Public Health Assessment for

RUSTON FOUNDRY
ALEXANDRIA, RAPIDES PARISH, LOUISIANA
EPA FACILITY ID: LAD985185107
AUGUST 7, 2002

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry

PUBLIC HEALTH ASSESSMENT

RUSTON FOUNDRY

ALEXANDRIA, RAPIDES PARISH, LOUISIANA

EPA FACILITY ID: LAD985185107

Prepared by:

Louisiana Department of Health and Hospitals
Office of Public Health/Section of Environmental Epidemiology and Toxicology
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment 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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FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements. The public health assessment program allows the scientists flexibility in the format or structure of their response to the public health issues at hazardous waste sites. For example, a public health assessment could be one document or it could be a compilation of several health consultations the structure may vary from site to site. Nevertheless, the public health assessment process is not considered complete until the public health issues at the site are addressed.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists evaluate whether or not these contacts may result in harmful effects. ATSDR recognizes that children, because of their play activities and their growing bodies, may be more vulnerable to these effects. As a policy, unless data are available to suggest otherwise, ATSDR considers children to be more sensitive and vulnerable to hazardous substances. Thus, the health impact to the children is considered first when evaluating the health threat to a community. The health impacts to other high risk groups within the community (such as the elderly, chronically ill, and people engaging in high risk practices) also receive special attention during the evaluation.

ATSDR uses existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries, to determine the health effects that may result from exposures. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further public health actions are needed.

Conclusions: The report presents conclusions about the public health threat, if any, posed by a site. When health threats have been determined for high risk groups (such as children, elderly, chronically ill, and people engaging in high risk practices), they will be summarized in the conclusion section of the report. Ways to stop or reduce exposure will then be recommended in the public health action plan.

ATSDR is primarily an advisory agency, so usually these reports identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, fullscale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E56), Atlanta, GA 30333.

INTRODUCTION

The Agency for Toxic Substances and Disease Registry (ATSDR) was established under the mandate of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. This act, also known as the "Superfund" law, authorized the United States Environmental Protection Agency (EPA) to conduct clean up activities at hazardous waste sites. EPA was directed to compile a list of sites considered hazardous to public health. This list is termed the National Priorities List (NPL). The 1986 Superfund Amendments and Reauthorization Act (SARA) directed ATSDR to prepare a public health assessment for each NPL site. On May 10, 1999, the Ruston Foundry site was placed on the NPL.

In conducting a public health assessment (PHA), three types of information are used: environmental data, community health concerns, and health outcome data. The environmental data are reviewed to determine whether people in the community might be exposed to hazardous materials from the site. If people are being exposed to hazardous materials, ATSDR will determine whether the exposure is at levels which might cause harm. Community health concerns are collected to determine whether health concerns expressed by community members could be related to exposure to chemicals released from the NPL facility. If the community raises concerns about specific diseases in the community, health outcome data (information from state and local databases or health care providers) can be used to address the community concerns. Also, if ATSDR finds that harmful exposures have occurred, health outcome data can be used to determine if illnesses are occurring which could be associated with the hazardous chemicals released from the NPL facility.

In accordance with the Interagency Cooperative Agreement between ATSDR and the Louisiana Department of Health and Hospitals/Office of Public Health/Section of Environmental Epidemiology & Toxicology (LDHH/OPH/SEET), ATSDR and SEET have prepared this PHA for the Ruston Foundry site. This PHA presents conclusions about whether exposures are occurring, and whether a health threat is present. In some cases, it is possible to determine whether exposures occurred in the past; however, often a lack of appropriate historical data makes it difficult to quantify past exposures. If it is found that a threat to public health exists, recommendations are made to stop or reduce the threat to public health.

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I. SUMMARY

The Ruston Foundry site is an inactive and abandoned foundry situated on 4.6 acres of land within the city limits of Alexandria, Louisiana. This site was listed by the United States Environmental Protection Agency (EPA) as a National Priorities List (NPL) site on May 10, 1999 [1]. The property was first utilized in 1908, but has been inactive since 1985 due to adjudication by the Rapides Parish Tax Assessor's office for unpaid taxes. The company engaged in foundry and machine shop business and in the manufacturing, prefabrication, and repair of articles of steel, iron, and other metals [2].

The Louisiana Department of Health and Hospitals/Office of Public Health Agency/Section of Environmental Epidemiology & Toxicology (SEET) reviewed available environmental information for the site and evaluated several potential exposure situations. These exposure situations include potential contact with site contaminants in air, biota, surface water, sediment, surface soil, and groundwater. Although site-related contaminants have been found in several of these media, currently the contaminants on or off the site pose varying threats to public health. Based on available information, we have concluded that overall, the Ruston Foundry site poses a public health hazard to children due to soil contamination. The conclusion category for the overall site could change if additional data becomes available or if site conditions change (e.g., soil removal action occurs, future land use changes). A brief review of the exposure situations that were considered is presented in the following section.

I.A PUBLIC HEALTH HAZARD

SEET and ATSDR concluded that the following exposure situations pose a public health hazard (for an explanation of ATSDR's public health conclusion categories, please see Table 3). In these situations, actions (e.g., remedial activities) are needed to remediate the public health hazard.

1. Exposure to contaminants in **off-site residential soil** presents a public health hazard. We consider exposure to site contaminants through soil contact to be a significant exposure pathway because (1) off-site soil contamination is present, (2) present soil contaminant levels indicate that there are specific hazards to children, and (3) public access to the residential properties is not restricted.

2. Exposure to contaminants in **on-site soil** may have presented a public health hazard in the past to on-site workers. We consider exposure to site contaminants through soil contact to be a significant exposure pathway because (1) on-site soil contamination is present, (2) present soil contaminant levels (especially in the slag piles) indicate that there may have been a hazard to on-site workers or trespassers in the past, (3) the frequency and duration of any contact with contaminated soil are not known, but is thought to have been significant to past workers, previous trespassers, or current trespassers, and (4) public access to the site in the past was unrestricted. Currently, public access to the site is restricted by a fence.

I.B INDETERMINATE PUBLIC HEALTH HAZARD

The Section of Environmental Epidemiology and Toxicology (SEET) and ATSDR concluded that the following exposure situations pose an indeterminate public health hazard. In these situations, more information is required to adequately define the potential public health hazard.

1. Exposure to contaminants in **groundwater** is considered to be an indeterminate public health hazard. Although information pertaining to contaminant concentrations in groundwater was not available for review, contaminants which are a threat to the groundwater supply may be present on-site. Although no releases of contaminants to groundwater from this site have been documented, sampling is recommended to determine the extent, if any, of the groundwater contamination because of the depth and distance of municipal and domestic wells to this site.

2. Exposure to contaminants in the **air** is considered to be an indeterminate public health hazard. An on-site air sampling event in 1998 during the expanded site investigation indicated the presence of copper, manganese, and lead at levels three times above background levels. These results may indicate that in the past local residents may have been exposed to site-related contamination (i.e., metals) in the air. In April 1999, five separate air samplers were placed in a neighborhood adjacent to the site, and one was placed in a background area 850 feet east of the site. However, there were no historical ambient air data and no community-specific health outcome data available to indicate whether the site could have had an adverse impact on human health. During the air sampling at the site, no organic vapors were detected at levels above background. Background air levels were obtained by on-site upwind sampling. Past exposure to contaminants in the air is considered to be an indeterminate public health hazard.

I.C NO APPARENT PUBLIC HEALTH HAZARD

ATSDR concluded that the following identified exposure situations present no apparent public health hazard under current conditions because there is no evidence that people are coming into contact with contaminated media and it is unlikely that they are coming into contact with contaminated media often enough to present a threat to public health.

1. **Surface water** run off from the site to the Chatlin Lake Canal surrounding the site presents no apparent public health hazard because it is unlikely that people would be exposed to contaminants at levels that would be of health concern since: (1) the probability of ingesting surface water is very low, (2) the frequency and duration of any contact with surface water would be very low, and (3) the surface area of skin that potentially could come into contact with contaminated water is small.

2. Contaminants found in **sediments** present no apparent public health hazard because it is unlikely that people would be exposed to contaminants at levels that are of health concern. Currently, access onto the site is restricted, and it is likely that exposures to

sediment in the canal surrounding the site would be limited. We do not consider exposure to site contaminants either by ingesting or contacting sediment to be a significant exposure pathway since (1) access to the contaminated areas is limited; (2) the probability of ingesting contaminated sediment is very low; (3) the frequency and duration of any contact with contaminated sediment would be very low; and (4) the surface area of skin that potentially could come into contact with contaminated sediment would be small.

3. Exposure to site contaminants through the ingestion of **aquatic biota** is considered to present no apparent health hazard, as no discharges of bioconcentrating contaminants into surface water have been documented. Sampling of aquatic or terrestrial species has not yet been conducted in the vicinity of the site.

II. BACKGROUND

II.A Site Description

The 4.6 acre Ruston Foundry site, located at 1010 Bogan Street, Alexandria, Rapides Parish, Louisiana, is an inactive and abandoned iron foundry (Appendix C: Figure 1). The company engaged in foundry and machine shop activities and in the manufacturing, prefabrication, and repair of articles of steel, iron, and other materials [2].

II.A.1 Past Site Conditions

Since 1985, the Ruston Foundry facility has been inactive and abandoned. It is accessed by two bridges located north and south of the property (Appendix C: Figure 2). During its operational years, the facility consisted of a main foundry building, several out buildings (including equipment and storage sheds), a workshop, a parts building, machine shops, and tanks. The majority of the buildings on-site were demolished by the city because they were structurally unsafe. The three remaining on-site buildings are the parts building, the restroom building, and one unidentified building.

The site had been unsecured. Public access was allowed through an unsecured front entrance gate and several gaps in the fencing. Two of the gaps had well-defined footpaths passing through them. Solid waste that had been dumped on-site also indicated trespassing. The site was well-vegetated with shrubs, and it was surrounded by dilapidated fencing.

Five 55-gallon drums from past foundry activity were located on the southwest area of the site. These drums were sealed and in poor condition due to rust. They were reported to contain liquid and sludge; one was overturned and showing signs of leakage.

Five slag piles have been identified; three are located within a fenced area and two are along the bank of the Chatlin Lake Canal near the bridge at the south entrance. Various metal debris, foundry sand, and transite asbestos shingles from roofing materials were scattered primarily around the building areas. Site drainage is toward the north, south and east into the Chatlin Lake Canal.

II.A.2 Current Site Conditions

The facility is still heavily vegetated and has undergone a partial removal action. Some of the loose debris and waste have been removed from the site, along with dilapidated buildings and fencing. The old fence was replaced with a new six-foot fence that completely surrounds the site. The drums that remained on-site were removed, and those in poor condition were placed into overpack drums, which are larger drums used to contain degrading or damaged drums. These overpack drums were removed from the site. The five slag piles still remain on-site. The slag

piles are not covered; therefore, off-site wind dispersion of site-related contaminants may still occur.

II.A.3 Future Site Plans

The site encompasses 4.6 acres of land surrounded by residential properties. A recreational land use for the site has been proposed.

The site is still in need of remedial activity. The Environmental Protection Agency's (EPA) remedial investigation/feasibility study began in the fall of 2000. The Remedial Investigation Report was completed in February 2002 and will be the subject of a future health consultation.

To further characterize the extent of off-site residential soil, portable X-ray fluorescence instrumentation (XRF) testing was conducted in early December 1999.

II.B Site History

The initial incorporation of Ruston Foundry was August 30, 1908, as the Ruston Foundry and Machine Shop, Ltd. The corporation was reincorporated October 31, 1983, as the Ruston Foundry and Machine Shop, Inc. The purpose of this business was to engage in the manufacture, prefabrication, and repair of articles of steel and other metals. The property was adjudicated by the Rapides Parish tax assessor's office in 1985, and the corporation dissolved. The charter was revoked by the Louisiana Secretary of State for not filing its corporate annual report. There is no indication that the corporation was ever liquified or involved in bankruptcy proceedings; the operations at the site were abandoned.

On June 5, 1990, the Louisiana Department of Environmental Quality's Inactive and Abandoned Sites Division (LDEQ-IASD), conducted a site investigation which included drum and surface soil sampling. Inorganic analysis of the soil samples from the site revealed concentrations of up to 1,350 parts per million (ppm) of lead. Organic analysis of the on-site drums showed toluene at concentrations of up to 35 ppm, and ethylbenzene at 100 ppm. Based on these sample results, the LDEQ referred the site to the EPA as a candidate for an emergency response action.

On October 26, 1990, the EPA Emergency Response Branch (ERB) requested the Technical Assistance Team (TAT) to conduct a site investigation (SI) to determine sampling strategies for the site.

On November 12, 1990, the TAT conducted a site assessment (SA). Fifty soil samples and drum samples were taken for analysis. Analytical results showed the highest level of arsenic at 110 ppm, chromium at 230 ppm, cobalt at 220 ppm, lead at 2,130 ppm, mercury at 1.8 ppm, and zinc at 5,000 ppm in the soil samples. Sludge samples collected from 21 of the 22 drums on the site showed the presence of lead (2,130 ppm) and various organic compounds. Air monitoring found

no levels of organic vapors above background levels in the ambient air around the drums on the site. However, lead was found at 0.0685 milligrams per cubic meter (mg/m^3) at the on-site downwind location. This was three times higher than the lead concentration of 0.0181 mg/m^3 found at the upwind location.

In May 1993, a search was begun to identify potentially responsible parties (PRPs) associated with the ownership and operation of the Ruston Foundry site. This search presently continues.

On February 9, 1994, EPA asked the TAT to conduct another SA to determine the type and volume of materials to be addressed by a removal action and to research disposal actions for the site. The volume of waste estimated to be in the 22 55-gallon drums was 1,210 gallons. The estimated waste volume of the two slag piles was calculated to be 350 cubic yards.

In March and April 1998, the EPA and its contractors conducted an expanded site investigation (ESI) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Sampling of air and soil took place at the site in March and April 1998, and contaminated soils and slag piles were identified. Five slag piles were identified; three located within a fenced area, and two along the bank of the Chatlin Lake Canal, near the southern entrance bridge. This investigation led to further investigation and the proposal of the site to the National Priorities Listing (NPL) in January 1999.

EPA then began a remedial investigation/feasibility study (RI/FS) to determine whether any particular areas would require remediation. After a public comment period regarding the proposed site placement, Ruston Foundry was placed on the National Priority List (NPL) on May 10, 1999 [2].

II.C Site Visit

On July 15, 1999, a site visit was made by staff from the Section of Environmental Epidemiology and Toxicology (SEET). SEET was accompanied by representatives from LDEQ, EPA, and EPA's contractor to the Ruston Foundry Site. The site was completely fenced, with all areas of the fencing intact, and there was no evidence of recent trespassing. The three structures previously present on the site had been removed by the city, and the remaining debris was piled on several areas of the site. There were also several overpack drums that were used to contain the degrading drums still present on the site; some were empty, and some contained a liquid believed to be water.

A well embedded in an intact concrete slab was also found on the site. Upon examination, however, it appeared to be closed as it extended only two feet below ground surface (bgs). Near the well there was a very tarry, oily substance which was also present on the slab and surrounding areas.

On November 13, 1999, another site visit was made. The site's fencing remained intact, and the overpack drums and a substantial amount of debris had been removed from the site.

According to EPA, the site conditions remain unchanged. The site is still fenced, the gate is locked, and signs are posted warning people to keep away.

II.D Demographics/Land Use and Natural Resource Use

The foundry site is located in an urban area within the city limits of Alexandria. The Chatlin Lake Canal borders along the site to the north, east, and south, and the former Missouri-Pacific Railroad borders the site on the west. Residential neighborhoods are located to the north, east, and south of the site, on the opposite side of the Chatlin Lake Canal.

The nearest resident is located approximately 80 feet northwest of the site [3]. Table 1 (Appendix D) shows the population within varying distances from the site.

Currently, the site is not operational and there are no on-site workers. It is not known how many people worked at the foundry in the past.

Schools identified within 1 mile of the site include: Peabody Elementary, Peabody Magnet, Jones Street Junior High, Bolton High, South Alexandria 6th Grade School, and Alma Redwine Primary School [2,3].

There is a recreational park located a quarter-mile southeast of the site.

There are no rare, threatened, or endangered species or critical habitats documented within a 4-mile radius of the site. There are 850 acres of wetland frontage within four miles of the site [2].

The Chatlin Lake Canal is a fresh water river that borders the site on the north, south, and east. The areas of on-site contamination are not contained by any physical boundaries that may prevent migration of site contaminants to surface water via surface water run off. The canal is used primarily for drainage, and its recreational use is limited. Fishing was documented; however, the annual consumption amount has not been documented. There is unrestricted access to the canal.

The nearest well is a municipal supply well, serving the citizens of Alexandria. It is 0.6 miles southeast of the site and is completed in the Carnahan Bayou Aquifer at 723 feet below ground surface. The site is in the 100-year floodplain. The average rainfall for the area is 58.52 inches per year [2].

III. ENVIRONMENTAL CONTAMINATION/PATHWAYS ANALYSIS/ PUBLIC HEALTH IMPLICATIONS

III.A Introduction

Exposure to or contact with chemical contaminants drives the ATSDR public health assessment process. The release or disposal of chemical contaminants into the environment does not always result in exposure or contact. Chemicals only have the potential to cause adverse health effects if people actually come into contact with them. People may be exposed to chemicals by breathing, eating, or drinking a substance containing the contaminant, or by skin (dermal) contact with a substance containing the contaminant.

When people are exposed to chemicals, the exposure does not always result in adverse health effects. The type and severity of health effects that may occur in an individual as a result of contact with contaminants depend on the toxicologic properties of the contaminants, how much of the contaminant the individual is exposed to, how often and/or how long the individual was exposed, the manner in which the contaminant enters or contacts the body (breathing, eating, drinking, or skin/eye contact), and the number of contaminants to which an individual is exposed (combinations of contaminants). Table 2 in Appendix D indicates the various exposure pathway elements. Once exposure occurs, characteristics of the individual, such as age, sex, nutritional status, genetics, life style, and health status influence how the individual absorbs, distributes, metabolizes, and excretes the contaminant. These factors and characteristics influence whether exposure to a contaminant could result in adverse health effects.

To assess the potential health risks associated with contaminants at this site, we compared contaminant concentrations to health assessment comparison values. Comparison values are media specific contaminant concentrations that are used to screen contaminants for further evaluation. Non cancer comparison values are called environmental media evaluation guides (EMEGs) or reference dose media evaluation guides (RMEGs) and are respectively based on ATSDR's minimal risk levels (MRLs) or EPA's references doses (RfDs). MRLs and RfDs are estimates of a daily human exposure to a contaminant that is unlikely to cause adverse non-cancer health effects. Cancer risk evaluation guides (CREGs) are based on EPA's chemical specific cancer slope factors and an estimated excess lifetime cancer risk of one in one million persons exposed for a lifetime. We used standard assumptions to calculate appropriate comparison values (Appendix B-1).

In some instances, we compare contaminant concentrations in water to EPA's maximum contaminant levels (MCLs). MCLs are chemical-specific maximum concentrations allowed in water that is delivered to the users of a public water system; MCLs are considered protective of public health over a lifetime (estimated 70 years) of exposure at an ingestion rate of two liters per day. MCLs may be based on available technology and economic feasibility. Although MCLs only apply to public water supply systems, we often use them to help assess the public health implications of contaminants found in water that is intended for private consumption.

While exceeding a comparison value does not necessarily mean that a contaminant represents a public health threat, it does suggest that the contaminant warrants further consideration. The public health significance of contaminants that exceed comparison values may be assessed by reviewing and integrating relevant toxicological information with plausible exposure scenarios. Estimated exposures may be compared to reported "No Observed" and "Lowest Observed" Adverse Effects Levels (NOAELs and LOAELs) and to known effect levels in humans, when available.

III.B Environmental Contamination

During the week of April 20, 1998, 48 samples (including samples of air, on-site and off-site surface soils, sediments, the slag pile, and field quality control data) were collected and analyzed for total metals. Two soil samples were analyzed for toxicity characteristic leaching procedure (TCLP) metals, and air samples were also analyzed for total suspended particulates (TSP) during the expanded site inspection (ESI). The analyses and conclusions in this public health assessment are valid only if the referenced information is valid and complete. Quality Assurance/Quality Control and chain of custody requirements were assumed to have been followed for the sampling, analysis, and data reporting of the material collected in 1998. The data for the 1998 ESI were collected according to the State's Quality Assurance/Quality Control Work Plan which was approved by EPA prior to sampling. All samples were analyzed following EPA Contract Laboratory Program (CLP) analytical methods [2].

The maximum detected concentrations for each contaminant found in the different environmental media are presented in Appendix D, Tables 3 through 7. ATSDR comparison values for each of the contaminants are also listed in those tables. Contaminants with concentrations below ATSDR's comparison values, as well as those contaminants found at levels not exceeding two times the background level were excluded from further consideration. Inclusion of a contaminant in the tables or the fact that a contaminant exceeds a comparison value does not imply that a contaminant represents a threat to public health, but that it warrants further consideration to determine the effects it may have, if any, to public health.

III.C Pathways Analysis

In this section we evaluated the possible pathways for exposure to contamination at the Ruston Foundry site. We examined these possible exposure pathways to determine whether people near the site can be exposed to (or come into contact with) contaminants from the site. Exposure pathways consist of five elements: (1) a source of contamination, (2) transport through an environmental medium, (3) a point of exposure, (4) a plausible manner (route) for the contaminant to get into the body, and (5) an identifiable receptor population. Exposure pathways can be completed, potential, or eliminated. For a person to be exposed to a contaminant, the exposure pathway must be completed. An exposure pathway is considered completed when all five elements in the pathway are present and exposure has occurred, is occurring, or will plausibly occur in the future. A potential pathway is missing at least one of the five elements but possibly may be completed in the future as more data become available or site conditions change. Eliminated pathways are missing one or more of the five elements and will never be completed. Table 2 in Appendix D summarizes the exposure pathways considered in our evaluation of this

site. Contaminants whose concentrations did not exceed ATSDR comparison values were excluded from the pathways analysis.

III.C.1 PUBLIC HEALTH HAZARD

The Section of Environmental Epidemiology & Toxicology (SEET) and ATSDR concluded that the following exposure situations pose a public health hazard. In these situations, actions (e.g., remedial activity) are needed to ensure proper remediation of the public health hazard.

III.C.1.a Evaluation of Possible Soil Exposure Pathways

*Summary: Exposure to contaminants in **off-site and on-site soil** presents a public health hazard.*

Off-Site Soil
We consider exposure to site contaminants by contacting soil to be a significant exposure pathway because: (1) off-site soil contamination is present, (2) soil contaminant levels in off-site areas indicate that there are specific hazards to children, and (3) public access to the residential properties is not restricted.

On-Site Soil
We consider exposure to site contaminants by contacting soil on the site to be a significant exposure pathway because: (1) on-site soil contamination is present, (2) soil contaminant levels (especially in the slag piles) indicate that there may have been a hazard to on-site workers or trespassers in the past; (3) the frequency and duration of any contact with contaminated soil are not known, but are thought to be significant to past workers, previous trespassers, or current trespassers; and, (4) public access to the site in the past was unrestricted. Currently, public access to the site is restricted by a fence. If the fence or parts of the fence are removed, then the on-site soil could represent a public health hazard.

On-Site Soil

A sampling event prior to EPA's November 12, 1990, Site Assessment (SA) indicated the presence of volatile organic compounds in the sludge contained in the drums remaining on-site. However, the levels of these organic compounds did not exceed health assessment comparison values. Arsenic, chromium, lead, and zinc levels exceeded the pica child comparison values used for assessing the safety of contaminated soils for this document [4-7]. These drums have since been removed, and any leakage of volatile organic compounds would pose no threat to human health.

During the week of April 20, 1998, the Superfund Technical Assessment and Response Team (START) collected 25 surface soil samples. These samples were collected over a depth of zero to six inches. Samples collected onsite included four surface soil samples (including a duplicate), four slag pile samples, and two foundry sand pile samples. Sample points were

screened before collection to determine areas of higher concentrations. Samples were analyzed for Target Analyte List (TAL) metals, including mercury. One on-site soil sample and one slag pile sample were also analyzed for TCLP metals.

In all three surface soil samples and the duplicate collected on-site during the activities, copper and lead were detected. The highest concentration of copper was 4,300 parts per million (ppm) and the highest concentration of lead was 2,250 ppm. Barium, cadmium, chromium, manganese, nickel, selenium, vanadium, and zinc were detected with concentrations above the comparison values for pica behavior in children [8]. Antimony and arsenic were detected at levels exceeding their non cancer risk-based comparison value for children but not for adults. Arsenic also exceeded its cancer comparison value [9].

One of the four slag pile samples was found to have lead at 35,200 ppm. Arsenic, chromium, copper, and nickel were detected in all samples. Arsenic exceeded its non-cancer risk-based comparison value for children but not for adults, as well as its cancer comparison value. The highest concentration of copper was over three times above background levels (Appendix D: Table 7).

The maximum copper concentration of 144 ppm was found in two foundry sand pile samples near the northern entrance bridge (Appendix D: Table 6).

Although adult trespassers could come into contact with contaminated soil, chronic exposure to the maximum levels of metals at this site by ingesting 100 milligrams (mg) of this soil every day for 30 years would result in no apparent increase in the development of contaminant-related disease. Children exhibiting pica behavior (ingesting one to five grams a day) are at special risk due to the presence of barium, cadmium, chromium, manganese, nickel, selenium, vanadium, and zinc at this site. Arsenic and lead are present in on-site soil at levels that would pose a health hazard to children coming into contact with on-site soils and ingesting 200 mg daily for several years; however, such a scenario is unlikely, especially since the site is fenced.

Off-Site (Residential) Soils

The soil contamination is located within the residential yards surrounding the Ruston Foundry site on Ruston, Bogan, Applewhite, and 12th Streets. These residential homes are located north, south, and east of the facility, across the Chatlin Lake Canal.

The exact pattern of contaminant migration is not known for this site. A complete site characterization is needed to determine the prevailing winds of the area and the pattern of migration for on-site contaminants to off-site residential areas. This would effectively help to determine the likely location of the most heavily contaminated areas, and if need be, mitigate further future off-site contamination.

During the week of April 20, 1998, the START collected 25 surface soil samples (0 to 6 inches in depth) during ESI field activities. Samples collected off-site included two background samples and 13 residential soil samples (including a duplicate). Sample points were screened

before collection to determine areas of higher concentrations. Samples were analyzed for TAL metals, including mercury.

Chemical analyses of the residential soil samples show copper and lead were detected in all samples, with the highest concentrations of copper at 5,790 ppm, and lead at 1,560 ppm. Barium, cadmium, chromium, manganese, selenium, vanadium, and zinc were detected with concentrations above the comparison value for pica behavior in children. Antimony and arsenic were detected exceeding their non-cancer risk-based comparison value for children but not for adults, and arsenic exceeded its cancer comparison value (Appendix D, Table 7).

Upon review of the sample results reflecting residential contamination, it appears that there is one residential area that is driving the health risk for the residential areas of the site. This area reflects a pattern of contamination that is not representative of the contamination consistently seen throughout the other residential areas near the Ruston Foundry site. Further surface soil sampling is recommended to assess the extent of contamination at this residential property. If necessary, remedial actions (e.g., soil removal) would eliminate the public health risk.

III.C.2 INDETERMINATE PUBLIC HEALTH HAZARD

SEET and ATSDR have concluded that the following exposure situations pose an indeterminate public health hazard. In these situations, more information is required to adequately define the potential health hazard.

III.C.2.a Evaluation of Possible Groundwater Exposure Pathways

Summary: Exposure to contaminants in groundwater is considered to be an indeterminate public health hazard. Although information pertaining to contaminant concentrations in groundwater was not available for review, because of the depth and distance of the municipal and domestic wells, contaminants which may be present in the groundwater could possibly be transported to wells. Although no releases to groundwater from this site have been observed, sampling is recommended to determine the extent, if any, of the groundwater contamination.

Groundwater from aquifers is the sole drinking water source in Alexandria, Pineville, and the neighboring communities. It is obtained from the Catahoula Formation from the Red River Alluvial, Williamson Creek and Carnahan Bayou Aquifers. The Red River Alluvial Aquifer represents the shallowest known aquifer serving as a drinking water source for Rapides Parish. It begins at approximately 63 feet below ground surface (bgs) and continues for an estimated 50 to 100 feet in depth. The Williamson Creek Aquifer underlies the former and its most shallow point is 180 feet bgs and approximately 400 feet thick. The Carnahan Bayou Aquifer underlies the Williamson Creek Aquifer. The Carnahan Bayou Aquifer's most shallow point is 204 feet bgs, and it is up to 1073 feet thick [2].

The Louisiana Department of Transportation and Development water well search identified three active drinking water wells within a 1-mile radius of the site. The nearest well is a municipal supply well that serves the citizens of Alexandria. This well is located 0.6 miles southeast of the

site and is completed in the Carnahan Bayou Aquifer at 723 feet. Another public well is located 0.8 miles north of the site and is completed the same aquifer at 1190 feet. The nearest domestic well is 0.9 miles west of the site and gets its water from the Williamson Creek Aquifer. This domestic well is 285 feet deep, and serves three people. A total of 48 additional groundwater wells (27 domestic and 21 public supply) has been identified within 1 to 4 miles of the site. Within the four-mile radius, 27,441 people are served by municipal wells.

No groundwater samples are known to have been collected from private wells surrounding the site. Although no releases of contaminants have been observed, due to the depth and distance of the wells, it is slightly possible that the Catahoula Formation may have been adversely affected by the operations at the Ruston Foundry site. Sampling is recommended to determine the extent, if any, of the groundwater contamination.

III.C.2.b Evaluation of Possible Air Exposure Pathways

Summary: Exposure to contaminants in the air is considered to be an indeterminate public health hazard. A recent on-site air sampling event indicated the presence of copper, manganese, and lead at three times above background levels. These results may indicate that local residents in the past may have been exposed to site-related contamination (i.e., metals) in the air. However, there were no historical ambient air data and no community-specific health outcome data available to indicate whether the site could have had an adverse impact on human health. During the recent air sampling at the site, volatile organic compounds were detected above background levels. Background air levels were obtained by on-site upwind sampling. Past exposure to contaminants in the air is considered to be an indeterminate public health hazard.

Sixteen air samples and one field blank were collected during the Expanded Site Inspection (ESI). Samples were analyzed for target analyte list (TAL) metals (except for mercury). High volume total suspended particulate (TSP) air samplers were calibrated on the site, and samples were collected in the breathing zone for 12 continuous hours. During air sampling there was no activity occurring at the site.

Chemical analyses indicated the presence of the highest concentrations of copper at 0.103 micrograms per cubic meter ($\mu g/m^3$), lead at 0.039 $\mu g/m^3$, manganese at 0.059 $\mu g/m^3$, and zinc at 1.06 $\mu g/m^3$ (Appendix D, Table 4).

If a remedial action occurs in the future, dust suppression techniques are recommended to ensure that contaminants do not migrate through the air to off-site locations. Air monitoring would also be needed during remedial activity to determine whether the dust suppression techniques were effective.

III.C.3 NO APPARENT PUBLIC HEALTH HAZARD

ATSDR concluded that the following identified exposure situations present no apparent public health hazard under current conditions either because there is no evidence that people are coming into contact with contaminated media, or it is unlikely that they are coming into contact with contaminated media often enough to present a threat to public health.

III.C.3.a Evaluation of Possible Surface Water Exposure Pathways

Summary: Site surface water run-off into the Chatlin Lake Canal surrounding the site presents no apparent public health hazard because it is unlikely that people would be exposed to contaminants at levels that would be of health concern because: (1) the probability of ingesting surface water is very low, (2) the frequency and duration of any contact with surface water would be very low, and (3) the surface area of skin that potentially could come into contact with contaminated water would be small. It is rare that the canal is full of water, and at those times, the canal would present a drowning hazard.

The site is surrounded by the Chatlin Lake Canal, which is a freshwater river that borders the site on the north, south, and east. The Chatlin Lake Canal is primarily used as a drainage canal for the City of Alexandria. The canal has no surface water intakes since the water supply in the area is obtained from groundwater wells. Swimming and other recreational water contact, barring recreational fishing activities, in the vicinity of Ruston Foundry is not likely, and actual exposure to contaminants through dermal contact or incidental ingestion during these activities would be limited.

Surface water data, reflecting current contaminant concentrations does not yet exist; however, the metals that are contaminants of concern have a very low dermal absorption rate or low ability to pass through the skin. There are no observed releases of hazardous constituents that can be documented by sediment samples collected within the study of the Chatlin Lake Canal, and there is limited contact with the water in the canal. Therefore, it is not a major pathway of concern.

III.C.3.b Evaluation of Possible Sediment Exposure Pathways

Summary: Contaminants found in sediments present no apparent public health hazard because it is unlikely that people would be exposed to contaminants at levels that would be of health concern. Currently access onto the site is restricted, and it is likely that exposures to sediment in the canal surrounding the site would be limited. We do not consider exposure to site contaminants either by ingesting or contacting sediment to be a significant exposure pathway since: (1) access to the contaminated areas is limited, (2) the probability of ingesting contaminated sediment is very low, (3) the frequency and duration of any contact with contaminated sediment would be very low, and (4) the surface area of skin that potentially could come into contact with contaminated sediment would be small.

During the week of April 20, 1998, four sediment samples were collected from the Chatlin Lake Canal by START as part of the ESI. Sediment samples were collected between 0 to 24 inches deep from locations at the junction of the northwest and southwest water flow of the canal, downstream of the canal, before and after the bridge, and a quarter mile from the probable point of entry (PPE). The samples were analyzed for TAL metals, including mercury. Arsenic exceeded its cancer comparison value, but was not found at a level two times greater than the background level. Therefore, it's uncertain as to whether the arsenic is site-related. Regardless, the level of arsenic present in sediment does not pose a significant health risk due to the lack of a completed exposure pathway. There were no other sediment sample results where contaminant levels exceeded comparison values (Appendix D, Table 5).

III.C.3.c Evaluation of Possible Aquatic Biota Exposure Pathways

Summary: Exposure to site contaminants through the ingestion of fish or seafood is considered to present no apparent public health hazard. No discharges of bioaccumulative contaminants into surface water have been documented. Biota sampling has not yet been conducted in the vicinity of the site.

There have been no documented releases of contaminants into the Chatlin Lake Canal. No hazardous constituents were found in the sediment samples collected within the study area of the canal. The contaminants of concern (metals) do not bioaccumulate in fish and/or other seafood. Although, fishing along the canal was documented April 21, 1998, the consumption of fish from Chatlin Lake Canal is not expected to cause harm to public health.

III.C.4 PHYSICAL AND OTHER HAZARDS

There were no imminent and/or substantial endangerment conditions on the site such as the potential for explosive conditions. However, physical hazards do exist throughout the site. These hazards include piles of debris. The tall vegetation on-site may obscure other on-site hazards. However, the site is currently completely fenced, and access is restricted. If the fencing is breached, the site may pose a hazard to people who trespass.

III.D TOXICOLOGICAL EVALUATION

In this section, health effects that could result from exposures to site contaminants are discussed. People can only be exposed to a site contaminant if they come in contact with it. In order to understand health effects that may be caused by a specific chemical, three factors affecting how the human body responds to exposure need to be considered. These factors include the exposure concentration, the duration of exposure, and the route of exposure. Lifestyle can affect exposure duration and the likelihood of adverse effects from the contaminant in question. Individual characteristics of each human such as age, sex, nutritional status, and overall health can affect how a contaminant is absorbed, distributed, metabolized or eliminated from the body. Together,

these factors determine the individual's response to chemical contaminants and what health effects may occur for that individual.

To evaluate health effects, ATSDR has developed a Minimal Risk Level (MRL) for contaminants commonly found at hazardous waste sites. The MRL is an estimate of daily human exposure to a contaminant below which noncancerous, adverse health effects are unlikely to occur. MRLs are developed for each route of exposure, such as ingestion and inhalation, and for the length of exposure, such as acute (less than 14 days), intermediate (15 to 364 days), and chronic (greater than 365 days). For determining possible exposures to contaminants in soil, maximum contaminant levels in the surface soil are used. Cancer risk is calculated using EPA's cancer slope factors and ATSDR's exposure assumptions. These are theoretical risks, based on conservative (i.e., protective) assumptions.

Factors such as duration of exposure, age, and body weight are used to help estimate the amount of a contaminant that might have entered a person's body. For example, some young children between the ages of 1 to 6 years old are known to put everything in their mouth (pica behavior). This behavior increases their chances of being exposed to soil contaminants. The assumptions for exposure calculations for a young child (exhibiting pica behavior) are a body weight of 10 kilograms (kg) (approximately 22 pounds), with an ingestion rate of 5,000 milligrams of soil per day (mg soil/day). The assumptions for an older child (7 years or older) are a body weight of 16 kg (approximately 35 pounds) and a soil ingestion rate of 200 mg per day. The adult assumptions are a body weight of 70 kg (approximately 150 pounds), and a soil ingestion rate of 100 mg/day. In addition, the maximum concentration found in a particular media is usually used for calculating risks and doses; therefore, a worse case scenario is evaluated.

III.D.1 Antimony

Antimony was detected in on-site surface soils at 38 parts per million (ppm) and in off-site surface soils at 30.7 ppm. The highest level of antimony detected in both on- and off-site soils is above the comparison value for children; however, it is several times below the RMEG and should present no health risk. The effects of past antimony exposure to workers and residents are not known.

However, as previously stated, this residential level of antimony is not reflective of the levels present throughout the residential area. This level is from a single outlying residential area. Levels indicate that some previous activity on the property may have contributed to the contamination present in this area.

III.D.2 Arsenic

Arsenic was detected in on-site surface soils at 84.8 ppm and off-site surface soils at 87.5 ppm. The highest level of arsenic present is above the comparison value for children and the cancer

screening level. However, it is several times below the RMEG [4]. The effects of past arsenic exposure to workers and residents are not known.

The highest level of arsenic found off-site, was at a location consistent with the highest level of antimony. These levels are not reflective of the levels present throughout the residential area. This level is from a single outlying residential area. Levels indicate that individual property use may have contributed to the contamination present in this area.

III.D.3 Copper

Copper was detected in the on-site and off-site soil at the Ruston Foundry site. Presently, the fence prohibits trespassers from exposure to on-site contaminants, and exposure would come only from contact with contaminated residential soils. The highest level of copper present in off-site soils is 5,790 ppm. The effects of past copper exposure to workers and residents is not known.

Studies of copper ingestion have identified a Lowest Observed Adverse Effects Level (LOAEL) dose of 0.056 mg copper/kg body weight/day to result in abdominal pains and vomiting [8]. Currently there is no ATSDR MRL or EPA RfD to estimate noncancerous health effects from ingestion. However, if 200 mg of the highest level of copper (5,790 mg/kg) from the off-site residential soils were ingested daily by a child with a body weight of 16 kilograms, the estimated dose received would be at the LOAEL associated with the abdominal pain. The off-site copper levels in one residential yard may represent a public health hazard.

III.D.4 Lead

Lead was detected in on-site and off-site surface soils at the Ruston Foundry site. Presently, the fence prohibits trespassers from exposure to on-site contaminants; therefore, exposure would come only from contact with contaminated residential soils. The highest level of lead present in off-site soils is 1,560 ppm which is above the 400 ppm EPA action level. The effects of past lead exposure to workers and residents is not known.

Exposure to lead is a major health concern especially for young children, because it is particularly harmful to the developing brain and nervous system of the young child. Some investigators have reported decreases in the intelligence quotient (IQ) in children who have been exposed to high levels of lead [6].

There are two reasons why children are at greater risk for lead poisoning than adults. First, young children tend to exhibit hand-to-mouth behaviors that increase their exposure to lead from their environment. Second, if children consume lead contaminated materials such as soil, house dust, or paint chips, they will absorb more of the lead from their stomachs and intestines than adults would. Children absorb about 50% of the lead they ingest, while adults absorb approximately 10%. Furthermore, a strong correlation exists between the exposure to lead in the

soil and blood lead levels. For every 1000 ppm of lead detected in dust or soil, there is a 3-7 microgram per deciliter (µg/dl) increase in blood lead levels in children [10].

Elevated surface soil lead levels were found in several places in residential properties. However, the highest level of lead (1,560 ppm) found, is again at the location consistent with the highest levels of antimony and arsenic. Although lead has been found at a few other sampling locations, this level is not reflective of the levels present throughout the residential area. This level is from a single outlying residential area. Levels indicate that paint or a previous property use may have contributed to the contamination present in this area.

IV. COMMUNITY HEALTH CONCERNS/HEALTH OUTCOME DATA

IV.A Community Health Concerns Evaluation

As part of the public health assessment process, SEET and ATSDR try to learn what concerns people in the area may have about the impact of the site on their health. Consequently, attempts are made to actively gather information and comments from people who live or work near the site. To obtain community health concerns related to the Ruston Foundry site, we spoke with residents during meetings and the site visit, and we contacted several different agencies and individuals by telephone. We also contacted the Louisiana Department of Health and Hospitals (LDHH), Office of Public Health (OPH) Region 6 office, which is the local health unit servicing residents that reside near the site. Currently, the Section of Environmental Epidemiology and Toxicology (SEET) is developing a community needs assessment that will be implemented during an outreach activity.

Residents are concerned about lead contamination and the effects that it may have had on children in the area. Children have been found with elevated blood lead levels. Due to visits by state sanitarians, these elevated levels have been attributed to abiding in older homes that contain lead-based paint rather than from soil contamination due to the Ruston facility.

IV.B Health Outcome Data Evaluation

Health outcome data (HOD) record certain health conditions that occur in populations. These data can provide information on the general health of communities living near a hazardous waste site. They also can provide information on patterns of specified health conditions. Some examples of health outcome databases are tumor registries, birth defects registries, birth and death records, and vital statistics. Information from local hospitals and other local health care providers also may be used to investigate patterns of disease in a specific population. SEET and ATSDR look at appropriate and available health outcome data if there is a completed exposure pathway or community concern. Health Outcome Data is not available for the area surrounding the Ruston Foundry site.

Blood lead testing that was not initiated from the sampling events, was performed on a few of the children residing near the site. It has been verbally communicated to SEET that no elevated blood lead levels have been reported to the Office of Public Health at this time.

IV.C Child Health Initiative

ATSDR's Child Health Initiative recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination of their water, soil, air, or food. Children are at greater risk than adults from certain kinds of exposures to hazardous substances emitted from hazardous waste sites and/or emergency release events. They are more likely to be exposed because they play outdoors and they often bring food into contaminated

areas. They are shorter than adults, which means they breathe more dust, soil, and heavy vapors close to the ground. Children are also smaller, resulting in higher doses of chemical exposure per body weight. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. Most importantly, children depend completely on adults for risk identification and management decisions, and access to medical care.

SEET evaluated the likelihood for children living in the vicinity of the Ruston Foundry site to be exposed to site contaminants at levels of health concern. Presently, children are not likely to be exposed to contaminants in on-site sediments or soils from Ruston Foundry site. The present complete fencing of the site eliminates the entrance of children to the site. Off-site soil contamination in residential yards, especially lead and copper, could be a hazard to children living there.

V. CONCLUSIONS

1. Site-related contaminants have been detected in various environmental media. There are also possible situations (i.e., future recreational land use) in which additional information would be needed to determine risks to public health. Based on available information, we have concluded that due to metal contamination in off-site soil at a few specific residences, the Ruston Foundry site currently poses a public health hazard to children. The levels of copper and arsenic detected in one residential yard and lead detected in two residential yards could pose a public health hazard to children at those specific locations.

2. Due to the current fencing, it is unlikely that contact with on-site soil would exist; therefore, on-site soils from the site pose no apparent public health hazard.

3. There was not enough information available to assess the public health significance of exposure to site contaminants through groundwater; we concluded that this exposure pathway is an indeterminate public health hazard.

4. In the past, people may have been exposed to metals in air; however, a general lack of historical ambient air data, and the type of data collected recently (on-site air data collected during no activities at the site), we could not assess the potential public health significance of this pathway. We concluded that this pathway is an indeterminate public health hazard.

5. No surface water samples were collected from the Chatlin Lake Canal. However, it is unlikely that exposure to contaminants in surface water would be of health concern since: (1) the probability of ingesting surface water is very low, (2) the frequency and duration of any contact with surface water would be very low; and (3) the surface area of skin that potentially could come into contact with contaminated water would be small. Therefore, the surface water from the site poses no apparent public health hazard.

6. Site-related contaminants were not detected in sediment at levels above the health assessment comparison values. Arsenic was detected in sediment, but it is unclear if this detection is site related. Regardless, the level of arsenic present in sediment does not pose a significant health risk due to the lack of a completed exposure pathway. Therefore, the levels of contaminants detected in sediment pose no apparent public health hazard.

7. Additional on-site (future site use may become recreational) and off-site (residential properties) characterization of the nature and extent of contamination is necessary to determine if contaminant levels present represent a public health hazard.

VI. RECOMMENDATIONS

1. Ensure that site-related contaminants do not migrate off-site by wind dispersion by implementing appropriate dust suppression techniques. Cover on-site slag piles to prevent off-site migration of site-related contamination via wind dispersion, until a removal action is conducted. In addition, air monitoring should also take place during remedial activities to ensure that the dust suppression techniques employed are effective in preventing off-site migration of site-related contaminants.

2. Prevent exposure in the residential yard where elevated levels of lead, arsenic, and copper in soil were detected.

3. Characterize groundwater samples on-site to determine if site-related contaminants have impacted the groundwater beneath the site.

4. Additional sampling is needed to adequately characterize off-site migration, particularly via the air pathway, and if site contamination migration is contributing to off-site contamination of residential properties.

5. If this site's use becomes recreational in the future, then more sampling will be necessary to further characterize the extent of on-site soil contamination at that time to ensure that the levels of contaminants in the surface soils are protective of public health. If construction activities are planned for the site in the future, then subsurface soil sampling should also be conducted to determine the levels of contaminants. If levels of contaminants present in the subsurface soils are found to be at levels of health concern, then actions should be taken to prevent the subsurface soils from being brought to the surface during any construction activities.

VII. PUBLIC HEALTH ACTION PLAN

Actions Planned

1. SEET will review EPA's Remedial Investigation Report for this site and prepare a health consultation concerning the data contained therein.

2. SEET will provide health education to the families at residences with elevated levels of metal contamination in soil.

3. SEET will coordinate additional sampling and testing with EPA, LDEQ, and other agencies as needed.

4. SEET will review any health outcome data if it becomes available.

5. SEET will review the Remedial Action Plan as it becomes available.

Actions Completed

1. Telephone calls have initiated contact with community residents.

2. Attendance of the Lower Third Neighborhood Watch Community Meeting, March 22, 1999.

3. Site visits occurred July 15, 1999, and November 13, 1999.

4. The Health Education component with the community has been initiated.

5. SEET has provided assistance to EPA in informing the community of the site's status by going door to door and talking with residents personally.

6. The initial version of the Public Health Assessment was completed, January 19, 2000.

7. A focus group with the site's Community Assistance Panel (CAP) was held on November 18, 1999, to discuss the Residential Needs Assessment.

8. SEET and ATSDR have administered a Needs Assessment Survey.

9. State sanitarians have determined that older homes with high lead-based paint have been the cause of elevated blood lead levels instead of soil contaminated from the Ruston site.

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APPENDICES

APPENDIX A-1

GLOSSARY OF TERMS

ATSDR:

The Agency for Toxic Substances and Disease Registry. ATSDR is a federal health agency in Atlanta, Georgia that deals with hazardous substance and waste site issues. ATSDR gives people information about harmful chemicals in their environment and tells people how to protect themselves from coming into contact with chemicals.

CERCLA:

The Comprehensive Environmental Response, Compensation, and Liability Act was put into place in 1980. It is also known as **Superfund**. This act concerns releases of hazardous substances into the environment, and the cleanup of these substances and hazardous waste sites. ATSDR was created by this act and is responsible for looking into the health issues related to hazardous waste sites.

Comparison Value (CVs):

Concentrations or the amount of substances in air, water, food, and soil that are unlikely, upon exposure, to cause adverse health effects. Comparison values are used by health assessors to select which substances and environmental media (air, water, food and soil) need additional evaluation while health concerns or effects are investigated. Also known as Comparison (Health Assessment Comparison)Values .

CREG

The Cancer Risk Evaluation Guide is an estimated contaminant concentration that would result in no more than one excess cancer in a million (10E-6) persons exposed over a lifetime. CREGs are calculated from EPA's cancer slope factors (CSFs).

EMEG

Environmental Media Evaluation Guides are based on ATSDR's minimal risk levels (MRLs). An MRL is an estimate of a daily human exposure to a chemical that is likely to be without an appreciable risk for noncarcinogenic effects over a specified duration of exposure (acute, intermediate, chronic).

LDEQ

Louisiana Department of Environmental Quality

LDHH

Louisiana Department of Health & Hospials

LTHA

The **L**ifetime **H**ealth **A**dvisory represents a contaminant concentration that EPA considers to be protective of noncarcinogenic health effects during a lifetime (70 years) of exposure.

LTR

Louisiana **T**umor **R**egistry

MRL:

Minimal **R**isk **L**evel. An estimate of daily human exposure – by a specified route and length of time -- to a dose of chemical that is likely to be without a measurable risk of adverse, noncancerous effects. An MRL should not be used as a predictor of adverse health effects.

NPL:

The **N**ational **P**riorities **L**ist. (Which is part of **Superfund**.) A list kept by the U.S. Environmental Protection Agency (EPA) of the most serious, uncontrolled or abandoned hazardous waste sites in the country. An NPL site needs to be cleaned up or is being looked at to see if people can be exposed to chemicals from the site.

PHA:

Public **H**ealth **A**ssessment. A report or document that looks at chemicals at a hazardous waste site and tells if people could be harmed from coming into contact with those chemicals. The PHA also tells if possible further public health actions are needed.

OPH

Office **of P**ublic **H**ealth

PRP:

Potentially **R**esponsible **P**arty. A company, government or person that is responsible for causing the pollution at a hazardous waste site. PRP's are expected to help pay for the clean up of a site.

Reference Dose (RfD):

An estimate, with safety factors (see **safety factor**) built in, of the daily, life-time exposure of human populations to a possible hazard that is <u>not</u> likely to cause harm to the person.

RMEG

Similar to the EMEG but derived from EPA's reference dose. It is the concentration in a specific media at which daily human exposure is unlikely to result in adverse noncancerous effects.

SEET

Section of Environmental Epidemiology & Toxicology

U.S. Environmental Protection Agency (EPA):

The federal agency that develops and enforces environmental laws to protect the environment and the public's health.

APPENDIX A-2
Acronyms and Abbreviations

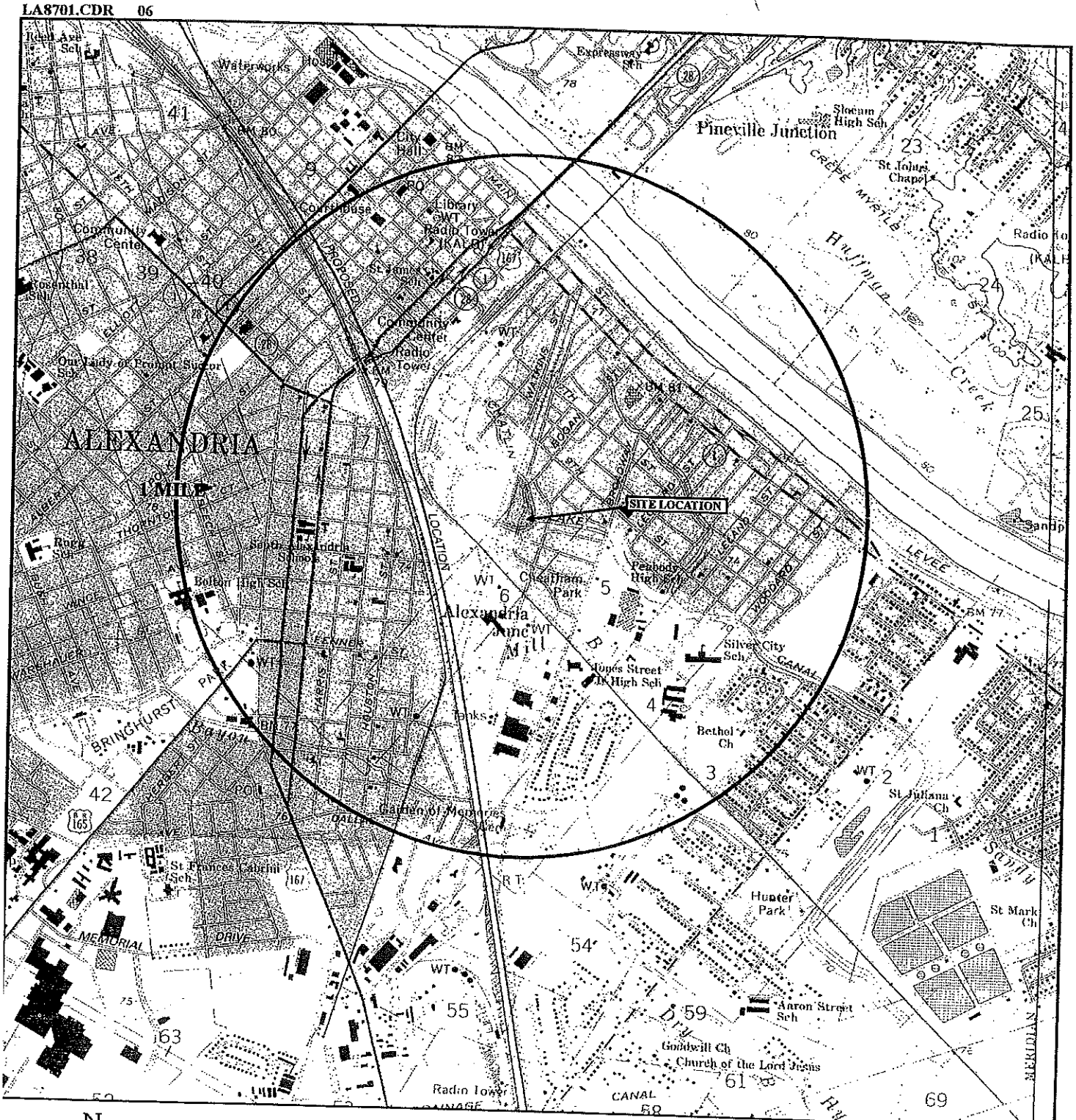
ATSDR	Agency for Toxic Substances and Disease Registry
LDHH	Louisiana Department of Health and Hospitals
OPH	Office of Public Health
SEET	Section of Environmental Epidemiology & Toxicology
LDEQ	Louisiana Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
PHA	Public Health Assessment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1990
SARA	1986 Superfund Amendments and Reauthorization Act
NPL	National Priorities List
HACV	Health Assessment Comparison Value
EMEG	Environmental Media Evaluation Guide
CREG	Carcinogenic Risk Evaluation Guide
RfD	Reference Dose
RMEG	Reference Dose-Based Media Evaluation Guide
MRL	Minimal Risk Level
MCL	Maximum Contaminant Level
LTHA	Lifetime Health Advisory
MCLG	Maximum Contaminant Level Goal
PMCLG	Proposed Maximum Contaminant Level Goal
µg/L	Micrograms per Liter
µg/kg	Micrograms per Kilogram (equal to parts per billion)
mg/kg	Milligrams per Kilogram (equal to parts per million)
VOCs	Volatile Organic Compounds
Semi-VOCs	Semi Volatile Organic Compounds

APPENDIX B-1
Explanation of Comparison Values

Explanation of Comparison Values	
Background	Levels reported to exist in an uncontaminated environment.
Child	A subscript child adjacent to the EMEG or RMEG indicate that the comparison value was determined using a child exposure scenario. Child EMEGs and RMEGs are lower for children.
EMEG	Environmental Media Evaluation Guides are based on ATSDR's minimal risk levels (MRLs). An MRL is an estimate of a daily human exposure to a chemical that is likely to be without an appreciable risk for noncarcinogenic effects over a specified duration of exposure (acute, intermediate, chronic).
CREG	The Cancer Risk Evaluation Guide is an estimated contaminant concentration that would result in no more than one excess cancer in a million (10E-6) persons exposed over a lifetime. CREGs are calculated from EPA's cancer slope factors (CSFs).
LTHA	The Lifetime Health Advisory represents a contaminant concentration that EPA considers to be protective of noncarcinogenic health effects during a lifetime (70 years) of exposure.
MCL	The maximum permissible level of a contaminant in a public water system.
RMEG	Similar to the EMEG but derived from EPA's reference dose. It is the concentration in a specific media at which daily human exposure is unlikely to result in adverse noncancerous effects.

APPENDIX C - Figures

LA8701.CDR 06



N

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET

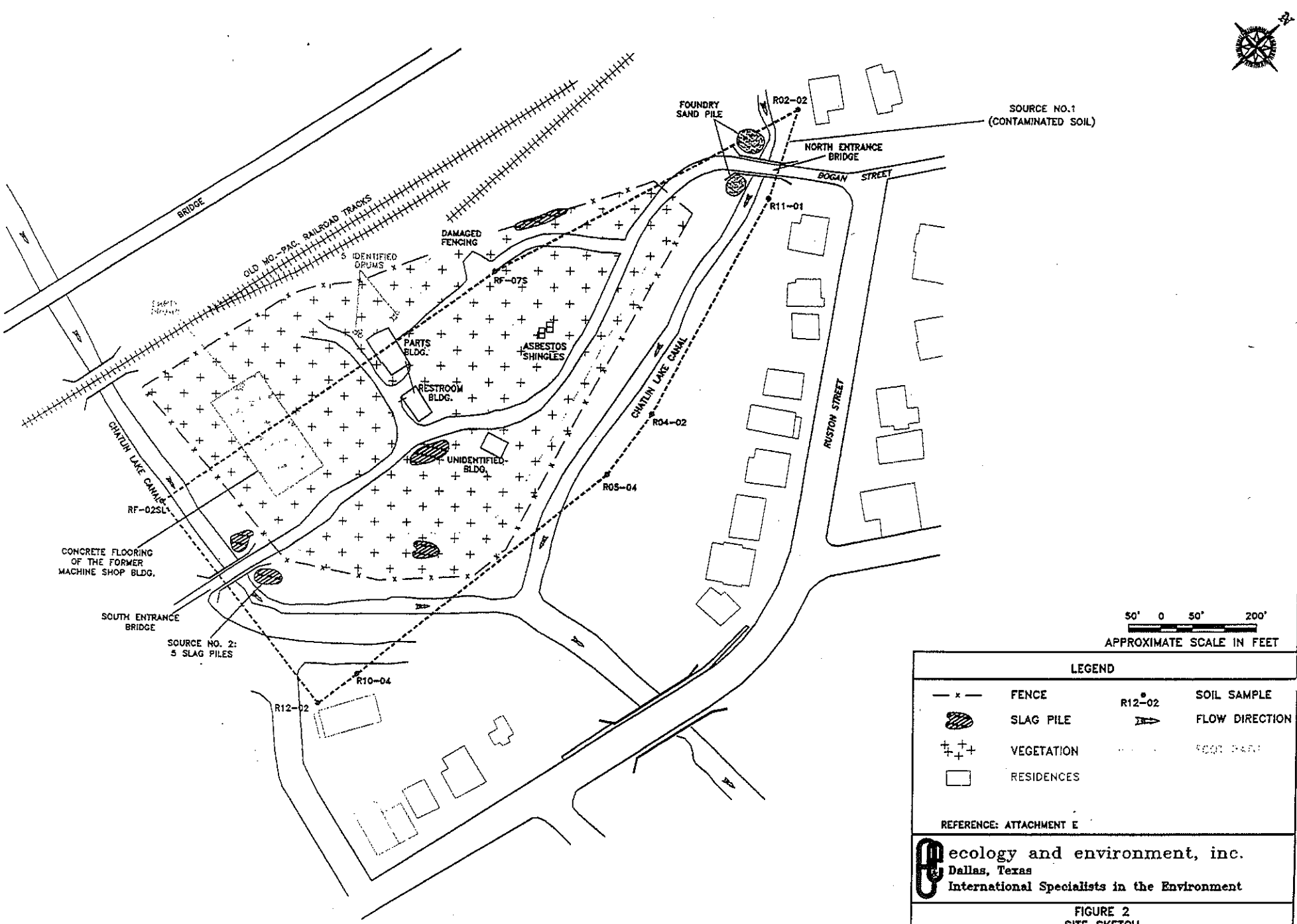
QUADRANGLE LOCATION

ecology and environment, inc.
Superfund Technical Assessment & Response Team - Region 6

CERCLIS/CASE No. LAD985185107 TDD No. S06-98-01-0022

SOURCE: USGS 7.5 MIN. TOPOGRAPHIC QUADRANGLES
ALEXANDRIA, LOUISIANA - 1972

FIGURE 1
SITE LOCATION MAP
RUSTON FOUNDRY



ecology and environment, inc.
Dallas, Texas
International Specialists in the Environment

FIGURE 2
SITE SKETCH
RUSTON FOUNDRY

TDD# S06-98-01-0022	Date: AUGUST 5, 1998
PAN# 048701SRXX	P.M.: A. RILLERA

APPENDIX D - Tables

Table 1
Population By Distance Table

Ruston Foundry Site, Alexandria, Rapides Parish, Louisiana

Distance Categories	Population
0 to ¼ mile	1,178
>¼ mile to½ mile	1,750
>½ to 1 mile	6,111
>1 to 2 miles	21,047
>2 to 3 miles	14,681
>3 to 4 miles	19,597

Pathway Name	TABLE 2 - Exposure Pathway Elements						
	Contaminants of Concern	Media	Point of Exposure	Route of Exposure	Exposed Population	Time	Comments
Potential Exposure Pathways							
Foodchain	Possibly Heavy Metals Possibly VOCs	Fish / Shellfish	Chatlin Lake Canal	Ingestion	People who eat fish and shellfish caught in Chatlin Lake Canal	Past Present Future	No apparent public health hazard. Contaminants do not readily bioaccumulate. Water bodies nearby limit amount and type of biota possibly ingested. Water from canal is from upstream and would wash away contaminants. Sediments don't contain levels of concern
Air	Heavy Metals Possibly VOCs	Air	On-Site Off-Site	Inhalation	Residents On-Site Workers	Past Present Future	Indeterminate public health hazard. Lead was found 3X above background in some samples.
Groundwater	Possibly Heavy Metals Possibly VOCs	Groundwater	Municipal and Domestic Wells	Ingestion Dermal Contact	Those utilizing water near the site.	Past Present Future	Indeterminate public health hazard since groundwater has not been analyzed.
Surface Water	Heavy Metals Possibly VOCs	Surface Water	Chatlin Lake Canal adjacent to the site	Incidental Ingestion Dermal Contact	People who use the Chatlin Lake Canal for fishing and other recreational activities	Past Present Future	No apparent public health hazard. Although contact with the surface water is possible it would most likely be minimal. Current contaminant concentrations are not known.
Sediment	Heavy Metals Possibly VOCs	Sediment	Off-Site (Chatlin Lake Canal)	Incidental Ingestion Dermal Contact	On-Site Workers Trespassers Recreational Users	Past Present Future	No apparent public health hazard. Although people theoretically could contact contaminated sediment, such contact would be minimal and infrequent. Contamination levels are minimal
Surface Soil	Arsenic Chromium Copper Lead Zinc	Surface Soil	On-Site Off-Site	Incidental Ingestion Dermal Contact	Residents On-Site Workers Trespassers	Past Present Future	Public health hazard. People could contact contaminated soils, and children are susceptible to health hazards based on levels of contamination.

APPENDIX D - Table 3 Ruston Foundry

Air Sampling Event (April 20-26, 1998)

Constituent	Background Level ($\mu g/m^3$)	Maximum Concentration Detected	Comparison Value (CV) (ppm)	Exceeds CV?
Copper	0.023	0.103	-	NA
Lead	0.0051	0.039	-	NA
Manganese	0.0126	0.059	0.05 EMEG	Yes
Zinc	0.505	1.06	-	NA

EMEG - Environmental Media Evaluation Guides (Derived from Reference Dose)
NA - Not Applicable
- - Designates that Comparison Value is not available
Background concentrations were taken from off-site locations within the site area.

APPENDIX D - Table 4 Ruston Foundry

Sediment Sampling Event (April 20-26, 1998)

Constituent	Background Level (ppm)	Maximum Concentration Detected (ppm)	Comparison Value (CV) (ppm)	Exceeds CV?
Aluminum	20,800	20,000	-	NA
Antimony	2	3.6	20 RMEG (child)	No
Arsenic	10.5	**11.6**	0.5 CREG	Yes**
Barium	257	501	4000 RMEG (child)	No
Beryllium	1.2	1.4	100 RMEG (child)	No
Cadmium	0.31	1.2	10 EMEG (child)	No
Calcium	14,700	31,200	-	NA
Chromium*	27.5	44.8	200 RMEG (child)	No
Cobalt	10.5	13.9	-	NA
Copper	25.3	60.1	-	NA
Iron	23,000	20,200	-	NA
Lead	114	302	400 EPA Action Level	No
Magnesium	11,400	12,600	-	NA
Manganese	530	949	7000 RMEG (child)	No
Mercury	0.13	0.22	-	NA
Nickel	21.5	64.5	1000 RMEG (child)	No
Potassium	6,180	7,140	-	NA
Selenium	2.8	5.1	300 EMEG (child)	No
Silver	0.32	0.61	300 EMEG (child)	No
Sodium	330	524	-	NA
Thallium	0.66	0.97	-	NA
Vanadium	34.4	34.6	200 EMEG (child)	No
Zinc	126	359	20000 EMEG (child)	No

* Assume Hexavalent Chromium (Poses Greater Hazard)
** Arsenic exceeds the Comparison Value, however, the amount found is not greater than 2X the background level.
ppm - parts per million
EMEG - Environmental Media Evaluation Guides
RMEG - Environmental Media Evaluation Guides (Derived from Reference Dose)
NA - Not Applicable
Background concentrations were taken from off-site locations within the site area.
Bold type indicates an exceedence of a comparison value.

APPENDIX D - Table 5 Ruston Foundry

Foundry Sand Sampling Event (April 20-26, 1998)

Constituent	Background Level (ppm)	Maximum Concentration Detected (ppm)	Comparison Value (CV) (ppm)	Exceeds CV?
Aluminum	12900	3930	-	NA
Antimony	1.6	3.8	20 RMEG (child)	No
Arsenic	5.5	**8.5**	0.5 CREG	Yes**
Barium	187	66.7	4000 RMEG (child)	No
Beryllium	1	0.19	100 RMEG (child)	No
Cadmium	0.32	0.61	10 EMEG (child)	No
Calcium	5050	1240	-	NA
Chromium*	17.2	16.9	200 RMEG (child)	No
Cobalt	9.2	2.8	-	NA
Copper	48	144	-	NA
Iron	13400	15400	-	NA
Lead	74.2	217	400 EPA Action Level	No
Magnesium	8900	641	-	NA
Manganese	522	215	7000 RMEG (child)	No
Mercury	0.13	0.35	-	NA
Nickel	19.4	58.2	1000 RMEG (child)	No
Potassium	4020	1470	-	NA
Selenium	2.1	4.1	300 EMEG (child)	No
Silver	0.31	0.25	300 EMEG (child)	No
Sodium	170	271	-	NA
Thallium	0.65	0.53	-	NA
Vanadium	23.6	9.6	200 EMEG (child)	No
Zinc	130	192	20000 EMEG (child)	No

* Assume Hexavalent Chromium (Poses Greater Hazard)
** Arsenic exceeds the Comparison Value, however, the amount found is not greater than 2X the background level.
ppm - parts per million
EMEG - Environmental Media Evaluation Guides
RMEG - Environmental Media Evaluation Guides (Derived from Reference Dose)
NA - Not Applicable
Background concentrations were taken from off-site locations within the site area.
Bold type indicates an exceedence of a comparison value.

APPENDIX D - Table 6 Ruston Foundry

Foundry Slag Pile Sampling Event (April 20-26, 1998)

Constituent	Background Level (ppm)	Maximum Concentration Detected (ppm)	Comparison Value (CV) (ppm)	Exceeds CV?
Aluminum	12900	13500	-	NA
Antimony	1.6	17.9	20 RMEG (child)	No
Arsenic	5.5	**76.2**	0.5 CREG	Yes
Barium	187	237	4000 RMEG (child)	No
Beryllium	1	0.81	100 RMEG (child)	No
Cadmium	0.32	8.9	10 EMEG (child)	No
Calcium	5050	9450	-	NA
Chromium*	17.2	156	200 RMEG (child)	No
Cobalt	9.2	30.2	-	NA
Copper	48	27200	-	NA
Iron	13400	207000	-	NA
Lead	74.2	**35200**	400 EPA Action Level	Yes
Magnesium	8900	8990	-	NA
Manganese	522	2170	7000 RMEG (child)	No
Mercury	0.13	0.22	-	NA
Nickel	19.4	177	1000 RMEG (child)	No
Potassium	4020	4850	-	NA
Selenium	2.1	41.6	300 EMEG (child)	No
Silver	0.31	5.7	300 EMEG (child)	No
Sodium	170	16700	-	NA
Thallium	0.65	7.6	-	NA
Vanadium	23.6	30.7	200 EMEG (child)	No
Zinc	130	13800	20000 EMEG (child)	No

* Assume Hexavalent Chromium (Poses Greater Hazard)
ppm - parts per million
EMEG - Environmental Media Evaluation Guides
RMEG - Environmental Media Evaluation Guides (Derived from Reference Dose)
NA - Not Applicable
Background concentrations were taken from off-site locations within the site area.
Bold type indicates an exceedence of a comparison value.

APPENDIX D - Table 7 Ruston Foundry Soil Sampling Event (April 20-26, 1998)

Constituent	Background Level (ppm)	Maximum Concentration Detected On-Site (ppm)	Maximum Concentration Detected Off-Site (ppm)	Comparison Value (CV) (ppm)	Exceeds CV?
Aluminum	12900	5710	25000	-	NA
Antimony	1.6	**38**	**30.7**	20 RMEG (child)	Yes
Arsenic	5.5	**84.8**	**87.5**	0.5 CREG	Yes
Barium	**187**	**130**	**585**	100 RMEG (pica child) 4000 RMEG (child)	Yes No
Beryllium	1	0.37	1.6	4 RMEG (pica child) 100 RMEG (child)	No No
Cadmium	0.32	**4.4**	**4.7**	0.4 EMEG (pica child) 10 EMEG (child)	Yes No
Calcium	5050	2010	18000	-	NA
Chromium*	**17.2**	**129**	**55.3**	6 RMEG (pica child) 200 RMEG (child)	Yes No
Cobalt	9.2	20.6	21.6	-	NA
Copper	48	4300	5790	-	NA
Iron	13400	336000	189000	-	NA
Lead	74.2	**2250**	**1560**	400 EPA Action Level	Yes
Magnesium	8900	1470	14000	-	NA
Manganese	**522**	**2520**	**1040**	300 RMEG (pica child) 7000 RMEG (child)	Yes No
Mercury	0.13	0.91	0.21	-	NA
Nickel	19.4	**58.5**	30.9	40 RMEG (pica child) 1000 RMEG (child)	Yes No
Potassium	4020	2930	7520	-	NA
Selenium	2.1	**60.7**	**38.8**	10 EMEG (pica child) 300 EMEG (child)	Yes No
Silver	0.31	1.1	0.33	10 EMEG (pica child) 300 EMEG (child)	No No
Sodium	170	924	1310	-	NA
Thallium	0.65	9.6	7.7	-	NA
Vanadium	**23.6**	**37.6**	**43.1**	6 EMEG (pica child) 200 EMEG (child)	Yes No
Zinc	130	**811**	**1260**	600 (pica child) 20000 EMEG (child)	Yes No

* Assume Hexavalent Chromium (Poses Greater Hazard)

NA-Not Applicable

ppm - parts per million

EMEG - Environmental Media Evaluation Guides

RMEG - Environmental Media Evaluation Guides (Derived from Reference Dose)

TABLE 8

Agency for Toxic Substances and Disease Registry
Public Health Conclusion Categories

CATEGORY A. URGENT PUBLIC HEALTH HAZARD	CATEGORY B. PUBLIC HEALTH HAZARD	CATEGORY C. INDETERMINATE PUBLIC HEALTH HAZARD	CATEGORY D. NO APPARENT PUBLIC HEALTH HAZARD	CATEGORY E. NO PUBLIC HEALTH HAZARD
This category is used for sites that pose an urgent public health hazard as the result of short-term exposures to hazardous substances. **Criteria:** Evidence exists that exposures have occurred, are occurring, or are likely to occur in the future; and the estimated exposures are to a substance or substances at concentrations in the environment that, upon short-term exposures (less than 1 year), can cause adverse health effects to any segment of the receptor population. The adverse health effect can be the result of either carcinogenic or noncarcinogenic toxicity from a chemical exposure. For a noncarcinogenic toxic effect, the exposure exceeds an acute or intermediate minimal risk level (MRL) established in the ATSDR Toxicological Profiles or other comparable value; and /or community-specific health outcome data indicate that the site has had an adverse impact on human health that requires rapid intervention; and /or physical hazards at the site pose an imminent risk of physical injury.	This category is used for sites that pose a public health hazard as the result of long-term exposures to hazardous substances. **Criteria:** Evidence exists that exposures have occurred, are occurring, or are likely to occur in the future; and the estimated exposures are to a substance or substances at concentrations in the environment that, upon long-term exposures (greater than 1 year), can cause adverse health effects to any segment of the receptor population. The adverse health effect can be the result of either carcinogenic or noncarcinogenic toxicity from a chemical exposure. For a noncarcinogenic toxic effect, the exposure exceeds a chronic MRL established in the ATSDR Toxicological Profiles or other comparable value; and/or community-specific health outcome data indicate that the site has had an adverse impact on human health that requires intervention.	This category is used for sites with incomplete information. **Criteria:** The limited available data do not indicate that humans are being or have been exposed to levels of contamination that would be expected to cause adverse health effects. However, data or information are not available for all environmental media to which humans may be exposed; and there are insufficient or no community-specific health outcome data to indicate that the site has had an adverse impact on human health.	This category is used for sites where human exposure to contaminated media is occurring or has occurred in the past, but the exposure is below a level of health hazard. **Criteria:** Exposures do not exceed an ATSDR chronic MRL or other comparable value; and data are available for all environmental media to which humans are being exposed; and there are no community-specific health outcome data to indicate that the site has had an adverse impact on human health.	This category is used for sites that do not pose a public health hazard. **Criteria:** There is no evidence of current or past human exposure to contaminated media; and future exposures to contaminated media are not likely to occur; and there are no community-specific health outcome data to indicate that the site has had an adverse impact on human health.

APPENDIX E:

Statement of Clarification Regarding Sections IV and V of the Public Health Assessment for the Ruston Foundry, Alexandria, Rapides Parish, Louisiana

This statement is in reference to sections IV A,B and section V #1 of the public health assessment (PHA) for the Ruston Foundry site located in Alexandria, Rapides Parish, Louisiana. The document, released on August 7, 2002, was prepared by the Louisiana Department of Health and Hospitals (LDHH), Office of Public Health (OPH), Section of Environmental Epidemiology and Toxicology (SEET) under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). In efforts to clarify issues of concern in the Ruston Foundry PHA, this statement will address off-site soil contamination and information related to the level of heavy metal contamination near the site.

As part of the public health assessment process, SEET reviewed available environmental information for the site and evaluated the potential exposure pathways associated with the Ruston Foundry. Based on such review, SEET has concluded that a public health hazard exists for children exposed to metal contaminated off-site soils at a few specific residences. It should be noted that levels of metals detected in these areas are not representative of levels present throughout the residential area. Single outlying levels of arsenic, copper, and lead at these specific locations indicate that residential use may have contributed to the contamination present in these areas. This stated, it should be clarified that the currently posed public health hazard to children exposed to contaminated off-site soils at these residential locations, may be attributable to previously stated activity, rather than to the Ruston Foundry.

As stated in the PHA, residents are concerned about lead contamination and the health effects that it may have had on children in the area. In response to these concerns, children in the area were screened and found to have had elevated blood lead levels. These elevated levels have been attributed by state sanitarians to be due to abiding in older homes that contain lead-based paint, rather than from soil contamination from the Ruston Foundry facility. On a separate occasion, blood lead testing that was not initiated from sampling events related to the site, was performed on a few children residing nearby the site. It was verbally communicated to SEET by the nursing supervisor at the Alexandria Health Unit, Children's Special Services, that there were no elevated blood lead levels reported from that screening event.

In conclusion, there is not an indisputable causal relationship between the metal contaminated off-site residential soil and the Ruston Foundry site. It has been determined by state public health professionals that elevated child blood lead levels are not attributable to contamination at the Ruston Foundry facility . A comprehensive examination of exposure pathways related to the Ruston Foundry site is available in the PHA.

CERTIFICATION

This Ruston Foundry Public Health Assessment was prepared by the Louisiana Department of Health and Hospitals under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the public health assessment was begun.

Technical Project Officer, SPS, SSAB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.

Chief, State Program Section, SSAB, DHAC, ATSDR