Public Health Assessment

Gulf Mobile and Ohio Rail Yard

EPA Facility ID# ILSFN0507955

(Aliases: Mobile and Ohio Railroad Site and Former Greenberg Salvage Site)

Murphysboro, Jackson County, Illinois

Prepared by:

Illinois Department of Public Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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Summary

The Gulf Mobile and Ohio Rail Yard site is a former rail yard in a residential and light industrial area in the north-central portion of Murphysboro, Illinois. Greenberg Salvage operated on part of the former rail yard property. Greenberg's activities included salvaging and recycling automobiles, various machinery, and vehicle batteries. The battery recycling operation resulted in lead contamination in the surface soil. The Illinois Environmental Protection Agency (Illinois EPA) has closed the site and has fenced three parcels of land because of high lead levels in the surface soil.

The Meadows of Murphy was a 27-lot manufactured housing subdivision located on a portion of former rail yard property. Surface soil samples from residential yards in the subdivision contained elevated levels of lead, dioxin, polycyclic aromatic hydrocarbons, and pentachlorophenol.

Residents of the Meadows of Murphy subdivision and the surrounding area were exposed to site-related contaminants through inhalation and ingestion of contaminated soils and dust. Illinois EPA requested the U.S. Environmental Protection Agency conduct a time-critical removal action of contaminated soil in the Meadows of Murphy subdivision and the three closed, fenced parcels of land heavily contaminated with lead. The residents of the Meadows of Murphy subdivision have moved, and the removal action was completed on August 3, 2001.

The Illinois Department of Public Health considers the site a past public health hazard based on the level of contamination identified in the surface soil of the residential area and the closed areas. Community members are no longer exposed to the contamination from the site, and the emergency removal is complete. For that reason, the site does not pose a health hazard at this time. Recommendations to remove contaminated soil from the Meadows of Murphy subdivision and the three fenced parcels have been addressed. IDPH provided Meadows of Murphy residents health education and will continue to educate others in nearby communities on ways to reduce exposure to site-related contaminants as needed.

Purpose

The U.S. Environmental Protection Agency (USEPA) and the Illinois Environmental Protection Agency (Illinois EPA) requested that the Illinois Department of Public Health (IDPH) conduct a public health assessment for the Gulf Mobile and Ohio Rail Yard (a.k.a. Greenberg Salvage) site. The purpose of this public health assessment is to evaluate, based on the information currently available, any known or potential adverse human health effects if people are exposed to contaminants related to the site.

Background

Site Location

The Gulf Mobile and Ohio Rail Yard site is in the north-central portion of Murphysboro in Jackson County, Illinois (Attachment 1). The former rail yard is about 10 blocks in size and occupies about 40 acres. The former Greenberg Salvage property occupies approximately 4 acres of the former rail yard on Gartside Street between 17th and 19th Street. Most of the former salvage yard is on the north side of Gartside Street, but a small parcel is on the south side. Cox Trucking owns the portion of the property that contained the former salvage site.

The former rail yard included property between 17th and 19th Streets south of Illinois Avenue and north of Logan Street. Most of the area is residential, with a few commercial businesses and an industrial facility nearby. The Meadows of Murphy, a 27-lot manufactured home subdivision, is about 2 blocks in size southeast of the former salvage site. The subdivision was developed in the early 1990s on former rail yard property and contains two streets, Meadow Lane and Glover Lane.

Site History

The Mobile and Ohio rail yard was active from the late 1800s until 1925, when a tornado destroyed the property. Historical photos show the railroad continued to use portions of the property for the storage of equipment and railroad ties. Most of the railroad tie storage was on land later developed into the Meadows of Murphy subdivision.

The Greenberg Salvage operation was active from 1948 to 1980. Activities included salvaging and recycling automobiles, various machinery, and vehicle batteries (1). The battery cracking operation likely led to the contamination of surface soil with lead levels as high as 114,000 parts per million (ppm) (2). The lead contamination was discovered in June 1999 during an Illinois EPA investigation. Because of the elevated lead levels in the surface soil, Illinois EPA issued a seal order in October 1999 securing two parcels of property formerly occupied by the salvage operation. Illinois EPA fenced those areas and evaluated them for remediation. Illinois EPA also conducted a more extensive investigation of properties surrounding the former salvage site. Surface soil sampling in the Meadows of Murphy subdivision showed lead present at levels

ranging from 186 to 7,400 ppm (2). Elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) and pentachlorophenol (PCP) were also detected in surface soil samples from the subdivision.

To characterize the contamination in the Meadows of Murphy subdivision further, Illinois EPA conducted soil sampling in November 1999 and February 2000. Results of the soil samples confirmed the areas contaminated with elevated lead and PAHs. The soil samples also identified areas of dioxin contamination. The maximum dioxin level (reported as 2,3,7,8-TCDD or tetrachlorodibenzo-p-dioxin) identified in the surface soil in the subdivision was 17 parts per billion (ppb) (2). Illinois EPA sealed a third parcel of uninhabited land along the western boundary of the subdivision. It was secured by a fence to restrict access to high levels of lead in the surface soil. In March 2000, Illinois EPA requested USEPA conduct a time-critical removal action of contaminated soil in the Meadows of Murphy subdivision and the fenced lots near the subdivision.

In June 2000, the Canadian National Railway (CNR) as current holder of Gulf Mobile and Ohio Rail Yard liability agreed to accept responsibility to clean up the site. In September 2000, CNR began purchasing the residential properties of the Meadows of Murphy subdivision. On August 3, 2001, CNR completed the removal action at the site. The city is considering a plan to change the zoning of the Meadows of Murphy from residential to industrial.

Illinois EPA continues to evaluate other areas that may be contaminated on the former rail yard property.

Discussion

Chemicals of Interest

IDPH compared the maximum concentration of each contaminant detected during environmental sampling with appropriate screening comparison values to select contaminants for further evaluation for carcinogenic and non-carcinogenic health endpoints (3). Chemicals that exceeded comparison values were selected for further evaluation. A detailed discussion of each of the comparison values used is found in Attachment 2.

The comparison values are used only to screen for contaminants that should be evaluated further and do not represent thresholds of toxicity. Though some of these chemicals may exist at levels greater than comparison values, they can only affect someone who is exposed and receives a high enough dose for adverse effects to occur. Whether exposure to a chemical will cause adverse health effects depends on how much has entered the body, the duration of the exposure, how the chemical entered the body, and how the body responds. The chemicals of interest at this site are lead, dioxin, PAHs, and PCP.

Soil sampling activities at the site have included surface soil samples and soil borings using a geoprobe. Illinois EPA screened the borings with an X-ray fluorescence (XRF) field instrument to determine the extent and depth of metal contamination in the soil.

IDPH collected surface dust samples inside target homes in the Meadows of Murphy subdivision. Dust samples collected from eight homes in November 1999 were analyzed for lead. Dust samples collected from twenty homes in February 2000 were analyzed for dioxin. Lead and dioxins were not detected at levels greater than comparison values in any of the interior dust samples collected.

Exposure Pathways

Adverse health effects may occur when a contaminant reaches a receptor population through an exposure pathway. These pathways are separated into completed and potential pathways (4). Completed exposure pathways consist of five elements: 1) a source of contamination, 2) transport through an environmental medium, 3) a point of exposure, 4) a route of human exposure, and 5) an exposed population. Potential exposure pathways have at least one element missing, but the missing element could exist. Potential exposure pathways suggest that exposure could have occurred in the past, could be occurring, or could occur in the future. An exposure pathway is eliminated if one or more of the elements are missing and will never be present.

The completed exposure pathway associated with the site is summarized in Table 1. Likely routes of exposure to residents in the Meadows of Murphy subdivision include ingestion and possible inhalation of contaminated soils and dust during recreational activities. Because of their behavior and play, children ingest a certain amount of soil daily. Children who exhibit frequent hand-to-mouth activity may ingest much more soil. Adults ingest a small amount of soil daily through accidental hand-to-mouth transfer. Playing in the soil, gardening, or digging in contaminated soil will increase exposure to area residents.

Toxicological Evaluation

Lead

Exposure to lead can cause adverse health effects, especially for young children and pregnant women, since it is a neurotoxin that permanently interrupts normal brain development. Lead has no beneficial biological function and is known to accumulate in the body. No safe threshold has been identified. The U.S. Food and Drug Administration published a provisional tolerable daily lead intake value of 6 micrograms for a 10-kg child based on a blood lead level of 10 micrograms per deciliter. A survey of a variety of foods determined the average adult lead intake to be 54 micrograms per day (Fg/day) (5).

The primary exposure routes to lead are inhalation and ingestion. Lead is not readily absorbed through the skin. Children, especially those who are preschool age, are at particular health risk if

exposed to lead because they ingest more lead through normal hand-to-mouth activity, absorb more of the lead they ingest, and are most sensitive to its effects.

Lead exposure may cause learning difficulties and reduce the growth of young children. Exposure to lead is also dangerous for the fetus because lead can adversely affect the developing organ systems, particularly the nervous system. Lead easily crosses the placenta and appears in umbilical cord blood at nearly the same concentration as in the mother's blood (5). Lead exposure in middle-aged men may increase blood pressure.

The IDPH Lead Poisoning Prevention Code states that the permissible limit of lead in soil that is readily accessible to children is 1,000 ppm (6). Exposure to lead levels greater than 1,000 ppm in residential soil may increase lead uptake into the body. Lead levels as high as 7,400 ppm have been identified in soils in the Meadows of Murphy subdivision. Lead concentrations as high as 114,000 ppm have been identified in the soils of a currently sealed area.

Because levels greater than 1,000 ppm were detected in and near the subdivision, IDPH recommended that persons residing in the subdivision who play or work in soil have their blood tested for lead to find out if they were being exposed to lead in the soil. No individuals associated with the subdivision have been identified with elevated levels of lead in their blood.

Dioxins and Furans

Dioxins and furans are groups of chlorinated aromatic organic chemicals formed when household and industrial wastes are burned. Those chemicals also are formed when some pesticides are made and when paper pulp is bleached. Dioxins and furans can be found as contaminants in chlorinated compounds such as PCP and polychlorinated biphenyls (PCBs) (7).

The most toxic chemical in these groups is 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD). Many studies have been done on TCDD; however, little is known about most other dioxins and furans. To conservatively estimate the potential human health effects from exposure to the complex mixtures of dioxins and furans, toxicity equivalency factors (TEFs) were developed based on the compound's toxicity compared with TCDD (8). A TEF of 1 means the toxicity of the compound is the same as TCDD. A TEF of 0.1 means the compound is one tenth as toxic as TCDD. The total TEFs for all the dioxin and furan isomers are then compared with toxicity data for TCDD. IDPH and the Agency for Toxic Substances and Disease Registry (ATSDR) have determined that no short-term health effects would be expected from exposure to the levels of dioxins and furans detected in the surface soil in the residential area. The most obvious short-term health effect in persons exposed to large amounts of dioxins is chloracne, which is a severe skin disease with pimple-like sores that usually occur on the face and upper body.

The levels of dioxins found may pose a health risk over a long-term exposure. Studies of laboratory animals to determine the long-term effects of exposure to dioxins have shown that they may cause cancer. In 2001, the USEPA Science Advisory Board completed its review of the

draft report regarding the cancer classification of dioxins and has preliminarily determined that dioxin should be classified as a known human carcinogen (cancer-causing chemicals); however, there is currently no evidence that dioxins at the levels found near the site cause cancer in humans.

Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs are a complex group of chemicals that occur in the environment as mixtures of many components with widely varying toxic properties. They are associated with the burning of crude oil, coal, and gasoline, and are present in products made from fossil fuels, such as coal-tar, creosote, and asphalt (9). Benzo(a)pyrene (BaP) is one of the most potent PAHs and probably the most studied. Little is known about many of the other PAHs. USEPA developed TEFs for many of the PAHs based on their toxicity relative to BaP to estimate the potential for human health effects from exposure to mixtures of PAHs (10).

Because PAHs can accumulate in fat tissue and breast milk, nursing mothers could expose infants to PAHs excreted in the breast milk. Certain PAHs have been associated with cancer in laboratory animals. In addition to skin and scrotal cancer, PAHs have been linked to lung, bladder, and gastrointestinal cancers (9). Animal studies have demonstrated reproductive and developmental effects from PAH exposure, although these effects have not been seen in humans. Data are limited about how PAH exposure causes disease in humans.

Elevated concentrations of PAHs were detected in the residential surface soil. A maximum PAH concentration of 31 ppm was identified. IDPH determined that exposure to this level of PAH contamination in the soil may present a low increased cancer risk.

Pentachlorophenol (PCP)

PCP is a manufactured chemical used in industry as a wood preservative for power line poles, railroad ties, and fence posts. Long-term exposure to low levels can harm the liver, kidneys, blood, lungs, nervous system, immune system, and gastrointestinal tract (11). Although there is no strong evidence that PCP can cause cancer in people, the chemical has caused cancer in laboratory animals.

PCP was detected in residential surface soil samples at a maximum concentration of 91 ppm. IDPH determined that exposure to this level of PCP contamination in the soil should result in no apparent increased cancer risk or adverse health effects.

Health Outcome Data

IDPH reviewed a department database for children tested for lead as part of a statewide screening program. From 1994 to October 1999, 15 blood samples were collected from children living

along Meadow Lane and Glover Lane. Blood lead levels ranged from 2 to 11 micrograms per deciliter (Fg/dL), with an average level of 5 Fg/dL. In Illinois, any child with a blood lead level between 10 and 14 Fg/dL is tested again in a few months. If the confirmed blood level is at least 15 Fg/dL, case follow-up is conducted. If a blood lead level of at least 20 Fg/dL is detected, IDPH conducts an environmental investigation.

Because of the elevated levels of lead detected in the surface soil of the subdivision, IDPH recommended that children and adults with frequent soil contact residing in the subdivision have their blood tested for lead. The Jackson County Health Department (JCHD) agreed to collect the blood samples. As of December 1999, 8 children and 13 adults, representing 10 households, had their blood tested for lead. The children ranged from 2 years of age to 12 years of age. All of the blood lead levels were less than 7 Fg/dL (12).

Community Health Concerns

IDPH visited the site several times to assist Illinois EPA with sampling activities and to talk with residents in the target area. IDPH distributed a fact sheet entitled “Reducing Exposure to Contaminants in Soil” to residents along Meadow Lane and Glover Lane. In October 1999 and February 2000, IDPH and Illinois EPA held public availability sessions to meet with area residents and answer health-related questions and concerns regarding exposures to contaminants associated with the site. The following information is a summary of the health concerns expressed and our answers to these questions.

Should I let my children/grandchildren play in the yard?

Children who live and play in a contaminated area can have increased exposure. Preschool-age children are more likely to be exposed because of their frequent hand-to-mouth activity. By taking the following measures, you can protect your children from exposure:

- Wash children's hands and faces frequently, especially before eating and bed time. Keep their fingernails clean and short. Discourage children from placing fingers and non-food items in their mouths.
- Frequently clean toys or objects that children put in their mouths.
- Remove shoes upon entering your home to prevent tracking contaminated soil inside.
- Provide a covered sandbox to encourage play in the sandbox rather than digging in the soil.

Are adults at risk from exposure to contaminants in the soil?

Although children are at the greatest risk for exposures to soil contaminants because of their frequent hand-to-mouth activity, adults may also ingest a certain amount of soil daily, through accidental hand-to-mouth transfer. Activities such as playing in the soil, gardening, or excavating

contaminated soil could increase their exposure. To reduce or prevent exposure to contaminants in soil, adults should follow the same measures discussed above including practicing good personal hygiene habits and housekeeping techniques.

Can I eat vegetables grown in my garden?

The most important route of exposure to lead is through ingestion of contaminated soil and dust. In soils with high levels of lead, a small amount of lead could be taken up into the plant; however, the greater risk is eating contaminated soil and dust on the plant rather than uptake of lead by the plant. Before consuming any garden vegetables, you should thoroughly wash the produce.

Is anyone going to remove the contamination from my property and will I have to pay for it?

In March 2000, the Illinois EPA requested that USEPA conduct a time-critical removal action on two areas within the Mobile & Ohio rail yard in Murphysboro including the area known as the Meadows of Murphy subdivision. Appropriate cleanup measures were selected and implemented by USEPA. The Canadian National Railway bought the residential properties from the owners, and USEPA is overseeing cleanup of the properties. No costs were incurred by residents.

Are there any risks to my pets from exposure to soil contamination?

Research associated with a Granite City, Illinois, lead smelter site and surrounding area with lead contamination in the soil (greater than 5,000 ppm) involved sampling cats and dogs owned by individuals living near the site. Sampling results suggested living near the site and heavy soil contamination were not associated with high blood lead concentrations in pets (13,14).

Child Health Initiative

IDPH and ATSDR recognize that children are especially sensitive to some contaminants. For this reason, IDPH includes children when evaluating exposures to contaminants. Children are the most sensitive population considered in this health assessment because of their frequent hand-to-mouth play habits.

Conclusions

On the bases of the information reviewed, IDPH concludes the Gulf Mobile and Ohio Rail Yard site posed a past public health hazard for individuals contacting contaminated soil. The Meadows of Murphy, a residential subdivision, was on a portion of the former rail yard property. Currently, no one is being exposed to contaminants remaining on the site; therefore, the site currently poses no public health hazard. Results of blood and dust samples suggest current exposure to lead in

soil is minimal; however, these results are limited because they only capture recent exposures to lead. The blood test does not provide information on past or possible future exposures. IDPH educational efforts on reducing exposure to contaminants in soil may also have influenced lead levels.

On-site surface soil samples showed very high levels of lead. Dioxins, PAHs, and PCP were also detected at elevated levels in surface soil. On the bases of environmental investigations of nearby residential properties, residents may have been exposed to the contaminants in residential soil. Now that the contaminated areas have been remediated, future exposure should be eliminated.

Recommendations

IDPH recommended that USEPA remediate the Meadows of Murphy subdivision and the three fenced parcels of land heavily contaminated with lead. In September 2000, the Canadian National Railway began purchasing the residential properties of the Meadows of Murphy subdivision. Cleanup was completed in August 2001. The city is considering a plan to change the zoning of the Meadows of Murphy from residential to industrial.

Illinois EPA continues to evaluate other areas that may be contaminated on the former railyard property. IDPH will evaluate the public health implications of future sample results.

Public Health Actions

IDPH has undertaken public health actions to address issues and concerns about potential adverse human health effects associated with contaminants present at the site. The actions taken and recommended are described as follows:

- Illinois EPA collected environmental samples from residential areas. IDPH reviewed all sample results and provided written explanations to the affected homeowners.

- IDPH and Illinois EPA provided community health education by conducting community interviews with residents in the Meadows of Murphy subdivision and surrounding neighborhoods. IDPH distributed educational material including a fact sheet on how to reduce exposures to contaminants in soil.

- IDPH reviewed a department database for children tested for lead as part of a statewide screening program. From 1994 to October 1999, 15 blood samples were collected from children residing in the target area. No elevated blood lead levels were identified in this data set.

- On October 15, 1999, IDPH provided community health education through a public availability session. Other agencies present were Illinois EPA, the Jackson

County Health Department (JCHD), and representatives of the city of Murphysboro, Illinois.

- On November 17, 1999, IDPH staff collected environmental dust samples from nine homes in the target area for lead analysis. None of the samples contained elevated lead levels.

- IDPH conducted an exposure investigation at the site that included recommending that children residing in the Meadows of Murphy subdivision have their blood tested for lead. JCHD agreed to collect the blood samples. IDPH also allowed adults in the subdivision to be tested if they felt that they were routinely exposed to soil. As of December 1999, 8 children and 13 adults, representing 10 households had their blood tested for lead. The children ranged from 2 years of age to 12 years of age. All of the blood lead levels were less than 7 Fg/dL.

- On February 8, 2000, IDPH staff members participated in a press conference and a public availability session. Other agencies present were Illinois EPA, JCHD, and the city of Murphysboro.

- On February 15 and 16, 2000, IDPH staff collected environmental dust samples from twenty homes in the Meadows of Murphy subdivision for dioxin analysis. Dioxins were not detected at levels that might present a health hazard.

- On March 8, 2000, IDPH and Illinois EPA participated in a neighborhood meeting to discuss health concerns and the formation of a Citizen Advisory Group.

- IDPH will continue to educate persons living in the area on how to reduce exposure to site-related contaminants as needed.

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Certification

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

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

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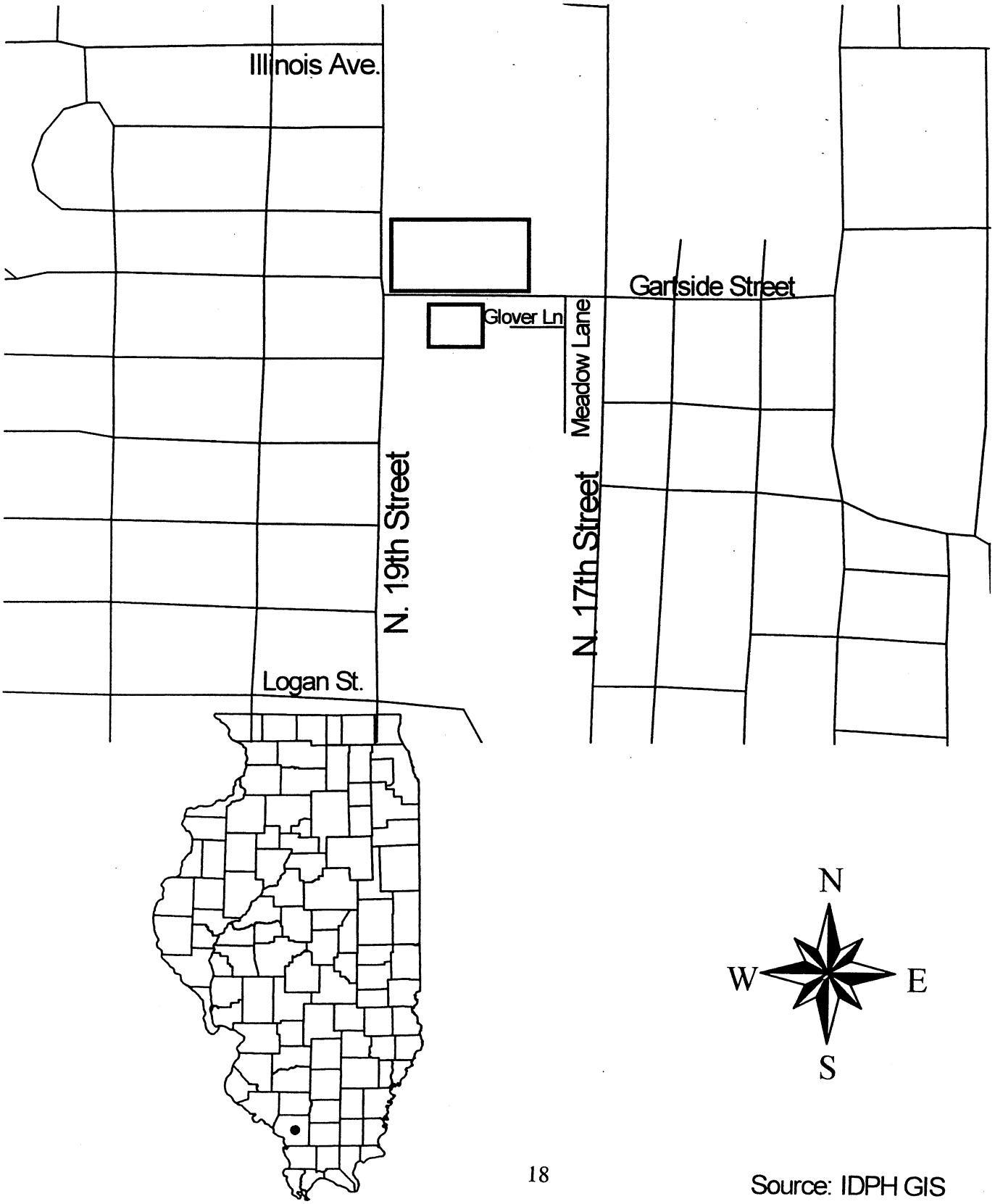
Tables

Table. Completed Exposure Pathway

Pathway Name	Source	Medium	Exposure Point	Exposure Route	Receptor Population	Time of Exposure	Exposure Activities	Estimated Number Exposed	Chemicals
On-site Surface Soil	Soil/dust	Soil	Yards	Ingestion Inhalation	Residents	Past Present Future	Outdoor recreation; Gardening; Lawn Mowing	100	Lead, Dioxins, PAHs, PCP

Attachments

Approximate Location of Former Greenberg Salvage Site



Source: IDPH GIS

Attachment 2

Comparison Values Used in Screening Contaminants For Further Evaluation

Environmental Media Evaluation Guides (EMEGs) are developed for chemicals based on their toxicity, frequency of occurrence at National Priorities List (NPL) sites, and potential for human exposure. They are comparison values used only to select chemicals for further evaluation. They are developed without consideration for carcinogenic effects, chemical interactions, multiple routes of exposure, or other media-specific routes of exposure. They are very conservative concentration values designed to protect sensitive members of the populations.

Reference Dose Media Evaluation Guides (RMEGs) are another type of comparison value derived to protect the most sensitive populations. They are developed without consideration for carcinogenic effects, chemical interactions, multiple routes of exposure, or other media-specific routes of exposure. They are conservative concentrations.

Cancer Risk Evaluation Guides (CREGs) are estimated contaminant concentrations based on one excess cancer in a million persons exposed to a chemical over a lifetime. These are also conservative values designed to protect sensitive members of the population.

Maximum Contaminant Levels (MCLs) have been established by USEPA for public water supplies to reduce the chances of adverse health effects from use of contaminated drinking water. These standards are well below levels for which health effects have been observed and take into account the financial feasibility of achieving specific contaminant levels. These are enforceable limits that public water supplies must meet.

Lifetime Health Advisories (LTHAs) have been established by USEPA for drinking water and are the concentration of a chemical in drinking water that is not expected to cause any adverse, non-carcinogenic effects over a lifetime of exposure. These are conservative values that incorporate a margin of safety.