

APPENDIX H

**TO
Z2&3 ASAOC**

ACTION MEMORANDUM-FIFTH AMENDMENT

**ZONES 2 AND 3 OF OU1 OF
USS LEAD SUPERFUND SITE
EAST CHICAGO, INDIANA**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MAR 06 2017

REPLY TO THE ATTENTION OF:

MEMORANDUM

SUBJECT: **ACTION MEMORANDUM** – **5th AMENDMENT:** Request for a Change in Scope and Ceiling Increase for the Time-Critical Removal Action at the U.S. Smelter and Lead Refinery Site, East Chicago, Lake County, Indiana (Site ID # 053J)

FROM: Margaret M. Guerriero, Acting Director
Superfund Division

THRU: Reggie Cheatham, Office Director
Office of Emergency Management (OEM)

TO: Barry Breen, Acting Assistant Administrator
Office of Land and Emergency Management

I. PURPOSE

The purpose of this Action Memorandum Amendment is to request and document your approval, consistent with Section 104(c)(1)(A) of CERCLA, 42 U.S.C. Section 9604 (c)(1)(A), to change the scope of the response and for a ceiling increase for the time-critical removal action at portions of the U.S. Smelter and Lead Refinery Site (the Site) residential area defined as Zone 2 and Zone 3 of Operable Unit 1 (OU1), in East Chicago, Lake County, Indiana (see Figure 2). The sought increase of \$2,983,985 would raise the project ceiling for the time-critical removal action from \$40,268,048 to \$43,252,033.

Indoor data collected as a part of cleanup actions in Zones 2 and 3 found lead and arsenic concentrations in indoor dust samples above the screening criteria established for the Site. Response actions are necessary in Zones 2 and 3 to mitigate threats to public health, welfare, and the environment posed by the release and/or threatened release of uncontrolled hazardous substances at the Site. This removal action is twofold. It involves testing for lead and/or arsenic contaminated dust in residential homes located within Zones 2 and 3 where excavation of lead- or arsenic-contaminated soils has already taken place, or where EPA has been specifically requested to perform sampling by a resident. If dust in homes contains concentrations of lead or arsenic above the site-specific screening levels, and those homes had exterior soils that required remediation, contaminated dust will be removed from those homes. It also involves excavating soils in properties in Zone 2 that are eligible for time-critical removal actions based on criteria outlined in OSWER Publication 9285.7-50 *Superfund Lead-Contaminated Residential Sites*

Handbook (Lead Handbook) (2003) that were not previously considered in the fourth amendment to the action memorandum.

A change of scope of the response and ceiling increase is necessary as the previous Action Memoranda approved on January 22, 2008, August 13, 2008, September 12, 2011, October 13, 2016, and October 28, 2016 (Attachments IX, X, XI, XII, XIII), were for the excavation and proper disposal of lead-contaminated soils from residential parcels in OU1, Zones 1, 2 and 3; indoor cleanup of lead contaminated dust inside of residences in Zones 1 and 2; and temporary relocation of residents in the West Calumet Housing Complex (WCHC) in Zone 1 and residents in Zone 2. They did not address indoor cleanup of lead contaminated dust inside of residences in Zone 3. Further, for residences in Zones 2 and 3, the site-specific interior dust screening level for arsenic has been revised downward from 100 mg/kg to 26 mg/kg.

A change of scope is also necessary to further define the prioritization of Zone 2 properties for time-critical removal actions for the excavation of exterior soil to include properties with lead concentrations in surface soils at or greater than 400 mg/kg where a member of a sensitive population resides (children up to age 7 and/or pregnant women) and properties with lead concentrations at or greater than 400 mg/kg at any depth down to 24 inches bgs where a child with blood lead levels at or greater than 10 µg/dL lives.

Conditions existing at the Site in Zone 2 and Zone 3 present a threat to public health and the environment and meet the criteria for initiating a removal action under 40 CFR § 300.415(b) of the National Contingency Plan (NCP). The U.S. Environmental Protection Agency (EPA or the Agency) documented elevated levels of lead and arsenic in surface soil in residential parcels at the Site in Zones 1, 2 and 3. Lead and arsenic are hazardous substances as defined by CERCLA § 101(14). The EPA has also documented elevated levels of lead and arsenic in dust found within residences located within Zones 1, 2 and 3 of the Site.

There are no nationally significant or precedent setting issues associated with the Change of Scope sought in this Action Memorandum as it seeks approval only for the sampling and removal of lead and/or arsenic contaminated dust in residential homes in Zone 3 and for the inclusion of soil removals in Zone 2 where sensitive populations live. EPA has previously issued Action Memoranda for the sampling and removal of lead and/or arsenic contaminated dust in residential homes in Zone 1 and Zone 2, and performing time-critical removal actions at contaminated properties with sensitive populations is consistent with OSWER Publication 9285.7-50 *Superfund Lead-Contaminated Residential Sites Handbook* (Lead Handbook) (2003). The Site is on the National Priorities List (NPL) and has been since April of 2009.

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID:	IND047030226
RCRA ID:	IND047030226
STATE ID:	None
Category:	Time-Critical Removal

A. Site Description

1. Removal Site Evaluation

The Indiana Department of Environmental Management (IDEM) sampled some of the residential parcels to the north of the U.S. Smelter and Lead Refinery, Inc. (U.S.S. Lead) facility in 1985. This area, known locally as the Calumet neighborhood, is now known as Operable Unit 1 of the Site. IDEM found elevated lead levels in these residential yards. In September of 1985, the Indiana State Board of Health found the U.S.S. Lead facility in violation of state law and stated that the lead-contaminated soils within the facility boundaries may pose a risk to human health and the environment. IDEM referred the U.S.S. Lead facility, now known as Operable Unit 2 or OU2, to EPA for cleanup but did not refer for cleanup the area now known as Operable Unit 1.

From 1993 through 2006, EPA's Resource Conservation and Recovery Act (RCRA) Corrective Action program oversaw the remediation and management of lead-contaminated soils within the boundaries of OU2, the U.S.S. Lead facility. On November 18, 1993, EPA and U.S.S. Lead entered into an Administrative Order on Consent (AOC) pursuant to Section 3008(h) of RCRA. The AOC required U.S.S. Lead to implement interim measures, including site stabilization and construction of a corrective action management unit (CAMU) to contain contaminated soils and slag and to conduct a Modified RCRA Facility Investigation at the U.S.S. Lead facility, OU2. The CAMU now covers approximately 10 acres and is surrounded by a subsurface slurry wall. Excavation and construction of the CAMU was conducted in two phases and completed between August and September 2002. Slag generated from the U.S.S. Lead facility's blast-furnace operations was routinely placed in piles on the southern portion of OU2 near the banks of the Grand Calumet River. The cleanup of slag was described in the Interim Stabilization Measures Work Plan prepared by ENTACT, LLC and was completed during the third quarter of 2002.

As part of a RCRA Corrective Action in 2003 and 2006, EPA conducted soil sampling in the residential neighborhood to the north located in what is now referred to as OU1 of the U.S.S. Lead Site. In the investigation of late July and early August 2003, 83 residential parcels within OU1 were sampled and analyzed for lead using a Niton X-ray fluorescence (XRF) instrument. Soils from 43 locations (52 percent) exceeded the 400 milligrams per kilogram (mg/kg) residential soil screening criterion for lead. In 2006, EPA's Field Environmental Decision Support (FIELDS) team supplemented the work performed in 2003 by collecting additional data from 14 parcels sampled in 2003 to (1) assess whether the top-most soils (zero to one inch below ground surface (bgs)) had elevated lead concentrations relative to deeper soils (one to six inches bgs), (2) collect and compare composite samples to individual samples to assess whether composite samples accurately represented the concentrations in residential yards and parks, and (3) compare lead concentrations in the fine and coarse fractions of sieved samples to evaluate whether lead was preferentially distributed in the fine-grain sizes. These sampling results showed some yards in OU1 to have high levels of lead contamination with the highest sample containing lead at a concentration of 3,000 mg/kg. The RCRA Corrective Action program looked at the possible source of the lead contamination and determined it was from various industrial sources. The RCRA Corrective Action program referred OU1—the off-site contamination from the U.S.S. Lead facility and other industrial sources - to the Superfund Program in 2004; the remainder of OU2—the on-site contamination—was referred in 2006.

Consistent with the Lead Handbook, the Superfund Program prioritized which homes needed to be cleaned up first based on the above-referenced sampling results. Specifically, residential parcels with lead concentrations in surface soils (0-6 inches) at or above 1,200 mg/kg were given priority. EPA does not consider the 1,200 mg/kg concentration as an action level for removal actions but this level does provide an alternative to running the Integrated Exposure Uptake Biokinetic (IEUBK) model with limited data to determine if the site poses an urgent threat.

On January 22, 2008, EPA signed the original action memorandum to conduct a time-critical removal action in OU1 to address known parcels with lead levels in surface soil that exceeded 1,200 mg/kg. These parcels had been identified as part of the RCRA Corrective Action residential investigation. The EPA identified 15 private parcels that contained soil with lead concentrations that exceeded 1,200 mg/kg in the top six inches of soil. On June 9, 2008, the EPA initiated the time-critical removal action to address the 15 residential parcels with lead levels that exceeded 1,200 mg/kg. On August 13, 2008, the EPA amended the original action memorandum to increase the project ceiling by \$511,950 for a total of \$984,060. The EPA was able to obtain access agreements and remediate 13 of the 15 parcels; two parcels were not remediated. The removal action was completed on November 18, 2008. In total, 1,838 tons of lead-contaminated soil were removed and disposed of at an approved landfill.

A Remedial Investigation (RI) was conducted from 2009 through 2010 to collect additional soil data in OU1, which EPA later divided for implementation of the remedy into Zone 1, Zone 2, and Zone 3. As a result of the sampling, EPA discovered an additional 14 areas within OU1 with lead levels that exceeded the removal action level of 1,200 mg/kg. On September 11, 2011, EPA signed the second amendment to the original action memorandum, which increased the total project ceiling to \$1,928,460. On October 11, 2011, EPA started the time-critical removal action involving lead-contaminated soil removals at five West Calumet Housing Complex (WCHC) addresses (located in Zone 1) and nine other residential parcels outside the WCHC. In addition, two parcels that were not remediated during the previous removal action in 2008 because of access issues were remediated during this removal action. The removal action was completed on December 9, 2011. In total, 1,913 additional tons of lead-contaminated soil were removed and disposed of at an approved landfill as a result of the 2011 removal activities.

In November 2012, EPA issued a Record of Decision (ROD) for Operable Unit 1 (OU1) of the Site. EPA has divided OU1 into 3 separate zones for implementation of the remedy (Zones 1, 2, and 3). Residential yards within OU1 are contaminated with lead and arsenic at levels that pose a threat to human health through ingestion, inhalation and direct contact. EPA's selected remedy for OU1 addresses these risks from exposure to contaminated soils through the excavation and off-site disposal of lead or arsenic contaminated soils. The remedial action levels (RALs) for OU1 are 400 mg/kg for lead at residential parcels, 800 mg/kg for lead at industrial/commercial parcels, and 26 mg/kg for arsenic at both residential and industrial/commercial parcels.

ZONE 1 ACTIONS

From November 2014 through April 2015, EPA conducted more extensive soil sampling within Zone 1 as part of the remedial design process for OU1. EPA completed remedial designs for Zone 1, the WCHC, in the summer of 2016. Zone 1 includes approximately 118 separate

“parcels,” including 111 parcels in the WCHC, three right-of-way parcels, and a school, park, recreation center, and maintenance facilities. EPA sampled all parcels in Zone 1 except a narrow strip of land on the east bank of the Indiana Harbor Canal. In May 2016, EPA received validated sampling results, which revealed lead concentrations in soil up to 24 inches in depth ranged from non-detect (ND) to 91,100 mg/kg for lead. Arsenic concentrations ranged from ND to 3,530 mg/kg (See Attachment V – Summary of OU1 RD Soil Sampling Results). Within Zone 1, a total of 117 parcels exceeded the removal management level (RML) for lead of 400 mg/kg for residential soil and 61 parcels exceeded the RML for arsenic of 68 mg/kg. Each of the parcels that exceeded the RML for arsenic also exceeded the RML for lead. Sample results from surface soils (0-6”) indicated that lead concentrations at 13 parcels in the WCHC exceed 5,000 mg/kg with concentrations up to 45,000 mg/kg.

On July 29, 2016, EPA initiated in-house sampling for dust collection in the WCHC in Zone 1 to determine lead concentrations in homes. EPA was concerned about the elevated levels of lead in surface soils within the WCHC and the likelihood that lead contaminated soil/dust was being tracked or blown into the housing units. EPA prioritized homes for sampling based on residency of sensitive populations and the lead concentration in the soils of the yard. The prioritization process included homes occupied by a child with an elevated blood lead level (EBLL) as determined by reference to records from Indiana State Department of Health (ISDH), and homes with elevated soil lead concentrations in their yards. As of January 9, 2017, EPA had received validated results from 269 residences. Concentrations ranged from 3.9 to 32,000 mg/kg for lead fines and 0.077J (J means the associated value is the approximate concentration) to 880 mg/kg for arsenic fines. Indoor dust results from 110 out of the 269 sampled residences exceeded the EPA screening level of 316 mg/kg for lead for indoor living spaces (See Attachment VII – Indoor Dust Screening Criteria for Lead).

Lead Inspectors from the Indiana State Department of Health (ISDH) accompanied EPA into 28 of the initial 42 residences in Zone 1 and conducted a separate inspection for compliance with lead paint abatement policies. Wipe samples were collected from floors, interior window sills, and window troughs and compared to HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition) (40 µg/ft² - floors, 250 µg/ft² - window sills, and 400 µg/ft² - window trough). Wipe samples from six of the initial 14 units sampled were above the respective lead dust clearance standards (see Attachment VIII - Indiana State Department of Health Wipe Sample Results). Evidence of lead based paint was not found by ISDH in any of the Zone 1 inspected units based on X-Ray fluorescence (XRF) screening of painted surfaces. EPA contractors performed side by side XRF screening of painted surfaces and compared their results with the ISDH’s findings; EPA’s findings were consistent with the findings of ISDH. Following this comparison, EPA contractors continued screening properties with an XRF.

On August 12, 2016, EPA began to clean the inside of residences in the WCHC to remove lead contaminated dust. A combination of HEPA vacuums and wet cleaning were used to remove lead dust from ceilings, floors, carpets, walls, drapes, accessible ductwork, furnace, and furniture. As of November 7, 2016, EPA had cleaned approximately 270 out of 334 occupied units. Residents were temporarily relocated during the cleaning process and clearance sampling was conducted as necessary to document the efficacy of the cleaning.

The Agency for Toxic Substances and Disease Registry (ATSDR) is working with the East Chicago Health Department (ECHD), which is conducting an ongoing exposure investigation of blood lead levels of residents in the WCHC. The following is a summary of the findings from screenings of children living in the WCHC, which is derived from both historical data and the on-going blood lead testing campaign being conducted by ECHD:

- From the most recent ECHD testing in summer 2016, 18 out of 94 (19%) tested children from the WCHC under age six were identified with elevated blood lead (EBL) levels (> 5 $\mu\text{g}/\text{dL}$) based on capillary (finger stick) measurements.
- From 2014 through 2015, 26% of children under age seven tested at the WCHC were identified with EBL levels, with the highest measurement at 33 $\mu\text{g}/\text{dL}$ in a one-year-old child. Within the same period, the census tract that includes all of the children from the WCHC (Zone 1) and part of Zone 2 had an EBL incidence rate of 22%. By comparison, the EBL rates for the two adjacent census tracts were 9% and 11%.
- The ATSDR Exposure Investigation conducted in the West Calumet neighborhood in 1997 showed a 35% EBL incidence rate, which was defined at that time as greater than 10 $\mu\text{g}/\text{dL}$.

These observations by ATSDR, ISDH, and ECHD across almost 20 years demonstrate a consistent pattern of elevated blood lead levels in young children living in OU1. Given that the ISDH Lead Inspectors found no lead-based paint in recently sampled units within the WCHC, it is likely that exposure to soil-based lead contamination in the WCHC and portions of Zone 2 is a principle cause of elevated blood lead levels in children there.

ZONE 2 ACTIONS

Beginning in July 2016, EPA began conducting more extensive soil sampling within Zone 2 as part of the RD process for OU1. Zone 2 includes approximately 590 separate “parcels.” Most of these parcels are residential parcels, though there are some commercial/industrial parcels and some of the residential parcels contain multi-family residences. As of February 7, 2017, EPA has sampled 499 properties in Zone 2, of which 404 properties have results that exceed the RALs for lead (400 mg/kg) and/or arsenic (26 mg/kg). The concentrations in surface soils range from 13 to 17,500 mg/kg for lead and 2.2 to 210 mg/kg arsenic.

In the fourth amendment to the action memorandum, EPA defined priority properties as those with surface (0 – 6 inches) soil values for lead at or above 1,200 mg/kg or arsenic at or above 68 mg/kg. Of the properties that exceeded the RMLs, 47 properties were deemed priorities.

Beginning on November 1, 2016, EPA performed removal actions to excavate and dispose of contaminated soil from those properties where lead and/or arsenic contamination in the top six inches exceeded 1,200 mg/kg or 68 mg/kg, respectively. During the fall 2016 construction season, EPA performed removal actions at 17 properties in Zone 2, including the 10 properties initially identified when the fourth amendment to the action memorandum was signed.

As a part of the larger USS Lead Site response and in conjunction with the 17 soil removal actions performed in the fall of 2016, EPA conducted interior dust sampling in residences at those properties (some properties are multiunit residences) to determine whether contaminated dust was present at concentrations that exceed screening levels established for arsenic and lead based on the August 10, 2016 (lead) and December 13, 2016 (arsenic) recommendations of the EPA-Region 5 toxicologist and in consultation with ATSDR. Dust sampling was conducted in high traffic areas of the interior of a residence to evaluate if contamination has been tracked into the home and whether it may pose a potential health risk. The lead based paint screening procedures, conducted by EPA contractors, were also used at a few homes in Zones 2 and 3 as a part of the interior dust sampling process.

Indoor dust sampling was offered to all Zone 2 priority properties where EPA had performed exterior soil remediation. EPA sampled 30 residences in Zone 2 for dust and identified 15 residences with lead or arsenic levels above the site specific screening values. Interior cleanings were conducted at 14 of those residences (one property owner deferred cleaning to Spring 2017).

ZONE 3 ACTIONS

On October 2, 2016, EPA initiated excavation activities in Zone 3. The excavation activities were performed consistent with the terms of a Consent Decree entered into in 2014 by the federal government, State of Indiana and certain private entities. Property specific design drawings prescribed dig depths for each property based on sampling data generated during the remedial design process. As of December 14, 2016, EPA had completed excavations at 37 priority properties and 1 park (Riley Park) in Zone 3. The work included excavation of the contaminated soil and its replacement with clean dirt fill, topsoil, and sod.

As in Zone 2, EPA offered to perform indoor sampling at all properties in Zone 3 that had their soil remediated. The lead based paint screening procedures, conducted by EPA contractors, were also used at a few homes in Zone 3 as a part of the interior dust sampling process. As of January 9, 2017, 36 priority residences in Zone 3 have had interior dust sampling completed and have validated data. Laboratory results indicated 17 residences exceed the interior dust screening levels of 316 mg/kg for lead and/or 26 mg/kg for arsenic (See Attachment V – Summary of OU1 Interior Dust Sampling Results for Zone 3). This exceedance rate is consistent with the exceedance rates in both Zones 1 and 2. To date, EPA has identified one residence in Zone 3 as having lead based paint inside the structure. EPA intends to perform additional lead based paint screenings during future sampling events.

2. Physical Location

The U.S.S. Lead Site lies approximately 18 miles southeast of Chicago, Illinois, in East Chicago, Indiana (Figure 1). The Site consists of the former U.S.S. Lead facility located at 5300 Kennedy Avenue, East Chicago, Indiana (designated as Operable Unit 2 (OU2)) and the residential area to the north and northeast (defined as OU1). OU1 is bound by East Chicago Avenue on the north, East 151st Street/149th Place on the south, the Indiana Harbor Canal on the west, and Parrish Avenue on the east. OU1 includes about 1200 homes, a small number of parks, open space as a part of the railroad right-of-way, schools, and public buildings. For the purpose of implementing

the remedial action (RA) in OU1, EPA has divided OU1 into three distinct geographic areas (Zones 1, 2, and 3). The actions authorized by this fifth amendment are taking place in OU1, Zones 2 and 3. Zone 2 is generally bordered: (1) on the north by Chicago Avenue; (2) on the east, by Elgin, Joliet Railroad; (3) on the south by East 151st Street; and (4) on the west by: (i) the Indiana Harbor Canal between Chicago Avenue and the northern boundary of the Carrie Gosch Elementary School; (ii) the eastern-most edge of a north/south utility right of way that runs parallel to McCook Avenue until East 149th Place, and (iii) McCook Avenue between East 149th Place and 151st Street. Zone 3 is adjacent to and directly east of Zone 2 and is generally bordered: (1) on the north by East Chicago Avenue; (2) on the east by Parrish Ave; (3) on the south by East 149th Street; and (4) on the west by the Elgin, Joliet Railroad.

The EPA conducted an EJ analysis for the Site (see Attachment I). Screening of the surrounding area was conducted using Region 5's EJ Screen Tool. Region 5 has reviewed environmental and demographic data for the area surrounding the U.S.S. Lead Site and has determined there is high potential for EJ concerns at this location.

3. Site Characteristics

OU1 includes about 1,200 homes, a small number of parks, open space as a part of the railroad right-of-way, schools, and public buildings. OU1 is primarily a residential area, which includes commercial and light industrial areas. Some parcels in the residential area in Zones 1, 2 and 3 have levels of lead in soils above EPA's RML of 400 mg/kg and arsenic above the RML of 68 mg/kg. Indoor dust sampling of residential properties in OU1 has lead and arsenic dust values above the site specific screening level.

United States Geological Survey (USGS) historical aerial photographs from 1939, 1951, 1959, and 2005 show OU1 over time. Review of these aerial photographs indicates that most of the residential neighborhoods within the Site west of the railroad tracks were built before 1939. By 1951, approximately 75 to 80 percent of the homes were built; by 1959, most of the homes east of the railroad tracks had also been built. These photographs also show that the International Smelting and Refining Company, a subsidiary of the Anaconda Copper Company (whose successor in interest is now the Atlantic Richfield Company [ARC]) occupied the area where the WCHC is currently located (Zone 1 in the southwest portion of OU1) prior to 1946. Title records indicate that the East Chicago Housing Authority constructed the WCHC on the former Anaconda Copper Mining Company/International Smelting and Refining Company site between 1970 and 1973.

The U.S.S. Lead facility was a primary and secondary smelter of lead. It began operations around 1906 and ended operations in 1985. From about 1920 until 1973, the facility was a primary smelter of lead but also conducted secondary smelting operations. The primary smelting operations included a refining process to create high quality lead free of bismuth. From 1973 until its closure in 1985, the facility was exclusively a secondary smelter. The secondary refinery operations included: battery breaking with tank treatment of spent battery acid at a rate of 16,000 gallons per day; baghouse dust collection with storage in on-site waste piles of up to 8,000 tons of flue dust; and blast furnace slag disposal, which was deposited in the wetland adjacent to and along the southern boundary of the facility (OU2). The blast-furnace baghouse

collected approximately 300 tons of baghouse flue dust per month during maximum operating conditions. Some of the flue dust escaped the baghouse capture system and was deposited by the wind within the boundaries of OU1. Secondary lead recovery operations ceased in 1985.

In addition to the U.S.S. Lead facility operation, other industrial operations have managed or processed lead and other metals and are likely sources of contamination in OU1. Immediately east of the U.S.S. Lead facility and south of Zone 3 is the former DuPont site (currently leased and operated by W.R. Grace & Co., Grace Davison). One of the processes that historically took place at the DuPont site was the manufacturing of a lead arsenate pesticide. In 2015, DuPont spun off certain assets and liabilities to a newly created company, The Chemours Company FC, LLC (Chemours). Chemours is now the owner of the former DuPont facility.

North of the former U.S.S. Lead facility stood two lead processing operations, which processed lead and other metals. A 1930 Sanborn map identifies the operations as Anaconda Lead Products and International Lead Refining Company (referred to as the former Anaconda facility). Anaconda Lead Products was a manufacturer of white lead and zinc oxide and the International Lead Refining Company was a metal refining facility. These facilities consisted of a pulverizing mill, white lead storage areas, a chemical laboratory, a machine shop, a zinc oxide experimental unit building and plant, a silver refinery, a lead refinery, a baghouse, and other miscellaneous buildings and processing areas. The International Lead Refining Company was a subsidiary of the Anaconda Copper Mining Company. Title to the property in Zone 1 was held between 1934 and 1946 by International Lead Smelting and Refinery Company. International Lead Smelting and Refinery Company acquired title to the property in Zone 1 in 1934 from International Lead Refining Company, which had acquired title in 1912.

The residential area that comprises Zones 2 and 3 has been contaminated by the deposition of contaminants from the U.S.S. Lead facility, Anaconda Copper Mining Company/International Lead Smelting and Refinery Company facility, and DuPont/Chemours facility. The focus of this time-critical removal action is two-fold: The first focus is the removal of exterior lead and/or arsenic contaminated soils from two additional categories of priority properties: (1) residences where sensitive populations (i.e., pregnant women and/or children 6 years of age and under) live *and* the top six inches of soil associated with the residence has lead in excess of 400 mg/kg; (2) residences where a child has a blood lead level above 10 ug/dL and the top 24 inches of soil associated with the residence has lead in excess of 400 mg/kg. The second focus is the interior sampling and cleaning of residences in Zones 2 and 3 that have associated soils which require or required remediation. Approximately 81% of the properties in Zone 2 and 51% of the properties in Zone 3 require or required soil remediation. Based on data generated during work performed during the 2016 construction season, EPA anticipates that 50% of residences in both Zones 2 and 3 which require exterior soil remediation will also require interior cleaning.

4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

The threat is presented by the presence of lead and arsenic-contaminated soil in residential yards and lead and arsenic contaminated dust within some of the residences in Zones 2 and 3. The presence of lead and arsenic in outdoor soils and in indoor dust at concentrations above health

screening values provides a constant source of exposure for individuals both outside and while in the home. Lead and arsenic are hazardous substances as defined by section 101(14) of CERCLA. *See* 40 C.F.R. § 302.4. Nearby lead processing operations caused extensive lead and arsenic contamination in soils throughout the Site. This removal is responding to actual and potential outdoor lead and arsenic contamination, as well as potential indoor contamination caused by the migration of lead and arsenic contaminated soil from outdoors to indoors (like the source of contamination found in Zone 1). The presence of elevated lead and arsenic levels in surface soils and potential presence of lead and arsenic in indoor dust in Zones 2 and 3 makes this a time-critical removal action.

Exposure may occur from direct ingestion of soil in yards, soil tracked indoors, or house dust; and inhalation of fugitive dust. Potential human receptors include residents, including children six years of age and under, and pregnant or nursing women.

Lead exposure via inhalation and/or ingestion can have detrimental effects on almost every organ and system in the human body. Exposure may occur from direct ingestion of soil in yards, soil tracked indoors (house dust), and inhalation of fugitive dust. Lead can cause a variety of health problems to people who are exposed to it. Potential human receptors include residents, with a particular concern for children six years of age and under and pregnant or nursing women. Children are at greatest risk from the toxic effects of lead. Initially, lead travels in the blood to the soft tissues (heart, liver, kidney, brain, etc.). Then, it gradually redistributes to the bones and teeth where it tends to remain. Children exposed to high levels of lead have exhibited nerve damage, liver damage, colic, anemia, brain damage, and death. The most serious effects associated with markedly elevated blood lead levels include neurotoxic effects such as irreversible brain damage.

Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of “pins and needles” in hands and feet. Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small “corns” or “warts” on the palms, soles, and torso. Skin contact with inorganic arsenic may cause redness and swelling. Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cancer and cancer in the liver, bladder, and lungs. Inhalation of inorganic arsenic can cause increased risk of lung cancer. The Department of Health and Human Services (DHHS) and the EPA have determined that inorganic arsenic is a known human carcinogen (ATSDR, Chemical Abstract Services [CAS] # 7440-38-2], August 2007).

5. NPL status

The U.S.S. Lead Site consisting of both the former U.S.S. Lead facility (OU2) and the Calumet neighborhood to the north (OU1) was listed as a Superfund site on the National Priorities List (NPL) on April 8, 2009. EPA began the RI for OU1 on June 26, 2009. During December 2009 and August 2010, EPA contractors sampled yards in residential areas and background locations. In June 2012, EPA completed a preliminary remedial investigation and feasibility study to determine the level and extent of lead and arsenic contamination within OU1 and proposed a

remedy. In November 2012, after considering comments received from the City and IDEM, EPA outlined the long-term permanent cleanup plan in a Record of Decision for OU1. EPA has completed the remedial designs for work in Zone 1 and most of Zone 3. EPA is in the process of completing the remedial designs for Zone 2.

6. Maps, pictures and other graphic representations

Maps include:

Figure 1 – USS Lead and Lead Refinery, E. Chicago, IN. Location Map

Figure 2 – OU1 Zones 1, 2, and 3 – Location Map

B. Other Actions to Date

On January 22, 2008, EPA signed the original action memorandum to conduct a time-critical removal action in OU1 to address known parcels with lead levels that exceeded the removal action limit of 1,200 mg/kg. These parcels were identified based on sampling data collected during the RCRA Corrective Action investigation. That removal action began on June 9, 2008, and involved the excavation and off-site disposal of lead contaminated soil from 13 residential parcels. On August 13, 2008, EPA amended the original action memorandum to increase the project ceiling in order to complete the ongoing, time-critical removal action. In total, 1,838 tons of lead-contaminated soil were removed and disposed of at an approved landfill. Excavated areas were backfilled with clean fill and seeded. This removal action was completed on September 25, 2008, and the final Pollution Report was issued on November 18, 2008.

On September 12, 2011, EPA signed a second amendment to the action memorandum – which is an extension of the original memorandum - to conduct a time-critical removal action in Zones 1, 2, and 3 of OU1 to address 16 parcels (including the 2 that were missed in 2008) with lead levels exceeding the removal action limit of 1,200 mg/kg. These parcels were identified based on sampling data collected during the RI. This removal action began on October 24, 2011, and involved the excavation and off-site disposal of lead contaminated soil from 16 residential parcels. In total, 1,913 tons of lead-contaminated soil were removed and disposed of at an approved landfill. Excavated areas were backfilled with clean fill and seeded. This removal action was completed on December 9, 2011, and the final Pollution Report was issued on December 15, 2011.

On August 2, 2016, and continuing throughout the month of August, verbal authorizations were provided for emergency removal actions within the West Calumet Housing Complex for the purpose of conducting indoor home cleanings and the temporary relocation of residents during the cleanings. On September 20, 2016, EPA approved a third amendment to the action memorandum. The third amendment authorized the continuation of the activities within the WCHC.

On October 2, 2016, pursuant to the Consent Decree referenced above, EPA started excavation activities at 38 high priority properties in Zone 3 of OU1. As of December 14, 2016, 31 properties in Zone 3 have been excavated, backfilled and fully restored. An additional 7

properties in Zone 3 have been excavated and backfilled, but will require sod placement in the Spring of 2017.

On October 28, 2016, EPA signed a fourth amendment to the action memorandum to conduct a time-critical soil removal actions in Zone 2 for priority properties. On November 1, 2016, soil excavations commenced in Zone 2 on 17 properties. By December 14, 2016, all 17 properties in Zone 2 were excavated, backfilled and fully restored

As a part of the soil removal work in Zones 2 and 3, EPA conducted interior dust sampling to determine whether contaminated dust is present at concentrations that exceed screening levels established for arsenic and lead based on the August 10, 2016 (lead), and December 13, 2016 (arsenic) recommendations of EPA's toxicologist. In Zone 2, 15 of the 30 residences that were sampled had results that exceed the screening levels. Pursuant to the fourth amendment, EPA completed cleaning 14 of these 15 by the end of 2016 (one property owner deferred cleaning to Spring 2017). As of January 9, 2017, 17 of the 36 sampled residences in Zone 3 have results that exceed the screening levels (3 residences exceeded for arsenic only and 14 residences for lead or both lead and arsenic).

C. State and Local Authorities' Roles

1. State and Local Actions to Date

On August 24, 2016, Rex Osborn, Federal Programs Section Chief with IDEM, sent an email that indicated the State of Indiana does not have the financial resources to eliminate the threat posed by lead-contaminated soil in yards and lead-contaminated dust within the residences, or to fund temporary relocations. Neither the State of Indiana nor the City of East Chicago have taken or have the capacity to take action to abate the immediate threat.

2. Potential for Continued State/Local Response

The EPA is working with ATSDR, the East Chicago Health Department, the Indiana State Department of Health, and City of East Chicago elected officials to provide information to the public. EPA is coordinating discussions with stakeholders regarding the elevated levels of lead and arsenic in soil and dust, as well as EPA's plans to address these issues. Neither the state nor local officials have the resources to conduct the necessary cleanup of the indoor dust contamination or to provide for the temporary relocation of residents.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

The conditions at Zones 2 and 3 of the U.S.S. Lead Site present a threat to the public health or welfare and the environment and meet the criteria for a time-critical removal action as provided for in the NCP, 40 C.F.R. § 300.415(b)(1), based on the factors in 40 C.F.R. § 300.415(b)(2). These factors include, but are not limited to, the following:

§ 300.415(b)(2)(i) - Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

On October 2, 2016, EPA commenced excavation activities in Zone 3 to remove contaminated soil from high priority properties. To date, EPA has identified 250 properties above the remedial action level in Zone 3. In 2016, EPA remediated the soil in 38 high priority properties in Zone 3 (37 residential and 1 park). EPA conducted indoor dust sampling in conjunction with the yard excavations to fully evaluate the extent of contamination and to determine if exterior soils have migrated into homes. As of January 9, 2017, EPA has validated dust samples at 36 residential properties in Zone 3. Of the 36 residences, EPA has determined that 17 have levels above the established screening values (316 mg/kg for lead [fine fraction dust] and 26 mg/kg for arsenic [fine fraction]). Three residences had only arsenic values above the screening level with values ranging from 33 to 310 mg/kg. Fifteen residences exceeded the screening levels for lead or both lead and arsenic with lead values ranging from 330 to 1,200 mg/kg (attachment V).

Similarly, in 2016 EPA performed removal actions at 17 properties in Zone 2 and sampled 30 residences at those properties for lead and/or arsenic contaminated dust. EPA identified 15 residences with lead or arsenic levels above the site specific screening values. Interior cleanings were conducted at 14 of those residences (one property owner deferred cleaning to Spring 2017).

EPA expects to find similar exceedance rates in the interior of the remaining properties that still require outdoor soil remediation. High lead or arsenic concentrations in indoor dust are a risk to human health, particularly for children under the age of seven, because the contaminated dust may be ingested or an occupant or visitor may come into direct contact with the contaminated dust.

Pursuant to this fifth amendment, EPA is defining priority properties for the purposes of time-critical removal action as those with one or more of the following present: (1) surface soil (0-6 inches) with lead concentrations at or above 1,200 mg/kg and/or arsenic concentrations at or above 68 mg/kg, (2) residences with sensitive populations (children under 7 years of age and/or pregnant women) and surface soils (0-6 inches) with lead concentrations in excess of 400 mg/kg, and (3) children residing at a residence with blood lead levels at or above 10 µg/dL. Of the 404 Zone 2 properties with soil results that exceed the RALs, 72 have been identified as priority properties under this fifth amendment. 34 properties in Zone 2 have surface soils at 1,200 mg/kg or greater for lead and/or 68 mg/kg for arsenic, and 38 residential properties in Zone 2 have surface soils at 400 mg/kg or greater for lead and with sensitive populations present.

Lead is a hazardous substance, as defined by Section 101(14) of CERCLA. The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in the body. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant

women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

Arsenic is a hazardous substance under CERCLA and may be ingested or inhaled by residents living at the Site. Acute (short-term) high-level inhalation exposure to arsenic dust or fumes has resulted in gastrointestinal effects (nausea, diarrhea, abdominal pain); central and peripheral nervous system disorders have occurred in workers acutely exposed to inorganic arsenic. Chronic (long-term) inhalation exposure to inorganic arsenic in humans is associated with irritation of the skin and mucous membranes and effects in the brain and nervous system. Chronic oral exposure to elevated levels of inorganic arsenic has resulted in gastrointestinal effects, anemia, peripheral neuropathy, in humans. Chronic exposure by the inhalation route has been shown to cause a form of skin cancer and also to cause bladder, liver, and lung cancer. EPA has classified inorganic arsenic as a human carcinogen.

§ 300.415(b)(2)(vii) - The availability of other appropriate federal or state response mechanisms to respond to the release;

At this time, no local or state agency has the resources to respond to the immediate threat.

IV. EXEMPTION FROM STATUTORY LIMITS

Section 104(c) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), limits a removal action to 12 months and \$2 million unless continued response actions are immediately required to prevent, limit or mitigate an emergency (i.e., the emergency exemption) or is appropriate and consistent with the remedial action to be taken (i.e., the consistency exemption). This removal action continues to meet the exemption criteria stated in the Fourth Action Memorandum Amendment transmitted from Region 5 to EPA Headquarters on October 24, 2016, and signed by the Assistant Administrator of the Office of Land and Emergency Management on October 28, 2016: there is an immediate risk to public health or welfare or the environment; continued response actions are immediately required to prevent, limit, or mitigate an emergency; and assistance will not otherwise be provided on a timely basis.

V. ENDANGERMENT DETERMINATION

Given the Site conditions, the nature of the known and suspected hazardous substances on-site, and the potential exposure pathways described in Sections II. and III. above, actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response actions selected in this Memorandum, may present an imminent and substantial endangerment to public health, welfare, or the environment.

VI. PROPOSED ACTIONS

The response actions described in this memorandum directly address actual or potential releases of hazardous substances on Site that pose an imminent and substantial endangerment to public health, welfare, or the environment.

The actions proposed for authorization in this memo are twofold. The first is to authorize indoor actions including indoor sampling and indoor cleaning in Zones 2 and 3. These indoor actions are consistent with interior work currently approved in the Fourth Amendment except that: (1) the interior screening level for arsenic has been lowered from 100 mg/kg to 26 mg/kg; and (2) based on the knowledge that EPA gained in the fall 2016 cleaning, temporary relocation as an option during interior cleanings can be more carefully circumscribed. While the fourth amendment authorized EPA to temporarily relocate residents to undertake cleaning, EPA did not in fact have to do so. Thus, EPA has determined that temporary relocation of residents during cleanings in either Zone 2 or Zone 3 should be considered only on a case-by-case basis and only where compelling circumstances justify the need to relocate the resident(s) during the cleaning and the cleaning cannot be effectuated without the temporary relocation.

The second action proposed for authorization is soil removal actions at properties in Zone 2 beyond those authorized in the Fourth Amendment.

EPA may seek an additional ceiling request if the cost estimate provided in this action memorandum proves to be inaccurate.

Exterior Soil Removal Actions

The fourth amendment to the action memorandum authorized the excavation and removal of lead and arsenic-contaminated soils at residential parcels within Zone 2 with surficial soil concentrations at or above 1,200 mg/kg for lead and/or at or above 68 mg/kg for arsenic. This fifth amendment to the action memorandum expands the definition of priority property to include properties within Zone 2 with (1) surficial soil concentrations at or above 400 mg/kg for lead if a member of a sensitive population (e.g., pregnant women, children under the age of 7) resides at that property; and (2) lead soil concentrations in the first 24 inches bgs at or above 400 mg/kg if a child residing at the property has a blood lead level at or above 10 ug/dL. The response actions are consistent with the (OSWER) Publication 9285.7-50 *Superfund Lead-Contaminated Residential Sites Handbook* (Handbook) (2003), where the Superfund Program uses a tiered approach to prioritize which soils need to be cleaned up first. The two categories added by this Fifth Amendment are prioritized for immediate action under a time-critical removal action in the same manner as residential parcels with lead concentrations in surface soil at or greater than 1,200 mg/kg.

For cost accounting purposes, EPA has identified a total of 72 properties in Zone 2 which require time-critical removal action: 34 properties have surficial soils with lead concentrations at or greater than 1,200 mg/kg and/or arsenic concentrations at or greater than 68 mg/kg, and 38 residential properties have surficial soils with lead concentrations at or greater than 400 mg/kg where a sensitive population also resides. (EPA is not aware at this time of any properties where a child with blood lead levels at or above 10 µg/dL resides where lead soil concentrations exist in the top 24 inches bgs at or above 400 mg/kg.) These properties were identified based on the latest validated remedial design data for Zone 2 and information collected when securing access agreements. The actual number of properties subject to removal action may change due to additional properties being sampled, or more information being gathered about where sensitive

populations or children with elevated blood lead levels currently live, or additional sensitive populations/children with elevated blood lead levels moving into a Zone 2 residence.

Removal activities associated with the excavation of lead and/or arsenic contaminated soil from properties in Zone 2 will include:

1. Development of site plans, including a Work Plan, Sampling Plan/QAPP, site-specific HASP, and Emergency Contingency Plan;
2. Development of an air monitoring plan and conduct dust control measures to ensure worker and public health protection;
3. Provision for site security measures as necessary;
4. Excavation of soil at parcels where lead in the top six inches of soil is equal to or exceeds 1,200 mg/kg and/or arsenic is equal to or exceeds 68 mg/kg, as determined by EPA's RD sampling. Soil will be excavated to a depth of approximately two feet bgs, to eliminate any direct contact and inhalation threats. Excavated material that fails toxicity characteristic leaching procedure (TCLP) for lead may be treated with a fixation agent prior to disposal. Excavation will cease if lead and/or arsenic concentrations are less than 400 mg/kg for lead and 26 mg/kg for arsenic;
5. Excavation of soil at residential parcels where lead in the top six inches is equal to or exceeds 400 mg/kg, as determined by EPA's RD sampling, and where a member of a sensitive population resides (children 6 years old and under or a pregnant woman). Soil will be excavated to a depth of approximately two feet bgs, to eliminate any direct contact and inhalation threats. Excavated material that fails toxicity characteristic leaching procedure (TCLP) for lead may be treated with a fixation agent prior to disposal. Excavation will cease if lead and/or arsenic concentrations are less than 400 mg/kg for lead and 26 mg/kg for arsenic;
6. Excavation of soil at residential parcels where lead in the top twenty-four inches is equal to or exceeds 400 mg/kg, as determined by EPA's RD sampling, and where a child with a blood lead level of 10 ug/dL or greater resides. Soil will be excavated to a depth of approximately two feet bgs, to eliminate any direct contact and inhalation threats. Excavated material that fails toxicity characteristic leaching procedure (TCLP) for lead may be treated with a fixation agent prior to disposal. Excavation will cease if lead and/or arsenic concentrations are less than 400 mg/kg for lead and 26 mg/kg for arsenic;
7. Collection and analysis of confirmation samples from the bottom of each excavation. If lead levels below 400 mg/kg or arsenic levels below 26 mg/kg cannot be achieved at an excavation depth of approximately two feet bgs, excavation will cease and a visible barrier will be placed at the bottom of the excavation to alert the property owner of the existence of high levels of lead and/or arsenic. In such instances and consistent with the Record of Decision, institutional controls (ICs) will be implemented as part of the

remedial action to ensure the users of the property are not exposed to the contaminants of concern in soil;

8. Replacement of excavated soil with clean soil, including 6 inches of top soil to maintain the original grade. Each yard will be restored as close as practicable to its pre-removal condition. Once the parcels are sodded or seeded, removal site control of the sod or seed, including, watering, fertilizing, and cutting, will be conducted for 30 days. After the initial 30-day period, property owners will be responsible for the maintenance of their own yards. The aforementioned work shall be documented in a Work Plan;
9. Transportation and disposal off-site of any hazardous substances, pollutants and contaminants at a CERCLA-approved disposal facility in accordance with EPA's Off-Site Rule (40 CFR § 300.440); and
10. Performance of any other response actions to address any release or threatened release of a hazardous substance, pollutant or contaminant that the EPA On-Scene Coordinator (OSC) determines may pose an imminent and substantial endangerment to the public health or the environment.

These removal activities prioritize imminent risks associated with high levels of soil lead contamination and are consistent with the *Superfund Lead-Contaminated Residential Sites Handbook* (2003), with current Removal Management Levels, and with Office of Land and Emergency Management Directive 9200.2-167. EPA will continue to review the protectiveness of any actions performed consistent with the remedy selected in the Record of Decision, in a manner consistent with EPA policies and guidance and EPA's obligations under 42 U.S.C. § 9621(c).

Interior Dust Removal Actions

Data results from the first 30 residences in Zone 2 sampled for indoor dust indicate that 15 of those residences exceed the EPA screening level of 316 mg/kg for lead and/or 26 mg/kg for arsenic. Similarly, data results from the first 36 residences in Zone 3 sampled for indoor dust indicate that 17 residences of those residences exceed the EPA screening level of 316 mg/kg for lead and/or 26 mg/kg for arsenic. These exceedance rates are consistent with the exceedance rate for residences in Zone 1, where it was determined that lead-based paint was not a contributing source to indoor dust contamination. Given the significant number of indoor dust samples from Zones 2 and 3 that exceed the screening levels, given the threat posed by high concentrations of lead or arsenic in soil in adjacent outdoor areas, and given the consistent pattern of EBL levels in children less than 6 years of age living in WCHC and portions of Zone 2, action is needed.

At all residences where soil remediation is required, EPA will offer to test indoor dust for lead and arsenic. EPA will also screen the residence for lead-based paint using an XRF. Indoor sampling/screening (and any necessary follow-up cleaning, as described below) will be offered after soil excavations to prevent potential recontamination to the dwelling. For residences that qualify for indoor cleaning by EPA, EPA will also take post-cleaning samples and compare these to World Trade Center (WTC) dust loading values to determine the efficacy of the cleaning.

(World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks; May 2003.)

EPA will offer to clean the inside of residences where indoor sampling results exceed the risk-based screening criteria if soils associated with those residences exceeded the remedial actions levels and have been remediated. A combination of HEPA vacuums and/or wet cleaning will be used to remove contaminated dust from floors, carpeting, upholstery, surfaces, and readily accessible elements of HVAC systems. EPA may also clean and/or replace HVAC and AC unit filters. Replacement of carpets/mats may be considered on a case-by-case basis if cleaning mechanisms fail to result in or, based on experience, will likely fail to result in, lead and arsenic loading numbers that are below the WTC cleanup efficacy criteria. EPA may re-clean a residence if post-cleaning samples are above the WTC dust loading values. However, EPA will not re-clean any residence where indoor sampling/screening indicates the presence of lead-based paint.

EPA will not temporarily relocate any residents during interior cleanings in Zones 2 or 3 unless, on a case-by-case basis, compelling circumstances justify the need to relocate the resident during the cleaning and the cleaning cannot be effectuated without the temporary relocation.

Given the risk of tracking and cross contamination from lead or arsenic contaminated soils identified at private properties and commonly used public properties, including Riley Park and Kennedy Gardens Park, EPA will also perform indoor dust sampling/lead paint screening at other Zone 2 and Zone 3 residences when specifically requested by residents. If indoor sampling results exceed the risk-based screening criteria, EPA will offer the resident the use of a HEPA vacuum for cleaning.

For cost accounting purposes, EPA anticipates the scope of these indoor removal actions in Zones 2 and 3 to include (1) approximately 700 to 800 residences for indoor sampling; and (2) approximately 350 to 400 residences for indoor cleaning. The interior sampling figures are based on an approximation of the number of residences associated with approximately 600 properties in Zones 2 and 3 that have exterior soil contamination that exceeds the RALs. The interior cleaning figures are 50% of the interior sampling figures based on past history. The past history is a relatively small data set, and the actual number of residences that require indoor cleaning may increase as more data is collected. This may result in additional ceiling increase requests.

Removal activities associated with indoor sampling, evaluation, and removal of contaminated dust in Zone 2 and Zone 3 homes will include:

1. Development and implementation of an indoor sampling/screening plan;
2. Development of a Work Plan and Site Specific Health and Safety Plan, including plans for indoor cleaning;
3. Provision for Site security, as directed by the OSC or RPM;

4. Performance of indoor cleaning as specified in the Site Work Plan;
5. On a case-by-case basis and only upon a showing of a compelling circumstances where the cleaning cannot otherwise be effectuated, temporary relocation of a resident(s) during the indoor cleaning; and
6. Transportation and disposal off-site of any hazardous substances, pollutants and contaminants at a CERCLA-approved disposal facility in accordance with EPA's Off-Site Rule (40 CFR § 300.440).

The Action Memorandum and supporting documentation follow the April 2002 Superfund Response Actions: Temporary Relocations Implementation Guidance, particularly in considering residents' needs, property security, dealing with residents' stress and disruptions, and explaining benefits. Consistent with EPA's guidance on temporary relocations (2002), Sec. IV.A ("Making the Relocation Decision"), temporary relocation at the Site is justified during the cleaning process by the following factor:

- Efficiency of response action: temporary relocation minimizes concerns about noise, property access, and other restrictions on the hours or types of response activities that may be conducted at the Site.

Both the exterior and interior removal actions will be conducted in a manner not inconsistent with the NCP.

The threats posed by uncontrolled substances considered hazardous meet the NCP criteria listed at § 300.415(b), and the response actions proposed herein are consistent with the remedial action to be taken.

Off-Site Rule

All hazardous substances, pollutants, or contaminants removed off-site pursuant to this removal action for treatment, storage, and disposal shall be treated, stored, or disposed of at a facility in compliance, as determined by EPA, with the EPA Off-Site Rule, 40 C.F.R. § 300.440.

1. Contribution to remedial performance

The proposed action should not impede future remedial performance.

2. Engineering Evaluation/Cost Analysis (EE/CA)

Not Applicable

3. Applicable or relevant and appropriate requirements (ARARs)

All applicable or relevant and appropriate requirements (ARARs) will be complied with to the extent practicable. On August 18, 2016, EPA sent an e-mail to Rex Osborn of IDEM asking for any State of Indiana ARARs that may apply. IDEM provided both Action and Chemical specific

state ARARs in a letter dated August 26, 2016. EPA will consider and implement the submitted ARARs as appropriate.

Project Schedule

The time-critical removal actions will require approximately 528 working days to complete.

B. Removal Project Ceiling Estimate – Extramural Costs:

The detailed cleanup contractor cost is presented in Attachment 1 and the Independent Government Cost Estimate is presented in Attachment IV. Estimated project costs are summarized below:

REMOVAL ACTION PROJECT CEILING ESTIMATE

<u>Extramural Costs</u>	<u>Current Ceiling</u>	<u>Proposed Increase</u>	<u>Proposed Ceiling</u>
<u>Regional Removal Allowance Costs</u>			
Total Cleanup Contractor Costs (This costs category includes estimates for ERRS, subcontractors, Notices to Proceed, and Interagency Agreements with Other Federal Agencies and 20% Contingency)	\$29,009,457	\$1,359,154	\$30,368,611
<u>Other Extramural Costs Not funded from the Regional Allowance</u>			
Total START including multiplier costs	\$4,547,250	\$1,127,500	\$5,674,750
<u>Subtotal</u>			
Subtotal Extramural Costs	\$33,556,707	\$2,486,654	\$36,043,361
Extramural Costs Contingency (20% of Subtotal, Extramural Costs rounded to nearest thousand for Proposed Increase)	\$6,711,341	\$497,331	\$7,208,672
TOTAL REMOVAL ACTION PROJECT CEILING	\$40,268,048	\$2,983,985	\$43,252,033

The response actions described in this memorandum directly address the actual or threatened release of hazardous substances, pollutants, or contaminants at the Site, which may pose an imminent and substantial endangerment to public health or welfare or to the environment. These response actions do not impose a burden on affected property disproportionate to the extent to which that property contributes to the conditions being addressed.

VII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Given the Site conditions, the nature of the hazardous substances and pollutants or contaminants documented in Zones 2 and 3 of OU1, and the potential exposure pathways to nearby populations described in Section II. and Section III., above, actual or threatened releases of hazardous substances and pollutants or contaminants from this Site, if not addressed by implementing the response actions selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, welfare, or the environment.

VIII. OUTSTANDING POLICY ISSUES

None.

IX. ENFORCEMENT

For administrative purposes, information concerning the enforcement strategy for this Site is contained in the Confidential Enforcement Addendum.

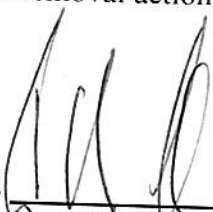
The total EPA costs of this removal action based on full-cost accounting practices that will be eligible for cost recovery are estimated to be \$71,929,729¹.

$$(\$43,252,033 + \$2,000,000) + (61.96\% \times \$45,252,033) = \$73,290,193$$

¹ Direct Costs include direct extramural costs and direct intramural costs. Indirect costs are calculated based on an estimated indirect cost rate expressed as a percentage of site specific direct costs, consistent with the full cost accounting methodology effective October 2, 2000. These estimates do not include pre-judgement interest, do not take into account other enforcement costs, including Department of Justice costs, and may be adjusted during the course of a removal action. The estimates are for illustrative purposes only and their use is not intended to create any rights for responsible parties. Neither the lack of a total cost estimate nor deviation of actual total costs from this estimate will affect the United States right to cost recovery.

X. RECOMMENDATION

This decision document, along with the Action Memorandum signed on January 22, 2008, and the Action Memorandum Amendments signed on August 13, 2008, September 12, 2011, October 13, 2016, and October 28, 2016, represents the selected removal action for the U.S. Smelter and Lead Refinery Site, Zone 3, OU1, East Chicago, Lake County, Indiana. This removal action is developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision is based upon the Administrative Record for the Site (Attachment II). Conditions at OU1, Zones 2 and 3 meet the NCP Section 300.415(b) criteria for a removal action and the CERCLA Section 104(c) emergency exemption from the \$2 million and 12-month statutory limitations. The total removal action project ceiling, if approved, will be \$43,252,033 of which as much as \$35,343,361 may be used from the removal allowance. I recommend your approval of the proposed removal action. You may indicate your decision by signing below.

APPROVE  DATE: 3/14/2017
Barry N. Breen, Acting Assistant Administrator
Office of Land and Emergency Management

DISAPPROVE _____ DATE: _____
Barry N. Breen, Acting Assistant Administrator
Office of Land and Emergency Management

Enforcement Addendum

Figures:

- Figure 1 – USS Lead and Lead Refinery, E. Chicago, IN. Location Map
- Figure 2 – OU1 Zones 1, 2, and 3– Location Map

Attachments:

- I. Environmental Justice Analysis
- II. Administrative Record Index
- III. Detailed Cleanup Contractor Estimate
- IV. Independent Government Cost Estimate
- V. Summary of OU1 RD Soil Sampling Results
- VI. Indoor Dust Screening Criteria for Lead
- VII. Indoor Dust Screening Criteria for Arsenic
- VIII. Fourth Amended Action Memorandum dated October 13, 2016

cc: Brian Schlieger, U.S. EPA, 5104A/B517F (**Schlieger.Brian@epa.gov**)
Lindy Nelson, U.S. DOI, **w/o Enf. Addendum** (**Lindy_Nelson@ios.doi.gov**)
Rex Osborn, IDEM **w/o Enf. Addendum** (**rosborn@idem.in.gov**)

BCC PAGE HAS BEEN REDACTED

**NOT RELEVANT TO SELECTION
OF REMOVAL ACTION**

**ENFORCEMENT ADDENDUM
HAS BEEN REDACTED – FOUR PAGES**

**ENFORCEMENT CONFIDENTIAL
NOT SUBJECT TO DISCOVERY
FOIA EXEMPT**

**NOT RELEVANT TO SELECTION
OF REMOVAL ACTION**

Figure 1
Site Location
USS Smelter and Lead Refinery, East Chicago, IN

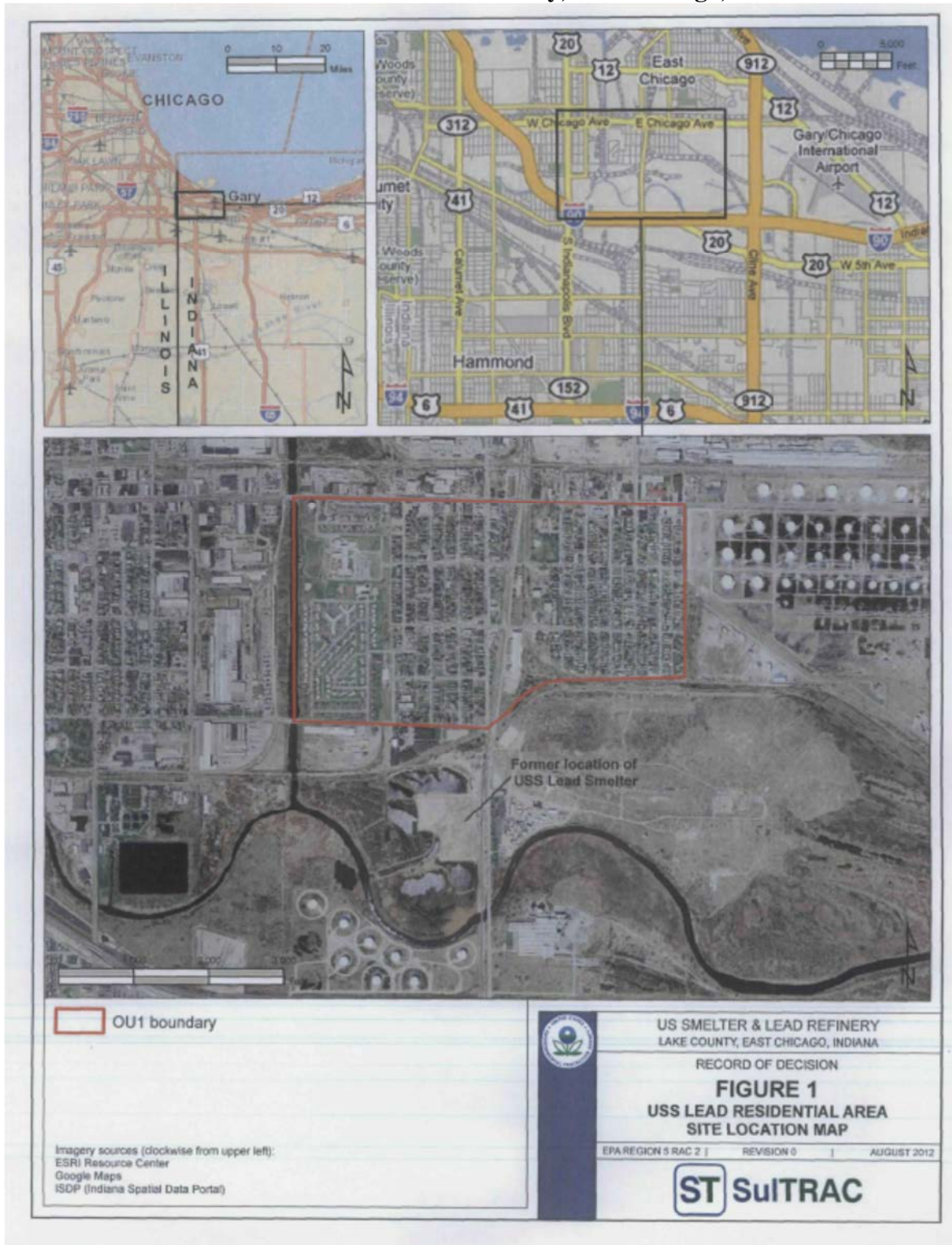


FIGURE 2
Zone 3/OU1 MAP
U.S. Smelter and Lead Refinery Site, East Chicago, Lake County, Indiana



ATTACHMENT I

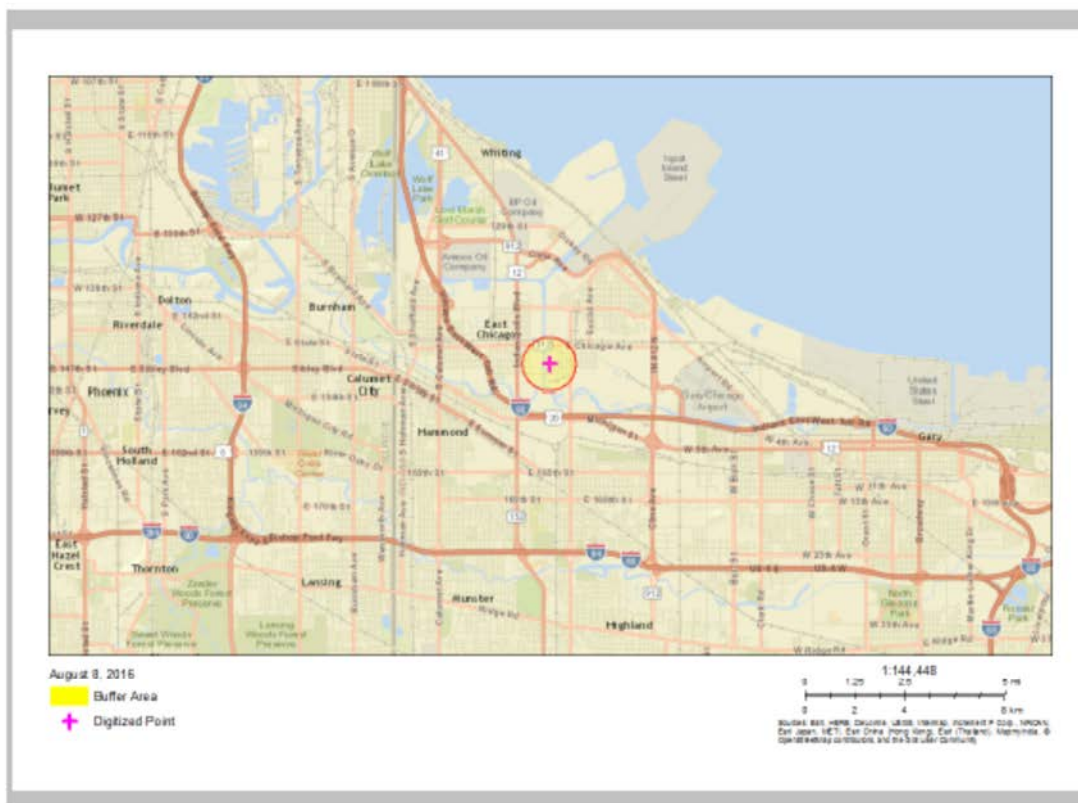
**U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION**

**ENVIRONMENTAL JUSTICE ANALYSIS
FOR
U.S. SMELTER AND LEAD REFINERY SITE, EAST CHICAGO, LAKE COUNTY,
INDIANA**

0.5 mile Ring Centered at 41.623974,-87.469228, INDIANA, EPA Region 5

Approximate Population: 2,455

Input Area (sq. miles): 0.79



Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	0
National Pollutant Discharge Elimination System (NPDES)	0

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu\text{g}/\text{m}^3$)	11.7	11	98	10.6	86	9.32	93
Ozone (ppb)	48.8	51.2	11	50.3	21	47.4	52
NATA* Diesel PM ($\mu\text{g}/\text{m}^3$)	0.86	0.835	57	0.931	50-60th	0.937	50-60th
NATA* Cancer Risk (lifetime risk per million)	32	34	38	34	<50th	40	<50th
NATA* Respiratory Hazard Index	1.5	1.4	61	1.7	<50th	1.8	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	240	250	73	370	70	560	65
Lead Paint Indicator (% Pre-1960 Housing)	0.65	0.36	82	0.39	77	0.3	84
Superfund Proximity (site count/km distance)	1.5	0.16	99	0.12	99	0.13	99
RMP Proximity (facility count/km distance)	4.3	0.52	99	0.51	99	0.43	99
Hazardous Waste Proximity (facility count/km distance)	0.09	0.044	91	0.069	78	0.072	77
Water Discharger Proximity (facility count/km distance)	2.9	0.34	99	0.31	99	0.31	99
Demographic Indicators							
Demographic Index	84%	27%	99	29%	97	36%	96
Minority Population	92%	19%	98	24%	94	37%	91
Low Income Population	77%	35%	95	33%	95	35%	95
Linguistically Isolated Population	5%	2%	87	2%	83	5%	70
Population With Less Than High School Education	22%	12%	84	11%	87	14%	78
Population Under 5 years of age	10%	6%	81	6%	83	6%	81
Population over 64 years of age	8%	14%	23	14%	23	14%	27

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: <https://www.epa.gov/national-air-toxics-assessment>.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.

ATTACHMENT II

U.S. ENVIRONMENTAL PROTECTION AGENCY

REMOVAL ACTION

ADMINISTRATIVE RECORD

FOR THE

U.S. SMELTER AND LEAD SITE

EAST CHICAGO, LAKE COUNTY, INDIANA

UPDATE 5

FEBRUARY, 2017

SEMS ID:

<u>NO.</u>	<u>SEMS ID</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
1	930087	5/1/03	World Trade Center Indoor Air Task Force Working Group	File	World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks	78
2	929996	8/10/16	Fusinski, K., U.S. EPA	Behnke, K., and Mitchell, J., U.S. EPA	Memorandum re: Development of an Indoor Dust Screening Criteria for the USS Lead Site	2
3	929997	9/20/16	Fusinski, K., U.S. EPA	Behnke, K., and Mitchell, J., U.S. EPA	Memorandum re: Development of an Indoor Dust Arsenic Screening Criteria for the USS Lead Site	1
4	931126	10/27/16	Vickers, J., Tetra Tech	Behnke, K., U.S. EPA	Data Validation Report for USS Lead Indoor Dust	11
5	931127	11/4/16	Vickers, J., Tetra Tech	Behnke, K., U.S. EPA	Data Validation Report for USS Lead Zone 3 Indoor Sampling	9
6	931128	11/9/16	Vickers, J., Tetra Tech	Behnke, K., U.S. EPA	Data Validation Report for USS Lead Zone 3 Indoor Sampling	11
7	931129	11/10/16	Vickers, J., Tetra Tech	Behnke, K., U.S. EPA	Data Validation Report for USS Lead Zone 3 Indoor Sampling	10

8	931130	11/18/16	Vickers, J., Tetra Tech	Behnke, K., U.S. EPA	Data Validation Report for USS Lead Zone 3 Indoor Sampling	30
9	931131	11/22/16	Vickers, J., Tetra Tech	Behnke, K., U.S. EPA	Data Validation Report for USS Lead Zone 3 Indoor Sampling	16
10	931245	11/30/16	Vickers, J., Tetra Tech	Behnke, K., U.S. EPA	Data Validation Report for USS Lead Zone 3 Indoor Sampling	44
11	931125	12/13/16	Fusinski, K., U.S. EPA	Behnke, K., and Mitchell, J., U.S. EPA	Memo re: Justification for Using Site-Specific Arsenic Background Concentration in Soil for Indoor Dust Screening Concentration for the USS Lead Site	2
12	932276	1/9/17	Vickers, J., Tetra Tech	Behnke, K., U.S. EPA	Data Validation Reports for Indoor Dust Sampling (Combined) - August 11, 2016 - January 9, 2017	838
13	932290	1/27/16	Snyder, R., U.S. EPA	File	Lab Data and Data Validation Reports for 18 Soil Samples - December 8-16, 2016 (Redacted)	29
14	932291	3/24/10	Griffin, S., U.S. EPA	File	Data Validation Report for 20 Soil Samples - December 7- 10, 2009	55
15	932292	9/7/10	Griffin, S., U.S. EPA	File	Data Validation Report for 20 Soil Samples - August 12-13, 2010	68
16	-	-	Guerriero M., U.S. EPA	Breen, B., U.S. EPA	Action Memorandum re: Request for Approval and Funding for a Time-Critical Removal Action at the U.S. Smelter and Lead Refinery Site (PENDING)	-

ATTACHMENT III

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION**

DETAILED CLEANUP & OVERSIGHT CONTRACTOR COST ESTIMATE

U.S. Smelter and Lead Refinery Site (Zone 3)

East Chicago, Indiana

January 2017

Indoor Dust Mitigation		
<i>ERRS Removal contractor</i>		Funding Allocation
Personnel	\$895,256	Removal
Equipment	\$100,322	Removal
Miscellaneous	\$136,900	Removal
T&D	\$150	Removal
Total	\$1,132,628	
Plus 20% Contingency	\$226,525.69	
Total ERRS Contractor Costs	\$1,359,154	

Indoor Dust Mitigation		
<i>START contractor</i>		Funding Allocation
Personnel	\$375,000	Removal
Dust Sampling	600,000	Removal
Equipment/Vehicle	\$40,000	Removal
Data Management	\$100,000	Removal
Report Writing	\$12,500	Removal
Total START Contractor Costs	\$1,127,500	

ATTACHMENT IV

January 2016

INDEPENDENT GOVERNMENT COST ESTIMATE

Indoor Dust Mitigation Zone 3

U.S. Smelter and Lead Refinery Site

East Chicago, Indiana (based on latest information from January 9, 2017)

Note: As of January 2017, Zone 3 indoor dust sampling is summarized as follows:

- 468 parcels in Zone
- Validated dust sampling results available from 36 residential homes scheduled for a 2016 cleanup.
- 17 of the 36 sampled residences have levels above the lead and/or arsenic indoor screening value(s) (Validated Results)
- Currently, 247 properties in Zone 3 have been identified as needing soil remediation
- Approximately 50% of 247 identified properties = 124 (rounded up) properties may need indoor dust mitigating actions.
- Indoor sampling cost about \$2,000 per event. A home would require at least 2 sampling events

Based on the aforementioned information the IGCE is estimated for approximately **124 homes** in Zone 3, 1.5 days per home. Estimated **188 working days (includes 2 days for mobilization and demobilization)** Working Days for total of **1880 hours** at 10 hours per day or 15 hours per home.

(see IGCE below)

ESTIMATED DAYS TO COMPLETE WORK

<u>Activity</u>	<u>Days</u>
Mob/Demob	2
Sampling	0
Removal Action	186
TOTAL	188

ERRS TRANSPORTATION AND DISPOSAL

<u>Matrix</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Subtotal</u>	<u>Trans</u>	<u>Samples</u>	<u>Total</u>
Non-Haz Waste	1	ton	50	50		\$100	\$150
T&D TOTAL							\$150

Personnel & Equipment

<u>Personnel</u>	<u>Units</u>	<u>Reg Rate</u>	<u>OT Rate</u>	<u>Reg Hours</u>	<u>OT Hours</u>	<u>Labor Cost</u>	<u>PerDiem</u>	<u>Lodging</u>	<u>PerDiem/Lodging Cost</u>	<u>Total</u>
Response Manager	1	66	66	1504	376	\$124,080	\$59	\$104	\$30,644	\$154,724
FCA	1	35	52	1504	376	\$72,192	\$59	\$104	\$30,644	\$102,836
Foreman	1	55	77	1504	376	\$111,672	\$59	\$104	\$30,644	\$142,316
Equipment Operator	0	56	73	1504	376	\$0	\$59	\$104	\$0	\$0
Laborer	5	35	42	1504	376	\$342,160	\$59	\$104	\$153,220	\$495,380
T&D Coordinator	0	65	65	1504	376	\$0	\$59	\$104	\$0	\$0
Industrial Hygienist	0	65	65	1504	376	\$0	\$59	\$104	\$0	\$0
Chemist	0	45	45	1504	376	\$0	\$59	\$104	\$0	\$0
Truck Driver	0	50	63	1504	376	\$0	\$59	\$104	\$0	\$0
PERSONNEL SUB TOTAL										\$895,256

<u>Equipment</u>	<u>Units</u>	<u>Daily Rate</u>	<u>Weekly Rate</u>	<u>Monthly Rate</u>	<u>Length</u>	<u>Lump Sum</u>	<u>Total</u>
1/2 ton pickup truck	3	\$49			188		\$27,771
1 ton stakebed truck	1	\$74			188		\$13,895
HEPA Vacuum	2	\$18			188		\$6,768
Negative air machine	2	\$30			188		\$11,280
PPE	6	\$36			188		\$40,608
EQUIPMENT SUB TOTAL							\$100,322

<u>Materials & Miscellaneous</u>	<u>Quantity</u>	<u>Costs</u>	<u>Daily Cost</u>	<u>Lump Sum</u>	<u>Length</u>	<u>Subtotal</u>	<u>Misc</u>
Miscellaneous cleaning materials						\$1,000	\$1,000
Carpet Replacement	124	\$1,000				\$125,000	\$125,000
Vehicle (fuel)		\$25			188	\$4,700	\$4,700
Utility Usage	124	\$50				\$6,200	\$6,200
MISC. TOTAL							\$136,900

ERRS 20% Contingency \$226,525.69

ERRS SUBTOTAL \$1,359,154

START

	<u>Units</u>	<u>Rate</u>	<u>Hours</u>	<u>Labor</u> <u>Cost/Unit Cost</u>	<u>PerDiem</u>	<u>Lodging</u>	<u>Cost</u>	<u>Total</u>
START-on site	2	\$125	1,500					\$375,000
Sampling	300			2,000				600,000
Equipment: vehicle, air monitoring, supplies	2	\$125	200					\$40,000
Data Management		100	1,000					100,000
Report Writing	1	\$125	100					\$12,500
							START TOTAL	\$1,127,500

ATTACHMENT V

Summary of OU1 Interior Dust Sampling Results for Zone 3 U.S. Smelter and Lead Refinery Site East Chicago, Lake County, Indiana

Final validated data from USS Lead OU1 Zone 3 Indoor Dust Sampling) (as of 11/29/2016). Pb > 316 and As > 26

EDD Status	Location	Samp_No	Sub_Location	Analyte	Result	Result_Qualifier	Lab_Result_Qualifier	Result_Units
Level4	USSL-3023	USSL-3023-BR-101116	Bedroom	Arsenic (fine fraction)	1.1	J	J	mg/Kg-dry
Level4	USSL-3023	USSL-3023-BR-101116	Bedroom	Lead (fine fraction)	21	J		mg/Kg-dry
Level4	USSL-3023	USSL-3023-FE-101116	Front Entrance	Arsenic (fine fraction)	3.9	J	J	mg/Kg-dry
Level4	USSL-3023	USSL-3023-FE-101116	Front Entrance	Lead (fine fraction)	180			mg/Kg-dry
Level4	USSL-3037	USSL-3037-BM-112216	Basement	Arsenic (fine fraction)	11			mg/Kg-dry
Level4	USSL-3037	USSL-3037-BM-112216	Basement	Lead (fine fraction)	920			mg/Kg-dry
Level4	USSL-3037	USSL-3037-BR-110216	Bedroom	Arsenic (fine fraction)	2.6	J	J	mg/Kg-dry
Level4	USSL-3037	USSL-3037-BR-110216	Bedroom	Lead (fine fraction)	58			mg/Kg-dry
Level4	USSL-3037	USSL-3037-FE-110216	Front Entrance	Arsenic (fine fraction)	12			mg/Kg-dry
Level4	USSL-3037	USSL-3037-FE-110216	Front Entrance	Lead (fine fraction)	360			mg/Kg-dry
Level4	USSL-3039	USSL-3039-BR-110916	Bedroom	Arsenic (fine fraction)	3.3	J	J	mg/Kg-dry
Level4	USSL-3039	USSL-3039-BR-110916	Bedroom	Lead (fine fraction)	58			mg/Kg-dry
Level4	USSL-3039	USSL-3039-FE-110916	Front Entrance	Arsenic (fine fraction)	12	J	J	mg/Kg-dry
Level4	USSL-3039	USSL-3039-FE-110916	Front Entrance	Lead (fine fraction)	350			mg/Kg-dry

Level4	USSL-3043	USSL-3043-BM-101116	Basement	Arsenic (fine fraction)	310			mg/Kg-dry
Level4	USSL-3043	USSL-3043-BM-101116	Basement	Lead (fine fraction)	53			mg/Kg-dry
Level4	USSL-3043	USSL-3043-BR-101116	Bedroom	Arsenic (fine fraction)	37			mg/Kg-dry
Level4	USSL-3043	USSL-3043-BR-101116	Bedroom	Lead (fine fraction)	56			mg/Kg-dry
Level4	USSL-3043	USSL-3043-FE-101116	Front Entrance	Arsenic (fine fraction)	18			mg/Kg-dry
Level4	USSL-3043	USSL-3043-FE-101116	Front Entrance	Lead (fine fraction)	56			mg/Kg-dry
Level4	USSL-3046	USSL-3046-BR-101216	Bedroom	Arsenic (fine fraction)	3.8	J-		mg/Kg-dry
Level4	USSL-3046	USSL-3046-BR-101216	Bedroom	Lead (fine fraction)	350			mg/Kg-dry
Level4	USSL-3046	USSL-3046-FE-101216	Front Entrance	Arsenic (fine fraction)	26	J-		mg/Kg-dry
Level4	USSL-3046	USSL-3046-FE-101216	Front Entrance	Lead (fine fraction)	210			mg/Kg-dry
Level4	USSL-3047	USSL-3047-BM-101116	Basement	Arsenic (fine fraction)	38			mg/Kg-dry
Level4	USSL-3047	USSL-3047-BM-101116	Basement	Lead (fine fraction)	150			mg/Kg-dry
Level4	USSL-3047	USSL-3047-BR-101116	Bedroom	Arsenic (fine fraction)	17			mg/Kg-dry
Level4	USSL-3047	USSL-3047-BR-101116	Bedroom	Lead (fine fraction)	220			mg/Kg-dry
Level4	USSL-3047	USSL-3047-FE-101116	Front Entrance	Arsenic (fine fraction)	11			mg/Kg-dry
Level4	USSL-3047	USSL-3047-FE-101116	Front Entrance	Lead (fine fraction)	170			mg/Kg-dry

Level4	USSL-3055	USSL-3055-BM-101716	Basement	Arsenic (fine fraction)	3.6	J	J	mg/Kg-dry
Level4	USSL-3055	USSL-3055-BM-101716	Basement	Lead (fine fraction)	61			mg/Kg-dry
Level4	USSL-3055	USSL-3055-BR-092316	Bedroom	Arsenic (fine fraction)	3.5	J	J	mg/Kg-dry
Level4	USSL-3055	USSL-3055-BR-092316	Bedroom	Lead (fine fraction)	60			mg/Kg-dry
Level4	USSL-3055	USSL-3055-FE-092316	Front Entrance	Arsenic (fine fraction)	4.5			mg/Kg-dry
Level4	USSL-3055	USSL-3055-FE-092316	Front Entrance	Lead (fine fraction)	120			mg/Kg-dry
Level4	USSL-3070	USSL-3070-BR-102516	Bedroom	Arsenic (fine fraction)	1.8	J-	J	mg/Kg-dry
Level4	USSL-3070	USSL-3070-BR-102516	Bedroom	Lead (fine fraction)	80			mg/Kg-dry
Level4	USSL-3070	USSL-3070-RE-102516	Rear Entrance	Arsenic (fine fraction)	7.5	J-	J	mg/Kg-dry
Level4	USSL-3070	USSL-3070-RE-102516	Rear Entrance	Lead (fine fraction)	890			mg/Kg-dry
Level4	USSL-3071	USSL-3071-BM-111516	Basement	Arsenic (fine fraction)	13			mg/Kg-dry
Level4	USSL-3071	USSL-3071-BM-111516	Basement	Lead (fine fraction)	83	J-		mg/Kg-dry
Level4	USSL-3071	USSL-3071-FE-110416	Front Entrance	Arsenic (fine fraction)	9			mg/Kg-dry
Level4	USSL-3071	USSL-3071-FE-110416	Front Entrance	Lead (fine fraction)	87	J+		mg/Kg-dry
Level4	USSL-3071	USSL-3071-LR-110416	Living Room	Arsenic (fine fraction)	6.4			mg/Kg-dry
Level4	USSL-3071	USSL-3071-LR-110416	Living Room	Lead (fine fraction)	86			mg/Kg-dry

Level4	USSL-3072	USSL-3072-BR-101716	Bedroom	Arsenic (fine fraction)	2.4	J+	J	mg/Kg-dry
Level4	USSL-3072	USSL-3072-BR-101716	Bedroom	Lead (fine fraction)	120			mg/Kg-dry
Level4	USSL-3072	USSL-3072-FE-101716	Front Entrance	Arsenic (fine fraction)	2.7	J+	J	mg/Kg-dry
Level4	USSL-3072	USSL-3072-FE-101716	Front Entrance	Lead (fine fraction)	64			mg/Kg-dry
Level4	USSL-3075	USSL-3075-BR-102816	Bedroom	Arsenic (fine fraction)	8.1	J		mg/Kg-dry
Level4	USSL-3075	USSL-3075-BR-102816	Bedroom	Lead (fine fraction)	29	J		mg/Kg-dry
Level4	USSL-3075	USSL-3075-RE-102816	Rear Entrance	Arsenic (fine fraction)	33	J	J	mg/Kg-dry
Level4	USSL-3075	USSL-3075-RE-102816	Rear Entrance	Lead (fine fraction)	85	J	J	mg/Kg-dry
Level4	USSL-3087	USSL-3087-BM-101416	Basement	Arsenic (fine fraction)	48	J		mg/Kg-dry
Level4	USSL-3087	USSL-3087-BM-101416	Basement	Lead (fine fraction)	500			mg/Kg-dry
Level4	USSL-3087	USSL-3087-BR-101416	Bedroom	Arsenic (fine fraction)	14	J	J	mg/Kg-dry
Level4	USSL-3087	USSL-3087-BR-101416	Bedroom	Lead (fine fraction)	110			mg/Kg-dry
Level4	USSL-3087	USSL-3087-FE-101416	Front Entrance	Arsenic (fine fraction)	26			mg/Kg-dry
Level4	USSL-3087	USSL-3087-FE-101416	Front Entrance	Lead (fine fraction)	190			mg/Kg-dry
Level4	USSL-3088	USSL-3088-BM-101216	Basement	Arsenic (fine fraction)	1.6	J-	J	mg/Kg-dry
Level4	USSL-3088	USSL-3088-BM-101216	Basement	Lead (fine fraction)	110			mg/Kg-dry

Level4	USSL-3088	USSL-3088-BR-101216	Bedroom	Arsenic (fine fraction)	3	J-	J	mg/Kg-dry
Level4	USSL-3088	USSL-3088-BR-101216	Bedroom	Lead (fine fraction)	50			mg/Kg-dry
Level4	USSL-3088	USSL-3088-FE-101216	Front Entrance	Arsenic (fine fraction)	7.3	J-	J	mg/Kg-dry
Level4	USSL-3088	USSL-3088-FE-101216	Front Entrance	Lead (fine fraction)	330			mg/Kg-dry
Level4	USSL-3091	USSL-3091-BR/KI-111116	Bedroom, Kitchen	Arsenic (fine fraction)	20	J+	J	mg/Kg-dry
Level4	USSL-3091	USSL-3091-BR/KI-111116	Bedroom, Kitchen	Lead (fine fraction)	140	J	J	mg/Kg-dry
Level4	USSL-3091	USSL-3091-FE-111116	Front Entrance	Arsenic (fine fraction)	6.6	J	J	mg/Kg-dry
Level4	USSL-3091	USSL-3091-FE-111116	Front Entrance	Lead (fine fraction)	62			mg/Kg-dry
Level4	USSL-3092	USSL-3092-BR-101716	Bedroom	Arsenic (fine fraction)	4.5			mg/Kg-dry
Level4	USSL-3092	USSL-3092-BR-101716	Bedroom	Lead (fine fraction)	71			mg/Kg-dry
Level4	USSL-3092	USSL-3092-FE-101716	Front Entrance	Arsenic (fine fraction)	7.2	J	J	mg/Kg-dry
Level4	USSL-3092	USSL-3092-FE-101716	Front Entrance	Lead (fine fraction)	190			mg/Kg-dry
Level4	USSL-3097	USSL-3097-BR-102916	Bedroom	Arsenic (fine fraction)	5.2			mg/Kg-dry
Level4	USSL-3097	USSL-3097-BR-102916	Bedroom	Lead (fine fraction)	57			mg/Kg-dry
Level4	USSL-3097	USSL-3097-FE-102916	Front Entrance	Arsenic (fine fraction)	6.2			mg/Kg-dry
Level4	USSL-3097	USSL-3097-FE-102916	Front Entrance	Lead (fine fraction)	74			mg/Kg-dry

Level4	USSL-3106	USSL-3106-FE/RE-111016	Front Entrance, Rear Entrance	Arsenic (fine fraction)	3.3	J+	J	mg/Kg-dry
Level4	USSL-3106	USSL-3106-FE/RE-111016	Front Entrance, Rear Entrance	Lead (fine fraction)	18			mg/Kg-dry
Level4	USSL-3106	USSL-3106-LR-111016	Living Room	Arsenic (fine fraction)	22	J	J	mg/Kg-dry
Level4	USSL-3106	USSL-3106-LR-111016	Living Room	Lead (fine fraction)	81			mg/Kg-dry
Level4	USSL-3119	USSL-3119-BR-091516	Bedroom	Arsenic (fine fraction)	75	U	U	mg/Kg-dry
Level4	USSL-3119	USSL-3119-BR-091516	Bedroom	Lead (fine fraction)	160			mg/Kg-dry
Level4	USSL-3119	USSL-3119-LR-091516	Living Room	Arsenic (fine fraction)	75	U	U	mg/Kg-dry
Level4	USSL-3119	USSL-3119-LR-091516	Living Room	Lead (fine fraction)	73	J	J	mg/Kg-dry
Level4	USSL-3119	USSL-3119-RE-091516	Rear Entrance	Arsenic (fine fraction)	8	J	J	mg/Kg-dry
Level4	USSL-3119	USSL-3119-RE-091516	Rear Entrance	Lead (fine fraction)	110			mg/Kg-dry
Level4	USSL-3185	USSL-3185-FE-110216	Front Entrance	Arsenic (fine fraction)	4.9	J	J	mg/Kg-dry
Level4	USSL-3185	USSL-3185-FE-110216	Front Entrance	Lead (fine fraction)	210			mg/Kg-dry
Level4	USSL-3185	USSL-3185-LR-110216	Living Room	Arsenic (fine fraction)	12	J	J	mg/Kg-dry
Level4	USSL-3185	USSL-3185-LR-110216	Living Room	Lead (fine fraction)	140			mg/Kg-dry
Level4	USSL-3206	USSL-3206-BR-101416	Bedroom	Arsenic (fine fraction)	4.1	J	J	mg/Kg-dry
Level4	USSL-3206	USSL-3206-BR-101416	Bedroom	Lead (fine fraction)	410			mg/Kg-dry

Level4	USSL-3206	USSL-3206-FE-101416	Front Entrance	Arsenic (fine fraction)	12	J+	J	mg/Kg-dry
Level4	USSL-3206	USSL-3206-FE-101416	Front Entrance	Lead (fine fraction)	1200			mg/Kg-dry
Level4	USSL-3226	USSL-3226-BR-102616	Bedroom	Arsenic (fine fraction)	1.1	J	J	mg/Kg-dry
Level4	USSL-3226	USSL-3226-BR-102616	Bedroom	Lead (fine fraction)	44			mg/Kg-dry
Level4	USSL-3226	USSL-3226-FE-102616	Front Entrance	Arsenic (fine fraction)	8.9			mg/Kg-dry
Level4	USSL-3226	USSL-3226-FE-102616	Front Entrance	Lead (fine fraction)	190			mg/Kg-dry
Level4	USSL-3277	USSL-3277-BR-101116	Bedroom	Arsenic (fine fraction)	5.7			mg/Kg-dry
Level4	USSL-3277	USSL-3277-BR-101116	Bedroom	Lead (fine fraction)	84			mg/Kg-dry
Level4	USSL-3277	USSL-3277-FE-101116	Front Entrance	Arsenic (fine fraction)	7	J	J	mg/Kg-dry
Level4	USSL-3277	USSL-3277-FE-101116	Front Entrance	Lead (fine fraction)	520			mg/Kg-dry
Level4	USSL-3277	USSL-3277-RE-101116	Rear Entrance	Arsenic (fine fraction)	34			mg/Kg-dry
Level4	USSL-3277	USSL-3277-RE-101116	Rear Entrance	Lead (fine fraction)	740			mg/Kg-dry
Level4	USSL-3282	USSL-3282-BR-102616	Bedroom	Arsenic (fine fraction)	2.5	J	J	mg/Kg-dry
Level4	USSL-3282	USSL-3282-BR-102616	Bedroom	Lead (fine fraction)	75			mg/Kg-dry
Level4	USSL-3282	USSL-3282-SE-102616	Side Entrance	Arsenic (fine fraction)	4	J	J	mg/Kg-dry
Level4	USSL-3282	USSL-3282-SE-102616	Side Entrance	Lead (fine fraction)	100			mg/Kg-dry
Level4	USSL-3301	USSL-3301-BR-110116	Bedroom	Arsenic (fine fraction)	2.1	J	J	mg/Kg-dry

Level4	USSL-3301	USSL-3301-BR-110116	Bedroom	Lead (fine fraction)	120	J		mg/Kg-dry
Level4	USSL-3301	USSL-3301-FE/RE-110116	Front Entrance, Rear Entrance	Arsenic (fine fraction)	16			mg/Kg-dry
Level4	USSL-3301	USSL-3301-FE/RE-110116	Front Entrance, Rear Entrance	Lead (fine fraction)	280			mg/Kg-dry
Level4	USSL-3302	USSL-3302-BR-102716A	Bedroom	Arsenic (fine fraction)	2.8	J	J	mg/Kg-dry
Level4	USSL-3302	USSL-3302-BR-102716A	Bedroom	Lead (fine fraction)	160			mg/Kg-dry
Level4	USSL-3302	USSL-3302-BR-102716B	Bedroom	Arsenic (fine fraction)	4.4	J	J	mg/Kg-dry
Level4	USSL-3302	USSL-3302-BR-102716B	Bedroom	Lead (fine fraction)	220			mg/Kg-dry
Level4	USSL-3302	USSL-3302-BR-102716C	Bedroom	Arsenic (fine fraction)	3.4	J	J	mg/Kg-dry
Level4	USSL-3302	USSL-3302-BR-102716C	Bedroom	Lead (fine fraction)	150			mg/Kg-dry
Level4	USSL-3302	USSL-3302-FE-102716B	Front Entrance	Arsenic (fine fraction)	6.3	J	J	mg/Kg-dry
Level4	USSL-3302	USSL-3302-FE-102716B	Front Entrance	Lead (fine fraction)	430			mg/Kg-dry
Level4	USSL-3302	USSL-3302-FE-102716C	Front Entrance	Arsenic (fine fraction)	120	U	U	mg/Kg-dry
Level4	USSL-3302	USSL-3302-FE-102716C	Front Entrance	Lead (fine fraction)	110	J	J	mg/Kg-dry
Level4	USSL-3302	USSL-3302-RE-102716A	Rear Entrance	Arsenic (fine fraction)	5.6	J	J	mg/Kg-dry
Level4	USSL-3302	USSL-3302-RE-102716A	Rear Entrance	Lead (fine fraction)	400			mg/Kg-dry
Level4	USSL-3310	USSL-3310-BR-101116	Bedroom	Arsenic (fine fraction)	5.9	J	J	mg/Kg-dry

Level4	USSL-3310	USSL-3310-BR-101116	Bedroom	Lead (fine fraction)	110			mg/Kg-dry
Level4	USSL-3310	USSL-3310-FE-101116	Front Entrance	Arsenic (fine fraction)	16	J	J	mg/Kg-dry
Level4	USSL-3310	USSL-3310-FE-101116	Front Entrance	Lead (fine fraction)	170	J	J	mg/Kg-dry
Level4	USSL-3319	USSL-3319-BR-101816	Bedroom	Arsenic (fine fraction)	75	U	U	mg/Kg-dry
Level4	USSL-3319	USSL-3319-BR-101816	Bedroom	Lead (fine fraction)	69	J	J	mg/Kg-dry
Level4	USSL-3319	USSL-3319-FE-101816	Front Entrance	Arsenic (fine fraction)	4.8	J	J	mg/Kg-dry
Level4	USSL-3319	USSL-3319-FE-101816	Front Entrance	Lead (fine fraction)	460			mg/Kg-dry
Level4	USSL-3338	USSL-3338-BR-101116	Bedroom	Arsenic (fine fraction)	3.3	J	J	mg/Kg-dry
Level4	USSL-3338	USSL-3338-BR-101116	Bedroom	Lead (fine fraction)	91			mg/Kg-dry
Level4	USSL-3338	USSL-3338-FE-101116	Front Entrance	Arsenic (fine fraction)	8.5	J	J	mg/Kg-dry
Level4	USSL-3338	USSL-3338-FE-101116	Front Entrance	Lead (fine fraction)	170			mg/Kg-dry
Level4	USSL-3338	USSL-3338-RE-101116	Rear Entrance	Arsenic (fine fraction)	6.7	J	J	mg/Kg-dry
Level4	USSL-3338	USSL-3338-RE-101116	Rear Entrance	Lead (fine fraction)	210			mg/Kg-dry
Level4	USSL-3345	USSL-3345-BR-101116	Bedroom	Arsenic (fine fraction)	2.7	J	J	mg/Kg-dry
Level4	USSL-3345	USSL-3345-BR-101116	Bedroom	Lead (fine fraction)	130			mg/Kg-dry
Level4	USSL-3345	USSL-3345-FE-101116	Front Entrance	Arsenic (fine fraction)	7.1			mg/Kg-dry
Level4	USSL-3345	USSL-3345-FE-101116	Front Entrance	Lead (fine fraction)	190			mg/Kg-dry

Level4	USSL-3383	USSL-3383-BR-110316	Bedroom	Arsenic (fine fraction)	1.4	J	J	mg/Kg-dry
Level4	USSL-3383	USSL-3383-BR-110316	Bedroom	Lead (fine fraction)	76			mg/Kg-dry
Level4	USSL-3383	USSL-3383-FE/RE-110316	Front Entrance, Rear Entrance	Arsenic (fine fraction)	10			mg/Kg-dry
Level4	USSL-3383	USSL-3383-FE/RE-110316	Front Entrance, Rear Entrance	Lead (fine fraction)	560			mg/Kg-dry
Level4	USSL-3406	USSL-3406-BR-101716	Bedroom	Arsenic (fine fraction)	1.9	J	J	mg/Kg-dry
Level4	USSL-3406	USSL-3406-BR-101716	Bedroom	Lead (fine fraction)	110			mg/Kg-dry
Level4	USSL-3406	USSL-3406-RE-101716	Rear Entrance	Arsenic (fine fraction)	6.2			mg/Kg-dry
Level4	USSL-3406	USSL-3406-RE-101716	Rear Entrance	Lead (fine fraction)	920			mg/Kg-dry
Level4	USSL-3434	USSL-3434-BR-101416	Bedroom	Arsenic (fine fraction)	380	U	U	mg/Kg-dry
Level4	USSL-3434	USSL-3434-BR-101416	Bedroom	Lead (fine fraction)	110	J+	J	mg/Kg-dry
Level4	USSL-3434	USSL-3434-FE-101416	Front Entrance	Arsenic (fine fraction)	9			mg/Kg-dry
Level4	USSL-3434	USSL-3434-FE-101416	Front Entrance	Lead (fine fraction)	500			mg/Kg-dry
Level4	USSL-3437	USSL-3437-BR-110316	Bedroom	Arsenic (fine fraction)	1.8	J	J	mg/Kg-dry
Level4	USSL-3437	USSL-3437-BR-110316	Bedroom	Lead (fine fraction)	67			mg/Kg-dry
Level4	USSL-3437	USSL-3437-FE-110316	Front Entrance	Arsenic (fine fraction)	4.8	J	J	mg/Kg-dry
Level4	USSL-3437	USSL-3437-FE-110316	Front Entrance	Lead (fine fraction)	230			mg/Kg-dry

Level4	USSL-3443	USSL-3443-BR-110416	Bedroom	Arsenic (fine fraction)	4.7	J	J	mg/Kg-dry
Level4	USSL-3443	USSL-3443-BR-110416	Bedroom	Lead (fine fraction)	57	J+	J	mg/Kg-dry
Level4	USSL-3443	USSL-3443-FE-110416	Front Entrance	Arsenic (fine fraction)	7			mg/Kg-dry
Level4	USSL-3443	USSL-3443-FE-110416	Front Entrance	Lead (fine fraction)	220			mg/Kg-dry

Lead screening level exceedance (316 ppm)

Arsenic screening level exceedance (26 ppm) and not U qualified

Arsenic screening level exceedance (26 ppm) but U qualified= not detected above reporting limit

ATTACHMENT VI

US Smelter and Lead Refinery Site Dust Screening Level for Lead



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
9311 GROH ROAD
GROSSE ILE, MI 48138

MEMORANDUM

SUBJECT: Development of an Indoor Dust Screening Criteria for the USS Lead Site

FROM: Keith Fusinski, PhD Toxicologist US EPA
Superfund Division, Remedial Response Branch #1, Remedial Response Section #1

TO: Jim Mitchell, On-Scene Coordinator US EPA
Superfund Division, Emergency Response Branch #2, Emergency Response Section #4

AND

Kristina Behnke, On-Scene Coordinator US EPA
Superfund Division, Emergency Response Branch #2, Emergency Response Section #3

DATE: 8/10/2016

The Integrated Exposure Uptake Biokinetic (IEUBK) model used by the US Environmental Protection Agency (USEPA) uses the concentration of indoor dust as a key parameter to evaluate risks to children from lead in soil. EPA separates dust into fine ($<150\ \mu\text{m}$) and coarse ($>150\ \mu\text{m}$) fractions. It has been shown that the fine particle size is the fraction that is most likely to adhere to children's hands and be ingested. In addition, more recent information also indicates that there is a potential for enrichment of lead in smaller sized particles and increased bioavailability (USEPA 2016). Using only the fine particle size concentration for screening can improve the accuracy of exposure and risk calculations in lead risk assessments.

The IEUBK model (version 1.1 Build 11) was used to determine an indoor dust screening level for lead. The default assumption in the model is that the concentration of lead in indoor dust is 70% of the concentration of lead in outdoor soil (Brattin and Griffin - 2011). US EPA recommends that lead concentrations in residential soil do not exceed 400 parts per million (ppm) in soil.

The modeling was performed using default inputs from the IEUBK model for diet, drinking water, air concentration and bioavailability. The IEUBK model was run using 400 ppm for lead in soil and modeled children 0 to 84 months of age. The calculated screening level to protect this population from a current US EPA acceptable blood lead level of $10\ \mu\text{g/dL}$ is **316 ppm** of lead in

dust. This concentration should be used when evaluating the fine particle size fraction of lead dust contamination.

REFERENCES

Brattin and Griffin - 2011 - William Brattin, Susan Griffin. Evaluation of the Contribution of Lead in Soil to Lead in Dust at Superfund Sites. Human and Ecological Risk Assessment: An International journal Vol. 17, Iss. 1, 2011.

USEPA 2016 - OLEM Directive 9200.1-128. Recommendations for Sieving Soil and Dust Samples at Lead Sites for Assessment of Incidental Ingestion.

Attachment VII

US Smelter and Lead Refinery Site Dust Screening Level for Arsenic



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
9311 GROH ROAD
GROSSE ILE, MI 48138

MEMORANDUM

SUBJECT: Justification for Using Site-Specific Arsenic Background Concentration in Soil for Indoor Dust Screening Concentration for the USS Lead Site.

FROM: Keith Fusinski, PhD Toxicologist US EPA
Superfund Division, Remedial Response Branch #1, Science and Quality Assurance Section

TO: Jim Mitchell, On-Scene Coordinator US EPA
Superfund Division, Emergency Response Branch #2, Emergency Response Section #4

AND

Kristina Behnke, On-Scene Coordinator US EPA
Superfund Division, Emergency Response Branch #2, Emergency Response Section #3

DATE: 12/13/2016

The US EPA looks at both cancer and non-cancer detrimental effects of exposure to contaminants. For non-cancer, EPA determines probability of a detrimental health effect to occur by calculating a hazard quotient (HQ). The HQ is a ratio of a single substance exposure level over a specified period of time to a reference dose of the same substance derived from a similar exposure period. It is recommended that the HQ of an exposure to a chemical of concern be below or equal to 1 which is the level at which no adverse human health effects are expected to occur. For cancer risk, the U.S. EPA recommends a screening level that would equate to a one in a million (1×10^{-6}) or greater lifetime risk of developing cancer from exposure to a contaminated site. However, rates up to 1 in 10,000 (1×10^{-4}) can be considered acceptable. Regional screening levels (RSLs) are based upon an excess lifetime cancer risk (ELCR) of 1×10^{-6} or an HQ of 1, whichever is most protective. The Office of Land and Emergency Management (OLEM) recommends removal management levels (RMLs) be set at an excess lifetime cancer risk of 1 in 10,000 or a non-cancer HQ of 3, whichever is most protective. Risks found between the RSLs and RMLs are remediated at the discretion of EPA risk managers. Risks greater than the RML, typically require remediation.

The residential RSL for arsenic in soil is 0.68 mg/kg. The residential RML for soil is 68 mg/kg. These values are highly protective and are based upon an individual working or playing in the soil for 24 hours a day, for 350 days per year for 26 years. This includes the first 6 years of life, where children are most susceptible to developmental effects of contaminant exposure. Routes of exposure in these calculations include ingestion, inhalation, and dermal contact. Any concentration

of arsenic in soil less than 68 mg/kg is considered within EPA's acceptable risk range and protective of human health.

House dust is composed of small amounts of plant pollen, human and animal hairs and skin cells, textile fibers, paper fibers, outdoor soil, and many other materials which may be found in the local environment. It is important to note that only a fraction of house dust actually comes from exterior soils. However, in order to be protective of human health, US EPA will assume that 100 percent of house dust at the USS Lead Site comes directly from exterior soil degradation.

Arsenic is a naturally occurring substance and can be found in soils all across the US at some concentration. This is considered naturally occurring background. The site specific background concentration for arsenic in soils at the USS Lead site has been determined to be 26 milligrams of arsenic per kilogram of soil (mg/kg). This value is well below the residential soil RML of 68 mg/kg. As US EPA is assuming that 100 percent of house dust comes from exterior soils, then it can be considered that 26 mg/kg is not only the background in exterior soils, but also residential house dust.

When evaluating homes for remediation, or to review the effects of remediation, any home with concentrations of arsenic below 26 mg/kg should be considered below background concentrations and safe for unrestricted residential use.

**ATTACHMENT VIII
FOURTH AMENDED ACTION MEMORANDUM
DATED OCTOBER 13, 2016**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

USEPA RECORDS CENTER REGION 5



495079

OCT 24 2016

REPLY TO THE ATTENTION OF:

MEMORANDUM

SUBJECT: ACTION MEMORANDUM - 4th AMENDMENT: Request for a Change in Scope and Ceiling Increase for the Time-Critical Removal Action at the U.S. Smelter and Lead Refinery Site, East Chicago, Lake County, Indiana (Site ID # 053J)

FROM: Douglas Ballotti, Acting Director
Superfund Division

THRU: Reggie Cheatham, Office Director
Office of Emergency Management (OEM)

TO: Mathy Stanislaus, Assistant Administrator
Office of Land and Emergency Management

I. PURPOSE

The purpose of this Action Memorandum Amendment is to request and document your approval, consistent with Section 104(c)(1)(A) of CERCLA, 42 U.S.C. Section 9604 (c)(1)(A), to Change the Scope of the Response and for a Ceiling Increase for the time-critical removal action at portions of the U.S. Smelter and Lead Refinery Site (the Site) residential area defined as Zone 2 of Operable Unit 1 (OU1), in East Chicago, Lake County, Indiana (see Figure 2). The sought increase of \$13,870,506 would raise the project ceiling for the time-critical removal action from \$26,397,542 to \$40,268,048.

The Change of Scope of the Response and Ceiling Increase is necessary as the previous Action Memoranda approved on January 22, 2008, August 13, 2008, September 12, 2011, and October 13, 2016 (Attachments IX, X, XI, XII), were for the excavation and proper disposal of lead-contaminated soils from residential parcels in OU1, Zones 1, 2 and 3, indoor cleanup of lead contaminated dust inside of residences in Zone 1, and temporary relocation of residents in the West Calumet Housing Complex (WCHC) in Zone 1. Subsequent soil data collected in Zone 2 during the remedial design (RD) phase in order to implement EPA's Remedial Action as set forth in the Record of Decision (November 2012), found lead and arsenic concentrations in surface soils (0-6") in a number of residential yards above EPA screening criteria.

Response actions are necessary in Zone 2 of OU1 to mitigate threats to public health, welfare, and the environment posed by the release and/or threatened release of uncontrolled hazardous substances at the Site. This removal involves (1) the excavation and proper disposal of lead

and/or arsenic contaminated soils from residential parcels in Zone 2, and (2) testing for lead and/or arsenic contaminated dust in residential homes if requested by the home owner and, if necessary, removal of the contaminated dust.

Conditions existing at the Site present a threat to public health and the environment and meet the criteria for initiating a removal action under 40 CFR § 300.415(b) of the National Contingency Plan (NCP). The U.S. Environmental Protection Agency (EPA or the Agency) documented elevated levels of lead and arsenic in surface soil in residential parcels at the Site. Lead and arsenic are hazardous substances as defined by Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

There are no nationally significant or precedent setting issues associated with the Change of Scope sought in this Action Memorandum to the extent it seeks approval for the excavation of soils. Testing at the owner's request and the removal of lead and/or arsenic contaminated dust in residential homes may set a precedent. The Site is on the National Priorities List (NPL).

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID: IND047030226
RCRA ID: IND047030226
STATE ID: None
Category: Time-Critical Removal

A. Site Description

1. Removal Site Evaluation

The Indiana Department of Environmental Management (IDEM) sampled some of the residential parcels to the north of the U.S. Smelter and Lead Refinery, Inc. (U.S.S. Lead) facility in 1985. This area is now known as Operable Unit 1 of the Site. IDEM found elevated lead levels in these residential yards. In September of 1985, the Indiana State Board of Health found the U.S.S. Lead facility in violation of state law and stated that the lead-contaminated soils within the facility boundaries may pose a risk to human health and the environment. IDEM referred the U.S.S. Lead facility, but not the area now known as Operable Unit 1, to EPA for cleanup.

From 1993 through 2006, EPA's Resource Conservation and Recovery Act (RCRA) Corrective Action program oversaw the remediation and management of lead-contaminated soils within the boundaries of the U.S.S. Lead facility, currently referred to as Operable Unit 2 (OU2). On November 18, 1993, EPA and U.S.S. Lead entered into an Administrative Order on Consent (AOC) pursuant to Section 3008(h) of RCRA. The AOC required U.S.S. Lead to implement interim measures, including site stabilization and construction of a corrective action management unit (CAMU) to contain contaminated soils and slag and to conduct a Modified RCRA Facility Investigation at the U.S.S. Lead facility, OU2. The CAMU covers approximately 10 acres and is surrounded by a subsurface slurry wall. Excavation and construction of the CAMU was conducted in two phases and completed between August and September 2002. Slag generated from the blast-furnace operations was routinely placed by U.S.S. Lead in piles on the southern

portion of the property near the banks of the Grand Calumet River. The cleanup of slag was described in the Interim Stabilization Measures Work Plan prepared by ENTACT, LLC and was completed during the third quarter of 2002.

As part of a RCRA Corrective Action in 2003 and 2006, EPA conducted soil sampling in the residential neighborhood to the north located in OU1 of the U.S.S. Lead Site. In the investigation of late July and early August 2003, 83 residential parcels within OU1 were sampled and analyzed for lead using a Niton X-ray fluorescence (XRF) instrument. Soils from 43 locations (52 percent) exceeded the 400 milligrams per kilogram (mg/kg) residential soil screening criterion for lead. In 2006, EPA's Field Environmental Decision Support (FIELDS) team supplemented the work performed in 2003 by collecting additional data from 14 parcels sampled in 2003 to (1) assess whether the top-most soils (zero to one inch below ground surface (bgs)) had elevated lead concentrations relative to deeper soils (one to six inches bgs), (2) collect and compare composite samples to individual samples to assess whether composite samples accurately represented the concentrations in residential yards and parks, and (3) compare lead concentrations in the fine and coarse fractions of sieved samples to evaluate whether lead was preferentially distributed in the fine-grain sizes. These sampling results showed some yards in OU1 to have high levels of lead contamination with the highest sample containing lead at 3,000 mg/kg. The RCRA Corrective Action program looked at the possible source of the lead contamination and determined it was from various industrial sources. The RCRA Corrective Action program referred OU1—the off-site contamination from the U.S.S. Lead facility—and other industrial sources to the Superfund Program in 2004; the remainder of OU2—the on-site contamination—was referred in 2006.

Consistent with the OSWER Publication 9285.7-50 *Superfund Lead-Contaminated Residential Sites Handbook* (Handbook) (2003), the Superfund Program used a tiered approach to prioritize which homes needed to be cleaned up first. Residential parcels with lead concentrations in surface soil at or greater than 1,200 mg/kg were the highest priority for immediate action under a time-critical removal action. Residential parcels with lead concentrations in surface soil below 1,200 mg/kg, but above 400 mg/kg would be addressed through remedial actions. EPA does not consider the 1,200 mg/kg concentration as an action level for removal actions, but this level does provide an alternative to running the Integrated Exposure Uptake Biokinetic (IEUBK) model with limited data to determine if the site poses an urgent threat. On January 22, 2008, EPA signed the original action memorandum to conduct a time-critical removal action in OU1 to address known parcels with lead levels in surface soil exceeding 1,200 mg/kg. These parcels had been identified as part of the RCRA Corrective Action residential investigation. The EPA identified 15 private parcels that contained soil with lead concentrations exceeding 1,200 mg/kg in the top six inches of soil. On June 9, 2008, the EPA initiated the time-critical removal action to address the 15 residential parcels with lead levels exceeding 1,200 mg/kg. On August 13, 2008, the EPA amended the original action memorandum to increase the project ceiling by \$511,950 for a total of \$984,060. The EPA was able to obtain access agreements and remediate only 13 of the 15 parcels. The removal action was completed on November 18, 2008. In total, 1,838 tons of lead-contaminated soil were removed and disposed of at an approved landfill.

A Remedial Investigation (RI) was conducted from 2009 through 2010 to collect additional soil data in OU 1 which consists of Zone 1, Zone 2, and Zone 3. As a result of the sampling, EPA

discovered an additional 14 areas within OU1 with lead levels exceeding the removal action level of 1,200 mg/kg. On September 11, 2011, EPA signed the second amendment to the original action memorandum which increased the total project ceiling to \$1,928,460. On October 11, 2011, EPA started the time-critical removal action involving lead-contaminated soil removals at five West Calumet Housing Complex (WCHC) addresses (located in Zone 1) and nine other residential parcels outside the WCHC. In addition, two parcels that were not remediated during the previous removal action in 2008 because of access issues were remediated during this removal action. The removal action was completed on December 9, 2011. In total, 1,913 additional tons of lead-contaminated soil were removed and disposed of at an approved landfill as a result of the 2011 removal activities.

In November 2012, EPA issued a Record of Decision (ROD) for Operable Unit 1 (OU1) of the Site. OU1 has been divided into 3 separate zones for implementation of the remedy (Zones 1, 2, and 3). OU1 contains residential yards contaminated with lead and arsenic at levels that pose a threat to human health through ingestion, inhalation and direct contact. EPA's selected remedy for OU1 addresses these risks from exposure to contaminated soils through the excavation and off-site disposal of lead or arsenic contaminated soils. The remedial action levels (RALs) for OU1 are 400 mg/kg for lead at residential parcels, 800 mg/kg for lead at industrial/commercial parcels, and 26 mg/kg for arsenic at both residential and industrial/commercial parcels.

From November 2014 through April 2015, EPA conducted more extensive soil sampling within Zone 1 as part of the remedial design process for OU1 and completed remedial designs for Zone 1 in October 2015. Zone 1 includes approximately 118 separate "parcels," including 111 parcels in the WCHC, three right-of-way parcels, and a school, park, recreation center, and maintenance facilities. EPA sampled all parcels in Zone 1 except a narrow strip of land on the east bank of the Indiana Harbor Canal. In May 2016, EPA received validated sampling results which revealed lead concentrations in soil up to 24 inches in depth ranged from non-detect (ND) to 91,100 mg/kg for lead. Arsenic concentrations ranged from ND to 3,530 mg/kg (See Attachment V – Summary of OU1 RD Soil Sampling Results). Within Zone 1, a total of 117 parcels exceeded the removal management level (RML) for lead of 400 mg/kg for residential soil and 61 parcels exceeded the RML for arsenic of 68 mg/kg. Each of the parcels that exceeded the RML for arsenic also exceeded the RML for lead. Sample results from surface soils (0-6") indicated that lead concentrations at 13 parcels in the WCHC exceed 5,000 mg/kg with concentrations up to 45,000 mg/kg.

Beginning in July 2016, EPA began conducting more extensive soil sampling within Zone 2 as part of the RD process for OU1. Zone 2 includes approximately 590 separate "parcels." Most of these parcels are residential parcels, though there are some commercial/industrial parcels. In September 2016, EPA received validated sampling results from 48 parcels which revealed lead concentrations in surface soil (0-6 inches below ground surface) at values ranging from 38.3 to 2,120 mg/kg. Arsenic concentrations ranged from 4.3 to 111 mg/kg (See Attachment V – Summary of OU1 RD Soil Sampling Results). Ten sampled parcels had surface soil lead concentrations above 1,200 mg/kg and 40 of 48 parcels exceed the RML for lead of 400 mg/kg for residential surface soil. Two parcels exceeded the 68 mg/kg RML for arsenic (111 and 78.1 mg/kg in surface soil). One parcel that exceeded the RML for arsenic also exceeded the RML for lead in soil.

On July 29, 2016, EPA initiated in-house sampling for dust collection in Zone 1 to determine lead concentrations in homes given the elevated levels of lead in surface soils within the WCHC and the likelihood that lead contaminated soil/dust was being tracked or blown into the housing units. EPA prioritized homes for sampling based on the likelihood that they would have elevated lead levels in indoor dust, based on elevated lead concentrations in yards and elevated blood lead level (BLL) records associated with those residences. As of September 28, 2016, EPA has received validated results from 154 residences. Concentrations ranged from 3.9 to 32,000 mg/kg for lead fines and 0.12J (J means the associated value is the approximate concentration) to 880 mg/kg for arsenic fines. Results from indoor dust from the first 154 homes indicate 69 parcels exceed the EPA screening level of 316 mg/kg for lead for indoor living spaces (See Attachment VII – Indoor Dust Screening Criteria for Lead).

On August 12, 2016, EPA began cleaning the inside of residences in the WCHC to remove lead contaminated dust. A combination of HEPA vacuums and wet cleaning are used to remove lead dust from ceilings, floors, carpets, walls, drapes, accessible ductwork, furnace, and furniture. As of October 3, 2016, EPA has cleaned approximately 113 out of 334 occupied units. Residents were temporarily relocated during the cleaning process and clearance sampling conducted as necessary to document efficacy of cleaning.

The Indiana State Department of Health (ISDH) accompanied EPA into 14 of the initial 42 residences in Zone 1 and conducted a separate inspection for compliance with lead paint abatement policies. Wipe samples were collected from floors, interior window sills, and window troughs and compared to HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition)(40 µg/ft²-floors, 250 µg/ft²- window sills, and 400 µg/ft²- window trough). Wipe samples from six of the 14 units sampled were above the respective lead dust clearance standards (see Attachment VIII - Indiana State Department of Health Wipe Sample Results). Lead based paint was not found by ISDH in any of the inspected units.

The Agency for Toxic Substances and Disease Registry (ATSDR) is working with the East Chicago Health Department (ECHD), which is conducting an ongoing exposure investigation of blood lead in the WCHC. The following is a summary of the findings from screenings of children living in the WCHC, which is derived both from historical data and from the on-going blood lead testing campaign being conducted by ECHD:

- From the most recent ECHD testing in summer 2016, 18 out of 94 (19%) tested children from the WCHC under age six were identified with elevated blood lead (EBL) levels (> 5 µg/dL) based on capillary (finger stick) measurements.
- From 2014 through 2015, 26% of children under age seven tested at the WCHC were identified with EBL levels, with the highest measurement at 33 µg/dL in a one-year-old child. Within the same period, the census tract that includes all of the children from the WCHC (Zone 1) and part of Zone 2 had an EBL incidence rate of 22%. By comparison, the EBL rates for the two adjacent census tracts were 9% and 11%.
- The ATSDR Exposure Investigation conducted in the West Calumet neighborhood in 1997 showed a 35% EBL incidence rate, which was defined at that time as greater than 10 µg/dL.

These observations by ATSDR across almost 20 years demonstrate a consistent pattern of elevated blood lead levels in young children living in OU1. Given that the ISDH Lead Inspectors found no lead-based paint in recently sampled units within the WCHC, it is likely that exposure to soil-based lead contamination in the WCHC and portions of Zone 2 is a primary cause of elevated blood lead levels in children there.

2. Physical Location

The U.S.S. Lead Site lies approximately 18 miles southeast of Chicago, Illinois, in East Chicago, Indiana (Figure 1). The Site consists of the former U.S.S. Lead facility located at 5300 Kennedy Avenue, East Chicago, Indiana (designated as Operable Unit 2 (OU2)) and the residential area to the north and northeast (defined as OU1). OU1 is bound by East Chicago Avenue on the north, East 151st Street/149th Place on the south, the Indiana Harbor Canal on the west, and Parrish Avenue on the east. OU1 includes about 1200 homes, a small number of parks, open space as a part of the railroad right-of-way, schools, and public buildings. For the purpose of implementing the remedial action (RA) in OU1, EPA has divided OU1 into three distinct geographic areas (Zones 1, 2, and 3). This removal action is taking place in OU1 Zone 2. Zone 2 is adjacent to and directly east of Zone 1 and is generally bordered: (1) on the north by East Chicago Avenue; (2) on the east by Joliet, Elgin Railroad; (3) on the south by East 151st Street; and (4) on the west by the East Chicago Public Housing Complex, the Carrie Gosch Elementary School, and the Harbor Canal.

The EPA conducted an EJ analysis for the Site (see Attachment I). Screening of the surrounding area was conducted using Region 5's EJ Screen Tool. Region 5 has reviewed environmental and demographic data for the area surrounding the U.S.S. Lead Site and has determined there is high potential for EJ concerns at this location.

3. Site Characteristics

OU1 includes about 1,200 homes, a small number of parks, open space as a part of the railroad right-of-way, schools, and public buildings. OU1 is primarily a residential area, which includes commercial and light industrial areas. Some parcels in the residential area in Zones 1, 2 and 3 have levels of lead above EPA's RML of 400 mg/kg and arsenic above the RML of 68 mg/kg.

United States Geological Survey (USGS) historical aerial photographs from 1939, 1951, 1959, and 2005 show OU1 over time. Review of these aerial photographs indicates that most of the residential neighborhoods within the Site west of the railroad tracks were built before 1939. By 1951, approximately 75 to 80 percent of the homes were built; by 1959, most of the homes east of the railroad tracks had also been built. These photographs also show that the International Smelting and Refining Company, a subsidiary of the Anaconda Copper Company (whose successor in interest is now the Atlantic Richfield Company [ARC]) occupied the area where the WCHC is currently located (Zone 1 in the southwest portion of OU1) prior to 1946. Title records indicate that the East Chicago Housing Authority constructed the WCHC on the former Anaconda Copper Mining Company/International Smelting and Refining Company site between 1970 and 1973.

The U.S.S. Lead facility was a primary and secondary smelter of lead in the East Chicago, Indiana area. It began operations around 1906 and ended operations in 1985. From about 1920 until 1973, the facility was a primary smelter of lead. This included a refining process to create high quality lead free of bismuth. From 1973 until its closure in 1985, the facility was a secondary smelter and a reprocessor of car batteries. The secondary refinery operations included: battery breaking with tank treatment of spent battery acid at a rate of 16,000 gallons per day; baghouse dust collection with storage in on-site waste piles of up to 8,000 tons of flue dust; and blast furnace slag disposal, which was deposited in the wetland adjacent to and along the southern boundary of the facility. The blast-furnace baghouse collected approximately 300 tons of baghouse flue dust per month during maximum operating conditions. Some of the flue dust escaped the baghouse capture system and was deposited by the wind within the boundaries of OU1. Secondary lead recovery operations ceased in 1985.

In addition to the U.S.S. Lead facility operation, other industrial operations have managed or processed lead and other metals and are sources of contamination in OU1. Immediately east of the U.S.S. Lead facility and south of Zone 3 is the former DuPont site (currently leased and operated by W.R. Grace & Co., Grace Davison). One of the processes that historically took place at the DuPont site was the manufacturing of a lead arsenate pesticide. In 2015, DuPont spun off certain assets and liabilities to a newly created company, The Chemours Company FC, LLC (Chemours). Chemours is now the owner of the former DuPont facility.

North of the former U.S.S. Lead facility stood two smelter operations, which processed lead and other metals. A 1930 Sanborn map identifies the operations as Anaconda Lead Products and International Lead Refining Company (referred to as the former Anaconda facility). Anaconda Lead Products was a manufacturer of white lead and zinc oxide and the International Lead Refining Company was a metal refining facility. These facilities consisted of a pulverizing mill, white lead storage areas, a chemical laboratory, a machine shop, a zinc oxide experimental unit building and plant, a silver refinery, a lead refinery, a baghouse, and other miscellaneous buildings and processing areas. The International Lead Refining Company was a subsidiary of the Anaconda Copper Mining Company. Title to the property in Zone 1 was held between 1934 and 1946 by International Lead Smelting and Refinery Company. International Lead Smelting and Refinery Company acquired title to the property in Zone 1 in 1934 from International Lead Refining Company, which had acquired title in 1912.

The residential area that comprises Zone 2 has been contaminated by aerial deposition of windblown contaminants from the U.S.S. Lead facility, the Anaconda Copper Mining Company/International Lead Smelting and Refinery Company facility, and the DuPont/Chemours facility. The focus of this time-critical removal action is Zone 2, which has approximately 590 residential parcels.

4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

The threat is presented by the presence of lead and arsenic-contaminated soil in residential yards and potential lead and arsenic contaminated dust within the residences in Zone 2. The presence of lead and arsenic in outdoor soils and potentially in indoor dust at concentrations above health

screening values provides a constant source of exposure for individuals both outside and while in the home. Lead and arsenic are hazardous substances as defined by section 101(14) of CERCLA. See 40 C.F.R. § 302.4. Nearby lead processing operations caused extensive lead and arsenic contamination in soils throughout the Site. The removal is responding to actual and potential outdoor lead and arsenic contamination, as well as potential indoor contamination caused by the migration of lead and arsenic contaminated soil from outdoors to indoors (like the source of contamination found in Zone 1). The presence of elevated lead and arsenic levels in surface soils and potential presence of lead and arsenic in indoor dust in Zone 2 makes this a time-critical removal action.

Exposure may occur from direct ingestion of soil in yards, soil tracked indoors, or house dust; and inhalation of fugitive dust. Potential human receptors include residents, including children six years of age and under, and pregnant or nursing women.

Lead exposure via inhalation and/or ingestion can have detrimental effects on almost every organ and system in the human body. Exposure may occur from direct ingestion of soil in yards, soil tracked indoors, or house dust; and inhalation of fugitive dust. Lead can cause a variety of health problems to people who are exposed to it. Potential human receptors include residents, including children six years of age and under, and pregnant or nursing women. Children are at greatest risk from the toxic effects of lead. Initially, lead travels in the blood to the soft tissues (heart, liver, kidney, brain, etc.). Then, it gradually redistributes to the bones and teeth where it tends to remain. Children exposed to high levels of lead have exhibited nerve damage, liver damage, colic, anemia, brain damage, and death. The most serious effects associated with markedly elevated blood lead levels include neurotoxic effects such as irreversible brain damage.

Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet. Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso. Skin contact with inorganic arsenic may cause redness and swelling. Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cancer and cancer in the liver, bladder, and lungs. Inhalation of inorganic arsenic can cause increased risk of lung cancer. The Department of Health and Human Services (DHHS) and the EPA have determined that inorganic arsenic is a known human carcinogen (ATSDR, Chemical Abstract Services [CAS] # 7440-38-2, August 2007).

5. NPL status

The U.S.S. Lead Site consisting of both the former U.S.S. Lead facility (OU2) and the West Calumet neighborhood to the north (OU1) was listed as a Superfund site on the national priorities list (NPL) on April 8, 2009. EPA began the RI for OU1 on June 26, 2009. During December 2009 and August 2010, EPA contractors sampled yards in residential areas and background locations. In June 2012, EPA completed a preliminary investigation and study to determine the level and extent of lead and arsenic contamination within OU1 and proposed a remedy. In November 2012, after considering comments received from the City and IDEM,

EPA outlined the long-term permanent cleanup plan in a Record of Decision for OU1. The EPA has completed the remedial designs for work in Zone 1 and Zone 3 and is in the process of completing the remedial design for Zone 2.

6. Maps, pictures and other graphic representations

Maps include:

Figure 1 – USS Lead and Lead Refinery, E. Chicago, IN. Location Map

Figure 2 – OU1 Zones 1, 2, and 3– Location Map

B. Other Actions to Date

1. Previous actions

On January 22, 2008, EPA signed the original action memorandum to conduct a time-critical removal action in OU1 to address known parcels with lead levels exceeding the removal action limit of 1,200 mg/kg. These parcels were identified based on sampling data collected during the RCRA Corrective Action investigation. That removal action began on June 9, 2008, and involved the excavation and off-site disposal of lead contaminated soil from 13 residential parcels. On August 13, 2008, EPA amended the original action memorandum to increase the project ceiling in order to complete the ongoing, time-critical removal action. In total, 1,838 tons of lead-contaminated soil were removed and disposed of at an approved landfill. Excavated areas were backfilled with clean fill and seeded. This removal action was completed on September 25, 2008, and the final Pollution Report was issued on November 18, 2008.

On September 12, 2011, EPA signed an action memorandum to conduct a time-critical removal action in Zones 1, 2, and 3 of OU1 to address 16 parcels (including the 2 that were missed in 2008) with lead levels exceeding the removal action limit of 1,200 mg/kg. These parcels were identified based on sampling data collected during the RI. This removal action began on October 24, 2011, and involved the excavation and off-site disposal of lead contaminated soil from 16 residential parcels. In total, 1,913 tons of lead-contaminated soil were removed and disposed of at an approved landfill. Excavated areas were backfilled with clean fill and seeded. This removal action was completed on December 9, 2011, and the final Pollution Report was issued on December 15, 2011.

2. Current actions

On July 11, 2016, EPA started remedial action activities to cover bare soils with wood mulch within the WCHC to minimize fugitive dust, direct contact and potential migration of soil with elevated lead levels. The mulching work was completed on July 22, 2016, although maintenance of the mulch cover is ongoing as part of the remedial work associated with the implementation of the ROD for OU1.

On July 29, 2016, EPA initiated in-house sampling for dust collection in Zone 1 to determine lead concentrations in homes. As of September 28, 2016, EPA has received validated results

from 154 residences. Concentrations ranged from 3.9 to 32,000 mg/kg for lead fines and 0.12J (J means value is estimate) to 880 mg/kg for arsenic fines (See Attachment VI – Summary of Indoor Dust Sampling Results). Data results from indoor dust from the first 154 homes indicate 69 parcels exceed the EPA screening level of 316 mg/kg for lead for indoor living spaces (See Attachment VII – Indoor Dust Screening Criteria).

ISDH conducted a separate inspection of fourteen of the identified residential units for compliance with lead paint abatement policies. Lead-based paint was not found in any of the inspected units. On August 12, 2016, EPA began cleaning (under October 13, 2016 USS Lead action memo for Zone 1) the inside of all occupied (approximately 334) units within the WCHC, all of which are or have the potential to be contaminated with lead contaminated dust above the risk-based screening criteria for indoor dust from industrial activities. A combination of HEPA vacuums and wet cleaning are used to remove lead dust from ceilings, floors, carpets, walls, drapes, accessible ductwork, furnace, and furniture. As of October 3, 2016, approximately 113 out of 334 occupied units have been cleaned. Residents were temporarily relocated during the indoor cleaning period.

C. State and Local Authorities' Roles

1. State and Local Actions to Date

On August 24, 2016, Rex Osborn, Federal Programs Section Chief with IDEM, sent an email indicating the State of Indiana does not have the financial resources to eliminate the threat posed by lead-contaminated soil in yards and dust within the residences or to fund temporary relocations. Neither the State of Indiana nor the City of East Chicago have taken or have the capacity to take action to abate the immediate threat.

2. Potential for Continued State/Local Response

The EPA is working with ATSDR, the East Chicago Health Department, the Indiana State Department of Health, and City of East Chicago elected officials to provide information to the public. EPA is coordinating discussions with stakeholders regarding the elevated levels of lead and arsenic in soil and EPA's plans to address this issue. Neither the state nor local officials have the resources to conduct the necessary cleanup of the indoor dust contamination or to provide for the temporary relocation of residents.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES.

The conditions at Zone 2 of the U.S.S. Lead Site present a threat to the public health or welfare and the environment and meet the criteria for a time-critical removal action as provided for in the NCP, 40 C.F.R. § 300.415(b)(1), based on the factors in 40 C.F.R. § 300.415(b)(2). These factors include, but are not limited to, the following:

§ 300.415(b)(2)(i) - Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

Beginning in July 2016, EPA began conducting more extensive soil sampling within Zone 2 as part of the RD process for OU1. Zone 2 includes approximately 590 separate parcels. Most of these parcels are residential parcels, though there are some commercial/industrial parcels. In September 2016, EPA received validated sampling results from 48 parcels in Zone 2 which revealed lead concentrations in surface soil (0-6 inches below ground surface) at values ranging from 38.3 to 2,120 mg/kg. Arsenic concentrations ranged from 4.3 to 111 mg/kg (See Attachment V – Summary of OU1 RD Soil Sampling Results). Ten sampled parcels had surface soil lead concentrations above 1,200 mg/kg and 40 of 48 parcels exceed the RML for lead of 400 mg/kg for residential surface soil. Two parcels exceeded the 68 mg/kg RML for arsenic (111 and 78.1 mg/kg in surface soil). One parcel that exceeded the RML for arsenic also exceeded the RML for lead in soil.

Data results from indoor dust from the first 154 homes sampled in Zone 1 indicate 69 properties exceed the EPA screening level of 316 mg/kg for lead for indoor living spaces. EPA is currently addressing exposure to lead contaminated soil in yards and indoor dust in Zone 1. High lead concentrations in indoor dust are a risk to human health, particularly for children under the age of six (i.e., inhalation, ingestion). A recent blood lead study conducted by ECHD found that children in the WCHC and part of Zone 2 are at an increased risk for lead exposure (22% at or above 5 µg/dL compared to the national average of 2.5%).

Lead is a hazardous substance, as defined by Section 101(14) of CERCLA. The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in the body. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

Arsenic is a hazardous substance under CERCLA and may be ingested or inhaled by residents living at the Site. Acute (short-term) high-level inhalation exposure to arsenic dust or fumes has resulted in gastrointestinal effects (nausea, diarrhea, abdominal pain); central and peripheral nervous system disorders have occurred in workers acutely exposed to inorganic arsenic. Chronic (long-term) inhalation exposure to inorganic arsenic in humans is associated with irritation of the skin and mucous membranes and effects in the brain and nervous system. Chronic oral exposure to elevated levels of inorganic arsenic has resulted in gastrointestinal effects, anemia, peripheral neuropathy, in humans. Chronic exposure by the inhalation route, has been shown to cause a form of skin cancer and also to cause bladder, liver, and lung cancer. EPA has classified inorganic arsenic as a human carcinogen.

§ 300.415(b)(2)(iv). - High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;

As stated in the previous paragraphs, surface soils in Zone 2 were found to be contaminated with lead and arsenic above the EPA screening levels.

Residents living in Zone 2 may cause the high levels of lead and arsenic to migrate into other areas including inside the home by walking through and tracking in, gardening, play, and other residential activities, especially in areas where the soil does not have any cover. Other means of migration may include routine construction activities.

§ 300.415(b)(2)(v) - Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

There is a threat of release from high winds dispersing surface particulate matter containing lead, resulting in exposure to children and adults who reside within the Site. Grass cover is generally lighter in the early spring and fall, allowing more potential of tracking contaminated soil into the home. Rain or thundershowers may cause the outdoor lead to migrate via surface runoff. The use of an air conditioner during the hot summer months or the running of a furnace during the winter would also result in the migration of indoor dust.

§ 300.415(b)(2)(vii) - The availability of other appropriate federal or state response mechanisms to respond to the release;

At this time, no local or state agency has the resources to respond to the immediate threat.

IV. EXEMPTION FROM STATUTORY LIMITS

Section 104(c) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), limits a Federal response action to 12 months and \$2 million unless response actions meet emergency and/or consistency exemptions. Documentation for the aforementioned exemptions are provided in the U.S.S. Lead Action Memorandum-Third Amendment approved on October 13, 2016.

V. ENDANGERMENT DETERMINATION

Given the Site conditions, the nature of the known and suspected hazardous substances on-site, and the potential exposure pathways described in Sections II and III above, actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response actions selected in this Memorandum, may present an imminent and substantial endangerment to public health, welfare, or the environment.

VI. PROPOSED ACTIONS

The response actions described in this memorandum directly address actual or potential releases of hazardous substances on Site, which may pose an imminent and substantial endangerment to public health, or welfare, or the environment.

The proposed action involves excavation and removal of lead and arsenic-contaminated soil at residential parcels within Zone 2 with surficial soil concentrations at or above 1,200 mg/kg for lead and/or the removal management level (RML) of 68 mg/kg for arsenic, and indoor dust sampling and cleaning upon the request of residents and owners. The response actions are consistent with the (OSWER) Publication 9285.7-50 *Superfund Lead-Contaminated Residential Sites Handbook* (Handbook) (2003), where the Superfund Program uses a tiered approach to prioritize which homes needed to be cleaned up first. Residential parcels with lead concentrations in surface soil at or greater than 1,200 mg/kg would be the highest priority for immediate action under a time-critical removal action. Excavated areas will be backfilled to original grade with clean soil and the yards restored as closely as practicable to its pre-removal condition.

Approximately 590 Zone 2 parcels will be sampled during the remedial design process. For cost accounting purposes, EPA anticipates the scope of this removal action in Zone 2 to include approximately 132 residential parcels that are at or greater than 1,200 mg/kg for lead and/or 68 mg/kg for arsenic based on historical and the latest remedial design validated data from Zone 2.

Removal activities associated with the excavation of lead and arsenic contaminated soil from residential yards in Zone 2 will include:

1. Development of site plans, including a Work Plan, Sampling Plan/QAPP, site-specific HASP, and Emergency Contingency Plan;
2. Development of an air monitoring plan and conduct dust control measures to ensure worker and public health protection;
3. Provision for site security measures as necessary;
4. Excavation of soil at residential parcels where lead is equal to or exceeds 1,200 mg/kg and/or arsenic exceeds 68 mg/kg as determined by EPA's RD sampling. Soil will be excavated to a depth of approximately two feet bgs, to eliminate any direct contact and inhalation threats. Excavated material that fails toxicity characteristic leaching procedure (TCLP) for lead may be treated with a fixation agent prior to disposal. Excavation will cease if lead and/or average arsenic concentrations are less than 400 mg/kg for lead and 26 mg/kg for arsenic.
5. Collection and analysis of confirmation samples from the bottom of each excavation. If lead levels below 400 mg/kg or arsenic levels below 26 mg/kg cannot be achieved at an excavation depth of approximately two feet bgs, excavation will cease and a visible barrier will be placed at the bottom of the excavation to alert the property owner of the existence of high levels of lead and/or arsenic. In such instances and consistent with the record of

decision, institutional controls (ICs) will be implemented as part of the remedial action to ensure the users of the property are not exposed to the contaminants of concern in soil;

6. Replacement of excavated soil with clean soil, including 6 inches of top soil to maintain the original grade. Each yard will be restored as close as practicable to its pre-removal condition. Once the parcels are sodded or seeded, removal site control of the sod or seed, including, watering, fertilizing, and cutting, will be conducted for 30 days. After the initial 30 day period, property owners will be responsible for the maintenance of their own yards. The aforementioned work shall be documented in a Work Plan;
7. Transportation and disposal off-site of any hazardous substances, pollutants and contaminants at a CERCLA-approved disposal facility in accordance with EPA's Off-Site Rule (40 CFR § 300.440);
8. Performance of any other response actions to address any release or threatened release of a hazardous substance, pollutant or contaminant that the EPA On-Scene Coordinator (OSC) determines may pose an imminent and substantial endangerment to the public health or the environment; and
9. Conduct an evaluation to determine if soil excavation activities result in a release of lead scale particles from lead service lines into the drinking water supply. This sampling will be conducted from parcels being excavated in the fall of 2016. Data will be evaluated prior to the 2017 construction season to determine if construction activities impact drinking water quality. Bottled water and water filters will be provided during and after the soil excavation activities as necessary during the evaluation period. Based on findings from the 2016 evaluation, a determination will be made on whether the provision of bottled water and water filters should continue beyond the evaluation period. (Note: This evaluation is being conducted at the request of the Agency for Toxic Substances and Disease Registry, see memo from Mark Johnson to Doug Ballotti dated October 24, 2016.)

Data results in Zone 1 from indoor dust from the first 154 homes sampled indicate 69 parcels exceed the EPA screening level of 316 mg/kg for lead for indoor living spaces. Given the significant number of indoor samples that indicated action is needed and the threat posed by high concentrations of lead in soil in adjacent outdoor areas, and the consistent pattern of EBL levels in children less than 6 years of age living in WCHC and portions of Zone 2, EPA, at the request of the residents and homeowners, will vacuum sample indoor dust for lead and arsenic. EPA will clean the inside of residences that are above the risk-based screening criteria of 316 mg/kg for lead and 100 mg/kg arsenic for indoor dust from industrial-related activities. In general, the indoor cleanup process will involve four basic steps: (1) collection of indoor dust vacuum samples (in homes previously not sampled), (2) possible temporary relocation of residents, (3) removal of contaminated indoor dust from floors and carpeting, and cleaning of accessible HVAC systems and filter replacement (4) Post cleaning clearance sampling; and (5) the return of occupants to their residence if temporarily relocated. A combination of HEPA vacuums and/or wet cleaning will be used to remove contaminated dust from floors, carpeting and HVAC systems. Replacement of carpets/mats may be considered on a case by case basis if cleaning mechanisms fail to remove lead and arsenic dust below cleanup criteria.

Removal activities associated with indoor sampling, evaluation, and removal of contaminated dust in homes in Zone 2 will include:

1. Development of a Work Plan and Site Specific Health and Safety Plan;
2. Development and implementation of an air monitoring/sampling plan for the work zone and Site;
3. Continuation of indoor dust and other sampling as determined necessary;
4. Provision for Site security, as directed by the OSC;
5. Development of a relocation plan to address, if necessary, the temporary relocation of residents during the cleaning process;
6. Performance of interior dust cleanup activities as specified in the Site Work Plan;
7. Transportation and disposal off-site of any hazardous substances, pollutants and contaminants at a CERCLA-approved disposal facility in accordance with EPA's Off-Site Rule (40 CFR § 300.440); and
8. Performance of any other response actions to address any release or threatened release of a hazardous substance, pollutant or contaminant that the EPA On-Scene Coordinator (OSC) determines may pose an imminent and substantial endangerment to the public health or the environment.

The Action Memorandum and supporting documentation follow the April 2002 Superfund Response Actions: Temporary Relocations Implementation Guidance, particularly in considering residents' needs, property security, dealing with resident's stress and disruptions, and explaining benefits. Consistent with EPA's guidance on temporary relocations (2002), Sec. IV.A ("Making the Relocation Decision"), temporary relocation at the Site is justified during the cleaning process by the following factor:

- Efficiency of response action: temporary relocation minimizes concerns about noise, property access, and other restrictions on the hours or types of response activities that may be conducted at the Site.

The removal actions will be conducted in a manner not inconsistent with the NCP.

The threats posed by uncontrolled substances considered hazardous meet the NCP criteria listed at § 300.415(b), and the response actions proposed herein are consistent with any long-term remedial actions which may be required.

Off-Site Rule

All hazardous substances, pollutants, or contaminants removed off-site pursuant to this removal action for treatment, storage, and disposal shall be treated, stored, or disposed of at a facility in compliance, as determined by EPA, with the EPA Off-Site Rule, 40 C.F.R. § 300.440.

1. Contribution to remedial performance

The proposed action should not impede future remedial performance.

2. Engineering Evaluation/Cost Analysis (EE/CA)

Not Applicable

3. Applicable or relevant and appropriate requirements (ARARs)

All applicable or relevant and appropriate requirements (ARARs) will be complied with to the extent practicable. On August 18, 2016, EPA sent an e-mail to Rex Osborn of IDEM asking for any State of Indiana ARARs that may apply. IDEM provided both Action and Chemical specific state ARARs in a letter dated August 26, 2016. EPA will consider and implement the submitted ARARs as appropriate.

Project Schedule

The time-critical removal actions will require approximately 528 working days to complete.

B. Removal Project Ceiling Estimate – Extramural Costs:

The detailed cleanup contractor cost is presented in Attachment I and the Independent Government Cost Estimate is presented in Attachment IV. Estimated project costs are summarized below:

REMOVAL ACTION PROJECT CEILING ESTIMATE

<u>Extramural Costs</u>	<u>Current Ceiling</u>	<u>Proposed Increase</u>	<u>Proposed Ceiling</u>
<u>Regional Removal Allowance</u>			
<u>Costs:</u>			
Total Cleanup Contractor Costs (This cost category includes estimates for ERRS, subcontractors, Notices to Proceed, and Interagency Agreements with Other Federal Agencies and 20% Contingency)	\$18,875,702	\$10,133,755	\$29,009,457
<u>Other Extramural Costs Not Funded from the Regional Allowance:</u>			
Total START, including multiplier costs	\$3,122,250	\$1,425,000	\$4,547,250
<u>Subtotal</u>			
Subtotal Extramural Costs	\$21,997,952	\$11,558,755	\$33,556,707
Extramural Costs Contingency (20% of Subtotal, Extramural Costs rounded to nearest thousand for Proposed Increase)	<u>\$4,399,590</u>	\$2,311,751	
TOTAL REMOVAL ACTION PROJECT CEILING	\$26,397,542	\$13,870,506	\$40,268,048

The response actions described in this memorandum directly address the actual or threatened release of hazardous substances, pollutants, or contaminants at the Site which may pose an imminent and substantial endangerment to public health or welfare or to the environment. These response actions do not impose a burden on affected property disproportionate to the extent to which that property contributes to the conditions being addressed.

VII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Given the Site conditions, the nature of the hazardous substances and pollutants or contaminants documented in Zone 2 of OU1, and the potential exposure pathways to nearby populations described in Section II and Section III, above, actual or threatened releases of hazardous substances and pollutants or contaminants from this Site, if not addressed by implementing the response actions selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, welfare, or the environment.

VIII. OUTSTANDING POLICY ISSUES

None

IX. ENFORCEMENT

For administrative purposes, information concerning the enforcement strategy for this Site is contained in the Confidential Enforcement Addendum.

The total EPA costs of this removal action based on full-cost accounting practices that will be eligible for cost recovery are estimated to be \$68,457,330¹.

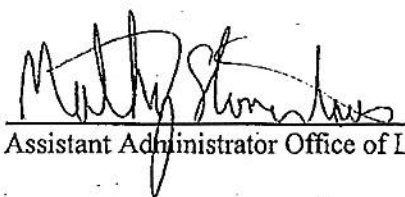
$$(\$40,268,048 + \$2,000,000) + (61.96\% \times \$42,268,048) = \$68,457,330$$

¹ Direct Costs include direct extramural costs and direct intramural costs. Indirect costs are calculated based on an estimated indirect cost rate expressed as a percentage of site specific direct costs, consistent with the full cost accounting methodology effective October 2, 2000. These estimates do not include pre-judgment interest, do not take into account other enforcement costs, including Department of Justice costs, and may be adjusted during the course of a removal action. The estimates are for illustrative purposes only and their use is not intended to create any rights for responsible parties. Neither the lack of a total cost estimate nor deviation of actual total costs from this estimate will affect the United States right to cost recovery.

X. RECOMMENDATION

This decision document, along with the Action Memorandum signed on January 22, 2008, and the Action Memorandum Amendments signed on August 13, 2008, September 12, 2011, and October 13, 2016 represents the selected removal action for the U.S. Smelter and Lead Refinery Site, Zone 2, OU1, East Chicago, Lake County, Indiana. It was developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision is based upon the Administrative Record for the Site (Attachment II). Conditions at OU1, Zone 2 meet the NCP Section 300.415(b) criteria for a removal action and the CERCLA Section 104(c) emergency exemption from the \$2 million and 12-month limitation. The total removal action project ceiling, if approved, will be \$40,268,048 of which as much as \$33,770,398 may be used from the removal allowance. I recommend your approval of the proposed removal action. You may indicate your decision by signing below.

APPROVE



DATE:

10/28/16

Assistant Administrator Office of Land and Emergency Management

DISAPPROVE

DATE:

Assistant Administrator Office of Office of Land and Emergency Management

Enforcement Addendum

Figures:

- Figure 1 – USS Lead and Lead Refinery, E. Chicago, IN. Location Map
- Figure 2 – OU1 Zones 1, 2, and 3– Location Map

Attachments:

- I. Environmental Justice Analysis
- II. Administrative Record Index
- III. Detailed Cleanup Contractor Estimate
- IV. Independent Government Cost Estimate
- V. Summary of OU1 RD Soil Sampling Results
- VI. Indoor Dust Screening Criteria for Lead
- VII. Indoor Dust Screening Criteria for Arsenic
- VIII. Third Amended Action Memorandum dated October 13, 2016

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