully met its objectives.

Comments:

- Participate in more community events
- Get in contact with OPI – for home-schooled children

Identify sources of lead that are affecting or have the potential to impact blood lead levels.

All participants stated the program had fully met its objectives.

Implement and monitor abatement actions where necessary with the goal of reducing blood lead levels in East Helena residents to the national average.

All participants stated the program had fully met its objectives.

Comments:

- Contact East Helena city offices about remodeling (right now structural changes need a city building permit)
- EPA money is not a consistent source

Education Program

Provide information to the general public on how to live safely around lead.

All focus group participants stated the program had fully met its objectives.

Comments:

- Give presentations to church groups
- Check business licenses and provide information to new businesses
- Economic development – contact “Gateway” to attend meetings provide information and assistance
- Citizens or legislators - write letters to the editor about various issues concerning East Helena’s economic development, clean –up levels, safe place to work and live etc.
- Send soil samples to different environmental labs for verification

Quarterly newsletter ideas:

Comments:

- Add “school” corner
- Put in important dates of East Helena happenings
- Add city and school phone numbers
- Add section for grandparents on how to “child safe” their homes
- Add, “Story” of the quarter (positive event or personal contribution or activity that a business or individual contributed to the community)

Program Management

Maintain program office, which is accessible to the public for information and blood lead screenings.

All focus group participants stated the program had fully met its objectives.

Comments:

- Very beneficial to keep the program office in East Helena.

Staff the program appropriately to deliver consistent service to the community.

All participants stated the program had fully met its objectives.

Additional Comments:

- Show people how to put up barriers when remodeling.
- Improve the community by keeping the action level at 1000 parts per million
- Improve the business climate by letting business owners know this is a safe place to live and work - possibly get a letter from Scott Brown at EPA
- Get an updated list every month of new employers (Go to City Hall and get list from them – keep businesses up to date on any changes made dealing with the lead issues)
- Get an updated list from realtors of new residents to East Helena
- Put together information about the program and distribute to realtors' offices
- Contact realtors, contractors and give a presentation on lead issues.

East Helena Business Leaders

Health Intervention and Prevention Program

Monitor blood lead levels with the goal of reducing blood lead levels in East Helena area residents to the national average.

All focus group participants stated the program had fully met its objectives.

Comments:

- Stress more of the positive results from the blood-lead screenings
- Sufficient blood-lead testing has been done - "When is enough, enough?"

Identify sources of lead that are affecting or have the potential to impact blood lead levels.

All participants stated the program had fully met its objectives.

Implement and monitor abatement actions where necessary with the goal of reducing blood lead levels in East Helena residents to the national average.

All participants stated the program had fully met its objectives.

Education Program

Provide information to the general public on how to live safely around lead.

All focus group participants stated the program had fully met its objectives.

Comments:

- Distribute brochures in city hall about the lead program
- Offer informational presentations to new businesses
- Work on stating the positive successes of our program and not on the negative aspects of living in a superfund site
- Go to East Helena improvement association meetings
- Discourage image that we are a "monitoring" program. Encourage the idea that we are working with the East Helena community, not against them
- The business owners did not feel they had to "jump through hoops" to start or operate a business in East Helena

Program Management

Maintain program office, which is accessible to the public for information and blood lead screenings.

All participants stated the program had fully met its objectives.

Comments:

- Very beneficial to keep the program office in East Helena.

Staff the program appropriately to deliver consistent service to the community.

All participants stated the program had fully met its objectives.

East Helena Area Subdivision Residents

Health Intervention and Prevention Program

Monitor blood lead levels with the goal of reducing blood lead levels in East Helena area residents to the national average.

All focus group participants stated the program had fully met its objectives.

Comments:

- The program has done an excellent job screening children

Identify sources of lead that are affecting or have the potential to impact blood lead levels.

The majority of the participants said the program had fully met the objectives.

Comments:

- One resident would like to have an environmental assessment done on his home.
- One resident would like his home checked for lead-based paint

Implement and monitor abatement actions where necessary with the goal of Reducing blood lead levels in East Helena residents to the national average.

The majority of the focus group participants said the program fully met the objectives

Comments:

- One resident questioned why a home couldn't qualify for abatement even if the yard hasn't been remediated because the possible hazard is still there.
- One resident was unaware of this objective

Education Program

Provide information to the general public on how to live safely around lead.

All focus group participants stated the program had fully met its objectives.

Comments:

- *Have had very positive experiences with the program through screenings and baby packet distribution*
- Visit more homes, offices and businesses to drop off information
- Personal contact and follow up with the residents is good
- Talk with the individuals who still have yards that are contaminated and keep them informed on where issues stand
- Give presentations to realtors

- Check with SBA or other loan institutions and give them information to distribute to people starting businesses or moving into East Helena
- Attend East Helena improvement association meetings and become familiar with what they are doing and join them in promoting East Helena or organizing activities or events
- Use public service announcements as an additional media source
- Use Childcare Partnerships' (referral service) because people check on this when they are new to the area - get brochures and pamphlets to them and use them for an information source.

Quarterly newsletter idea

- Put in helpful information for people new to the area like a "welcome wagon"
- Put in important dates of East Helena happenings
- Add city and school phone numbers
- Add section for community events
- Put in a section on "Things to Do With Your Kids" or a "Fishing Report" as one-way to get everyone to look at the newsletter
- Number the newsletters or put in a hidden word and those that have the number or find the word win a prize (donated by a business)
- Add a "Story" of the quarter (positive event or personal contribution or activity that a business or individual contributed to the community)

Program Management

Maintain program office that is accessible to the public for information and blood lead screenings.

All focus group participants stated the program had fully met its objectives.

Comments:

- Very beneficial to keep the program office in East Helena.

Staff the program appropriately to deliver consistent service to the community.

All participants stated the program had fully met its objectives.

City of East Helena Residents

Health Intervention and Prevention Program

Monitor blood lead levels with the goal of reducing blood lead levels in East Helena area residents to the national average.

All focus group participants stated the program had fully met the objectives.

Comments:

- The program has done an excellent job screening children

Identify sources of lead that are affecting or have the potential to impact blood lead levels.

All participants said the program had fully met the objectives.

Comments:

- The program and personnel are very helpful, courteous, and have done an excellent job with environmental assessments.
- Yard remediation are done much more professional now than when the project first started

Implement and monitor abatement actions where necessary with the goal of reducing blood lead levels in East Helena residents to the national average.

All participants stated the program had fully met the objectives.

Education Program

Provide information to the general public on how to live safely around lead.

All focus group participants stated the program had fully met its objectives.

Comments:

- *Residents have had very positive experiences with the program through blood-lead screenings and baby packet distribution*
- For all people new to the area, distribute a "Welcome to East Helena" packet of lead information
- Additional follow up after yard remediation and environmental assessments would be good public relations
- Give presentations to realtors
- All residents felt safe living around this superfund site
- Join or attend Home Builder's Association meetings
- Become a member or entity of the East Helena City Council meetings
- Put information about the lead program in the mayor's newsletter
- Put information about the lead program on the East Helena website

Quarterly newsletter ideas:

Comments:

- Do a feature success story of a business/family/or individual in the East Helena area
- Add a section for community events.

Program Management:

Maintain program office that is accessible to the public for information and blood lead screenings.

All focus group participants stated the program had fully met its objectives.

Comments:

- Very beneficial to keep the program office in East Helena.

Staff the program appropriately to deliver consistent service to the community.

All participants stated the program had fully met its objectives.