Public Health Assessment

Sauget Area 2 Landfill

Sites P, Q and R

Sauget, St. Clair County, Illinois

EPA Facility ID # ILD000672329

Prepared by

Illinois Department of Public Health
under cooperative agreement with the
Agency for Toxic Substances and Disease Registry

Table of Contents

Summary 1

Purpose and Health Issues 2

Background 2
- Location and History 2
- Demographics and Land Use 4
- Environmental Sampling 4
- Site Visit 7

Discussion 7
- Chemicals of Interest 7
- Exposure Analysis 9
- Completed Exposure Pathways 9
- Potential Exposure Pathways 10

Toxicological Evaluation 10

Community Health Concerns 11

Child Health Considerations 11

Conclusions 12

Recommendations and Public Health Action Plan 12

Preparers of Report 13

References 13

Tables 16

Figures 29

Attachments 36

Summary

Sauget Area 2 is a proposed National Priorities List site. This public health assessment prepared by the Illinois Department of Public Health (IDPH) evaluates Area 2 Sites P, Q and R. A separate public health assessment evaluated Sauget Area 2 Sites O and S.

The source of contamination at these sites included industrial subsurface waste disposal at Site P, Q, and R from nearby industries. Contaminants at these sites include polychlorinated biphenyls (PCBs), nitrobenzenes, chlorinated solvent wastes, pesticides, polycyclic aromatic hydrocarbons (PAHs), and metals.

The sites consist of mostly inactive landfills with commercial and industrial areas in the northern section of Site Q and southern portion of Site P. The southern portion of Site Q is not fenced, and has evidence of trespassing. Site R is the location of the Sauget Toxic Dump, which is also known as the Krummerich Landfill.

Based on the limited number of surface soil samples collected in the northern section of Site Q, IDPH has concluded that Site Q in Sauget Area 2 poses no apparent public health hazard. PCB levels in the surface soil at Site Q should not pose a health risk to exposed workers.

Sites P and R within Sauget Area 2 pose no apparent public health hazard for exposure to contaminated soil and groundwater. Contamination exists in subsurface soil and in groundwater, but no one is exposed to these chemicals. MCPP in fish may increase the risk of non-cancer adverse health effects over a long period for children eating catfish caught near Site R. The source of MCPP in the fish is not known.

IDPH recommends that children's consumption of channel catfish from the Mississippi River along Sauget Area 2 be limited to twelve fish meals per year to reduce the risk of non-cancer adverse health effects.

Purpose and Health Issues

The Sauget Area 2 site was proposed for addition to the National Priorities List on September 13, 2001. Area 2 consists of Site O, and landfills P, Q, R, and S. In this public health assessment, the Illinois Department of Public Health (IDPH) examined whether exposure to contaminants at Sites P, Q and R has occurred in the past, is occurring, or may occur in the future. Site O and Landfill S are addressed in a separate public health assessment.

Site P is in a mixed industrial and commercial area, with the nearest homes 0.3 miles east across a four-lane highway. Site R is fenced and is covered by a clay cap. Employees of the businesses in the northern section of Site Q are currently most likely to be exposed to site-related contaminants. Past and future exposures may occur in workers sampling or monitoring the sites and excavating or otherwise disturbing the contaminated areas.

Background

Location and History

Sauget is in St. Clair County, Illinois south of East St. Louis and across the Mississippi River from St. Louis, Missouri. Sauget is surrounded by several large industries and has many areas of contamination. These contaminated areas are collectively known as the Sauget Sites and include areas in the communities of Sauget and Cahokia, Illinois (Figure 1). The Sauget Sites are divided into two areas, Area 1 and Area 2. The dividing line for Areas 1 and 2 is Illinois Route 3, with the sites east of Route 3 belonging to Area 1 and those to the west in Area 2. This public health assessment evaluates Sites P, Q and R in Area 2 (Figure 2).

Site P

Site P covers approximately 20 acres in the northwestern part of Sauget. The site is an inactive landfill permitted by the Illinois Environmental Protection Agency (Illinois EPA). Site P has steep slopes along the sides of the landfill, which are somewhat eroded. Access to the site is not restricted and a nightclub is located on top of its southern end. Surface runoff from the site is toward the low area in the south-central portion of the site. This low area is the result of a water line that crosses the property (1). The site is bordered to the west by the Illinois Gulf Railroad, to the east by the Terminal Railroad Association, and to the south by Monsanto Avenue. Surface drainage does not leave the site due to the railroad embankments and the depression in the central portion of the site (1).

Site Q

Site Q is an inactive waste disposal facility in Sauget and Cahokia that covers approximately 90 acres. Sauget and Company operated the facility between 1966 and 1973 (1). The site is on the east bank of the Mississippi River and is on the river side of the flood control levee. The site was flooded in 1973 and 1993 (2).

The Pillsbury Company occupies much of Site Q. It operates a coal and grain transfer facility on the site. River City Landscape Supply occupies 10 acres of Site Q along the Mississippi River. A company located south of River City Landscape Supply reclaims re-bar from building materials. Three barge terminals are located along the river at Site Q. A railroad spur divides the site into northern and southern sections. A chain link fence on the north side and a guard at the gate restrict vehicular traffic. Pedestrian access is not restricted in the southern portion of the site.

Site Q was operated as a landfill without an Illinois EPA permit. The north site was registered with IDPH in 1967, before the formation of Illinois EPA (1). The site is presently covered with black cinders, which makes it highly permeable.

In early 1972, a smoldering underground fire was observed at the site, which continued until October 1972. During flooding in 1973, exposed refuse was observed being carried downstream (1). Beginning in 1972, Sauget and Company applied several times for a permit to extend the landfill in the southern portion of Site Q. Illinois EPA denied these extension permits, but disposal reportedly continued in this area (1).

In 1993, flooding of the Mississippi River inundated Site Q for several months, and left drums exposed in portions of the site. In May 1994, the U.S. Environmental Protection Agency (USEPA) Technical Assistance Team contractor Ecology and Environment (E & E) collected three drum samples from Site Q. This was done after exposed drums were noted on the embankment of the Mississippi River because of scouring that occurred during the flood of 1993. In November 1994, Illinois EPA and IDPH collected surface soil samples from Site Q, including two drum samples. In 1995, USEPA removed surface waste materials, including exposed drums, along the shoreline of the Mississippi River and repaired exposed sections of the fill area.

On October 18, 1999, USEPA began removing wastes including drums from the southern portion of Site Q. The removal involved approximately 25 acres in a low area where water ponded and persons fished. This removal was prompted by PCB-contaminated surface wastes and soils and the presence of exposed drums. Removal included 3,271 drums and about 17,000 tons of waste, and was completed in April 2000 (5). Cleanup funds were limited, so the southern portion of the site still contains contaminated areas and drums protruding from the ground (5).

Site R

Site R is the location of the Sauget Toxic Dump, which is also known as the Krummerich Landfill. The site is owned by Monsanto Chemical Company and was used as a landfill by Monsanto from 1957 to 1977. Site R is north and west of Site Q on the river side of the flood control levee (Figure 2). Site R is covered with a clay cap and is vegetated. Closure of Site R was completed in October 1979. Drainage flows to ditches along the perimeter of the site. Access to Site R is restricted by a chainlink fence and monitored by television cameras. An estimated 262,500 tons of liquid and solid industrial waste was disposed of at Site R. In 1968 and 1972, Monsanto submitted two reports to Illinois EPA concerning the waste disposed at Site R. Site R was flooded by the Mississippi River in 1973 and 1993.

Demographics and Land Use

Most of Sauget Area 2 is either landfill or industrial property. Agricultural land is also present in the eastern portion of Area 2 and to the south of Area 2 along Cargill Road. Commercial property including a nightclub are south and east of Site P. Industries in Area 2 include the American Bottoms Regional Waste Water Treatment, the Sauget Waste Water Treatment Plant, Trade Waste Incinerator, and Phillips Petroleum Company. The number of employees that work in businesses in Area 2 is estimated to be 150. Nearby industries also include Cerro Copper, Big River Zinc, and Solutia.

No permanent residents live within Sauget Area 2 (3). The nearest home is about 0.3 miles east of the Site P, across Route 3 in East St. Louis, Illinois. The home nearest Site Q is 0.75 miles east across Route 3 (Sauget) and southeast (Cahokia). The home nearest Site R is approximately 0.8 miles east, across Route 3 in Sauget, Illinois. The population within 1 mile of Area 2 is about 9,000, including 711 children less than 5 years of age and 2,185 between 5 - 17 years of age (3).

Environmental Sampling at Site P

Environmental sampling at Site P consisted of four subsurface soil samples collected by Ecology and Environment, Inc. (E and E) in February 1987 and four surface samples collected by Illinois EPA and IDPH in March 1994 (see Figure 3). Chemicals analyzed in these samples included volatile organic chemicals (VOCs), semi-volatile organic chemicals (SVOCs), inorganic chemicals, pesticides, and polychlorinated biphenyls (PCBs).

Environmental Sampling at Site Q

Illinois EPA collected several samples from Site Q in the 1970s including leachate, ponded surface water, and groundwater. These samples were analyzed only for inorganic chemicals and a few organic chemicals.

Illinois EPA collected two samples from leachate seeps in October 1981 and three more leachate samples in September 1983. These samples were analyzed for inorganic chemicals and a few organic chemicals, including phenols and PCBs.

In July 1983, USEPA had E & E investigate the northern portion of Site Q in response to the drums uncovered in this area in 1980. This study involved a geophysical investigation and subsurface soil sampling. The subsurface sampling consisted of 35 samples collected from 18 locations. The depths of the samples ranged from 10 to 26 feet (1). The sample analysis included 112 organic chemicals including 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)(1).

In 1987, E & E collected groundwater samples from eight locations. These samples were analyzed for inorganic chemicals, VOCs, SVOCs, pesticides, and PCBs.

On July 21 and 22, 1987, E & E collected six air samples (Figure 5). A blank sample was collected for each of the two days. The wind on July 21 was generally from the south-southwest and south, while on July 22 it was predominantly from the southeast. The samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Based on the wind direction at the time of sampling, the airborne contaminants from Site R would not be represented in these samples.

In March 1994, Illinois EPA collected eight surface soil samples and two drum samples (Figure 4)(4). In May 1994, E & E collected three drum samples at Site Q(5).

In 1994, Geraghty and Miller conducted an expanded remedial investigation on the northern section of Site Q (6). This investigation included a magnetometer survey (to identify buried drums), a soil gas survey, subsurface soil samples, groundwater samples, and ambient air monitoring. Sixty soil gas samples and eleven subsurface soil samples were collected as part of the expanded investigation. Ten air samples were collected on three consecutive days in July 1994. The air samples consisted of four samples upwind and six samples downwind of the northern section of Site Q. Seven groundwater wells were sampled during the investigation.

On October 18, 1999, USEPA began removing wastes and drums from the southern portion of Site Q (7). The removal was prompted by PCB-contaminated surface wastes and soils. Waste, drummed material, surface soil, subsurface soil, and groundwater samples were collected as part of the removal action. Six of the surface soil samples were collected in the southern ponded area of Site Q and fourteen surface soil samples were collected on railroad property (presumably not landfilled) where a road was placed to get the waste from the removal area to the railroad tracks for loading. The fourteen railroad samples were collected to see if the transfer of site wastes contaminated the surface soil in this area. Seven samples were collected before the waste was transferred and seven were collected after the operation was complete (Figure 4).

The collection of additional environmental samples at Site Q including air, groundwater, waste, and surface soil began in June 2002 and continued into fall 2002 (8).

Environmental Sampling at Site R

In August 1968, IDPH collected five groundwater samples at Site R. Analysis of these samples was limited to alkalinity, total solids, and phenol. Illinois EPA collected another set of samples from these wells in December 1972. These samples were analyzed for inorganic chemicals, phenols, and oil. In January 1973, Illinois EPA collected samples from three waste ponds and

analyzed these for phenol. Illinois EPA sampled the monitoring wells and an industrial well located northwest of the site annually between 1973 and 1976. All well samples collected before 1976 were analyzed for inorganic chemicals and phenols. The 1976 well samples were analyzed for PCBs in addition to inorganic chemicals and phenols.

In 1977, D'Appolonia Consulting Engineers installed eight monitoring wells during a subsurface investigation of the site. In 1979, Illinois EPA sampled these eight wells and analyzed the samples for inorganic and organic chemicals reportedly disposed of in the landfill. In March 1981, Illinois EPA again sampled the wells and analyzed the samples for organic chemicals.

In October 1981, Illinois EPA collected leachate and sediment samples on the side of the landfill next to the Mississippi River. These samples were collected from leachate seeps that were flowing into the river.

In November 1981, a USEPA contractor collected leachate and sediment samples from three seeps along the Mississippi River. Eight samples were collected, which consisted of three leachate samples, two duplicate leachate samples and three sediment samples. These samples were analyzed for dibenzodioxins and dibenzofurans, inorganic chemicals, and organic chemicals.

In 1987, E & E collected seven groundwater samples including one duplicate from six locations. These samples were analyzed for inorganic chemicals, VOCs, SVOCs, pesticides, and PCBs.

A Remedial Investigation (RI) was conducted at Site R beginning in 1992 (9). Environmental samples for the RI included soil gas, ambient air, surface soil, sediment, subsurface soil (25 from eight locations in 1989 and 48 from 16 locations in 1992), and groundwater from 22 wells. Approximately 280 soil gas samples from 90 locations were collected in 1999 before the RI. The soil gas samples were analyzed for VOCs. Nine ambient air samples were collected in July 1992 and consisted of two downwind samples and one upwind sample for three consecutive days. Ambient air samples were analyzed for VOCs, SVOCs, and metals. Eighteen surface soil samples were collected in 1989, eight from the clay cap and ten from the perimeter. Eight sediment samples were collected from the storm water trenches around the perimeter of the site. Sediment samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Seventy-three subsurface samples were collected or used in the RI. These sediment samples consisted of 25 samples from eight locations in 1989 and 48 samples from 16 locations in 1992. Subsurface samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Groundwater from 22 wells was analyzed for inorganic chemicals, VOCs, SVOCs, pesticides, PCBs, and metals.

In October and November 2000, surface water, sediment, and fish samples were collected in the Mississippi River upstream and downstream of Sites R and Q (8). Samples were collected next to Site R (Figure 6) and upstream and downstream of Site R. The fish samples collected included whole catfish and big mouth buffalo fish fillets. Samples were analyzed for VOCs, SVOCs, pesticides, PCBs, dioxins, furans, and metals.

The collection of additional air, groundwater, waste, and surface soil samples at Site R began in June 2002 and continued through the fall of 2002 (10).

Site Visit

IDPH has made several site visits; the most recent was on October 2, 2003. During the flood of 1993, IDPH observed the condition of the site. IDPH staff visited Site Q during drum removal in the fall of 1999. Evidence of trespass, including spent shotgun shells and motorcycle and all-terrain-vehicle tracks, was noted during on site visits to Site Q. Persons have been seen fishing at the ponds at the south end of Site Q and the Mississippi River bank on site Q. After the flood of 1993, drums were exposed on the bank of the Mississippi River at Site Q and in the central portion of Site Q.

Discussion

Chemicals of Interest

IDPH compared the results of each air, soil, sediment, fish, leachate, surface water, and groundwater sample with appropriate screening comparison values used to select chemicals for further evaluation for carcinogenic and non-carcinogenic health effects. Chemicals found at levels greater than comparison values or those for which no comparison values exist were selected for further evaluation. The chemicals of interest are shown in Tables 1 through 7. A brief explanation of the comparison values used is found in Attachment 1.

Surface Soil

Surface soil samples were collected from the top 6 inches. The chemicals of interest in surface soil from Sites P, Q, and R include PCBs, lead, cadmium, arsenic, benzene, polycyclic aromatic hydrocarbons (PAHs), and pesticides (Table 1). The surface soil samples at Site R were from the clay cap and along the perimeter. The surface soils in the ponded area of Site Q have been removed by USEPA.

Subsurface Soil

Subsurface samples were collected from Sites P, Q and R. Forty-one chemicals of interest were identified in subsurface soil samples (Table 2). Many subsurface soil samples were from well boring cores that were through the waste materials at the landfills.

Drums and Waste

Drums have been exposed in several locations at Site Q due to flooding. Drums sampled from the southern portion of Site Q were mostly unexposed drums uncovered during the USEPA 2000-2001 removal activity (5). USEPA also sampled waste piles during the removal activity. All the drums and waste tested were ultimately removed (4). Using the comparison values for soil, forty-three chemicals of interest were identified in the drums and waste (Table 3).

Sediments

Sediments were collected from drainage areas around Site R, including the soil under seeps flowing from Site R to the Mississippi River. In addition, an ecological risk assessment conducted by Menzie-Cura included Mississippi River sediments upstream, along Site R, and downstream of Site R. Using the comparison values for soil, IDPH identified sixteen chemicals of interest in the sediment samples (Table 4).

Groundwater

Seventy-two chemicals of interest were identified in the groundwater under Sites Q and R (Table 5). IDPH used drinking water comparison values to select chemicals of interest for groundwater.

Surface Water

Nine chemicals of interest were identified in the Mississippi River (Table 6) including chlorinated VOCs and SVOCs. No PCBs were detected in the surface water. IDPH used drinking water comparison values for the surface water samples.

Leachate

The leachate samples were collected from the west side of Site R before they enter the Mississippi River. Sixteen chemicals of interest were found in the leachate samples including PCBs, chloroaniline, chlorobenzene, chlorophenol, nitroaniline, nitrophenol, and 2,4-D (Table 6).

Fish

Fish sampled included whole channel catfish and big mouth buffalo fish. 2-2 Methyl-4-chlorophenoxy proprionic acid (MCPP) was the only chemical that exceeded an oral health guideline (Table 7).

Air

Twenty-one chemicals of interest, including PCBs, chlorinated solvents, and metals, were identified from air sampling results at Sites Q and R (Table 8).

Exposure Analysis

Exposure to a chemical at a level that exceeds a comparison value does not necessarily mean that adverse health effects will result. The potential for exposed persons to experience adverse health effects depends on:

- how much of each chemical a person is exposed to,
- how long a person is exposed, and
- the health condition of the exposed person.

A chemical can affect people only if they contact it through an exposure pathway at a sufficient concentration to cause a toxic effect. This requires a source of exposure, an environmental transport medium, a point of exposure, a route of exposure, and a receptor population. A pathway is complete if all components are present and if people were exposed in the past, are currently exposed, or will be exposed in the future. If parts of a pathway are absent, data are insufficient to decide whether it is complete, or exposure may occur at some time (past, present, future), then it is a potential pathway. If part of a pathway is not present and will never exist, the pathway is incomplete and can be eliminated from further consideration.

In the past, before closing and capping of Site R and remediation of surface waste at Site Q, exposure to elevated levels of some contaminants may have occurred. Exposure to site-related chemicals in the past may have included surface water, sediments, exposed waste and drums, and soil, and it is not known if they would have resulted in adverse health effects. The following section will discuss current exposure pathways at the site.

Completed Exposure Pathways

Completed exposure pathways (Table 9) exist for contaminants in surface soil at Sites P and Q, air at Sites Q and R, surface water, and fish in the Mississippi River. Exposure can occur by breathing contaminated air, coming into direct contact with the soil, water, or waste, ingesting the chemicals, or absorbing them through the skin.

Air

Exposure to airborne chemicals could occur for workers at Site Q, including workers at the barge terminals and the landscape supply company. Exposure was estimated for adult workers working an 8-hour work day. The maximum levels of chemicals in the workers' ambient air are much less than the U.S. Department of Labor Occupational Health and Safety Administration permissible exposure limits for these chemicals. No adverse health effects would be expected from worker exposure to airborne contaminants.

Fish

IDPH estimated the exposure of children eating fish caught near the site. Using the maximum levels of chemicals found in fish, we assumed that a 16-kilogram child ate 16 grams of fish per day for half the year. Calculations were done for buffalo fish fillets and whole catfish. The levels of chemicals in whole catfish were reduced by 50% to adjust for their loss during cleaning and cooking the fish.

Based on the exposure scenarios, MCPP in catfish caught near Site R may increase the risk of non-cancer adverse health effects if consumed over a long period. Available data suggest a low potential of MCPP to bioaccumulate in fish (11). The source of MCPP in channel catfish is not known. No increased risk of cancer is expected from eating fish from the Mississippi River near Site R.

Surface Water

Exposure to surface water by incidental ingestion was calculated for teenagers. We assumed that a 55-kilogram teenager ingested 100 milliliters of water during recreation twice per week for 17 weeks of the year. Based on this exposure scenario, no adverse health effects would be expected from exposure to chemicals in the Mississippi River near the sites.

Surface Soil

Surface soil exposures were estimated for Sites P and Q using their respective chemicals of interest. The exposure scenario for Site P was 55 kilogram teenagers ingesting 100 milligrams of surface soil when entering the site 2 days per week, 26 weeks per year. Based on this exposure scenario, no adverse health effects would be expected from exposure to surface soil at Site P.

The two exposure scenarios at Site Q were for a teenager using the southern portion of the site and an adult worker in the northern section of the site. For the teenager exposure scenario we assumed that a 55 kilogram teenager ingested 100 milligrams of surface soil when entering the site 2 days per week, 26 weeks per year. Based on this exposure scenario, no chemicals are expected to cause adverse health effects for the teenage trespassers. Lead was found in one sample in the southern portion of Site Q at a level of 1,920 parts per million (ppm). The next highest level of lead found in this area was 161 ppm. Lead levels greater than 1,000 ppm in residential soils may be a hazard for children six years of age and younger. Exposure to lead at Site Q is not considered a health hazard because trespassers would be older than six years of age, Site Q is not residential soil where exposure would be continuous, and only one of fourteen samples was greater than 1,000 ppm. Also, consistent exposure to the highest levels of lead in soil would be unlikely.

For workers contacting surface soil in the northern section of Site Q, we assumed exposure to the average levels detected in the four samples collected by Illinois EPA in 1994. We assumed the workers are exposed to the soil 5 days per week for 50 weeks per year. Based on this exposure scenario and limited sampling, no apparent increased cancer risk would be expected.

Potential Exposure Pathways

Potential exposure pathways (Table 10) could occur during remediation or otherwise by disturbing or contacting surface soil, subsurface soil, and groundwater. Workers remediating site-related contaminants should wear protective clothing.

The nearest drinking water well is upgradient of Area 2, approximately 0.75 miles southeast of Site Q. No drinking water wells are in use near Area 2. The Fox Terminal industrial well is approximately 0.1 miles south of Site Q. Extensive groundwater contamination exists, but no known contact with groundwater occurs near the sites. Groundwater contaminants will not be considered further in this assessment.

Toxicological Evaluation

The estimated exposure doses were compared with health guidelines for non-cancer health effects. An increased risk of non-cancer adverse health effects in children may exist from exposure to MCPP in fish from the Mississippi River near Site R.

2-2 Methyl-4-chlorophenoxy proprionic acid (MCPP)

The level of MCPP found in fish was greater than the USEPA chronic oral reference dose for children. Exceeding the chronic oral reference dose does not mean that adverse health effects will occur. The USEPA chronic oral reference dose for MCPP is based on a study where rats were exposed to levels similar to our estimated dose for MCPP found in the 2000 fish sampling. These rats had increased absolute and relative kidney weights after being exposed to MCPP for 90 days (14). Exposure is based on whole catfish samples and available data suggest a low potential for MCPP to bioaccumulate in fish. The MCPP level in the edible portion of the fish may be much lower. MCPP was not detected in big mouth buffalo fish fillets collected from the same area.

Community Health Concerns

No community health concerns were identified for Sites P, Q, and R. Sauget and Cahokia residents have concerns about other areas in the Sauget Sites. These concerns have been addressed in the public health assessment for Sauget Area 1.

This public health assessment was made available for public comment from December 18, 2002 to April 11, 2003. No public comments were received.

Child Health Considerations

IDPH recognizes that children are especially sensitive to some chemicals. Children's exposure to Area 2 contaminants would be limited to the southern section of Site Q and Mississippi River fish. Children are not expected to be exposed to contaminants at Site R because it is fenced. Site P is not easily accessible to children because they must cross Illinois Route 3, and the northern portion of Site Q contains active businesses. We estimated exposure for teenage trespassers on the southern portion of Site Q. No chemicals at Site Q are expected to cause adverse health effects or increased cancer risk in the teenage trespassers.

MCPP in fish may increase the risk of non-cancer adverse health effects over a long period for children eating catfish caught near Site R. Available data suggest a low potential for MCPP to bioaccumulate in fish (12). MCPP was detected only in whole channel catfish. The source of MCPP in channel catfish is not known. Parents should follow the proper fish cooking and cleaning guidelines in the Illinois Fishing Information publication from the Department of Natural Resources to reduce exposure to contaminants in fish.

Conclusions

IDPH concludes that Sauget Sites Area 2, Site Q, in Sauget, Illinois, poses no apparent public health hazard. PCB levels in the surface soil at Site Q should not pose a health risk to exposed workers; however, only a limited number of surface soil samples were collected in the northern section of Site Q. MCPP in fish may increase the risk of non-cancer adverse health effects over a long period for children eating catfish caught near Site R. The source of MCPP in the fish is not known.

Sites P and R, within Sauget Sites Area 2, pose no apparent public health hazard for exposure to contaminated soil and groundwater. This conclusion is based on the fact that estimated exposure to the highest levels of chemicals detected during environmental sampling would not be expected to cause adverse health effects. Contamination exists in subsurface soil and in groundwater, but no one is exposed to these chemicals.

In the past, before closing and capping of Site R and remediation of surface waste at Site Q, exposure to elevated levels of some contaminants may have occurred. Exposure to site-related chemicals in the past may have included surface water, sediments, exposed waste and drums, and soil, and it is not known if they would have resulted in adverse health effects.

Recommendations

IDPH recommends that:

1) Children's consumption of channel catfish from the Mississippi River along Sauget Area 2 be limited to twelve fish meals per year. This recommendation corresponds to the fish advisory established for that part of the river by the Illinois Fish Contaminant Monitoring Program.

2) USEPA sample surface soil in the northern portion of Site Q to better characterize the potential for workers to be exposed to PCBs. IDPH will re-evaluate the surface soil exposure pathway when results of these samples are available.

Public Health Action Plan

IDPH will re-evaluate worker exposure to surface soil when the results of samples collected in the northern portion of Site Q are available.

Preparers of Report

Preparer
David R. Webb, M.S.
Environmental Toxicologist
Illinois Department of Public Health

Reviewers
Ken Runkle & Jennifer Davis
Environmental Toxicologists
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

Sylvia Allen-Lewis
Division of Health Education and Promotion

Steve Inserra
Division of Health Studies

References

1) Ecology and Environment, Inc. DRAFT Remedial Investigation Dead Creek Project Sites at Cahokia/Sauget, Illinois. Volumes 1 & 2. March 1988.

2) IDPH, Site Visits, 1993.

3) US 2000 Census data, US Department of Commerce, Bureau of Census, 2000.

4) Removal Action Report for Sauget Area 2: Site Q. E & E. July 29, 1994.

5) Ecology and Environment, Inc., Final Federal On-scene Coordinator's Report for Area 2 Site Q, Cahokia, St. Clair County, Illinois, TDD S05-9909-015, July 31, 2000.

6) Illinois EPA. Data Package for Samples Collected from Area 2. May 1999.

7) Remedial Investigation for the Expanded Study Area, Sauget Illinois, Monsanto Company, Sauget, Illinois. Geraghty and Miller, Inc. August 1994.

8) Ecological Risk Assessment for W. G. Krummrich Plant, Revision I, Sauget, St. Clair County, Illinois. Menzie-Cura and Associates, Inc. June 1, 2001.

9) Remedial Investigation at Sauget Site R, Monsanto Company, Sauget, Illinois. Geraghty and Miller, Inc. August 1994.

10) Conversation with Sandra Bron, Illinois EPA. September 12, 2002.

11) Mecoprop (Chipco Turf Herb. MCPP) Herbicide Profile 12/88. USEPA Pesticide Fact Sheet, Fact Sheet # 192, December 1988.

12) 2001 Illinois Annual Air Quality Report, Illinois EPA - Bureau of Air, Springfield, Illinois. August 2002.

13) Agency for Toxic Substances and Disease Registry. Toxicology Profile for Arsenic. ATSDR. Atlanta, Ga., September 2000.

14) USEPA Integrated Risk Information System, 2-(2-Methyl-4-chlorohphenoxy)propionic acid (MCPP) (CASRN 93-65-2), August 1, 1990.

Certification

This Sauget Area 2 (Sites P, Q, R) 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 was done in accordance with methodology and procedures approved when the public health assessment was begun.

W. Allen Robison
Technical Project Officer
Superfund Site Assessment Branch (SAAB)
Division of Health Assessment and Consultation (DAC)
ATSDR

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

Roberta Erlwein
Chief, State Programs Section
SSAB, DHAC, ATSDR

Tables

Table 1. Chemicals of Interest in Surface Soil (in parts per million).

Chemical	Site P	Site R	Site Q			Soil Comparison Value (in ppm)	
			Northern	Southern			
				Ponded Area	Railroad		
Benzene	450DJ	–	0.004J	–	–	10	CREG
2-Hexanone	–	–	0.003J	–	–	NV	
4-Methyl-2-pentanone	0.036	–	–	–	–	NV	
Phenanthrene	0.57J	–	0.17J	–	–	NV	
Chrysene	2.2J	–	0.29J	0.78	–	NV	
Benzo(k)fluoranthene	1.9J	–	0.16J	0.59	–	NV	
Benzo(b)fluoranthene	3.9	–	0.41J	0.6	–	NV	
Indeno(1,2,3-cd)pyrene	2.6J	–	–	–	–	NV	
Benzo(a)pyrene	1.6J	–	0.25J	0.54	–	0.1	CREG
Benzo(g,h,i)perylene	2J	–	0.27J	–	–	NV	
Benzo(a)anthracene	1.1J	–	0.41J	0.74	–	NV	
Acrolein	–	100	–	–	–	30	EMEG
4-nitrodiphenylamine	–	0.36	–	–	–	NV	
4-nitrochlorobenzene	–	0.36	–	–	–	NV	
Lead	378	–	218	656	1,920	NV	
Thallium	2	–	–	3.81	0.972	NV	
Arsenic	34.7	–	8.3	9.13	6.38	0.5	CREG
Cadmium	32.9	–	13.1	36.8	1.98	10	EMEG
Dieldrin	–	–	0.38P	–	–	0.04	CREG
Endrin ketone	0.052	–	–	–	–	NV	
Aroclor 1254	–	–	–	0.434	311	1	EMEG
Total PCBs[1]	9.8BC	1.31	211BC	0.788	449	0.4	CREG

1 - Total = Aroclors - 1242, 1254, 1260
J - Estimated Value
N - Presumptive evidence of the Chemical present
C - Confirmed
NV - No value
EMEG - Environmental Media Evaluation Guide
Dash - Chemical not detected
D - Analysis at secondary dilution factor
B - Chemical found in blank
P - Analyte present
CREG - Cancer Risk Evaluation Guide

Table 2. Chemicals of Interest in Subsurface Soil (in parts per million).

Chemical	Site P	Site R Remedial Investigation	Site Q				Soil Comparison Values	
			Northern		Southern			
			Remedial Investigation (RI)	Samples Prior to RI	Pre-removal	Post Removal[2]	Value (in ppm)	Source
1,2,4-Trichlorobenzene	–	230	–	13000	–	–	500	RMEG
1,2-Dichloroethene	–	220	–	12	–	–	8	CREG
4-Methyl-2-pentanone	0.049	2800	240J	250	–	–	NV	
4-Nitroaniline	–	8300	–	–	–	–	NV	
Benzene	0.049	210	0.3J	44	–	–	10	CREG
Chlorobenzene	–	2400	4.4J	–	–	–	1000	RMEG
Chrysene	–	–	9	6.4	–	–	NV	
Pentachlorophenol	–	790J	0.24J	100	–	–	50	EMEG
Phenanthrene	–	–	5.3	5.2	–	–	NV	
Toluene	0.41	3800	0.004J	2400	–	–	1000	EMEG
Trichloroethene	–	750	–	55	–	–	2	CREG
2,4-Dichlorophenol	–	16000D	3.3J	3100	–	–	200	RMEG
2-Chlorophenol	–	6900	0.2J	360	–	–	300	RMEG
2-Nitroaniline	–	1000	–	–	–	–	NV	
4-Chloroaniline	–	2000	–	–	–	–	200	RMEG
Benzo(a)anthracene	–	–	5.4	–	270	–	NV	
Benzo(a)pyrene	–	–	3.7J	–	813	–	0.1	CREG
Benzo(b)fluoranthene	–	–	0.15J	1.3	549	–	NV	
Benzo(g,h,i)perylene	–	–	2.7	–	260	–	NV	
Benzo(k)fluoranthene	–	–	3.8J	–	535	–	NV	
bis(2-Ethylhexyl)phthalate	0.23J	960	110DJ	1100	–	–	500	EMEG
Dibenzo(a,h)anthracene	–	–	1.5	–	174	–	NV	
Dibenzofuran	–	–	0.011J	–	–	–	NV	
Dimethylphthalate	–	14J	–	–	–	–	NV	
Indeno(1,2,3-cd)pyrene	–	–	0.31	–	507	–	NV	
Nitrobenzene	–	–	–	56	–	–	30	RMEG
Arsenic	4 R	147	6	–	19.9	–	20	EMEG
Cadmium	4	7	1.2	–	18.9	–	10	EMEG
Lead	526	64.7	16.6	–	2880	–	NV	NV

Chemical	Site P	Site R Remedial Investigation	Site Q				Comparison Value	
			Northern		Southern			
			Remedial Investigation	Samples Prior to RI	Pre-Removal	Post-Removal	Value	Source
Mercury	–	43	0.07	–	–	–	20	RMEG[4]
Vanadium	–	645	28.7	–	–	–	200	EMEG
2,4,6-Trichlorophenol	–	3900	0.027	–	–	–	60	CREG
4,4'-DDT	–	52	–	–	–	–	30	RMEG
Endrin aldehyde	–	290	–	–	–	–	NV	
Endrin ketone	–	99	–	–	–	–	NV	
Heptachlor epoxide	–	0.6	–	–	–	–	0.02	CREG
Aroclor 1254	–	1100	1.7	60	2.05	456	1	EMEG
Total PCBs[1]	–	4800	9	16000	3.15	456	0.4	CREG
TEQ 2,3,7,8-TCDD	–	–	–	0.0033	–	–	5E-05	
2-Chloroaniline	–	4900	4.8	–	–	–	200	RMEG[3]
3-Chloroaniline	–	280	–	–	–	–	200	RMEG[3]

1 - Total = Aroclors - 1242, 1254, 1260
2 - Post-removal subsurface samples analyzed for PCBs only
3 - Comparison value for 4-Chloroanline
4 - Comparison Value for Mercuric Chloride
J = Estimated Value
D = Analysis at secondary dilution factor
N = Presumptive evidence of the Chemical present
TEQ 2,3,7,8-TCDD - Toxicity Equivalance of Dioxins and Furans to 2,3,7,8 - Tetrachloro-p-dibenzodioxin
NV - No value
RMEG - Reference Dose Media Evaluation Guide
EMEG - Environmental Media Evaluation Guide
CREG - Cancer Risk Evaluation Guide

Table 3. Chemicals of Interest in Drums and Surface Waste at Site Q (in parts per million).

Chemical	Central Portion		Southern Portion		Comparison Value	
	Drum Waste IEPA, 1994	Drums, USEPA, 1994	Drums	Waste Pile	Value	Source
Trichloroethene	–	–	17000	0.022J	2	CREG
4-Methyl-2-pentanone	–	–	1800J	–	NV	
1,1-Dichloroethane	–	–	54	–	8	CREG
Phenanthrene	–	–	11J	13	NV	
bis(2-Ethylhexyl)phthalate	–	–	2300	120	500	EMEG
Benzo(a)anthracene	–	–	–	5.8J	NV	
Benzo(a)pyrene	–	–	–	6.9	0.1	CREG
Benzo(k)fluoranthene	–	–	–	5.8J	NV	
Benzo(g,h,i)perylene	–	–	–	2J	NV	
Chrysene	–	–	0.77J	8.2	NV	
Indeno(1,2,3-cd)pyrene	–	–	–	4J	NV	
Benzo(b)fluoranthene	–	–	–	6J	NV	
Total PCBs[1]	51450BC	260000	5042	367	0.4	CREG
Cadmium	–	–	651	65.1	10	EMEG
Arsenic	–	–	138	9.32	0.5	CREG
Chromium	6.5	–	7400	384	200	RMEG (VI)
Toluene	–	–	23000	0.22	1000	EMEG
Lead	25.5	–	18400	764	NV	
Ethylbenzene	–	–	40000	0.028J	3000	RMEG
Xylenes, Total	2.2	–	58000	0.296	10000	EMEG
Naphthalene	–	–	90000B	180B	1000	EMEG
4-Nitrophenol	–	24JD	–	2	NV	
n-Nitrosodi-n-propylamine	–	42JD	–	–	0.1	CREG
4-Chloro-3-methylphenol	–	67JD	–	–	NV	
Dichloroaniline	–	–	–	–	NV	
2-Methylphenol (o-cresol)	–	–	18600	14	3000	
1,3,5-Trimethylbenzene	–	–	14000	0.2J	NV	
n-Propylbenzene	–	–	7100	–	NV	
Aroclor 1254	–	–	4140	267	1	EMEG
n-Butylbenzene	–	–	760J	0.032J	NV	
3,4-Dimethylphenol	–	–	5300	45	NV	
Antimony	–	–	257	–	20	RMEG
s-Butylbenzene	–	–	55J	–	NV	
p-Isopropyltoluene	–	–	580	0.005J	NV	
Benzyl alcohol	–	–	24J	–	NV	
4-Nitroaniline	–	–	19J	–	NV	
Bromodichloromethane	–	–	1	–	NV	
2,4-Dimethylphenol	–	–	21400	34	1000	RMEG
Dibenzo(a,h)anthracene	–	–	–	1.4J	NV	
Dibenzofuran	–	–	–	1.2J	NV	
bis(2-Chloroethyl)ether	–	–	–	14	0.6	CREG
1,2,4-Trimethylbenzene	–	–	40000	0.23	NV	

1 - Total = Aroclors - 242, 1254, 1260
J = Estimated Value
C = Confirmed
D = Analysis at secondary dilution factor
B = Chemical found in blank
NV - No comparison value
CREG - Cancer Risk Evaluation Guide
RMEG - Reference Dose Media Evaluation Guide
EMEG - Environmental Media Evaluation Guide

Table 4. Chemicals of Interest in Sediments in Sauget Area 2 (in parts per million).

Chemical	Site R Sediment[2]	Mississippi River	Soil Comparison Value	
			Value	Source
Chrysene	0.47	–	NV	
Phenanthrene	0.37	–	NV	
Benzo(a)anthracene	0.45	–	NV	
Benzo(a)pyrene	0.49	–	0.1	CREG
Benzo(b)fluoranthene	0.28J	–	NV	
Benzo(g,h,i)perylene	0.16J	–	NV	
Benzo(k)fluoranthene	0.13J	–	NV	
Carbazole	0.032J	–	NV	
Dibenzofuran	0.066	–	NV	
Indeno(1,2,3-cd)pyrene	0.1	–	NV	
Aniline	–	3.4	NV	
Arsenic	9.6	–	0.5	CREG
Lead	22.6	–	NV	
Dichlorprop	–	1.1	NV	
MCPP	–	160	NV	
Total PCBs[1]	1.5	0.12J	0.4	CREG

1- Total = Aroclors - 1242, 1254, 1260
2 - Sediment seeps and surface drainageway
J - Estimated value
NV - No comparison value
CREG - Cancer Risk Evaluation Guide

Table 5. Chemical of Interest in Groundwater in Area 2, Sites Q and R (in parts per billion).

Chemical	Site Q			Site R - Pre-2000	Site R - Remedial Investigation				Drinking Water Comparison Values	
	Southern Portion	Northern Portion	Northern - RI		Shallow (10-45 feet)	Intermediate (46-95 feet)	Deep (96-140 feet)	Bedrock	Value	Source
1,1-Dichloroethane	1400J	–	31	3J	–	4J	–	–	NV	
1,1-Dichloroethene	–	–	–	7	–	–	–	–	0.06	CREG
1,2-Dichloroethane	–	3000	–	16000	–	16000	300	–	5	MCL
2-Chloroaniline	–	–	220J	–	85000D	140000J	200000J	1600000EJ	40	RMEG[1]
2-Hexanone	–	3500J	–	–	–	–	–	–	NV	
3-Chloroaniline	–	–	16J	–	4700DJ	500000	1400000	100000J	40	RMEG[1]
Acetone	–	7100B	–	1700B	–	17000J	420	–	3000	RMEG
Aniline	–	–	41J	–	2600DJ	2400000	92000DJ	23000J	6	CREG
Benzene	–	2000	660	1500	1100	4600J	560	94J	0.6	CREG
Chlorobenzene	–	6700J	130	8100	34000	13000	3400	2000	100	LTHA
Chloroethane	1600J	–	–	–	–	–	–	–	NV	
Chloroform	–	1J	–	–	–	180J	–	–	6	CREG
Ethylbenzene	4700	33J	–	2J	–	410J	410J	87J	700	LTHA
Methylene chloride	5900	2200BJ	–	–	–	270J	–	–	5	CREG
Tetrachloroethene	–	–	–	–	510J	–	57J	–	5	MCL
Toluene	94000	1600J	51	760J	95J	4800	240	580	2000	RMEG
Trichloroethene	–	2J	–	–	0.8J	360J	17J	–	0.09	CREG
Xylenes, Total	32000	230	–	95J	–	560J	960J	300	10000	LTHA
1,2,4-Trichlorobenzene	170J	390	–	–	5J	–	140J	–	10	LTHA
1,2,4-Trimethylbenzene	9300	–	–	–	–	–	–	–	NV	
1,2-Dichlorobenzene	–	2000	9J	340	120J	6500J	220000DJ	2900J	600	LTHA
1,4-Dichlorobenzene	4J	250	13J	550	190J	13000J	1200	–		
2,4-Dichlorophenol	–	14000E	530J	14000E	1500J	25000DJ	5000J	33000J	20	LTHA
2,4-Dimethylphenol	1355	2800	74J	160	–	2400J	–		200	RMEG
2-Chlorophenol	–	33000E	2300J	14000E	640J	26000J	92J	4800J	40	LTHA
2-Methylphenol	–	350	1J	–	–	960	–	–	500	RMEG
2-Nitroaniline	–	2000	–	–	–	–	–	–	NV	
3&4-Methylphenol	–	23000E	–	6100	27J	9800J	–	–	500	RMEG
3,4-Dimethylphenol	1355	–	280J	–	–	–	–	–	NV	
3-Nitroaniline	–	3900	–	–	–	–	–	–	NV	
4-Chloroaniline	–	15000E	19J	25000E	22000DJ	1000000DJ	2300000	160000J	40	RMEG
4-Methyl-2-pentanone	–	2700J	5100	–	–	1900	100	–	NV	
4-Nitrophenol	–	80J	–	–	84J	–	–	–	60	LTHA
Benzyl alcohol	–	490	–	750	–	–	–	–	NV	
bis(2-Ethylhexyl)phthalate	4237	160	220DJ	37	3J	29J	220J	–	3	CREG
cis-1,2-Dichloroethene	2700	–	–	–	–	–	–	–	70	LTHA
Dimethylphthalate	–	–	420DJ	–	–	–	–	–	NV	
Di-n-butylphthalate	58J	12BJ	13J	7J	–	73J	–	–	NV	
Di-n-octylphthalate	–	7J	0.6J	40	–	–	–	–	NV	
Hexachlorobenzene	–	–	–	850	–	–	–	–	0.02	CREG
Chemical	**Site Q**			**Site R -**	**Site R - Remedial Investigation**				**Comparison Value**	

	Southern Portion	Northern Portion	Northern - RI	Pre-2000	Shallow	Intermediate	Deep	Bedrock	Value	Source
Nitrobenzene	–	820	–	420	88J	3600J	8J	5000J	2	RMEG
n-Propylbenzene	1200J	–	–	–	–	–	–	–	NV	
Pentachlorophenol	–	35000E	–	–	–	–	–	–	0.2	CREG
Phenol	192	190000E	13000DJ	60000E	18000DJ	120000DJ	3500J	–	4000	LTHA
p-Isopropyltoluene	580J	–	–	–	–	–	–	–	NV	
2-Methylnaphthalene	860	–	–	200	–	–	–	–	NV	
Naphthalene	9200B	70	–	82J	93J	13000DJ	–	–	100	LTHA
Phenanthrene	20J	–	–	–	–	0.6J	–	–	NV	
Antimony	–	–	72.3	–	–	–	–	–	4	RMEG
Arsenic	430	100	27.7	48	35.6	191	–	29.7	0.02	CREG
Barium	–	384	403	440	431	1800	1550	–	700	RMEG
Beryllium	12	–	–	–	–	–	–	–	4	MCL
Cadmium	57	–	–	20	–	–	–	–	2	EMEG
Chromium (III)	299	13	–	40	–	–	–	–	100	MCL
Cobalt	–	148	–	120	24.1B	–	–	–	100	EMEG
Cyanide, Total	–	1560	–	14	–	–	–	–	200	EMEG
Lead	432	–	–	300	–	–	–	–	NV	
Manganese	–	13200	20400	11200	8040	5870	1880	–	500	RMEG
Nickel	311	74	–	1900	104	–	–	–	100	LTHA
Selenium	61	--	–	–	–	–	–	–	50	EMEG
Thallium	18	–	–	–	–	–	–	–	0.5	LTHA
Zinc	–	326	–	102R	–	3420	1770	–	2000	LTHA
2,4,5-T	3800	--	–	–	–	1.1	19	–	70	LTHA
2,4,6-Trichlorophenol	–	6000	64J	2100	450J	6400DJ	120J	43000J	3	CREG
2,4-D	–	–	–	–	850	22000	1100J	–	70	LTHA
4,4'-DDD	–	–	–	–	–	–	3.4JN	–	0.1	CREG
beta-BHC	–	–	–	–	–	0.057P	–	–	0.02	CREG
delta-BHC	–	–	–	–	–	0.063P	–	–	0.02	CREG
Dichlorprop	–	–	–	–	–	–	–	--	NV	
Dieldrin	–	–	–	–	–	0.17P	–	–	0.002	CREG
Aroclor 1254	133	–	–	–	–	–	–	–	0.2	RMEG
Total PCBs	370	–	–	7.7	–	–	–	–	0.02	CREG

1 - 4-chloroaniline used for comparison
2 - 2-chlorophenol used for comparison
3 - 4-nitrophenol used for comparison
J - Estimated value
D = Analysis at secondary dilution factor
N = Presumptive evidence of the Chemical present
E = Estimated value
B = Chemical found in blank
C = Confirmed

P = Analyte present
NV - No comparison value
RMEG - Reference Dose Media Evaluation Guide
CREG - Cancer Risk Evaluation Guide
LTHA - Lifetime Health Advisory
MCL - Maximum Contaminant Level
EMEG - Environmental Media Evaluation Guide
RI - Remedial Investigation

Dash = Chemical not detected

Table 6. Chemicals of interest in surface water and leachate (in parts per billion).

Chemical	Mississippi River (surface water)	Leachate	Comparison Value	
			Value	Source
Benzene	1.8	–	0.6	CREG
Chlorobenzene	24	1600	100	LTHA
Trichloroethene	0.3	–	0.09	CREG
2,4-Dichlorophenol	31	NA	20	LTHA
4-Chloroaniline	45	–	40	RMEG
Chloroaniline	–	38000	40	RMEG[1]
Chloronitroaniline	–	84	NV	
Chloronitrobenzene	–	21000	NV	
Chlorophenol	–	30000	40	LTHA[2]
Dichloroaniline	–	2800	NV	
Dichloronitrobenzene	–	790	NV	
Dichlorophenol	–	32000	20	LTHA
Di-n-butylphthalate	0.34	–	NV	
Methylbenzene	–	2000	NV	
Methylphenol	–	570	NV	
Nitroaniline	–	100	NV	
Nitrophenol	–	600	60	LTHA[3]
Pentachlorophenol	0.87	–	0.2	CREG
Phenol	–	22000	4000	LTHA
2,4-D	10	17000	70	LTHA
Dichlorprop	1.85	–	NV	
Total PCBs	–	2.6	0.02	CREG
Aniline	–	550	6	CREG

1 - 4-chloroaniline used for comparison
2 - 2-chlorophenol used for comparison
3 - 4-nitrophenol used for comparison
NV - No comparison value
Dash - Chemical not detected
CREG - Cancer Risk Evaluation Guide
LTHA - Lifetime Health Advisory
RMEG - Reference Dose Media Evaluation Guide

Table 7. Chemical of interest in whole catfish.

Chemical of Interest	Estimated Dose	Health Guideline	Source
MCCP	0.0021	0.001	Oral Reference Dose

Child exposure does assumes 16 grams consumed per day, 26 weeks per year, based on a 16 kilogram child.

Table 8. Chemicals of interest in air.

Chemical	Upwind Maximum	Downwind Maximum		Comparison Value	
	ppb	$\mu g/m^3$	ppb	Value	Source
Benzene	0.312	1.32	0.414	0.1	CREG
Carbon Tetrachloride	–	0.408	0.065	0.07	CREG
Chloroform	–	0.2	0.041	0.04	CREG
Methylene chloride	–	20.42	5.88	3	CREG
Trichlorofluoromethane	–	–	0.197	NV	NV
Benzoic acid	2.291	–	3.5	NV	NV
Di-n-butylphthalate	0.1	–	0.1	NV	NV
Chloro-2/4-nitrobenzene[1]	–	–	0.005	NV	NV
2-Methylnaphthalene	0.011	–	0.019	NV	NV
1, 2, 4-Trichlorobenzene	–	–	0.019	NV	NV
bis(2-Ethylhexyl)phthalate	0.045	–	0.052	NV	NV
Diethylphthalate	0.013	–	0.012	NV	NV
PCBs	–	0.41	–	0.01	CREG
Phenanthrene	–	–	0.07	NV	NV
Phenol	–	0.04	–	NV	NV
Antimony	0.0033	–	0.003	NV	NV
Arsenic	0.008	0.0245	0.008	0.0002	CREG
Cadmium	0.03	0.1655	0.036	0.006	CREG
Silver	0.02	–	0.079	NV	NV
Thallium	–	–	0.0034	NV	NV
Zinc	2.49	–	2.49	NV	NV

1 - Lab could not distinguish between chloro-2-nitrobenzene and chloro-4-nitrobenzene
NV - No comparison value
Dash - Chemical not detected
CREG - Cancer Risk Evaluation Guide

Table 9. Completed exposure pathways.

Pathway Name	Source	Medium	Exposure Point	Exposure Route	Receptor Population	Time of Exposure	Exposure Activities	Estimated Number Exposed	Chemicals
Ambient Air	Sites Q and R	Air	Sites Q and R	Inhalation	Employees Workers at or near Sites Q and R	Past Present Future	Breathing	100	Table 8
Surface Water	Mississippi River	Surface Water	Mississippi River	Dermal Ingestion	Recreational Users	Past Present Future	Swimming, skiing, and fishing near Site R	100	Table 6
Fish	Mississippi River	Fish	Fish Meals	Ingestion	Fishermen	Past Present Future	Eating fish from the Mississippi River near Site R	30	Table 7
On-site surface soil	On-site soil Surfacing waste	Soil	Sites Q and P	Ingestion Inhalation Dermal	Workers Trespassers	Past Present Future	Contacting contaminated soil	75	Table 1

Table 10. Potential exposure pathways.

Pathway Name	Source	Medium	Exposure Point	Exposure Route	Receptor Population	Time of Exposure	Exposure Activities	Estimated Potential Number Exposed	Chemicals
On-site Contamination	Area 2	On-site soil Subsurface soil Groundwater Waste	Sites P, Q and R.	Ingestion Inhalation Dermal	Remedial Workers	Future	Surface and subsurface soil and waste excavation or removal Groundwater monitoring or remediation	100	Tables 1 and 2
Industrial Groundwater	Area 2	Groundwater	Fox Terminal Well	Inhalation Ingestion	Workers	Future	Breathing near or ingestion of well water	25	VOCs in Table 3

Figures

Figure 1 - Sauget Area 2 Location Map

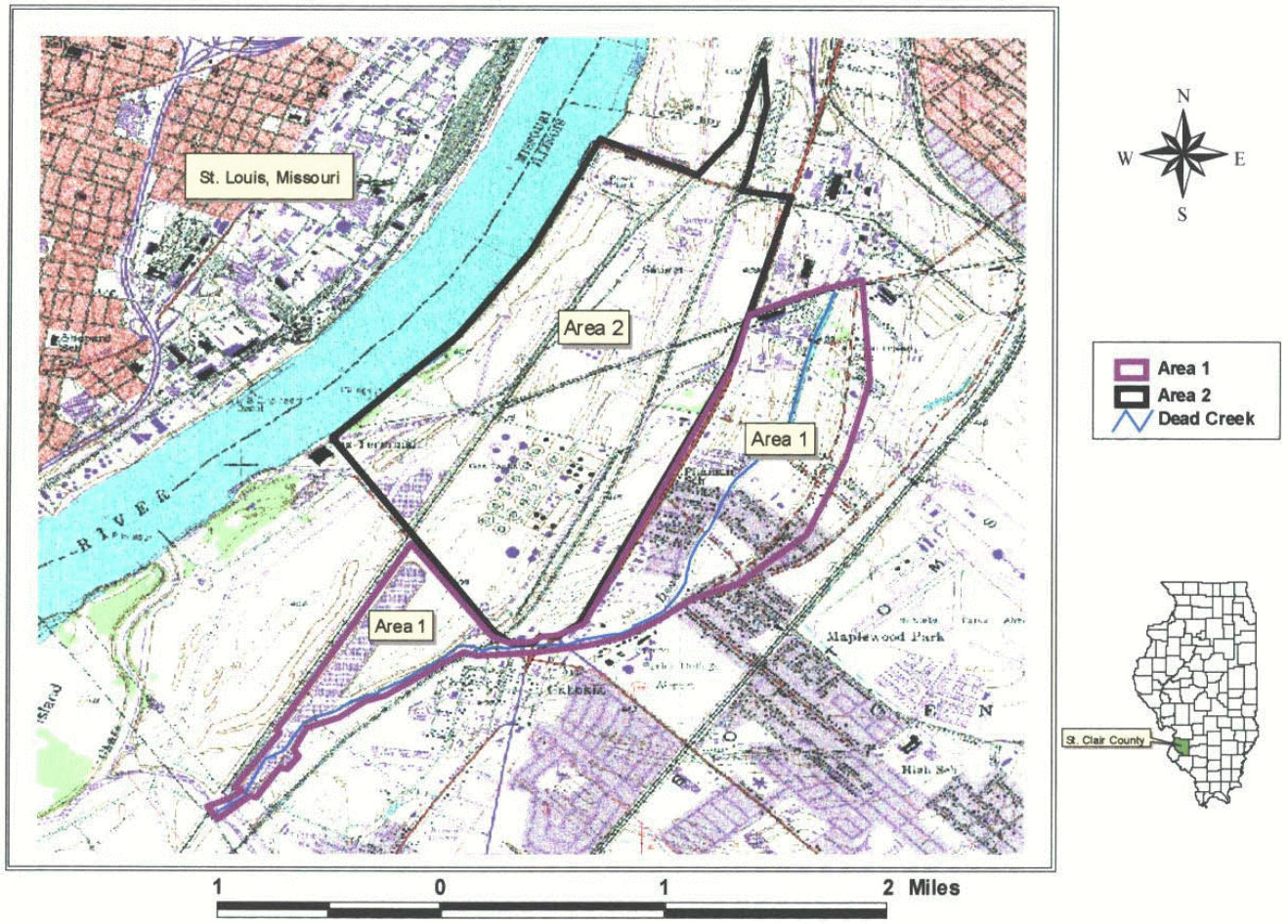


Figure 2 - Area 2 Sites Location Map

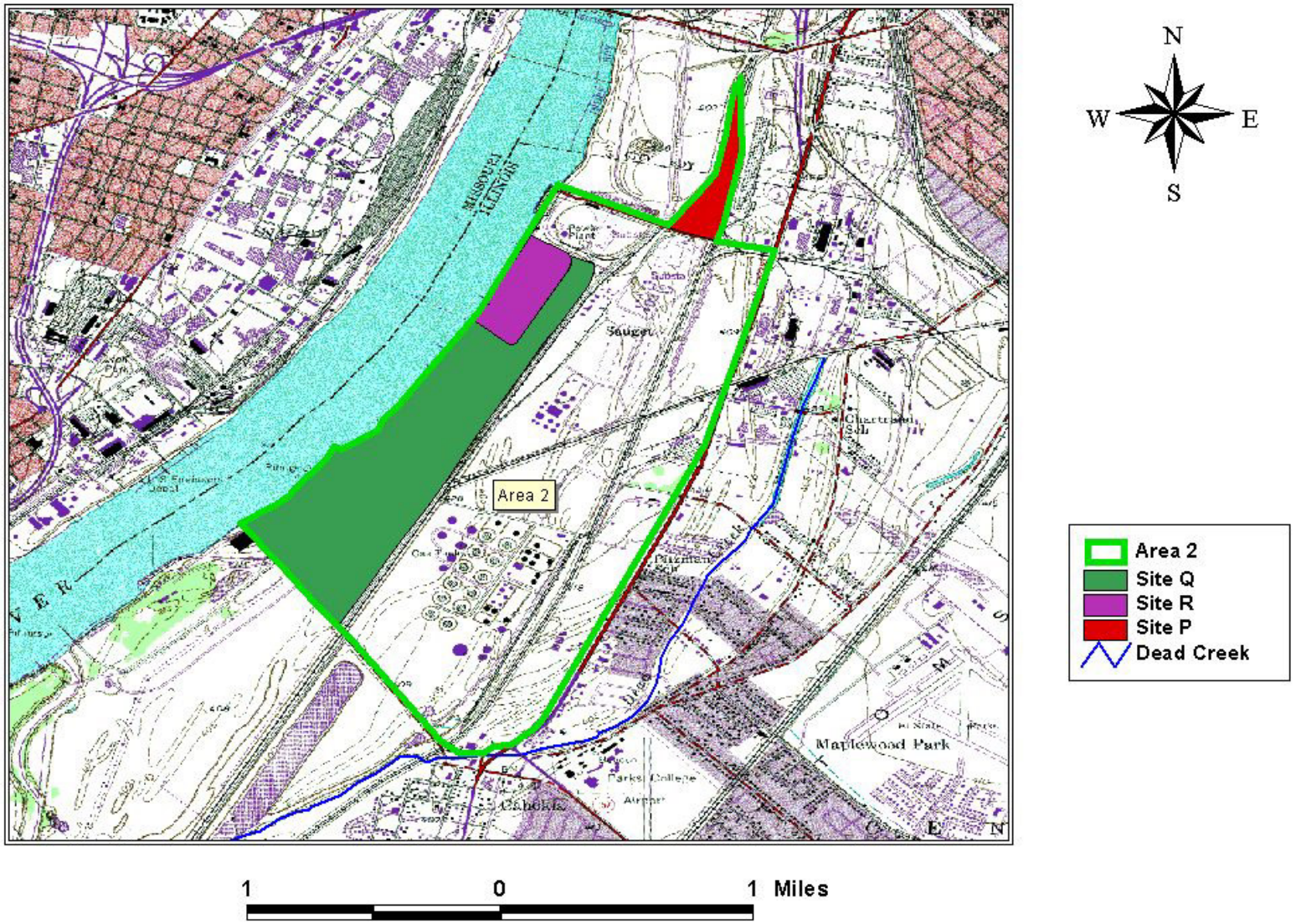


Figure 3 - Site P Sample Locations

Figure 4- Site Q Surface Soil Sample Locations

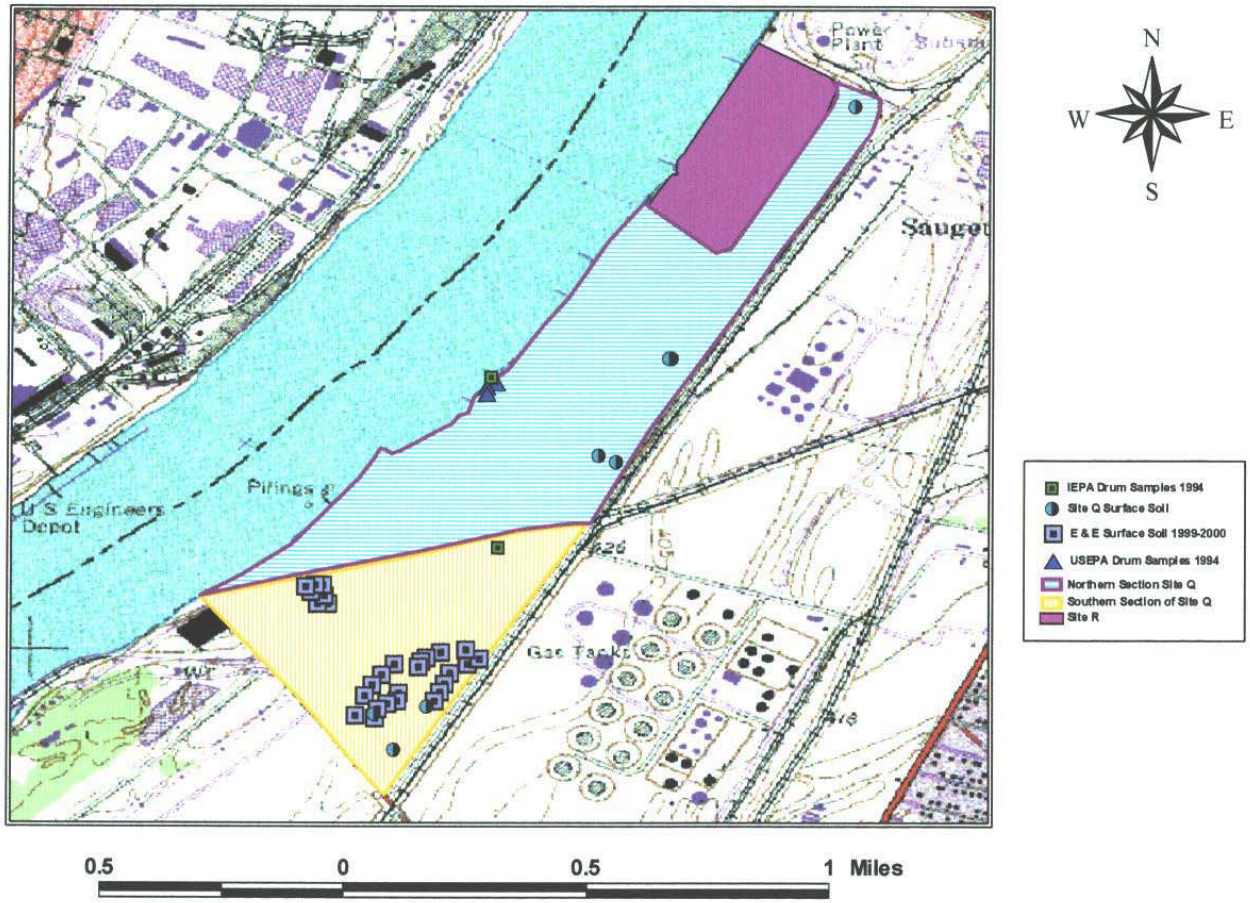


Figure 5 - Air Sample Locations at Sites Q and R

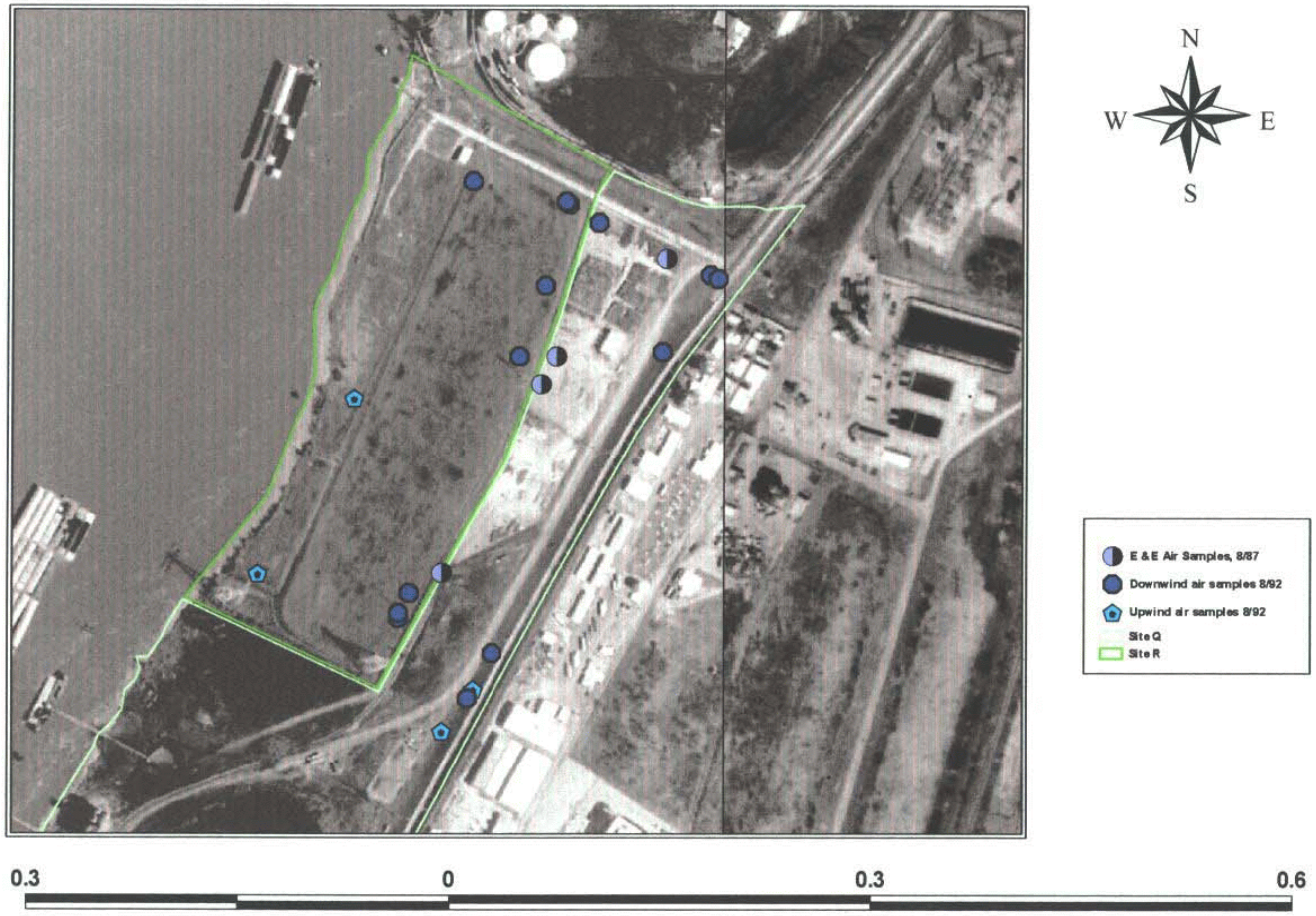
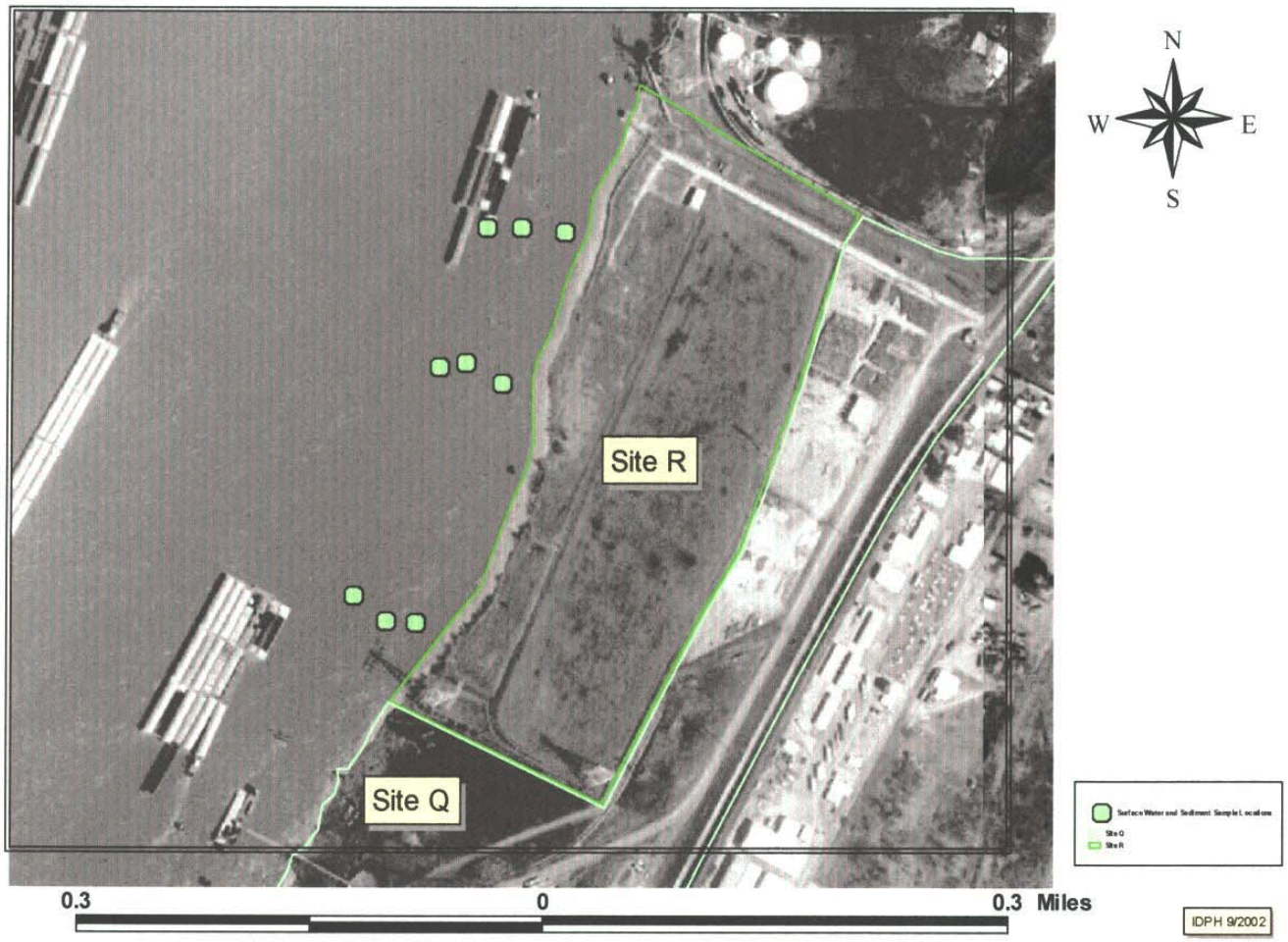


Figure 6 - Surface Water and Sediment Sample Locations



Attachments

Attachment 1

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 Priority List (NPL) sites, and potential for human exposure. They are derived to protect the most sensitive populations and are not action levels, but rather comparison values. They do not consider carcinogenic effects, chemical interactions, multiple route exposure, or other media-specific routes of exposure, and are very conservative concentration values designed to protect sensitive members of the population.

Reference Dose Media Evaluation Guides (RMEGs) are another type of comparison value derived to protect the most sensitive populations. They do not consider carcinogenic effects, chemical interactions, multiple route exposure, or other media-specific routes of exposure, and are very conservative concentration values designed to protect sensitive members of the population.

Cancer Risk Evaluation Guides (CREGs) are estimated contaminant concentrations based on a probability of one excess cancer in a million persons exposed to a chemical over a lifetime. These are also very 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 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 for drinking water (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.

Attachment 2

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].

Additive effect
A biologic response to exposure to multiple substances that equals the sum of responses of all the individual substances added together [compare with antagonistic effect and synergistic effect].

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

Aerobic-Requiring oxygen [compare with anaerobic].

Ambient-Surrounding (for example, ambient air).

Anaerobic-Requiring the absence of oxygen [compare with aerobic].

Analyte
A substance measured in the laboratory. A chemical for which a sample (such as water, air, or blood) is tested in a laboratory. For example, if the analyte is mercury, the laboratory test will determine the amount of mercury in the sample.

Analytic epidemiologic study
A study that evaluates the association between exposure to hazardous substances and disease by testing scientific hypotheses.

Antagonistic effect
A biologic response to exposure to multiple substances that is less than would be expected if the known effects of the individual substances were added together [compare with additive effect and synergistic effect].

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.

Biodegradation
Decomposition or breakdown of a substance through the action of microorganisms (such as bacteria or fungi) or other natural physical processes (such as sunlight).

Biologic indicators of exposure study
A study that uses (a) biomedical testing or (b) the measurement of a substance [an analyte], its metabolite, or another marker of exposure in human body fluids or tissues to confirm human exposure to a hazardous substance [also see exposure investigation].

Biologic monitoring
Measuring hazardous substances in biologic materials (such as blood, hair, urine, or breath) to determine whether exposure has occurred. A blood test for lead is an example of biologic monitoring.

Biologic uptake
The transfer of substances from the environment to plants, animals, and humans.

Biomedical testing
Testing of persons to find out whether a change in a body function might have occurred because of exposure to a hazardous substance.

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.

CAP [see Community Assistance Panel.]

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.

Case study
A medical or epidemiologic evaluation of one person or a small group of people to gather information about specific health conditions and past exposures.

Case-control study
A study that compares exposures of people who have a disease or condition (cases) with people who do not have the disease or condition (controls). Exposures that are more common among the cases may be considered as possible risk factors for the disease.

CAS registry number
A unique number assigned to a substance or mixture by the American Chemical Society Abstracts Service.

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.

Community Assistance Panel (CAP)
A group of people from a community and from health and environmental agencies who work with ATSDR to resolve issues and problems related to hazardous substances in the community. CAP members work with ATSDR to gather and review community health concerns, provide

information on how people might have been or might now be exposed to hazardous substances, and inform ATSDR on ways to involve the community in its activities.

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.

Delayed health effect
A disease or an injury that happens as a result of exposures that might have occurred in the past.

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].

Descriptive epidemiology
The study of the amount and distribution of a disease in a specified population by person, place, and time.

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

Disease prevention-Measures used to prevent a disease or reduce its severity.

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

DOD-United States Department of Defense.

DOE-United States Department of Energy.

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.

EPA-United States Environmental Protection Agency.

Epidemiologic surveillance [see Public health surveillance].

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-dose reconstruction
A method of estimating the amount of people's past exposure to hazardous substances. Computer and approximation methods are used when past information is limited, not available, or missing.

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.

Exposure registry
A system of ongoing followup of people who have had documented environmental exposures.

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.

Grand rounds
Training sessions for physicians and other health care providers about health topics.

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

Half-life (t½)
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 Substance Release and Health Effects Database (HazDat)
The scientific and administrative database system developed by ATSDR to manage data collection, retrieval, and analysis of site-specific information on hazardous substances, community health concerns, and public health activities.

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 promotion
The process of enabling people to increase control over, and to improve, their health.

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].

In vitro
In an artificial environment outside a living organism or body. For example, some toxicity testing is done on cell cultures or slices of tissue grown in the laboratory, rather than on a living animal [compare with in vivo].

In vivo
Within a living organism or body. For example, some toxicity testing is done on whole animals, such as rats or mice [compare with in vitro].

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/cm2-milligram per square centimeter (of a surface).

mg/m3-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].

Morbidity
State of being ill or diseased. Morbidity is the occurrence of a disease or condition that alters health and quality of life.

Mortality-Death. Usually the cause (a specific disease, a condition, or an injury) is stated.

Mutagen-A substance that causes mutations (genetic damage).

Mutation-A change (damage) to the DNA, genes, or chromosomes of living organisms.

National Priorities List for Uncontrolled Hazardous Waste Sites (National Priorities List or 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.

National Toxicology Program (NTP)
Part of the Department of Health and Human Services. NTP develops and carries out tests to predict whether a chemical will cause harm to humans.

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 for Uncontrolled Hazardous Waste Sites]

Physiologically based pharmacokinetic model (PBPK model)
A computer model that describes what happens to a chemical in the body. This model describes how the chemical gets into the body, where it goes in the body, how it is changed by the body, and how it leaves the body.

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].

Prevalence survey
The measure of the current level of disease(s) or symptoms and exposures through a questionnaire that collects self-reported information from a defined population.

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 health statement
The first chapter of an ATSDR toxicological profile. The public health statement is a summary written in words that are easy to understand. The public health statement explains how people might be exposed to a specific substance and describes the known health effects of that substance.

Public health surveillance
The ongoing, systematic collection, analysis, and interpretation of health data. This activity also involves timely dissemination of the data and use for public health programs.

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.

Registry
A systematic collection of information on persons exposed to a specific substance or having specific diseases [see exposure registry and disease registry].

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.

RFA
RCRA Facility Assessment. An assessment required by RCRA to identify potential and actual releases of hazardous chemicals.

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]

SARA [see Superfund Amendments and Reauthorization Act]

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.

Special populations
People who might be more sensitive or susceptible to exposure to hazardous substances because of factors such as age, occupation, sex, or behaviors (for example, cigarette smoking). Children, pregnant women, and older people are often considered special populations.

Stakeholder
A person, group, or community who has an interest in activities at a hazardous waste site.

Statistics
A branch of mathematics that deals with collecting, reviewing, summarizing, and interpreting data or information. Statistics are used to determine whether differences between study groups are meaningful.

Substance-a chemical.

Substance-specific applied research
A program of research designed to fill important data needs for specific hazardous substances identified in ATSDR's toxicological profiles. Filling these data needs would allow more accurate assessment of human risks from specific substances contaminating the environment. This research might include human studies or laboratory experiments to determine health effects resulting from exposure to a given hazardous substance.

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

Superfund Amendments and Reauthorization Act (SARA)
In 1986, SARA amended the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and expanded the health-related responsibilities of ATSDR. CERCLA and SARA direct ATSDR to look into the health effects from substance exposures at hazardous waste sites and to perform activities including health education, health studies, surveillance, health consultations, and toxicological profiles.

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

Surveillance [see public health surveillance]

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].

Synergistic effect
A biologic response to multiple substances where one substance worsens the effect of another substance. The combined effect of the substances acting together is greater than the sum of the effects of the substances acting by themselves [see additive effect and antagonistic effect].

Teratogen
A substance that causes defects in development between conception and birth. A teratogen is a substance that causes a structural or functional birth defect.

Toxic agent
Chemical or physical (for example, radiation, heat, cold, microwaves) agents that, under certain circumstances of exposure, can cause harmful effects to living organisms.

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