Public Health Assessment

Sauget Area 1

Dead Creek

Sauget, St. Clair County, Illinois

EPA Facility ID #s ILD980792006, ILD981953623, and ILD984809277

Prepared by

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

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Summary

Sauget Area 1 is a proposed National Priorities List site. The Illinois Department of Public Health (IDPH) has prepared this public health assessment to evaluate the various sites of Sauget Area 1, including Dead Creek. In May 1995, The Agency for Toxic Substances and Disease Registry (ATSDR) issued a health consultation prepared by IDPH for Sauget Area 1. This current public health assessment will address activities since the 1995 health consultation.

The Area 1 Sauget Sites consist of Sites G, H, I, L, M, N, and Dead Creek. Sites G, H, and I are borrow pits that were filled with a variety of wastes including chemicals. Site L is a holding pond used for wash water from cleaning trucks used to haul hazardous wastes. Site M is a borrow pit that filled with water. Site N is an excavated area partly filled with construction debris. Dead Creek runs from Site I at Creek Segment A (CS-A), flows south through Sauget and Cahokia, drains into the Old Prairie DuPont spillway, and then enters the Mississippi River.

IDPH has concluded that Sauget Sites Area 1, in Sauget, Illinois, poses a public health hazard because long-term exposure to ambient air and eating fish from Borrow Pit Lake could result in adverse health effects. The source of dioxins, 1,1-dichloroethene, and methylene chloride in ambient air is presently not known. Results from sampling and analysis of fish before the remediation of Borrow Pit Lake sediments suggest the possibility of developmental health effects in children who routinely eat contaminated fish from this site. At the time of completing this health assessment (December 2003), no post-remediation fish data were available. IDPH has recommended that additional fish sampling and analysis be conducted by USEPA. IDPH will review that data when it becomes available.

Prior to remediation of creek sediments and the fencing of some sites, exposure to elevated levels of some contaminants may have occurred. Exposure to site-related chemicals in surface water, sediments, and soil would not be expected to result in adverse health effects.

IDPH has also recommended that additional air sampling be conducted, and that the responsible parties maintain restricted access to Creek Segment B and Site M.

Purpose

The Sauget Area 1 site was proposed for addition to the National Priorities List on September 13, 2001. In May 1995, the Agency for Toxic Substances and Disease Registry (ATSDR) issued a health consultation prepared by the Illinois Department of Public Health (IDPH) for Sauget Area 1. The conclusions and recommendations of that health consultation can be found in Attachment 1. This public health assessment will address site sampling and activities that have occurred since the 1995 health consultation.

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 environmental contamination. These contaminated areas are collectively known as the Sauget Sites. The Sauget Sites are divided into two areas, Area 1 and Area 2. The general dividing line between Areas 1 and 2 is Illinois Route 3, with all sites east of Route 3 belonging to Area 1 and those to the west, except Dead Creek Segment F, in Area 2 (Figure 1).

The separate sites in Sauget Area 1 are designated by letters. Dead Creek runs through Area 1, and has been divided into six segments. Information about each of these sites is provided below.

Site G

Site G is in Sauget and is bordered by Queeny Avenue to the north, Dead Creek to the east, a cultivated field to the south, and Wiese Engineering to the west. Site G was a subsurface disposal area that covered approximately 5 acres (Figure 2).

The chain-link fence around Site G was originally constructed in May 1987 in response to high levels of volatile organic chemicals (VOCs) in surface soils. In 1995, the U.S. Environmental Protection Agency (USEPA) removed surface wastes and soils, solidified open oil pits, and covered part of the site with a soil cap (1). The depth of the soil cap varies from 1.5 to 2 feet.

Site H

Site H was also a subsurface disposal area in Sauget just south and west of the intersection of Queeny Avenue and Falling Springs Road. The site covers approximately 5 acres (Figure 2). At one time, the site was connected to Site I. Presently, Site H is level and vegetated. Drainage is toward Dead Creek, which is west of the site. Access to this site is not restricted.

Site I

Site I covers approximately 20 acres on the eastern side of the Cerro Copper Products property (Figure 2). The site is just north and east of the intersection of Queeny Avenue and Falling Springs Road in Sauget. Site I runs along the eastern border of Creek Segment A and was the site of a sand and gravel borrow pit. The pit was filled and then covered and graded. A chain-link fence and a guard at the main gate restrict access to the site.

Site L

Site L is a former surface impoundment used to dispose of rinse water from truck cleaning operations of a hazardous waste hauler (Figure 2). The impoundment was about 70 feet by 150 feet in size and was 500 feet south of Queeny Avenue and approximately 125 feet east of Dead Creek in Cahokia. The site is level, covered with black cinders, and is being used to store heavy equipment. Access to the site is not restricted.

Site M

Site M is a pit just east of Dead Creek Segment B, approximately 300 feet north of Judith Lane (Figure 2). Site M is a borrow pit that was excavated in the 1940s by H. H. Hall Construction (3). It is approximately 275 feet by 350 feet in size and is 40 feet deep. It is filled with water and is connected to Dead Creek Segment B by a drainage way that is approximately 8 feet wide. Site M has no visible signs of chemical dumping. It is surrounded by a chain-link fence that also encompasses Dead Creek Segment B.

Site N

Site N was a borrow pit in the 1940s and was filled with concrete rubble, scrap wood, and other demolition debris (1). The site covers about 5 acres and is west of Dead Creek Segment C, east of Falling Springs Road, north of Judith Lane, and south of Edwards Street (Figure 2) (3). Site N is no longer in use and is fenced.

Dead Creek Segments A, B, C, D, E, and F

Dead Creek Segment A (CS-A) is due west of Site I on Cerro Copper Products property in Sauget (Figure 2). No wastes are currently being discharged into CS-A. CS-A no longer discharges to the lower segments of the creek due to the blocking of a culvert under Queeny Avenue in the 1970s. Cerro Copper remediated CS-A in 1990 and 1991.

Creek Segment B (CS-B) is just south of CS-A between Queeny Avenue and Judith Lane. Figure 3 shows the features of CS-B. Part of CS-B is in Sauget and the other part is in Cahokia. The culverts at both Queeny Avenue and Judith Lane have been blocked to prevent the contamination in the creek from flowing into the southern portion of the creek. A chain-link fence that USEPA originally installed in 1982 encompasses CS-B. CS-B was remediated in 2001.

Dead Creek Segments C through F are those portions of the creek south of Judith Lane. These segments run through Cahokia, a wetland called Borrow Pit Lake, and then empty into the Prairie DuPont Floodway. The floodway then discharges to the Mississippi River. The creek is wider in these sections than it is in CS-B. In the southern section of CS-E, the Parks College area, the creek runs underground. It resurfaces briefly at the intersection of Route 157 and Falling Springs Road, turns west through a series of culverts, and drains into a wetland area west of Route 3. Access to these sections of the creek are unrestricted and it runs through residential areas. Creek segments C, D, E, and F were remediated in 2001.

1995 Sauget Area 1 Health Consultation

On May 8, 1995, ATSDR issued a health consultation prepared by IDPH for Sauget Area 1. The conclusions and recommendations were based on the conditions and data available at that time. IDPH concluded that Area 1 posed a public health hazard based on chronic exposure to contaminated sediments in Dead Creek. Persons could also be exposed to contaminants near Site G and to groundwater contamination near Dead Creek Segment B. IDPH recommended the remediation of contaminated Dead Creek sediments, remediation of Site G, restricted groundwater use, restricted access to contaminated areas, flood control, and more sampling to better characterize the extent of the contamination. The conclusions and recommendations from the 1995 health consultation can be found in Attachment 1.

Demographics

The population within a 1-mile radius of Area 1 is about 11,400 persons and includes all of Sauget, and portions of East St. Louis and Cahokia.

Site Visit

IDPH made several site visits, the most recent on October 2, 2003. At that time, contaminated Dead Creek sediments had been remediated. Trees along Dead Creek were removed during the sediment removal, particularly at CS-B. Site G, CS-B, Site M, CS-A and Site I were all fenced.

Sampling Activities Since 1995

Sampling activities since the May 8, 1995 health consultation include:

- magnetometer (buried scrap metal/drums) and soil gas surveys of sites G, H, I, L, and N,
- waste samples at Sites G, H, I, L, and N,
- upgradient and down gradient groundwater samples at Sites G, H, I, and L,
- surface water and sediment samples from Creek Segments B, C, D, E, and F, Site M, the Borrow Pit, and the Old Prairie DuPont Creek,
- biological/ecological samples, and
- air samples (1).

Remedial projects have occurred at Site G, Site M, and Creek Segments B through F. A total of 748 samples were collected, not including magnetometer and soil gas samples. In addition, an ecological and a human health risk assessment have been conducted for the site (2,3).

On-site Surface Soil

On-site surface soil samples were collected from Sites G, H, I, L and N. This sampling consisted of four samples at each site collected between 0 and 6 inches in depth. In addition, a composite sample was collected from 0 to 2 feet below the bottom of the fill material. These borings were analyzed for VOCs, semi-volatile organic compounds (SVOCs), pesticides, total polychlorinated biphenyls (PCBs), inorganic chemicals, and dioxins (expressed as 2,3,7,8-TCDD equivalents). Soil samples were collected from the perimeter of the sites to determine the extent of contamination.

Residential and Undeveloped Area Surface Soil Samples

Surface and subsurface soil samples were collected from 45 residential and undeveloped areas in Sauget and northern Cahokia. Surface samples were collected from the surface to a depth of 0.5 feet, while the subsurface soil samples were collected between 3 and 6 feet in depth. Figure 4 shows the location of the surface soil samples. Surface and subsurface soil samples were analyzed for dioxins, PCBs, inorganics, VOCs, SVOCs, and pesticides. All surface samples and four of the forty-five subsurface samples were analyzed for dioxins and furans.

Groundwater

Groundwater samples were collected from shallow and deep aquifers near the fill areas including Sites G, H, I, and L and residential areas. Eighty-eight groundwater samples were associated with Sites G, H, I, and L. Fifteen groundwater samples were collected from two residential wells and four non-potable domestic wells in the residential areas.

Surface Water

Surface water samples were collected from Dead Creek, Site M, the Borrow Pit Lake, Old Prairie DuPont Creek and four background areas. Three samples were collected at Creek Segments B, D and F for a total of nine samples. One sample was collected from CS-E and another from Site M. Two samples were collected from the Old Prairie DuPont Creek.

Sediments

Sediment samples were collected before and after removal of contaminated sediments. Samples were collected from Creek Segments B, C, D, E and F, Site M, Reference Area and Old Prairie DuPont Creek before the removal action. After the removal action, 106 clearance samples were collected from Creek Segments B, C, D, E, and F, and Site M. PCBs were analyzed in all clearance sediment samples. Not all clearance sediment samples were analyzed for all chemicals.

Air Sampling

Air samples were collected from thirteen locations. Different sampling media were used to collect different chemicals. All air samples were collected over a 24-hour period. Two samples were collected upwind and two samples were collected downwind from Site G. Three upwind

and six downwind samples, two at each site, were collected from Sites H, I, and L. The locations of the air samples are shown in Figure 3.

Fish

Seven fish fillet samples were collected from white crappie, white bass, and largemouth bass. The samples were analyzed for PCBs, dioxins and furans, VOCs, SVOCs, inorganic chemicals, and pesticides. All fish fillet samples were collected from the Borrow Pit Lake.

Discussion

Chemicals of Interest

IDPH compared the results of the maximum levels detected in the environmental samples with appropriate screening comparison values 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. A brief explanation of each comparison value used is found in Attachment 2.

Soil

On-site Samples

The chemicals of interest identified in on-site surface soil samples from sites G, H, I, L, and N include dioxins, total PCBs, arsenic, cadmium, lead, thallium, heptachlor epoxide, six polycyclic aromatic hydrocarbons (PAHs), and carbazole (Table 1). Site G surface soil only had arsenic at a level that exceeded the soil comparison value, presumably because clean surface soil was brought onto the site during the 1995 remedial activities.

Residential and Undeveloped Soils

The chemicals of interest in surface and subsurface soil in the residential and undeveloped sections of Area 1 include dioxins, arsenic, thallium, nine PAHs, and two pesticides (Table 2).

Groundwater

Seventy chemicals of interest were identified in the groundwater samples collected from residential wells and groundwater at Sites G, H. I, and L (Table 3). IDPH used drinking water comparison values to select chemicals of interest in groundwater.

Surface Water

Twenty-three chemicals of interest were found in the surface water samples collected from Dead Creek Segments B, D, E, and F, Site M, Old Prairie DuPont Creek, and background reference

areas (Table 4). Dioxins are of interest because they were detected in the samples, but they cannot be further evaluated since the laboratory detection limit exceeded the comparison value.

Sediments

The chemicals of interest in creek sediments were selected from samples before removal activities (Table 5) and after removal activities (Table 6). All the chemicals of interest identified in the pre-removal sediments were also chemicals of interest in the post removal sediments, but generally at lower levels.

Air

Review of the results of eight downwind and five upwind air samples yielded twenty chemicals of interest (Table 7). The location of the upwind sample at Site I was downwind of Sites G, H, and L. The Site G sample was directly across Queeny Avenue from the upwind sample for Site I. Seven of the twenty samples had higher levels of the chemicals of interest in samples upwind of Area 1. The source of the chemicals in the upwind samples is not known. The selection of these sampling locations makes it difficult to determine the source of the chemicals of interest, but exposure to these chemicals can still be estimated.

Fish

Twelve chemicals of interest were identified in the fish fillets from Borrow Pit Lake including dioxins, five metals, four pesticides, and two phthalates (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.

People can be affected by a chemical 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 of its 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. Completed exposure pathways are shown in Table 9 and potential exposure pathways are shown in Table 10. Table 11 shows the population near various Area 1 sites.

Completed Exposure Pathways

Air

Exposures were calculated for the chemicals of interest in air. The benzo(a)pyrene toxicity equivalency factor (TEF) was used for acenaphthylene, fluorene, and fluoranthene and these values were added together to estimate exposure.

Exposure was estimated for a 10-year-old child resident, an adult resident, and an adult worker breathing the chemicals of interest in the air. Exposures were calculated using the upwind and downwind maximum values for each chemical.

Based on the exposure scenarios, dioxins in air may increase the risk of non-cancer adverse health effects over a long period for children and adults residing near Queeny Avenue and workers on these sites and in nearby industries. A moderate increased cancer risk may be associated with exposure to methylene chloride and 1,1-dichloroethene in air.

Creek Sediments

Sample results from 1999 showed that Dead Creek sediments contained elevated levels of dioxins, PCBs and arsenic. Dead Creek Segment B had the highest levels of these chemicals. Segment B is fenced, so exposure to the highest levels of contaminants is not likely. Samples in segments further downstream showed a decrease in the levels of chemicals.

An exposure scenario for a child playing in the creek four days per week, 26 weeks per year for a maximum of five years indicated that there would be no apparent increased risk of cancer for past exposure to creek sediments.

Remediation of Dead Creek sediments occurred in 2000 and 2001. After remediation, the levels of PCBs and arsenic decreased. Based on the above exposure scenario, exposure to creek sediments would cause no increased risk of cancer. Exposure to dioxins would not be expected to cause adverse health effects if children are exposed over a long period. No other chemicals in creek sediments would be expected to cause adverse health effects.

Surface Water

Surface water samples were collected before the remediation of the creek sediments. Elevated levels of benzene and PCBs were found in the 1999 surface water sampling. Based on the same exposure scenario used for children playing in creek sediments, no increased risk of cancer would be expected. No non-cancer health effects would be expected from exposure to surface water in Dead Creek.

Fish

Results for fish are based on sampling that occurred before remediation of the creek sediments. Elevated levels of dioxins were found in fish from Borrow Pit Lake. To determine whether

adverse health effects might occur from eating fish from Borrow Pit Lake, we used an exposure scenario of children and adults eating 0.25 pounds of fish per week for 26 weeks per year.

Based on the above exposure scenarios, elevated levels of dioxins may increase the risk of non-cancer adverse health effects over a long period. Arsenic was found in only one of the fish samples. Based on our exposure scenarios, no increased risk of cancer would be expected from eating arsenic in fish caught in Borrow Pit Lake. Because of remediation, current levels of contaminants in fish may be less than the values found in the 1999 sampling.

Surface Soil

Forty-five samples were collected in residential and undeveloped areas surrounding the sites. Levels of arsenic, PAHs, and dioxins exceeded comparison values. Based on an exposure scenario of young children playing 5 days per week, 35 weeks per year for a maximum of 5 years, no apparent increased risk of cancer would be expected. No non-cancer health effects would be expected for children exposed to surface soil in these areas.

For adults, an exposure scenario of 5 days per week, 35 weeks per year for 30 years would result in no apparent increased risk of cancer. No non-cancer health effects would be expected for adults exposed to surface soil in these areas.

On-site Surface Soil

Site I is fenced and not accessible to trespassers. Site G was remediated in 1995 and has a cap of 1 to 2 feet of clean soil.

In sites H and L elevated levels of PCBs, PAHs, heptachlor epoxide, and arsenic were found in surface soil samples. An exposure scenario of a young child playing 1 day per week, 18 weeks per year for a maximum of 5 years was used.

Based on this exposure scenario, a child would have no apparent increased risk of cancer from playing in contaminated soil. No non-cancer adverse health effects would be expected from exposure to the on-site surface soil.

Potential Exposure Pathways

On-site Contamination

Exposure to chemicals in on-site soil could occur during remediation or otherwise disturbing subsurface soil, waste, and groundwater. Workers remediating site-related contaminants should wear protective clothing as required by the U.S. Department of Labor. Appropriate containment should be used during any further remediation activity to ensure that dust and site-related contaminants do not affect nearby residential areas.

Residential Groundwater

In residential areas, only one well had an elevated level of PCBs; however, because of a local ordinance, wells are not used as a source of drinking water. All areas are connected to the public water supply.

Industrial areas to the north had elevated levels of several chemicals, including VOCs. If this contamination moves toward residential areas, their groundwater may be affected in the future.

Toxicological Evaluation

The estimated exposure doses were compared with health guidelines for non-cancer health effects. Cancer risks were estimated for those chemicals that are known or suspected carcinogens. From these estimates, IDPH found an increased risk of non-cancer adverse health effects in children from exposure to dioxins in fish from Borrow Pit Lake. No increased risk of cancer would be expected from exposure to site-related contaminants. The source of 1,1-dichloroethene and methylene chloride in ambient air is not known.

Dioxins

The level of dioxins found in fish was greater than the minimal risk level (MRL) for children. Exceeding the MRL does not mean that adverse health effects will occur. The MRL for dioxins is based on a study where monkeys were exposed to levels similar to the estimated dose for dioxins in fish based on the 1999 sampling. These monkeys exhibited altered developmental and social behavior when exposed to this level of dioxins. Human studies have not suggested similar developmental effects from exposure to the level of dioxins found in fish from Borrow Pit Lake. In addition, because the only available fish data were collected before the remediation activities occurred, the level of dioxins in fish may have decreased.

1,1-Dichloroethene

Based on our exposure scenario, breathing 1,1-dichloroethene in ambient air may cause an increased risk of cancer. USEPA has determined that 1,1-dichloroethene is a possible human carcinogen. Studies on workers who breathed 1,1-dichloroethene have not shown an increase in cancer. These studies, however, are not conclusive because of the small numbers of workers and the short time studied. Animal studies have shown mixed results. Several studies reported an increase in tumors in rats and mice, and other studies reported no such effects.

Methylene Chloride

Based on our exposure scenario, breathing methylene chloride in ambient air may cause an increased risk of cancer. Human studies are not conclusive; however, an increased cancer risk was seen in mice breathing large amounts of methylene chloride for a long period.

USEPA has determined that methylene chloride is a probable cancer-causing agent in humans. The World Health Organization has determined that methylene chloride may cause cancer in humans. The Department of Health and Human Services has determined that methylene chloride can be reasonably anticipated to be a cancer-causing chemical.

Community Health Concerns

Could exposure to creek sediments harm my child?

Exposure to contaminants in sediment in Dead Creek Segments C, D, E, and F would not be expected to cause adverse health effects in children. Dead Creek Segment B is fenced and not accessible. Currently, exposure to the levels of chemicals in creek sediments would not be expected to cause adverse health effects in children contacting the sediments. Still, children should be discouraged from playing in the creek because by doing so, they would be unnecessarily exposed to not only chemical contaminants, but to possible bacteriological and viral pathogens.

Before sediment removal in 2001, long-term exposures to sediments in all creek segments may have increased the risk of adverse health effects associated with dioxins and may have posed a low increased risk of cancer due to PCBs.

Is the flooding from Dead Creek contaminating our yards?

Contaminated sediments may have been deposited in yards during past flood events. The contribution of flood water to residential soil contamination is not known; however, no adverse health effects would be expected from exposure to the levels of chemicals detected in residential yards. Now that creek sediments have been remediated, future flooding should not be a hazard.

Can I use the groundwater to wash my car or water my garden?

Groundwater should not be used to wash cars or water gardens because groundwater contamination may be present in residential areas. In accordance with local ordinances, groundwater is not to be used as drinking water in either Sauget or Cahokia.

Public Comments

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 contaminants. IDPH evaluated children's exposure to contaminants to determine whether adverse health effects would be expected. Based on animal studies, developmental effects could occur in children who routinely eat fish from Borrow Pit Lake that contain elevated levels of dioxins. 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. This publication can be obtained by calling 217-782-7498. No other site-related contaminants would be expected to cause adverse health effects in children.

Conclusions

IDPH concludes that the Area 1 Sauget Sites pose a public health hazard because long-term exposure to ambient air and fish from Borrow Pit Lake could result in adverse health effects. Sources of dioxins, 1,1-dichloroethene, and methylene chloride in ambient air are not known. Data from fish samples obtained before the remediation of sediments in Borrow Pit Lake suggest the possibility of developmental health effects in children who routinely eat contaminated fish from this site. Fish sampling and analysis have not been done since remediation of Borrow Pit Lake sediments was completed.

Prior to remediation of creek sediments and the fencing of some sites, exposure to elevated levels of some contaminants may have occurred. Current exposures to site-related chemicals in surface water, unfenced sediments, and soil would not be expected to result in adverse health effects.

Recommendations and Public Health Action Plan

IDPH recommends that:

1. USEPA collect additional air samples near Sites G, H, I, and L to determine if VOC levels are elevated. The source of these chemicals should be determined and proper background samples collected.

2. The responsible parties maintain restricted access to Creek Segment B and Site M.

3. USEPA perform additional fish sampling to determine if the levels of dioxins in fish have decreased since the completion of remediation activities.

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Certification

This Sauget Area 1 (Dead Creek) 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.

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

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Tables

Table 1. Chemicals of Interest in Site G, H, I, L, and N Surface Soils in parts per million (ppm)

Chemical of Interest	Maximum Level (in ppm)					Soil Comparison Value (in ppm)[2]	
	Site G	Site H	Site I	Site L	Site N	Comparison Value	Source
Dioxins and Furans as 2,3,7,8-TCDD [1]	1e-05	0.00129	0.00127	0.001	0.000345	0.00005	CEMEG
Total PCBs	0.0465	1.5	121	1.17	0.178	0.4	CREG
Arsenic	8	64	12	37	7.3	0.5	CREG
Cadmium	0.39	22	31	10	1.5	10	CEMEG
Lead	16	230	1410	940	0.41	NV	NV
Thallium	ND	2.5	ND	2.1	ND	NV	NV
Heptachlor epoxide	0.0002	0.044	0.14	1.17	ND	0.08	CREG
Benzo(a)pyrene	ND	0.14	2.2	7	0.33	0.1	CREG
Indeno(1,2,3-cd)pyrene	ND	0.1	1.6	4.8	0.25	NV	NV
Phenanthrene	ND	0.11	3.3	12	0.26	NV	NV
Benzo(a)anthracene	ND	0.13	2.2	7.8	0.27	NV	NV
Benzo(b)Fluoranthene	ND	0.14	2.8	6.6	0.32	NV	NV
Benzo(k)Fluoranthene	ND	0.24	0.96	6.8	0.36	NV	NV
Chrysene	ND	0.3	2.2	7.8	0.31	NV	NV
Dibenzo(a,h)anthracene	ND	ND	0.36	1.3	0.11	NV	NV
Carbazole	ND	ND	0.32	1.5	ND	NV	NV

CEMEG - Chronic Environmental Media Guide
NV - No Value
CREG - Cancer Risk Evaluation Guide
ND - Not Detected
PCB - Polychlorinated Biphenyls
[1] The total toxicity equivalent as 2,3,7,8-Tetrachlorodibenzo-p-dioxin
[2] Guideline values for children

Table 2. Chemicals of Interest in Residential and Undeveloped Surface and Subsurface Soils in parts per million (in ppm)

Chemical of Interest	Surface		Subsurface		Comparison Value (CV)	
	Maximum Level	Average Level	Maximum Level	Average Level	CV	Source
Dioxins and Furans as 2,3,7,8-TCDD [1]	0.0001874	0.00001	0.00014	0.00005	0.00005	CEMEG
Arsenic	34	7.41	11	5.38	0.5	CREG
Thallium	1.4	0.64	0.72	0.57	NV	NV
Dibenzo(a,h)anthracene	0.8	0.09	1.9	0.086	NV	NV
Benzo(a)anthracene	4.3	0.3	12	0.3	NV	NV
Benzo(b)fluoranthene	4.4	0.3	9.8	0.26	NV	NV
Benzo(k)fluoranthene	3.4	0.27	6.3	0.211	NV	NV
Benzo(a)pyrene	3.6	0.26	5.6	0.154	0.1	CREG
Indeno(1,2,3-cd)pyrene	2	0.19	3.5	0.16	NV	NV
Chrysene	4.9	0.34	11	0.28	NV	NV
Benzo(g,h,i)perylene	2.2	0.196	1.1	0.105	NV	NV
Phenanthrene	9.2	0.461	0	0	NV	NV
Heptachlor epoxide	0.03	0.00174	ND	ND	0.02	CREG
Carbazole	1	0.125	0.82	0.11	NV	NV

[1] The total toxicity equivalent as 2,3,7,8-Tetrachlorodibenzo-p-dioxin
CEMEG - Chronic Environmental Media Evaluation Guide
CREG - Cancer Risk Environmental Guide
NV - No Value
ND - Not Detected

Table 3. Chemicals of Interest in Groundwater in parts per billion (ppb)

Chemical of Interest	Residential	Site I	Sites G,H,L	Env. Media Guide (6)	
	Maximum Level	Maximum Level	Maximum Level	Comparison Value	Source
Dioxins and Furans as 2,3,7,8-TCDD (1)	0.001	0.01	0.01	0.00001	CEMEG
Total PCBs (2)	0.06	15,750	54.5	0.02	CREG
1,1-Dichloroethane	ND	960	ND	NV	NV
1,1-Dichloroethene	ND	330	ND	0.06	CREG
2-Chlorophenol	ND	84	630	40	LTHA
Benzene	ND	750	ND	0.6	CREG
Chlorobenzene	ND	34,000	ND	100	LTHA
Cis/Trans-1,2-Dichloroethene	ND	1,400	ND	70/100 CIS/TRANS	LTHA
Ethylbenzene	ND	870	1,800	700	LTHA
Tetrachloroethene	ND	83	ND	5	MCL
Trichloroethene	0.642	180	ND	5	CREG
Vinyl chloride	ND	970	ND	0.03	CREG
1,2,4-Trichlorobenzene	ND	1,100,000	1,080	10	LTHA
1,2-Dichlorobenzene	ND	12,000	720	600	LTHA
1,3-Dichlorobenzene	ND	1,100	ND	600	LTHA
1,4-Dichlorobenzene	ND	51,000	14,000	75	LTHA
2,4,6-Trichlorophenol	ND	1,700	18.92	3	CREG
2,4-Dichlorophenol	ND	2,400	89.82	20	LTHA
3&4-Methylphenol (m&p-cresol)	ND	ND	2400	500	RMEG
4,6-Dinitro-2-methylphenol	ND	ND	1.02	NV	NV
4-Chloroaniline	ND	4,100	23,000	40	RMEG
bis(2-Chloroethyl)ether	ND	7.35	ND	0.02	CREG
bis(2-Ethylhexyl)phthalate	ND	420	32	3	CREG
Carbazole	ND	240	4.122	NV	NV
Dimethylphthalate	ND	ND	3.652	NV	NV
Hexachlorobenzene	ND	90,000	1,022	0.02	CREG
Nitrobenzene	ND	140	3.242	2	RMEG
N-Nitrosodiphenylamine	ND	760	14.7	7	CREG
Phenol	ND	ND	14,000	4,000	LTHA
Pyrene	ND	540	ND	300	RMEG
Benzo(a)anthracene	0.45 (3)	400	1.92	NV	NV
Benzo(a)pyrene	0.49 (3)	380	4.92	0.005	CREG
Benzo(b)fluoranthene	0.44 (3)	290	2.112	NV	NV
Benzo(g,h,i)perylene	ND	300	4.872	NV	NV
Benzo(k)fluoranthene	ND	220	5.992	NV	NV
Chrysene	0.58 (3)	740	6.152	NV	NV
Dibenzo(a,h)anthracene	ND	210	5.962	NV	NV
Indeno(1,2,3-cd)pyrene	0.66 (3)	240	4.942	NV	NV
Naphthalene	ND	5,800	1,112	100	LTHA
Phenanthrene	ND	790	5.532	NV	NV
Aluminum	ND	ND	33,000	20,000	IEMEG

Chemical of Interest	Residential	Site I	Sites G,H,L	Env. Media Guide (6)	
	Maximum Level	Maximum Level	Maximum Level	Comparison Value	Source
Antimony	ND	60	150	4	RMEG
Arsenic	40	140	4,300	0.02	CREG
Barium	ND	1,200	980	700	RMEG
Cadmium	ND (4)	70	ND (4)	2	CEMEG
Chromium	ND	200	570	100	LTHA/MCL
Cobalt	ND	ND	220	100	IEMEG
Lead	80 (3)	3,850	50	NV	NV
Manganese	1,700	7,700	10,000	500	RMEG
Molybdenum	ND	40	450	40	LTHA
Nickel	ND	27,000	180,000	100	LTHA
Sodium	ND	600,000	ND	20,000	IDPH
Thallium	ND	ND	10	0.5	LTHA
Vanadium	60	50	330	30	IEMEG
Zinc	2,300	33,000	ND	2,000	LTHA
2,4-D	ND	ND	380	70	LTHA
4,4'-DDD	ND	180	0.642	0.1	CREG
4,4'-DDE	ND	2.2	0.16	0.1	CREG
4,4'-DDT	ND	1.1	14	0.1	CREG
Aldrin	ND	0.01	0.07	0.002	CREG
alpha-BHC	ND	3,300	1,295	0.006	CREG
beta-BHC	ND	46	1.822	0.02	CREG
delta-BHC	ND	41	0.432	0.02	CREG
gamma-BHC (Lindane)	0.03	0.4	0.012	0.02	CREG
Chlordane	ND	3.5	YES (5)	0.1	CREG
Alpha Chlordane	ND	ND	0.1	0.1	CREG
Gamma Chlordane	ND	3.5	YES (5)	0.1	CREG
Dieldrin	ND	0.012	8	0.002	CREG
Heptachlor	ND	2.2	0.022	0.008	CREG
Heptachlor epoxide	ND	0.22	4.4	0.004	CREG
Isophorone	ND	ND	50	40	CREG
MCPA	ND	ND	720	4	LTHA
MCPP	ND	18,000	4,250	NV	NV
Pentachlorophenol	1.292	575	1,152	0.2	CREG
2,4,5-TP (Silvex)	ND	ND	390	50	LTHA

1 The total toxicity equivalent as 2,3,7,8-Tetrachlorodibenzo-p-dioxin
2 PCBs - Polychlorinated Biphenyls
3 only one sample used in calculations
4 Detection limit greater than comparison value
5 Isomers Exceed Value
6 All Comparison Values for children
IDPH - At levels greater than 20,000 ppb, residents on a sodium restricted diet should consult their physicians.
CEMEG - Chronic Environmental Media Guide
IEMEG - Intermediate Environmental Media Guide
CREG - Cancer Risk Evaluation Guide
LTHA - Lifetime Health Advisory
RMEG - Reference Dose Media Evaluation Guide
MCL - Maximum Contaminant Level
NV - No Comparison Value
ND - Not Detected

Table 4. Chemicals of Interest for Surface Water in Sauget Area 1 in parts per billion (ppb)

Chemical of Interest	Maximum Level for Each Location							Comparison Values (CV)	
	CS-B	CS-D	CS-E	CS-F	OPDC	REF	Site M	CV for Child	Source
Dioxins and Furans as 2.3.7.8-TCDD*	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.00001	CEMEG
Total PCBs	ND	0.06	ND	ND	ND	ND	ND	0.02	CREG
Benzene	ND	ND	ND	1.7	ND	ND	ND	0.6	CREG
Arsenic	10	10	ND	0	10	20	ND	0.02	CREG
Antimony	10	ND	ND	ND	ND	ND	ND	4	RMEG
Lead	0.01	20	ND	0	0	30	0.01	15	USEPA
Manganese	0.03	0.17	0.14	0.14	630	2900	0.17	500	RMEG
Di-n-octylphthalate	ND	ND	ND	ND	1.1	ND	ND	NV	NV
3,3'-Dichlorobenzidine	ND	ND	ND	ND	ND	***5***	ND	0.08	CREG
Aldrin	0	0.01	ND	ND	ND	0	0	0.3	RMEG
gamma-BHC (Lindane)	0.04	0.05	0	ND	ND	0.01	0	0.024	CREG
alpha-BHC	0.02	0.01	0	ND	ND	0	0	0.006	CREG
beta-BHC	0.02	0.03	0.01	ND	ND	0.02	0	0.02	CREG
delta-BHC	0.02	0.01	0.03	ND	ND	0.01	0	0.024	CREG
Heptachlor	0	0.01	0	ND	ND	03	0	0.008	CREG
Heptachlor epoxide	0.01	0.02	ND	ND	ND	0.01	0.01	0.004	CREG
Pentachlorophenol	1.75	ND	ND	ND	ND	ND	ND	0.2	CREG
Benzo(a)anthracene	ND	ND	ND	ND	0.62	ND	ND	NV	NV
Benzo(a)pyrene	ND	ND	ND	ND	2.89	ND	ND	0.005	CREG
Benzo(b)Fluoranthene	ND	ND	ND	ND	2.8	ND	ND	NV	NV
Benzo(k)fluoranthene	ND	ND	ND	ND	2.88	ND	ND	NV	NV
Chrysene	ND	ND	ND	ND	0.74	ND	ND	NV	NV
Dibenzo(a,h)anthracene	ND	ND	ND	ND	2.9	ND	ND	NV	NV

* The total toxicity equivalent as 2,3,7,8-Tetrachlorodibenzo-p-dioxin

OPDC - Old Prairie DuPont Creek
CEMEG - Chronic Environmental Media Guide
NV - No Comparison Value
ND - Not Detected
TEQ - Toxicity Equivalent (of 2,3,7,8-TCDD)
REF - background reference value
CREG - Cancer Risk Evaluation Guide
RMEG - Reference Dose Media Evaluation
2,3,7,8-TCDD - 2,3,7,8-Tetrachlorodibenzo-p-dioxin
USEPA - action level for lead in drinking water

Table 5. Chemicals of Interest in Creek Sediments and Site M Before Remediation in parts per million (ppm)

Chemical of Interest	Maximum Level Detected at each Location								Comparison Value	
	CS-B	CS-C	CS-D	CS-E	CS-F	Site M	OPDC	Reference Areas	CV for Child	Source
Dioxins and Furans as 2,3,7,8-TCDD (1)	0.012	0.0029	0.0007	0.0005	0.0003	0.0039	0	0.00001	0.00005	CEMEG
Total PCBs	226.1	48.25	10.6	8.76	6.2	12.2	ND	ND	0.4	CREG
Arsenic	38	28	17	16	19	35	7.2	8	0.5	CREG
Cadmium	25	20	15	14	47	17	ND	0.65	10	CEMEG
Lead	1,000	480	260	310	320	530	16	26	NV	NV
Thallium	2.1	ND	ND	1.9	ND	ND	ND	ND	NV	NV
Zinc	26,000	41,000	19,000	2,300	11,000	2,400	60	96	20,000	CEMEG
Benzo(a)pyrene	1.2	1.4	0.56	0.42	ND	1.5	ND	ND	0.1	CREG
Benzo(a)anthracene	0.87	0.89	0.42	0.34	ND	1.3	ND	ND	NV	NV
Benzo(b)fluoranthene	2	2	0.97	0.52	ND	1.5	ND	ND	NV	NV
Benzo(k)fluoranthene	1.2	1.2	0.66	0.6	ND	1.8	ND	ND	NV	NV
Chrysene	1.8	1.5	0.79	0.66	0.074	1.5	ND	ND	NV	NV
Indeno(1,2,3-cd)pyrene	1.1	ND	ND	0.43	ND	ND	ND	ND	NV	NV
Dieldrin	ND	ND	ND	0.09	0.093	ND	ND	ND	3	CEMEG
Heptachlor	0.5	0.0097	ND	0.0005	0.0009	0.059	ND	ND	0.2	CREG

1 The total toxicity equivalent as 2,3,7,8-Tetrachlorodibenzo-p-dioxin
OPDC - Old Prairie DuPont Creek
CREG - Cancer Risk Evaluation Guide
CEMEG - Chronic Environmental Media Evaluation Guide
NV - No Comparison Value
ND - Not Detected

Table 6. Chemicals of Interest in Creek Sediments and Site M After Remediation in parts per million (ppm)

Chemical of Interest	Maximum Level at Each Location						Comparison Value (CV)	
	CS-B	CS-C	CS-D	CS-E	CS-F	Site M	CV for Child	Source
Dioxins and Furans as 2,3,7,8-TCDD (1)	0.00795	5.1E-05	0.001323	0.000186	0.000667	0.007241	5E-05	CEMEG
Total PCBs	86.7	0.178	2.44	1.25	0.3569	10	0.4	CREG
4-Nitrophenol	0.44	ND	ND	ND	ND	ND	NV	NV
Carbazole	0.62	ND	ND	ND	ND	0.032	NV	NV
Benzo(a)anthracene	1.9	ND	0.26	0.26	0.092	0.72	NV	NV
Benzo(a)pyrene	1.2	ND	0.14	0.42	0.19	0.49	0.1	CREG
Benzo(b)fluoranthene	1.4	0.27	0.26	0.51	0.18	0.64	NV	NV
Benzo(k)fluoranthene	0.9	0.27	0.26	0.37	0.13	0.34	NV	NV
Chrysene	1.9	ND	0.26	0.37	0.14	0.82	NV	NV
Dibenzo(a,h)anthracene	0.34	ND	ND	0.14	ND	0.15	NV	NV
Indeno(1,2,3-cd)pyrene	0.83	ND	0.18	0.35	0.11	0.17	NV	NV
Arsenic	44	14	18	20	19	30	0.5	CREG
Cadmium	57	24	40	38	70	21	10	CEMEG
Lead	700	140	150	400	450	270	NV	NV
Nickel	630	570	530	600	630	1,700	1,000	RMEG
Thallium	2.1	1.2	1.1	1.8	3.2	0	3	RMEG
Dieldrin	0.05	0.011	0.69	0.034	0.0082	0	0.04	CREG
Heptachlor epoxide	0.41	0	0	0.095	0	0.86	0.02	CREG

1 The total toxicity equivalent as 2,3,7,8-Tetrachlorodibenzo-p-dioxin
CREG - Cancer Risk Evaluation Guide
RMEG - Reference Dose Media Evaluation Guide
CEMEG - Chronic Environmental Media Evaluation Guide
ND - Compound not detected
NV - No comparison value

Table 7. Chemicals of Interest in Air Samples Upwind and Downwind of Sauget Area 1 in micrograms per cubic meter ($\mu g/m^3$) and parts per billion (ppb)

Chemical of Interest	Upwind		Downwind		Comparison Value	
					EMEG	CREG
	$\mu g/m^3$	ppb	$\mu g/m^3$	ppb	ppb	$\mu g/m^3$
1,1-Dichloroethene	32.57	8.21	27.47	6.93	20	0.02
Methylene chloride	300	86.37	2424	679.8	300	3
2-Methylnaphthalene	0.15	0.0258	0.15	0.0258	NL	NL
2-Nitroaniline	ND	ND	0.03	0.0053	NL	NL
4-Methyl-2-pentanone (MIBK)	ND	ND	106	21.6	NL	NL
Acenaphthylene	0.03	0.005	0.04	0.0064	NL	NL
Benzyl alcohol	0.03	0.007	ND	ND	NL	NL
bis(2-Ethylhexyl)phthalate	0.07	0.004	0.08	0.005	NL	NL
Dibenzofuran	0.04	0.006	0.04	0.0058	NL	NL
Diethylphthalate	0.05	0.006	0.03	0.0033	NV	NV
Dimethylphthalate	0.05	0.006	0.07	0.0088	NV	NV
Fluorene	0.03	0.004	0.03	0.0044	NV	NV
Isopropylbenzene	1.67	0.3397	22.12	4.5	NL	NL
n-Butylbenzene	ND	ND	1.45	0.264	NL	NL
Phenanthrene	0.04	0.006	0.06	0.0082	NV	NV
Phenol	0.06	0.0156	ND	ND	NV	NV
p-Isopropyltoluene	ND	ND	8.8	1.6	NL	NL
s-Butylbenzene	ND	ND	2.2	0.4	NL	NL
t-Butylbenzene	ND	ND	9.4	1.71	NL	NL
1998 Total TEQ w/ EMPC[1] as	0.000030	NC	0.00004	NC	NV	NV

EMEG - Environmental Media Guide
CREG - Cancer Risk Environmental Guide
NL - chemical not listed on ATSDR Comparison Value Tables
NV - No Value
NC - Concentration for TEQ 2,3,7,8-TCDD equivalents could not be calculated
ND - Not Detected
TEQ - Toxicity Equivalent (of 2,3,7,8-TCDD)
EMPC - estimated maximum possible concentration

Table 8. Chemicals of Interest in Fish Fillets based on 26 Week per Year Child Exposure (in mg/kg-day)

Chemical of Interest	Estimated Dose	Health Guideline	Source
Dioxins and Furans as 2,3,7,8-TCDD (1)	***2 x 10^{-08}***	1 x 10^{-09}	C MRL
Arsenic	***0.0045***	0.003	C MRL

1 The total toxicity equivalent as 2,3,7,8-Tetrachlorodibenzo-p-dioxin
C MRL - Chronic Minimal Risk Level

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

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	Various Sites of Area 1	Air	Air near sites G, H, I and L of Area 1	Inhalation	Workers and residents	Past Present Future	Breathing	70	Table 2
Creek Sediments	Dead Creek	Sediments	Dead Creek Sediments	Dermal Ingestion	Residents	Past Present Future	Playing Wading	100	Tables 5 & 6
Surface Water	Dead Creek	Surface Water	Dead Creek	Dermal Ingestion	Residents	Past Present Future	Playing Wading	100	Table 4
Fish	Borrow Pit Lake	Fish	Fish Meals	Ingestion	Residents	Past Present Future	Eating fish from Borrow Pit Lake	10	Table 8
Residential Surface Soil	Residential Surface Soil	Soil	Homes	Ingestion Dermal Inhalation	Residents	Past Present Future	Contacting soil	100	Table 2
On-site surface soil	On-site soil Surfacing waste	Soil	Sites H and L	Ingestion Inhalation Dermal	Trespassers	Past Present Future	Contacting contaminated soil	10	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 1	On-site soil Subsurface soil Groundwater Waste	Sites G, H, I and L	Ingestion Inhalation Dermal	Remedial Workers Area Residents	Future	Subsurface soil and waste excavation or removal Groundwater monitoring or remediation Breathing chemicals released during excavation	25	Tables 1 and 2
Residential Groundwater	Area 1	Groundwater	none currently Perhaps soil-gas in future	Inhalation	Residents	Future	Breathing in possible affected homes	25	Volatile Organic Compounds in Table 3

Table 11. Population Estimates for Sauget Area 1 Sites.

Media/Location	Radius (in miles)	Children < 5 years	Children 5-17 years	Total Population
Air	1/3	43	110	567
Sediments				
All Creek Sectors	1	894	2,861	11,402
CS-B	1	325	908	4,102
CS-C	1	346	966	4,298
CS-D	1	438	1,280	5,549
CS-E	1	701	2,114	8,778
CS-F	1	729	2,254	8,925
Soil/Sauget-N. Cahokia*	0	175	447	2,008
Fish/Borrow Pit Lake	1	425	1,314	4,958

* Population in area where surface soil was tested, this area was bordered by Queeny Ave to the north, Illinois Route 3 to the west, Falling Springs Road to the east, and Camp Jackson Road to the south.

Source of population data: 2000 US Census Data.

Attachments

Attachment 1

Conclusions and Recommendations from the May 8, 1995 ATSDR Health Consultation for Sauget Sites Area 1 Prepared by IDPH.

Conclusions

Based on the information reviewed, IDPH concludes:

1. The Area 1 Sauget Sites in Sauget and Cahokia, Illinois pose a public health threat based on chronic exposure to contaminated sediments in Creek Segments B through F. Children have been observed playing in and around Dead Creek and are the population most likely to be exposed to the contaminated sediments. Since Dead Creek is an intermittent stream, the sediments are exposed much of the time especially during the summer months.

2. Airborne exposures to Site G contaminants including PCBs, are occurring by volatilization and fugitive dust generation. The population that would be exposed to airborne Site G contaminants are nearby residents and employees in are industries and businesses.

3. Private wells near Creek Segment B contain low levels of contaminants. An increased cancer risk is possible from the arsenic in the groundwater. However, exposure from drinking contaminated well water could be eliminated if all the homes were connected to a municipal water supply and the private wells are properly sealed.

4. Exposure to site-related contaminants would likely have been higher in the past. During past site operations, especially at sites G, H, I and Creek Segment A, site-related contaminant exposures to area residents and employees would likely have been much higher than they are today. The employees on the site during active site operations potentially could have been exposed to very high levels of site-related contaminants since they were working in close proximity to the more concentrated wastes.

5. Site remediation may expose residents and workers to on-site contaminants by volatilization and fugitive dust generation. This exposure has the potential to be much higher than any of the current site-related exposures.

Recommendations

Cease/Reduce Exposure Recommendations

1. Remove the contaminants in Creek Segments B, C, D, E, and F or restrict access to all these areas (especially to children).

2. Remove or contain Site G surface soil contaminants in such a way that they are not released to the air or allowed to move by surface runoff. Prevent Site G fires.

3. Take precautions during site remediation to protect both the workers and residents from exposure to site contaminants.

4. Discontinue the use of private or industrial wells that are contaminated or are near contaminated groundwater plumes and seal the wells. In addition, no new wells should be installed.

5. Repair the fences. Consider additional actions to prevent site access.

6. Eliminate the flooding in Creek Segment B. Flood waters have inundated all or parts of Queeny Avenue for several days at a time. Limited sample data is available on the surface water at Creek Segment B; however, based on the results from the samples taken, acute health effects would not be expected from brief dermal exposures.

Site Characterization Recommendations

1. Perform air monitoring at Site G especially at exposure points such as nearby residences, and area businesses and industries to determine airborne exposure to contaminants. Air monitoring would also be important in determining airborne contaminant concentration during site remediation.

2. Take additional surface soil samples in those areas just outside the fence at Site G and in the yards or the nearest residences in order to determine the levels of dioxins and furans and whether these areas pose a threat to public health.

3. Monitor regularly the groundwater contaminant plume to determine movement in off-site areas. Remediation should remove or at least prevent further migration of the contaminant plume.

4. Characterize the extent of sediment contaminants in Creek Segments C through F. The known concentrations of contaminants in Creek Segments C through F would not be expected to result in any acute adverse health effects to those children playing in the sediments. However, sampling in the creek Segments is limited and additional samples would be used to more accurately determine potential exposures to the sediment contaminants. Restricting access would be recommended in the areas of the creek Segments that contain compounds at levels that may cause chronic adverse health effects, if remedial activities are not expected to begin within the next few years.

5. Test the indoor are of the residences (if any) that are suspected to have indoor air contamination due to site-related compounds.

Attachment 2

Comparison Values Used In Screening Contaminants For Further Evaluation

Environmental Media Evaluation Guides (EMEGs) are developed for chemicals based on their toxicity, frequency of occurrence at National 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.

Figures

Figure 1 - Sauget Area 1 Location Map

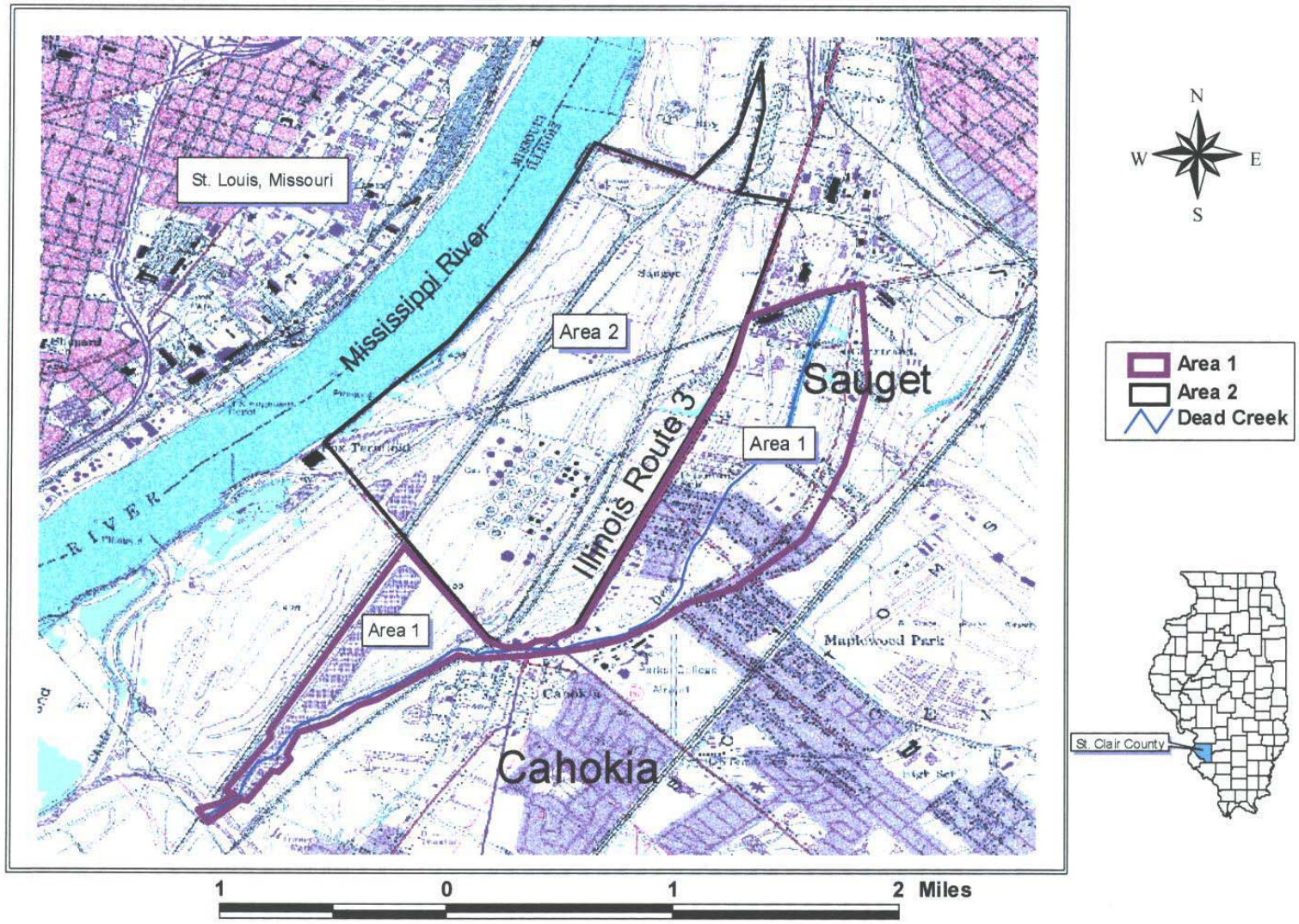

Figure 2 - Sauget Area 1 Sites Location Map

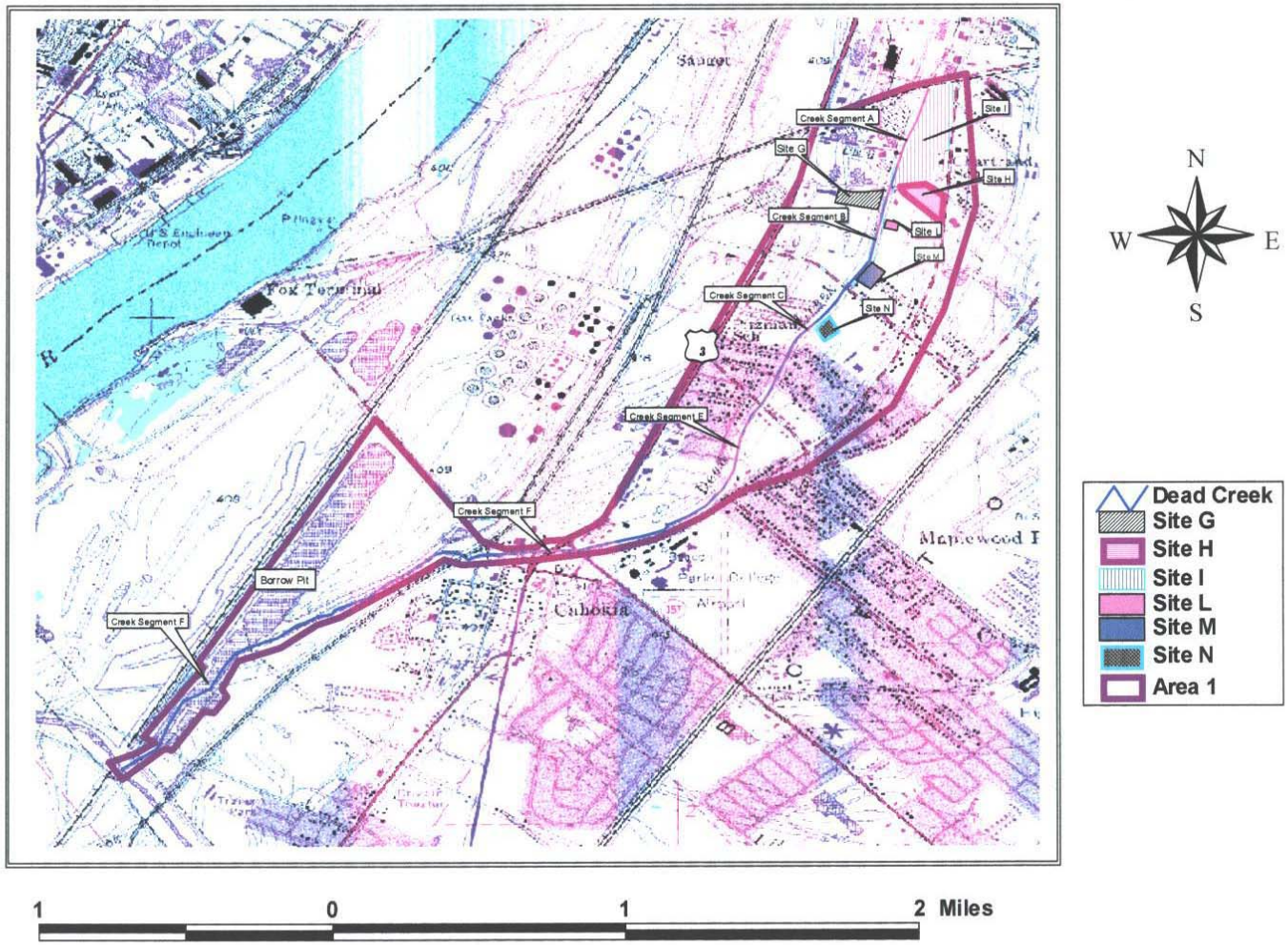

Figure 3 - Air Sample Locations Sauget Area 1

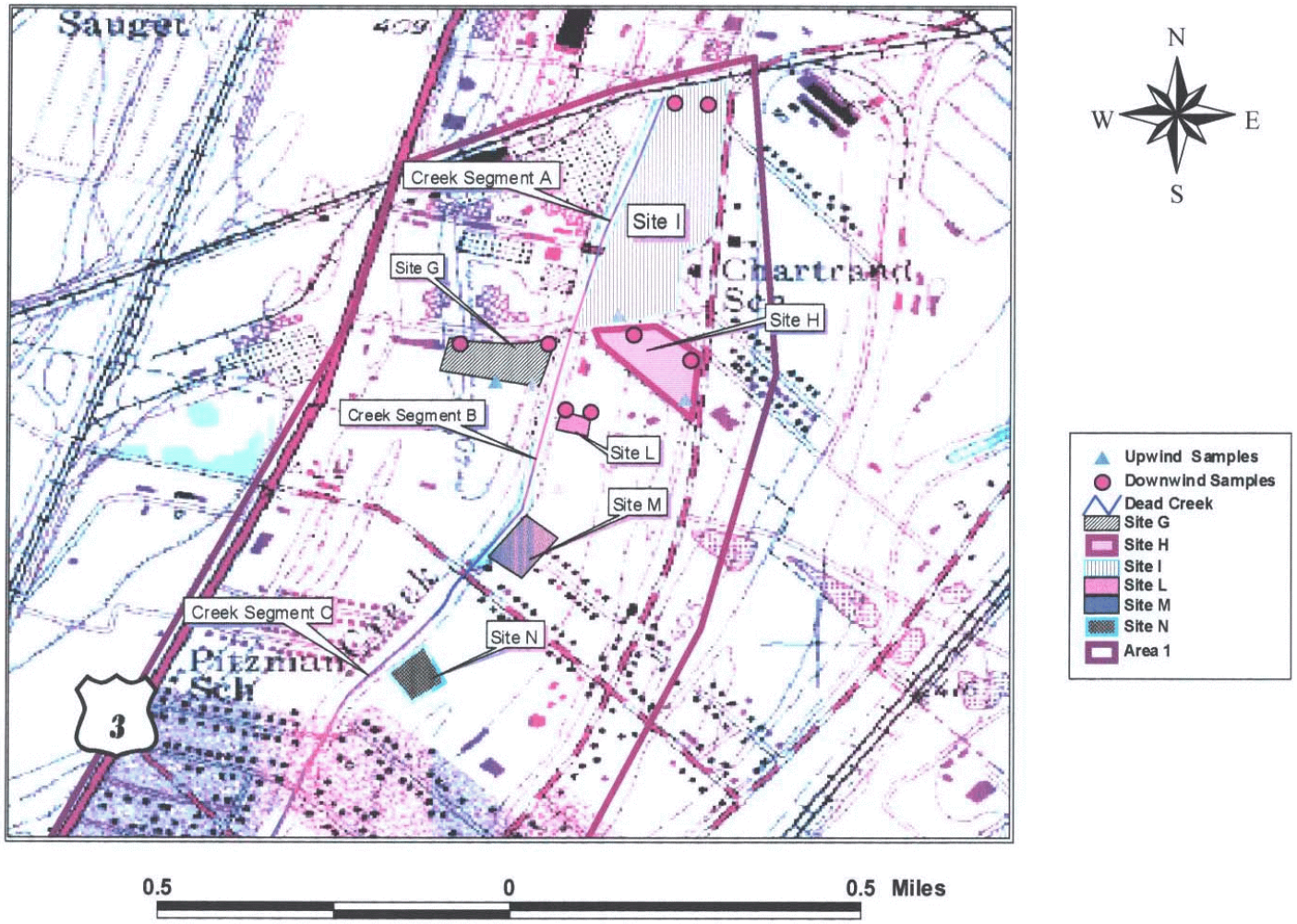

Figure 4 - Residential Soil Sample Locations Sauget Area 1