

**Public Health Assessment**

**KOPPERS WOOD TREATING COMPANY  
GALESBURG, KNOX COUNTY, ILLINOIS**

**EPA Facility ID# ILD990817991**

**May 19, 2004**

**Prepared by**

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

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## **Summary**

The Koppers Wood Treating Company (Koppers) site is an active wood-treatment facility about 2 miles south of Galesburg, Illinois. For nearly 100 years the facility has treated “green” railroad crossties with organic chemicals. The site was placed on the National Priorities List (NPL) in September 1983 and since that time has undergone extensive testing and remedial activities.

Contaminated soil and sediments on the site have been remediated; however, contaminated groundwater still exists on the site. To date, off-site private drinking water wells have not been affected, and a groundwater-treatment system on the site should reduce the level of groundwater contamination over time.

The Illinois Department of Public Health (IDPH) concludes that the site poses no public health hazard. Currently, no one is being exposed to chemicals at levels that would be expected to cause adverse health effects.

IDPH recommends that the Illinois Environmental Protection Agency continue to monitor groundwater-remediation activities as planned to ensure that they continue to be effective in reducing groundwater contamination

## **Purpose**

The Agency for Toxic Substances and Disease Registry (ATSDR) requested that the Illinois Department of Public Health (IDPH) complete a public health assessment for the Koppers Wood Treating Company (Koppers) site. In September 1992, ATSDR issued an initial release public health assessment (1) prepared by IDPH, but no final release of this document was made. The purpose of this public health assessment is to update the status of the site and to evaluate, based on information currently available, any known or potential adverse human health hazards related to the site.

## **Background and Statement of Issues**

### **Site Location**

The Koppers site occupies about 105 acres in a rural area approximately 2 miles south of Galesburg in Knox County, Illinois (Figure 1). The active wood-treatment facility treats “green” railroad cross-ties with heat, pressure, creosote, and coal tar to make about one million railroad ties per year. The current tie-treating area occupies about 2 acres of the site. Most of the remaining property is used to store railroad ties.

The site is bounded on the west by Illinois Route 41 and on the north by Burlington-Northern railroad property (Figure 2). North and east of the site is a Burlington-Northern rail yard. The site is bordered by railroad tracks on the south. On-site ditches carry surface water off the site to Brush Creek, which flows southeast and empties into Lake Bracken about 2 miles downstream.

Directly southeast of the site, across the railroad tracks, is Steagall Landfill. In December 1988, IDPH released a public health assessment for Steagall Landfill and concluded that the integrity of the landfill was questionable because it was not properly closed and capped. Leachate from the landfill, and runoff from the Koppers site, were entering Brush Creek and carrying hazardous materials, including polychlorinated biphenyls (PCBs), to Lake Bracken. IDPH recommended that Steagall Landfill be properly capped and that leachate be prevented from reaching Brush Creek. Area residents were advised to avoid contact with Brush Creek sediments, and a fish advisory was established for Lake Bracken. Area farmers were advised not to allow livestock to use Brush Creek as a water source (2). Since that time, the landfill has been capped and a leachate collection system has been installed. The fish advisory continues for Lake Bracken.

The nearest rural home is about 0.25 miles east of the site and east of Steagall Landfill. Across the tracks and about 0.5 miles south along Illinois Route 41 are six more rural homes. Several other rural homes are within a 1-mile radius of the Koppers site. These homes use private wells for their drinking water supply.

## Site History

The Koppers site began operation in 1907 as a wood-treatment facility and was operated by the Burlington-Northern Railroad until December 1966. In the past, a 50:50 blend of creosote and number 6 fuel oil was used to treat the wooden railroad crossties. Today, various creosotes and creosote blends are used (3).

In 1965, a citizen complaint led to an investigation of disposal practices at the facility. In December 1966, Koppers Company leased the production plant from Burlington-Northern and took over operation of the facility. Wastewater from the tie-treatment process was discharged to creosote lagoons and from there to Brush Creek. In 1970, sampling of Brush Creek showed phenol contamination (3).

Once Koppers Company took over the facility, they changed many of the waste-handling practices. They closed and cleaned the lagoons, began recycling instead of disposing of used oil, and installed wastewater spray fields. From 1971 to 1976, pentachlorophenol (PCP) was used in one of the pressure treatment cylinders (3).

In December 1982, the Koppers site was proposed for inclusion on the National Priorities List (NPL) and was listed in September 1983. Chemicals of interest in the various environmental media were PCP, naphthalene, phenols, and polycyclic aromatic hydrocarbons (PAHs). The contaminated areas and media at the Koppers site included:

- ▶ a slurry pond,
- ▶ two creosote lagoons,
- ▶ a PCP lagoon,
- ▶ a waste pile storage area,
- ▶ the drip track area,
- ▶ two backfilled drainage ditches,
- ▶ two former spray wastewater fields,
- ▶ shallow and deeper groundwater,
- ▶ surface water, and
- ▶ on-site and off-site sediment (4).

In 1983, the PCP lagoon was pumped dry, the water treated, and contaminated soils removed and disposed of off the site. A Record of Decision presenting the selected final remedial action for the site was signed on June 28, 1989 (4).

In late 1988, Koppers Industries, Inc. (now Koppers Inc.) purchased the assets of the wood treating division of Koppers Company (Beazer East, Inc.) and became the site operator. Koppers Company and Burlington-Northern Railroad retained liability for the environmental conditions resulting from past operations and since 1989, the facility has moved forward with remedial activities. In December 1991, about 5,000 cubic yards of contaminated soil were removed from the drip track area and stored on the site in a lined storage cell for biologic treatment. In all, some 15,000 cubic yards of contaminated soil have been excavated and consolidated for on-site

biologic treatment. Biologic treatment was conducted by “land farming,” in which contaminated soil was spread over a 5-acre area and mixed with microbes, which digested and lowered the concentrations of organic contaminants. When soil treatment was successfully completed in late 1999, the “land farm” was closed, capped, and covered with grass.

Groundwater-interceptor trenches were installed in the southeastern portion of the site and air was injected into the aquifer to increase the level of dissolved oxygen in the groundwater. This allows for the reduction of PAHs in the groundwater through biologic degradation. For the deeper sand aquifer, magnesium peroxide was introduced to increase the oxygen level. Groundwater samples collected before, during, and after the pilot testing of this procedure showed PAHs in the aquifer were reduced from levels as high as 434 micrograms per liter ( $\mu\text{g/L}$ ) to less than 8  $\mu\text{g/L}$  (5). Contaminated drainage-ditch sediments were removed and replaced with a concrete drainage channel.

This biologic groundwater-treatment system will operate until remedial objectives of the Illinois Environmental Protection Agency (Illinois EPA) and U.S. Environmental Protection Agency (USEPA) are met.

A preliminary close-out report was completed and approved in September 2001. USEPA reports that the site is currently in the Operations and Maintenance phase. Human exposure and groundwater migrations are currently under control (6).

## Site Visits

IDPH staff have visited the Koppers site, Brush Creek, and nearby Steagall Landfill on many occasions. Several visits were made in the late 1980s and early 1990s, and again in 1999. The most recent site visit was on May 21, 2003. The Koppers facility continues operations and tens of thousands of “green” and treated railroad crossties are stored in stacks about 20 feet high. The “land farm” appeared to be covered with soil and vegetation.

At the western entrance to the facility on Illinois Route 41, IDPH staff noticed an odor of naphthalene coming from facility operations. Directly west of the Koppers entrance were three businesses: Smith’s Garden Center, Glenns’ Storage, and Treasures Flea Market. These businesses are on the former Wickes Lumber Yard property. Six homes are about 0.5 miles south of the Koppers entrance along Illinois Route 41.

IDPH staff followed the path of Brush Creek south and then southeast to where it crosses Township Road 46 and empties into Lake Bracken, about 2 miles downstream from the site. New homes with private wells were being built along Township Road 46, about 1.5 miles southeast of the Koppers site. The northern side of Lake Bracken was lined with residential homes, a golf course, a boat launch, and other recreational facilities.

## **Demographics**

Galesburg, with a population of 33,700, is the county seat of Knox County. The Koppers site is in a rural area about 2 miles south of Galesburg. About 80 persons live within 1 mile of the site (Figure 3). Homes closest to the site are older, rural homes. Homes farther south along Township Road 46 and many near Lake Bracken are newer, suburban-style homes.

## **Natural Resource Use**

Most land surrounding the Koppers site, if not used for rail purposes, is used for agriculture.

Lake Bracken, which is about 2 miles southeast of the Koppers site, is used for recreational activities including, boating, fishing and water sports. A golf course is north of the lake and several homes border the lake.

Sediments in the northwestern portion of Lake Bracken, where Brush Creek enters the lake, are contaminated with organic chemicals including PAHs and PCBs (2). Fish in Lake Bracken have tested positive for PCB contamination, and an advisory exists for certain fish species (7).

## **Discussion**

### **Chemicals of Interest**

IDPH compared the maximum level of each contaminant detected during environmental sampling with appropriate screening comparison values, when available, to select contaminants for further evaluation of both carcinogenic and non-carcinogenic health effects. An explanation of each of the comparison values used can be found in Attachment 1.

Comparison values are used only to screen for contaminants that should be evaluated further and do not represent thresholds of toxicity. Although some chemicals may exist at levels greater than comparison values, they can only affect a person who comes in contact with them and receives a high enough dose for adverse effects to occur. The amount of contaminant, duration and route of exposure, and the health status of exposed individuals are important factors in determining the potential for adverse health effects.

Chemicals of interest at this site are pentachlorophenol (PCP), naphthalene, and polycyclic aromatic hydrocarbons (PAHs). IDPH used the USEPA approach of relative potency factor to evaluate PAHs (8). Levels of the carcinogenic PAHs were converted to benzo(a)pyrene (BaP) equivalents based on their cancer potencies relative to BaP. BaP equivalents were then used to evaluate the potential for adverse health effects. Tables 1 and 2 show the levels of chemicals of interest in various media before remediation.

## **Soil**

Past treatment and disposal practices at the Koppers site led to soil contamination at various locations on the property. Areas of the treatment building, the drip track, the creosote lagoons, and the Burlington-Northern trestle had the highest levels of contamination (Table 1). The creosote lagoons and the trestle area are in the southeastern portion of the site where the greatest groundwater contamination exists.

In the 1990s, contaminated soil was treated and no longer contains elevated levels of contaminants.

## **Groundwater and Surface Water**

Groundwater at the site is contaminated with organic chemicals related to site operations. PAHs, naphthalene, and PCP were found at elevated levels (Table 2). Contaminants have been detected in both the shallow till aquifer and the deeper sand aquifer, but the greatest contamination is in the shallow aquifer. The greatest groundwater contamination is in the southeastern portion of the site.

Off-site private wells were sampled on several occasions in the past. PAHs were found in one well in the initial round of sampling in the mid-1980s (Table 2) but were not detected in any subsequent sampling rounds.

Surface water in Brush Creek and Lake Bracken consists of intermittent runoff from Steagall Landfill and the Koppers site. Samples collected from these bodies of surface water showed PAHs as the only chemical of interest (Table 2).

## **Fish**

A fish advisory for Lake Bracken was established in the late 1980s as a result of PCB contamination of lake sediments found during the environmental investigation of Steagall Landfill. The fish advisory remains in effect for largemouth bass, channel catfish, and carp. All sizes of carp and channel catfish larger than 15 inches should be limited to one meal per month. All sizes of largemouth bass and channel catfish less than 15 inches should be limited to one meal per week. As part of the statewide methyl mercury advisory, pregnant or nursing women, women of childbearing age, and children less than 15 years of age are advised to eat no more than one meal per week of predator fish (7).

## **Exposure Analysis**

IDPH evaluates human exposure pathways to determine the potential for the development of adverse health effects as a result of exposure to contaminants. Exposure pathways are separated into completed and potential exposure pathways. An exposure pathway consists 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) a receptor population.

In completed exposure pathways, all five exposure elements must exist, and exposure has occurred in the past, is currently occurring, or will occur in the future without some type of intervention. In potential exposure pathways, at least one element is 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 is missing and will never be present.

### **Completed Exposure Pathways**

Completed exposure pathways associated with the Koppers site are summarized in Table 3. On-site workers and trespassers may have been exposed to contaminated soil in the past, but on-site remediation has removed this exposure. IDPH estimated the exposure to contaminated on-site soil for an on-site worker and an occasional trespasser. For on-site workers, IDPH estimated a 70 kilogram (kg) adult worker would ingest 100 milligrams of soil per day (mg/day) for 100 days per year. For trespassers, IDPH assumed a 55 kg person would ingest 100 mg of soil per day for 20 days per year. Using the maximum level of contaminants in areas where workers might contact contaminated soil, IDPH found that no health hazards would be expected due to either of these exposure scenarios. On-site workers were more likely exposed to contaminants because of the process of treating railroad ties. No apparent increased risk of cancer would be expected for on-site workers or trespassers from incidental ingestion of contaminated soil.

Groundwater at the site is contaminated, but off-site sampling of private wells in the mid-1980s showed only one sample with a slightly elevated level of PAHs. PAHs were not detected in any subsequent sampling rounds. IDPH estimated the exposure for a resident near the site who, for one year, drank the maximum level of PAHs detected in that one sample. IDPH assumed a 10 kg child would drink 1 liter of water per day. No immediate health effects would be expected from the level of exposure in that scenario, and such short-duration exposure would not be expected to cause long-term health effects.

Certain fish in Lake Bracken remain contaminated with PCBs, but this was not a chemical of interest at the Koppers site. Based on available information, the Koppers site has not impacted area surface water. PCBs were found at the nearby Steagall Landfill site. A fish advisory is currently in effect for Lake Bracken based on PCB levels in fish.

### **Potential Exposure Pathways**

Potential exposure pathways associated with the site are summarized in Table 4. Because groundwater at the Koppers site is contaminated with organic chemicals, the potential exists for off-site migration to private wells. However, on-site treatment of contaminated groundwater should reduce the level of contamination over time and reduce the potential for off-site exposure.

## Health Outcome Data

No health outcome data have been generated for this site because of the small population surrounding the site. Larger study populations are required to provide significant health outcome statistics. In addition, current exposure to site-related chemicals is not at levels that would be expected to cause adverse health effects.

## Community Health Concerns

IDPH staff gathered community health concerns by talking with area residents, Illinois EPA staff, and local officials. The main community health concerns and answers are:

1. Is it safe to swim and eat fish from Lake Bracken?

Surface water samples suggest that it is safe to swim and boat in Lake Bracken. Because of PCB contamination, a fish advisory is in effect for largemouth bass, channel catfish, and carp in Lake Bracken. All sizes of carp and channel catfish larger than 15 inches should be limited to one meal per month. All sizes of largemouth bass and channel catfish less than 15 inches should be limited to one meal per week (7).

2. Will private wells near the site become contaminated?

Groundwater at the site is contaminated, but off-site sampling of private wells showed only one result in the mid-1980s with a slightly elevated level of PAHs. PAHs were not detected in any subsequent sampling rounds. Groundwater treatment under way at the Koppers site should reduce the potential for future exposure to contaminated groundwater.

A copy of the draft Public Health Assessment for the Koppers Galesburg site was available for public review and comment at Galesburg Public Library, 40 East Simmons Street, Galesburg from March 10, 2004 to April 23, 2004. No public comments were received.

## Child Health Considerations

IDPH recognizes that children are especially sensitive to some contaminants. For this reason, IDPH included children when evaluating exposures to contaminants at the Koppers site. Children are the most sensitive population considered in this health assessment; however, because of restricted access and groundwater treatment, children are not currently being exposed to contaminants from the site.

## Conclusions

From the information reviewed, IDPH concludes that current conditions at the Galesburg Koppers Wood Treating Company **pose no public health hazard**. Workers may have been exposed to contaminants in the past, but no adverse health effects would be expected from those

exposures. Currently, no one is being exposed to chemicals at levels that would be expected to cause adverse health effects.

Groundwater contamination remains on the site; however, treatment of this groundwater has begun and will continue until USEPA and Illinois EPA remediation standards are met.

### **Recommendations**

IDPH recommends that Illinois EPA continue to monitor groundwater-remediation activities as planned to ensure that they continue to be effective in reducing groundwater contamination.

### **Public Health Action Plan**

IDPH will review any additional data as it is generated to determine any potential health implications.

### **Preparers of Report**

#### **Preparers**

Ken Runkle  
C. Michael Moomey  
Environmental Toxicologists  
Illinois Department of Public Health

#### **Reviewer**

Jennifer Davis  
Environmental Toxicologist  
Illinois Department of Public Health

#### **ATSDR Regional Representative**

Mark Johnson  
Regional Operations, Office of the Assistant Administrator

#### **ATSDR Technical Project Officers**

Allen Robison  
Division of Health Assessment and Consultation

Steve Inserra  
Division of Health Studies

Sylvia Allen-Lewis  
Division of Health Education and Promotion

## References

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2. Illinois Department of Public Health. Health assessment for Steagall Landfill, Galesburg, Illinois. Springfield: Illinois Department of Public Health; Dec 1988.
3. Environmental Science and Engineering, Inc. Remedial investigation report, Koppers Company, Inc., Galesburg, Illinois. Gainesville, FL: Environmental Science and Engineering, Inc.; June 1986.
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8. Agency for Toxic Substances and Disease Registry. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta: US Department of Health and Human Services; August 1995.

### **Certification**

The Illinois Department of Public Health prepared this public health assessment for the Koppers Wood Treating site in Galesburg, Illinois, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was done in accordance with methods and procedures approved at the time the health consultation was begun.

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W. Allen Robison

Technical Project Officer  
Superfund Site Assessment Branch (SAAB)  
Division of Health Assessment and Consultation (DHAC)

### **ATSDR**

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

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Roberta Erlwein

Team Leader, State Programs  
SSAB, DHAC, ATSDR

## **TABLES**

**Table 1. Comparison values and maximum levels of chemicals of interest (mg/kg) in soil before remediation at various locations at Galesburg Koppers Co., Galesburg, Illinois.**

<b>Comparison values and sample locations</b>	<b>Pentachlorophenol</b>	<b>Naphthalene</b>	<b>PAHs as BaP</b>
Comparison value	6 (CREG)	1,000 (Child EMEG)	0.1 (CREG)
Treatment building area	540	ltcv	30.2
Drip track area	690	1,090	105
Existing spray field	38	ltcv	6.2
Old spray field	44	ltcv	2.8
North & south creosote lagoons	6,870	6,870	256.4
Burlington-Northern trestle area	2,500	5,770	158.5
Penta lagoon	87	ltcv	7.3
Burlington-Northern slurry pond	54	ltcv	6.9

mg/kg = milligrams per kilogram

PAHs = polycyclic aromatic hydrocarbons

BaP = benzo(a)pyrene

CREG = cancer risk evaluation guide

Child EMEG = environmental media evaluation guide for a child

ltcv = less than comparison value

**Table 2. Comparison values and maximum levels of chemicals of interest ( $\mu\text{g/L}$ ) in groundwater and surface water before remediation at Galesburg Koppers Co., Galesburg, Illinois.**

<b>Comparison values and media</b>	<b>Pentachlorophenol</b>	<b>Naphthalene</b>	<b>PAHs as BaP</b>
Comparison value	1 (MCL)	100 (LTHA)	0.2 (MCL)
Groundwater on the site	83,600	6,870,000	82,545
Groundwater off the site	ltcv	ltcv	4.6
Surface water	ltcv	ltcv	0.8

$\mu\text{g/}$  = micrograms per liter

PAHs = polycyclic aromatic hydrocarbons

BaP = benzo(a)pyrene

MCL = maximum contaminant limit

LTHA = lifetime health advisory

ltcv = less than comparison value

**Table 3. Elements of completed exposure pathways at Koppers Wood Treating Co., Galesburg, Illinois.**

Pathway	Source	Medium	Exposure point	Exposure route	Receptor population	Time of exposure	Exposure activities	Estimated number exposed	Chemicals
Surface soil	Koppers	Surface soil	On-site soil	Dermal Ingestion Inhalation	On-site workers; trespassers	Past	Working or trespassing on the site	25	PAHs PCP naththalene
Groundwater	Koppers	Groundwater	Private Wells	Dermal Ingestion Inhalation	Nearby residents	Past	Drinking, bathing, & other water uses	5	PAHs
Fish	Steagall Landfill	Fish	Lake Bracken	Ingestion	Residents consuming fish	Past Present Future	Eating contaminated fish	50	PCBs

PHA = polycyclic aromatic hydrocarbons

PCP = pentachlorophenol

PCB = polychlorinated biphenyls

**Table 4. Elements of potential exposure pathways at Koppers Wood Treating Co., Galesburg, Illinois.**

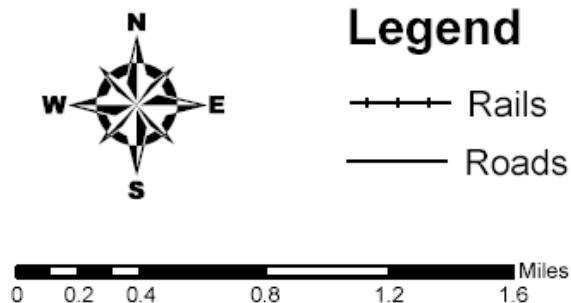
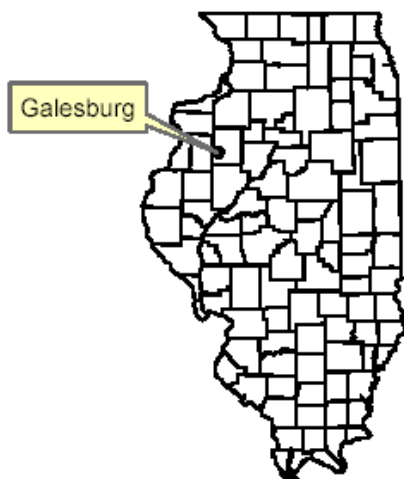
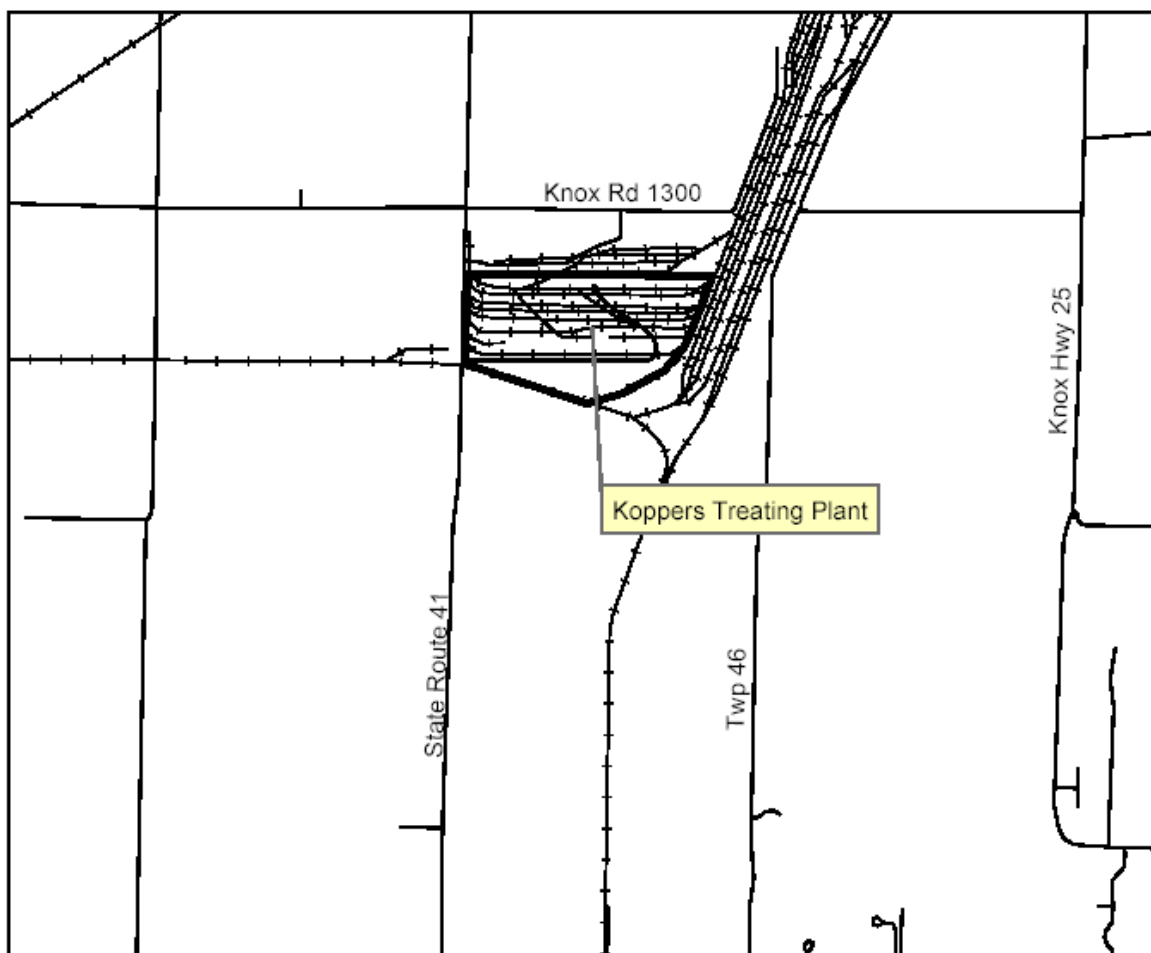
Pathway	Source	Medium	Exposure point	Exposure route	Receptor population	Time of exposure	Exposure activities	Estimated number exposed	Chemicals
Groundwater	Koppers	Groundwater	Nearby wells	Ingestion Dermal Inhalation	Nearby residents	Future	Drinking, bathing, & other water uses	20	PAHs

PHA = polycyclic aromatic hydrocarbons

## **Figures**

Figure 1

## Approximate Location of Koppers Galesburg Site



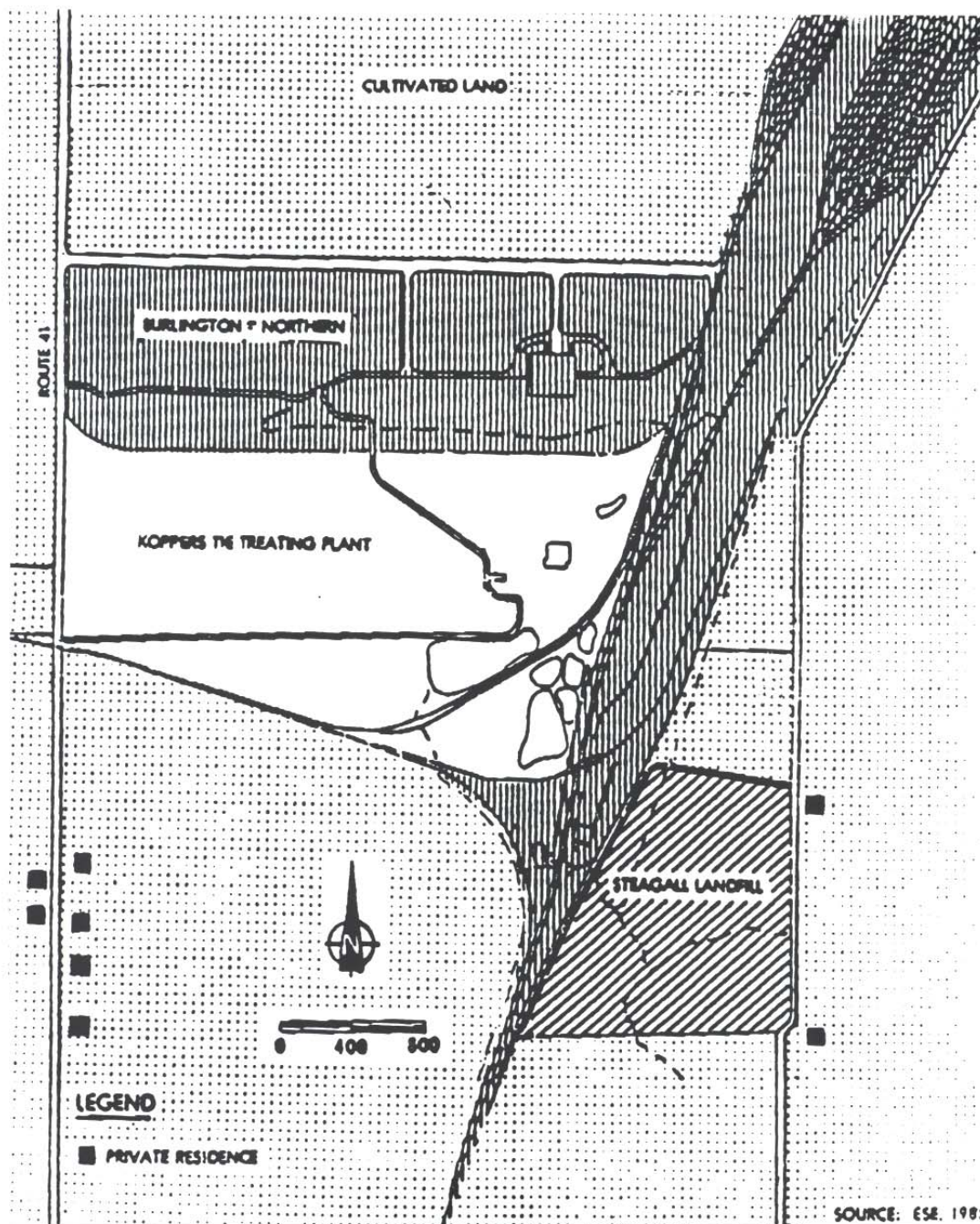
**Legend**

- +---+--- Rails
- Roads

Source: IDPH Toxicology Section

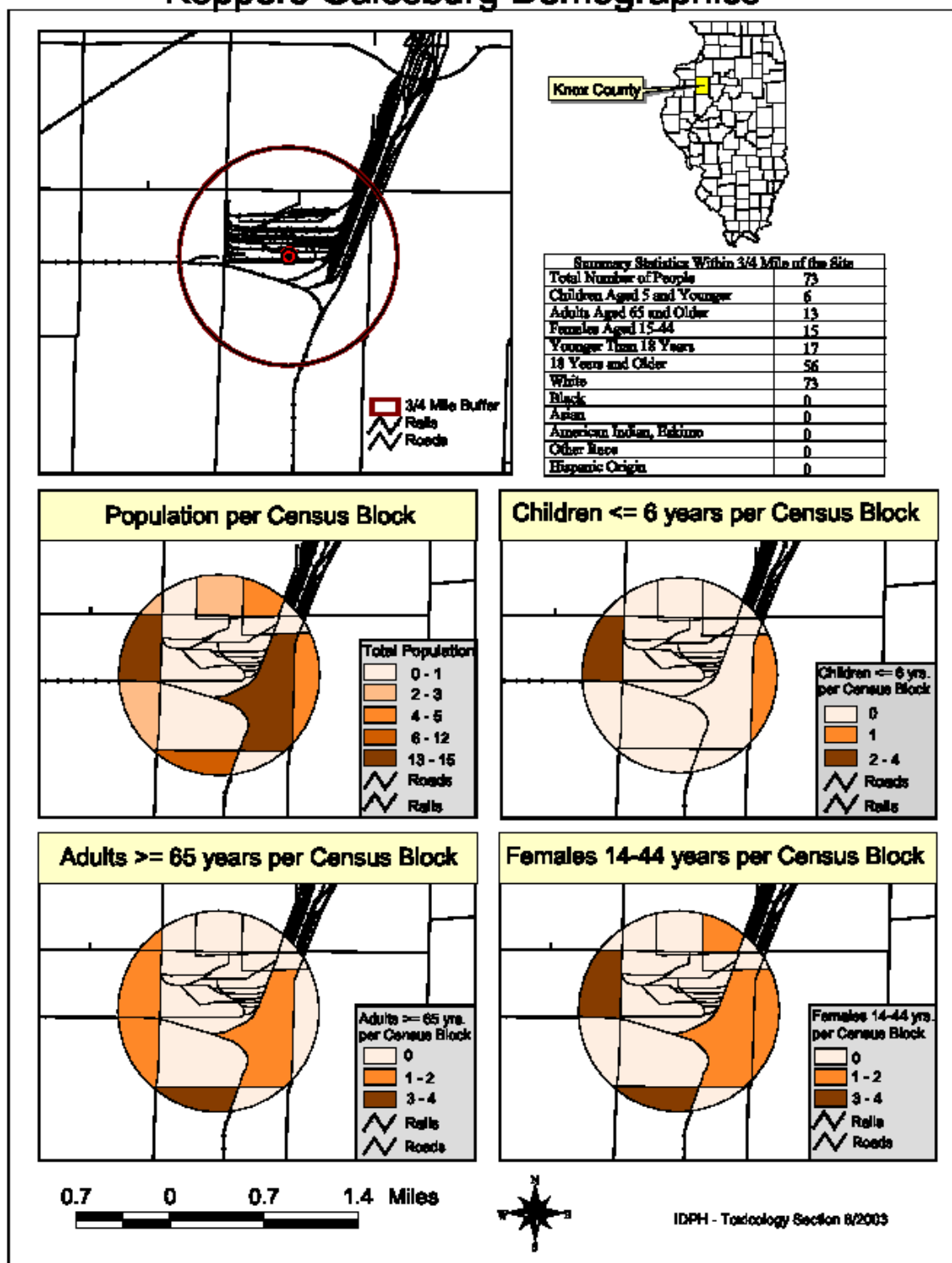
**Figure 2**

**Land Use Surrounding Koppers Galesburg Plant**



# Koppers Galesburg Demographics

Figure 3



**ATTACHMENT 1****Comparison Values Used In Screening Contaminants For Further Evaluation**

Comparison values (CVs) are the calculated levels of a chemical in air, water, food, or soil that is unlikely to cause adverse health effects in exposed people. CVs are used as a screening level during the public health assessment process. Substances found in amounts greater than their CVs might be selected for further evaluation in the public health assessment process.

There are three different types of comparison values, environmental media evaluation guides (EMEGs), reference dose media evaluation guides (RMEGs), and cancer risk evaluation guides (CREGs). These values are used to screen chemicals and determine those that need to be evaluated further.

Environmental media evaluation guides (EMEGs) are derived from minimal risk levels presented in ATSDR Toxicological Profiles. Standard exposure assumptions for children and adults (body weights; ingestion rates for water, soil and air; and frequency and duration of exposure) are used. Individual EMEGs do not consider cancer, chemical interactions or multiple routes of exposure. They do help to identify specific chemicals needing further evaluation.

Reference dose media evaluation guides (RMEGs) are derived from the oral RfDs developed by USEPA using standard exposure assumptions for children and adults (body weights; ingestion rates for water, soil and air; and frequency/duration of exposure). Like EMEGs, RMEGs do not consider carcinogenic effects, chemical interactions, or multiple exposures.

Cancer risk evaluation guides (CREGs) represent levels of environmental chemicals that may pose a  $1 \times 10^{-6}$  (one in a million) excess cancer risk. They are derived using cancer slope factors published by USEPA.

## ATSDR Glossary of Terms

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency with headquarters in Atlanta, Georgia, and 10 regional offices in the United States. ATSDR's mission is to serve the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases related to toxic substances. ATSDR is not a regulatory agency, unlike the U.S. Environmental Protection Agency (EPA), which is the federal agency that develops and enforces environmental laws to protect the environment and human health. This glossary defines words used by ATSDR in communications with the public. It is not a complete dictionary of environmental health terms. If you have questions or comments, call ATSDR's toll-free telephone number, 1-888-42-ATSDR (1-888-422-8737).

### General Terms

**Absorption**

The process of taking in. For a person or an animal, absorption is the process of a substance getting into the body through the eyes, skin, stomach, intestines, or lungs.

**Acute**-Occurring over a short time [compare with chronic].

**Acute exposure**

Contact with a substance that occurs once or for only a short time (up to 14 days) [compare with intermediate duration exposure and chronic exposure].

**Adverse health effect**

A change in body function or cell structure that might lead to disease or health problems

**Ambient**-Surrounding (for example, ambient air).

**Background level**

An average or expected amount of a substance or radioactive material in a specific environment, or typical amounts of substances that occur naturally in an environment.

**Biota**

Plants and animals in an environment. Some of these plants and animals might be sources of food, clothing, or medicines for people.

**Body burden**

The total amount of a substance in the body. Some substances build up in the body because they are stored in fat or bone or because they leave the body very slowly.

**Cancer**

Any one of a group of diseases that occur when cells in the body become abnormal and grow or multiply out of control.

**Cancer risk**

A theoretical risk for getting cancer if exposed to a substance every day for 70 years (a lifetime exposure). The true risk might be lower.

**Carcinogen**-A substance that causes cancer.

**Central nervous system**

The part of the nervous system that consists of the brain and the spinal cord.

**CERCLA** [see Comprehensive Environmental Response, Compensation, and Liability Act of 1980]

**Chronic**-Occurring over a long time [compare with acute].

**Chronic exposure**

Contact with a substance that occurs over a long time (more than 1 year) [compare with acute exposure and intermediate duration exposure]

**Cluster investigation**

A review of an unusual number, real or perceived, of health events (for example, reports of cancer) grouped together in time and location. Cluster investigations are designed to confirm case reports; determine whether they represent an unusual disease occurrence; and, if possible, explore possible causes and contributing environmental factors.

**Comparison value (CV)**

Calculated concentration of a substance in air, water, food, or soil that is unlikely to cause harmful (adverse) health effects in exposed people. The CV is used as a screening level during the public health assessment process. Substances found in amounts greater than their CVs might be selected for further evaluation in the public health assessment process.

**Completed exposure pathway** [see exposure pathway].

**Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)**

CERCLA, also known as Superfund, is the federal law that concerns the removal or cleanup of hazardous substances in the environment and at hazardous waste sites. ATSDR, which was created by CERCLA, is responsible for assessing health issues and supporting public health activities related to hazardous waste sites or other environmental releases of hazardous

substances. This law was later amended by the Superfund Amendments and Reauthorization Act (SARA).

**Concentration**

The amount of a substance present in a certain amount of soil, water, air, food, blood, hair, urine, breath, or any other media.

**Contaminant**

A substance that is either present in an environment where it does not belong or is present at levels that might cause harmful (adverse) health effects.

**Dermal**-Referring to the skin. For example, dermal absorption means passing through the skin.

**Dermal contact**-Contact with (touching) the skin [see route of exposure].

**Detection limit**

The lowest concentration of a chemical that can reliably be distinguished from a zero concentration.

**Disease registry**

A system of ongoing registration of all cases of a particular disease or health condition in a defined population.

**Dose (for chemicals that are not radioactive)**

The amount of a substance to which a person is exposed over some time period. Dose is a measurement of exposure. Dose is often expressed as milligram (amount) per kilogram (a measure of body weight) per day (a measure of time) when people eat or drink contaminated water, food, or soil. In general, the greater the dose, the greater the likelihood of an effect. An "exposure dose" is how much of a substance is encountered in the environment. An "absorbed dose" is the amount of a substance that actually got into the body through the eyes, skin, stomach, intestines, or lungs.

**Dose (for radioactive chemicals)**

The radiation dose is the amount of energy from radiation that is actually absorbed by the body. This is not the same as measurements of the amount of radiation in the environment.

**Dose-response relationship**

The relationship between the amount of exposure [dose] to a substance and the resulting changes in body function or health (response).

**Environmental media**

Soil, water, air, biota (plants and animals), or any other parts of the environment that can contain contaminants.

**Environmental media and transport mechanism**

Environmental media include water, air, soil, and biota (plants and animals). Transport mechanisms move contaminants from the source to points where human exposure can occur. The environmental media and transport mechanism is the second part of an exposure pathway.

**Epidemiology**

The study of the distribution and determinants of disease or health status in a population; the study of the occurrence and causes of health effects in humans.

**Exposure**

Contact with a substance by swallowing, breathing, or touching the skin or eyes. Exposure may be short-term [acute exposure], of intermediate duration, or long-term [chronic exposure].

**Exposure assessment**

The process of finding out how people come into contact with a hazardous substance, how often and for how long they are in contact with the substance, and how much of the substance they are in contact with.

**Exposure investigation**

The collection and analysis of site-specific information and biologic tests (when appropriate) to determine whether people have been exposed to hazardous substances.

**Exposure pathway**

The route a substance takes from its source (where it began) to its end point (where it ends), and how people can come into contact with (or get exposed to) it. An exposure pathway has five parts: a source of contamination (such as an abandoned business); an environmental media and transport mechanism (such as movement through groundwater); a point of exposure (such as a private well); a route of exposure (eating, drinking, breathing, or touching), and a receptor population (people potentially or actually exposed). When all five parts are present, the exposure pathway is termed a completed exposure pathway.

**Feasibility study**

A study by EPA to determine the best way to clean up environmental contamination. A number of factors are considered, including health risk, costs, and what methods will work well.

**Geographic information system (GIS)**

A mapping system that uses computers to collect, store, manipulate, analyze, and display data. For example, GIS can show the concentration of a contaminant within a community in relation to points of reference such as streets and homes.

**Groundwater**

Water beneath the earth's surface in the spaces between soil particles and between rock surfaces [compare with surface water].

**Half-life ( $t_{1/2}$ )**

The time it takes for half the original amount of a substance to disappear. In the environment, the half-life is the time it takes for half the original amount of a substance to disappear when it is changed to another chemical by bacteria, fungi, sunlight, or other chemical processes. In the human body, the half-life is the time it takes for half the original amount of the substance to disappear, either by being changed to another substance or by leaving the body. In the case of radioactive material, the half life is the amount of time necessary for one half the initial number of radioactive atoms to change or transform into another atom (that is normally not radioactive). After two half lives, 25% of the original number of radioactive atoms remain.

**Hazard-**A source of potential harm from past, current, or future exposures.

**Hazardous waste**

Potentially harmful substances that have been released or discarded into the environment.

**Health consultation**

A review of available information or collection of new data to respond to a specific health question or request for information about a potential environmental hazard. Health consultations are focused on a specific exposure issue. Health consultations are therefore more limited than a public health assessment, which reviews the exposure potential of each pathway and chemical [compare with public health assessment].

**Health education**

Programs designed with a community to help it know about health risks and how to reduce these risks.

**Health investigation**

The collection and evaluation of information about the health of community residents. This information is used to describe or count the occurrence of a disease, symptom, or clinical measure and to evaluate the possible association between the occurrence and exposure to hazardous substances.

**Health statistics review**

The analysis of existing health information (i.e., from death certificates, birth defects registries, and cancer registries) to determine if there is excess disease in a specific population, geographic area, and time period. A health statistics review is a descriptive epidemiologic study.

**Indeterminate public health hazard**

The category used in ATSDR's public health assessment documents when a professional judgment about the level of health hazard cannot be made because information critical to such a decision is lacking.

**Incidence**

The number of new cases of disease in a defined population over a specific time period [contrast with prevalence].

**Ingestion**

The act of swallowing something through eating, drinking, or mouthing objects. A hazardous substance can enter the body this way [see route of exposure].

**Inhalation**

The act of breathing. A hazardous substance can enter the body this way [see route of exposure].

**Intermediate duration exposure**

Contact with a substance that occurs for more than 14 days and less than a year [compare with acute exposure and chronic exposure].

**Lowest-observed-adverse-effect level (LOAEL)**

The lowest tested dose of a substance that has been reported to cause harmful (adverse) health effects in people or animals.

**Medical monitoring**

A set of medical tests and physical exams specifically designed to evaluate whether an individual's exposure could negatively affect that person's health.

**Metabolism**

The conversion or breakdown of a substance from one form to another by a living organism.

**Metabolite**-Any product of metabolism.

**mg/kg**-Milligram per kilogram.

**mg/cm<sup>2</sup>**-Milligram per square centimeter (of a surface).

**mg/m<sup>3</sup>**

Milligram per cubic meter; a measure of the concentration of a chemical in a known volume (a cubic meter) of air, soil, or water.

**Migration**-Moving from one location to another.

**Minimal risk level (MRL)**

An ATSDR estimate of daily human exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of harmful (adverse), noncancerous effects. MRLs are calculated for a route of exposure (inhalation or oral) over a specified time period (acute, intermediate, or chronic). MRLs should not be used as predictors of harmful (adverse) health effects [see reference dose].

**National Priorities List (NPL)**

EPA's list of the most serious uncontrolled or abandoned hazardous waste sites in the United States. The NPL is updated on a regular basis.

**No apparent public health hazard**

A category used in ATSDR's public health assessments for sites where human exposure to contaminated media might be occurring, might have occurred in the past, or might occur in the future, but where the exposure is not expected to cause any harmful health effects.

**No-observed-adverse-effect level (NOAEL)**

The highest tested dose of a substance that has been reported to have no harmful (adverse) health effects on people or animals.

**No public health hazard**

A category used in ATSDR's public health assessment documents for sites where people have never and will never come into contact with harmful amounts of site-related substances.

**NPL** [see National Priorities List]

**Pica**

A craving to eat nonfood items, such as dirt, paint chips, and clay. Some children exhibit pica-related behavior.

**Plume**

A volume of a substance that moves from its source to places farther away from the source. Plumes can be described by the volume of air or water they occupy and the direction they move. For example, a plume can be a column of smoke from a chimney or a substance moving with groundwater.

**Point of exposure**

The place where someone can come into contact with a substance present in the environment [see exposure pathway].

**Population**

A group or number of people living within a specified area or sharing similar characteristics (such as occupation or age).

**Potentially responsible party (PRP)**

A company, government, or person legally responsible for cleaning up the pollution at a hazardous waste site under Superfund. There may be more than one PRP for a particular site.

**ppb**-Parts per billion.

**ppm**-Parts per million.

**Prevalence**

The number of existing disease cases in a defined population during a specific time period [contrast with incidence].

**Prevention**

Actions that reduce exposure or other risks, keep people from getting sick, or keep disease from getting worse.

**Public availability session**

An informal, drop-by meeting at which community members can meet one-on-one with ATSDR staff members to discuss health and site-related concerns.

**Public comment period**

An opportunity for the public to comment on agency findings or proposed activities contained in draft reports or documents. The public comment period is a limited time period during which comments will be accepted.

**Public health action**-A list of steps to protect public health.

**Public health advisory**

A statement made by ATSDR to EPA or a state regulatory agency that a release of hazardous substances poses an immediate threat to human health. The advisory includes recommended measures to reduce exposure and reduce the threat to human health.

**Public health assessment (PHA)**

An ATSDR document that examines hazardous substances, health outcomes, and community concerns at a hazardous waste site to determine whether people could be harmed from coming into contact with those substances. The PHA also lists actions that need to be taken to protect public health [compare with health consultation].

**Public health hazard**

A category used in ATSDR's public health assessments for sites that pose a public health hazard because of long-term exposures (greater than 1 year) to sufficiently high levels of hazardous substances or radionuclides that could result in harmful health effects.

**Public health hazard categories**

Public health hazard categories are statements about whether people could be harmed by conditions present at the site in the past, present, or future. One or more hazard categories might be appropriate for each site. The five public health hazard categories are no public health hazard, no apparent public health hazard, indeterminate public health hazard, public health hazard, and urgent public health hazard.

**Public meeting**-A public forum with community members for communication about a site.

**Radioisotope**

An unstable or radioactive isotope (form) of an element that can change into another element by giving off radiation.

**Radionuclide**-Any radioactive isotope (form) of any element.

**RCRA** [see Resource Conservation and Recovery Act (1976, 1984)]

**Receptor population**

People who could come into contact with hazardous substances [see exposure pathway].

**Reference dose (RfD)**

An EPA estimate, with uncertainty or safety factors built in, of the daily lifetime dose of a substance that is unlikely to cause harm in humans.

**Remedial investigation**

The CERCLA process of determining the type and extent of hazardous material contamination at a site.

**Resource Conservation and Recovery Act (1976, 1984) (RCRA)**

This Act regulates management and disposal of hazardous wastes currently generated, treated, stored, disposed of, or distributed.

**RfD** [see reference dose]

**Risk**-The probability that something will cause injury or harm.

**Risk reduction**

Actions that can decrease the likelihood that individuals, groups, or communities will experience disease or other health conditions.

**Risk communication**-The exchange of information to increase understanding of health risks.

**Route of exposure**

The way people come into contact with a hazardous substance. Three routes of exposure are breathing [inhalation], eating or drinking [ingestion], or contact with the skin [dermal contact].

**Safety factor** [see uncertainty factor]

**Sample**

A portion or piece of a whole. A selected subset of a population or subset of whatever is being studied. For example, in a study of people the sample is a number of people chosen from a larger

population [see population]. An environmental sample (for example, a small amount of soil or water) might be collected to measure contamination in the environment at a specific location.

**Sample size**-The number of units chosen from a population or an environment.

**Solvent**

A liquid capable of dissolving or dispersing another substance (for example, acetone or mineral spirits).

**Source of contamination**

The place where a hazardous substance comes from, such as a landfill, waste pond, incinerator, storage tank, or drum. A source of contamination is the first part of an exposure pathway.

**Substance**-A chemical.

**Superfund** [see Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Superfund Amendments and Reauthorization Act (SARA)]

**Surface water**

Water on the surface of the earth, such as in lakes, rivers, streams, ponds, and springs [compare with groundwater].

**Survey**

A systematic collection of information or data. A survey can be conducted to collect information from a group of people or from the environment. Surveys of a group of people can be conducted by telephone, by mail, or in person. Some surveys are done by interviewing a group of people [see prevalence survey].

**Toxicological profile**

An ATSDR document that examines, summarizes, and interprets information about a hazardous substance to determine harmful levels of exposure and associated health effects. A toxicological profile also identifies significant gaps in knowledge on the substance and describes areas where further research is needed.

**Toxicology**-The study of the harmful effects of substances on humans or animals.

**Tumor**

An abnormal mass of tissue that results from excessive cell division that is uncontrolled and progressive. Tumors perform no useful body function. Tumors can be either benign (not cancer) or malignant (cancer).

**Uncertainty factor**

Mathematical adjustments for reasons of safety when knowledge is incomplete. For example, factors used in the calculation of doses that are not harmful (adverse) to people. These factors are applied to the lowest-observed-adverse-effect-level (LOAEL) or the no-observed-adverse-effect-

level (NOAEL) to derive a minimal risk level (MRL). Uncertainty factors are used to account for variations in people's sensitivity, for differences between animals and humans, and for differences between a LOAEL and a NOAEL. Scientists use uncertainty factors when they have some, but not all, the information from animal or human studies to decide whether an exposure will cause harm to people [also sometimes called a safety factor].

**Urgent public health hazard**

A category used in ATSDR's public health assessments for sites where short-term exposures (less than 1 year) to hazardous substances or conditions could result in harmful health effects that require rapid intervention.

**Volatile organic compounds (VOCs)**

Organic compounds that evaporate readily into the air. VOCs include substances such as benzene, toluene, methylene chloride, and methyl chloroform.

Other glossaries and dictionaries:

Environmental Protection Agency (<http://www.epa.gov/OCEPAterms/>)

National Center for Environmental Health (CDC)  
(<http://www.cdc.gov/nceh/dls/report/glossary.htm>)

National Library of Medicine (NIH)  
(<http://www.nlm.nih.gov/medlineplus/mplusdictionary.html>)

For more information on the work of ATSDR, please contact:

Office of Policy and External Affairs  
Agency for Toxic Substances and Disease Registry  
1600 Clifton Road, N.E. (MS E-60)  
Atlanta, GA 30333  
Telephone: (404) 498-0080