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THE OMAHA LEAD SUPERFUND SITE OMAHA, NEBRASKA

INNOVATIVE PARTNERSHIPS AND HOLISTIC REMEDIAL APPROACHES PRIORITIZE COMMUNITY HEALTH

Introduction

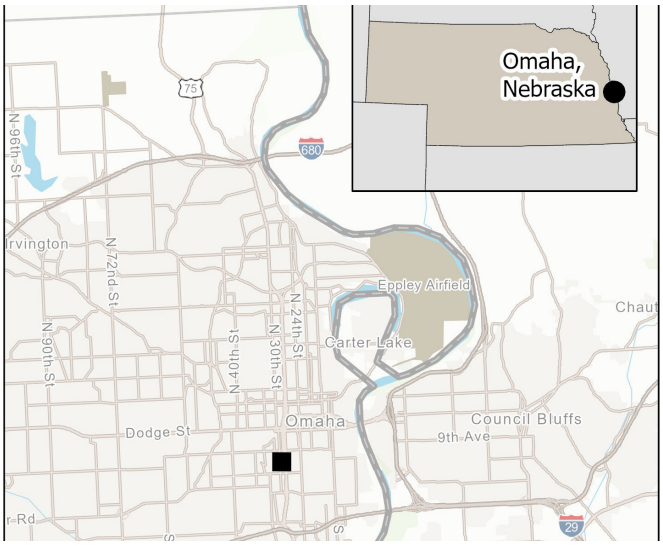
For over 125 years, lead smelting and refining works operated along the Missouri River in eastern Omaha, Nebraska. Omaha and Grant Smelting and Refining Company constructed the smelter and refinery and ran the facilities from 1870 to 1889. The American Smelting and Refining Company, Inc. (ASARCO) operated the smelter from 1889 until the closure of the facility in 1997. During the smelter's heyday in the early twentieth century, it was considered the largest lead refinery in the world.

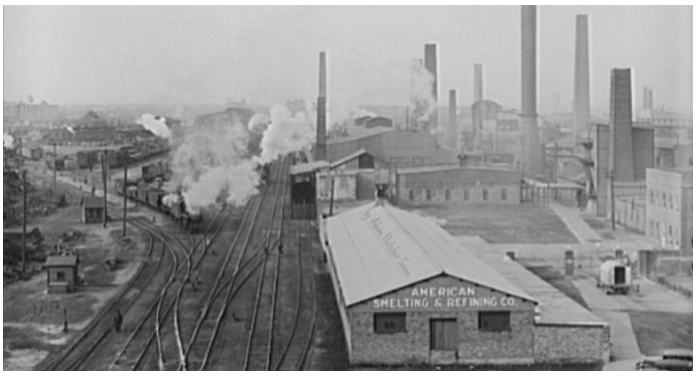
In addition to ASARCO, Aaron Ferer & Sons Company and later the Gould Electronics, Inc. owned and operated a smaller smelter facility for recycling of lead batteries near the ASARCO smelter for many years. More than a century of smelter operations churned out dark billowing exhaust from their smokestacks, resulting in the release of vast quantities of lead particles into the air. The lead particles traveled in the clouds and on the wind across the city of Omaha, falling to the ground when it rained or as natural airborne deposition. The lead particles from the smelter works landed on surfaces and soils throughout eastern Omaha.

In the 1990s, the Douglas County Health Department (DCHD) determined that over 36 % of children tested in eastern Omaha had elevated blood lead level concentrations above the Centers for Disease Control (CDC) recommended action level of 10 micrograms per deciliter (ug/dL) at the time. When blood lead screening results confirmed these elevated blood lead concentrations exceeded the national average in children 7 years and younger, the DCHD approached the city of Omaha for assistance. The city of Omaha immediately reached out to the EPA to identify the source of lead exposures in eastern Omaha driving the elevated blood lead levels in children.

In 1999, EPA began the first sampling and cleanup of residential properties to address the risk of lead exposure in contaminated soil. While sampling and cleanup continued, the EPA contracted for the completion of studies, conducted the Remedial Investigation and Feasibility Study, and developed the Proposed Plan for what would later be named the Omaha Lead Site (OLS). The OLS was listed on the National Priorities List as a Superfund Site in April 2003 and the final Record of Decision (ROD) was signed in May 2009.

Based on the various studies and investigations into the impact from the historic smelter emissions on residential properties, the EPA delineated a 27-square-mile area as the Omaha Lead Superfund site. The size and scope of the OLS make it the largest residential Superfund site in the country. Cleanup efforts are equivalent in scope to cleaning up the Island of Manhattan in New York City 100 times.





A historical photo of the former ASARCO refining facility. Image from the Omaha World-Herald/John Savage Photography Collection at The Durham Museum, used with permission.

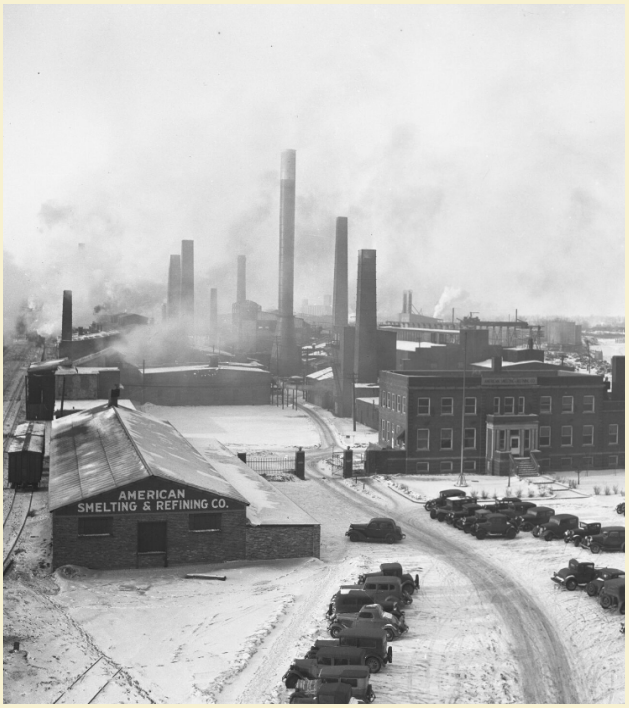
This case study explores the tools and partnerships between local, county, state and federal entities that have led to the successful cleanup and transformation at the Omaha Lead Superfund site. The following pages trace the evolution of cleanup and reuse efforts, highlighting the community's leadership, engagement of local stakeholders,and coordination of remedy and reuse considerations to attract businesses to the site. The case study provides information for parties interested in the large-scale study of contaminated sites, unique intergovernmental cooperative agreements, comprehensive cleanup approaches to address cumulative risks and local partnerships to facilitate outreach and education of community members. Sampling and cleanup of residential properties remains ongoing. The DCHD, the City of Omaha, the State of Nebraska and the EPA credit the commitment of all involved with the success achieved at the OLS in reducing the blood lead levels in children. Since 2015, less than 2% of children 7 years and younger within the OLS have had blood lead levels greater than 5 ug/dL.

Site History and Contamination

For over 125 years, various companies operated a lead smelting and refinery operation at 500 Douglas Street in Omaha, Nebraska. Located along the Missouri River and next to rail lines, the location offered road, rail and boat options for transporting lead ingots formed at the refinery. The Omaha Smelting Company began operating at the site in the 1870s, before merging with the Grant Smelting Company in 1882 to form the Omaha and Grant Smelting and Mining Company. A decade later, another merger of 16 companies, including Omaha and Grant Smelting and Mining Company, resulted in the formation of the American Smelting and Refinement Company, commonly known as ASARCO.

ASARCO ceased operations and closed the Omaha smelter and refinery at this location in 1997. At nearby 555 Farnam Street in Omaha, Aaron Ferer & Sons Company (Aaron Ferer) and later Gould Electronics operated a lead battery recycling plant from the early 1950s until closing in 1982. Throughout their years of operation, both ASARCO and the Aaron Ferer/Gould Electronics battery recycler released vast amounts of lead-containing particles through their smokestack emissions. Wind dispersal of these particles led to the deposition and contamination of a roughly 27-square-mile area of downtown Omaha. Once in the environment, lead, a metal, can remain near surface soil for decades providing ongoing risk of exposure.

EPA considers ASARCO to have been the primary source for the soil contamination in downtown Omaha. Other lead sources, such as lead-based paint, lead from the past use of leaded gasoline in automobiles, and industrial sources including Gould Electronics, Union Pacific Railroad and Aaron Ferer, contributed lesser volumes of airborne lead deposition.



Historical images of ASARCO in 1937 (top) and Gould Electronics, Inc. in 1968 (bottom) show dense clouds of smokestack emissions that led to deposition of lead over 27 square miles of downtown Omaha. Image from the Omaha World-Herald/John Savage Photography Collection at The Durham Museum, used with permission.

From 1972 to 1998, DCHD conducted blood lead level testing in children as part of routine health care. Between 1992 and 1998, roughly one-third of children tested (27% to 42% of children tested, by zip code) exhibited elevated blood lead levels above the level of concern at that time of 10 micrograms per deciliter (µg/dL). In 1997, the Centers for Disease Control and Prevention (CDC) recommended that local governments analyze available lead blood lead level data and issue targeted screening guidelines. In November 1998, DCHD released the available blood lead screening results. It found that blood lead levels in Douglas County exceeded the national average of about 3 µg/dL, prompting the city of Omaha to approach EPA for federal assistance in addressing the high incidence of blood lead levels in local children.

Timeline of Events

Early 1870s until 1997	ASARCO operated a lead refinery at 500 Douglas Street.
Early 1950s until 1982	Aaron Ferer & Sons Company and later Gould Electronics, Inc. lead battery recycling plant operated at 555 Farnam Street.
1972 to 1998	DCHD measured blood lead levels in local children.
1998	Omaha City Council requested EPA assistance to address the high incidence of elevated blood lead levels in local children.
March 1999	EPA began collecting soil from residential properties used as childcare facilities and homes of children with documented elevated blood lead levels.
August 1999	EPA began first soil removal action at residential properties with lead concentrations exceeding 800 parts per million, or ppm, and at childcare centers and homes of children with elevated blood lead levels with lead concentrations exceeding 400 ppm.
1999	Former ASARCO plant demolished as part of facility cleanup.
2002	EPA completed excavation of contaminated soil and placement of uncontaminated backfill at 257 properties.
February 26, 2002	EPA proposed listing the site on the NPL.
August 2002	EPA began second soil removal action to address all other residential-type properties where the maximum non-foundation soil lead concentration exceeded an action level of 2,500 ppm.
April 30, 2003	EPA finalized the site's listing on the NPL.
2003	The city opened Lewis & Clark Landing at the former ASARCO plant location.
December 2004	EPA issued the Interim ROD.
July 2005	EPA began the interim remedial action
August 2005	ASARCO filed for bankruptcy.
March 2006	EPA completed a removal action at 1,227 properties, with work transitioning to Superfund remedial authority.
May 2009	EPA issued the final ROD.
June 2009	EPA began the final remedial action.
July 2009	ASARCO bankruptcy settlement resulted in more than $200 million for cleanup.
September 2009	EPA completed the interim remedial action.
2010	DCHD created the Interior Lead Dust Program to improve lead poisoning awareness in Omaha.
May 2015	EPA signed cooperative agreement with the city of Omaha and began transitioning lead cleanup activities to the city.
December 2015	EPA completed cleanup of 13,090 residential properties under the final remedial action.
Ongoing	The city and DCHD continue to address lead contamination issues at remaining properties where owner was not willing to grant access to collect soil samples or clean up lead-contaminated soil.

Project History

EPA Mobilizes Emergency Response

1999 to 2005

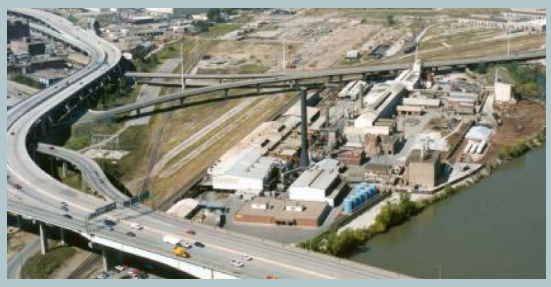
In August 1999, EPA issued its first time-critical removal action using the Superfund authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to address lead-contaminated soils at childcare centers and homes of children with elevated blood lead levels. The early cleanups in the OLS were performed through an Interagency Agreement with the U.S. Army Corps of Engineers (USACE). The first removal action targeted soil with lead contamination exceeding 400 ppm lead at childcare centers and homes of children with elevated blood lead levels. USACE completed these removal actions at 257 properties.

EPA proposed listing the site on the Superfund program's National Priorities List (NPL) in February 2002. EPA issued general notice letters to suspected polluters, or potentially responsible parties (PRPs), in June 2002 to begin discussions for the site's remedial investigation and feasibility study (RI/FS). In addition to the smelters responsible for lead contamination, Union Pacific Railroad owned the property leased to ASARCO for much of the operating years and is considered another site PRP. EPA proceeded with remedial actions using Superfund Trust Fund resources, intending to recover costs later from PRPs. EPA finalized the OLS NPL listing in April 2003.

The EPA's second time-critical removal action utilizing USACE interagency agreements began in August 2002 and was ongoing through December 2005. The time-critical actions addressed the most contaminated residential properties with the highest child exposure risk and with maximum soil lead levels exceeding

ASARCO Facility Cleanup

In the mid-1990s, former U.S. Congressman and former Omaha Mayor Hal Daub began exploring options for cleaning up the riverfront, both to transition away from heavy industry along the Missouri River and to anchor the proposed economic revitalization of downtown Omaha. Daub negotiated with ASARCO for the city to take title to the ASARCO facility and for ASARCO to provide the city with $50 million for cleanup of the property. After shuttering of the ASARCO facility in 1997, the Nebraska Department of Environmental Quality issued a State Order under the State of Nebraska Remedial Action Plan Monitoring Act Program to ASARCO for cleanup of the ASARCO facility.



Aerial view of the former ASARCO facility prior to demolition in 1997.

Investigation and cleanup of the ASARCO facility indicated that area groundwater and the Missouri River had minimal contamination from lead and other metals originating from ASARCO's operations. After the demolition and removal of ASARCO facility structures in 1999, the highest concentrations of lead-contaminated soils were wrapped in a liner and covered with 3 to 6 feet of clean fill. The state transferred ownership of the former ASARCO property to the city of Omaha. In 2003, the city completed its redevelopment of the property and opened Lewis and Clark Landing, a public riverfront park. EPA Region 7 recognized the project with a Phoenix Award in 2008, celebrating the remediation and redevelopment of the former ASARCO property.

Placement of a liner system to contain lead-contaminated soils in a "burrito" prior to adding several feet of clean soil as a cap.

The former ASARCO facility property after demolition.

2,500 parts per million (ppm). As this highest contamination and highest risk cleanup phase approached completion, EPA identified the next tier of high priority cleanups as having soil lead concentrations above 1,200 ppm. Once addressed, the next tier for cleanup had soil lead concentrations above 800 ppm. This tiered approach allowed EPA to prioritize and direct time-critical removal action resources to the highest risk properties – residential properties with the highest soil lead levels and areas with the most vulnerable populations (children 7 years and younger and pregnant or nursing mothers) – first. The time-critical removal actions excavated all soils exceeding a cleanup level of 400 ppm lead, backfilled the areas with clean soil that was confirmed to have lead concentrations below 150 ppm, and revegetated with sod.

While the time-critical removal actions were ongoing the EPA performed modeling using the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK). The modeling is used to identify the lead cleanup action level in residential soil based on the 5% chance that a child with typical exposures to lead in air, water and food – but not the site – would develop a blood lead concentration exceeding 10 µg/dL. The modeling concluded that a residential soil lead level of 400 ppm was the appropriate action level across the OLS. It should be noted that in May 2021 EPA updated the IEUBK model to adjust the lead action level target to reflect the CDC recommendation of 5 µg/dL blood lead level in children 7 years and younger.

In December 2004, EPA signed an Interim Record of Decision (IROD) for the OLS. Interim action cleanups continued to address areas with high child impact – properties where children ages seven and younger spend a significant portion of their day, such as childcare facilities, parks and homes. The interim action cleanup also addressed the most highly contaminated properties with lead soil sampling results of 800 ppm or higher. As in the time-critical removal actions, the remedial action objective of the IROD was to reduce the risk of lead exposure for young children such that there would be no more than a 5% chance of them having a blood lead level exceeding 10 µg/dL. The interim action approach continued the lead cleanup activities consisting of the excavation of soil with lead concentrations above 400 ppm, disposing of the contaminated soil at an off-site facility, backfilling the excavation with clean soil and restoring surface vegetation. The same steps in the early time-critical removal actions and the interim actions have been continued throughout the OLS to the present day.

In addition to addressing residential lead soil contamination the IROD allowed EPA to work with other organizations and agencies on a comprehensive remedy to tackle all identified sources of elevated lead exposures at the OLS. This effort included stabilization of deteriorating exterior lead-based paint at residential properties and testing of interior dust at residential properties where lead contaminated soils could contribute to interior lead dust loading. Public health education on the risks of lead for the Omaha community and for medical professionals to support awareness, assessment, diagnosis and treatment of unacceptable lead exposures was developed. The site is the only Superfund site in the country with a lead-based paint stabilization component in its remedy. The justification for including lead paint stabilization in the remedy was that chipping lead-based paint on the exterior of buildings could contaminate or even re-contaminate soil in the drip zone along residential building foundations.

This multi-pronged interim action remedial approach to tease out the individual sources of lead exposure, as well as a robust public outreach education campaign, has been vitally important for connecting residents living in the 27-square-mile site area with resources to assess the potential for lead exposure and to mitigate those risks through treatment by encapsulation or removal.

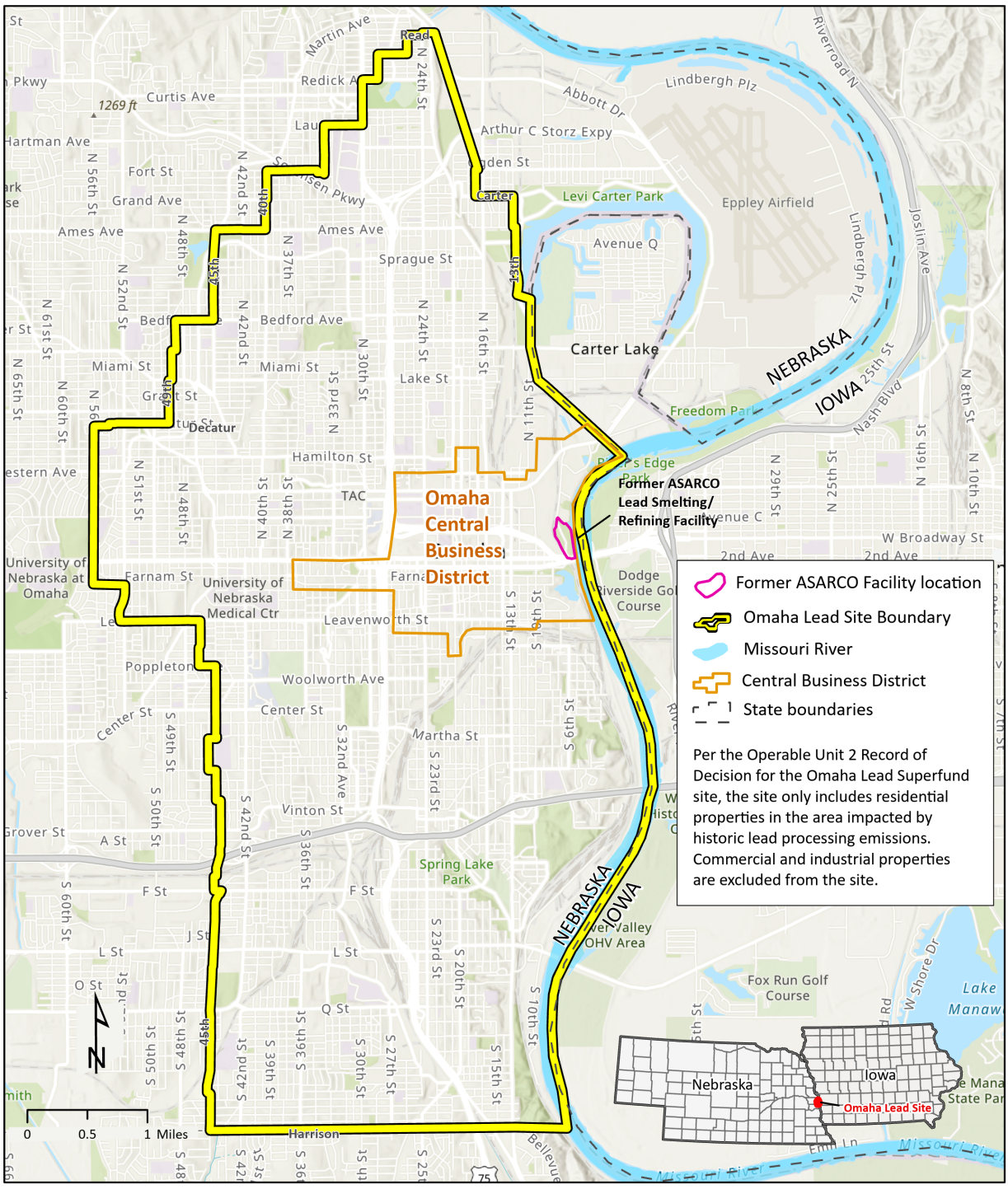
CERCLA

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is the law passed by Congress on December 11, 1980, that is commonly known as Superfund.

The NPL listing includes a general boundary of about 27 square miles, encompassing residential and non-residential properties. EPA has defined the site as including only residential and residential-type properties where the concentration of lead in surface soil is determined to be 400 ppm or greater, based on soil sampling. This definition may be modified due to potential future policy changes, such as any changes emerging from the National Lead Policy review underway at the writing of this case study.

The primary mechanism of contamination was deposition of airborne contaminants from smokestack emissions. Therefore, the lead concentrations in soil generally decrease with depth. Residential properties where surface soil sampling detected lead concentrations below 400 ppm and commercial and industrial properties are not considered to be part of the site. The entire downtown Omaha Central Business District is excluded from the site (as seen in the site map on the next page).

Omaha Lead National Priority List (NPL) Superfund Site



The Environmental Protection Agency does not guarantee the accuracy, completeness, or timeliness of the information shown, and shall not be liable for any injury or loss resulting from reliance upon the information shown.

Basemap: Esri, NASA, NGA, USGS, FEMA, County of Douglas, NE, Pottawattamie County, Iowa, Iowa DNR, Nebraska Game & Parks Commission, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA

HM 3/30/2023

A map of the Omaha Lead site delineating the site boundary and the excluded downtown area.

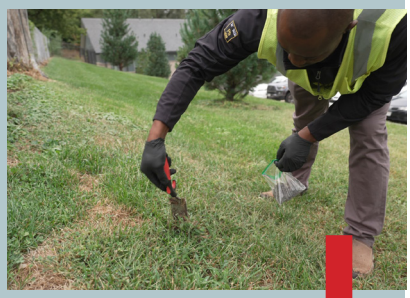
Residential Land Use: More than just Homes

EPA's definition of residential-type properties includes single- and multi-family dwellings, apartment complexes, childcare centers, vacant lots in residential areas, schools, churches, community centers, parks, greenways and any other areas where children may be exposed to site-related contaminated media.

Source: EPA's Superfund Lead-Contaminated Residential Sites Handbook (https://www.epa.gov/superfund/lead-superfund-sites-guidance#residentialsites).

Removal Action Steps

Step 1: Soil sampling determines which properties require cleanup and their priority.



Step 2: Soil contamination at properties requiring cleanup is excavated and taken off site for disposal.

Step 3: Clean backfill is placed in the excavated area, followed by sod to restore vegetation.

After learning about lead exposure risks, parents of children living on site were eager to do everything possible to mitigate risk and protect children's health. Union Pacific Railroad was identified as one of the OLS's lesser contributors of lead contamination from the general notice letters in 2002. In 2004, to increase outreach and awareness and strengthen community engagement as part of the EPA's remedial decision-making process the Union Pacific Railroad sponsored a Community Advisory Group (CAG). The formation of a CAG was only part of Union Pacific Railroad's response to CERCLA enforcement actions within the OLS.

After issuing the IROD in December 2004, EPA issued special notice letters to the most significant polluters identified as PRPs requesting payment for past removal costs and to require that the PRPs begin cleanup actions under the IROD. While awaiting the PRP response, EPA continued its interim actions and proceeded with Superfund Trust funding to address the threats posed by the OLS lead contamination.

EPA also established two public information centers on site in 2004. EPA staffed the centers with bilingual personnel and published fact sheets about the site and the Superfund program in English and Spanish.

Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin or income, with respect to the development, implementation, and enforcement of environmental laws, regulations and policies. This goal will be achieved when everyone enjoys:

- The same degree of protection from environmental and health hazards.
- Equal access to the decision-making process to have a healthy environment in which to live, learn and work.

For more information about environmental justice at EPA, please visit www.epa.gov/environmentaljustice.

Did you know?

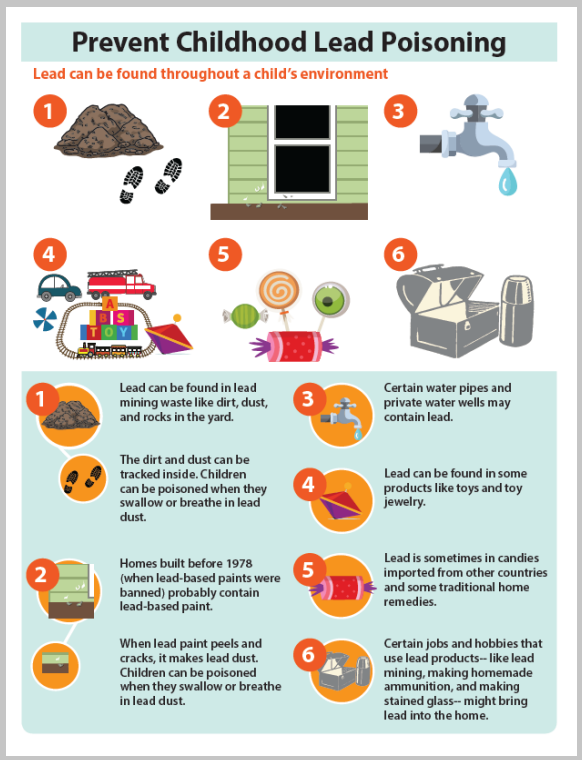
Many of the neighborhoods and communities within the site boundry have environmental justice concerns. About 53% of people living on site are considered low income, compared to the state poverty rate of 28%. The unemployment rate is 7%, with about a quarter of people having less than a high-school level of education. An estimated 10% of people living on site are considered liguistically isolated, with Spanish being the predominant non-English language. About 57% of people living on site are people of color.

Source: EJScreen: Environmental Justice

Screening and Mapping Tool (www.epa.gov/ejscreen).

Children's Health Impacts from Lead Exposure

Exploration of the physical environment is a natural developmental process for young children, who often put their hands and other objects in their mouths. The concern emerges when they may inadvertently ingest lead from dust or soil on their hands or other objects. Given their higher contact rates with soil or dust, young children are most susceptible to lead exposure because they absorb lead more readily than adults and are more sensitive to the adverse effects of lead than are older children and adults. The effect of greatest concern in children is impairment of their developing brains and nervous systems, including learning deficits, reduced intelligence and adverse effects on behavior. Lead can harm a wide variety of organ systems including the nervous, cardiovascular, kidney, immune, hematological, reproductive and developmental systems. Exposure to lead is also likely to cause cancer.



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Source: EJScreen: Environmental Justice

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Lead-Based Paint Nuisance Ordinance

In 2012, Omaha City Council amended the Omaha Municipal Code to add lead-based paint and other lead-based finishes and coatings as a hazard and "nuisance" when it is located on the interior or exterior of a home when it is accessible, or may become accessible, to ingestion or inhalation. Once notified of a lead-based paint nuisance, a designated city officer or DCHD representative will present a notice to abate. If the person served the notice does not abate the nuisance within a specified time or request a hearing, the city will abate the nuisance and bill the responsible party. Penalties for failure to abate include fines of up to $500 and/or imprisonment for up to six months for each day the nuisance remains.

Interim Remedial Actions Prioritize Vulnerable Community Members

2005 to 2009

EPA started the interim remedial action cleanup in July 2005; In August 2005, the American Smelting and Refining Company, Inc. (ASARCO), later identified as the largest contributor of lead contamination within the OLS, filed for bankruptcy. In August 2006, the United States filed a proof of bankruptcy claim on behalf of EPA in the United States Bankruptcy Court for the Southern District of Texas to recover past Agency costs, as well as projected future costs associated with the cleanup of the OLS. ASARCO was responsible for cleanup at 20 Superfund sites across the United States, including the OLS. ASARCO was the largest environmental bankruptcy in U.S. history at the time, when EPA, along with other federal and state agencies, pursued and received $1.79 billion to fund cleanup and restoration of properties contaminated by ASARCO under its bankruptcy reorganization. ASARCO was party to several settlement agreements, including the Residual Sites Settlement resolving claims pertaining to past and future cleanup costs at three sites: Omaha Lead, Coeur d'Alene and Tacoma, Washington. The $880 million settlement resulted in ASARCO providing $220 million for lead cleanup within the OLS.

EPA also settled with other site responsible parties to recover cleanup costs for the OLS. In 2011, Union Pacific Railroad provided $21.35 million, roughly half for EPA and half for the City's lead paint remediation work and DCHD's blood lead level screening work with children. About $3 million also went towards creation of the Omaha Healthy Kids Alliance, a non-profit educational program about lead paint hazards and hazard remediation to improve children's health in Omaha. Gould Electronics, Inc. also paid EPA $1.1 million in 2011. NL Industries paid EPA $624,000 in 2012 and Aaron Ferer & Sons Company paid $480,000 to EPA in 2013.

Omaha Lead Registry Dashboard Statistics

42,840 properties sampled
165 properties to be sampled

13,548 properties remediated
563 properties to be remediated

414,091 cubic yards remediated

6,467 paint stabilizations

Source: Data from Omaha Lead Registry Lead Activity Summary: https://lead-registry.cityofomaha-ne.gov/en-US/summary. Accessed November 21, 2022.

Under the IROD EPA continued cleanup efforts at residential properties with lead contamination within the OLS and commissioned further studies. In May 2007, a study called the "Analysis of Lead Sources in the Omaha Lead Site Area: Total Lead Emissions from the ASARCO Smelter in Comparison to Other Industrial Sources, Lead Paint and Leaded Gasoline" was finalized. The expert report concluded that the ASARCO plant, in its 125 years of operation along the Missouri River discharged 168,830 tons of lead particles via smokestack emissions into the air. The report also concluded the Aaron Ferer & Sons/Gould Inc., smelter operated for 30 years near the same location as the ASARCO smelter on the Missouri River and discharged an additional 1,203 tons of lead particles via smokestack emissions into the air.

The IROD allowed for the excavation, backfill and restoration cleanup approach initiated in the prior removal actions to continue at the most highly contaminated properties and properties with a high potential for child exposure to lead. Concurrent with the cleanup, EPA continued sampling residential properties impacted by lead contamination and using information gathered to develop a preliminary remediation goal for the site and to support the final remedy selection in the final Record of Decision (ROD).

Partnering to Develop Comprehensive Remedy Approach

2009 to 2015

EPA

The final Record of Decision (ROD) for the Omaha Lead Site was signed in May 2009. The remedy in the ROD continued the activities of sampling residential properties, excavation of residential soil contaminated by lead, backfill with clean soil and restoration of the residential property to unrestricted use. The final ROD also includes the development of a public-facing website as an Institutional Control (IC) where interested parties could look up the investigation and cleanup activities performed at residential properties.

EPA began implementation of the final remedy from the ROD in June 2009, continuing its soil residential sampling and cleanup efforts within the OLS through 2015. The EPA's efforts from the initial start of the time-critical removal actions in 1999 through the actions required in the 2009 ROD continuing until 2015 resulted in:

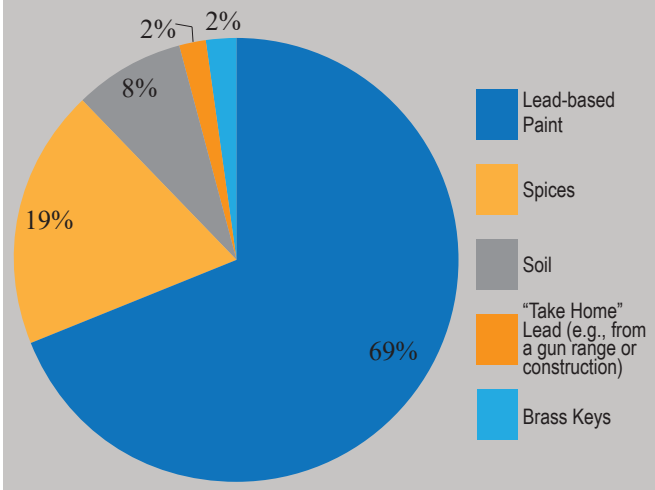
- Sampling for lead contamination in soil at 42,161 residential properties,
- Soil cleanup at 13,090 residential properties where soil samples exceeded the 400 ppm action level for lead,
- Removal of 405,981 cubic yards of lead contaminated soil,
- Indoor dust sampling at 3,173 residential properties,
- Sampling for exterior lead-based paint at 12,050 residential properties, and
- Stabilization of exterior lead-based paint at 6,324 residential properties.

EPA worked extensively with the Omaha community, participating in speaking engagements, citizen group and city council meetings, local public access television shows, and coverage on radio and television and in local newspapers. EPA staff sent out mass mailings of information materials, conducted public outreach by phone, led public meetings, and provided site information via EPA's webpage for the site. From 2004 to 2015, EPA operated two Public Information Offices within the OLS, staffing the offices with bilingual staff. The offices provided a walk-in office for the public to access and to pick up fact sheets in both English and Spanish.

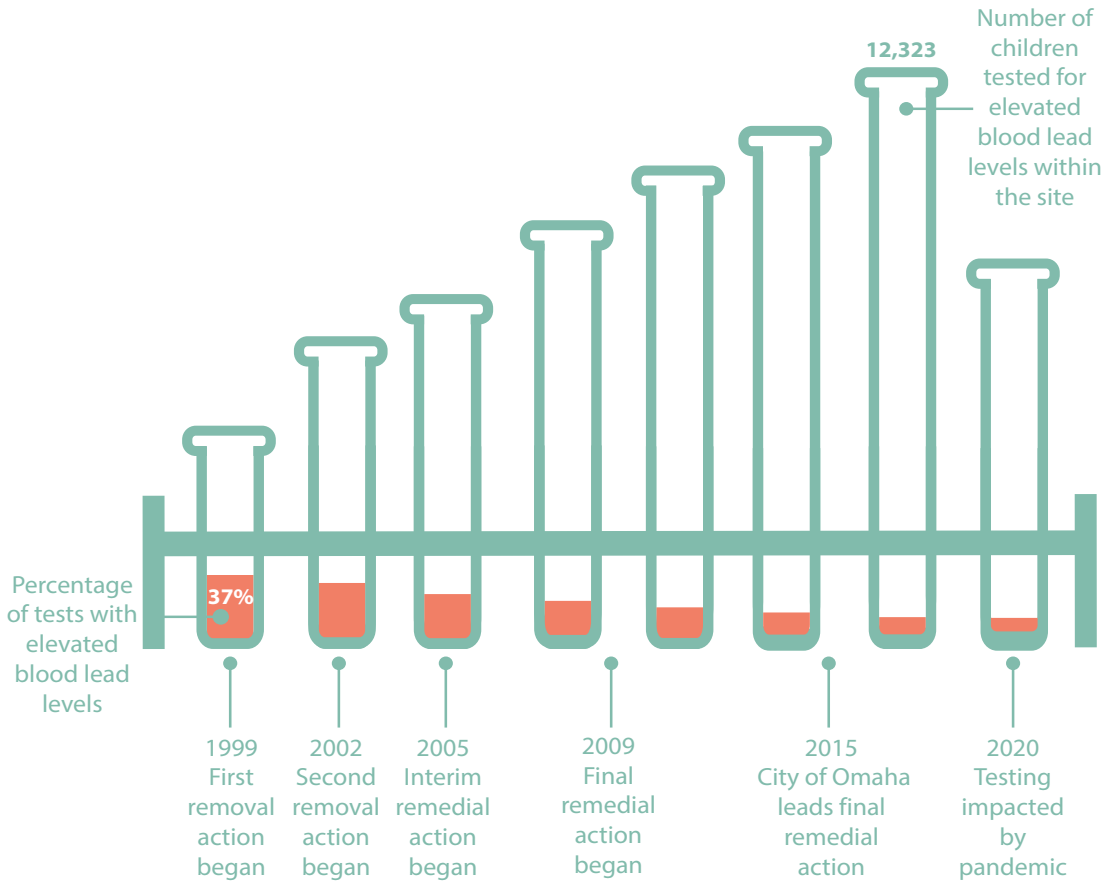
In 2015, the EPA worked to build on its partnerships with the City of Omaha and the Douglas County Health Department. The EPA would fund separate Cooperative Agreements with each entity to further its actions to protect human health and the environment within the OLS.

Did you know?

In 2021, elevated blood lead levels in children living in the OLS were attributed to the following sources:



Source: Douglas County Health Department



Over the past 20 years, community outreach efforts have resulted in greater numbers of children tested for blood lead levels. Education and awareness, as well as residential soil cleanup, have resulted in a marked decline in instances of elevated blood lead levels.

City of Omaha

In 2015, the EPA approached the City of Omaha to assume the management of the residential soil cleanup and lead-based paint stabilization, to develop the public-facing website identified as an IC in the final ROD, and to create a broad public education program on the hazards of lead. The City would perform these tasks through a Cooperative Agreement funded and overseen by the EPA. The city of Omaha committed to address the remaining phases of the final ROD, including ongoing efforts to collect soil samples, clean up the remaining eligible residential properties, conduct exterior lead-based paint stabilization, and develop a public-facing website and a broad public education program. The 2015 Cooperative Agreement with the City of Omaha provided seven years of funding with approximately $3.1 million awarded annually.

The city of Omaha implemented the development of the public-facing website and the broad public education program immediately. EPA does not have regulatory authority under Superfund law to address all potential lead exposures in communities. Soil contamination from leaded gasoline/airplane fuel emissions, indoor lead-based paint or even lead pipes do not fall under Superfund authority, but these sources of lead exposure can contribute to elevated blood lead levels in children. In the 2015 Cooperative Agreement, the city of Omaha agreed to undertake lead awareness and educational programming to inform the public about all possible lead sources and actions community members can take to mitigate possible risks.

The City also worked to gain access for sampling at the nearly 1000 residential properties within the OLS where EPA had been unable to gain access. The City anticipated that the residential property owners might be more comfortable interacting with the local government rather than a federal agency. The City has had success with gaining access at residential properties to sample for lead in soil. In September 2022, only 162 residential properties remain throughout the 27-square mile OLS to be sampled for lead contamination in soil. After development of the appropriate contracting mechanisms and City ordinances, the city of Omaha began implementation of the cleanup of lead

City of Omaha Lead Hazard Control Program

HUD supports the City of Omaha Lead Hazard Control Program, an initiative that mitigates interior lead-based paint hazards, including window and door replacement and paint stabilization, in homes at the site that are occupied by children ages seven and younger. For lead paint stabilization activities that do not fall under Superfund remedial authority, the city coordinates with HUD through a partnership to bring in needed supplies and resources.

contamination at residential properties within the OLS in September 2017.

As of September 2022, the City has completed:

- Sampling for lead contamination in soil at 832 residential properties.
- Soil cleanup at 433 residential properties where soil samples exceeded the 400 ppm action level for lead.
- Removal of 7,568 cubic yards of lead contaminated soil.
- Stabilization of exterior lead-based paint at 214 residential properties.

The 2009 final ROD specified the need for a public-facing webpage as an institutional control to provide interested parties the ability to access information on lead investigation and cleanup activities at residential properties. In 2015, the EPA and the city of Omaha collaborated on the development of a new database and web-based application that is wholly owned by the city of Omaha, the Omaha Lead Management System (OLMS). The OLMS is an internal database for the City and is the primary data source for all Omaha Lead Site data. The City regularly shares updates of OLS site data with the EPA. The OLMS generates selected data for the City to publish on the public-facing webpage that went live in Spring 2020, the Omaha Lead Registry. The Omaha Lead Registry (OLR) is an online, publicly available database with information regarding the lead investigation and cleanup status of each of the residential properties within the OLS site boundary. The OLR provides information about soil cleanups as well as any lead-based paint stabilization efforts on individual property parcels. The city of Omaha's Lead Hazard Mitigation Manager, Steve Zivny, recalls transitioning its tracking program for impacts on housing to an interactive GIS tool. "We asked EPA to be a partner with us and they were very interested in getting involved. In fact, they helped fund the project. It was incredible to see this device we used to record things grow to be an actual useful tool for the public." The OLR , launched in June 2020 at www.omahalead.org, is the most detailed, comprehensive public-facing registry of its kind.

In addition to the specific functions specified in the final ROD, the city of Omaha is also playing a critical role in ensuring the long-term effectiveness of the cleanup. Clean soil at remediated properties acts as a barrier to prevent exposure to any remaining contaminated material in the subsurface soil. Under the 2015 Cooperative Agreement, the city conducts visual inspections of the soil surface and revegetated areas at residential properties where lead-contaminated soils are left at depth. The Superfund Law (CERCLA) requires that EPA identify disturbances of the final remedy specified in the ROD years after the cleanup has been completed. The results of the remedy inspections will be published by EPA in the upcoming Five-Year Review of the OLS in August 2024.

Douglas County Health Department

In 2015, the EPA approached the Douglas County Health Department (DCHD) to assume the management of the residential interior dust investigations at properties within the OLS where lead in soil had been identified over the 400 ppm lead action level. The aggregate reports compiled by the DCHD on childhood lead screening data have historically been an integral component of the EPA decision-making within the OLS. The EPA extended an offer of a Cooperative Agreement that would fund interior lead dust screening, fund blood lead screening for children 7 years and younger residing within the OLS (where the DCHD only reports aggregate data to the EPA), and fund education and outreach efforts to the medical community on the health hazards of lead exposures. The DCHD Cooperative Agreement would be funded and overseen by the EPA for seven years with approximately $1.1 million awarded annually.

The DCHD monitoring and summary reports of elevated blood lead levels of children under the age of seven residing within the OLS, has provided important insight into the effectiveness of cleanup efforts to date.

The DCHD established a Childhood Lead Poisoning Prevention Program and an Interior Lead Dust Program to improve public awareness about lead poisoning in Omaha. The EPA Cooperative Agreement supports the DCHD's Childhood Lead Poisoning Prevention Program as another tool to increase education and awareness of the risks of lead exposures, especially to children. The program encourages blood lead testing and provides inspection services to help community members identify sources of lead exposures within their homes as well as tools to mitigate identified exposure risks. Homes of children found to have elevated blood lead levels are the top priority for the program's inspection and risk abatement services. In addition, EPA funded an interior lead dust program through which DCHD provides lead education and a free HEPA vacuum cleaner to residents on properties with remediated soils. As of March 2022, the DCHD has helped address interior lead dust at 1,721 residential properties within the OLS. DCHD also conducts education and outreach to health care providers to increase awareness of the health effects of lead.

The two Cooperative Agreements funded and overseen by the EPA within the OLS have shown to be highly successful partnerships with committed and engaged local partners. The City of Omaha Lead Hazard Control Program and the Douglas County Health Department Childhood Lead Poisoning Prevention Program are great examples of federal, county and local partnerships that can provide local management of federal funds to further EPA's mission of protecting human health and the environment.

Collaboration Leads to Remarkable Progress

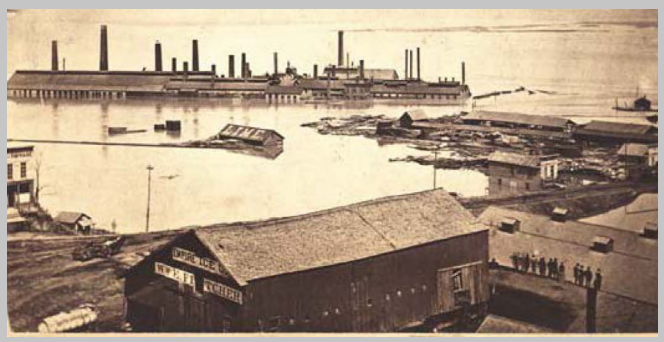
2015 to Present

DCHD data regarding the number of children tested for blood lead levels and the percentage with elevated blood lead levels have confirmed the progress made cleaning up the site. **In 1999, 36.6% of the 4,371 children tested had blood lead levels exceeding 10 µg/dL.** In 2020, 1.9% of the 8,223 children tested had blood lead levels exceeding 5 µg/dL.

Climate Change Impacts

EPA's 2021 Climate Adaptation Action Plan analyzed Superfund sites located near or within 100-year and 500-year floodplains, as well as Superfund sites within an area projected to see a 1-meter rise in sea levels. The screening analysis highlighted the vulnerability of Superfund site containment systems to climate change. At the former ASARCO facility, now Lewis and Clark Landing, lead-contaminated soil is contained in a lined cell, covered with several feet of clean soil and concrete. The remedy prevents the public from any potential exposure to the buried cells. The Site's location along the Missouri River means the former lead smelter and refinery experienced several floods during its 125 years of operation. The installation of flood walls vastly improved the facility's resilience to flooding events, as seen in the 1952 flooding images below, particularly compared to an 1881 flood event, before any flood protection measures were in place. Today, these flood walls remain in place, helping to protect the containment remedy. Looking forward, EPA will continue to engage with the Nebraska Department of Environment and Energy and the city of Omaha to monitor site conditions and evaluate any future strategies needed to ensure long-term remedy protectiveness in the face of climate change.

EPA's 2021 Climate Adaptation Action Plan is available at www.epa.gov/climate-adaptation/climate-adaptation-plan.



Former ASARCO facility underwater during the Missouri River flood of 1881. A group of workers is standing on a roof in the foreground (lower right). Image from Louis Bostwick and Homer Frohardt, used with permission of The Durham Museum.

Installation of flood walls helped protect the ASARCO facility from Flooding. Image from the Omaha World-Herald/John Savage Photography Collection at The Durham Museum, used with permission.

EPA's National Lead Strategy

In October 2022, EPA published its Strategy to Reduce Lead Exposures and Disparities in U.S. Communities. EPA developed the Lead Strategy to strengthen public health protections and address legacy lead contamination for communities with the greatest exposures. Engaging with communities across the country, as well as with federal, tribal, state and local government partners, was an integral part of developing the Lead Strategy.

The Lead Strategy sets out four goals:

1. Reduce community exposures to lead sources.
2. Identify communities with high lead exposures and improve their health outcomes.
3. Communicate more effectively with stakeholders.
4. Support and conduct critical research to inform efforts to reduce lead exposures and related health risks.

EPA is following three approaches to achieve these goals:

- Reduce lead exposures locally, with a focus on communities with disparities, and promote environmental justice.
- Reduce lead exposures nationally through protective standards, analytical tools and outreach.
- Reduce lead exposures with a "whole of EPA" and "whole of government" approach.

The Lead Strategy defines challenges to achieving each of these goals and identifies actions the Agency will take to address them. Despite great progress over the past few decades to reduce lead exposure, EPA still has important work to do, especially in communities already burdened by pollution and other stressors. Working locally, nationally and with a whole of government approach, EPA is determined to take ambitious actions that follow the science and advance justice and equity to rid communities of harmful lead exposure and the resulting toxic effects.

To learn more, please visit https://www.epa.gov/lead/final-strategy-reduce-lead-exposures-and-disparities-us-communities.

The most dramatic decline in elevated blood lead levels took place during EPA's two removal actions, with the percentage of exceedances of 10 µg/dL dropping from 36.6% in 1999 to 9.1% in 2004. Since 2015, the percentage of exceedances of the updated 5 µg/dL action level has been below 2%, regardless of the number of children tested. The other item of note in the DCHD data is the number of children who had a blood lead test. The lowest number of children tested was in 1999 (4,371). The highest number of children tested was in 2018 (12,440). The cleanup has dramatically reduced the potential for lead exposures, while the community outreach and education process has allowed more children to get tested and enabled earlier risk mitigation. Naudia McKracken, Supervisor of the DCHD's Lead Poisoning Prevention Program, credits EPA support for this dramatic reduction. "We have been able to do a great deal with the money from EPA. CDC funding is very limited and provides no capacity for home visits or doing investigations," she said. "We have been very fortunate to be able to provide that service for our communities and then to refer them to the Lead Hazard Reduction Program through the city for assistance."

On October 1, 2022, the EPA renewed the Cooperative Agreement with the Douglas County Health Department to continue their work for another seven years. A new Cooperative Agreement was awarded for $12.7 million in total with $1.3 million dollars awarded annually.

Local organizations have also played a key role reaching out to Omaha families. In response to the growing Latinx population in Omaha, EPA partnered with the University of Nebraska Medical Center's College of Public Health, and several Omaha community-based organizations to launch the Grassroots Latino Environmental Education Program (GLEE) in 2014. With the objective of sharing information about environmental hazards in Spanish, the program trained

Did You Know?

Since 2017, the Omaha Municipal Land Bank (OMLB) has worked to consolidate vacant, abandoned and dilapidated properties throughout Omaha. Envisioned as a redevelopment tool to help transform distressed properties into community assests, such as affordable housing and safe neighborhoods, OMLB works to clear liens and encumbrances, and sells the properties to the community as part of an "avenue to ownership." Multiple properties can be cobbled together through the Land Assembly program to create larger development areas. The OMLB teams up with local non-profit organizations to hold properties tax-free for up to one year for redevelopment. As part of routine real estate due diligence, OMLB works with the City and the Omaha Lead Registry to determine each parcel's lead sampling and cleanup status.

The Corporate headquarters for the OneWorld Community Health Centers is located on site at the Livestock Exchange Building Campus.
Source: OneWorld Community Health Center, used with permission.

Main entrance to the Refugee Empowerment Center.
Source: Refugee Empowerment Center, used with permission.

more than 40 *promotoras* (community health workers) to disseminate information to the Spanish-speaking community about the link between people's health and the environment where they live (and work). Over two years, the promotoras helped educate more than 1,000 Spanish-speaking Omaha residents, providing critical public health and safety information to this growing community group.

Adapting to a Global Pandemic

Outreach, education, screening, sampling and remedial efforts involved in the Omaha Lead site cleanup all rely heavily on direct personal interactions. With the emergence of the COVID-19 public health emergency, the DCHD had to transition to work from home and virtual home visits. DCHD staff would use programs such as WhatsAPP for virtual inspections and to communicate with residents of the home regarding lead awareness. With school closures resulting in more children spending significantly more time in the home, it was vital to adapt educational approaches. Many DCHD staff were also repurposed during the height of the pandemic, meaning fewer people were available to address greater educational needs. The DCHD reached out to refugee partners to help ensure the newest Omaha community members were educated and informed about lead exposure risks. Local non-profit, Restoring Dignity, stepped up to work with home visit staff and provide lead education to refugees and let the DCHD follow up, as needed.

From an all-time high of 21,500 children tested in 2019, blood lead level screenings also dropped dramatically due to the pandemic and limiting public interactions. The decline correlates with a similarly dramatic drop in child well visits. WIC clinics also were closed for two years to in-person visits, reopening in July 2022. These clinics serve a hard-to-reach and particularly vulnerable community demographic. As many schools and workplaces return to in-person schedules, the number of children being screened is also increasing, but numbers remain down and the DCHD is working to rebuild in-person networking to support screening more children, particularly in eastern Omaha.

The pandemic also meant limited resources and access to contractors who would assist with lead abatement projects in homes identified by the city. Contractor accreditations and training certifications lapsed, as well. Combined with the increase in material costs, even when appropriately trained contractors are available, there is no guarantee that necessary materials such as timber will also be available. This limited the work that could be done at homes identified as having high lead exposure risks. However, with DCHD staff back

Federal Opportunity Zones Spur Economic Growth

Congress established the Federal Opportunity Zones Program through the Tax Cuts and Jobs Act of 2017. The program authorized governors of each U.S. state and territory to nominate qualifying census tracts, or Opportunity Zones, to receive resources aimed toward spurring investment and economic growth in low-income and/or economically disadvantaged communities. Opportunity Zones can help revitalize contaminated and formerly contaminated properties, including Superfund sites. They attract private investment and strengthen the financial viability of redevelopment projects. Thirteen Opportunity Zones are located within the Omaha Lead site, highlighting the potential for long-term investment and economic growth.

in their usual roles and the city diligently applying for HUD resources to continues lead abatement projects, the program is rebuilding its capacity and plans to continue ramping up work.

Looking to the Future

With publication of the October 2022 *Strategy to Reduce Lead Exposures and Disparities in U.S. Communities*, EPA is taking further measures to address legacy lead contamination for communities such as those inhabiting the OLS through reducing exposures, improving health outcomes of vulnerable communities, employing more effective communication and education methods and supporting the critical research needed to reduce lead exposures and associated risks. The city of Omaha and DCHD are key local partners in these efforts, by continuing to lead cleanup, lead education and awareness efforts, connecting families with resources to diagnosis and address lead exposure risks and share monitoring data with EPA to document progress at the OLS.

Looking forward, EPA has asked the city to focus on two core areas of outreach: 1. Continued outreach and education regarding the Omaha Lead Registry, and 2. Continued property sampling and cleanup at appropriate properties. With an estimated 108 languages spoken in Omaha, the city has considered trying to reach refugees and non-native English speakers to ensure they feel comfortable, informed and supported. Outreach activities include:

- Partnering with the Omaha Children's Museum to host family nights at the museum for area public schools where the city can provide information to focal community groups and DCHD can do health screenings.
- Engaging with faith-based organizations and medical clinics to meet with smaller community groups.
- Participating in the Cinco de Mayo Festival Omaha to engage with Hispanic communities in the southern area of the Site.
- Participating in the Omaha Freedom Festival: A Celebration of Juneteenth to engage with African-American communities in the northern area of the Site.
- Developing a one-hour "brown bag" training for real estate professionals regarding the Site history and status, and how to use the Omaha Lead Registry. The Nebraska Board of Realtors has approved the training to count toward continued education unit credits to keep realtor accreditations active.
- Hiring locals from the community to assist with interpretation needs for public meetings and messaging so that communication is available in all necessary languages.
- Sharing messaging via radio, television, targeted web streaming, public service announcement videos describing why cleanups are needed and what that entails, mailers to targeted census tracts or zip codes, and more.

As the number of properties remaining to be sampled continues to decline, the city is working to secure access to properties that have been non-responsive over past years. These include property owners who live out of the area, pockets of community groups that are uneasy interacting with government officials and some groups that do not want to be involved in the sampling and cleanup efforts. The diverse members of the city's staff work across programs to help with outreach and interpretation so that wary property owners or tenants can always access a familiar, friendly face. The Nebraska real estate disclosure form includes mention of the Site history and asks if they buyers are aware of the lead status of the property they wish to purchase. The city also directly contacts new property owners to ensure they are aware of the Omaha Lead Registry, as well as the lead status of their new property.

Today, Omaha continues to be home to communities with environmental justice concerns, including a significant population of immigrants and refugees who settle in the city each year. The city has intentionally welcomed immigrants, recognizing opportunities to bolster the local workforce and spur economic revitalization. The Omaha Chamber of Commerce manages programs that attract a more diverse workforce to the area. Nebraska also ranks in the top 10 states per capita in terms of refugee resettlement, triple the national rate. The majority of refugees settle in Omaha or Lincoln. The five largest refugee groups come from Myanmar, Bhutan, Iraq, Sudan and Somalia.

The DCHD continues to provide lead awareness outreach throughout Omaha, attending many community events such as World Refugee Day and the University of Nebraska College of Public Health's Bridge to Care Health Fair. Whenever an elevated blood lead level (3.5 µg/dL or higher) is detected in a child, the DCHD engages by reaching out to the family, conducting a home visit and examining all potential lead exposures. EPA resources go towards providing soil lead level awareness, but, particularly in light of the number of refugees and immigrants in the Omaha area, screening and examination also extends to cultural products. In fact, in 2021 alone, imported spices contributed to about 20% of all elevated blood lead levels detected, second to lead-based paint, which accounts for almost 70% of exposures.

EPA and Reuse: Lessons Learned

Since the inception of the Superfund program, EPA has been building on its expertise in conducting site characterization and remediation to ensure that contamination is not a barrier to the reuse of property. Today, consideration of future use is an integral part of EPA's cleanup programs from initial site investigations and remedy selection through to the design, implementation, and operation and maintenance of a site's remedy.

At older sites, EPA did not focus on considering reuse during the cleanup design process. As the largest residential cleanup site in the country, EPA had no option but to factor in the ongoing residential and residential-type land uses into both their time-critical removal action and remedial action approaches. Thorough property sampling allowed EPA to develop a tiered cleanup approach, addressing the highest levels of soil lead contamination and the properties with children showing elevated blood levels first and reframing the scope of properties to be cleaned up as higher contamination levels and higher risk scenarios were addressed. Remediated properties with contamination remaining at depth have institutional controls to prevent exposure, but the vast majority of remediated properties have unrestricted uses. EPA continues to work with the city of Omaha and the DCHD to ensure continued residential uses remain safe for residents.

EPA also works with site stakeholders to consider how future land use considerations can inform the implementation and long-term stewardship of site remedies as well as cleanup planning. At some sites, for example, reuse considerations can inform the future location of groundwater monitoring wells and other operation and maintenance equipment that might inadvertently hinder redevelopment efforts. At other sites, detailed site reuse plans have provided additional benefits that save time and reduce redevelopment costs. For example, future infrastructure corridors or building footers can be installed in coordination with site cleanup activities.

For more information about EPA's Superfund Redevelopment Program, please visit www.epa.gov/superfund-redevelopment

Starting around 2016 or 2017, the DCHD began partnering with the Heartland Family Service Ready in 5 Program to work with parents and caregivers who are international refugees to assist them in preparing their children for success in American kindergarten. The program uses a preventative approach to target young children who are most vulnerable to lead exposure. If the home pre-dates 1978, the DCHD will offer to inspect the home for potential lead sources, offering resources for cleanup and providing vacuums, as needed. These visits also provide the opportunity to provide lead awareness education for cultural products, including spices, teas, herbs, kohl- or kajal-based eyeliner, or powder used for a bindi. Building a relationship with the University of Nebraska Medical Center has helped streamline testing of cultural products and has facilitated specific screening and sample-testing events in community gathering spaces.

With many county staff who are immigrants themselves, the DCHD can readily relate to how hard it can be to even find some of these cultural products, many of which are closely tied to cultural identity. If people want to continue using these products, they are encouraged to spread out exposure over time for adults and avoid use with children. Many refugees come from areas of the world hardest hit by wars, persecution or natural disasters, and their education levels are usually around 4th grade. Literacy rates are also variable. In some cultures, the word for the element "lead" may not even exist. The DCHD works closely with community interpreters to educate on translating both the

Routine activities at the ASARCO smelter and refinery in 1938. Pouring lead ingots, stamping Omaha & Grant name into cooling ingots, and loading and stacking ingots for shipment. Image from Louis Bostwick and Homer Frohardt, used with permission of The Durham Museum.

English language and the highly technical terminology into plain language that is more readily accessible to refugees. Interpreters from within the community also understand the culture, which helps them connect with newly arrived immigrants during home visits and helps "validate" the information being shared.

The DCHD has partnered with many clinics across the city to conduct blood lead level screenings. A contract with the Nebraska Methodist Nursing College supports screening and outreach events in city schools. The College began working with head start and early education programs, screening about 1,200 children per year. The DCHD also works with two federally qualified health centers in Omaha. The Charles Drew Health Center in north Omaha sees primarily African-American and refugee populations. The OneWorld Community Health Center in south Omaha sees primarily Hispanic populations. Both health centers have Women, Infants and Children (WIC) clinics, which are imperative for blood lead level screenings and education around mitigating lead exposure risks for the youngest members of the community.

OneWorld Community Health Centers

This organization's headquarters are located on site. It focuses on meeting the primary health care needs of the community, providing treatment regardless of an individual's income or insurance coverage, without differentiation or consideration of race, sex, disability, national origin, religion, sexual orientation, gender identity, immigration status or ability to pay. OneWorld offers a network of social/community support for patients through partnerships with other organizations, such as the Learning Community Center of South Omaha; the Women, Infants and Children (WIC) programs; the Immigrant Legal Center; and Saving Grace Perishable Food Rescue. The organization also offers support groups and classes for patients and participates in advocacy for underserved populations at local, state and federal levels. In 2019, 93% of OneWorld patients were considered low income; 51% were uninsured and 40% were under age 19.

Immigrant Legal Center (ILC)

Established in 1999, ILC is an affiliate of Justice for Our Neighbors, a network of 17 state chapters offering more than 40 legal clinics for immigration services. ILC welcomes immigrants to the community by providing high-quality legal services, education and advocacy. ILC's ultimate goal is to empower immigrants to be full participants in the community by providing them with access to the justice system.

Refugee Empowerment Center

This organization welcomes immigrants and refugees to Nebraska, helping newcomers settle in and maximize their potential. Support services include establishing healthcare providers, employment opportunity outreach, enrollment in English classes,

Did you know?

With less than 5% of remaining properties requiring remediation, the city has turned an eye to redevelopment with a $7.9 billion downtown revitalization effort to attract businesses, conventions and visitors. This project includes a $300 million riverfront revitalization project aimed at reconnecting the community with the Missouri River. The project, called The RiverFront, includes Gene Leahy Mall, Heartland of America Park and Lewis and Clark Landing, located in the footprint of the former ASARCO facility. Features planned for the 23-acre Lewis and Clark Landing include a children's playground, pickleball courts, an urban beach, sand volleyball courts, prairie gardens, a renovated marina and an event plaza. The park will reopen to the public in 2023. In 2021, The RiverFront earned the Envision® Platinum rating, the highest ranking available from the Institute for Sustainable Infrastructure, for the project's approach to environmental sustainability and resiliency.

driving classes, financial literacy, access to higher education and skill development, and civic and community engagement opportunities. It opened a new community center in 2020, with the goals of expanding social support networks, providing a shared creative space to share and celebrate cultures, and providing former refugees with the opportunities to give back to their new communities.

Lessons Learned

- The scale of cleanup at the Omaha Lead site is simply massive. It has included soil sampling and remediation for a 27-square-mile area, cross-walking results with risk scenarios, evaluating multiple sources of lead contamination, and then actually performing cleanup and following up to make sure the remedy remains protective. Several key factors have contributed to the success of the Superfund cleanup.

- EPA's Superfund program took a flexible approach at the site, combining removal action and remedial actions to rapidly jumpstart cleanup efforts and protect high-risk and vulnerable community members before the completion of all site investigations.

- Former Omaha Mayor Hal Daub had experience with the Superfund program and federal agency involvement from his prior tenure as a state senator. His insights facilitated negotiations with ASARCO that led to the closure of lead smelting and refining operations and to funding for the demolition and cleanup of the former ASARCO facility.

- DCHD continues to closely monitor blood lead levels in children and use various analyses to establish the higher-than-average concentrations of blood lead levels in children before sharing this information with the city. Comprehensive, accurate data help city officials understand the risk and scale of response required, facilitating timely communication and engagement with EPA.

- The city's close involvement with the ASARCO facility cleanup allowed the locality to plan ahead for a protective remedy that would facilitate redevelopment of the 23-acre property as a park that restores public access to the Missouri River.

- EPA staff conducted extensive outreach with Omaha communities affected by the site through local media, newsletters and fact sheets, public information centers, public meetings and other outlets.

- Local government agencies and community organizations implemented strategic outreach plans that focused on at-risk communities, providing lead awareness education and resources to mitigate risks.

- The city of Omaha stepped up to take over remaining cleanup efforts in 2015, anticipating that owners who had not granted EPA access to sample their properties might feel more comfortable working with local authorities. The city was able to sample about 90% of remaining properties over the next five years.

- EPA recognized the importance of a comprehensive cleanup approach in remedial documents, setting the stage for a multi-stakeholder approach to identifying and mitigating all potential sources of lead exposure.

Bigger Picture

There are also a range of broader lessons learned from the successful cleanup, continued use and planned redevelopment of the site that can help guide similar projects at contaminated lands across the country:

Public Health Comes First

ASARCO negotiated with the city of Omaha for it to take and remediate the former ASARCO facility property. However, lead contamination in residential soils extended far beyond the facility property bounds. Once the city notified EPA of elevated blood lead levels in Omaha children across 11 zip codes, EPA enforcement immediately reached out to ask ASARCO to take action to identify and address hazardous lead concentrations in residential property soils. Under EPA enforcement policy, the Agency strives to ensure that the polluter, not the taxpayer, pays

for environmental remediation and restoration. ASARCO, the primary PRP for the site, repeatedly refused to fulfill time-critical removal actions for the Omaha community or to conduct studies to support the interim ROD. ASARCO declared bankruptcy in 2005. EPA took the lead on site cleanup, with the intent to recover Agency costs later, because the situation required immediate action. EPA's tiered approach to short-term removal and long-term remedial actions resulted in dramatic reductions in the number of children with elevated blood lead levels. After a four-year legal battle, ASARCO emerged from bankruptcy and settled Omaha Lead site claims totaling over $220 million.

Community Partnerships Enable Comprehensive Cleanups that Reduce Cumulative Risk

EPA's 2005 Interim ROD provided a comprehensive remedy that relied on partnerships with other organizations and agencies to characterize and address all identified sources of lead exposure at the site. For example, EPA worked with DCHD and the city of Omaha on a process for lead characterization whenever a child exhibited elevated blood lead levels. DCHD, city staff and local nonprofit organizations responded to these situations by visiting the home of the child and testing to identify the lead sources. Property owners were then put in contact with a network of agencies, organizations and programs with resources to address specific lead sources. This comprehensive cleanup approach addressed not only airborne lead-contamination of soil but also lead-based paint, emissions and interior lead dust, resulting in a significant reduction of cumulative risk, at the Omaha Lead Superfund site and beyond.

Dare to Develop Unique Cooperative Agreements – DCHD

DCHD has been a long-time partner, compiling blood lead level data annually to share with EPA as part of a cooperative agreement. DCHD takes a hands-on approach to each case of a child with an elevated blood lead level. DCHD notifies the child's parent/guardian and physician, and continues to monitor blood lead levels until they drop below the CDC action level. DCHD staff spends time in the field, investigating and characterizing lead exposure sources, developing appropriate mitigation plans, and conducting follow-up visits to make sure required steps have been taken to remediate the source of lead exposure. DHCD's knowledge of local resources and programs available to mitigate sources of lead and provide community outreach helps address needs, irrespective of the soil lead contamination status. DCHD also provides education to families regarding the health effects of lead exposure in children, and ways to reduce and eliminate a child's exposure to lead.

Dare to Develop Unique Cooperative Agreements – City of Omaha

Through a cooperative agreement with the city of Omaha in 2015, EPA provided resources that enabled the locality to take the lead role in cleanup activities. The agreement enabled local government staff to perform outreach for soil sampling access agreements at about 1,000 properties where EPA did not have access. The city also manages a first-of-its-kind lead registry database that includes sampling and remedial work by EPA, the city and DCHD. This public-facing database provides key information about the status of individual properties. It facilitates coordination among city departments, and provides transparency regarding contamination and cleanup activities in the community.

Emphasize Health Education and Know Your Audience

Federal, state and local agencies have focused extensively on health education efforts in Omaha. These efforts include public awareness activities, exposure prevention programs, in-home assessments, blood-lead screening programs, and characterization, treatment and monitoring programs. The Omaha Lead site benefited from a multi-pronged community outreach approach that included local media coverage, public meetings, fact sheets and guides, grassroots nonprofit organization outreach, a CAG, door-to-door canvasing, and public information centers. Early indicators suggested the need for lead awareness education and that a rapidly growing Latinx community could benefit from bilingual resources. EPA placed bilingual staff in public information centers and translated key documents into Spanish. To further strengthen outreach in the local Spanish-speaking community, EPA supported OKHA's GLEE program to send promotoras into the community, ultimately reaching over 1,000 residents

Conclusion

Today, EPA's Lead Strategy is building on the strong partnerships, comprehensive cleanup approaches and widespread community outreach and education efforts already in place at the OLS. Since 1999, nearly 13,500 properties have been remediated and cleanup efforts continue. Elevated blood lead levels in children have dropped from 36% above an action level of 10 µg/dL to <2% above a revised action level of 5 µg/dL, with almost triple the number of children getting tested for blood lead levels today. With these milestones of remedial progress and protection of human health, the city of Omaha is looking to the future, investing over $7.9 billion in projects focused on community amenities and economic revitalization. The former ASARCO facility property will soon anchor Lewis and Clark Landing, a public riverfront park.

Programs managed by DCHD and the city of Omaha continue to investigate, characterize and mitigate lead exposures in homes, protecting public health and ensuring the long-term protectiveness of wide-ranging cleanup efforts . These exemplary partnerships with local agencies and nonprofit organizations and innovative outreach and cleanup approaches have enabled a comprehensive cleanup to reducing cumulative lead exposures. By implementing a tiered cleanup approach driven by addressing the highest lead concentrations and children with elevated blood lead levels, EPA prioritized resources to protect the public health of the most vulnerable community members. Engaging local partners to assist with community outreach and education has resulted in greater awareness and understanding of lead exposure risks.

In the future, should ongoing research about lead exposures and related health risks find that lead cleanup requires a change in approach or target action levels, the well-established network of contacts and outreach mechanisms will facilitate ease of communication and clarity about safety and risk management. This comprehensive cleanup approach with strong community involvement has set the groundwork for successfully addressing legacy lead contamination and associated risks in the OLS.

THE OMAHA LEAD SUPERFUND SITE IN OMAHA, NEBRASKA

INNOVATIVE PARTNERSHIPS AND HOLISTIC REMEDIAL APPROACHES PRIORITIZE COMMUNITY HEALTH

Sources and Resources

Sources

Images and maps for this case study are from the Trust for America's Health, the EPA, the Environmental Epidemiology Journal, the National Center for Healthy Housing, the University of Nebraska Medical Center, the Nebraska Department of Health & Human Services, the Durham Museum and the Douglas County Health Department.

Resources

EPA site profile page: www.epa.gov/superfund/omahalead

EPA Superfund Redevelopment Program: www.epa.gov/superfund-redevelopment

EPA Strategy to Reduce Lead Exposures and Disparities in U.S. Communities (draft):

www.epa.gov/lead/draft-strategy-reduce-lead-exposures-and-disparities-us-communities

Omaha Lead Registry: lead-registry.cityofomaha-ne.gov/en-US

DCHD Lead Poisoning Prevention Program: www.douglascountyhealth.com/lead-poisoning-prevention

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