

5. LAKE MICHIGAN

5.1 MUSKEGON LAKE AOC AND WHITE LAKE AOC, MUSKEGON COUNTY, MI

The Muskegon Lake AOC includes the entirety of Muskegon Lake, in Muskegon County, MI. Muskegon Lake is a 4,149 acre inland coastal lake. The Muskegon River flows through the lake before emptying into Lake Michigan (see AOC map in the appendix).

The White Lake AOC includes White Lake and a quarter-mile wide zone around the lake, in Muskegon County MI. White Lake is a 2,570 coastal, drowned river mouth lake (see AOC map in the appendix).

5.1.1 Hazardous Waste Sites Relevant to the Muskegon Lake and White Lake AOCs

ATSDR has evaluated the data for 12 hazardous waste sites in Muskegon County, MI, and reached conclusions regarding the public health threat posed by these sites. These conclusions, along with information regarding the AOC near which the site is located, the type and location of the site, and the date and type of assessment document, are summarized in Table 5-1.

For hazardous waste sites in Muskegon County, NY that *at any time* had Public Health Hazard Categories of 1-3, the number of contaminant records in HazDat that exceeded health based-screening values was 1890, as shown in Table 5-2. Most of the records were for the water media group; the soil media group had the next highest number of records.

The IJC Great Lakes critical pollutants accounted for 114 (6%) of these records, with the majority for the soil media group. The IJC critical pollutants that have been found at Muskegon County, MI, hazardous waste sites at concentrations exceeding health-based screening values are: PCBs, B(A)P, DDT and metabolites, aldrin/dieldrin, lead, mercury, and hexachlorobenzene. Details are provided in Table 5-3.

Further evaluation of the data for the sites with Public Health Hazard Categories of 1-3 was conducted by ATSDR in the public health assessments and other health-related documents listed in the table. These evaluations are discussed in the following subsections.

5.1.1.1 Bofors Nobel Incorporated

Bofors Nobel, Inc. is a 120-acre site 6 miles east of downtown Muskegon, in Muskegon County, MI. It extends to the south bank of Big Black Creek, which flows west-southwest across the site. Various owners have operated chemical manufacturing facilities on the site since 1960. Chemicals produced at the site have included pesticides, herbicides, 3,3'-dichlorobenzidine, benzidine, and other aromatic amines. Many other VOCs and SVOCs have been used as solvents and intermediates. Before 1976, operators of the plant used several unlined lagoons and settling ponds for wastewater and sludge disposal. In 1965 and in 1975, dikes around some of the lagoons failed, releasing wastewater into Big Black Creek. Beginning in 1976, the plant discharged its waste water to the Muskegon County wastewater treatment system. Groundwater contamination with aromatic amines and VOCs was discovered at the site in 1976, and purge wells were installed to collect and pump groundwater for treatment. The plant area of the site (35 acres) is still in operation, but the remainder of the site including the lagoon area is fenced and administered by the Michigan Department of Environmental Quality. A groundwater treatment facility,

Table 5-1. Hazardous Waste Sites in Muskegon County, MI

Site Name, AOC	Public Health Hazard Category	EPA NPL Status	Site ID	City
Bofors Nobel Inc., Muskegon Lake	3 (1990 HA) 3 (1992 HA) 4 (1996 HA)	Final	MID006030373	Muskegon
Duell & Gardner Landfill, Muskegon Lake	3 (1989 HA) 4 (1994 HA)	Final	MID980504716	Dalton Township
E.I. Du Pont De Nemours & Co., Inc., Montague Plant, White Lake	3 (1989) 4 (n.d. SR)	Removed Post SARA	MID000809640	Montague
Hooker (Montague Plant), White Lake	3 (1989 HA) 3 (n.d. SR)	Removed Post SARA	MID006014906	Montague
Kaydon Corp., Muskegon Lake	4 (1992 HA)	Final	MID006016703	Muskegon
Muskegon Chemical Co., White Lake	3 (1992 HA) 4 (n.s. SR)	Final	MID072569510	Whitehall
Ott/Story/Cordova Chemical Co., Muskegon Lake	3 (1988 HA) 2 (1993 HA)	Final	MID060174240	Dalton Township
Peerless Plating Co., Muskegon Lake	3 (1992 HA) 2 (n.d. SR)	Final	MID060174240	Muskegon
Ruddiman Drain Area, Muskegon Lake	3 (2003 HC)	Non NPL	MID980608764	Muskegon
SCA Independent Landfill, Muskegon Lake	3 (1989 HA) 4 (n.d. SR)	Final	MID000724930	Muskegon Heights
Thermo-Chem, Inc. Muskegon Lake	3 (1988 HA) 3 (1996 HA)	Final	MID044567162	Muskegon
Whitehall Municipal Wells, White Lake	3 (1989 HA) 4 (1992 HA)	Deleted Post SARA	MID980701254	Whitehall

1 = Urgent Public Health Hazard, 2 = Public Health Hazard, 3 = Indeterminate Public Health Hazard, 4 = No Apparent Public Health Hazard
 HA = Public Health Assessment, HC = Health Consultation, SR = Site Review and Update
 n.d. = no date provided

completed in September 1994, discharged treated water to Big Black Creek. 3,3'-Dichlorobenzidine has been tracked out into the community by workers at the plant. Information regarding this site is taken from ATSDR's 1990 preliminary health assessment, 1992 interim public health assessment, and 1996 public health assessment. Updated information is taken from the 2003 EPA NPL fact sheet.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) in the 1990 and 1992 ATSDR health assessments because human exposure to 3,3' dichlorobenzidine, benzidine, VOCs, and metals may have occurred in the past via worker track-out, surface water, air, soil and sediment pathways, and future exposure to the chemicals may occur via contaminated groundwater. In the 1996 health assessment, ATSDR concluded that the site "currently" posed *No Apparent Public Health Hazard* (category 4), although it posed a past public health hazard and could pose a health hazard in the future if new water supply wells are installed before groundwater remediation is complete.

Contaminants of Concern in Completed Exposure Pathways: None in 1996. The IJC critical pollutant lead was detected at above health-based screening values in one on-site monitoring well and at high concentrations in soil at several limited areas with the restricted area of the site, but lead did not seem to be a widespread pollutant. The main concern was for 3,3'-dichlorobenzidine and benzidine, particularly in groundwater. VOCs were also present at levels of concern in groundwater. As of the 1996 public health assessment, groundwater is no longer used as a water supply on-site, the flow is not toward residential wells, and remedial measures are preventing contaminated groundwater from discharging into Big Black Creek. In the past, workers may have ingested benzidine and 3,3'-dichlorobenzidine at levels of concern from groundwater used as the source of water at the plant. In addition, in a 1980-1981 study, 3,3'-dichlorobenzidine was found in homes of the workers and in urine of workers and some family members.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	140
Females aged 15-44	283
Adults 65 and older	140

Public Health Outcome Data:

- A 1985 NIOSH study evaluated the occurrence of dermatitis, cancer, and reproductive effects among workers at Bofors exposed to oryzalin (3,5-dinitro-N⁴N⁴-dipropylsufanilamine), dinitrochlorobenzene, 3,3'-dichlorobenzidine, and benzidine. Skin problems were common among workers exposed to dinitrochlorobenzene, but the incidence was not statistically significantly higher than among unexposed workers. There were too few reproductive events (and no adverse outcomes) to make any determination regarding hazard from oryzalin. Bladder cancer was diagnosed in ten members of the cohort, and there were unconfirmed reports of two other cases in this group. Because only a summary of the study was furnished, which did not clearly report information necessary to interpret the findings, such as size of the cohort and age distribution, ATSDR could not draw conclusions from the report. Bladder cancer is an outcome of concern for benzidine (a known human carcinogen) and 3,3'-dichlorobenzidine (a probable human carcinogen).
- Incidence data for bladder cancer and all invasive cancers for 1985 through 1993 were analyzed for the three zip code areas nearest the Bofors site (49442, which included the site and land to the north; 49444, southwest of the site; and 49415, south and southeast of the site). The number of observed cases was compared to the number expected based on age-specific annual rates derived from Michigan state-wide cancer incidence statistics. According to ATSDR, the incidence of bladder cancer for residents of zip code 49442 was statistically significantly higher than the state-wide incidence in 1993 (but not in the other years, or for the entire period). The incidence and rate of all invasive cancers of all sites was statistically significantly higher than the state-wide results for zip code 49415 in 1987 (but not in the other years, or for the entire period).
- The Michigan Inpatient Data Base was reviewed for hospital discharge statistics with any mention of bladder cancer for the years 1983-1987. Rates per 100,000 population for zip codes 49442 and 49444 (see previous bullet for location descriptions) were compared with the discharge rate for Muskegon County as a whole. There were no significant differences. The rates were not adjusted for age/sex/race differences and could include multiple hospitalizations of single individuals.
- ATSDR, in cooperation with Michigan and local health departments, has initiated a health study of workers, their families, and exposed community members for the Bofors site and two other facilities in Michigan where similar chemicals were manufactured or used. Data are not yet available from this study.

Conclusions: This site does not appear to have contributed significantly to environmental or human exposure to the IJC critical pollutants. In the past, workers at the plant were exposed to benzidine and 3,3'-dichlorobenzidine and also VOCs from the use of contaminated groundwater as sources of water in the plant. Contaminants were transported off site in groundwater and also by worker track-out. The contaminants in soil and sediment on-site are to be contained through construction of a barrier wall remedy, which is to be completed in September 2004. A groundwater treatment plant was completed in 1998, and is expected to operate for at least 43 years and to remove approximately 25,000 pounds of total organic contaminant from approximately 10.2 billion gallons. It is unlikely that this site is still releasing significant contamination into the environment. Health outcome data provide only a slight suggestion that the site-related exposure may have had adverse health effects (slight increase in bladder cancer incidence for 1 year only and in total invasive cancer incidence for 1 year only).

5.1.1.2 Duell & Gardner Landfill

This approximately 80-acre landfill, located in Dalton Township, Muskegon County, MI, operated as an uncontrolled dump for industrial waste and general refuse from the 1940s to 1973. The landfill ceased operations in 1973. During 1986, about 500 deteriorating drums, hundreds of lab bottles, and piled waste were removed from the site, and areas of heavily stained soil were covered with plastic to reduce leaching of contaminants into groundwater. The groundwater flow is to the southeast toward Bear Creek, which is located about 1 mile southeast of the site. The area is rural; residents use private wells for their domestic water supply. Information regarding this site is taken from the 1994 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) in the 1989 health assessment (not provided for inclusion in this document, and not discussed in the subsequent health assessment). In the 1994 health assessment, ATSDR concluded that the site posed *No Apparent Health Hazard* (category 4) under conditions at that time.

Contaminants of Concern in Completed Exposure Pathways: None. Maximum concentrations of the IJC critical pollutants PCBs and DDT and metabolites, and also of crystal violet, in soil samples exceeded health-based screening values, but trespassers would not be exposed at levels expected to be harmful. Aniline, N,N-dimethylaniline, crystal violet, and VOCs are present in the on-site groundwater at levels that would be of health concern if the water were used for household purposes, but the contamination has not reached nearby residential wells or surface water as of the time of the health assessment. According to the 2003 EPA NPL fact sheet for this site, remediation has included or will include soil excavation with off-site disposal and capping. Groundwater concentrations of contaminants have declined and have not migrated from the site.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	40
Females aged 15-44	96
Adults 65 and older	38

Public Health Outcome Data: Age-adjusted cancer mortality rates available from the Michigan Death Registry for Dalton Township (where the site is located), and Muskegon, and Fruitland Townships (adjacent to Dalton Township) for the period of 1983-1987 were compared with the 1985 statewide age-specific mortality rates. Population estimates could not be adjusted by sex due to the unavailability of

census data by sex for this area. The actual numbers of deaths observed in these townships were fewer (though not statistically significantly so) than expected based on the statewide cancer mortality rate. Thus, there is no evidence of an impact of the site on cancer death rates. (This study was also cited in the public health assessment for the Ott/Story/Cordova Chemical site, reviewed in Section 5.1.1.6 of this document.)

Conclusions: Although the IJC critical pollutants PCBs and DDT and metabolites were detected in on-site surface soils, contamination was not remarkably high or widespread, and there were no data to indicate off-site migration. On-site groundwater was contaminated by aniline compounds and VOCs, but concentrations were declining and there is no migration off-site. The site is being remediated, so future exposures to site-related contaminants are unlikely. There was no evidence of increased cancer incidence associated with this site.

5.1.1.3 E.I. Du Pont De Nemours & Col., Inc., Montague Plant

This site was a petrochemical manufacturing plant, located southwest of the city of Montague, Muskegon County, MI, and about 1 mile from White Lake. Information regarding this site was taken from the 1989 preliminary health assessment conducted by ATSDR, and from HazDat.

Category of Public Health Hazard: In 1989, ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3) because of the potential threat to human health from exposure to contaminants at levels that may result in adverse health effects over time. A subsequent ATSDR site review and update (not provided for inclusion in this document) changed the category to *No Apparent Public Health Hazard* (category 4).

Contaminants of Concern in Completed Exposure Pathways: None. No IJC critical pollutants were discussed. A contaminant of concern was thiocyanate, which entered groundwater and contaminated residential wells. The source of this chemical was a lime waste impoundment containing approximately 1 million tons of ammonia thiocyanate. Thiocyanate also discharged to Lake Michigan, and groundwater seeps contaminated the sand of White Lake Beach. An interceptor well was installed south of the lime pile and the contaminated sands were removed. Spills of diethylene glycol monobutyl ether and trifluorotrichloroethane occurred in the past and were cleaned up. VOCs were found in groundwater in 1979 and treated through use of purge wells. Waste material including neoprene tars and latexes were buried in a pit and in a dump area. VOCs were found to contaminate soils in the bulk storage and unloading area. Contaminated soils have been removed, and the lime waste impoundment was to removed. More recent information was not available, but because the site has been removed from the NPL list Post SARA, it likely has been remediated so that exposures are no longer occurring.

Demographics: Demographic profile not reported. The 1989 health assessment described the population within 1 mile of the site as approximately 300 people.

Public Health Outcome Data: None reported.

Conclusions: This site does not appear to have been a source of IJC critical pollutants. It did contaminate Lake Michigan and the White Lake AOC with thiocyanate in the past. It has been remediated.

5.1.1.4 Hooker (Montague Plant)

The Hooker Chemical & Plastics Corp. is a 900-acre site, the southern portion of which borders on White Lake. Hooker was reported to have disposed of more than 21 million cubic feet of organic, inorganic, heavy metal, and acid wastes on-site. Much of the contaminated soil had been placed in a clay-lined, clay-capped vault constructed on-site. Groundwater purge wells and a treatment system were installed to capture and cleanse contaminated groundwater before it discharged into White Lake. An on-site area still contained approximately 80,000 cubic yards of soil contaminated with hexachlorobenzene, hexachlorocyclopentadiene, and related chemicals. The information on this site is taken from the 1989 ATSDR preliminary public health assessment and HazDat. Since that time, the site has been removed from the NPL (Post SARA), but updated information regarding the site was not available for inclusion in this document.

Category of Public Health Hazard: In 1989, ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3) because of the potential threat to human health from exposure to contaminants at levels that may result in adverse health effects over time, and the lack of monitoring data for an area of the site contaminated with hexachlorobenzene and related chemicals. A subsequent ATSDR site review and update (not provided for inclusion in this document) also categorized the site as an *Indeterminate Public Health Hazard*.

Contaminants of Concern in Completed Exposure Pathways: Not identified. As mentioned in the site description, soil in one area of the site was heavily contaminated with the IJC critical pollutant hexachlorobenzene. Residential wells downgradient of the site were contaminated with chlorinated VOCs such as carbon tetrachloride and chloroform, but residents have been switched to municipal water. The contaminant plume from this site also discharged into White Lake, located about a mile south of the site. The NPDES permit for discharge of treated groundwater from the site into white Lake was authorized to contain low levels of chlorinated VOCs, and the IJC critical pollutants hexachlorobenzene and mirex, which implies that these contaminants were in the groundwater plume. White Lake fish in 1979 contained mirex and hexachlorobenzene at levels below health-based screening values. More recent information was not available, but because the site has been removed from the NPL list Post SARA, it likely has been remediated so that exposures are no longer occurring.

Demographics: Demographic profile not reported. As of 1989, approximately 500 people lived within 1 mile of the site.

Public Health Outcome Data: Not reported.

Conclusions: This site appears to have discharged groundwater contaminated with the IJC critical pollutants hexachlorobenzene and mirex into White Lake, and also contaminated residential wells, in the past. Extensive remediation of the site had already occurred by the time ATSDR performed its 1989 preliminary health assessment. Since that time, the site has been removed from the NPL, indicating that it has been remediated and further releases are unlikely.

5.1.1.5 Muskegon Chemical Company

The Muskegon Chemical Company site is located in Whitehall, Muskegon County, MI. It produced chemicals for the pharmaceutical industry in 1975. By 1977, groundwater contamination was discovered. A contaminant plume containing 1,2-dichloroethane, triglycol dichloride, and bis(2-chloroethyl) ether extended from the site into Mill Pond Creek, which in turn flows into Mill Pond, which feeds White Lake.

Site-related contaminants have been found in each of these surface water bodies. The information regarding this site is taken from the 1992 ATSDR interim public health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: In 1992, ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3) because although there did not appear to be any completed pathways of human exposure, there was a potential for future exposure to hazardous substances in groundwater and surface water at concentrations that may result in adverse health effects. A subsequent ATSDR site review and update (not provided for inclusion in this document), categorized the site as posing *No Apparent Public Health Hazard* (category 4).

Contaminants of Concern in Completed Exposure Pathways: None as of the 1992 health assessment. No IJC critical pollutants were associated with this site. The contaminants of concern, 1,2 dichloroethane, triglycol dichloride, and bis(2-chloroethyl) ether, are present in surface water above health-based screening values, but warnings are posted against wading and swimming in the contaminated water bodies. Private wells are not contaminated. The subsequent site review and update may have identified completed exposure pathways, but was not provided for inclusion in this document. According to the EPA NPL fact sheet, the site is being remediated by groundwater extraction, treatment, and reinjection followed by natural attenuation. Soil is being remediated by soil vapor extraction and natural attenuation. A 5-year review will be completed in 2003.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	152
Females aged 15-44	367
Adults 65 and older	379

Public Health Outcome Data: None reported.

Conclusions: No IJC critical pollutants were associated with this site. This site contributed to pollution of the White Lake AOC through groundwater discharge of 1,2-dichloroethane, triglycol dichloride, and bis(2-chloroethyl) ether into surface water feeding into the lake. Remediation of this site is mitigating the potential for continued contamination.

5.1.1.6 Ott/Story/Cordova Chemical Co.

The Ott/Story/Cordova site is located 2 miles north of the City of North Muskegon, in Dalton Township, Muskegon County, MI. The plant occupies about 25 acres of the 210-acre parcel. This former chemical manufacturing plant operated under a succession of owners from 1957 until 1985, discharging wastes into unlined, on-site lagoons, discharging purged groundwater into the Little Bear Creek, and, subsequently, discharging purged water along with wastewater, into the Muskegon County Wastewater management system. Purging of groundwater eventually was discontinued, and a contaminant plume containing many organics expanded off-site toward the southeast, partially discharging into a tributary of Little Bear Creek, and contaminating residential wells. A large number of drums of waste material and 8,000 cubic yards of contaminated soils and sludge were removed in 1978. The plant site is securely fenced, but the surrounding areas affected by groundwater contamination are not. Information regarding this site was taken from the 1993 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: In the 1993 health assessment, ATSDR categorized the site as a *Public Health Hazard* (category 2) because of the risk that could result from chronic exposure to hazardous substances through groundwater and air.

Contaminants of Concern in Completed Exposure Pathways: This site is not associated with the IJC critical pollutants. Exposure through household use of contaminated groundwater, (resulting in ingestion, dermal, and inhalation exposure) was considered a completed exposure pathway to a broad array of organic chemicals including VOCs (benzene and chlorinated VOCs including vinyl chloride), aniline, and N,N-dimethylaniline. At least four households used contaminated wells in the past, and although alternative water supplies have been provided, ongoing exposure through use of the well water for watering lawns and gardens, washing cars, and other non-potable uses is possible. Discharge areas for the groundwater may evaporate volatile chemicals into the air leading to inhalation exposure. Remediation of the site since the time of ATSDR's assessment has includes removal and off-site disposal of contaminated soil and sediment, including from the creek, and groundwater extraction and treatment, which should be completed in 2030. These actions should minimize exposure to site-related contaminants and migration of the chemicals off-site.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	131
Females aged 15-44	294
Adults 65 and older	140

Public Health Outcome Data: Age-adjusted cancer mortality rates available from the Michigan Death Registry for Dalton Township (where the site is located), and Muskegon, and Fruitland Townships (adjacent to Dalton Township) for the period of 1983-1987 were compared with the 1985 statewide age-specific mortality rates. Population estimates could not be adjusted by sex due to the unavailability of census data by sex for this area. The actual numbers of deaths observed in these townships were fewer (though not statistically significantly so) than expected based on the statewide cancer mortality rate. Thus, there is no evidence of an impact of the site on cancer death rates. (This study was also cited in the public health assessment for the Duell & Gardner Landfill, reviewed in Section 5.1.1.2 of this document.)

A subsequent survey of the 29 households with the greatest potential for site-related exposures showed no unusual disease or illness pattern that would suggest a site-related health impact.

Conclusions: This site has contributed to human exposure at levels of concern to VOCs and some anilines, and to the environmental burden of these chemicals, through contamination of groundwater. The site has undergone extensive remediation; groundwater remediation is continuing. These activities should minimize any continuing impact of the site. There was no evidence of increased cancer incidence associated with this site.

5.1.1.7 Peerless Plating

The 1-acre Peerless Plating Co. site is an abandoned electroplating facility located on a 1-acre site in Muskegon, Muskegon County, MI. It was in operation from 1937 to 1983. Process wastes with high concentrations of heavy metals and very high and low pH values were discharged into unlined lagoons, and other wastes were discharged directly to the ground from manholes inside the building. When the

plant closed, it was abandoned along with plating solutions, drummed wastes, and raw materials. Hydrocyanic acid gas was detected inside the facility. In 1983 and 1991, EPA removed acids, cyanide plating solution, chromium plating solution, trichloroethylene, and liquids containing heavy metals, and remediated the waste lagoons. Asbestos was encapsulated and the site was fenced. Information regarding this site was taken from the 1992 ATSDR interim preliminary public health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: In 1992, ATSDR characterized this site as an *Indeterminate Public Health Hazard* (category 3) because of the potential threat to human health from exposure to potentially contaminated groundwater, surface water, sediments, and soil. A subsequent ATSDR site review and update (not provided for inclusion in this document) changed the category to *Public Health Hazard* (category 2).

Contaminants of Concern in Completed Exposure Pathways: Not identified. No IJC critical pollutants are mentioned in the 1992 ATSDR health assessment. The shallow groundwater and soil on-site were contaminated with heavy metals, particularly cadmium and chromium, and cyanide. Little Black Creek was a discharge point for the shallow groundwater. Shallow groundwater also was a source of potable water. The wells of 18 businesses and residences within a 0.5-mile radius of the site were contaminated with heavy metals (chromium and copper) and chlorinated VOCs in 1986, and bottled water was provided for drinking, followed by switching to municipal water supply. Additional remediation of the site since 1992 has included treatment and/or removal of on-site soils. Groundwater treatment started in 2001 and is expected to continue for 10 years.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	1,253
Females aged 15-44	2,151
Adults 65 and older	1,371

Public Health Outcome Data: Local health department records and “staff memory” revealed no community health concerns of adverse health effects relating to the site.

Conclusions: This site contributed to the human exposure and the environmental burden of non-IJC contaminants including cadmium, chromium, chlorinated VOCs, and cyanide. As described in the EOA NPL fact sheet, extensive remediation of the site, including ongoing groundwater treatment, should minimize any further migration of contaminants from the site. Groundwater treatment, started in 2001, was expected to continue for 10 years.

5.1.1.8 Ruddiman Drain Area (Ruddiman Creek Area)

The west, north, and main branches of Ruddiman Creek watershed flow through areas of dense residential development, and into Ruddiman Pond. Area residents play in and around these creek branches and pond. Sediments of Ruddiman Creek and pond were sampled following passage of the Clean Michigan Initiative, and found to be contaminated. The sources of contamination were not discussed. Information on this site is taken from the 2003 ATSDR health consultation.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) in 2003 because of the limited monitoring data and uncertainties in estimated human doses.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutants PCBs and lead were found at concentrations of concern in sediments of the main branch of the Ruddiman Creek. ATSDR concluded that the uncertainties surrounding the estimated dose of PCBs from sediment exposure, the lack of a lead model for the child (age 10-16 years) likely to be exposed to creek sediments, and the limited numbers of samples that did not adequately characterize the contamination, precluded a definitive conclusion regarding the hazard.

Demographics: Not reported, but the contaminated main branch of the creek is located less than 100 feet from several apartment complexes and an elementary school.

Public Health Outcome Data: None reported.

Conclusions: The sediments of the main branch of this creek are contaminated with PCBs and lead at levels of concern for human exposure (and for ecological effects). The sources of this contamination were not discussed, and it was concluded that additional sampling was needed to better define the extent of contamination, including sampling of fish, and that warning signs were needed.

5.1.1.9 SCA Independent Landfill

This landfill occupies approximately one-third of a 100-acre site in Muskegon County, MI, in a swampy area near Black Creek, which flows along the north side of the landfill. The site received refuse, probably including industrial as well as domestic waste, starting in the 1950s and continuing through about 1987. The groundwater flow at this site is northward, and appears to empty into wetlands that border Black Creek. Information regarding this site is taken from the 1989 ATSDR preliminary health assessment, HazDat, and the 2003 EPA NPL fact sheet for the site.

Category of Public Health Hazard: In 1989, ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3) because of the potential threat to human health from exposure to contaminants and the lack of adequate monitoring data. In a subsequent site review and update (not provided for inclusion in this document), ATSDR characterized the site as posing *No Apparent Public Health Hazard* (category 4).

Contaminants of Concern in Completed Exposure Pathways: Not identified. No IJC contaminants were contaminants of concern. On-site monitoring wells indicated contamination of groundwater with VOCs including benzene, but comparisons with health-based screening values were not presented, no downgradient monitoring had been done, and other media were not investigated as of the 1989 assessment. The EPA NPL fact sheet discusses contamination of groundwater, surface water, and wetlands with ammonia and manganese. The landfill has been remediated by improvement of the waste cover, surface water drainage, and leachate management; and by excavation of surface soil from on-site hot spots. Long-term groundwater and surface water monitoring started in 2001, and deed restrictions are being obtained for nearby residents to prohibit the use of private wells for drinking water.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	598
Females aged 15-44	1,054
Adults 65 and older	505

Public Health Outcome Data: None reported.

Conclusions: No IJC critical pollutants are implicated as contaminants from this site. The site has been remediated at least in part, but exposure to groundwater is being prevented by deed restrictions.

5.1.1.10 Thermo-Chem Incorporated

The Thermo-Chem site includes two properties that together cover approximately 9.5 acres of land in Muskegon County, MI, near the city of Muskegon. The sites were operated as waste solvent reprocessing, storage, and incineration facilities. These operations resulted in extensive contamination of soil and groundwater. Information on this site is taken from the 1996 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) in the 1988 health assessment (not provided for inclusion in this document) and in the 1996 health assessment. The 1996 rationale for this categorization was that subsurface soil was contaminated but adequate surface soil data were lacking, and that groundwater was contaminated, although no residential wells exist downgradient of the site.

Contaminants of Concern in Completed Exposure Pathways: None identified. The groundwater is contaminated with VOCs; the groundwater flow is toward Black Creek, and there was some contamination of the surface water and sediments downstream from the site. No residences exist downgradient of the site and no wells have been found to be contaminated. Some contamination of subsurface soils with the IJC critical pollutant PCBs was noted at above health-based screening levels, but surface soil data were not available, and the contamination was not high. Concentrations of PCBs in fish in Black Creek were not above FDA action levels. Remediation of the site has occurred and monitoring will continue.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	420
Females aged 15-44	716
Adults 65 and older	401

Public Health Outcome Data: Cancer incidence data for 1985 through 1989 for the two zip code areas (49442, 49444) nearest the Themo-Chem site were compared to the number of cases expected based on age-specific annual rates for the National Cancer Institute Surveillance, Epidemiology, and End Results program. For both areas, the number of observed cases was lower than the number expected.

Conclusions: Although this site may have contributed to environmental contaminant burdens, particularly of VOCs, in the past, it has been remediated. The IJC critical pollutant PCBs was found in on-site subsurface soil at concentrations of concern, but did not appear to have migrated off-site, and levels were not high.

5.1.1.11 Whitehall Municipal Wells

The Whitehall Wells site consists of the city of Whitehall's municipal Production Well #3 and some of the surrounding area. The well was found to be contaminated with VOCs. The source was unknown. Information on this site was taken from the 1992 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet.

Category of Public Health Hazard: The 1989 ATSDR public health assessment (not provided for inclusion in this document) concluded that the site was an *Indeterminate Public Health Hazard* (category 3). The 1992 ATSDR public health assessment concluded that the site poses *No Apparent Public Health Hazard* because there is no current human exposure to significant levels of hazardous substance.

Contaminants of Concern in Completed Exposure Pathways: Not identified. No IJC critical pollutants were involved. In 1981, well #3 was found to be contaminated with tetrachloroethylene, and nearby wells were contaminated with chlorinated VOCs and benzene, but levels were low, and exposure was minimized by reducing the pumping rates, and ultimately by taking the well off-line. Contamination of the monitoring wells is sporadic.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	228
Females aged 15-44	545
Adults 65 and older	507

Public Health Outcome Data: None reported.

Conclusions: Although this municipal supply well contributed to human exposure to VOCs, it was not the source of contamination, which remains unknown. It has been taken off-line. Monitoring of the groundwater continues.

5.1.2 TRI Data for the White Lake AOC and Muskegon AOC

The TRI on-site chemical releases for Muskegon County are summarized in Table 5-3. Total on-site releases in 2001 were 1,370,434 pounds, the majority of which were released to air, followed by releases to land. Very little was released to surface water. The number of TRI release facilities in the vicinity of the Muskegon Lake AOC is large, whereas there are none shown in the vicinity of the White Lake AOC in the maps in the appendix.

Of the total on-site releases, 12,488 (0.9%) were IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (to air, surface water, and land), and mercury and mercury compounds (to air and land). The facilities that released these pollutants are listed in Table 5-4.

The major release ($\geq 500,000$ pounds) of a non-IJC chemical was of hydrochloric acid aerosols (to air). The next highest release, in the range of 150,000-299,999 pounds, was barium compounds (primarily to land).

5.1.3 County Demographics and Health Status Data for the Muskegon Lake and White Lake AOCs

The demographic profile, from the 2000 U.S. Census, for vulnerable populations living in Muskegon County, MI, is as follows:

Children 6 years and younger	1,964
Females aged 15-44	4,487
Adults 65 and older	2,579

Most of this population is situated near the Muskegon Lake AOC. The population near and in the White Lake AOC is sparser (see AOC maps in the appendix).

According to the 2000 HRSA community health status reports, Muskegon County health status indicators that compared unfavorably with those of the U.S. and also with the median of the peer counties were as follows (indicators that were above the upper limit of the peer county range are bolded):

Infant mortality (per 1,000 births)

- infant mortality
- white infant mortality
- neonatal infant mortality
- post-neonatal infant mortality

Birth measures (as percent)

- **unmarried mothers**
- no care in first trimester

Death measures (per 100,000 population)

- breast cancer (female)
- coronary heart disease
- stroke

5.1.4 Summary and Conclusions for the Muskegon Lake AOC and White Lake AOC

5.1.4.1 Hazardous Waste Sites

ATSDR has assessed 11 hazardous waste sites in public health hazard categories 1-3 in Muskegon County, MI. Seven of these sites were near the Muskegon Lake AOC, and four were situated close to or in the White Lake AOC.

Muskegon Lake AOC:

IJC critical pollutants were associated with:

- the Deuell & Gardner Landfill (Section 5.1.1.2), which contained PCBs and DDT and metabolites in soil, but not at levels expected to be harmful, and not migrating off-site. Soil is under remediation
- the Ruddiman Drain Area (Section 5.1.1.8), where sediments in the main branch of the Ruddiman Creek are contaminated with PCBs and lead at concentrations of concern. The source is unknown, the area is surrounded by apartments and a school, and children are exposed.

- the Thermo-Chem site (Section 5.1.1.10), which contained PCBs in subsurface soil, but not migrating off-site, and the site has been remediated.

Other contaminants were associated with:

- six sites, which contributed to the environmental burden and/or human exposure to VOCs (all six sites), aniline compounds (two sites), and benzidine and 3,3'-dichlorobenzidine (one site) in the past. The sites have been remediated.

White Lake AOC:

IJC critical pollutants were associated with:

- the Hooker (Montague Plant) site (Section 5.1.1.4), which may in the past have discharged groundwater contaminated with hexachlorobenzene and mirex to White Lake, but has been remediated.

Other contaminants were associated with:

- four sites, which contributed to the environmental burden and/or human exposure to VOCs (all four sites) and thiocyanate (one site) in the past, but the sites have been remediated.

Public health outcome data, available for three of the Muskegon Lake AOC sites, generally did not indicate elevated incidences of cancer. The exception was an apparent increased incidence of bladder cancer and of total invasive cancer incidence but for 1 year only for the Bofors Nobel site (Section 5.1.1.1). This site was contaminated with benzidine (a known human carcinogen that causes bladder cancer) and 3,3'-dichlorobenzidine (a probable human carcinogen).

Issues for Follow-Up

Bofors Nobel site: ATSDR, in cooperation with Michigan and local health departments, has initiated a health study of workers, their families, and exposed community members.

Ruddiman Drain Area: As of 2003, sediments of the main branch of the Ruddiman Creek were contaminated with PCBs and lead at concentrations of concern and exposure was occurring.

5.1.4.2 TRI Data

The TRI on-site chemical releases for Muskegon County in 2001 were 1,370,434 pounds, the majority of which were released to air, followed by releases to land. Very little was released to surface water. Facilities reporting these releases are concentrated in the vicinity of the Muskegon Lake AOC; there are none situated near the White Lake AOC.

Of the total on-site releases, 12,488 (0.9%) were IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (to air, surface water, and land), and mercury and mercury compounds (to air and land).

The major release ($\geq 500,000$ pounds) of a non-IJC chemical was of hydrochloric acid aerosols (to air).

5.1.4.3 County Demographics and Health Status Indicators

Vulnerable populations in Muskegon County totaled 9,030. Several Muskegon County health status indicators compared unfavorably with both U.S. indicators and with the median of peer county indicators. These health status indicators included infant mortality, white infant mortality, neonatal infant mortality,

post-neonatal infant mortality, unmarried mothers, no care in first trimester, and deaths from breast cancer, coronary heart disease, and stroke. The population in Muskegon County is much more concentrated around the Muskegon Lake AOC than the White Lake AOC.

**Table 5-2. Waste Site Contaminants that Exceeded Health-Based Screening Values
Muskegon Lake and White Lake AOCs**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						
			Air	Biota	Human Material	Other Media	Soil	Water	Total
011097-69-1	AROCLOR 1254	1					2		2
011096-82-5	AROCLOR 1260	1					1		1
001336-36-3	POLYCHLORINATED BIPHENYLS	1		3			11		14
000050-32-8	BENZO(A)PYRENE	4				1	7		8
000072-54-8	DDD, P,P'-	5					2		2
000050-29-3	DDT, P,P'-	5				1	5		6
000309-00-2	ALDRIN	6					4	1	5
000060-57-1	DIELDRIN	6		2			2		4
002385-85-5	MIREX	7		1					1
007439-92-1	LEAD	8					23	19	44
007439-97-6	MERCURY	9		3		1	9	7	20
000118-74-1	HEXACHLOROENZENE	11		4			3		7
		Total IJC	0	13	0	5	69	27	114
000071-55-6	1,1,1-TRICHLOROETHANE		8				5	7	22
000079-34-5	1,1,2,2-TETRACHLOROETHANE							3	3
000079-00-5	1,1,2-TRICHLOROETHANE		4					2	9
000075-34-3	1,1-DICHLOROETHANE		4				2	9	20
000075-35-4	1,1-DICHLOROETHENE		6					2	15
000120-82-1	1,2,4-TRICHLOROENZENE		1					2	4
000096-12-8	1,2-DIBROMO-3-CHLOROPROPANE								1
000095-50-1	1,2-DICHLOROENZENE							4	10
000107-06-2	1,2-DICHLOROETHANE		4				1	10	34
000156-59-2	1,2-DICHLOROETHENE, CIS-							1	1
000156-60-5	1,2-DICHLOROETHENE, TRANS-							3	6
000540-59-0	1,2-DICHLOROETHYLENE						4	7	15
000122-66-7	1,2-DIPHENYLHYDRAZINE		1						
000541-73-1	1,3-DICHLOROENZENE							6	2
000106-46-7	1,4-DICHLOROENZENE							4	6
002201-15-2	1-PHENYLCYCLOHEXYL-ETHYLAMINE								1
007334-33-0	2,2'-DICHLOROAZOENZENE							3	
000105-67-9	2,4-DIMETHYLPHENOL							3	4
000078-93-3	2-BUTANONE						1	3	1
000095-51-2	2-CHLOROANILINE						2	4	4
000095-57-8	2-CHLOROPHENOL							2	6
000091-57-6	2-METHYLNAPHTHALENE		1				1	6	7
000091-94-1	3,3'-DICHLOROENZIDINE				1		4	4	3
000106-47-8	4-CHLOROANILINE							4	10
000083-32-9	ACENAPHTHENE						1	1	1
000208-96-8	ACENAPHTHYLENE						1	1	1
000067-64-1	ACETONE						2	11	14
007429-90-5	ALUMINUM							2	
001762-95-4	AMMONIUM THIOCYANATE						1		
012172-73-5	AMOSITE ASBESTOS						2		
000062-53-3	ANILINE		1					7	18
000548-62-9	ANILINE VIOLET							3	1
000120-12-7	ANTHRACENE						1	2	1
007440-36-0	ANTIMONY							9	4
007440-38-2	ARSENIC						3	24	18
000103-33-3	AZOENZENE		1					2	4
007440-39-3	BARIUM						1	15	16
000071-43-2	BENZENE		6				8	9	25
000092-87-5	BENZIDINE			1			4	5	6
000056-55-3	BENZO(A)ANTHRACENE							3	1
000205-99-2	BENZO(B)FLUORANTHENE						1	4	
000191-24-2	BENZO(GHI)PERYLENE						1	2	
000207-08-9	BENZO(K)FLUORANTHENE						1	3	
000065-85-0	BENZOIC ACID							4	4
000100-51-6	BENZYL ALCOHOL							1	5
007440-41-7	BERYLLIUM							9	1
000111-44-4	BIS(2-CHLOROETHYL) ETHER							2	6

**Table 5-2. Waste Site Contaminants that Exceeded Health-Based Screening Values
Muskegon Lake and White Lake AOCs**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						
			Air	Biota	Human Material	Other Media	Soil	Water	Total
039638-32-9	BIS(2-CHLOROISOPROPYL) ETHER						1	3	4
000085-68-7	BUTYL BENZYL PHTHALATE		1						1
007440-43-9	CADMIUM						16	12	28
007440-70-2	CALCIUM						2		2
000076-22-2	CAMPHOR							1	1
000075-15-0	CARBON DISULFIDE		2				2	1	5
000056-23-5	CARBON TETRACHLORIDE						1	2	14
000057-74-9	CHLORDANE			1					1
HZ2100-12-T	CHLORIDES							4	4
027134-26-5	CHLOROANILINE							1	1
000108-90-7	CHLOROBENZENE		4				2	8	13
000075-00-3	CHLOROETHANE							2	6
000067-66-3	CHLOROFORM		6				2	7	20
007440-47-3	CHROMIUM						3	23	24
000218-01-9	CHRYSENE						1	7	1
006923-20-2	CIS-1,2-DICHLOROPROPENE								2
007440-48-4	COBALT						2	16	7
007440-50-8	COPPER						1	17	19
000095-48-7	CRESOL, ORTHO-							4	9
000106-44-5	CRESOL, PARA-							4	10
001319-77-3	CRESOLS								1
000057-12-5	CYANIDE							13	11
000117-81-7	DI(2-ETHYLHEXYL)PHTHALATE		1					9	8
000053-70-3	DIBENZO(A,H)ANTHRACENE							2	2
025321-22-6	DICHLOROBENZENE		2	2	2		8	7	10
001300-21-6	DICHLOROETHANE								4
025323-30-2	DICHLOROETHYLENE								2
000131-11-3	DIMETHYL PHTHALATE						1	1	2
000121-69-7	DIMETHYLANILINE							9	8
000084-74-2	DI-N-BUTYL PHTHALATE							3	2
000117-84-0	DI-N-OCTYL PHTHALATE							7	3
000959-98-8	ENDOSULFAN, ALPHA							2	2
033213-65-9	ENDOSULFAN, BETA								1
000100-41-4	ETHYLBENZENE		7				11	10	17
000206-44-0	FLUORANTHENE						1	2	1
000086-73-7	FLUORENE						1	2	1
000076-44-8	HEPTACHLOR								3
001024-57-3	HEPTACHLOR EPOXIDE						1		2
000087-68-3	HEXACHLOROBUTADIENE							1	1
000319-85-7	HEXACHLOROCYCLOHEXANE, BETA-							1	1
000319-86-8	HEXACHLOROCYCLOHEXANE, DELTA-							1	1
000058-89-9	HEXACHLOROCYCLOHEXANE, GAMMA-							1	2
000077-47-4	HEXACHLOROCYCLOPENTADIENE							1	1
HZ1000-01-T	HYDROCARBONS, UNSPECIFIED		2				1	1	4
000074-90-8	HYDROGEN CYANIDE		2						2
000193-39-5	INDENO(1,2,3-CD)PYRENE						1	2	3
007439-89-6	IRON							2	2
000078-59-1	ISOPHORONE								2
007439-95-4	MAGNESIUM							2	2
007439-96-5	MANGANESE						1	16	17
HZ0900-01-T	METALS N.O.S.							3	3
000074-82-8	METHANE						1		1
000110-12-3	METHYL ISOAMYL KETONE								2
000108-10-1	METHYL ISOBUTYL KETONE							2	4
000075-09-2	METHYLENE CHLORIDE						1	4	10
001321-94-4	METHYLNAPHTHALENE								2
000091-20-3	NAPHTHALENE						2	10	8
000104-51-8	N-BUTYLBENZENE								1
000103-69-5	N-ETHYLANILINE							6	6
000613-97-8	N-ETHYL-N-METHYLANILINE								2

**Table 5-2. Waste Site Contaminants that Exceeded Health-Based Screening Values
Muskegon Lake and White Lake AOCs**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						
			Air	Biota	Human Material	Other Media	Soil	Water	Total
007440-02-0	NICKEL					1	19	14	34
000098-95-3	NITROBENZENE						1	3	4
000100-61-8	N-METHYLBENZENAMINE						2	6	8
000086-30-6	N-NITROSODIPHENYLAMINE						4	4	8
000706-78-5	OCTACHLOROCYCLOPENTENE						1		1
029082-74-4	OCTACHLOROSTYRENE			2					2
019044-88-3	ORYZALIN					1			1
000095-47-6	O-XYLENE						1		1
000087-86-5	PENTACHLOROPHENOL						2	1	3
000085-01-8	PHENANTHRENE					1	8	4	13
000108-95-2	PHENOL		1						1
064743-03-9	PHENOLICS							4	4
HZ1400-01-T	PHTHALATES, UNSPECIFIED						1		1
007440-09-7	POTASSIUM						2	1	3
000129-00-0	PYRENE					1	1	1	3
000135-98-8	SEC-BUTYLBENZENE							1	1
HZ1900-02-T	SEMIVOLATILE ORGANIC COMPOUNDS N.O.S.						2	1	3
007440-22-4	SILVER						5	4	9
000100-42-5	STYRENE		2			3	1	2	8
000098-06-6	TERT-BUTYLBENZENE							1	1
000127-18-4	TETRACHLOROETHYLENE		9			8	15	32	64
000109-99-9	TETRAHYDROFURAN						2	2	4
007440-28-0	THALLIUM						2	1	3
000302-04-5	THIOCYANATE							5	5
007440-31-5	TIN						6	1	7
000108-88-3	TOLUENE		9			9	17	20	55
005103-74-2	TRANS-CHLORDANE							1	1
025323-89-1	TRICHLOROETHANE					1			1
000079-01-6	TRICHLOROETHYLENE		7			6	9	32	54
000112-26-5	TRIGLYCOL DICHLORIDE						3	7	10
HZ0700-03-T	TRIHALOMETHANES							2	2
007440-62-2	VANADIUM						17	11	28
000075-01-4	VINYL CHLORIDE		6			2	4	18	30
HZ1900-01-T	VOLATILE ORGANIC COMPOUNDS N.O.S.						3	4	7
001330-20-7	XYLENES, TOTAL		5			6	6	8	25
007440-66-6	ZINC					1	21	22	44
000132-64-9	DIBENZOFURAN						1	1	2
MEDEXP-00-0			16	12		4	24	50	106
PENDING							1	1	2
			1	2		7	5	7	22
		Total Non-IJC	120	20	3	144	625	864	1776
		Total	120	33	3	149	694	891	1890

Table 5-3. TRI Releases (in pounds, 2001) for Muskegon Lake and White Lake AOCs

Chemical	IJC Tracking Number	Total Air Emissions	Surface Water Discharges	Under-ground Injection	Releases to Land	Total On-site Releases	Total Off-site Releases	Total On-and Off-site Releases
DIOXIN AND DIOXIN-LIKE COMPOUNDS (PCDDs and PDCFs)	2	0.00106722	No data	0	0	0.00106722	0	0.00106722
LEAD	8	1786	12	0	89	1887	15325.779	17212.779
LEAD COMPOUNDS	8	196.6996	3100.001	0	7100	10396.7006	1684.33037	12081.03097
MERCURY COMPOUNDS	9	153	1	0	50	204	9.23	213.23
Total IJC		2135.700667	3113.001	0	7239	12487.70167	17019.33937	29507.04104
1,2,4-TRIMETHYLBENZENE		236	No data	0	0	236	0	236
1,2-DICHLOROETHANE		22	No data	0	0	22	0	22
3,3'-DICHLOROBENZIDINE DIHYDROCHLORIDE		5	No data	0	0	5	7200	7205
4,4'-ISOPROPYLIDENE-DIPHENOL		343	No data	0	0	343	74938	75281
ACETONITRILE		2150	No data	0	0	2150	0	2150
ALUMINUM (FUME OR DUST)		15244	No data	0	153	15397	286	15683
AMMONIA		26755	No data	0	0	26755	0	26755
ATRAZINE		10	0	0	0	10	0	10
BARIUM COMPOUNDS		1297	5800	0	170880	177977	153990	331967
BENZENE		1141	No data	0	0	1141	0	1141
CERTAIN GLYCOL ETHERS		18	No data	0	0	18	0	18
CHLORINE		3465	0	0	0	3465	0	3465
CHLORINE DIOXIDE		255	No data	0	0	255	0	255
CHLOROBENZENE		12	No data	0	0	12	0	12
CHLOROFORM		430	No data	0	0	430	0	430
CHLOROMETHANE		6680	No data	0	0	6680	0	6680
CHROMIUM		2354	10	0	5	2369	22407	24776
CHROMIUM COMPOUNDS (EXCEPT CHROMITE ORE MINED IN THE TRANSVAAL REGION)		0	No data	0	0	0	20233	20233
COBALT		1644	No data	0	5	1649	12732	14381
COBALT COMPOUNDS		0	No data	0	0	0	5780	5780
COPPER		2305	10	0	11	2326	22746	25072
COPPER COMPOUNDS		70	No data	0	0	70	350	420
DICHLOROMETHANE		49106	No data	0	0	49106	0	49106
DIISOCYANATES		1	No data	0	0	1	0	1
DIMETHYL PHTHALATE		0	No data	0	0	0	16000	16000
ETHYLBENZENE		1331	No data	0	0	1331	0	1331
ETHYLENE GLYCOL		12	No data	0	0	12	0	12
FORMALDEHYDE		6	No data	0	0	6	0	6
FORMIC ACID		4	No data	0	0	4	0	4
FREON 113		5	No data	0	0	5	0	5
HYDROCHLORIC ACID (1995 AND AFTER 'ACID AEROSOLS' ONLY)		691508	0	0	0	691508	0	691508
HYDROGEN FLUORIDE		54923	No data	0	0	54923	0	54923
MANGANESE		5911	5	0	0	5916	13424	19340
MANGANESE COMPOUNDS		33418	0	0	39470	72888	17281	90169
M-CRESOL		3	No data	0	0	3	0	3
METHANOL		87887	No data	0	0	87887	0	87887
METHYL ETHYL KETONE		630	No data	0	0	630	0	630
METHYL ISOBUTYL KETONE		81	No data	0	0	81	0	81
N,N-DIMETHYLFORMAMIDE		244	No data	0	0	244	0	244
N-BUTYL ALCOHOL		36	No data	0	0	36	0	36
N-HEXANE		1500	No data	0	0	1500	0	1500
NICKEL		2383	255	0	5	2643	29427	32070
NICKEL COMPOUNDS		0	No data	0	0	0	2680	2680
NITRATE COMPOUNDS		10	No data	0	0	10	5	15
NITRIC ACID		10029	No data	0	0	10029	0	10029
N-METHYL-2-PYRROLIDONE		261	No data	0	0	261	0	261
PHENOL		750	No data	0	0	750	0	750
PHTHALIC ANHYDRIDE		4	No data	0	0	4	0	4
POLYCYCLIC AROMATIC COMPOUNDS		0	No data	0	18	18	4	22
PYRIDINE		277	No data	0	0	277	0	277
STYRENE		18346	No data	0	0	18346	7816	26162
SULFURIC ACID (1994 AND AFTER 'ACID AEROSOLS' ONLY)		51588	No data	0	0	51588	0	51588

Table 5-3. TRI Releases (in pounds, 2001) for Muskegon Lake and White Lake AOCs

Chemical	IJC Tracking Number	Total Air Emissions	Surface Water Discharges	Under- ground Injection	Releases to Land	Total On-site Releases	Total Off- site Releases	Total On- and Off-site Releases
TETRACHLORO-ETHYLENE		16	No data	0	0	16	0	16
TOLUENE		15235	No data	0	0	15235	0	15235
TRICHLOROETHYLENE		24510	2	0	0	24512	0	24512
TRIETHYLAMINE		148	No data	0	0	148	0	148
VANADIUM COMPOUNDS		3203	No data	0	20000	23203	4400	27603
XYLENE (MIXED ISOMERS)		3471	No data	0	0	3471	0	3471
ZINC COMPOUNDS		22	22	0	0	44	2216	2260
Total Non-IJC		1121295	6104	0	230547	1357946	413915	1771861
Total		1123430.701	9217.001	0	237786	1370433.702	430934.3394	1801368.041

Table 5-4. TRI Facilities Releasing IJC Critical Pollutants On-site for the Muskegon Lake and White Lake AOCs

IJC Critical Pollutant	Number of Facilities	Facility Name	TRIF ID	City
Dioxin and dioxin-like compounds (PCDDs and PCDFs)	2			
Muskegon County, MI	2	B. C. COBB GENERATING PLANT S. D. WARREN CO.	49445BCCBB151NC 49443SDWRR2400L	MUSKEGON MUSKEGON
Lead and lead compounds	12			
Muskegon County, MI	12	B. C. COBB GENERATING PLANT BEKAERT CORP. DILESCO CORP. EAGLE ALLOY INC. HAYES LEMMERZ INTL. - MONTAGUE INC. MARATHON ASHLAND PETROLEUM L.L.C. NORTH MUSKEGON MI TERMINAL MUSKEGON CASTINGS CORP. NON FERROUS CAST ALLOYS INC. PORT CITY DIE CAST RAVENNA CASTING CENTER INC. TEXTRON INC. CWC DIV. WEST MICHIGAN STEEL FNDY.	49445BCCBB151NC 49442BKRTC2121L 49441DLSCC1806B 49442GLLLY5142E 49437HYSLM5353W 49445NRTHM3005H 49442MSKGN2325S 49441NNFRR1146N 49442PRTCT1985E 49451SLDPW3800A 49441CWCCS2672H 49441WSTMC1148W	MUSKEGON MUSKEGON MUSKEGON MUSKEGON MONTAGUE NORTH MUSKEGON MUSKEGON MUSKEGON MUSKEGON RAVENNA MUSKEGON MUSKEGON
Mercury and mercury compounds	2			
Muskegon County, MI	2	B. C. COBB GENERATING PLANT S. D. WARREN CO.	49445BCCBB151NC 49443SDWRR2400L	MUSKEGON MUSKEGON

5.2 KALAMAZOO RIVER AOC, ALLEGAN AND KALAMAZOO COUNTIES, MI

The Kalamazoo River, located in the southwest portion of the lower peninsula of Michigan, flows in a westerly direction to discharge into Lake Michigan. The Kalamazoo River AOC extends from the Morrow Dam downstream to Lake Michigan, a distance of approximately 80 miles (see AOC map in the appendix).

5.2.1 Hazardous Waste Sites Relevant to the Kalamazoo River AOC

ATSDR has evaluated the data for hazardous waste sites in Allegan and Kalamazoo Counties, MI, and reached conclusions regarding the public health threat posed by these sites. These conclusions, along with information regarding the type and location of the site, and the date and type of assessment document, are summarized in Table 5-5, for sites that had public health hazard categories of 1-3 at some point during their assessment history.

Table 5-5. Hazardous Waste Sites in Allegan and Kalamazoo Counties, MI

Site Name, County	Public Health Hazard Category	EPA NPL Status	Site ID	City
Rockwell International, Allegan	3 (1989 HA) 3 (n.d. SR)	Final	MID006028062	Allegan
Allied Paper /Portage Creek/Kalamazoo River, Allegan, Kalamazoo	2 (1991 HA) 5 (2001 HC) 4 (2002 HC)	Final	MID006007306	Kalamazoo
Auto Ion Chemical, Inc.	3 (1989 HC) 3 (1992 HA) 5 (n.d. SR)	Final	MID980794382	Kalamazoo
K & L Landfill, Kalamazoo	3 (1989 HA) 2 (1992 HA)	Final	MID980506463	Kalamazoo
Michigan Disposal Service, Kalamazoo	3 (1989 HA) 3 (1993 HA)	Final	MID000775957	Kalamazoo
Roto-Finish Company, Kalamazoo	3 (1989 HA)	Final	MID005340088	Kalamazoo

2 = Public Health Hazard, 3 = Indeterminate Public Health Hazard, 4 = No Apparent Public Health Hazard, No Public Health Hazard

HA = Public Health Assessment, HC = Health Consultation, SR = Site Review and Update
n.d. = no date provided

For hazardous waste sites in Allegan and Kalamazoo Counties that *at any time* had Public Health Hazard Categories of 1-3, the number of contaminant records in HazDat that exceeded health based-screening values was 753, as shown in Table 5-6. The highest number of records was for the water media group; the soil media group had the next highest number of records.

The IJC Great Lakes critical pollutants accounted for 86 (11%) of these records, with the majority for the soil media group. The IJC critical pollutants that have been found at Allegan and Kalamazoo Counties,

MI, hazardous waste sites at concentrations exceeding health-based screening values are: PCBs, B(A)P, DDT and metabolites, aldrin/dieldrin, lead, and mercury. Details are provided in Table 5-7.

Further evaluation of the data for the sites with Public Health Hazard Categories of 1-3 was conducted by ATSDR in the public health assessments and other health-related documents listed in the table. These evaluations are discussed in the following subsections.

5.2.1.1 Rockwell International Corp.

This 30-acre site is located in Allegan, Allegan County, MI, from the early 1900s through 1991, Rockwell International manufactured universal joints for heavy trucks and construction equipment. Rockwell discharged quenching and cutting fluids to the Kalamazoo River, and loater to three unlined ponds, which discharged to the river. When the ponds filled with sludge, they were buried and new ponds were constructed. Oil seeps appeared along the river in 1971, and were traced to six leaking underground storage tanks. By the time of the 1989 health assessment, the leaks were eliminated, and oil recovery wells were installed to control the migration of oil. Information regarding this site is taken from the 1989 ATSDR health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) in the 1989 health assessment and in the subsequent site review and update (not provided for inclusion in this document). In 1989, the rationale for this conclusion was that risk to human health could result from possible exposure to hazardous substances at levels that may result in adverse health effects over time.

Contaminants of Concern in Completed Exposure Pathways: Not discussed in the 2-page 1989 health assessment. According the EPA NPL fact sheet, contaminants at the site included the IJC critical pollutant PCBs, as well as VOCs, SVOCs, pesticides, and metals in soil, groundwater (which discharges to the Kalamazoo River), and sediments in the ponds and river. In 2001-2002, soil contaminated with PCBs in a yard across from the street and along the sewer lines was removed. Remediation of the site is expected to start in late 2004.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	445
Females aged 15-44	890
Adults 65 and older	505

Public Health Outcome Data: Not reported.

Conclusions: This site probably contributed to human exposure and environmental burdens of PCBs, and possibly other IJC critical pollutants, as well as non-IJC contaminants. The provided documentation was not adequate to support further conclusions or to delineate contaminants in completed exposure pathways. Some remedial activity has occurred in the past, and further remediation is expected to start in 2004.

5.2.1.2 Allied Paper/Portage Creek/Kalamazoo River

This site includes the Allied Paper, Inc., Residual Disposal Area, covering 75 acres in the city of Kalamazoo, Portage Creek from Cork Street, Kalamazoo to the confluence of the creek with the Kalamazoo River, and 35 miles of the Kalamazoo River, from Portage Creek downstream to Lake Allegan in Allegan County. The site is contaminated with PCBs from discharges and disposal of waste by the paper industry. Disposal areas are located on the banks of the river. Contaminated sediments have been largely deposited in four impoundment areas. The river sediments are estimated to contain over 350,000 pounds of PCBs. Information regarding this site is taken from the 1991 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet. According to the EPA NPL fact sheet, the site includes the entire Kalamazoo River AOC (i.e., the 80-mile stretch of river from the Morrow Dam downstream to Lake Michigan).

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 3) in the 1991 ATSDR public health assessment due to the threat to human health from exposure to PCBs in environmental media and biota. ATSDR health consultations in 2001 and 2002 (not provided for inclusion in this document) categorized the site as *No Public Health Hazard* (category 5, 2001) and *No Apparent Public Health Hazard* (category 4, 2002).

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutant PCBs was the primary contaminant of concern. The maximum levels of PCBs in fish from the Kalamazoo River and Portage Creek exceeded the PDA limit and the Michigan trigger level for fish consumption advisories (both 2,000 ppb). Although fish advisories were issued, it had been reported that anglers had been taking home fish in amounts inconsistent with consumption advisories. Turtles from the river also are used for food and may be highly contaminated. PCBs also were found in sediment and water of the river and creek. Some remedial action has taken place. The plan is to first eliminate ongoing sources of PCBs, including the exposed paper wastes along the river banks and the impoundments.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	7,085
Females aged 15-44	17,055
Adults 65 and older	8,523

Public Health Outcome Data: Not reported. Because human exposure to PCBs at levels of public health concern may be occurring, the site (as of 1991) was being considered for a study to investigate fish ingestion and serum PCB levels, if the number of people eating fish from the Kalamazoo River and Portage Creek is large enough to warrant such a study.

Conclusions: The site covers a very large geographic area, heavily contaminated with PCBs from the paper industry. Remediation is in the early phases. Vulnerable populations living near the site are large.

5.2.1.3 Auto Ion Chemicals, Inc.

This 1.5-acre site is located in the city of Kalamazoo, Kalamazoo County, MI, on the bank of the Kalamazoo River. Wastes from chromium plating operations were treated and disposed of at the site. Liquid wastes were deposited in an unlined lagoon on-site or stored in tanks in a basement. Inadequate waste handling, treatment, and storage led to a number of discharges to the soil, storm and sanitary

sewers, and directly into the river. In 1985-1986, a cleanup was conducted to remove water and wastes from the site. The building was demolished and the site was fenced. Soil and groundwater remained contaminated. Information regarding this site is taken from the 1992 ATSDR interim public health assessment, HazDat, and the 2003 EPA NPL fact sheet.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) by ATSDR in the 1989 health consultation and 1992 health assessment because of the potential risk to human health that could result from possible exposure to hazardous substances at levels that may result in adverse health effects over time. In 1993, the contaminated soil was excavated and disposed off-site in licensed landfills, and the site was backfilled with clean soil. This removed the source of groundwater contamination. Groundwater is being monitored. A subsequent ATSDR site review and update (not provided for inclusion in this document) concluded that this site poses *No Public Health Hazard* (category 5).

Contaminants of Concern in Completed Exposure Pathways: None identified. As of ATSDR's 1992 health assessment, no IJC critical pollutants were found at concentrations of concern in potential exposure pathways. Some VOCs, including vinyl chloride, were found in on-site groundwater at levels above health-based screening values, but the water was not used as a source of drinking or industrial process water. As previously described, subsequent remediation has removed the contaminated soil at the site, eliminating the source of groundwater contamination.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	994
Females aged 15-44	708
Adults 65 and older	1,819

Public Health Outcome Data: Not reported.

Conclusions: In the past, well before ATSDR assessments of the site, the improper handling of chromium plating wastes contaminated the environment and contributed to human exposure. No IJC critical pollutants were called out as contaminants of concern in the ATSDR 1992 assessment. The site has been remediated, and groundwater is being monitored to ensure that contaminants in groundwater do not pose a risk to the ecosystem of the river.

5.2.1.4 K & L Landfill

This 87-acre site was used as a sanitary landfill from the early 1960s until 1979. It also accepted liquid and drummed chemical wastes. The landfill was closed in 1979 when VOCs were found in nearby residential wells. The information regarding this site is taken from the 1992 ATSDR interim public health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: In 1989, ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3). In 1992, ATSDR concluded that the site posed a *Public Health Hazard* (category 2) because of the risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse health effects.

Contaminants of Concern in Completed Exposure Pathways: Past completed exposure pathways are ingestion of the IJC critical pollutant lead from groundwater; and ingestion, dermal contact, and inhalation of VOCs (including benzene and vinyl chloride) from groundwater used as household water. Households have been switched to municipal water or to deeper wells to avoid exposure, but the site has not been remediated, and the plume may reach other residential wells, leading to a concern for health hazard. The critical IJC pollutants PCBs and B(a)P were found in on-site shallow subsurface soil, but levels were not high enough to cause adverse health impacts, and the PCB contamination was very localized. Groundwater is being monitored, and construction of a landfill cap may be initiated in 2004. A remedy for groundwater contamination is under discussion.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	53
Females aged 15-44	130
Adults 65 and older	61

Public Health Outcome Data: Not reported.

Conclusions: The site has caused human exposure to the IJC critical pollutant lead and to VOCs at levels of concern in groundwater used as household water. Exposures were eliminated by institutional controls (switching to other sources of household water) but the site has not been remediated. ATSDR was concerned, that the groundwater plume could migrate to other residential wells. Subsurface soil is contaminated, but not highly so, with PCBs and B(a)P; construction of a landfill cap may be initiated in 2004.

5.2.1.5 Michigan Disposal Service

This 68-acre landfill is located in the city of Kalamazoo, Kalamazoo County, MI. The landfill accepted household and industrial waste from 1925 to 1968. An incinerator also operated on the site for many years during that period, and ash was buried in the landfill. Since 1968, the site has been used as a Type III landfill, accepting only inert materials, such as construction debris. The landfill is adjacent to Davis Creek, which flows into the Kalamazoo River. Information regarding this site is taken from the 1993 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) in the 1989 and 1993 ATSDR health assessments because there are several pathways by which people may be exposed, but no evidence that significant exposure has occurred. Critical data were missing (adequate characterization of groundwater contamination; surface soil concentrations of contaminants).

Contaminants of Concern in Completed Exposure Pathways: None. On-site groundwater concentrations of the IJC critical pollutant lead exceeded health-based screening values, as do concentrations of arsenic and benzene. The high concentrations were found in limited areas or for limited times. Although groundwater flows towards Davis Creek, the creek water and sediments were not contaminated. Since 1993, the entire landfill has been capped, and groundwater has been pumped, treated, and discharged to a wastewater treatment facility.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	830
Females aged 15-44	1,827
Adults 65 and older	863

Public Health Outcome Data: Not reported.

Conclusions: On-site groundwater was contaminated with the IJC critical pollutant lead, and also with arsenic and VOCs at levels of concern, but there was no completed exposure pathway. The nearby creek did not have site-related contamination. Since that time, the landfill has been completely capped and the groundwater remediated.

5.2.1.6 Roto-Finish Company

This 7.5-acre site is located near Kalamazoo (in Portage), Kalamazoo County, MI. From 1960 to 1979, Roto-Finish pumped manufacturing and processing wastes (estimated at 83,000 gallons) into two on-site unlined lagoons, which often overflowed. Wastes were also reportedly dumped approximately 1 mile south of the site, and in low areas behind the shop. In 1979-1983, Roto-Finish excavated the lagoons and stained soils and disposed of them in an offsite landfill. The excavated areas were backfilled with clean material, and no significant soil contamination was detected. Information regarding this site has been taken from the 1989 ATSDR preliminary public health assessment and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) in the 1989 ATSDR health assessment because of the risk to human health that could result from possible exposure to hazardous substances at levels that may result in adverse health effects over time.

Contaminants of Concern in Completed Exposure Pathways: None. No IJC critical pollutants are identified as contaminants of concern at this site. As reported in the 1989 health assessment, on-site groundwater contained high levels of chromium and 4,4-methylene bis(2-chloroaniline). VOCs also were found in groundwater. Since that time, a groundwater extraction system has been operated (1995-2001) to transfer the water for treatment at a wastewater treatment plant. The remaining remedy is natural attenuation with institutional controls, expected to take 50-60 years. Monitoring continues. Contaminants remaining in groundwater are chlorinated VOCs.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	386
Females aged 15-44	852
Adults 65 and older	305

Public Health Outcome Data: A study of the presence of 4,4-methylene bis(2-chloroaniline), a suspected bladder carcinogen, in the homes of Roto-Finish employees was performed to determine whether worker track-out was a problem. The chemical was found in vacuum cleaner dust, dryer lint, and

also in urine samples from an employee and a family member. The study does not provide health outcome information for those not associated (directly or indirectly) with industrial activity at the site.

Conclusions: This site was not a source of IJC critical pollutant exposure or environmental contamination. Following remediation activities, the remaining contaminants are VOCs in groundwater, which are being monitored and allowed to attenuate naturally.

5.2.2 TRI Data for the Kalamazoo River AOC

The TRI on-site chemical releases for Allegan and Kalamazoo Counties (combined) are summarized in Table 5-7. Total on-site releases in 2001 were 2,083,449 pounds, the majority of which were released to air, followed by underground injection. Allegan County accounted for 45% and Kalamazoo County accounted for 55% of the total on-site releases.

Only 2,253 pounds (0.1%) of the total on-site releases were IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (primarily to air), and mercury compounds (to air). The facilities that released these pollutants are listed in Table 5-8.

The largest releases of non-IJC chemicals, in the range of 300,000-499,999 pounds, were of xylenes and of n-hexane (to air). Dichloromethane and methanol (primarily to air) were the next largest releases (150,000-299,999 pounds).

5.2.3 County Demographics and Health Status Data for the Kalamazoo River AOC

The demographic profiles, from the 2000 U.S. Census, for vulnerable populations living in the two counties of the Kalamazoo River AOC, WI, are shown in Table 5-9.

Table 5-9. County Demographic Profiles for the Kalamazoo River AOC

Vulnerable population	Allegan County	Kalamazoo County	Total for AOC
Children 6 years and younger	10,928	21,709	32,637
Females aged 15-44	22,337	57,290	79,627
Adults 65 years and older	11,725	27,148	38,873

According to the 2000 HRSA community health status reports, health status indicators that compared unfavorably with those of the U.S. and also with the median of the peer counties for the two counties relevant to the Kalamazoo River AOC were as follows (none were above the upper limit of the peer county range):

Allegan County:

Infant mortality (per 1,000 births)

- white infant mortality
- Neonatal infant mortality

Birth measures (as percent)

- no care in first trimester

Death measures (per 100,000 population)

- colon cancer

Kalamazoo County:

Infant mortality (per 1,000 births)

- infant mortality
- white infant mortality
- black infant mortality
- neonatal infant mortality
- post-neonatal infant mortality

Birth measures (as percent)

- low birth weight
- very low birth weight
- unmarried mothers

Death measures (per 100,000 population)

- colon cancer

5.2.4 Summary and Conclusions for the Kalamazoo River AOC

5.2.4.1 Hazardous Waste Sites

ATSDR has categorized six hazardous waste sites relevant to the Kalamazoo River AOC in health hazard categories 1-3 at some time in their assessment history. One of these sites is in Allegan County, one crosses Allegan and Kalamazoo Counties, and four are in Kalamazoo County. Four of the sites have been remediated or institutional controls have been instituted such that completed exposure pathways no longer exist, and for the most part, further release to the environment does not seem to be occurring. Two of these sites had the IJC critical pollutant lead in groundwater, and all had VOC contamination of groundwater.

The two remaining sites, which still pose public and environmental contamination hazards, are:

- Rockwell International (Allegan County): Contaminants include the IJC critical pollutant PCBs, and possibly other IJC critical pollutants, as well as non-IJC contaminants, in soil, groundwater, and sediment. The contaminants may have entered the Kalamazoo River and also have contributed to human exposure. The provided documentation was not adequate to fully assess the situation. Some remedial activity has occurred in the past, and additional remedial activity is expected to start in 2004.
- Allied Paper/Portage Creek/Kalamazoo River (Allegan and Kalamazoo Counties): This site covers a very large geographical area, including 75 acres in the city of Kalamazoo, Portage Creek, and 35 miles of the Kalamazoo River (or the entire AOC according to the EPA fact sheet). The site is contaminated with PCBs from discharges and disposal of waste by the paper industry, has been characterized as a *Public Health Hazard* by ATSDR in 1991, and remediation is only in the early stages. Vulnerable populations living near the site are relative large.

Public health outcome data, available for three of the Muskegon Lake AOC sites, generally did not indicate elevated incidences of cancer. The exception was an apparent increased incidence of bladder cancer and of total invasive cancer incidence but for 1 year only for the Bofors Nobel site (Section 5.2.1.1). This site was contaminated with benzidine (a known human carcinogen that causes bladder cancer) and 3,3'-dichlorobenzidine (a probably human carcinogen).

Issues for Follow-Up

The two sites listed above as not yet remediated may need follow up to determine progress toward mitigation of human and environmental exposure.

5.2.4.2 TRI Data

The TRI on-site chemical releases for Allegan and Kalamazoo Counties (combined) in 2001 were 2,083,449 pounds, the majority of which were released to air, followed by underground injection. Allegan County accounted for 45% and Kalamazoo County accounted for 55% of the total on-site releases.

Only 2,253 pounds (0.1%) of the total on-site releases were IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (primarily to air), and mercury compounds (to air).

The largest releases of non-IJC chemicals, in the range of 300,000-499,999 pounds, were of xylenes and of n-hexane (to air).

5.2.4.3 County Demographics and Health Status Indicators

Vulnerable populations in Allegan County totaled 44,990 and in Kalamazoo County totaled 106,147. Only a few Allegan County health status indicators compared unfavorably with both U.S. indicators and the median of the peer county indicators. These indicators were white infant and neonatal infant mortality, no care in first trimester, and deaths from colon cancer. In contrast, several Kalamazoo County health status indicators compared unfavorably with both U.S. indicators and with the median of peer county indicators. These included all the infant mortality measures (infant, white infant, neonatal infant, and post-neonatal infant mortality), low birth weight, very low birth weight, unmarried mothers, and deaths from colon cancer.

**Table 5-6. Waste Site Contaminants that Exceeded Health-Based Screening Values
Kalamazoo River AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						
			Air	Biota	Human Material	Other Media	Soil	Water	Total
001336-36-3	POLYCHLORINATED BIPHENYLS	1		10	1		17	7	35
000050-32-8	BENZO(A)PYRENE	4					8		8
000072-54-8	DDD, P,P'-	5		1			2	1	4
000072-55-9	DDE, P,P'-	5		1			3	1	5
000050-29-3	DDT, P,P'-	5		1			3	1	5
000309-00-2	ALDRIN	6						1	1
000060-57-1	DIELDRIN	6		1				1	2
007439-92-1	LEAD	8					5	16	21
007439-97-6	MERCURY	9		1			1	3	5
		Total IJC	0	15	1	0	39	31	86
000630-20-6	1,1,1,2-TETRACHLOROETHANE						1		1
000071-55-6	1,1,1-TRICHLOROETHANE						4	12	16
000079-00-5	1,1,2-TRICHLOROETHANE							4	4
000075-34-3	1,1-DICHLOROETHANE		2					9	11
000095-50-1	1,2-DICHLOROBENZENE							3	3
000107-06-2	1,2-DICHLOROETHANE							12	12
000156-59-2	1,2-DICHLOROETHENE, CIS-							10	10
000156-60-5	1,2-DICHLOROETHENE, TRANS-						3	4	7
000540-59-0	1,2-DICHLOROETHYLENE		2					5	7
000106-46-7	1,4-DICHLOROBENZENE						2	1	3
000088-06-2	2,4,6-TRICHLOROPHENOL							2	2
000078-93-3	2-BUTANONE						3	6	9
000116-53-0	2-METHYLBUTANOIC ACID							2	2
000091-57-6	2-METHYLNAPHTHALENE						2	3	5
000080-05-7	4,4'-(1-METHYLETHYLIDENE)BIS-PHENOL						1	1	2
000101-14-4	4,4'-METHYLENEBIS(2-CHLOROANILINE)				2		5	4	11
000083-32-9	ACENAPHTHENE						2		2
000067-64-1	ACETONE		2				3	13	18
007429-90-5	ALUMINUM							5	5
000120-12-7	ANTHRACENE						4		4
007440-36-0	ANTIMONY						3	2	5
007440-38-2	ARSENIC						3	12	15
007440-39-3	BARIUM						2	8	10
000071-43-2	BENZENE		2				3	15	20
000056-55-3	BENZO(A)ANTHRACENE						8	1	9
000205-99-2	BENZO(B)FLUORANTHENE						9		9
000191-24-2	BENZO(GHI)PERYLENE						2		2
000207-08-9	BENZO(K)FLUORANTHENE						8		8
000065-85-0	BENZOIC ACID						4	6	10
007440-41-7	BERYLLIUM						1	1	2
000085-68-7	BUTYL BENZYL PHTHALATE						3	3	6
007440-43-9	CADMIUM						3	10	13
000075-15-0	CARBON DISULFIDE						1		1
000057-74-9	CHLORDANE			1					1
000108-90-7	CHLOROBENZENE							1	1
000067-66-3	CHLOROFORM							5	5
007440-47-3	CHROMIUM			1			13	20	34
018540-29-9	CHROMIUM, HEXAVALENT						2	5	7
000218-01-9	CHRYSENE						8	1	9
007440-48-4	COBALT						2	2	4
007440-50-8	COPPER						4	7	11
000095-48-7	CRESOL, ORTHO-						2		2
000106-44-5	CRESOL, PARA-						7	10	17
000057-12-5	CYANIDE						5	4	9
000108-93-0	CYCLOHEXANOL							2	2
000117-81-7	DI(2-ETHYLHEXYL)PHTHALATE						7	3	10
000084-66-2	DIETHYL PHTHALATE						2	2	4
000084-74-2	DI-N-BUTYL PHTHALATE						8	3	11
000117-84-0	DI-N-OCTYL PHTHALATE						2	1	3

**Table 5-6. Waste Site Contaminants that Exceeded Health-Based Screening Values
Kalamazoo River AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						
			Air	Biota	Human Material	Other Media	Soil	Water	Total
000100-41-4	ETHYLBENZENE						1	2	3
000206-44-0	FLUORANTHENE						8		8
000086-73-7	FLUORENE						3		3
000076-44-8	HEPTACHLOR						1		1
001024-57-3	HEPTACHLOR EPOXIDE			1					1
000319-85-7	HEXACHLOROCYCLOHEXANE, BETA-						1		1
HZ1000-01-T	HYDROCARBONS, UNSPECIFIED		1						1
000193-39-5	INDENO(1,2,3-CD)PYRENE						2		2
007439-89-6	IRON						1	6	7
000067-63-0	ISOPROPANOL							2	2
007439-95-4	MAGNESIUM						2		2
007439-96-5	MANGANESE						3	4	7
HZ0900-01-T	METALS N.O.S.						1		1
000108-10-1	METHYL ISOBUTYL KETONE							6	6
000075-09-2	METHYLENE CHLORIDE		2				1	9	12
000091-20-3	NAPHTHALENE						2	3	5
007440-02-0	NICKEL			1			7	9	17
007718-54-9	NICKEL CHLORIDE						1	1	2
007727-37-9	NITROGEN							1	1
000087-86-5	PENTACHLOROPHENOL							2	2
000109-52-4	PENTANOIC ACID							2	2
HZ1200-01-T	PESTICIDES N.O.S.						1		1
000085-01-8	PHENANTHRENE						10	3	13
000108-95-2	PHENOL						2	12	14
HZ1400-04-T	PHTHALATE ESTERS						1		1
130498-29-2	POLYCYCLIC AROMATIC HYDROCARBONS						1		1
000071-23-8	PROPANOL							2	2
000129-00-0	PYRENE						8		8
007440-22-4	SILVER						1	3	4
000100-42-5	STYRENE						1		1
HZ2100-14-T	SUSPENDED SOLIDS							2	2
000127-18-4	TETRACHLOROETHYLENE						3	3	6
000108-88-3	TOLUENE		2				3	12	17
025323-89-1	TRICHLOROETHANE							1	1
000079-01-6	TRICHLOROETHYLENE						5	12	17
007440-62-2	VANADIUM						3	6	9
000075-01-4	VINYL CHLORIDE							5	5
HZ1900-01-T	VOLATILE ORGANIC COMPOUNDS N.O.S.						1	1	2
001330-20-7	XYLENES, TOTAL		2				3	2	7
007440-66-6	ZINC						6	11	17
000132-64-9	DIBENZOFURAN						3		3
MEDEXP-00-0			6	13			20	26	65
				3			6	2	11
		Total Non-IJC	21	20	2	0	254	370	667
		Total	21	35	3	0	293	401	753

Table 5-7. TRI Releases (in pounds, 2001) for the Kalamazoo River AOC

Chemical	IJC Tracking Number	Total Air Emissions	Surface Water Discharges	Under-ground Injection	Releases to Land	Total On-site Releases	Total Off-site Releases	Total On- and Off-site Releases
DIOXIN AND DIOXIN-LIKE COMPOUNDS (PCDDs and PCDFs)	2 3	0.000253575	0	0	0	0.000253575	0	0.000253575
LEAD	8	24	11.85	0	0	35.85	1815.63	1851.48
LEAD COMPOUNDS	8	1934.67	28.8	2	222	2187.47	491.1	2678.57
MERCURY COMPOUNDS	9	30.13	0	0	0	30.13	39.53	69.66
Total IJC		1988.800254	40.65	2	222	2253.450254	2346.26	4599.710254
ACETALDEHYDE		20638	250	0	124	21012	0	21012
ACETONITRILE		12700	0	360	0	13060	0	13060
ACRYLAMIDE		18	0	0	0	18	0	18
AMMONIA		27067	1149	80	8029	36325	0	36325
BARIUM COMPOUNDS		0	0	0	0	0	15148	15148
CERTAIN GLYCOL ETHERS		9	0	0	0	9	0	9
CHLORINE		4870	600	0	0	5470	0	5470
CHLORODIFLUORO-METHANE		11350	0	0	0	11350	0	11350
CHLOROMETHANE		2593	0	0	0	2593	0	2593
CHROMIUM		250	0	0	0	250	0	250
CHROMIUM COMPOUNDS (EXCEPT CHROMITE ORE MINED IN THE TRANSVAAL REGION)		2150	0	52000	0	54150	3435	57585
COBALT		250	0	0	0	250	0	250
COPPER		0	0	0	0	0	10	10
COPPER COMPOUNDS		10	0	0	0	10	0	10
CUMENE		130	0	0	0	130	0	130
CYANIDE COMPOUNDS		160	0	0	0	160	0	160
CYCLOHEXANE		214	0	0	0	214	0	214
DICHLOROMETHANE		169750	179	87000	0	256929	10	256939
DIISOCYANATES		2	0	0	0	2	0	2
DIMETHYLAMINE		4262	0	0	0	4262	0	4262
EPICHLOROHYDRIN		127	0	0	0	127	0	127
ETHYLBENZENE		109817	0	0	0	109817	0	109817
FORMALDEHYDE		7181	510	1	0	7692	4500	12192
FORMIC ACID		10	0	60	0	70	0	70
HYDROCHLORIC ACID (1995 AND AFTER 'ACID AEROSOLS' ONLY)		130100	0	0	0	130100	0	130100
HYDROGEN FLUORIDE		10030	0	0	0	10030	0	10030
MANGANESE		500	0	0	0	500	5	505
MANGANESE COMPOUNDS		3800	0	11000	0	14800	13020	27820
METHANOL		156313	49022	50000	547	255882	1500	257382
METHYL ETHYL KETONE		15845	0	1	0	15846	0	15846
METHYL ISOBUTYL KETONE		9911	0	0	0	9911	0	9911
METHYL TERT-BUTYL ETHER		1260	1	0	0	1261	0	1261
N,N-DIMETHYLFORMAMIDE		1200	0	7100	40	8340	0	8340
N-BUTYL ALCOHOL		116529	0	32	0	116561	0	116561
N-HEXANE		305644	0	0	0	305644	1	305645
NICKEL		250	0	0	0	250	3205	3455
NITRATE COMPOUNDS		0	379	0	725	1104	0	1104
NITRIC ACID		1069	0	0	0	1069	0	1069
OZONE		670	0	0	0	670	0	670
PHENOL		120	0	0	0	120	800	920
POLYCYCLIC AROMATIC COMPOUNDS		0.143	0	0	0	0.143	0	0.143
POTASSIUM DIMETHYLDITHIO-CARBAMATE		13730	0	0	0	13730	0	13730
PYRIDINE		40	0	310	0	350	0	350
STYRENE		110053	0	0	0	110053	0	110053
TERT-BUTYL ALCOHOL		1820	0	3	0	1823	160	1983
TOLUENE		46450	24	41	0	46515	0	46515
TRIETHYLAMINE		150	0	2100	0	2250	0	2250
XYLENE (MIXED ISOMERS)		496886	0	0	0	496886	0	496886
ZINC COMPOUNDS		350	250	13000	0	13600	49113	62713
Total Non-IJC		1796278.143	52364	223088	9465	2081195.143	90907	2172102.143
Total		1798266.943	52404.65	223090	9687	2083448.593	93253.26	2176701.853

Table 5-8. TRI Facilities Releasing IJC Critical Pollutants On-site for the Kalamazoo River AOC

IJC Critical Pollutant	Number of Facilities	Facility Name	TRIF ID	City
Dioxin and dioxin-like compounds (PCDDs and PCDFs)	1			
Kalamazoo County, MI	1	PHARMACIA & UPJOHN CO.	49001THPJH7171P	KALAMAZOO
Lead and lead compounds	6			
Allegan County, MI	3	ROCK-TENN CO. UNIFORM COLOR CO. MENASHA CORP.	49078MDPPR431HE 49423NFRMC942BR 49078MNSHC320NF	OTSEGO HOLLAND OTSEGO
Kalamazoo County, MI	3	GRAPHIC PACKAGING CORP. HUMPHREY PRODS. CO. PHARMACIA & UPJOHN CO.	49007JMSRV243EA 49003HMPHRKILGO 49001THPJH7171P	KALAMAZOO KALAMAZOO KALAMAZOO
Mercury and mercury compounds	2			
Kalamazoo County, MI	2	GRAPHIC PACKAGING CORP. PHARMACIA & UPJOHN CO.	49007JMSRV243EA 49001THPJH7171P	KALAMAZOO KALAMAZOO

5.3 GRAND CALUMET AOC, LAKE COUNTY, IN, AND COOK COUNTY, IL

The Grand Calumet River originates in the east end of Gary, IN, and flows 13 miles through Gary, East Chicago, and Hammond. The majority of the river's flow drains into Lake Michigan via the Indiana Harbor and Ship Canal. The AOC begins 15 miles south of downtown Chicago, and includes the east branch and a small segment of the west branch of the river, and also the Indiana Harbor and Ship Canal (see AOC map in the appendix). Ninety percent of the river's flow originates as municipal and industrial effluent, storm water overflows, and cooling and process water.

5.3.1 Hazardous Waste Sites Relevant to the Grand Calumet AOC

ATSDR has evaluated the data for 14 hazardous waste sites in Lake County, IN, and Cook County, IL, and reached conclusions regarding the public health threat posed by these sites. These conclusions, along with information regarding the type and location of the site, and the date and type of assessment document, are summarized in Table 5-10, for sites that had public health hazard categories of 1-3 at some point during their assessment history.

Table 5-10. Hazardous Waste Sites in Lake County, IN, and Cook County, IL

Site Name, County	Public Health Hazard Category	EPA NPL Status	Site ID	City
American Chemical Services, Inc., Lake	3 (1988 HA) 3 (1994 HA)	Final	IND016360265	Griffith
Lake Sandy Jo Landfill, Lake	3 (1985 HA) 3 (n.d. SR)	Final	IND980500524	Gary
Midco I, Lake	3 (1987 HA) 2 (n.d. SR)	Final	IND980615421	Gary
Midco II, Lake	3 (1989 HA)	Final	IND980679559	Gary
Ninth Avenue Dump, Lake	3 (1989 HA) n.c. (1999 HC)	Final	IND980794432	Gary
U.S. Smelter and Lead Refinery, Inc. Lake	2 (1994 HA)	Proposed	IND047030226	East Chicago
Celotex Corp., Cook	2 (1999 HC)	Non NPL	ILD051053692	Chicago
Double A Metals, Cook	2 (1997 HC)	Non NPL	ILD025352139	Chicago
Electro Finishers, Cook	2 (2001 HC)	Non NPL	ILD009437906	Chicago
Elizabeth Street Foundry, Cook	2 (1997 HC)	Non NPL	ILD005086822	Chicago
Estech General Chemical Co., Cook	2 (1999 HC)	Non NPL	ILD099213498	Calumet City
Hartz Construction	3 (1999 HC)	Non NPL	ILXCRA583000	Oak Lawn
Stauffer Chemical Co., Cook	3 (1988 HA)	Removed Post SARA	ILD005110143	Chicago Heights
West Pullman Iron & Metal, Cook	3 (1999 HA)	Non NPL	ILD005428651	Chicago

2 = Public Health Hazard, 3 = Indeterminate Public Health Hazard

HA = Public Health Assessment, HC = Health Consultation, SR = Site Review and Update

n.c. = no category reported; n.d. = no date provided

For hazardous waste sites in Lake County IN, and Cook County, IL, that *at any time* had Public Health Hazard Categories of 1-3, the number of contaminant records in HazDat that exceeded health based-screening values was 853, as shown in Table 5-11. The highest number of records was for the soil media group; the water media group had the next highest number of records.

The IJC Great Lakes critical pollutants accounted for 145 (17%) of these records, with the majority for the soil media group. The IJC critical pollutants that have been found at Lake County IN, and Cook County, IL, hazardous waste sites at concentrations exceeding health-based screening values are: PCBs, B(a)P, DDT, dieldrin, lead, mercury, and hexachlorobenzene. Details are provided in Table 5-12.

Further evaluation of the data for the sites with Public Health Hazard Categories of 1-3 was conducted by ATSDR in the public health assessments and other health-related documents listed in the table. These evaluations are discussed in the following subsections.

5.3.1.1 American Chemical Services, Inc.

This site includes three properties with a total area of about 36 acres in Griffith, Lake County, IN. American Chemical Services was a solvent recovery firm and a chemical manufacturer, starting in 1955. In 1990, it ceased solvent reclamation, and continued chemical manufacturing to date. One of the associated properties was a chemical drum reconditioning operation. From 1955 until at least 1975, American Chemical Services disposed of hazardous wastes on-site, including numerous drums (it has been estimated that 35,000 drums were buried). It also incinerated waste chemicals, and disposed of the ash on-site. Information regarding this site is taken from the 1994 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet.

Category of Public Health Hazard: ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3) in a 1989 health assessment (not provided for inclusion in this document) and in the 1994 health assessment. Although there was no evidence of current or past exposure of residents to site-related contaminants, the 1994 assessment posed the concern that as long as contaminants remain at the site, they could migrate to residential wells and pose a health hazard for long-term exposure.

Contaminants of Concern in Completed Exposure Pathways: None identified. Although many contaminants were detected on-site at above health-based screening concentrations, there were no completed exposure pathways. Groundwater contaminants of concern on-site and in off-site monitoring wells included benzene and chlorinated VOCs. No site-related contaminants had migrated to residential wells. Subsurface soil in one area of the site had elevated concentrations of the IJC critical pollutant PCBs, and no monitoring data were available for surface soil. Off-site surface water and sediments were not contaminated at levels above background or of public health concern as of the 1994 assessment. Since that time, a subsurface barrier wall has been installed around the site to help contain groundwater, and a groundwater treatment plant was installed in 1997. Intact drums have been removed and soil vapor extraction is underway (to continue through 2005 or longer). Contaminated areas of the adjacent wetlands have been excavated and consolidated onsite.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	389
Females aged 15-44	1,002
Adults 65 and older	551

Public Health Outcome Data: ATSDR evaluated health outcome data to investigate the health concern of community members who believed that there was a high frequency of cancer within an 8-block area north of the American Chemical Services site. An ATSDR review of cancer incidence data showed percentages of site-specific cancers for Griffith to be comparable to those for the U.S. A review of mortality rates showed more deaths than expected in Lake County for all cancer sites combined compared with the state of Indiana, but the relevance of this finding to the 8-block area of concern north of the American Chemical Services site is problematic.

Conclusions: This site contained a large quantity of buried wastes, soil was contaminated with the IJC critical pollutant PCBs, and groundwater was contaminated with VOCs, but ATSDR found no evidence of completed exposure pathways in its 1994 assessment. The site is being remediated. Progress thus far has mitigated the potential for human exposure and release into the environment.

5.3.1.2 Sandy Jo Landfill

This 40-acre landfill is located in a residential area of Gary, Lake County, IN. Hazardous wastes as well as garbage and construction debris are buried on-site. Information regarding this site is taken from the 1985 ATSDR health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site. The health assessment was a review of well water data and a comment on the exposure assessment of a draft phase I remedial investigation.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) in the 1985 health assessment and in the subsequent site review and update (not provided for inclusion in this report) because of inadequate characterization of contamination at the site.

Contaminants of Concern in Completed Exposure Pathways: None identified. Concentrations of the IJC critical pollutant lead in soil on-site were considered to exceed levels of concern. The site has undergone further characterization and some remediation since the 1985 health assessment.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	948
Females aged 15-44	1,758
Adults 65 and older	1,644

Public Health Outcome Data: Not reported.

Conclusions: Little information was available at the time ATSDR performed the 1985 health assessment, and the subsequent ATSDR site review and update (not provided for this writing) also classified the site as an *Indeterminate Public Health Hazard*, indicating that information still was inadequate. Thus, no conclusions can be drawn regarding contaminants in completed exposure pathways. The site has been remediated by fencing, covering the site soils and sediments with clean soil, reseeding with prairie grasses, and extending municipal water (apparently to prevent use of groundwater for private wells). Groundwater is being monitored, and deed restrictions (not further explained) are being obtained. EPA concluded that the remedy remains protective of human health and the environment in its Five-Year Reviews in 1996 and 2001.

5.3.1.3 Midco I

This approximately 4-acre site was used to store and recycle wastes since 1974 through 1979. In 1976, a fire destroyed about 14,000 drums of waste. The site was abandoned in 1979, at which time there were an estimated 14,000 drums onsite in addition to the fire-damaged drums. Approximately 1 foot of topsoil was removed from the entire site, and also two tanks containing wastes. The site and the area immediately east of it were covered with a clay cap. Information regarding this site is taken from the 1987 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) in the 1987 public health assessment because contaminants in groundwater constitute a potential public health threat. A subsequent ATSDR site review and update (not provided for inclusion in this document) concluded that the site was a *Public Health Hazard* (category 2).

Contaminants of Concern in Completed Exposure Pathways: None identified. As of ATSDR's 1987 assessment, groundwater contained the IJC critical pollutant lead at concentrations consistently above the MCL for drinking water, but the groundwater plume had not reached drinking water wells. The contaminants buried on the site were considered a potential health threat in that they might migrate off-site. Currently, groundwater is being remediated and highly contaminated soil is to be treated.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	926
Females aged 15-44	1,878
Adults 65 and older	989

Public Health Outcome Data: Not reported.

Conclusions: This contamination at this site was not well characterized as of ATSDR's 1987 assessment, and no completed exposure pathways were identified. The IJC critical pollutant lead was present in groundwater at levels of concern, but the contamination had not reached drinking water wells. The site is under remediation, with groundwater treatment expected to continue for many years.

5.3.1.4 Midco II

This 7-acre site is located in Gary, Lake County, IN. The company stored and disposed of bulk liquids and wastes including oil sludges, chlorinated solvents, paint solvents and sludges, acids, and spent cyanides. A fire in 1977 destroyed an estimated 60,000 drums. In 1984, EPA removed some of the waste, including PCB-contaminated soil. Information regarding this site is taken from the 1989 ATSDR public health assessment and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) by ATSDR in 1989 because of the potential risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse health effects.

Contaminants of Concern in Completed Exposure Pathways: Not identified. The IJC critical pollutants PCBs and lead were found at levels of concern in sludge pit soil and groundwater prior to

removal actions. Other chemicals of concern in groundwater were VOCs and cyanide. Although a few residential wells were contaminated, the water was not used as drinking water, but rather for dishwashing. Groundwater treatment was initiated in 1996. Soil also will be treated.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	11
Females aged 15-44	11
Adults 65 and older	8

Public Health Outcome Data: Not reported.

Conclusions: The IJC critical pollutants PCBs and lead were contaminants of concern in waste areas and in groundwater, but no completed exposure pathways were identified. The site is being remediated, with groundwater treatment expected to continue for many years.

5.3.1.5 Ninth Avenue Dump

This 17-acre dump site in Gary, Lake County, IN, is located in an industrialized area and about 700 feet north of the Midco I site. It was operated as an uncontrolled chemical waste disposal facility from 1973 to 1980. In 1975, it was estimated that approximately 500,000 gallons of liquid industrial waste had been dumped and 1,000 drums were buried on site. Since disposal operations were discontinued in 1980, drums of wastes, abandoned tanker trucks, and surface soils have been removed. The site is fenced, but holes have been cut into it. Groundwater is contaminated, and flows north to discharge in Lake Michigan. Information regarding this site is taken from the 1989 ATSDR public health assessment, the 1999 ATSDR health consultation, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) in the 1989 health assessment because of the potential risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse health effects. No category was reported in the 1999 health consultation.

Contaminants of Concern in Completed Exposure Pathways: None identified. Levels of the IJC critical pollutants PCBs (in off-site groundwater, in the hydrocarbon layer on on-site groundwater, and in on-site soil and wastes), B(a)P (in subsurface soil and wastes), and lead (in on-site and offsite groundwater, and in on-site surface water, sediments, and surface soils) were of concern. VOCs, including benzene, also contaminated groundwater, surface water, and surface soils, and were in a hydrocarbon layer on on-site groundwater at concentrations of concern. The groundwater was not flowing in the direction of private wells, and the private wells were not contaminated. A concern for bioaccumulation into fish (of chemicals such as PCBs) was expressed. Remedial activities, instituted after the 1989 health assessment, include installation of slurry walls to contain the groundwater contamination and protect an existing pond, the capping of 11 acres, and soil vapor extraction. In the 1999 health consultation, ATSDR concluded that the remedy is protective of public health, but that deed and access restrictions, which have not been fully implemented, were essential.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	957
Females aged 15-44	1,893
Adults 65 and older	1,101

Public Health Outcome Data: Not reported.

Conclusions: This site may have contributed to environmental burden and human exposure to the IJC critical pollutants PCBs, B(a)P, and lead, but remedial activities have been successful, and as long as deed and access restrictions are fully implemented, the remedy should continue to be protective of human health.

5.3.1.6 U.S. Smelter and Lead Refinery, Inc.

This former site of the U.S. Smelter and Lead Refinery is a 79-acre site in East Chicago, Lake County, IN. The east branch of the Calumet River lies to the south, and Indiana Harbor Canal to the west. The site lies within the flood plain of the Grand Calumet River. A copper smelter operated on the site from about 1906 to 1920, a primary lead smelter from 1920 to 1970, and a secondary lead smelter from 1973 to 1985. Blast furnace slag and slag water, containing lead, were dumped into a nearby 21-acre wetland. When the facility was in operation, it often exceeded the NPDES permit levels for discharging lead and other metals in cooling water and storm water runoff to the Grand Calumet River. Lead-containing flue dust was trapped in bag filters and stored on-site, covering 3-5 acres, for possible recycling or sale. In 1982, the dust was brought into a building to prevent dispersion, and in 1992, the dust was removed from the site. An additional arsenic production facility may have existed on-site. Information regarding this site is taken from the 1994 ATSDR public health assessment and the 2003 EPA NPL fact sheet for the site.

Category of Public Health Hazard: ATSDR categorized this site as a *Public Health Hazard* (category 2) in the 1994 health assessment, because chronic exposure to contaminated soils, wastes, and airborne dusts could cause adverse health effects.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutant lead was the principal contaminant of concern for this site. Soils and air at the E.C. DuPont facility near the site have been heavily contaminated with lead. Soil contamination extends one-half mile off-site. Soils and air in residential neighborhoods also were contaminated with lead, but to a lesser extent. Exposures to airborne lead on-site, and also off-site at the adjacent DuPont facility, were at a level that may be associated with adverse effects during the time the plant was in operation. The highest estimated exposure from incidental ingestion of soil by off-site (DuPont) workers and off-site children was at levels associated with adverse effects in animal and human studies. On-site surface water and sediments also are contaminated with lead.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	1,511
Females aged 15-44	2,604
Adults 65 and older	1,511

Public Health Outcome Data: The Indiana State Board of Health conducted blood lead screening for children aged 6 months to 6 years in East Chicago over a 2-day period in June 1985, while the lead smelter was still in operation. The location of the children's residences with regard to the site were not

reported, nor were the criteria used in selecting the children. Of 53 children tested by finger stick, only 2 were found to have “class II” blood lead levels, indicating that they were moderately increased (10-20 µg/dL). No conclusive results regarding the source of lead were found: the home of one child had no lead in paint or soil, and the home of the other was an apartment undergoing remodeling (no additional information provided). ATSDR determined that this limited information did not support any conclusions regarding the impact of the site on children in the area.

Conclusions: This site clearly contributed to environmental contamination and human exposure to lead and other metals while it operated as a smelter. Air levels of lead declined greatly after it ceased operations, but lead remains in soil, sediments, and wastes. Lead was present in soil on-site and near the site at levels that could be harmful. The site has not been remediated, but is planned to be addressed through a long-term remedial action that involves cleanup of the entire site. As per the EPA NPL fact sheet, EPA has concluded that the site poses no immediate threat to the health and safety of the nearby population while awaiting remediation.

5.3.1.7 Celotex Corp.

The Celotex Corporation, located in Chicago, Cook County, IL, was engaged in coal tar distillation from about 1912 to 1970, and in manufacture of asphalt roofing from 1912 to 1982. These activities contaminated the soil with PAHs. In 1994, Celotex covered the site with clean soil to reduce exposure, and in 1997, regraded the site and installed a drainage system to reduce flooding. EPA concluded in 1999 that PAH levels in the soil at the site and in the nearby neighborhood were greater than the typical background level for the Chicago urban area. Information regarding this site is taken from the 1999 ATSDR health consultation for this site.

Category of Public Health Hazard: In 1999, ATSDR categorized this site as a *Public Health Hazard* (category 2), based on exposures of children to some PAH-contaminated residential soil near the site.

Contaminants of Concern in Completed Exposure Pathways: The contaminants of concern in completed exposure pathways were the IJC critical pollutant B(a)P and other carcinogenic PAHs, estimated as B(a)P equivalents in soil, for the incidental ingestion pathway. Doses were estimated using a site-specific oral absorption factor of 0.2 for B(a)P (20 ppm) equivalents in soil. Four residential properties were affected.

Demographics: Not reported.

Public Health Outcome Data: Not reported.

Conclusions: As of 1999, this site posed a health threat for incidental ingestion of soil containing the critical IJC pollutant B(a)P, together with other carcinogenic PAHs [as B(a)P equivalents]. Although the site itself had been covered with clean soil, and had undergone measures to reduce flooding, the residential properties had not been remediated as of 1999. It is unclear whether the measures taken on-site were adequate to prevent migration of the contamination, or how high the on-site contamination was. The extent of off-site contamination, however, is not great, involving only four residential properties.

5.3.1.8 Double A Metals

The Double A Metals site is an approximately 4-acre site that was engaged in aluminum dross recycling from 1964-1993. From 1964 until 1989, the facility only processed aluminum dross and then shipped it off-site for recycling. In 1989, an industrial furnace and a dust collection system (for collecting the byproduct, aluminum oxide) were installed, and the dross was heated on-site and cast into ingots. The site was abandoned in 1993. EPA removed some of the waste piles of dust and slag; drums of waste oils, solvents, and unknown materials; and electrical transformers that had been stripped. The transformer oil had been dumped onto the ground. The site was not secure from trespassers and there was evidence of trespassing. Information on this site was taken from the 1997 ATSDR health consultation on the site.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) because of an apparent explosion or fire hazard from combustible drum materials remaining on-site, and due to concentrations of contaminants in the remaining waste piles that could cause adverse effects.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutant lead was present in the remaining waste piles at concentrations that were above health-based screening values for lead in soil that is readily accessible to children. The pathway is incidental ingestion of soil (waste piles). Chromium in the waste piles, if assumed to be chromium(VI), was also estimated to be a hazard for direct skin contact. PCBs were not found above health-based screening values at the site, even in the vicinity of the transformers. No contaminants were found in surface water or in on-site or off-site soil at levels of concern

Demographics: Demographic profiles were not reported, but the surrounding area is partly residential.

Public Health Outcome Data: Not reported.

Conclusions: Although this site was considered a public health hazard, the areas of chemical contamination at levels high enough to be of concern were limited to the remaining waste piles on-site. Removal was going on at the time of the assessment, so the contaminated material may have been removed. Evidence of migration off-site was not found.

5.3.1.9 Electro Finishers

This 0.44-acre site is located in Chicago, Cook County, IL, about 2 miles west of Lake Michigan and 1,000 feet east of the north branch of the Chicago River. The site was a chromium plating and finishing facility for about 40 years, until 1990. Electro Finishers claimed to have cleaned up the facility properly, but some vats or tanks were left in the ground. In 2000, the next door resident complained that green and yellow crystalline material was forming in the house's basement and flood control pit. A building on the property currently used as a classic automobile body shop also had yellow crystals on the wall, floor, and in piles of dirt. Information regarding this site is taken from the 2001 ATSDR health consultation for this site.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) for persons who may be exposed to chromium (VI) in dust and air inside the building.

Contaminants of Concern in Completed Exposure Pathways: Chromium(VI) was found at very high concentrations in crumbled concrete and soil inside the building, and the IJC critical pollutant lead was found at relatively high concentrations in soil inside the building. Although air monitoring was

not performed, ATSDR was concerned that airborne levels could have a health impact when the dust was kicked up by activities in the building. Incidental ingestion also could have a health impact for people who work on cars inside the building frequently. Chromium(VI) and lead levels also were high in soil outside the building. High levels of chromium(VI) were found in the sump water and chromium(VI) was detected in wipe samples from the wall of the basement of the house with the yellow and green crystals on the wall, indicating migration of the contamination.

Demographics: Not reported.

Public Health Outcome Data: Not reported.

Conclusions: This site has contributed in a limited manner to the environmental burden of and human exposure to lead, and more strikingly, to chromium. The site is small, and although lead concentrations in soil were high (3,700 ppm maximum concentration in soil outside the building), the total impact is probably not that large. Chromium contamination of soil was very high, and migration offsite had occurred, with some of the chromium still present as chromium(VI) in the sump water and on the inner walls of a next door basement. ATSDR concluded that evaluation of additional residential properties was needed.

5.3.1.10 Elizabeth Street Foundry

This 1.34-acre site was a small gray iron foundry. Information regarding this site is taken from the 1997 ATSDR health consultation for this site.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) as long as drums containing chemicals with relatively low flash points are on site, and people have access to the site. The other contamination found on-site was considered not to pose an apparent public health hazard, but sampling of surface soil and air was not adequate to evaluate all possible exposure pathways.

Contaminants of Concern in Completed Exposure Pathways: None. The major concern was that transients, who may light fires on the site, have site access, and drums of materials with low flash points could cause an explosion. Also concentrations of VOCs in the drums could pose a threat to the health of individuals who contacted the drums' contents. Foundry sand was usually stored on-site for months before disposal, raising the issue that contaminants may have leach into the soil and groundwater. Further information was not provided.

Demographics: Demographic profiles for vulnerable populations living within 1 mile of this site were not reported. The total population living within a 1-mile radius of the site is approximately 55,177 people

Public Health Outcome Data: Not reported.

Conclusions: This site was not well characterized. The primary concern was for the explosive hazard posed by drums of chemicals with low flash points on-site.

5.3.1.11 Estech General Chemical Co.

This approximately 54-acre site located in Calumet City, Cook County, IL, operated as an unpermitted landfill. Estech had used the site for prepare fertilizers, pesticides, and sulfuric acid. Some records indicate that drums and pesticides may be buried on-site. The information regarding this site was taken from the 1999 ATSDR health consultation for this site.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) to the adult men living on the site and digging for scrap metal, who could be exposed to lead in soil at levels that pose a risk of adverse health effects.

Contaminants of Concern in Completed Exposure Pathways: Exposure to the IJC critical pollutant lead from incidental ingestion of, dermal contact with, and inhalation of contaminated soil particles could occur at levels that are of concern for health effects. There was some indication from sediment samples from the Grand Calumet River and the wetland area on the site that contaminants might be migrating off-site.

Demographics: Demographic profiles for vulnerable populations were not reported. The total population living within a 1-mile radius of the site is approximately 13,500.

Public Health Outcome Data: Not reported.

Conclusions: Lead, an IJC critical pollutant, was found in soil at the site at levels of health concern for the adult men living on the site, who dig for scrap metal. There may have been some migration of contaminants offsite to sediment, but details were not provided.

5.3.1.12 Hartz Construction

Hartz construction recently built several houses on a former landfill in Oak Lawn, Cook County, IL. Homeowners reported that the pilot lights of their water heaters kept going out. Hartz Construction sealed the basements and placed sealed lids on the sump pits. The pilot light problems ceased. The purpose of the health consultation was to determine whether carbon monoxide or methane in the sealed basements pose a public health hazard, and if other houses have the potential to be affected. More than 100 homes are on the Hartz Construction site, but it is uncertain how many of them are on the landfill. Information regarding this site is taken from the 1999 ATSDR health consultation for the site.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) because although the sealed basements do not currently contain carbon dioxide or methane at levels that would be a health or explosive hazard, basement cracks may develop in the future, allowing gases to infiltrate. It is not known what the past levels of airborne contaminants were in the basements.

Contaminants of Concern in Completed Exposure Pathways: None. No IJC pollutants were chemicals of concern. The major concern was for potential infiltration of carbon dioxide and methane into the basements of houses built on a landfill, but these gases were not detected in basements that were sealed, and were not monitored prior to sealing or in other basements. It was suggested that the source of CO₂ could be a reaction of acidic leachate with limestone fill.

Demographics: Not reported, but the site is residential.

Public Health Outcome Data: Not reported.

Conclusions: The concerns addressed by ATSDR in this assessment were limited to the potential infiltration of carbon dioxide and methane into basements of houses built on a former landfill. Neither contaminant was detected at levels that present a health risk.

5.3.1.13 Stauffer Chemical Company

The Stauffer Chemical site is a 10-acre site in Chicago Heights, Cook County, IL, where 175,000 cubic feet of hazardous waste was buried in an unlined pile. The pile was clay capped in 1970, and the site is fenced. Information regarding this site is taken from the 1988 ATSDR preliminary health assessment. The site was removed from the NPL Post SARA.

Category of Public Health Hazard: ATSDR characterized this site as an *Indeterminate Public Health Hazard* (category 3) because of the risk to human health from the potential exposure to hazardous substances via groundwater and surface water.

Contaminants of Concern in Completed Exposure Pathways: None. No IJC critical pollutants were mentioned. The shallow aquifer underlying the site was contaminated with arsenic, antimony, and selenium, but was not used as a drinking water source. Water supply wells for the nearby residences tap the lower aquifer, which was not tested, but the two aquifers are thought to be hydraulically connected.

Demographics: The demographic profile for vulnerable populations living within 1 mile of this site not reported, but the population within 3 miles of the site was 63, 550 in 1988.

Public Health Outcome Data: Not reported.

Conclusions: The only ATSDR assessment of this site that provided a public health category was a 1989 preliminary health assessment. At the time, few monitoring data were available; only the shallow aquifer had been monitored. No IJC critical pollutants were discussed.

5.3.1.14 West Pullman Iron & Metal

This site consists of two abandoned, adjacent industrial properties in southeast Chicago, Cook County, commonly known as the Dutch Boy and the International Harvester sites. The 5-acre Dutch Boy site produced lead-based paints from 1937 to 1986. In 1985, some people were diagnosed with lead poisoning. Their exposure was linked to demolition and salvaging activities, which started in 1983, at the Dutch Boy site. The source of exposure was airborne lead particles released from building surfaces during the demolition. Demolition was suspended and the site secured. The 21-acre International Harvester site manufactured heavy equipment from 1903 to 1983. Operations included on-site power generation, metal forging, machining, heat treating, and painting. Information regarding this site was taken from the 1999 ATSDR public health assessment.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) because of the potential public health hazard to on-site workers and trespassers who were exposed to elevated levels of lead in on-site soil.

Contaminants of Concern in Completed Exposure Pathways: For the Dutch Boy property, the only completed exposure pathways to contaminants at levels of concern were on-site and in the past: On-site workers and trespassers were exposed by inhalation and ingestion of air borne lead particles and inhalation, ingestion, and dermal exposure to lead in soil. Present and future exposure off-site to lead in soil along the roadways along the north/northeast borders of the Dutch Boy site was a potential concern. Exposure to the levels of contaminants found at the International Harvester property were not and are not sufficient to be of concern for adverse health effects.

Demographics: Demographic profiles for this non-NPL site, as reported in the public health assessment based on the 1990 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	3,697
Females aged 15-44	not reported
Adults 65 and older	2,588

Public Health Outcome Data: On the basis of blood lead levels, nine people had been reported by the Illinois Department of Health as having lead poisoning linked to the salvaging activities at the Dutch Boy site; the data were not provided to ATSDR. In 1986, the Chicago Department of Health performed mass blood lead screening of 599 residents. Identifiers were not provided for these data. ATSDR assumed that the nine highest blood lead levels from the mass screening (31-70 $\mu\text{g}/\text{dL}$) were for the individuals who were exposed on-site. An additional five individuals had blood lead levels at or above CDC's level of concern, which was 25 $\mu\text{g}/\text{dL}$ at the time. The percentile ranking of all the exposures in the vicinity of the two sites appears to have been intermediate between that of the general population levels in the second and third National Health and Nutrition Examination Survey, which bracket the time of the 1986 mass screening. In 1996, blood lead screening was offered for children in the neighborhood. Only eight children were tested; all had blood lead levels below 10 $\mu\text{g}/\text{dL}$.

Conclusions: This site may have contributed to the environmental burden of lead and to human exposure to lead in the past. At the time of ATSDR's health assessment in 1999, remediation activities were ongoing with EPA as the lead agency.

5.3.2 TRI Data for the Grand Calumet AOC

The TRI on-site chemical releases for Lake County, IN, and Cook County, IL (combined) are summarized in Table 5-12. Total on-site releases in 2001 were 24,461,209 pounds, with the highest releases to air and land, and fairly high releases to surface water as well. Lake County accounted for 71% and Cook County accounted for 29% of the total on-site releases.

Of the total on-site releases, 429,097 pounds (1.8%) were IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (mostly to surface water and land), mercury compounds (primarily to air), and hexachlorobenzene (to air). The facilities that released these pollutants are listed in Table 5-13.

The major release ($\geq 500,000$ pounds) of non-IJC chemicals was of zinc compounds (mainly to air and land and also to surface water). The next largest releases of non-IJC chemicals, in the range of 300,000-499,999 pounds, were of manganese compounds and nitrate compounds (primarily to air).

5.3.3 County Demographics and Health Status Data for the Grand Calumet AOC

The demographic profiles, from the 2000 U.S. Census, for vulnerable populations living in the two counties of the Grand Calumet AOC are shown in Table 5-14.

Table 5-14. County Demographic Profiles for the Grand Calumet AOC

Vulnerable population	Lake County, IN	Cook County, IL	Total for AOC
Children 6 years and younger	48,923	549,841	598,764
Females aged 15-44	104,503	1,229,431	1,333,934
Adults 65 years and older	63,234	630,265	693,499

According to the 2000 HRSA community health status reports, health status indicators that compared unfavorably with those of the U.S. and also with the median of the peer counties for the two counties relevant to the Grand Calumet AOC were as follows (indicators that were above the upper limit of the peer county range are bolded):

Lake County:

Infant mortality (per 1,000 births)

- infant mortality
- white infant mortality
- black infant mortality
- neonatal infant mortality
- post-neonatal infant mortality

Birth measures (as percent)

- low birth weight
- very low birth weight
- premature births
- unmarried mothers
- no care in first trimester

Death measures (per 100,000 population)

- **breast cancer (female)**
- **colon cancer**
- **coronary heart disease**
- **homicide**
- lung cancer
- stroke

Cook County:

Infant mortality (per 1,000 births)

- infant mortality
- white infant mortality
- **black infant mortality**
- neonatal infant mortality
- **post-neonatal infant mortality**

Birth measures (as percent)

- low birth weight
- very low birth weight
- **premature births**

- unmarried mothers
- no care in first trimester

Death measures (per 100,000 population)

- breast cancer (female)
- colon cancer
- coronary heart disease
- homicide
- lung cancer
- stroke

5.3.4 Summary and Conclusions for the Grand Calumet AOC

5.3.4.1 Hazardous Waste Sites

ATSDR has assessed 14 hazardous waste sites with public health hazard categories 1-3 for the Grand Calumet AOC: 6 in Lake County, IN, and 8 in Cook County, IL. Five of the sites in Lake County are final NPL sites and the sixth is a proposed NPL site. Most of these sites were classified as *Indeterminate Public Health Hazards*, so clear evidence of contaminants at exposure levels of concern in completed exposure pathways was lacking, often due to missing or incomplete data. IJC critical pollutants that were chemicals of concern at these sites and that may have contributed to human exposure and environmental burdens are lead (5 sites), PCBs (3 sites), and B(a)P (1 site). The IJC critical pollutants were found in soil on-site, and lead was also found in groundwater. Non-IJC contaminants of concern were VOCs in groundwater (2 sites) and cyanide in groundwater (1 site). The five NPL sites have been remediated or are under remediation. For these sites, the possibility of human exposure and environmental migration of contaminants is being mitigated.

The remaining site, a proposed NPL site (U.S. Smelter and Lead Refinery, Inc.) has not yet been remediated. The site has discharged lead and other metals into a nearby wetland and the Grand Calumet River, and lead into air, while it was operating as a smelter (from the early 1900s through 1985). Lead remains in soil, sediment, and wastes on-site. Soil at a nearby industrial facility and in residential areas near the site is also contaminated with lead. The site is to be addressed through a long-term remedial action that involves cleanup of the entire site. In the meantime, EPA has concluded that the site poses no immediate threat to the health and safety of the nearby population.

Public health outcome data, available for two of the sites in Lake County, IN, generally did not indicate elevated incidences of cancer (for a site associated with VOCs and lead) or on blood lead levels in children (for the U.S. Smelter and Lead Refinery site). The blood lead study, however, did not provide adequate detail for ATSDR evaluation.

Seven of the sites in Cook County are non-NPL sites. The eighth site was removed from the NPL post SARA. These sites tended to be abandoned industrial sites. The IJC critical pollutant B(a)P was present in a completed exposure pathway (incidental soil ingestion) in a nearby residential neighborhood for one site, but was present at levels of concern only on four properties. The IJC critical pollutant lead was in completed or potential completed exposure pathways at levels of concern for four sites, either in on-site waste piles (one site), or soil, and possibly migrating off-site for one site. Two of the four sites associated with IJC critical pollutants have been or are being remediated, one (Estech General Chemical Co., contaminated with lead in soil) has not, and one has been removed from the NPL post SARA, indicating that it does not pose a health threat. Three sites did not involve IJC critical pollutants

Public health outcome data, available only for the lead-contaminated West Pullman Iron & Metal site in Cook County, indicated that the site may have been associated with lead poisoning in a few workers and visitors on-site during demolition and salvage activities. A subsequent mass blood screening of 599 residents in 1986, however, did not indicate an impact of the site. Blood lead screening of 8 children in the neighborhood in 1996 revealed that all had blood lead levels below 10µg/dL.

Issues for Follow-Up

The two sites listed above as not yet remediated may need follow up to determine progress toward mitigation of human and environmental exposure. These sites are:

- U.S. Smelter and Lead Refinery, Inc., Lake County, IN
- Estech General Chemical Co, Cook County, IL

5.3.4.2 TRI Data

The TRI on-site chemical releases for Lake County, IN, and Cook County, IL (combined) in 2001 were 24,461,209 pounds, with the highest releases to air and land, and fairly high releases to surface water as well. Lake County accounted for 71% and Cook County accounted for 29% of the total on-site releases.

Of the total on-site releases, 429,097 pounds (1.8%) were IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (mostly to surface water and land), mercury compounds (primarily to air), and hexachlorobenzene (to air).

The major release ($\geq 500,000$ pounds) of non-IJC chemicals was of zinc compounds (mainly to air and land and also to surface water). The next largest releases of non-IJC chemicals, in the range of 300,000-499,999 pounds, were of manganese compounds and nitrate compounds (primarily to air).

5.3.4.3 County Demographics and Health Status Indicators

Vulnerable populations in Lake County, IN, totaled 216,660 and in Cook County, IL, totaled 2,409,537. Most of the infant mortality, birth measure, and death measure health status indicators for both Lake County and Cook County compared unfavorably with both the U.S. indicators and with the median of the peer county indicators, and a few were higher than the upper limit of the peer county range (death measures for Lake County and infant mortality and prematurity for Cook County). The most striking increase was in the homicide rate, which was 3-4 times higher in Lake County, IN, than in the U.S. as a whole and than the upper end of the peer county range.

**Table 5-11. Waste Site Contaminants that Exceeded Health-Based Screening Values
Grand Calumet AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						Total
			Air	Biota	Human Material	Other Media	Soil	Water	
053469-21-9	AROCLOR 1242	1					2		2
012672-29-6	AROCLOR 1248	1					1	2	3
011097-69-1	AROCLOR 1254	1				1	1		2
001336-36-3	POLYCHLORINATED BIPHENYLS	1				4	13	4	21
000050-32-8	BENZO(A)PYRENE	4				2	12	1	15
HZ1500-50-T	BENZO(A)PYRENE EQUIVALENTS	4					1		1
000050-29-3	DDT, P,P'-	5					2		2
000060-57-1	DIELDRIN	6				1			1
007439-92-1	LEAD	8	5		3	13	41	23	85
007439-97-6	MERCURY	9					9	2	11
000118-74-1	HEXACHLOROBENZENE	11					2		2
		Total IJC	5	0	3	21	84	32	145
000071-55-6	1,1,1-TRICHLOROETHANE					2	4		6
000079-00-5	1,1,2-TRICHLOROETHANE					2	2		4
000075-34-3	1,1-DICHLOROETHANE							3	3
000107-06-2	1,2-DICHLOROETHANE							3	3
000156-59-2	1,2-DICHLOROETHENE, CIS-					1			1
000156-60-5	1,2-DICHLOROETHENE, TRANS-							2	2
000090-12-0	1-METHYLNAPHTHALENE						2		2
000078-93-3	2-BUTANONE						4	9	13
000591-78-6	2-HEXANONE							3	3
000091-57-6	2-METHYLNAPHTHALENE						6		6
000083-32-9	ACENAPHTHENE						6		6
000208-96-8	ACENAPHTHYLENE						4		4
000067-64-1	ACETONE						5	3	8
007429-90-5	ALUMINIUM						2	2	4
000120-12-7	ANTHRACENE						6		6
007440-36-0	ANTIMONY						3	3	8
007440-38-2	ARSENIC						6	14	30
001332-21-4	ASBESTOS		1				1		3
068919-24-4	BAGHOUSE DUST (LIME)		2						2
007440-39-3	BARIUM						3	7	16
000071-43-2	BENZENE						4	8	25
000056-55-3	BENZO(A)ANTHRACENE						2	8	10
000205-99-2	BENZO(B)FLUORANTHENE						2	8	10
000191-24-2	BENZO(GHI)PERYLENE						1	10	11
000207-08-9	BENZO(K)FLUORANTHENE						2	6	8
007440-41-7	BERYLLIUM						1		1
007440-42-8	BORON							2	2
HZ1000-21-T	BTEX						1		1
000085-68-7	BUTYL BENZYL PHTHALATE						2	1	3
007440-43-9	CADMIUM						5	13	27
000086-74-8	CARBAZOLE							6	6
000124-38-9	CARBON DIOXIDE		2				1		3
000056-23-5	CARBON TETRACHLORIDE						2		2
000057-74-9	CHLORDANE							1	1
016887-00-6	CHLORIDE							2	4
HZ2100-12-T	CHLORIDES							1	1
068411-72-3	CHLORINATED ETHANE DERIVATIVES						1		1
000108-90-7	CHLOROENZENE						3		3
000075-00-3	CHLOROETHANE							2	2
000067-66-3	CHLOROFORM						4	1	5
007440-47-3	CHROMIUM						7	7	28
015723-28-1	CHROMIUM(IV)						2	1	3
000218-01-9	CHRYSENE						2	10	12
012001-29-5	CHRYSOTILE ASBESTOS		1				1		2
HZ9900-08-T	COMBUSTIBLE GAS		1						1

**Table 5-11. Waste Site Contaminants that Exceeded Health-Based Screening Values
Grand Calumet AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						Total
			Air	Biota	Human Material	Other Media	Soil	Water	
007440-50-8	COPPER						3	2	5
000057-12-5	CYANIDE						3	12	15
000117-81-7	DI(2-ETHYLHEXYL)PHTHALATE					1	2	1	4
000053-70-3	DIBENZO(A,H)ANTHRACENE					1	6		7
000084-66-2	DIETHYL PHTHALATE						2		2
000084-74-2	DI-N-BUTYL PHTHALATE						4		4
000117-84-0	DI-N-OCTYL PHTHALATE						2		2
HZ0400-05-T	DIOXINS N.O.S.						1		1
HZ2100-01-T	DISSOLVED SOLIDS							1	1
000072-20-8	ENDRIN					1			1
000100-41-4	ETHYLBENZENE					3	6	4	13
000206-44-0	FLUORANTHENE					1	10		11
000086-73-7	FLUORENE						6		6
016984-48-8	FLUORIDE ION							1	1
HZ0500-03-T	FURANS, UNSPECIFIED						1		1
HZ0900-02-T	HEAVY METALS, UNSPECIFIED						3	2	5
000076-44-8	HEPTACHLOR							1	1
001024-57-3	HEPTACHLOR EPOXIDE					1			1
000193-39-5	INDENO(1,2,3-CD)PYRENE						10		10
HZ0900-18-T	INORGANICS, N.O.S.							1	1
007439-89-6	IRON							2	2
HZ0300-01-T	KETONES						1		1
007439-93-2	LITHIUM							1	1
007439-95-4	MAGNESIUM							1	1
007439-96-5	MANGANESE					3	4	9	16
HZ0900-01-T	METALS N.O.S.						2	1	3
000074-82-8	METHANE					1			1
000108-10-1	METHYL ISOBUTYL KETONE						2	4	6
000075-09-2	METHYLENE CHLORIDE					1	2	4	7
000091-20-3	NAPHTHALENE					2	7		9
007440-02-0	NICKEL					1	4	5	10
000086-30-6	N-NITROSODIPHENYLAMINE						3		3
HZ0600-01-T	OIL/GREASE, UNSPECIFIED							1	1
007782-44-7	OXYGEN		2						2
HZ2100-16-T	PARTICULATES		1						1
HZ1200-01-T	PESTICIDES N.O.S.						2	1	3
000085-01-8	PHENANTHRENE						10		10
000108-95-2	PHENOL						1		1
064743-03-9	PHENOLICS						4		4
HZ1700-23-T	PLASTICIZERS						1		1
130498-29-2	POLYCYCLIC AROMATIC HYDROCARBONS						8	1	9
007440-09-7	POTASSIUM							1	1
000129-00-0	PYRENE					1	8		9
007782-49-2	SELENIUM					3		2	5
007440-22-4	SILVER						1	2	3
007440-23-5	SODIUM							11	11
014808-79-8	SULFATE							1	1
018496-25-8	SULFIDE							1	1
000127-18-4	TETRACHLOROETHYLENE					2	5	2	9
000108-88-3	TOLUENE					7	9	6	22
000079-01-6	TRICHLOROETHYLENE					4	9	4	17
007440-33-7	TUNGSTEN					2			2
007440-62-2	VANADIUM					1	3		4
000075-01-4	VINYL CHLORIDE					1		3	4
HZ1900-01-T	VOLATILE ORGANIC COMPOUNDS N.O.S.					1	3	2	6
001330-20-7	XYLENES, TOTAL					7	8	4	19
007440-65-5	YTTRIUM					2			2
007440-66-6	ZINC					1	6	1	8
000132-64-9	DIBENZOFURAN					1	6		7

**Table 5-11. Waste Site Contaminants that Exceeded Health-Based Screening Values
Grand Calumet AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						
			Air	Biota	Human Material	Other Media	Soil	Water	Total
MEDEXP-00-0 PENDING	PARANITROPHENOL (PNP)		4	7		6	23	28	68
			3			5	10	4	22
		Total Non-IJC	17	7	0	109	359	216	708
		Total	22	7	3	130	443	248	853

Table 5-12. TRI Releases (in pounds, 2001) for the Grand Calumet AOC

Chemical	IJC Tracking Number	Total Air Emissions	Surface Water Discharges	Under-ground Injection	Releases to Land	Total On-site Releases	Total Off-site Releases	Total On-and Off-site Releases
DIOXIN AND DIOXIN-LIKE COMPOUNDS (PCDDs and PCDFs)	2 3	0.027505039	0	0	0	0.027505039	0.3506391	0.378144139
LEAD	8	5994.0842	1	0	15	6010.0842	51657.985	57668.0692
LEAD COMPOUNDS	8	14938.321	254613.3562	0	151737	421288.6772	676231.35	1097520.027
MERCURY	9	29.2	0	0	0	29.2	6.12	35.32
MERCURY COMPOUNDS	9	1617.1	114.2	0	33	1764.3	48503.1	50267.4
HEXACHLOROBENZENE	11	4.85	0	0	0	4.85	0	4.85
Total IJC		22583.58271	254728.5562	0	151785	429097.1389	776398.9056	1205496.045
1,1-DICHLORO-1-FLUOROETHANE		126804	0	0	0	126804	28293	155097
1,2,4-TRIMETHYLBENZENE		103406	10	0	265	103681	1856	105537
1,3-BUTADIENE		445	0	0	0	445	0	445
2,4-D		2	0	0	0	2	0	2
2-ETHOXYETHANOL		1649	0	0	0	1649	0	1649
3-IODO-2-PROPYNYL BUTYL CARBAMATE		0	0	0	0	0	750	750
4,4'-ISOPROPYLIDENEDIPHENOL		986	0	0	0	986	82078	83064
4,4'-METHYLENEDIANILINE		60	0	0	0	60	330	390
ACETONITRILE		178	0	0	0	178	0	178
ACETOPHENONE		3350	0	0	0	3350	0	3350
ACRYLAMIDE		3	0	0	0	3	0	3
ACRYLIC ACID		1073	0	0	0	1073	0	1073
ACRYLONITRILE		150	0	0	0	150	0	150
ALUMINIUM (FUME OR DUST)		22422	0	0	0	22422	506898	529320
AMMONIA		523345	22306	0	7400	553051	1260017	1813068
ANILINE		1006	0	0	0	1006	128275	129281
ANTHRACENE		2144	4900	0	1	7045	5449	12494
ANTIMONY COMPOUNDS		527	584	0	26000	27111	2747	29858
ARSENIC COMPOUNDS		111	571	0	8900	9582	97836	107418
ASBESTOS (FRIABLE)		250	0	0	0	250	116790	117040
BARIUM COMPOUNDS		34654	8060	0	261807	304521	975017	1279538
BENZENE		96686	456	0	3405	100547	1138	101685
BENZO(G,H,I)PERYLENE		716.59	21	0	0	737.59	955.98	1693.57
BENZYL CHLORIDE		6	0	0	0	6	0	6
BIPHENYL		671	0	0	0	671	0	671
BROMINE		59	0	0	0	59	0	59
BUTYL ACRYLATE		883	0	0	0	883	72	955
CADMIUM COMPOUNDS		401	38	0	14000	14439	24260	38699
CARBON DISULFIDE		45	0	0	0	45	0	45
CARBON TETRACHLORIDE		472	0	0	0	472	0	472
CARBONYL SULFIDE		26000	0	0	0	26000	0	26000
CERTAIN GLYCOL ETHERS		1089731	0	0	0	1089731	35786	1125517
CHLORINE		10920	0.06	0	0	10920.06	1900	12820.06
CHLOROBENZENE		92	0	0	0	92	3	95
CHLOROFORM		27	0	0	0	27	0	27
CHLOROMETHANE		28800	0	0	3	28803	3	28806
CHROMIUM		13910	5	0	0	13915	48435	62350
CHROMIUM COMPOUNDS (EXCEPT CHROMITE ORE MINED IN THE TRANSVAAL REGION)		9485	4994	0	140250	154729	1293761	1448490
COBALT		5	0	0	0	5	0	5
COBALT COMPOUNDS		45	0	0	0	45	2312	2357
COPPER		11720	0	0	5005	16725	76427	93152
COPPER COMPOUNDS		19810	2327	0	46000	68137	806200	874337
CREOSOTE		44587	0	0	0	44587	0	44587
CRESOL (MIXED ISOMERS)		2397	0	0	0	2397	0	2397
CUMENE		95068	10	0	0	95078	0	95078
CUMENE HYDROPEROXIDE		250	0	0	0	250	0	250
CYANIDE COMPOUNDS		12900	14632	0	5100	32632	2823	35455
CYCLOHEXANE		14725	0	0	1900	16625	27	16652
DI(2-ETHYLHEXYL) PHTHALATE		2596	5	0	0	2601	15984	18585
DIBENZOFURAN		1024	0	0	0	1024	3368	4392
DIBUTYL PHTHALATE		1038	0	0	0	1038	0	1038
DICHLOROMETHANE		31031	0	0	0	31031	89	31120

Table 5-12. TRI Releases (in pounds, 2001) for the Grand Calumet AOC

Chemical	JC Tracking Number	Total Air Emissions	Surface Water Discharges	Under-ground Injection	Releases to Land	Total On-site Releases	Total Off-site Releases	Total On- and Off-site Releases
DIETHANOLAMINE		8707	0	0	0	8707	250	8957
DIISOCYANATES		1010	0	0	0	1010	1683	2693
DIMETHYL PHTHALATE		1500	0	0	0	1500	0	1500
DIMETHYL SULFATE		15	0	0	0	15	0	15
DIMETHYLAMINE		432	0	0	0	432	0	432
EPICHLOROHYDRIN		1	0	0	0	1	0	1
ETHYL ACRYLATE		2076	0	0	0	2076	4	2080
ETHYLBENZENE		79625	157	0	0	79782	891	80673
ETHYLENE		226324	0	0	0	226324	0	226324
ETHYLENE GLYCOL		34999	10	0	250	35259	51568	86827
ETHYLENE OXIDE		555	0	0	0	555	0	555
FORMALDEHYDE		4238	0	0	0	4238	0	4238
FORMIC ACID		55	0	0	0	55	0	55
HYDROCHLORIC ACID (1995 AND AFTER 'ACID AEROSOLS' ONLY)		1003176	0	0	0	1003176	0	1003176
HYDROGEN CYANIDE		819	0	0	0	819	0	819
HYDROGEN FLUORIDE		227983	0	0	0	227983	7110	235093
HYDROQUINONE		11	0	0	0	11	0	11
MALEIC ANHYDRIDE		49563	0	0	0	49563	0	49563
MANGANESE		28341	5	0	0	28346	32999	61345
MANGANESE COMPOUNDS		70472	25554	0	4211575	4307601	1893528	6201129
M-CRESOL		10	0	0	0	10	250	260
MECOPROP		5	0	0	0	5	0	5
METHANOL		122239	5	0	0	122244	1551	123795
METHOXONE		1	0	0	0	1	0	1
METHOXYCHLOR		2	0	0	0	2	0	2
METHYL ETHYL KETONE		403610	5	0	2	403617	113779	517396
METHYL ISOBUTYL KETONE		176323	0	0	0	176323	1088	177411
METHYL METHACRYLATE		3583	0	0	0	3583	18	3601
METHYL TERT-BUTYL ETHER		14604	0	0	0	14604	0	14604
MIXTURE		8731	0	0	0	8731	0	8731
MOLYBDENUM TRIOXIDE		1999	965	0	40000	42964	150765	193729
M-XYLENE		6378	0	0	0	6378	0	6378
N,N-DIMETHYLFORMAMIDE		20	0	0	0	20	0	20
NAPHTHALENE		110270	264	0	5	110539	21526	132065
N-BUTYL ALCOHOL		361485	0	0	0	361485	0	361485
N-HEXANE		868096	18	0	220	868334	75	868409
NICKEL		4181	5	0	0	4186	5801	9987
NICKEL COMPOUNDS		5417	2760	0	17000	25177	253018	278195
NICOTINE AND SALTS		70	0	0	0	70	22062	22132
NITRATE COMPOUNDS		2771	3256484	0	18560	3277815	3301	3281116
NITRIC ACID		27764	0	0	0	27764	172173	199937
N-METHYL-2-PYRROLIDONE		24698	0	0	0	24698	1436	26134
O-CRESOL		1300	0	0	0	1300	250	1550
O-XYLENE		8248	0	0	0	8248	0	8248
P-CHLOROANILINE		30	0	0	0	30	0	30
P-CRESOL		1500	0	0	0	1500	10000	11500
PERCHLOROMETHYL MERCAPTAN		42	0	0	0	42	0	42
PHENANTHRENE		3992	81	0	3770	7843	841	8684
PHENOL		59974	5423	0	5	65402	1000	66402
PHTHALIC ANHYDRIDE		46920	0	0	0	46920	934621	981541
POLYCHLORINATED ALKANES		505	0	0	0	505	0	505
POLYCYCLIC AROMATIC COMPOUNDS		5199.94	68	0	2114	7381.94	14968.7494	22350.6894
PROPYLENE		161518	0	0	0	161518	0	161518
PROPYLENE OXIDE		5003	0	0	0	5003	0	5003
PYRIDINE		39	0	0	0	39	0	39
QUINOLINE		275	0	0	0	275	0	275
SEC-BUTYL ALCOHOL		77645	0	0	0	77645	3	77648
SELENIUM COMPOUNDS		45	420	0	630	1095	1157	2252
SILVER		250	0	0	0	250	265	515
SILVER COMPOUNDS		255	0	0	0	255	5	260
SODIUM DIMETHYLDITHIO-CARBAMATE		20	0	0	0	20	12000	12020
SODIUM NITRITE		4125	0	0	0	4125	21300	25425
STYRENE		122567	230	0	0	122797	221269	344066

Table 5-12. TRI Releases (in pounds, 2001) for the Grand Calumet AOC

Chemical	IJC Tracking Number	Total Air Emissions	Surface Water Discharges	Under- ground Injection	Releases to Land	Total On- site Releases	Total Off- site Releases	Total On- and Off-site Releases
SULFURIC ACID (1994 AND AFTER 'ACID AEROSOLS' ONLY)		715591	0	0	0	715591	0	715591
TERT-BUTYL ALCOHOL		3510	0	0	0	3510	0	3510
TETRABROMOBIS PHENOL A		178	0	0	0	178	0	178
TETRACHLORO-ETHYLENE		31117	5	0	0	31122	697	31819
THALLIUM COMPOUNDS		538	100	0	59000	59638	1150	60788
TOLUENE		538875	266	0	69	539210	58446	597656
TOLUENE DIISOCYANATE (MIXED ISOMERS)		5	0	0	0	5	0	5
TRICHLOROETHYLENE		297447	0	0	0	297447	4592	302039
TRIETHYLAMINE		9	0	0	0	9	0	9
VANADIUM COMPOUNDS		2997	2	0	112867	115866	67948	183814
VINYL ACETATE		3652	0	0	0	3652	251	3903
XYLENE (MIXED ISOMERS)		655056	15	0	36	655107	18151	673258
ZINC (FUME OR DUST)		77686	0	0	37815	115501	55897	171398
ZINC COMPOUNDS		342126	1067332	0	5200000	6609458	7834523	14443981
	Total Non-IJC	9389064.53	4419093.06	0	10223954	24032111.59	17514090.73	41546202.32
	Total	9411648.113	4673821.616	0	10375739	24461208.73	18290489.64	42751698.36

Table 5-13. TRI Facilities Releasing IJC Critical Pollutants On-site for the Grand Calumet AOC

IJC Critical Pollutant	Number of Facilities	Facility Name	TRIF ID	City
Dioxin and dioxin-like compounds (PCDDs and PCDFs)	15			
Cook County, IL	7	CORN PRODS. ARGO PLANT CRAWFORD GENERATING STATION EDISON INTL. FISK GENERATING STATION HORSEHEAD RESOURCE DEVELOPMENT CO. INC. IMCO RECYCLING OF ILLINOIS INTAC AUTOMOTIVE PRODS. INC. MARBLEHEAD LIME INC. SOUTH CHICAGO PLANT	60501CRNPR6400A 60623CRWFR3501S 60608FSKGN1111W 60617HRSHD2701E 60411CLMBL400EA 60439NTCTM15550 60617MRBLH3245E	BEDFORD PARK CHICAGO CHICAGO CHICAGO CHICAGO HEIGHTS LEMONT CHICAGO
Lake County, IN	8	BP PRODS. N.A. WHITING BUSINESS UNIT D. H. MITCHELL GENERATING STATION ISPAT INLAND INC. LTV STEEL CO. MARBLEHEAD LIME INC. BUFFINGTON PLANT RHODIA INC. STATE LINE GENERATING L.L.C. USS GARY WORKS	46394MCLC 2815I 46401NRTHRCLARK 46312NLNDS3210W 46312LTVST3001D 46402MRBLHCLARK 46320STFFR2000M 46320STTLN103ST 46402SSGRYONENO	WHITING GARY EAST CHICAGO EAST CHICAGO GARY HAMMOND HAMMOND GARY
Lead and lead compounds	91			
Cook County, IL	75	AALLIED DIE CASTING CO. OF IL ACME PACKAGING CORP. RIVERDALE FACILITY ACME STEEL CO. FURNACE PLANT ACME STEEL CO. RIVERDALE PLANT ADHERON COATINGS CORP. ALLIED HASTINGS BARREL & DRUM SVC. ALLIED METAL CO. ALLIED METAL CO. AMES METAL PRODS. CO. AMITRON CORP. AMPEL INC. ANDERSON DIE CASTINGS ANDERSON DIE CASTINGS CALLEN MFG. CORP. CALUMET BRASS FNDY. INC. CALUMET STEEL CO. CASTLE METAL FINISHING CHICAGO EXTRUDED METALS CO. CHICAGO FAUCET CO. CID RECYCLING & DISPOSAL FACILITY CORN PRODS. ARGO PLANT CRAFTSMAN PLATING & TINNING CORP. CRAWFORD GENERATING STATION CULLIGAN INTL. CO. DU PONT CHICAGO REFINISHING SERVICE CENTER EASTMAN CHEMICALS ACCURATE DISPERSIONS DIV. EDISON INTL. FISK GENERATING STATION ELECTROMOTIVE LAGRANGE ENVIRITE OF ILLINOIS INC.	60131LLDCC3021C 60627CMPCK13500 60617CMSTL10730 60627CMSTL13500 60452DHRNC16420 60609LLDHS915W3 60616LLDMT2059S 60651LLDMT4528W 60609MSMTL4323S 60007MTRNC2001L 60007MPLNC925ES 60007NDRSN901CH 60090NDRSN1720S 60164CLLNM13ELA 60419CLMTB14610 60411CLMTS317E1 60176CSTLM4631N 60650CHCGX1601S 60018THCHC2100S 60409CDRCY138TH 60501CRNPR6400A 60657CRFTS1239W 60623CRWFR3501S 60062CLLGN1CULL 60053DPNCT7828N 60473MCWHR192W1 60608FSKGN1111W 60525GMCLC9301W 60426NVRTF16435	FRANKLIN PARK RIVERDALE CHICAGO RIVERDALE OAK FOREST CHICAGO CHICAGO CHICAGO CHICAGO ELK GROVE VILLAGE ELK GROVE VILLAGE ELK GROVE VILLAGE ELK GROVE VILLAGE WHEELING NORTHLAKE DOLTON CHICAGO HEIGHTS SCHILLER PARK CICERO DES PLAINES CALUMET CITY BEDFORD PARK CHICAGO CHICAGO NORTHBROOK MORTON GROVE SOUTH HOLLAND CHICAGO MC COOK HARVEY

Table 5-13. TRI Facilities Releasing IJC Critical Pollutants On-site for the Grand Calumet AOC

IJC Critical Pollutant	Number of Facilities	Facility Name	TRIF ID	City
		EQUILON ENTERPRISES L.L.C. DES PLAINES TERMINAL	60005DSPLN1605A	ARLINGTON HEIGHTS
		FORD MOTOR CO. CHICAGO ASSEMBLY	60633FRDMT12600	CHICAGO
		G & W ELECTRIC CO.	60406GWLCT3500W	BLUE ISLAND
		GKN SINTER METALS	60471GKNSN22501	RIGHTON PARK
		GRIFFITH LABS. USA INC.	60658GRFFT12200	ALSIP
		H. KRAMER & CO.	60608HKRMR1359W	CHICAGO
		HOLCIM (US) INC.	60617HLNMN3020E	CHICAGO
		HORSEHEAD RESOURCE DEVELOPMENT CO. INC.	60617HRSHD2701E	CHICAGO
		IMCO RECYCLING OF ILLINOIS	60411CLMBL400EA	CHICAGO HEIGHTS
		IMPERIAL ZINC CORP.	60628MPRLS10316	CHICAGO
		INLAND DIE CASTING	60090NLNDD161CA	WHEELING
		ITT BELL & GOSSETT	60053TTBLL8200N	MORTON GROVE
		JONAS ENTS. INC.	60644JNSNT21NOR	CHICAGO
		JOSLYN MFG. CO.	60609JSLYN3700S	CHICAGO
		KESTER SOLDER	60018KSTRS515EA	DES PLAINES
		LITTELFUSE INC.	60016LTTLF800EA	DES PLAINES
		MANUFACTURERS' SERVICE LTD.	60056MLTGR1800W	MOUNT PROSPECT
		METALDYNE	60648DPGDC6119W	NILES
		MIDWAY WIRE INC.	60632MDWYW4630W	CHICAGO
		MOTOROLA	60196MTRLN1301E	SCHAUMBURG
		MPC PRODS. CORP.	60714MPCPR5600W	NILES
		NATIONAL CASTINGS INC.	60650NTNLC1400S	CICERO
		NATIONAL TECH. INC.	60008NTLTC1101C	ROLLING MEADOWS
		NAZDAR CHICAGO	60622NZDRC1087N	CHICAGO
		NOBERT PLATING	60607NBRT340NO	CHICAGO
		NOBERT PLATING	60651NBRT1445N	CHICAGO
		NORTHORP GRUMMAN SYS.	60008NRTHR600HI	ROLLING MEADOWS
		NUART	60638NRT 6247W	BEDFORD PARK
		PERFECTION PLATING INC.	60007PRFCT775MO	ELK GROVE VILLAGE
		PHELPS DODGE CHICAGO ROD INC.	60623MGMC2324S	CHICAGO
		PLASTICS COLOR CORP. OF IL	60409PLSTC142EA	CALUMET CITY
		PRECISION PLATING CO. INC.	60646PRCSN4123W	CHICAGO
		PRECOAT METALS	60632PRCTM4800S	CHICAGO
		R. S. OWENS & CO.	60630RSWNS55214	CHICAGO
		REPUBLIC TECHS. INTL. HARVEY CFB	60426BLSSL281E1	HARVEY
		S & C ELECTRIC CO.	60626SCLCT6601N	CHICAGO
		SAINT-GOBAIN CONTAINERS	60419BLLGL13850	DOLTON
		SCIENTIFIC PLATING CO. INC.	60614SCNTF2073N	CHICAGO
		SHERWIN-WILLIAMS CO.	60628SHRWN11541	CHICAGO
		SIGNODE	60455SGNDC7701W	BRIDGEVIEW
		SIPI METALS CORP.	60622SPMTL1720E	CHICAGO
		SPRAYLAT CORP.	60633SPRYL1701E	CHICAGO
		TEMPERBENT GLASS L.P.	60803RDCNC12400	ALSIP
		UNITED REFINING & SMELTING CO.	60131NTDRF3700N	FRANKLIN PARK
		UNITY MFG.	60610NTYMF1260N	CHICAGO
		WHEATLAND TUBE CO. CHICAGO DIV.	60609MNLYL4435S	CHICAGO
Lake County, IN	16	BP PRODS. N.A. WHITING BUSINESS UNIT	46394MCLC 2815I	WHITING
		D. H. MITCHELL GENERATING STATION	46401NRTHRCLARK	GARY
		HAMMOND GROUP INC. HALSTAB DIV.	46323HMMND3100M	HAMMOND
		HAMMOND LEAD PRODS. HALOX	46323HMMND2308I	HAMMOND
		HAMMOND EXPANDERS DIVI.	46312NDNHR3210W	EAST CHICAGO
		INDIANA HARBOR COKE CO. L.P.	46312NLNDS3210W	EAST CHICAGO
		ISPAT INLAND INC.	46312LTVST3001D	EAST CHICAGO
		LTV STEEL CO.	46312NTNLB5222I	EAST CHICAGO
		NATIONAL BRIQUETTE CORP.	46312NTNLB5222I	EAST CHICAGO

Table 5-13. TRI Facilities Releasing IJC Critical Pollutants On-site for the Grand Calumet AOC

IJC Critical Pollutant	Number of Facilities	Facility Name	TRIF ID	City
		ONE SHOT L.L.C.	46406CNSMR5300W	GARY
		REPUBLIC TECHS. INTL. GARY 7TH AVENUE	46403RPBLC4000E	GARY
		REPUBLIC TECHS. INTL. GARY DUNES	46401GRYCL2800E	GARY
		RHODIA INC.	46320STFFR2000M	HAMMOND
		SAFETY-KLEEN OIL RECOVERY CO.	46312SFTYK601RI	EAST CHICAGO
		STATE LINE GENERATING L.L.C.	46320STTLN103ST	HAMMOND
		U.S. GYPSUM CO.	46312SGYPS3501C	EAST CHICAGO
		USS GARY WORKS	46402SSGRYONENO	GARY
Mercury and mercury compounds	15			
Cook County, IL	5	MARBLEHEAD LIME INC. SOUTH CHICAGO PLANT	60617MRBLH3245E	CHICAGO
		CORN PRODS. ARGO PLANT	60501CRNPR6400A	BEDFORD PARK
		EDISON INTL. FISK GENERATING STATION	60608FSKGN1111W	CHICAGO
		CRAWFORD GENERATING STATION	60623CRWFR3501S	CHICAGO
		HORSEHEAD RESOURCE DEVELOPMENT CO. INC.	60617HRSHD2701E	CHICAGO
Lake County, IN	10	BP PRODS. N.A. WHITING BUSINESS UNIT	46394MCLC 2815I	WHITING
		D. H. MITCHELL GENERATING STATION	46401NRTHRCLARK	GARY
		INDIANA HARBOR COKE CO. L.P.	46312NDNHR3210W	EAST CHICAGO
		ISPAT INLAND INC.	46312NLNDS3210W	EAST CHICAGO
		LTV STEEL CO.	46312LTVST3001D	EAST CHICAGO
		MARBLEHEAD LIME INC. BUFFINGTON PLANT	46402MRBLHCLARK	GARY
		RHODIA INC.	46320STFFR2000M	HAMMOND
		STATE LINE GENERATING L.L.C.	46320STTLN103ST	HAMMOND
		U.S. GYPSUM CO.	46312SGYPS3501C	EAST CHICAGO
		USS GARY WORKS	46402SSGRYONENO	GARY
Hexachlorobenzene	2			
Lake County, IN	2	ISPAT INLAND INC.	46312NLNDS3210W	EAST CHICAGO
		LTV STEEL CO.	46312LTVST3001D	EAST CHICAGO

5.4 WAUKEGAN HARBOR AOC, LAKE COUNTY, IL

The Waukegan Harbor AOC is located in Lake County, IL, on the west shore of Lake Michigan. A natural inlet and portions of adjacent wetlands were filled to form the harbor in its present form. Waukegan Harbor includes approximately 1.2 km² of industrial, commercial, municipal, and open or vacant lands. An Expanded Study Area was added in order to investigate additional concerns of the citizens. The watershed of the Waukegan expanded study area contains the Waukegan River drainage basin, the North Ditch drainage basin, and other near shore areas that drain to Lake Michigan. (See AOC map in the appendix.)

5.4.1 Hazardous Waste Sites Relevant to the Waukegan Harbor AOC

ATSDR has evaluated the data for hazardous waste sites in Lake County, IL, and reached conclusions regarding the public health threat posed by these sites. These conclusions, along with information regarding the type and location of the site, and the date and type of assessment document, are summarized in Table 5-15 for the sites that had public health hazard categories of 1-3 at some point during their assessment history, and all NPL sites.

Table 5-15. Hazardous Waste Sites in Lake County, IL

Site Name	Public Health Hazard Category	EPA NPL Status	Site ID	City
Diamond Scrap Yard	2 (2001 HC)	Non NPL	IL0001093509	Waukegan
H.O.D. Landfill	3 (1989 HA) 5 (1998 HA) 4 (1999 HC)	Final	ILD980605836	Antioch
Johns-Manville Disposal Area	3 (1988 HA)	Final	ILD005443544	Waukegan
Outboard Marine Corp.	2 (1989 HA) 2 (1994 HA) 2 (n.d. SR)	Final	ILD000802827	Waukegan
Peterson Sand & Gravel	5 (1988 HA) 5 (n.d. SR) 5 (2002 HC)	Deleted Post SARA	ILD003817137	Libertyville
Precision Chrome, Inc.	2 (1998 HC)	Non NPL	ILD089062871	Fox Lake
Wauconda Sand & Gravel	5 (1988 HA) 4 (1995 HA)	Final	ILD047019732	Wauconda
Yeoman Creek Landfill	3 (1992 HA) 4 (1997 HA) 1 (1998 HC) 4 (2000 HC)	Final	ILD980500102	Waukegan

1 = Urgent Public Health Hazard, 2 = Public Health Hazard, 3 = Indeterminate Public Health Hazard, 4 = No Apparent Public Health Hazard, 5 = No Public Health Hazard
 HA = Public Health Assessment, HC = Health Consultation, SR = Site Review and Update
 n.d. = no date provided

For hazardous waste sites in Lake County, IL, that *at any time* had Public Health Hazard Categories of 1-3, the number of contaminant records in HazDat that exceeded health based-screening values was 1,218, as shown in Table 5-16. Most of the records were for the soil and water media groups; the air media group had the next highest number of records.

The IJC Great Lakes critical pollutants accounted for 152 (12%) of these records, with the majority for the soil media group. The IJC critical pollutants that have been found at Lake County, IL, hazardous waste sites at concentrations exceeding health-based screening values are: PCBs, B(a)P, DDT, dieldrin, lead, and mercury. Details are provided in Table 5-17.

Further evaluation of the data for the sites with Public Health Hazard Categories of 1-3 was conducted by ATSDR in the public health assessments and other health-related documents listed in the table. These evaluations are discussed in the following subsections.

5.4.1.1 Diamond Scrap Yard

This site is located about 250 feet from Lake Michigan in the city of Waukegan, Lake County, IL, and measures approximately 250 feet wide by 3,000 feet long. The Waukegan River flows through a culvert beneath the northern portion of the site into Lake Michigan. Operations at the scrap yard started in the 1930s, and included coal storage, car and drum scrapping, petroleum storage, wire and transformer burning, and iron and steel production. The site is no longer in operation. Information regarding this site is taken from the 2001 ATSDR health consultation for the site.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) for the trespassers exposed to contaminated soil while on the property.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutant lead was present in on-site surface soil at levels that might cause adverse health effects through incidental ingestion. Because individuals are reported to be living in an abandoned foundation on the site, contact with soil is likely. The IJC critical pollutants PCBs were found in on-site soil at levels greater than health-based screening values, but not at levels thought to cause adverse health effects. Monitoring of sediment from the Waukegan River did not indicate that chemicals have migrated from the site into the river. On-site groundwater contained lead above the action level for drinking water, but no one is using groundwater at the site, and private wells are upgradient of the site.

Demographics: The demographic profile for vulnerable populations living within 1 mile of this non-NPL site was not reported. The total population within a 1-mile radius of the site is 15,155 people.

Public Health Outcome Data: Not reported.

Conclusions: The Diamond Scrap Yard poses a health hazard for people currently living in an abandoned foundation on-site, due to elevated levels of lead in soil. Groundwater also is contaminated with lead, but is not in use. The direction of groundwater flow was not reported.

5.4.1.2 H.O.D. Landfill

This 51-acre former landfill is located in the village of Antioch, Lake County, IL, and is in a freshwater wetland. The site functioned as a sanitary landfill until 1988, but also accepted special permitted wastes

at about 2% of the total volume of wastes. These wastes included waste oils and chlorinated solvents, paint sludge, and metal-containing wastes. It was estimated that almost 87,000 drums of hazardous wastes had been disposed at the landfill. Liquid organic wastes also were reported to have been dumped there, and other hazardous chemicals were alleged to have been illegally disposed of at the site. A leachate collection system was installed, and the entire landfill was covered with a clay cap in 1984. Information regarding this site is taken from the 1998 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet for the site.

Category of Public Health Hazard: ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3) in a 1989 public health assessment (not provided for inclusion in this document). In the 1998 public health assessment, ATSDR concluded the site poses *No Public Health Hazard* (category 5). A 1999 ATSDR health consultation (not provided for inclusion in this document) reported that the site poses *No Apparent Public Health Hazard* (category 4).

Contaminants of Concern in Completed Exposure Pathways: None identified. IJC critical pollutants were not among the contaminants of concern for this site. In the past, contaminants in on-site groundwater included vinyl chloride, thallium, and sodium, which also migrated off-site to an Antioch municipal well. Thallium and sodium migrated to nearby private wells. Although levels in the municipal well were above MCLs or health-based criteria, ATSDR concluded that dilution during distribution would diminish levels delivered to the tap. Remedial activities include replacement of the contaminated municipal well, containment of contaminant migration through leachate and gas extraction, improvements to the cap, and groundwater-monitored natural attenuation. Long-term monitoring is in place.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	611
Females aged 15-44	1,397
Adults 65 and older	649

Public Health Outcome Data: No site-specific health outcome data were identified or generated that were considered appropriate for this site.

Conclusions: This site was not associated with the IJC critical pollutants. Vinyl chloride in groundwater that was migrating to a municipal well was the primary concern. The site has been remediated.

5.4.1.3 Johns-Manville Disposal Area

This site is located within the Waukegan Harbor Extended Study Area, in Waukegan, Lake County, IL. From 1922 through 1998, the Johns-Manville site produced a variety of building and other materials that contained asbestos, lead, chromium, thiram, and xylene. Waste materials containing these substances were dumped on-site. Approximately 3 million cubic yards of off-specification products and wastewater sludge have been estimated to be disposed of in the eastern area of the 300-acre property. Information regarding this site is taken from the 1988 ATSDR public health assessment and from the 2003 EPA NPL fact sheet for the site.

Category of Public Health Hazard: In 1988, ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3) because of the potential public health threat from exposure to asbestos and lead, if the public was allowed to access the site.

Contaminants of Concern in Completed Exposure Pathways: Not identified. Asbestos contamination of the site was extensive and particularly when airborne, could pose a threat to on-site workers and trespassers, as well as to recreational users of the nearby state park. Air sampling data, however, were not adequate to determine the potential public health threat. High lead levels in the topsoil could pose a threat to children playing on the site, but it is unclear whether children would access the site from the adjacent beach. Since the time of the 1988 health assessment, extensive clean up activities have occurred, including a 24-inch soil cover with vegetation over all dry waste areas, paving of parking lots contaminated with asbestos. Soil cover maintenance and groundwater monitoring continue at the site. Additional areas of asbestos contamination were discovered outside the fence line in 1998. One has been cleaned up, and the remaining contaminated sites are planned to be cleaned up.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	623
Females aged 15-44	1,220
Adults 65 and older	746

Public Health Outcome Data: Not reported.

Conclusions: The contaminant of greatest concern at this site was asbestos, which was disposed of on-site in very large quantities. Lead also was present in high concentrations in on-site soil. Whether completed exposure pathways were present is uncertain, and the site has been remediated by containment. Whether migration of lead off-site occurred is not known. Additional areas of asbestos contamination have been discovered off-site and are being remediated.

5.4.1.4 Outboard Marine Corp.

This site, located around the upper Waukegan Harbor area in Waukegan, Lake County, IL, consists of several areas contaminated by PCBs. From 1959 to 1972, the Outboard Marine Corp. purchased about 8.4 million pounds of PCB-containing hydraulic fluid. Some of this fluid leaked onto the floor, was discharged through floor drains into surface water. During the early 1970s, this facility was one of the major sources of PCBs discharging into Lake Michigan. Information regarding this site is taken from the 1994 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet for the site.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) in the 1989 and 1994 ATSDR public health assessments and in a subsequent ATSDR site review and update (not provided for inclusion in this document). The primary concern is that anglers and their families have probably been exposed and may continue to be exposed to PCBs at levels that could result in adverse health effects through the consumption of contaminated fish.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutants PCBs were released into the harbor in great quantities from this site, where they reside in sediment and bioaccumulate into fish. The Outboard Marine Corp. was one of the major sources of PCBs discharging into Waukegan Harbor/Lake Michigan. Concentrations of PCBs in fish from Waukegan Harbor are high

enough that they could result in adverse health effects in people who regularly eat or ate fish from the harbor. On-site soil is contaminated with PCBs, and groundwater is contaminated with chlorinated VOCs. Cleanup actions at the site include dredging of the harbor, on-site treatment of high concentration wastes, construction and operation of three on-site containment cells, consolidation of contaminated soils and sediments within the cells, installation of groundwater extraction wells in the cells to prevent the release of PCBs from the cells, and construction of on-site water treatment systems. Water extraction and treatment from the cells is estimated to be ongoing for an extended period. The Outboard Marine Corp. plant has been abandoned and also needs cleanup.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	2,183
Females aged 15-44	3,754
Adults 65 and older	1,103

Public Health Outcome Data: No health studies of people in the Waukegan Area were available as of ATSDR's 1994 assessment. An epidemiological study of Lake Michigan fish eaters was mentioned as being performed through the ATSDR Great Lakes Human Health Effects Research Program.

Conclusions: The Outboard Marine Corp. has contributed greatly to the environmental burden of and human exposure to PCBs. Cleanup of the site and the harbor sediments is underway.

5.4.1.5 Precision Chrome, Inc.

This approximately 3-acre site is located in the village of Fox Lake, Lake County IL, 7 miles south of the Illinois-Wisconsin border. Precision Chrome is engaged in the production of steel shafts for hydraulic equipment, which involves cutting, grinding, polishing, induction hardening, and chrome plating. Chromic acid generated by Precision Chrome is sent to a facility meeting requirements for handling hazardous waste that is reused. Spills at the facility have contaminated the environment. Information regarding this site is taken from the 1998 ATSDR health consultation for the site.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) because groundwater is contaminated at levels that would be expected to cause adverse health effects in exposed individuals.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutant lead, and also manganese and chromium(VI) have been detected in numerous groundwater monitoring well samples at levels that would be expected to cause adverse health effects. Chromium(VI) was the primary concern. There are private and public drinking water wells on and near the site that have not been adequately monitored to determine whether the site-related contaminants are present in these wells and at what concentrations. A groundwater extraction and containment system was installed in 1997. The extracted water was piped to the village sanitary sewer, but the system was shut down within about 3 months because the levels of chromium(VI) exceeded the sanitary sewer system permit.

Demographics: Not reported for this non-NPL site.

Public Health Outcome Data: Not reported.

Conclusions: Groundwater that is used as a source of drinking water is contaminated with lead, manganese, and chromium, including chromium(VI). Drinking water wells in the vicinity have not been monitored adequately, and no remedial activities were taking place at the time of the 1998 assessment by ATSDR.

5.4.1.6 Yeoman Creek Landfill

The Yeoman Creek Landfill covers about 49.2 acres in Waukegan, Lake County, IL. This landfill and the nearby 11.9-acre Edwards Field Landfill are considered together in the ATSDR assessment. The landfill history is not well documented; apparently some hazardous wastes including PCBs were dumped there, even though the landfills ostensibly were receiving landscape and demolition wastes, domestic garbage, and sludge. Surface runoff from the landfill is towards Yeoman's creek, which discharges into the Waukegan River. Information regarding this site is taken from the 1992 ATSDR interim public health assessment, 1997 ATSDR health assessment, 1998 ATSDR health consultation, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: ATSDR has assessed this site four times. The 1992 health assessment concluded that the site posed an *Indeterminate Public Health Hazard* because the limited information did not indicate that people have been exposed to contaminants at levels of public health concern, but significant data gaps existed. The 1997 health assessment concluded, on the basis of more complete data, that the site posed *No Apparent Public Health Hazard* because no exposure to contaminants at levels of health concern exists. The 1998 health consultation concluded that the infiltration of nearby buildings with potentially flammable or confirmed flammable levels of gases poses an *Urgent Public Health Hazard*, and the 2000 health consultation (not provided for inclusion in this document) concluded that the site poses *No Apparent Public Health Hazard*.

Contaminants of Concern in Completed Exposure Pathways: None. The 1992 health assessment noted the presence of the IJC critical pollutant PCBs, and also VOCs in groundwater. It was not known if these contaminants could reach private wells north of the site, and concentrations of contaminants in surface soil were unknown. The 1997 health assessment stated that the homes and businesses near the landfills use municipal water from Lake Michigan, rather than groundwater. Although a number of contaminants, including the IJC critical pollutants PCBs, dieldrin, and B(a)P exceeded health-based screening values on-site or in the sediments of Yeoman Creek, access to contaminated areas is restricted. Flammable gases and other chemicals were found in the basement of a building north of the site, but a ventilation system was installed to eliminate the explosive hazard. In 1998, however, ATSDR determined that the frequent presence of flammable levels of gases in the buildings near the northern side of the Yeoman Creek Landfill was an *Urgent Public Health Hazard* because of the possibility of fire or explosion. A landfill gas collection system was installed, and has not achieved compliance at all monitoring points. Remedial action at the site includes excavation of sediments, reconstruction of Yeoman Creek, waste consolidation, monitored natural attenuation, and a multi-layer final landfill cover. Remedial activities are anticipated to continue through spring 2004.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	4,745
Females aged 15-44	8,346
Adults 65 and older	3,219

Public Health Outcome Data: No health studies of people around the landfills have been conducted. Because no significant exposures to site-related contaminants have been documented, no health studies are considered warranted.

Conclusions: A primary public health concern for this site is the migration of flammable gasses into nearby buildings. The primary environmental concern is migration of PCBs into Yeoman's Creek. These concerns are being addressed by remedial activities, which are not expected to be complete until 2004.

5.4.2 TRI Data for the Waukegan Harbor AOC

The TRI on-site chemical releases for Lake County, IL, are summarized in Table 5-17. Total on-site releases in 2001 were 724,859 pounds, the majority of which were released to air.

Only 4,624 pounds (0.6%) of the total on-site releases were IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (to air and surface water), and mercury compounds (primarily to air). The facilities that released these pollutants are listed in Table 5-18.

The largest on-site release of non-IJC chemicals, in the range of 150,000-299,999 pounds, was of hydrochloric acid aerosols (to air). All other releases were <150,000 pounds.

5.4.3 County Demographics and Health Status Data for the Waukegan Harbor AOC

The demographic profiles, from the 2000 U.S. Census, for vulnerable populations living in Lake County, IL, are as follows:

Children 6 years and younger	75,277
Females aged 15-44	140,790
Adults 65 years and older	54,986

According to the 2000 HRSA community health status reports, health status indicators that compared unfavorably with those of the U.S. and also with the median of the peer counties for Lake County, IL, were as follows (none were above the upper limit of the peer county range):

- Infant mortality (per 1,000 births)
 - none
- Birth measures (as percent)
 - no care in first trimester
- Death measures (per 100,000 population)
 - breast cancer (female)
 - colon cancer
 - lung cancer
 - stroke

5.4.4 Summary and Conclusions for the Waukegan Harbor AOC

5.4.4.1 Hazardous Waste Sites

Six hazardous waste sites in Lake County, IL, ever were categorized by ATSDR in public health hazard categories 1-3. Two of these sites have been remediated. Two are under remediation, and the remaining two are not being remediated, according to the available information.

The IJC critical pollutants PCBs were released into the environment by two sites, the Outboard Marine Corp. and the Yeoman Creek Landfill. The Outboard Marine Corp. reportedly was one of the major sources of PCBs discharging into Waukegan Harbor/Lake Michigan. Extensive cleanup actions are ongoing at this site, and include dredging of contaminated sediment from the harbor. This site contributed to the PCB concentrations in fish in the harbor, which are high enough that they could result in adverse health effects. The Yeoman Creek Landfill has discharged PCBs to Yeoman Creek, but is not such a large polluter, and people were not being exposed. The sediments are being removed. PCBs were also found at a third site, the Diamond Scrap Yard, in on-site soil, but migration off-site did not appear to be occurring, and the PCBs were not present at high concentrations.

The critical IJC pollutant lead was present in on-site soil at two sites and in groundwater at a third site, in completed exposure pathways or possibly completed exposure pathways at levels of concern. One of these sites has been remediated.

Non-IJC critical pollutants found in completed or potentially completed exposure pathways were vinyl chloride in groundwater migrating to a municipal well (one site, remediated) and asbestos in very large quantities disposed on land (one site, remediated).

Issues for Follow-Up

Outboard Marine Corp.: This site is under remediation, and was a major source of PCB contamination in the Waukegan Harbor, contributing to harmful concentrations of PCBs in fish. It and the contaminated sediments in the harbor are under remediation; follow up is needed to monitor progress toward mitigation of the hazard.

5.4.4.2 TRI Data

The TRI on-site chemical releases for Lake County, IL, in 2001 were 724,859 pounds, the majority of which were released to air.

Only 4,624 pounds (0.6%) of the total on-site releases were IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (to air and surface water), and mercury compounds (primarily to air).

The largest on-site release of non-IJC chemicals, in the range of 150,000-299,999 pounds, was of hydrochloric acid aerosols (to air). All other releases were <150,000 pounds.

5.4.4.3 County Demographics and Health Status Indicators

Vulnerable populations in Lake County, IL, totaled 271,053. A few Lake County health status indicators compared unfavorably with both U.S. indicators and with the median of peer county indicators. These health status indicators were no care in first trimester, and deaths from breast cancer, colon cancer, lung cancer, and stroke. None of these indicators exceeded the upper end of the peer county range.

**Table 5-16. Waste Site Contaminants that Exceeded Health-Based Screening Values
Waukegan Harbor AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						Total
			Air	Biota	Human Material	Other Media	Soil	Water	
011104-28-2	AROCLOR 1221	1					2		2
012672-29-6	AROCLOR 1248	1					2		2
011097-69-1	AROCLOR 1254	1					1		1
011096-82-5	AROCLOR 1260	1					3		3
001336-36-3	POLYCHLORINATED BIPHENYLS	1	2	8		7	38	23	78
000050-32-8	BENZO(A)PYRENE	4					15		15
000050-29-3	DDT, P,P'	5		1					1
000060-57-1	DIELDRIN	6		1				2	3
007439-92-1	LEAD	8					1	23	22
007439-97-6	MERCURY	9					1		1
		Total IJC	2	10	0	9	86	45	152
000075-34-3	1,1-DICHLOROETHANE		2						2
000075-35-4	1,1-DICHLOROETHENE							1	1
000095-63-6	1,2,4-TRIMETHYLBENZENE							1	1
000107-06-2	1,2-DICHLOROETHANE							2	2
000156-59-2	1,2-DICHLOROETHENE, CIS-		6			2		2	10
000156-60-5	1,2-DICHLOROETHENE, TRANS-							1	1
000540-59-0	1,2-DICHLOROETHYLENE							2	2
000078-87-5	1,2-DICHLOROPROPANE							1	1
000108-67-8	1,3,5-TRIMETHYLBENZENE							1	1
000541-73-1	1,3-DICHLOROBENZENE							1	1
000106-46-7	1,4-DICHLOROBENZENE						9	5	14
000101-55-3	1-BROMO-4-PHENOXY BENZENE						1		1
000105-67-9	2,4-DIMETHYLPHENOL						1	1	2
000121-14-2	2,4-DINITROTOLUENE						1		1
000606-20-2	2,6-DINITROTOLUENE						1		1
000095-49-8	2-CHLOROTOLUENE							1	1
000091-57-6	2-METHYLNAPHTHALENE						14	5	19
000088-75-5	2-NITROPHENOL						2		2
007005-72-3	4-CHLOROPHENYL PHENYL ETHER						1		1
000083-32-9	ACENAPHTHENE						1	1	2
000208-96-8	ACENAPHTHYLENE						3		3
000067-64-1	ACETONE		4					6	10
007429-90-5	ALUMINUM						2	2	4
007664-41-7	AMMONIA							11	11
000120-12-7	ANTHRACENE						1		1
007440-36-0	ANTIMONY		4				3	5	12
007440-38-2	ARSENIC					1	19	32	52
001332-21-4	ASBESTOS		2				1	3	6
007440-39-3	BARIUM		4				17	12	33
000071-43-2	BENZENE		12			8	1	14	35
000056-55-3	BENZO(A)ANTHRACENE						18		18
000205-99-2	BENZO(B)FLUORANTHENE						18		18
000191-24-2	BENZO(GHI)PERYLENE						15		15
000207-08-9	BENZO(K)FLUORANTHENE						18		18
007440-41-7	BERYLLIUM						4	8	12
007440-42-8	BORON							15	15
000075-27-4	BROMODICHLOROMETHANE							4	4
000085-68-7	BUTYL BENZYL PHTHALATE						1	4	5
007440-43-9	CADMIUM						20	8	28
007440-70-2	CALCIUM						2		2
016887-00-6	CHLORIDE							1	1
000108-90-7	CHLOROETHANE							1	1
000075-00-3	CHLOROETHANE					2		4	6
007440-47-3	CHROMIUM		4			2	26	20	52
018540-29-9	CHROMIUM, HEXAVALENT							4	4
000218-01-9	CHRYSENE						18	2	20
008007-45-2	COAL TARS						1		1
007440-48-4	COBALT						13	16	29
HZ9900-08-T	COMBUSTIBLE GAS		6						6

**Table 5-16. Waste Site Contaminants that Exceeded Health-Based Screening Values
Waukegan Harbor AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						Total
			Air	Biota	Human Material	Other Media	Soil	Water	
HZ1600-16-T	COOLANT WASTE					1			1
007440-50-8	COPPER					1		5	1
000095-48-7	CRESOL, ORTHO-							1	3
000106-44-5	CRESOL, PARA-							5	5
000098-82-8	CUMENE								1
000057-12-5	CYANIDE					1			1
000117-81-7	DI(2-ETHYLHEXYL)PHTHALATE							6	14
000053-70-3	DIBENZO(A,H)ANTHRACENE							8	8
025321-22-6	DICHLOROBENZENE					2			2
000075-71-8	DICHLORODIFLUOROMETHANE		2			2			4
000084-66-2	DIETHYL PHTHALATE							1	1
000131-11-3	DIMETHYL PHTHALATE							1	1
000084-74-2	DI-N-BUTYL PHTHALATE							3	3
000117-84-0	DI-N-OCTYL PHTHALATE							5	5
HZ0300-45-T	EPOXY, N.O.S.					1			1
000100-41-4	ETHYLBENZENE		16			5		1	1
000206-44-0	FLUORANTHENE							3	3
000086-73-7	FLUORENE							1	1
000076-14-2	FREON 114		2			2			4
068153-81-1	GREASE							2	2
HZ0900-02-T	HEAVY METALS, UNSPECIFIED					1			1
000319-85-7	HEXACHLOROCYCLOHEXANE, BETA-							1	1
000058-89-9	HEXACHLOROCYCLOHEXANE, GAMMA-							1	1
000077-47-4	HEXACHLOROCYCLOPENTADIENE							1	1
HZ1000-01-T	HYDROCARBONS, UNSPECIFIED					1			1
000193-39-5	INDENO(1,2,3-CD)PYRENE							16	16
HZ0900-18-T	INORGANICS, N.O.S.					1			1
007439-89-6	IRON							4	1
007439-91-0	LANTHANUM							2	2
007439-95-4	MAGNESIUM							2	2
007439-96-5	MANGANESE		4					14	22
HZ0900-01-T	METALS N.O.S.					1			1
000074-82-8	METHANE		1			2			3
000072-43-5	METHOXYCHLOR							1	1
000108-10-1	METHYL ISOBUTYL KETONE								2
000099-87-6	METHYL-4-(1- METHYLETHYL)BENZENE							1	1
000075-09-2	METHYLENE CHLORIDE		4					1	15
007439-98-7	MOLYBDENUM							2	2
000108-38-3	M-XYLENE								1
000091-20-3	NAPHTHALENE							1	6
007440-02-0	NICKEL		4					15	15
014797-55-8	NITRATE								1
000086-30-6	N-NITROSODIPHENYLAMINE							1	1
000103-65-1	N-PROPYL BENZENE								1
HZ0600-01-T	OIL/GREASE, UNSPECIFIED							1	1
HZ1000-11-T	ORGANIC THIOKETONE							2	2
000095-47-6	O-XYLENE		2						1
HZ1100-01-T	PAINT/PAINT WASTES, UNSPECIFIED							1	1
000059-50-7	P-CHLORO-M-CRESOL								2
000087-86-5	PENTACHLOROPHENOL							7	4
000085-01-8	PHENANTHRENE							23	2
000108-95-2	PHENOL							1	1
064743-03-9	PHENOLICS					1			1
007723-14-0	PHOSPHORUS, WHITE								1
130498-29-2	POLYCYCLIC AROMATIC HYDROCARBONS							1	1
007440-09-7	POTASSIUM							2	2
000106-42-3	P-XYLENE		2						2

**Table 5-16. Waste Site Contaminants that Exceeded Health-Based Screening Values
Waukegan Harbor AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						Total	
			Air	Biota	Human Material	Other Media	Soil	Water		
000129-00-0	PYRENE						3		3	
000135-98-8	SEC-BUTYLBENZENE							1	1	
HZ1900-02-T	SEMIVOLATILE ORGANIC COMPOUNDS N.O.S.						1		1	
007440-21-3	SILICON						2		2	
007440-23-5	SODIUM						2	6	8	
HZ0300-02-T	SOLVENTS, UNSPECIFIED						1		1	
007440-24-6	STRONTIUM						2		2	
000100-42-5	STYRENE		8				4		12	
014808-79-8	SULFATE							2	2	
000127-18-4	TETRACHLOROETHYLENE							5	5	
007440-28-0	THALLIUM							5	5	
007440-32-6	TITANIUM						2		2	
000108-88-3	TOLUENE		8				5	1	7	
HZ1600-01-T	TOTAL DISSOLVED SOLIDS							1	1	
025323-89-1	TRICHLOROETHANE		8				2		10	
000079-01-6	TRICHLOROETHYLENE						2	2	4	
007440-62-2	VANADIUM							19	16	
000075-01-4	VINYL CHLORIDE		8				2	1	9	
HZ1900-01-T	VOLATILE ORGANIC COMPOUNDS N.O.S.		6				1		4	
001330-20-7	XYLENES, TOTAL		12				9	2	2	
007440-66-6	ZINC		4				1	10	9	
000132-64-9	DIBENZOFURAN							11	11	
MEDEXP-00-0			6	6			2	12	16	
			6	4			2	7	9	
		Total Non-IJC	147	10	0		72	443	394	1066
		Total	149	20	0		81	529	439	1218

Table 5-17. TRI Releases (in pounds, 2001) for the Waukegan Harbor AOC

Chemical	IJC Tracking Number	Total Air Emissions	Surface Water Discharges	Under-ground Injection	Releases to Land	Total On-site Releases	Total Off-site Releases	Total On-and Off-site Releases
DIOXIN AND DIOXIN-LIKE COMPOUNDS (PCDDs and PCDFs)	2	0.002568825	No data	0	0	0.002568825	0	0.002568825
LEAD	8	2584.21	No data	0	0	2584.21	966	3550.21
LEAD COMPOUNDS	8	419.85714	1304.3	0	0	1724.15714	2807.29	4531.44714
MERCURY	9	4.73	No data	0	0	4.73	10.45	15.18
MERCURY COMPOUNDS	9	310.011	1	0	0	311.011	0.042	311.053
Total IJC	3318.810709	1305.3	0	0	4624.110709	3783.782	8407.892709	
1,2,4-TRIMETHYLBENZENE		1500	No data	0	0	1500	0	1500
1,4-DIOXANE		250	No data	0	0	250	0	250
2-METHOXYETHANOL		105	No data	0	0	105	0	105
4,4'-ISOPROPYLIDENE-DIPHENOL		694	No data	0	0	694	110	804
ACETONITRILE		9498	No data	0	0	9498	0	9498
ALUMINUM (FUME OR DUST)		2009	No data	0	0	2009	4500	6509
AMMONIA		1595	100	0	0	1695	0	1695
ANTIMONY		0	No data	0	0	0	9	9
BARIUM COMPOUNDS		16993	4400	0	0	21393	38216	59609
BROMOMETHANE		248	No data	0	0	248	0	248
CERTAIN GLYCOL ETHERS		2980	No data	0	0	2980	1075	4055
CHLOROFORM		2986	No data	0	0	2986	12	2998
CHROMIUM		0	No data	0	0	0	37	37
CHROMIUM COMPOUNDS (EXCEPT CHROMITE ORE MINED IN THE TRANSVAAL REGION)		28	No data	0	0	28	3897	3925
COPPER		0	No data	0	0	0	15659	15659
COPPER COMPOUNDS		833	110	0	0	943	2655	3598
DICHLOROMETHANE		114565	No data	0	0	114565	29	114594
DIISOCYANATES		10	No data	0	0	10	0	10
ETHYLBENZENE		1231	No data	0	0	1231	0	1231
ETHYLENE GLYCOL		10	No data	0	0	10	0	10
ETHYLENE OXIDE		4800	No data	0	0	4800	0	4800
FORMALDEHYDE		5	No data	0	0	5	0	5
FORMIC ACID		92	No data	0	0	92	0	92
HYDROCHLORIC ACID (1995 AND AFTER 'ACID AEROSOLS' ONLY)		229170	No data	0	0	229170	0	229170
HYDROGEN FLUORIDE		120504	No data	0	0	120504	0	120504
MANGANESE COMPOUNDS		1010	110	0	0	1120	0	1120
METHANOL		84784	No data	0	0	84784	96	84880
METHYL ETHYL KETONE		21506	No data	0	250	21756	250	22006
METHYL ISOBUTYL KETONE		1255	No data	0	5	1260	5	1265
METHYL TERT-BUTYL ETHER		91	No data	0	0	91	5	96
N,N-DIMETHYLFORMAMIDE		735	No data	0	0	735	0	735
NAPHTHALENE		10	No data	0	0	10	0	10
N-BUTYL ALCOHOL		5731	No data	0	0	5731	0	5731
N-HEXANE		5282	No data	0	0	5282	158	5440
NICKEL		250	No data	0	0	250	1538	1788
NITRIC ACID		40	No data	0	0	40	0	40
N-METHYL-2-PYRROLIDONE		579	No data	0	0	579	0	579
OZONE		80	No data	0	0	80	0	80
PROPYLENE OXIDE		34	No data	0	0	34	0	34
SEC-BUTYL ALCOHOL		255	No data	0	0	255	0	255
STYRENE		10255	No data	0	0	10255	0	10255
SULFURIC ACID (1994 AND AFTER 'ACID AEROSOLS' ONLY)		5	No data	0	0	5	0	5
TETRACHLORO-ETHYLENE		1010	No data	0	250	1260	250	1510
THIOUREA		52	No data	0	0	52	0	52
TOLUENE		29128	No data	0	250	29378	501	29879
TRICHLOROETHYLENE		13676	No data	0	0	13676	676	14352

Table 5-17. TRI Releases (in pounds, 2001) for the Waukegan Harbor AOC

Chemical	IJC Tracking Number	Total Air Emissions	Surface Water Discharges	Under- ground Injection	Releases to Land	Total On- site Releases	Total Off- site Releases	Total On- and Off-site Releases
VANADIUM COMPOUNDS		433	0	0	0	433	0	433
XYLENE (MIXED ISOMERS)		26961	No data	0	250	27211	368	27579
ZINC COMPOUNDS		1112	130	0	0	1242	250	1492
Total Non-IJC		714380	4850	0	1005	720235	70296	790531
Total		717698.8107	6155.3	0	1005	724859.1107	74079.782	798938.8927

Table 5-18. TRI Facilities Releasing IJC Critical Pollutants On-site for the Waukegan Harbor AOC

IJC Critical Pollutant	Number of Facilities	Facility Name	TRIF ID	City
Dioxin and dioxin-like compounds (PCDDs and PCDFs)	2			
Lake County, IL	2	ABBOTT LABS. NORTH CHICAGO FACILITY	60064BBTTL1400N	NORTH CHICAGO
		WAUKEGAN GENERATING STATION	60087WKGNG10GRE	WAUKEGAN
Lead and lead compounds	13			
Lake County, IL	13	ABBOTT LABS. ABBOTT PARK FACILITY	60064BBTTLINTER	ABBOTT PARK
		ABBOTT LABS. NORTH CHICAGO FACILITY	60064BBTTL1400N	NORTH CHICAGO
		AKZO NOBEL AEROSPACE COATINGS INC.	60085MDLND17EWA	WAUKEGAN
		BARNANT CO.	60010BRNNT28W09	BARRINGTON
		CIRCUT WORKS CORP.	60044CRCTW110AL	LAKE BLUFF
		CITATION DYCAST	60047DYCST320EA	LAKE ZURICH
		NEW NGC INC.	60085GLDBN515SE	WAUKEGAN
		OSRAM SYLVANIA LAKE ZURICH ECS	60084SRMSY800NC	LAKE ZURICH
		PICKARD INC.	60002PCKRD782PI	ANTIOCH
		PRECISION CHROME INC.	60020PRCSN105PR	FOX LAKE
		SIEMENS BUILDING TECHS. INC.	60089LNDSS1000D	BUFFALO GROVE
		TRIAD CIRCUITS	60073TRDCR703NS	ROUND LAKE
		WAUKEGAN GENERATING STATION	60087WKGNG10GRE	WAUKEGAN
Mercury and mercury compounds	2			
Lake County, IL	2	U.S. NAVY NAVAL TRAINING CENTER	60088SNVYN201DE	GREAT LAKES
		WAUKEGAN GENERATING STATION	60087WKGNG10GRE	WAUKEGAN

5.5 MILWAUKEE ESTUARY AOC, MILWAUKEE COUNTY, WI

The Milwaukee Estuary AOC includes the inner and outer Harbor and the near shore waters of Lake Michigan bounded by a line extending north from Sheridan Park to the city of Milwaukee's Linnwood water intake, as well as the lower 4-5 km of the Milwaukee, Menomonee, and Kinnickinnic Rivers (see AOC map in the appendix). The relatively small immediate drainage area contributes very large amounts of pollutants associated with urban runoff. The AOC is a source of pollution to Lake Michigan and a sink for pollutants generated throughout the entire Milwaukee River drainage.

5.5.1 Hazardous Waste Sites Relevant to the Milwaukee Estuary AOC

ATSDR has evaluated the data for hazardous waste sites in Milwaukee, WI, and reached conclusions regarding the public health threat posed by these sites. These conclusions, along with information regarding the type and location of the site, and the date and type of assessment document, are summarized in Table 5-19 for sites that had public health hazard categories of 1-3 at some point during their assessment history.

Table 5-19. Hazardous Waste Sites in Milwaukee County, WI

Site Name	Public Health Hazard Category	EPA NPL Status	Site ID	City
Boerke Property	2 (1998 HC)	Non NPL	WID981189632	Milwaukee
Fadowski Drum Disposal	3 (1988 HA) 4 (1994 HA)	Final	WID980901227	Franklin
Former Tannery	2 (1996 HC)	Non NPL	WI0001407717	Milwaukee
Moss-American Co., Inc.(Kerr McGee Oil Co.)	3 (1988 HA) 2 (1991 HA)	Final	WID039052626	Milwaukee
Northwestern Barrel Company (Former)	1 (1997 HC) 3 (1998 HA) 5 (2002 HC) 4 (2002 HC)	Non NPL	WID981095995	S. Milwaukee
P&G School Bus Co.	2 (2000 HC)	Non NPL	WISFN0507920	Milwaukee
Robert Betz Trust Co.	2 (1998 HC) 2 (1999 HC) 2 (2001 HC)	Non NPL	WI0000136226	Milwaukee
St. Francis Auto Wreckers	2 (2002 HC)	Non NPL	WID988639068	Milwaukee
Try Chemical Corporation	2 (2001 HC)	Non NPL	WID048034300	Milwaukee

1 = Urgent Public Health Hazard, 2 = Public Health Hazard, 3 = Indeterminate Public Health Hazard, 4 = No Apparent Public Health Hazard, 5 = No Public Health Hazard
 HA = Public Health Assessment, HC = Health Consultation
 n.d. = no date provided

For hazardous waste sites in Milwaukee County, WI, that *at any time* had Public Health Hazard Categories of 1-3, the number of contaminant records in HazDat that exceeded health based-screening values was 1,148, as shown in Table 5-20. Most of the records were for the soil media group.

The IJC Great Lakes critical pollutants accounted for 162 (14%) of these records, again with most of the records for the soil media group. The IJC critical pollutants that have been found at Milwaukee County, WI, hazardous waste sites at concentrations exceeding health-based screening values are: PCBs, B(a)P, PCDDs, PCDFs, DDT and metabolites, aldrin, dieldrin, lead, mercury, and hexachlorobenzene. Details are provided in Table 5-21.

Further evaluation of the data for the sites with Public Health Hazard Categories of 1-3 was conducted by ATSDR in the public health assessments and other health-related documents listed in the table. These evaluations are discussed in the following subsections.

5.5.1.1 Boerke Property

This abandoned 70-acre property is bounded on one side by Lake Michigan. It was used primarily as an unlined industrial landfill that received wastes from an adjacent dye manufacturer, which was in operation from about 1915 to 1939. The size of the landfill area was not specified. There is a drainage swale that runs from the disposal area to empty into Lake Michigan. Information regarding this site is taken from the 1998 ATSDR health consultation for the site.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) because the arsenic contamination in waste materials and adjacent surface soils pose a public health hazard to people who may enter the property.

Contaminants of Concern in Completed Exposure Pathways: Arsenic is the primary contaminant. Arsenic levels in the waste material are as high as 290,000 mg/kg, and in soil and in the drainage swale are in the thousands of ppm range, which would cause harmful effects from incidental inhalation of dust or ingestion of soil. The site is not fenced and there was evidence of some trespassing. Arsenic also has been found in groundwater beneath and downgradient of the waste disposal area. The groundwater probably discharges to Lake Michigan, and does not flow towards any wells. Other wastes have not been characterized.

Demographics: Not reported.

Public Health Outcome Data: Not reported.

Conclusions: No IJC critical pollutants have been associated with the site, but the nature and extent of contamination has not been well characterized. The site is highly contaminated with arsenic, some of which is migrating to Lake Michigan, but the amount of arsenic waste was not estimated.

5.5.1.2 Fadrowski Drum Disposal

This 20-acre site is located in the city of Franklin, Milwaukee County, WI. The site was operated as a landfill for construction debris and fill dirt from 1970 to 1982. In 1983, however, excavation for fill dirt on the property revealed barrels of hazardous wastes. As of 1994, the site had been fenced, and 167 buried drums and associated contamination had been excavated and contained. An on-site pond was drained and back filled. Information regarding this site is taken from the 1994 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet for the site.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) in a 1989 preliminary health assessment (not provided for inclusion in this report). In 1994, after some remediation had been performed, ATSDR concluded that the site poses *No Apparent Public Health Hazard* (category 4).

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutants B(a)P and lead were found in completed exposure pathways related to soil, but concentrations in surface soils were low enough that they did not pose a health risk. There was some migration of contaminated soil from the disposal area into the adjacent wetland sand stream, but the contamination has been covered with clean soil. Groundwater was not appreciably affected. Since 1994, the drums have been removed, waste has been consolidated and capped, and monitoring wells and a leachate collection system have been installed. The effectiveness of the remedy is being monitored, and shows natural attenuation of site-related contaminants.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	856
Females aged 15-44	2,246
Adults 65 and older	1,208

Public Health Outcome Data: A disease cluster investigation, not related to this site, but applicable to it, studied age-adjusted cancer rates for all cancer sites for the city of Franklin in comparison with the U.S., Wisconsin, and Milwaukee County for three time periods: 1960-1969, 1970-1979, and 1980-1985. The conclusion was that there are no significantly elevated rates for individual cancer sites, nor for specific cancers with an environmental exposure etiology, in Franklin.

Conclusions: The site has not been associated with completed exposure pathways to IJC or other pollutants at levels of health concern. The site has been remediated. There may have been some migration of B(a)P and lead to an adjacent wetland and stream.

5.5.1.3 Former Tannery

The 1.3-acre former Tannery site is located in east central Milwaukee, Milwaukee County, WI, near the Kinnickinnic River. It has been abandoned. The site had been a stove shop and foundry at the turn of the century, a tannery from about 1965 to 1980, and then was used for scrap waste storage and silver recovery from film from 1980 to 1987. The film was burned to recover the silver. Transformer fluids and automotive fluids and gasoline were drained on the property when transformers and cars were dismantled. Although the site is fenced, illegal dumping and trespassing occur. Surface water and shallow groundwater flow towards the river. Information regarding this site is taken from the 1996 ATSDR health consultation for the site.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) because of the friable asbestos and PCB contamination in the yard and building.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutants PCBs are present in high enough concentrations in soil and wastes on the property that they pose a health hazard from direct dermal contact as well as from incidental ingestion and inhalation for people entering the site without personal protection. In addition, the site may be contributing to PCB contamination of the

Kinnickinnic River, and thus to bioaccumulation in fish. PCB concentrations in fish in this area are high enough that fish consumption advisories have been issued for some species. Asbestos-containing building materials in the yard, poor condition asbestos insulation on pipes in the building, chunks of insulation on the floor and in garbage bags, and friable asbestos in the layer of debris on the floor of the building raised the concern for asbestos exposure. The building is open and air flow could transfer asbestos to the outdoors. Other contaminants, including the IJC critical pollutant lead, may also be a problem, but have not been well characterized.

Demographics: Demographic profiles for vulnerable populations living within 1 mile of this site were not reported. There are over 100 families living within a short walk to the site.

Public Health Outcome Data: Not reported.

Conclusions: This site may have contributed to PCB loading to the Kinnickinnic River, and thus, to PCB levels in fish in this river. Fish consumption advisories have been issued for a number of fish species on this river due to PCB contamination. In addition, the concentrations of PCBs in on-site soil and waste are a public health threat. Asbestos is also a health threat.

5.5.1.4 Moss-American Co., Inc. (Kerr-McGee Oil Co.)

This 88-acre site was a wood preserving plant on the northwest side of Milwaukee, Milwaukee County, WI. A five-mile stretch of the little Menomonee River, with associated wetlands, flows through the site. Between 1921 and 1976, creosote was used to treat railroad ties. Liquid wastes were discharged directly to the river until 1941, when settling basins were installed; waste discharged from the ponds to the river. In 1971, the company began pretreating its waste and discharging it to a sanitary sewer. Also in 1971, teenagers wading in sediments more than 3 miles downstream from the site received chemical burns, which were determined to have resulted from exposure to creosote-related chemicals originating from the plant. After this incident, warning signs were posted, the waste ponds were dredged and filled, and contaminated sediment along 1,700 feet of the riverbed adjacent to the site was excavated and buried along the west bank of the river. The settling pond dredgings were landfilled in the northeastern portion of the site. In 1973, sediment was dredged for about 1 mile downstream and placed in the landfill area and along the west bank of the river. The facility closed in 1976. The western portion of the site is used for a car loading and storage lot by a railroad company. The remaining 88 acres belong to the Milwaukee County park system. Information regarding this site is taken from the 1991 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) by ATSDR in the 1988 health assessment (not provided for inclusion in this document). In 1991, ATSDR concluded that the site poses a *Public Health Hazard* (category 2) to anyone entering the property or frequenting a stretch of the Little Menomonee River extending from the site to the river's confluence with the Menomonee River due to contamination with toxic and hazardous chemicals.

Contaminants of Concern in Completed Exposure Pathways: As of 1991, site-related chemicals present in on-site soil at levels of concern included the IJC critical pollutants B(a)P (and other carcinogenic PAHs) and lead. The maximum concentration of lead was only slightly above the EPA 400 ppm level. Completed exposure pathways were inadvertent ingestion, dermal absorption, and inhalation of chemicals from soil. The concern was for increased lifetime cancer risk and irritant effects. Site-related contaminants remaining in river sediments at levels of concern were PAHs including B(a)P;

the concern was increased lifetime cancer risk. PCDDs and PCDFs were present in on-site soil and in river sediment, but were not discussed. Fish are not found in significant numbers in the river, so fish consumption is not a likely completed exposure pathway. Shallow groundwater was contaminated on-site with PAHs, but is not used and contamination does not extend to the site boundary. Subsequent remedial activities have included removal of free product creosote and related wastewater, treatment of the most highly contaminated soils with thermal desorption, and management of site groundwater with a “funnel and gate” process. Remediation of the remaining contaminated sediment in the Little Menomonee River is under design.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	1,587
Females aged 15-44	2,910
Adults 65 and older	1,110

Public Health Outcome Data: Not reported.

Conclusions: This site contributed to the environmental burden of, and human exposure to, the IJC critical pollutants B(a)P, PCDDs, PCDFs, and lead. The site itself has been remediated, and the sediments of the Little Menomonee River were partially remediated. Additional remediation of the river sediments is in the design phase.

5.5.1.5 Northwestern Barrel (Former), (Marina Cliffs)

The Marina Cliffs Condominium property is located on the western portion of the former Northwestern Barrel Company property. From 1940 to 1964, Northwestern Barrel operated a barrel reconditioning facility, which resulted in the eastern portion of the property becoming contaminated with paint wastes, lead, PCBs, and other chemicals. Chemicals were dumped into pits in this area of the property. Contaminated soils and wastes from the eastern portion were excavated and disposed off-site, but there is some concern regarding the soils around and under the condominiums. Information regarding this site is taken from the 1998 ATSDR public health assessment and ambient air exposure investigation, HazDat, and the July 8, 2002 ATSDR health consultation for the site.

Category of Public Health Hazard: ATSDR has performed four assessments dealing with different aspects of this site. In a 1997 health consultation (not provided for inclusion in this document), ATSDR categorized the site as an *Urgent Public Health Hazard* (category 1). In 1998, ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3) because of airborne VOCs blowing from the area of soil remediation to the condominiums. In a 2002 health consultation (not provided for inclusion in this report), ATSDR concluded that the site *Poses No Public Health Hazard* (category 5). In another 2002 health consultation (dated July 8), ATSDR determined that the slightly contaminated soil near the condominiums posed *No Apparent Health Hazard* (category 4).

Contaminants of Concern in Completed Exposure Pathways: In 1997, the soil from the disposal pits was excavated and stockpiled on a prepared clay pad and covered with plastic sheeting. It was then screened to sift out debris prior to mixing with cement. Organic vapors were released by these activities. Condominium residents living less than 100 yards from these operations complained of noxious odors and of adverse health effects including headaches, sore throats, lethargy, and burning eyes. ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3) because air coming

from the property contained VOCs (including xylene and ethylbenzene) and although levels of individual chemicals were below levels known to cause illness, residents complained of illness when the odors were strong, and blood samples showed elevated concentrations of several VOCs in one individual. In 2002, ATSDR determined that the concentrations of PCBs and lead in surface and subsurface soils near two of the condominium buildings did not pose a health concern, even for young children who might have daily, long-term contact with the soil.

Demographics: Demographic profiles for vulnerable populations living within 1 mile of this site were not reported for this non-NPL site. In 1998, approximately 1,000 individuals lived within 300 yards of the property.

Public Health Outcome Data: Concentrations of three VOCs, ethylbenzene, styrene, and total xylenes in blood of three non-smoking residents were compared with those in the third National Health and Nutrition Examination Survey. One of three residents tested had elevated blood concentrations of these chemicals, which appeared to correlate with increases in indoor and outdoor air concentrations at the location of that person's condominium, but the person had no symptoms.

Conclusions: Based on the documents provided, low-level contamination of soil with the IJC pollutants PCBs and lead was noted. Other contaminants of concern included VOCs. Most of the contamination has been cleaned up. Exposure studies of three residents indicated elevated blood levels of VOCs only in one, who had no symptoms.

5.5.1.6 P&G School Bus Service

This approximately 6-acre site is located in Milwaukee, Milwaukee County, WI. School buses and other large vehicles were serviced at the site for an undetermined number of years. Debris, solid waste, above-ground storage tanks, containers of waste fluids, oily liquids in storm sewers, burn piles, and stained soils were seen in 1995. Debris and waste piles remained in 1998. Access to much of the property is restricted by a locked chain-link fence. Monitoring data were collected in 1998 as part of a Brownfields assessment. Information regarding this site is taken from the 2000 ATSDR health consultation on the site.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) by ATSDR because surface soils have elevated concentrations of some contaminants that could pose a health hazard to people who have frequent contact with the soils.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutants B(a)P and other carcinogenic PAHs were found at levels of health concern in surface soils on-site. Groundwater at one on-site location contained benzene at levels of concern, but is not used as a source of drinking water. Additional monitoring was recommended to determine the full extent of contamination prior to development of the site.

Demographics: Not reported.

Public Health Outcome Data: Not reported.

Conclusions: Contamination at the site is not well characterized, but the IJC critical pollutants B(a)P (and other carcinogenic PAHs), lead, and hexachlorobenzene were found in soil at levels of concern. The nature of past activity at the site indicates that the site probably does not constitute a major contributor to

the environmental burden of these contaminants. Currently, exposure does not seem to be occurring because the site is securely fenced; the concern was for future exposure in the event the site is developed.

5.5.1.7 Robert Betz Trust Co. (Betz, Robert G. Property)

This 4.5-acre property operated as a salvage yard from about 1960 to 1994. Asphalt operations also were based on the property during that time, and excess asphalt was spread on the ground at various locations. Following that period, the property was reportedly used for illegal dumping of waste, including waste oil, and for dismantling of stolen vehicles. In 1999, the buildings were demolished, and debris and solid wastes were hauled away. In 2001, EPA initiated a time-critical removal action for the property, and the site was fenced. Additional detail was not provided in the 2001 ATSDR health consultation, which is the source of information, along with HazDat, for this site.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) by ATSDR in its 1998 health consultation (not provided for inclusion in this document) due to physical hazards. In 1999, ATSDR concluded that the site posed a *Public Health Hazard* for people who frequented the property, due to soil contaminants. In 2001, ATSDR concluded, on the basis of more recent data, that the site continues to be a *Public Health Hazard* due to contamination of soil.

Contaminants of Concern in Completed Exposure Pathways: Lead in an on-site soil location in 1999 was very high, and B(a)P equivalents were also at levels of health concern in on-site surface soils. Lead in on-site perimeter surface soil in 2001 was at a level that would be a health concern for young children (only perimeter and off-site soils were tested in that round of sampling). In addition, in 2001, arsenic and B(a)P and B(a)P equivalents in a depression that collects runoff on an adjacent residential property were at levels of health concern, although it was not clear whether they came from the Betz property. Off-site sediment samples from a ditch that drains the property did not contain contaminants at levels that posed a health concern in 2001.

Demographics: Not reported.

Public Health Outcome Data: Not reported.

Conclusions: This site may have contributed to the environmental burden of the IJC critical pollutants lead and B(a)P and to human exposure before the site was fenced. It does not appear to be a large-scale contributor. Whether the time-critical removal action was to remove areas of high lead contamination in soil was not discussed in the available document.

5.5.1.8 St. Francis Auto Wreckers

This site includes a fenced auto salvage yard and an unfenced 1.6-acre wooded vacant lot where children play, adjacent to a residential neighborhood. Prior to the salvage business, there was a landfill that accepted foundry sand on the site. Information on this site was taken from the 2002 ATSDR health consultation for this site.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) due to the presence of hazardous materials in the vacant lot where children play and PCB-contaminated soils in the salvage yard.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutants PCBs and lead were found at elevated levels in soils throughout the salvage yard, but the shallowest samples were 6" deep, too deep to adequately characterize exposure from surface soil. Monitoring of surface soils in the vacant lot was inadequate, but soil samples that were 6" deep contained elevated levels of the IJC critical pollutants lead and mercury above health-based screening values, and samples taken from 2 feet deep contained PCBs at above health-based screening values. Foundry sand, which could be a source of lead and other heavy metals, was present in the vacant lot. Potential groundwater contamination was to be tested.

Demographics: Demographic profiles for vulnerable populations living within 1 mile of this site were not reported for this non-NPL site. Approximately 100 people live within 300 meters of the property, and about 750 live within 600 meters.

Public Health Outcome Data: Not reported.

Conclusions: The contamination at this site has not been adequately characterized. Lead and PCBs in soil were at levels of health concern, but surface soil data were lacking. There were no data to indicate that the site is a major contributor to environmental burdens of IJC critical pollutants or to human exposure.

5.5.1.9 Try Chemical Corp.

This Brownfields site, located in Milwaukee, Milwaukee County, WI, is just over 1 acre in area. The facility was used for metal finishing, paint stripping, painting, and electroplating from about 1916 to 1985. It was abandoned in 1985, at which time the EPA removed processing liquids and waste from the site. In 1997, the city of Milwaukee razed the buildings on the site and filled the basement pit. Information regarding this site is taken from the 2001 ATSDR health consultation for the site.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) because of physical hazards, particularly an unfenced terrace at the top a 15-foot retaining wall.

Contaminants of Concern in Completed Exposure Pathways: None. The IJC critical pollutants B(a)P and lead are present at concentrations above health-based screening values in subsurface soils, but the site is capped with concrete, so completed exposure pathways do not presently exist. A few contaminants including vinyl chloride (but not lead) exceed groundwater screening values, but no contact or ingestion of groundwater is expected.

Demographics: Not reported.

Public Health Outcome Data: Not reported.

Conclusions: There are no completed exposure pathways associated with this site. B(a)P and lead are present in subsurface soil at above health-based screening values, but the site is covered with concrete. Given the size and condition of the site, it seems unlikely that it is contributing significantly to the environmental burden of IJC critical pollutants.

5.5.2 TRI Data for the Milwaukee Estuary AOC

The TRI on-site chemical releases for Milwaukee County are summarized in Table 5-21. Total on-site releases in 2001 were 2,505,221 pounds, the majority of which were released to air, followed by releases to land.

IJC critical pollutants accounted for 10,520 pounds (1%) of the total on-site releases. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (to air, surface water, and land), and mercury compounds (primarily to air). The facilities that released these pollutants are listed in Table 5-22.

The major release ($\geq 500,000$ pounds) of non-IJC chemicals was of hydrochloric acid aerosols to air. The next largest releases (300,000-499,999 pounds) were of hydrogen fluoride (to air), followed by (150,000-299,999 pounds) certain glycol ethers (to air).

5.5.3 County Demographics and Health Status Data for the Milwaukee Estuary AOC

The demographic profiles, from the 2000 U.S. Census, for vulnerable populations living in Milwaukee County, WI are as follows:

Children 6 years and younger	94,930
Females aged 15-44	214,948
Adults 65 years and older	121,685

According to the 2000 HRSA community health status reports, Milwaukee County health status indicators that compared unfavorably with those of the U.S. and also with the median of the peer counties were as follows (none were above the upper limit of the peer county range):

Infant mortality (per 1,000 births)

- infant mortality
- white infant mortality
- black infant mortality
- neonatal infant mortality
- post-neonatal infant mortality

Birth measures (as percent)

- low birth weight
- very low birth weight
- premature births
- unmarried mothers

Death measures (per 100,000 population)

- colon cancer
- coronary health disease
- homicide
- stroke

5.5.4 Summary and Conclusions for the Milwaukee Estuary AOC

5.5.4.1 Hazardous Waste Sites

ATSDR has assessed nine hazardous waste sites with public health hazard categories of 1-3 in Milwaukee County, WI. Most of these were non-NPL sites in the city of Milwaukee.

The two final NPL sites have been fully or partially remediated. One of these sites, the Fadrowski Drum Disposal site, may have contaminated an adjacent wetland and stream somewhat with the IJC critical pollutants B(a)P and lead, but has now been remediated. The other NPL site, the Moss-American Co. (Kerr McGee Oil) site was a major contributor to pollution of the Little Menomonee River with PAHs, including B(a)P. On-site soil also was heavily contaminated. The site has been remediated. The river sediment has been partially remediated; further remediation is under design. Lead was also elevated in on-site soils, but the maximum concentration was only slightly above the EPA 400 ppm level.

Of the seven non-NPL sites, the Former Tannery site is probably the biggest contributor to the environmental burden of IJC critical pollutants. This site, although small (1.3 acres), is heavily contaminated with PCBs in soil and waste on-site, and appears to have contributed to PCB loading of the Kinnickinnic River, and therefore probably to fish contamination. The site had not been remediated as of 1996, when ATSDR performed a health consultation.

The other sites commonly had elevated levels of lead in on-site soils plus either B(a)P, or for one site, PCBs. Hexachlorobenzene was found in soil at one site. Another site (Boerke Property) had high levels of arsenic in on-site soil and was considered a health threat to on-site recreational visitors, and possibly to be contributing to pollution of Lake Michigan.

Issues for Follow-Up

Former Tannery site: This PCB-contaminated site had not been remediated as of 1996, and may be contributing to contamination of the AOC through discharges to the Kinnickinnic River.

Moss-American Co.: Remediation of B(a)P and other PAH-contaminated sediment in the Little Menomonee River was under design.

5.5.4.2 TRI Data

The TRI on-site chemical releases for Milwaukee County in 2001 were 2,505,221 pounds, the majority of which were released to air, followed by releases to land.

IJC critical pollutants accounted for 10,520 pounds (1%) of the total on-site releases. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (to air, surface water, and land), and mercury compounds (primarily to air). The facilities that released these pollutants are listed in Table 5-22.

The major release ($\geq 500,000$ pounds) of non-IJC chemicals was of hydrochloric acid aerosols to air. The next largest releases (300,000-499,999 pounds) were of hydrogen fluoride (to air), followed by (150,000-299,999 pounds) certain glycol ethers (to air).

5.5.4.3 County Demographics and Health Status Indicators

Vulnerable populations in Milwaukee County totaled 431,563. Several Milwaukee County health status indicators compared unfavorably with both U.S. indicators and the median of the peer county indicators. These indicators included all the infant mortality indicators, low birth weight, very low birth weight, premature births, unmarried mothers, and deaths from colon cancer, coronary heart disease, homicide, and stroke. None of these indicators exceeded the upper end of the peer county range.

**Table 5-20. Waste Site Contaminants that Exceeded Health-Based Screening Values
Milwaukee Estuary AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						Total
			Air	Biota	Human Material	Other Media	Soil	Water	
011097-69-1	AROCLOR 1254	1					2		2
011096-82-5	AROCLOR 1260	1				1	3		4
001336-36-3	POLYCHLORINATED BIPHENYLS	1				1	16	1	18
001746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	2					2		2
037871-00-4	HEPTACHLORODIBENZO-P-DIOXIN	2					4		4
034465-46-8	HEXACHLORODIBENZO-P-DIOXIN	2					4		4
003268-87-9	OCTACHLORODIBENZO-P-DIOXIN	2					4		4
036088-22-9	PENTACHLORODIBENZO-P-DIOXIN	2					2		2
041903-57-5	TETRACHLORODIBENZO-P-DIOXIN	2					2		2
039001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	3					2		2
038998-75-3	HEPTACHLORODIBENZOFURAN	3					2		2
055684-94-1	HEXACHLORODIBENZOFURAN	3					2		2
030402-15-4	PENTACHLORODIBENZOFURAN	3					2		2
000050-32-8	BENZO(A)PYRENE	4				1	21	2	24
HZ1500-50-T	BENZO(A)PYRENE EQUIVALENTS	4					2		2
HZ1500-02-T	PAHS (CARCINOGENIC)	4				1	4		5
000072-55-9	DDE, P,P'-	5					2		2
000050-29-3	DDT, P,P'-	5				2	3		5
000309-00-2	ALDRIN	6					2		2
000060-57-1	DIELDRIN	6					2		2
007439-92-1	LEAD	8			2	7	41	2	52
007439-97-6	MERCURY	9					14	3	17
000118-74-1	HEXACHLOROBENZENE	11					1		1
	Total IJC	0	0	2	13	139	8	162	
000577-16-2	1-(2-METHYLPHENYL)ETHANONE						2		2
000071-55-6	1,1,1-TRICHLOROETHANE						5	1	6
000075-34-3	1,1-DICHLOROETHANE						3	1	4
000526-73-8	1,2,3-TRIMETHYLBENZENE						2		2
000095-93-2	1,2,4,5-TETRAMETHYLBENZENE						2		2
000120-82-1	1,2,4-TRICHLOROBENZENE						1		1
000095-63-6	1,2,4-TRIMETHYLBENZENE		2				3		5
000095-50-1	1,2-DICHLOROBENZENE						1		1
000107-06-2	1,2-DICHLOROETHANE							1	1
000156-59-2	1,2-DICHLOROETHENE, CIS-						1		1
000108-67-8	1,3,5-TRIMETHYLBENZENE		2				2		4
000541-73-1	1,3-DICHLOROBENZENE						1		1
000106-46-7	1,4-DICHLOROBENZENE						1		1
000542-47-2	10-METHYLOCTADECANOIC ACID						2		2
132861-79-1	15-TETRACOSYNOIC ACID, METHYL ESTER						2		2
000540-54-5	1-CHLOROPROPANE						1		1
000611-14-3	1-ETHYL-2-METHYLBENZENE		2				2		4
000934-74-7	1-ETHYL-3,5-DIMETHYLBENZENE						2		2
000620-14-4	1-ETHYL-3-METHYLBENZENE		2				2		4
001074-17-5	1-METHYL-2-PROPYLBENZENE						2		2
004291-79-6	1-METHYL-2-PROPYLCYCLOHEXANE						2		2
001074-43-7	1-METHYL-3-PROPYLBENZENE						2		2
000112-72-1	1-TETRADECANOL						2		2
000874-35-1	2,3-DIHYDRO-5-METHYL-1H-INDENE						2		2
000088-06-2	2,4,6-TRICHLOROPHENOL						1		1
000120-83-2	2,4-DICHLOROPHENOL						1		1
000105-67-9	2,4-DIMETHYLPHENOL						3	2	5
000051-28-5	2,4-DINITROPHENOL						2		2
000121-14-2	2,4-DINITROTOLUENE						1		1
015869-89-3	2,5-DIMETHYLOCTANE						2		2
017302-28-2	2,6-DIMETHYLNONANE						2		2
002051-30-1	2,6-DIMETHYLOCTANE						2		2
000091-58-7	2-CHLORONAPHTHALENE						1		1
000095-57-8	2-CHLOROPHENOL						1		1

**Table 5-20. Waste Site Contaminants that Exceeded Health-Based Screening Values
Milwaukee Estuary AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						Total	
			Air	Biota	Human Material	Other Media	Soil	Water		
000592-27-8	2-METHYL HEPTANE		2						2	
000091-57-6	2-METHYLNAPHTHALENE							8	4	12
004110-44-5	3,3-DIMETHYLOCTANE							2		2
000100-73-2	3,4-DIHYDRO-2H-PYRAN-2-CARBOXALDEHYDE							2		2
015869-94-0	3,6-DIMETHYLOCTANE							2		2
017302-32-8	3,7-DIMETHYLNONANE							2		2
014676-29-0	3-ETHYL-2-METHYLHEPTANE							2		2
013151-34-3	3-METHYL DECANE							2		2
002216-33-3	3-METHYL OCTANE							2		2
000589-81-1	3-METHYLHEPTANE		2							2
000106-47-8	4-CHLOROANILINE							2		2
000622-96-8	4-ETHYLTOLUENE		2					2		4
002847-72-5	4-METHYLDECANE							2		2
017301-94-9	4-METHYLNONANE							2		2
000100-02-7	4-NITROPHENOL							3		3
000057-10-3	9-HEXADECANOIC ACID							2		2
002027-47-6	9-OCTADECENOIC ACID							2		2
000083-32-9	ACENAPHTHENE							9	4	13
000208-96-8	ACENAPHTHYLENE							7	2	9
000098-86-2	ACETOPHENONE							1		1
000074-86-2	ACETYLENE		2							2
007429-90-5	ALUMINUM							1		1
000120-12-7	ANTHRACENE							11	2	13
007440-36-0	ANTIMONY							3		3
HZ1000-02-T	AROMATICS, UNSPECIFIED							2		2
007440-38-2	ARSENIC						2	24	4	30
001332-21-4	ASBESTOS						3			3
008006-61-9	AUTOMOTIVE GASOLINE							1		1
007440-39-3	BARIUM							5	1	6
000100-52-7	BENZALDEHYDE							1		1
000071-43-2	BENZENE		4		2			7	4	17
000056-55-3	BENZO(A)ANTHRACENE						1	17	2	20
000205-99-2	BENZO(B)FLUORANTHENE						1	16	2	19
000192-97-2	BENZO(E)PYRENE							2		2
000191-24-2	BENZO(GHI)PERYLENE							13		13
000207-08-9	BENZO(K)FLUORANTHENE						1	16	2	19
000195-19-7	BENZOPHENANTHRENE							2		2
007440-41-7	BERYLLIUM							2		2
000092-52-4	BIPHENYL							1		1
034006-76-3	BIS(2-METHOXYETHYL) PHTHALATE							1		1
HZ1000-21-T	BTEX		2							2
000085-68-7	BUTYL BENZYL PHTHALATE							7		7
001678-93-9	BUTYLCYCLOHEXANE							2		2
007440-43-9	CADMIUM						1	17		18
007440-70-2	CALCIUM							2		2
000086-74-8	CARBAZOLE							4		4
000057-74-9	CHLORDANE							2		2
000108-90-7	CHLOROBENZENE		2							2
000075-00-3	CHLOROETHANE							1	1	2
000067-66-3	CHLOROFORM							2		2
007440-47-3	CHROMIUM						2	19	4	25
000218-01-9	CHRYSENE						1	17	2	20
012001-29-5	CHRYSTILE ASBESTOS						1			1
008001-58-9	COAL TAR CREOSOTE							10	2	12
007440-48-4	COBALT							7	1	8
007440-50-8	COPPER							11	1	12
000095-48-7	CRESOL, ORTHO-							2		2
000106-44-5	CRESOL, PARA-							1		1
000098-82-8	CUMENE		2					3		5
000057-12-5	CYANIDE							5	1	6
000124-18-5	DECANE		2					2		4

**Table 5-20. Waste Site Contaminants that Exceeded Health-Based Screening Values
Milwaukee Estuary AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						Total	
			Air	Biota	Human Material	Other Media	Soil	Water		
000117-81-7	DI(2-ETHYLHEXYL)PHTHALATE						7	3	10	
000053-70-3	DIBENZO(A,H)ANTHRACENE						15		15	
000084-66-2	DIETHYL PHTHALATE						3		3	
000131-11-3	DIMETHYL PHTHALATE						2		2	
000084-74-2	DI-N-BUTYL PHTHALATE						9	2	11	
000117-84-0	DI-N-OCTYL PHTHALATE						5		5	
000100-41-4	ETHYLBENZENE		4		2		11	2	19	
000206-44-0	FLUORANTHENE						12	2	14	
000086-73-7	FLUORENE						11	4	15	
HZ0600-03-T	FUEL OILS, UNSPECIFIED						2		2	
HZ0600-47-T	FUEL RELATED ORGANICS						1		1	
HZ0900-02-T	HEAVY METALS, UNSPECIFIED						1		1	
000076-44-8	HEPTACHLOR							2	2	
001024-57-3	HEPTACHLOR EPOXIDE						3		3	
000058-89-9	HEXACHLOROCYCLOHEXANE, GAMMA-						2		2	
HZ1000-01-T	HYDROCARBONS, UNSPECIFIED		2					2	4	
000193-39-5	INDENO(1,2,3-CD)PYRENE						1	16	17	
HZ0900-18-T	INORGANICS, N.O.S.							6	1	7
007439-89-6	IRON							2	4	6
HZ1000-24-T	M/P-XYLENE		2		2					4
007439-96-5	MANGANESE							8	3	11
000535-77-3	M-CYMENE							2		2
HZ0900-01-T	METALS N.O.S.							12	1	13
000099-87-6	METHYL-4-(1- METHYLETHYL)BENZENE							3		3
000108-87-2	METHYLCYCLOHEXANE		2							2
000075-09-2	METHYLENE CHLORIDE		2					5	3	10
007439-98-7	MOLYBDENUM							1		1
000091-20-3	NAPHTHALENE						1	11	4	16
000142-82-5	N-HEPTANE		2							2
007440-02-0	NICKEL							11	1	12
000621-64-7	N-NITROSODI-N-PROPYLAMINE							1		1
000086-30-6	N-NITROSODIPHENYLAMINE							4		4
000111-84-2	NONANE		2					2		4
000103-65-1	N-PROPYL BENZENE		2					3		5
000629-59-4	N-TETRADECANE							2		2
001120-21-4	N-UNDECANE		2					2		4
000057-11-4	OCTADECANOIC ACID							2		2
000111-65-9	OCTANE		2							2
000527-84-4	O-CYMENE							2		2
HZ0700-01-T	ORGANOCHLORINES, UNSPECIFIED							2	1	3
143662-20-8	OXACYCLOTETRADECANE-2,11- DIONE							2		2
000095-47-6	O-XYLENE		2		2					4
HZ1500-03-T	PAHS (NON-CARCINOGENIC)						1	3		4
000059-50-7	P-CHLORO-M-CRESOL							1		1
000087-86-5	PENTACHLOROPHENOL							5		5
HZ1200-01-T	PESTICIDES N.O.S.							6	1	7
008002-05-9	PETROLEUM AND PETROLEUM DISTILLATES		4							4
HZ0600-46-T	PETROLEUM HYDROCARBONS (FUEL)							1		1
000085-01-8	PHENANTHRENE							11	4	15
000108-95-2	PHENOL							7	4	11
000088-99-3	PHTHALIC ACID						1	2		3
000085-44-9	PHTHALIC ANHYDRIDE							2		2
000131-69-1	PHTHALYLSULFACETAMIDE							2		2
130498-29-2	POLYCYCLIC AROMATIC HYDROCARBONS							18	3	21
007440-09-7	POTASSIUM							2		2
001678-92-8	PROPYLCYCLOHEXANE							2		2
000115-07-1	PROPYLENE		2							2

**Table 5-20. Waste Site Contaminants that Exceeded Health-Based Screening Values
Milwaukee Estuary AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						Total	
			Air	Biota	Human Material	Other Media	Soil	Water		
000129-00-0	PYRENE						11	2	13	
007440-17-7	RUBIDIUM						1		1	
000135-98-8	SEC-BUTYLBENZENE						1		1	
007782-49-2	SELENIUM						3	1	4	
HZ1900-02-T	SEMIVOLATILE ORGANIC COMPOUNDS N.O.S.						9	1	10	
007440-22-4	SILVER						1		1	
007440-23-5	SODIUM							3	3	
HZ0300-02-T	SOLVENTS, UNSPECIFIED						2		2	
007440-24-6	STRONTIUM						1		1	
000100-42-5	STYRENE		4		2		6		12	
000127-18-4	TETRACHLOROETHYLENE						1	1	2	
000544-63-8	TETRADECANOIC ACID						2		2	
007440-28-0	THALLIUM						2		2	
007440-32-6	TITANIUM						1		1	
000108-88-3	TOLUENE		6		2		11	1	20	
000079-01-6	TRICHLOROETHYLENE						1	1	2	
007440-62-2	VANADIUM						8	3	11	
000075-01-4	VINYL CHLORIDE							1	1	
HZ1900-01-T	VOLATILE ORGANIC COMPOUNDS N.O.S.		3				14	2	19	
001330-20-7	XYLENES, TOTAL		4		2		9		15	
007440-66-6	ZINC						10		10	
007440-67-7	ZIRCONIUM						1		1	
000132-64-9	DIBENZOFURAN						12	4	16	
MEDEXP-00-0			5	6			2	16	14	43
PENDING	2-METHYLPHthalate							2		2
PENDING	4-(1-METHYLETHYL) HEPTANE							2		2
			2	1			2	9	2	16
		Total	82	7	14	26	734	123	986	
		Non-IJC								
		Total	82	7	16	39	873	131	1148	

Table 5-21. TRI Releases (in pounds, 2001) for the Milwaukee Estuary AOC

Chemical	IJC Tracking Number	Total Air Emissions	Surface Water Discharges	Under-ground Injection	Releases to Land	Total On-site Releases	Total Off-site Releases	Total On-and Off-site Releases
DIOXIN AND DIOXIN-LIKE COMPOUNDS (PCDDs and PCDFs)	2	0.0046746	No data	0	0	0.0046746	0.0147735	0.0194481
LEAD	8	4264.64	15	0	10	4289.64	16968.4377	21258.0777
LEAD COMPOUNDS	8	1434.476	2695.3	0	1954	6083.776	7415.59	13499.366
MERCURY COMPOUNDS	9	139.4	0.014	0	7.1	146.514	45.9468674	192.4608674
Total IJC		5838.520675	2710.3	0	1971.1	10519.93467	24429.98934	34949.92402
1,2,4-TRIMETHYLBENZENE		8962	0	0	0	8962	0	8962
4,4'-ISOPROPYLIDENE-DIPHENOL		557	No data	0	0	557	4043	4600
ACETALDEHYDE		111694	5	0	0	111699	No data	111699
ACRYLIC ACID		757	No data	0	0	757	0	757
ACRYLONITRILE		5	No data	0	0	5	1308	1313
ALUMINUM (FUME OR DUST)		6026	No data	0	0	6026	102422	108448
AMMONIA		34009	1000	0	14	35023	0	35023
ANTIMONY COMPOUNDS		1	No data	0	0	1	0	1
ARSENIC COMPOUNDS		10	No data	0	0	10	10397	10407
BARIUM		13	No data	0	0	13	1218	1231
BARIUM COMPOUNDS		3500	29	0	140000	143529	921900	1065429
BENZENE		330	0	0	0	330	0	330
BENZO(G,H,I)PERYLENE		10.85	No data	0	0.21	11.06	1.2679	12.3279
BUTYL ACRYLATE		1620	No data	0	0	1620	0	1620
CADMIUM COMPOUNDS		10	No data	0	0	10	6998	7008
CERTAIN GLYCOL ETHERS		224074	No data	0	0	224074	9882	233956
CHLORINE		255	250	0	0	505	0	505
CHLOROFORM		1000	No data	0	0	1000	0	1000
CHLOROMETHANE		6320	No data	0	0	6320	No data	6320
CHROMIUM		2024	5	0	0	2029	171376	173405
CHROMIUM COMPOUNDS (EXCEPT CHROMITE ORE MINED IN THE TRANSVAAL REGION)		2958	5	0	0	2963	553545	556508
COBALT		0	No data	0	0	0	250	250
COPPER		5034	28	0	0	5062	33563	38625
COPPER COMPOUNDS		584	4800	0	3850	9234	30414	39648
CUMENE HYDROPEROXIDE		0	No data	0	0	0	272	272
CYANIDE COMPOUNDS		505	No data	0	0	505	0	505
CYCLOHEXANE		1200	No data	0	0	1200	0	1200
DICHLOROMETHANE		25705	No data	0	0	25705	7897	33602
DIETHANOLAMINE		16	No data	0	0	16	257	273
DIISOCYANATES		10	No data	0	0	10	2167	2177
EPICHLOROHYDRIN		526	No data	0	0	526	0	526
ETHYL ACRYLATE		603	No data	0	0	603	0	603
ETHYLBENZENE		5163	0	0	0	5163	7	5170
ETHYLENE GLYCOL		250	No data	0	0	250	0	250
FORMIC ACID		5424	0	0	0	5424	0	5424
HYDROCHLORIC ACID (1995 AND AFTER 'ACID AEROSOLS' ONLY)		924255	No data	0	0	924255	0	924255
HYDROGEN FLUORIDE		401319	No data	0	0	401319	0	401319
MANGANESE		7148	10	0	0	7158	291841	298999
MANGANESE COMPOUNDS		249	11	0	38000	38260	71685	109945
METHANOL		26511	No data	0	0	26511	0	26511
METHYL ETHYL KETONE		24035	No data	0	0	24035	1	24036
METHYL ISOBUTYL KETONE		90108	No data	0	0	90108	0	90108
METHYL METHACRYLATE		6457	No data	0	0	6457	0	6457
METHYL TERT-BUTYL ETHER		755	No data	0	0	755	0	755
NAPHTHALENE		1833	No data	0	0	1833	0	1833
N-BUTYL ALCOHOL		43410	No data	0	0	43410	152	43562
N-HEXANE		3706	0	0	0	3706	0	3706
NICKEL		2223	10	0	0	2233	57949	60182
NICKEL COMPOUNDS		577	1205	0	0	1782	28801	30583
NITRATE COMPOUNDS		571	64	0	17	652	1530	2182
NITRIC ACID		3908	No data	0	250	4158	1000	5158
N-METHYL-2-PYRROLIDONE		21033	No data	0	0	21033	0	21033
OZONE		0.075	0	0	0	0.075	No data	0.075

Table 5-21. TRI Releases (in pounds, 2001) for the Milwaukee Estuary AOC

Chemical	IJC Tracking Number	Total Air Emissions	Surface Water Discharges	Under- ground Injection	Releases to Land	Total On- site Releases	Total Off- site Releases	Total On- and Off-site Releases
PHENOL		0	No data	0	0	0	189	189
PHTHALIC ANHYDRIDE		376	No data	0	0	376	2374	2750
POLYCYCLIC AROMATIC COMPOUNDS		893.87	0	0	1.21	895.08	7.146	902.226
SILVER		0	No data	0	0	0	5	5
SODIUM NITRITE		0	No data	0	0	0	5916	5916
STYRENE		47732	No data	0	0	47732	3924	51656
SULFURIC ACID (1994 AND AFTER 'ACID AEROSOLS' ONLY)		45331	No data	0	1500	46831	0	46831
TETRACHLORO-ETHYLENE		12200	No data	0	0	12200	0	12200
TOLUENE		88873	1	0	0	88874	22	88896
TRICHLOROETHYLENE		18684	No data	0	0	18684	0	18684
TRIETHYLAMINE		255	No data	0	0	255	0	255
VANADIUM COMPOUNDS		571	No data	0	5500	6071	35780	41851
XYLENE (MIXED ISOMERS)		68958	1	0	0	68959	37	68996
ZINC COMPOUNDS		2824	1593	0	2600	7017	94166	101183
Total Non-IJC		2293951.795	9017	0	191732.42	2494701.215	2453296.414	4947997.629
Total		2299790.316	11727.314	0	193703.52	2505221.15	2477726.403	4982947.553

Table 5-22. TRI Facilities Releasing IJC Critical Pollutants On-site for the Milwaukee Estuary AOC

IJC Critical Pollutant	Number of Facilities	Facility Name	TRIF ID	City
Dioxin and dioxin-like compounds (PCDDs and PCDFs)	3			
Milwaukee County, WI	3	OAK CREEK POWER PLANT VALLEY POWER PLANT WABASH ALLOYS L.L.C.	53154KCRKP4801E 53233VLLYP1035W 53154BSHLL9100S	OAK CREEK MILWAUKEE OAK CREEK
Lead and lead compounds	34			
Milwaukee County, WI	34	ACME GALVANIZING INC. ALUMINUM CASTING & ENG. CO. ARTISTIC PLATING COOPER POWER SYS. KYLE DISTRIBUTION SWITCHGEAR DELPHI DELCO ELECTRONICS SYS. MILWAUKEE DYNASTY DIV. C&D TECHS. EGS ELECTRICAL GROUP APPLETON EVERBRITE INC. GE CO. MEDICAL SYS. GE MEDICAL SYS. INFORMATION TECHS. GREDE FOUNDRIES INC. LIBERTY PLANT GREDE FOUNDRIES INC. MILWAUKEE STEEL FNDY. JOHNSON CONTROLS BATTERY GROUP INC. KRAMER INTL. INC. KRONES INC. MASTER LOCK CO. MID-CITY FNDY. MILWAUKEE COUNTY POWER PLANT MILWAUKEE DUCTILE IRON INC. MILWAUKEE ELECTRONICS CORP. MILWAUKEE GRAY IRON L.L.C. OAK CREEK POWER PLANT PHOENIX ENGINEERED PRODS. INC. PRESSED STEEL TANK CO. INC. ROCKWELL AUTOMATION INC. ROCORE INDS. INC. STROH DIE CASTING CO. INC. STUDIO ONE ART GLASS INC. TULIP CORP. UNIT DROP FORGE CO. INC. VALLEY POWER PLANT VULCAN LEAD INC. WABASH ALLOYS L.L.C. WISCONSIN PAPERBOARD CORP.	53215CMGLV2730S 53207LMNMC2039S 53212RTSTC428WV 53172CPRPW2800N 53154DLCLC7929S 53212JHNSN900EK 53172PPLTN2105S 53172VRBT315MA 53219GMDCL4855W 53223MRQTT8200W 53213GRDFN6432W 53204GRDFN1320S 53209JHNSN5400N 53204KZMRN114EP 53132KRNSN9600S 53210MSTRL2600N 53204MDCTY1521W 53226MLWKC9250W 53214BRGGS1706S 53209PHLPS5855N 53214BRGGS1501S 53154KCRKP4801E 53207PHNXN1924S 53214PRSSD1445S 53204LLNBR1201S 53132RCRND9845S 53222STRHD11123 53172STDNR1333M 53212TLLCR714EK 53219NTDRP1903S 53233VLLYP1035W 53204VLCNL1400W 53154BSHLL9100S 53211WSCNS1514E	MILWAUKEE MILWAUKEE MILWAUKEE SOUTH MILWAUKEE OAK CREEK MILWAUKEE SOUTH MILWAUKEE SOUTH MILWAUKEE WEST MILWAUKEE MILWAUKEE WAUWATOSA MILWAUKEE MILWAUKEE MILWAUKEE WEST ALLIS GLENDALE WEST ALLIS OAK CREEK MILWAUKEE WEST ALLIS MILWAUKEE FRANKLIN FRANKLIN WAUWATOSA SOUTH MILWAUKEE MILWAUKEE MILWAUKEE MILWAUKEE MILWAUKEE OAK CREEK MILWAUKEE
Mercury and mercury compounds	2			
Milwaukee County, WI	2	OAK CREEK POWER PLANT VALLEY POWER PLANT	53154KCRKP4801E 53233VLLYP1035W	OAK CREEK MILWAUKEE

5.6 SHEBOYGAN RIVER AOC, SHEBOYGAN COUNTY, WI

The Sheboygan River AOC consists of the lower Sheboygan River downstream from the Sheboygan Falls Dam, and includes the entire harbor and near shore waters of Lake Michigan (see AOC map in the appendix).

5.6.1 Hazardous Waste Sites Relevant to the Sheboygan River AOC

ATSDR has evaluated the data for two hazardous waste sites in Sheboygan County, WI, and reached conclusions regarding the public health threat posed by these sites. These conclusions, along with information regarding the type and location of the site, and the date and type of assessment document, are summarized in Table 5-23.

Table 5-23. Hazardous Waste Sites in Sheboygan County, WI

Site Name, County	Public Health Hazard Category	EPA NPL Status	Site ID	City
Kohler Company Landfill	3 (1989 HA) 2 (1995 HA)	Final	WID006073225	Kohler
Sheboygan Harbor & River	2 (1988 HA) 2 (1994 HA)	Final	WID980996367	Sheboygan

2 = Public Health Hazard, 3 = Indeterminate Public Health Hazard
HA = Public Health Assessment

For hazardous waste sites in Sheboygan County that *at any time* had Public Health Hazard Categories of 1-3 (both waste sites assessed by ATSDR), the number of contaminant records in HazDat that exceeded health based-screening values was 370, as shown in Table 5-24. Most of the records were for the water media group.

The IJC Great Lakes critical pollutants accounted for 89 (24%) of these records, with the records divided mainly among the water, soil, and biota media groups. The IJC critical pollutants that have been found at Sheboygan County hazardous waste sites at concentrations exceeding health-based screening values are: PCBs, PCDDs, PCDFs, B(a)P, DDT metabolite (p,p'-DDE), aldrin, dieldrin, lead, mercury, and hexachlorobenzene. Details are provided in Table 5-25.

Further evaluation of the data for the sites with Public Health Hazard Categories of 1-3 was conducted by ATSDR in the public health assessments and other health-related documents listed in the table. These evaluations are discussed in the following subsections.

5.6.1.1 Kohler Company Landfill

This 40-acre landfill is a disposal site for the Kohler Company, a manufacturer of bathroom fixtures and small engines. The site lies adjacent to the floodplain of the Sheboygan River. The east half of the landfill was built in the historic floodplain, but now is filled up to 40 feet above its original elevation. The Sheboygan River, which empties into Lake Michigan 4.2 miles downstream of the site, borders the

site on the south and east. Past disposal practices (mid 1950s through the 1970s) included pouring liquid slurries containing solvents, hydraulic oils, and metals into pits on the site, and filling the remainder with foundry sand and other solid and hazardous wastes. Starting in 1975, liquid hazardous wastes were no longer disposed at the site, and since 1980, solid hazardous wastes were no longer disposed at the site. Information regarding this site is taken from the 1995 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet for the site.

Category of Public Health Hazard: ATSDR characterized this site as an *Indeterminate Health Hazard* in the 1989 public health assessment (not provided for inclusion in this document). In 1995, ATSDR characterized this site as a *Public Health Hazard* (category 2) because PCBs in the floodplain and sediments adjacent to the Kohler Company Landfill pose a health hazard due to bioaccumulation through the food chain. Whether the PCB contamination is site-related is uncertain.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutants PCBs have been found at high concentrations (above the FDA standard of 2 ppm) in fish from the Sheboygan River and at even higher concentrations in tissues of mallard ducks caught in Sheboygan County. Advisories have been issued not to consume some species of fish and ducks, but many individuals remain unaware of these advisories. PCBs have been found at levels of concern in waste and soil of the landfill, but it is not known whether PCBs have migrated to leachate or are present in surface water runoff, because these media have not been monitored for PCBs. Leachate flows toward the river, and surface water runoff drains directly into the Sheboygan River. PCBs were found in unfiltered samples from the shallow aquifer groundwater monitoring wells. Groundwater flow appears to be toward the river. There is a significant source of PCBs upstream from the Kohler Landfill (discussed in Section 5.6.1.2), so the source of PCBs in the floodplain and sediments adjacent to the Kohler Company Landfill is uncertain. VOCs (including vinyl chloride) and the IJC critical pollutant lead are present in groundwater at levels of concern, but the groundwater is not used as well water, and its discharge into the river will not result in harmful levels of exposure to people who swim or fish in the river. Remedial activities completed since ATSDR's 1995 assessment include installation of a multi-layer soil cap over the entire landfill, and collection of groundwater and leachate within a perimeter drain along the southern and eastern margins of the landfill, and pumping of the collected groundwater and leachate to the city of Sheboygan's publicly-owned treatment works.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	119
Females aged 15-44	310
Adults 65 and older	184

Public Health Outcome Data: Not reported. An evaluation of health outcome data associated with human exposure to contaminants in Sheboygan River fish was performed for the Sheboygan Harbor & River site, to which it may be more applicable (see Section 5.6.1.2).

Conclusions: The site may have contributed to PCB contamination of the Sheboygan River in the past and to human exposure to PCBs through ingestion of PCB-contaminated fish and ducks in the past and present, but its contribution cannot be estimated due to the lack of appropriate monitoring for migration of PCBs from the landfill to the floodplain and river, and the presence upstream of another significant source. The site has been remediated by containment of wastes and collection of contaminated leachate and groundwater for treatment at a municipal wastewater treatment plant. Thus, future impacts of the site have been minimized.

5.6.1.2 Sheboygan Harbor & River

The Sheboygan Harbor & River site encompasses the lower Sheboygan River, from Sheboygan Falls to Lake Michigan, and extends into the harbor where the river enters Lake Michigan. In 1977, the Wisconsin Department of Natural Resources discovered that fish from the Sheboygan River contained PCBs at levels much higher than the FDA's tolerance level. Testing of waterfowl in 1985-1986 also indicated high levels of PCBs. Advisories were issued warning against eating fish and waterfowl. Sediments in the upper portion of the harbor's navigation channel upstream from the river's mouth were heavily polluted with heavy metals. Further sampling of river sediments and effluents from industries and sewage treatment plants implicated a die-casting plant, the Tecumseh Products Company, located just downstream of the dam at Sheboygan Falls. The plant lies in the floodplain, and used hydraulic fluids containing PCBs from 1966 to 1971. Removal actions in 1979 (of PCB-contaminated material from a dike near the Tecumseh facility) and in 1989 through 1991 (of the most highly PCB-contaminated sediments), and containment of PCB-contaminated sediments by covering with geotextile fabric and other layers, reduced the environmental burden, and PCB levels in fish have dropped dramatically since the late 1970s. Information regarding this site is taken from the 1989 ATSDR preliminary public health assessment, the 1995 ATSDR public health assessment (public comment release), and the 2003 EPA NPL fact sheet.

Category of Public Health Hazard: In both 1989 and 1995, ATSDR categorized this site as a *Public Health Hazard* (category 2) to people who frequently eat fish and waterfowl from the area and to people who frequently play on contaminated river banks and floodplains. Although PCB levels in the environment and in fish have dropped due to removal activities, they are still high enough to pose a health hazard.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutants PCBs are present at levels expected to result in adverse health effects in the following completed exposure pathways: eating fish or waterfowl from the area and playing or digging in riverbank soil or floodplain sediments, resulting in dermal absorption and incidental ingestion. The IJC critical pollutants DDT and metabolites, dieldrin, and hexachlorobenzene were present in fish, but it was not discussed further as to whether the levels presented a health risk, or were higher than in fish from other areas. According to the EPA NPL fact sheet, additional planned remediation involves removal of PCB-contaminated sediment from the river and the inner harbor, removal of PCB-contaminated soil from the floodplains, and long-term monitoring of sediment and fish.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	3,837
Females aged 15-44	8,074
Adults 65 and older	5,354

Public Health Outcome Data: A study of infants born to 34 mothers who ate at least two meals per month of fish from the Sheboygan River or Lake Michigan for at least the previous 3 years, as compared with infants born to 39 mothers who ate less than two meals per year of such fish for the previous 3 years, reported the following differences. A higher rate of infectious illnesses during the first 4 months of life was reported in infants of the high exposure group, and the birth weights of the high exposure group babies were higher. There were no differences in the infants' behavior assessed with a standard developmental scale. The relatively low rate of fish consumption among the high exposure group mothers is a limitation of the study.

Conclusions: The Sheboygan Harbor & River site, although partially remediated, remains a source of PCB contamination at levels that may cause adverse health effects in people exposed directly to the soil and sediments, or through the food chain. It flows into Lake Michigan and may be contributing to PCB contamination of the lake. Additional, extensive remediation of sediments is planned. Health outcome data indicate that infants of mothers who ate two meals per month of fish from the Sheboygan River or Lake Michigan had higher birth weights and a higher rate of infectious illnesses.

5.6.2 TRI Data for the Sheboygan River AOC

The TRI on-site chemical releases for Sheboygan County are summarized in Table 5-25. Total on-site releases in 2001 were 575,909 pounds, the majority of which were released to air.

IJC critical pollutants accounted for 9,695 pounds (1.7%) of the total on-site releases. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (primarily to air), and mercury (to air). The facilities that released these pollutants are listed in Table 5-26.

The highest on-site release of non-IJC chemicals was of hydrochloric acid aerosols (300,548 pounds) to air. No other chemicals were released in quantities $\geq 150,000$ pounds.

5.6.3 County Demographics and Health Status Data for the Sheboygan River AOC

The demographic profiles, from the 2000 U.S. Census, for vulnerable populations living in Sheboygan County, WI, are as follows:

Children 6 years and younger	12,081
Females aged 15-44	22,869
Adults 65 years and older	15,732

According to the 2000 HRSA community health status reports, Sheboygan County health status indicators that compared unfavorably with those of the U.S. and also with the median of the peer counties are as follows (none were above the upper limit of the peer county range).

- Infant mortality (per 1,000 births)
 - none
- Birth measures (as percent)
 - none
- Death measures (per 100,000 population)
 - colon cancer

5.6.4 Summary and Conclusions for the Sheboygan River AOC

5.6.4.1 Hazardous Waste Sites

Only two hazardous waste sites in Sheboygan County, WI, were assessed by ATSDR. Both of these sites were associated with PCBs. One, the Kohler Company Landfill, has been remediated by containment. It

is not entirely clear whether this site contributed to PCB contamination of the sediments, floodplain, and fish and waterfowl of the AOC.

The other site, the Sheboygan Harbor & River site, coincides with the AOC, and constitutes a public health hazard due to PCB contamination of river bank soil, river sediment, and fish and waterfowl at levels that may cause adverse health effects and that exist in completed exposure pathways. This site has been partially remediated by the facility that appears to be responsible for most or all of the PCB contamination, but PCBs are still present at levels of concern. Further and more extensive remediation of sediments and floodplain soils is planned. In the meantime, the site may be contributing to human exposure and to PCB burdens in Lake Michigan.

Public health outcome data, available for the Sheboygan Harbor & River, indicates that infants of mothers who ate two fish meals per month from the Sheboygan River or Lake Michigan had higher birth weights and more infectious illnesses than did infants from mothers who had much lower intakes of area fish.

Issues for Follow-Up

Kohler Company Landfill: The landfill, which contains PCBs, has been remediated by containment of wastes and treatment of leachate and groundwater. Continued monitoring is in place to ensure the effectiveness of the remedy.

Sheboygan Harbor & River: This site still poses a public health hazard and a source of PCB loading for Lake Michigan. Further extensive remediation has been planned.

5.6.4.2 TRI Data

The TRI on-site chemical releases for Sheboygan County in 2001 were 575,909 pounds, the majority of which were released to air.

IJC critical pollutants accounted for 9,695 pounds (1.7 %) of the total on-site releases. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (primarily to air), and mercury (to air).

The highest on-site release of non-IJC chemicals was of hydrochloric acid aerosols (300,548 pounds) to air. No other chemicals were release in quantities $\geq 150,000$ pounds.

5.6.4.3 County Demographics and Health Status Indicators

Vulnerable populations in Sheboygan County, WI, totaled 50,682. Only one Sheboygan County health status indicator (deaths from colon cancer) compared unfavorably with both U.S. indicators and with the median of peer county indicators. It did not exceed the upper end of the range of the peer counties.

**Table 5-24. Waste Site Contaminants that Exceeded Health-Based Screening Values
Sheboygan River AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						Total	
			Air	Biota	Human Material	Other Media	Soil	Water		
011141-16-5	AROCLOR 1232	1						2	2	
053469-21-9	AROCLOR 1242	1						2	2	
001336-36-3	POLYCHLORINATED BIPHENYLS	1		16			2	12	8	38
001746-01-6	2,3,7,8-TETRACHLORODIBENZO- P-DIOXIN	2		2						2
051207-31-9	2,3,7,8- TETRACHLORODIBENZOFURAN	3		4						4
000050-32-8	BENZO(A)PYRENE	4					2			2
000072-55-9	DDE, P,P'-	5		2						2
000309-00-2	ALDRIN	6		1						1
000060-57-1	DIELDRIN	6		2						2
007439-92-1	LEAD	8		1			2	6	18	27
007439-97-6	MERCURY	9		1			2	2	1	6
000118-74-1	HEXACHLOROENZENE	11		1						1
		Total IJC	0	30	0	8	20	31	89	
000071-55-6	1,1,1-TRICHLOROETHANE					2		6		8
000075-34-3	1,1-DICHLOROETHANE					2		6		8
000075-35-4	1,1-DICHLOROETHENE					2		2		4
000107-06-2	1,2-DICHLOROETHANE							2		2
000156-60-5	1,2-DICHLOROETHENE, TRANS-							4		4
000540-59-0	1,2-DICHLOROETHYLENE					4		2		6
000105-67-9	2,4-DIMETHYLPHENOL							2		2
000078-93-3	2-BUTANONE					2	1	2		5
000067-64-1	ACETONE					2	1	2		5
007429-90-5	ALUMINUM						1			1
007664-41-7	AMMONIA							1		1
007440-38-2	ARSENIC						2	2	13	17
007440-39-3	BARIUM						1	4		5
000071-43-2	BENZENE					2	1	4		7
007440-41-7	BERYLLIUM						1			1
034006-76-3	BIS(2-METHOXYETHYL) PHTHALATE							2		2
007440-43-9	CADMIUM			1		2	2	16		21
007440-70-2	CALCIUM						1			1
000057-74-9	CHLORDANE			1						1
000075-00-3	CHLOROETHANE							4		4
000067-66-3	CHLOROFORM						1			1
007440-47-3	CHROMIUM			1		2	2	13		18
007440-48-4	COBALT						1			1
007440-50-8	COPPER			1			2	11		14
000095-48-7	CRESOL, ORTHO-							2		2
000106-44-5	CRESOL, PARA-							2		2
000117-81-7	DI(2-ETHYLHEXYL)PHTHALATE							6		6
000100-41-4	ETHYLBENZENE						1			1
007439-89-6	IRON						1	1		2
007439-95-4	MAGNESIUM						1			1
007439-96-5	MANGANESE						1			1
000075-09-2	METHYLENE CHLORIDE					2	1	2		5
007440-02-0	NICKEL					2	2	9		13
014797-55-8	NITRATE							2		2
HZ0700-01-T	ORGANOCHLORINES, UNSPECIFIED			1						1
000108-95-2	PHENOL							1	4	5
HZ1400-04-T	PHTHALATE ESTERS							1		1
130498-29-2	POLYCYCLIC AROMATIC HYDROCARBONS					2	1			3
007440-09-7	POTASSIUM							1		1
007782-49-2	SELENIUM							1		1
007440-22-4	SILVER							2		2
000108-88-3	TOLUENE						1	4		5
000079-01-6	TRICHLOROETHYLENE					4		10		14

**Table 5-24. Waste Site Contaminants that Exceeded Health-Based Screening Values
Sheboygan River AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						
			Air	Biota	Human Material	Other Media	Soil	Water	Total
007440-62-2	VANADIUM						1		1
000075-01-4	VINYL CHLORIDE					2		10	12
HZ1900-01-T	VOLATILE ORGANIC COMPOUNDS N.O.S.		2			2			4
001330-20-7	XYLENES, TOTAL						1		1
007440-66-6	ZINC						2	3	5
MEDEXP-00-0			1	14			9	13	37
				4			2	8	14
		Total	3	23	0	36	45	174	281
		Total Non-IJC							
		Total	3	53	0	44	65	205	370

Table 5-25. TRI Releases (in pounds, 2001) for the Sheboygan River AOC

Chemical	IJC Tracking Number	Total Air Emissions	Surface Water Discharges	Under-ground Injection	Releases to Land	Total On-site Releases	Total Off-site Releases	Total On-and Off-site Releases
DIOXIN AND DIOXIN-LIKE COMPOUNDS (PCDDs and PCDFs)	2	0.009368604	No data	0	0	0.009368604	0	0.009368604
LEAD	8	9319.238	14.85	0	8.5	9342.588	11332.45	20675.038
LEAD COMPOUNDS	8	124	0	0	0	124	7007	7131
MERCURY	9	228.22	0	0	0	228.22	40.6	268.82
Total IJC		9671.467369	14.85	0	8.5	9694.817369	18380.05	28074.86737
AMMONIA		82	No data	0	0	82	150	232
ANTIMONY COMPOUNDS		1432	10	0	0	1442	150556	151998
ARSENIC COMPOUNDS		57	16	0	0	73	3105	3178
BARIUM COMPOUNDS		2475	1005	0	0	3480	79060	82540
BENZENE		28869	No data	0	0	28869	0	28869
BENZO(G,H,I)PERYLENE		0.1	No data	0	0	0.1	0	0.1
CERTAIN GLYCOL ETHERS		68247	0	0	0	68247	254	68501
CHROMIUM		0	No data	0	0	0	510	510
CHROMIUM COMPOUNDS (EXCEPT CHROMITE ORE MINED IN THE TRANSVAAL REGION)		542	68	0	0	610	25193	25803
COPPER		6796	18	0	0	6814	29755	36569
COPPER COMPOUNDS		436	0	0	0	436	25000	25436
DI(2-ETHYLHEXYL) PHTHALATE		174	No data	0	0	174	1550	1724
DICHLOROMETHANE		2399	No data	0	0	2399	0	2399
DIISOCYANATES		1	0	0	0	1	320	321
EPICHLOROHYDRIN		1	No data	0	0	1	0	1
ETHYLBENZENE		1850	0	0	0	1850	5	1855
ETHYLENE GLYCOL		0	28	0	0	28	180	208
FORMALDEHYDE		1243	0	0	0	1243	49	1292
HYDROCHLORIC ACID (1995 AND AFTER 'ACID AEROSOLS' ONLY)		300548	No data	0	0	300548	0	300548
HYDROGEN FLUORIDE		14020	No data	0	0	14020	0	14020
LITHIUM CARBONATE		199	5	0	0	204	5	209
MANGANESE		3192	27	0	0	3219	109715	112934
MANGANESE COMPOUNDS		485	130	0	0	615	14007	14622
METHANOL		5788	0	0	0	5788	0	5788
METHYL ETHYL KETONE		2050	0	0	0	2050	5	2055
METHYL ISOBUTYL KETONE		4400	0	0	0	4400	5	4405
N-BUTYL ALCOHOL		1950	0	0	0	1950	5	1955
NICKEL		390	32	0	0	422	5647	6069
NICKEL COMPOUNDS		293	34	0	0	327	18769	19096
NITRATE COMPOUNDS		3	1889	0	0	1892	0	1892
PHENOL		11992	0	0	0	11992	24405	36397
POLYCYCLIC AROMATIC COMPOUNDS		83.3	0	0	0	83.3	0	83.3
SEC-BUTYL ALCOHOL		1000	0	0	0	1000	5	1005
STYRENE		17932	No data	0	0	17932	14419	32351
SULFURIC ACID (1994 AND AFTER 'ACID AEROSOLS' ONLY)		32000	No data	0	0	32000	0	32000
TOLUENE		5655	0	0	0	5655	5	5660
TRIETHYLAMINE		958	No data	0	0	958	0	958
VANADIUM COMPOUNDS		265	0	0	0	265	14000	14265
XYLENE (MIXED ISOMERS)		18173	0	0	0	18173	104	18277
ZINC COMPOUNDS		25189	1783	0	0	26972	1093023	1119995
Total Non-IJC		561169.4	5045	0	0	566214.4	1609806	2176020.4
Total		570840.8674	5059.85	0	8.5	575909.2174	1628186.05	2204095.267

Table 5-26. TRI Facilities Releasing IJC Critical Pollutants On-site for the Sheboygan River AOC

IJC Critical Pollutant	Number of Facilities	Facility Name	TRIF ID	City
Dioxin and dioxin-like compounds (PCDDs and PCDFs)	1			
Sheboygan County, WI	1	EDGEWATER GENERATING STATION	53082DGWTR3739L	SHEBOYGAN
Lead and lead compounds	13			
Sheboygan County, WI	13	EDGEWATER GENERATING STATION	53082DGWTR3739L	SHEBOYGAN
		J. L. FRENCH CORP. TYLR	53082JLFRN3101S	SHEBOYGAN
		J.L. FRENCH CORP. GTWY	53081JLFRN4243G	SHEBOYGAN
		KOHLER CO. - VITREOUS CHINA & POTTERY	53044KHLRC444HB	KOHLER
		KOHLER CO. BRASS DIV.	53044KHLRC444HC	KOHLER
		KOHLER CO. CAST IRON DIV.	53044KHLRC444HA	KOHLER
		KOHLER POWER SYS. AMERICAS	53083KHLRCCOUNT	SHEBOYGAN
		MILLENNIUM TECHS. L.L.C.	53073MLLMN1404P	PLYMOUTH
		PLASTICS ENG. CO.	53081PLSTC1607G	SHEBOYGAN
		PLASTICS ENG. CO.	53083PLSTC2732N	SHEBOYGAN
		SHEBOYGAN PAINT CO.	53081SHBYG1439N	SHEBOYGAN
		THOMAS COMPRESSORS & VACUUM PUMPS	53081THMSN1419I	SHEBOYGAN
		WILLMAN INDS. INC.	53013WLLMN338SM	CEDAR GROVE
Mercury and mercury compounds	1			
Sheboygan County, WI	1	EDGEWATER GENERATING STATION	53082DGWTR3739L	SHEBOYGAN

5.7 LOWER GREEN BAY AND FOX RIVER AOC (FOX RIVER/SOUTHERN GREEN BAY AOC), BROWN COUNTY, WI

In addition to the names listed in the heading to this section, this AOC also is called the Lower Fox River and Green Bay AOC. The AOC consists of the lower 11.2 km of the Fox River below the De Pere Dam, as well as a 55 km² area of southern Green Bay out to Point au Sable and Long Tail Point (see AOC map in the appendix).

5.7.1 Hazardous Waste Sites Relevant to the Sheboygan River AOC

ATSDR has evaluated the data for hazardous waste sites in Brown County, WI, and reached conclusions regarding the public health threat posed by these sites. These conclusions, along with information regarding the type and location of the site, and the date and type of assessment document, are summarized in Table 5-27 for sites that had public health hazard categories of 1-3 at some point during their assessment history.

Table 5-27. Hazardous Waste Sites in Muskegon County, MI

Site Name	Public Health Hazard Category	EPA NPL Status	Site ID	City
Better Brite Plating Co. Chrome and Zinc	2 (n.d. HA) 2 (1996 HC) 2 (n.d. SR)	Final	WIT560010118	De Pere
Fox River NRDA/PCB Releases	2 (2001 HA)	Proposed	WI0001954841	Green Bay

2 = Public Health Hazard

HA = Public Health Assessment, HC = Health Consultation, SR = Site Review and Update

n.d. = no date provided

For hazardous waste sites in Brown County, WI, that *at any time* had Public Health Hazard Categories of 1-3, the number of contaminant records in HazDat that exceeded health based-screening values was 592, as shown in Table 5-28. The majority of the records were for the soil media group; water and other media had the next highest number of records.

The IJC Great Lakes critical pollutants accounted for 43 (7%) of these records, with the majority for the soil media group. The IJC critical pollutants that have been found at Brown County hazardous waste sites at concentrations exceeding health-based screening values are: PCBs, DDT, lead, and mercury. Details are provided in Table 5-29.

Further evaluation of the data for the sites with Public Health Hazard Categories of 1-3 was conducted by ATSDR in the public health assessments and other health-related documents listed in the table. These evaluations are discussed in the following subsections.

5.7.1.1 Better Brite Plating Co.

This site, located in De Pere, Brown County, WI, was the subject of three ATSDR assessments (listed in the initial table for this AOC), which were not provided for inclusion in this document. Because of the

lack of assessment documents, only a brief summary of the site will be provided, based on information from HazDat and the 2003 EPA NPL fact sheet for the site.

Category of Public Health Hazard: ATSDR categorized this site as a *Public Health Hazard* (category 2) in its three assessments of the site.

Contaminants of Concern in Completed Exposure Pathways: Chromium, and particularly chromium(VI), as well as cyanide, VOCs, and zinc were associated with the site. Further detail cannot be provided at this time, due to the lack of ATSDR documents.

Demographics: Demographic profile, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	893
Females aged 15-44	3,040
Adults 65 and older	1,338

Public Health Outcome Data: To be provided.

Conclusions: To be provided when ATSDR assessments are provided for inclusion in this document. The site does not appear to have been a source of IJC critical pollutants.

5.7.1.2 Fox River NRDA/PCB Releases

The Fox River Natural Resources Damage Assessment (NRDA)/PCB Releases site includes the Lower Fox River from Lake Winnebago downstream to the bay of Green Bay in Lake Michigan. The Lower Fox River has the highest concentration of pulp and paper mills in the world. Sediments in the Lower Fox River are contaminated with PCBs released into the river from seven pulp and paper companies located along its banks. This site is the greatest contributor of PCBs to Lake Michigan. It is estimated that approximately 600,000 pounds of PCBs were released to the river, of which 160,000 pounds have entered Green Bay and Lake Michigan. Although the pulp and paper mills stopped releasing PCBs into the river in the early 1970s, the contamination persists, and has been bioaccumulated in the food chain. Fish consumption advisories were issued in 1976, and are still in effect for many fish species. Approximately 90% of the total PCB mass and a large percentage of the contaminated sediments are located in the final stretch of river from the De Pere Dam downstream to the river's mouth at Green Bay. Information regarding this site is taken from the 2001 ATSDR public health assessment for PCB contaminated sediment in the Lower Fox River and Green Bay (public comment release) and the 2003 EPA NPL fact sheet for the site.

Category of Public Health Hazard: ATSDR categorized this site as a *Public Health Hazard* (category 2) because of exposure to PCBs at levels of concern from eating contaminated fish from the area.

Contaminants of Concern in Completed Exposure Pathways: The primary public health hazard for the Fox River NRDA/PCB Releases site is high levels of PCBs in fish, due to bioaccumulation in the food chain from PCB-contaminated sediment. Fish advisories have been issued, but some people are not aware and may be exposed to PCBs at levels that may cause adverse health effects through eating the fish. Eating other PCB-contaminated wildlife, such as waterfowl and snapping turtles, may also be of health concern, but less is known about consumption frequency. Concentrations of PCBs in sediments

were judged to be not high enough to be a health concern. Although many other chemicals, including the IJC critical pollutants PCDDs, PCDFs, DDT, dieldrin, mercury, and lead, have been found in the sediments, they do not contribute significant health risk relative to that posed by PCBs.

Demographics: Demographic profiles, from the 2000 U.S. Census, for vulnerable populations living within 1 mile of the Fox River Paper Company site are as follows:

Children 6 years and younger	57
Females aged 15-44	112
Adults 65 and older	140

Demographic profiles for vulnerable populations for the entire site were not provided. According to the ATSDR health assessment, the total population residing in the communities along the river is approximately 270,000, so the vulnerable populations are likely to be much larger than shown for the Fox River Paper Company.

Public Health Outcome Data: Not reported.

Conclusions: The Fox River NRDA/PCB Releases site poses a health threat due to the PCBs in its sediments, which bioaccumulate into fish and other wildlife. This site is the greatest contributor to Lake Michigan's PCB burden. Although discharges of PCBs into the Lower Fox River are no longer occurring, the sediments within the river constitute a huge reservoir of PCBs, which has not been remediated. The site has been proposed for the NPL.

5.7.2 TRI Data for the Lower Green Bay and Fox River AOC

The TRI on-site chemical releases for Brown County, WI, are summarized in Table 5-29. Total on-site releases in 2001 were 2,866,676 pounds, the majority of which were released to air, followed by releases to land and surface water.

IJC critical pollutants accounted for 15,619 pounds (0.5 %) of the total on-site releases. The IJC critical pollutants released were PCBs (to air), PCDDs and PCDFs (primarily to air), lead and lead compounds (primarily to air and land) and mercury compounds (primarily to air). The facilities that released these pollutants are listed in Table 5-30.

The major on-site releases ($\geq 500,000$ pounds) of non-IJC chemicals were of barium compounds (primarily to land), and sulfuric acid aerosols (to air). The next largest releases (300,000-499,999 pounds) were of hydrochloric acid aerosols (to air) and nitrate compounds (primarily to surface water).

5.7.3 County Demographics and Health Status Data for the Lower Green Bay and Fox River AOC

The demographic profiles, from the 2000 U.S. Census, for vulnerable populations living in Brown County, WI, are as follows:

Children 6 years and younger	22,016
Females aged 15-44	51,703
Adults 65 years and older	24,214

According to the 2000 HRSA community health status reports, Brown County health status indicators that compared unfavorably with those of the U.S. and also with the median of the peer counties were as follows (indicators that were above the upper limit of the peer county range are bolded):

Infant mortality (per 1,000 births)

- **infant mortality**
- **white infant mortality**
- **neonatal infant mortality**

Birth measures (as percent)

- none

Death measures (per 100,000 population)

- breast cancer (female)
- stroke

5.7.4 Summary and Conclusions for the Lower Green Bay and Fox River AOC

5.7.4.1 Hazardous Waste Sites

Only two hazardous waste sites in Brown County, WI, have been assessed by ATSDR with health hazard categories of 1-3. ATSDR documentation for one of these sites, the Better Brite Plating Co., was not provided for inclusion in this document, but the site does not appear to have been a source of IJC critical pollutants.

The second site, the Fox River NRDA/PCB Releases site, includes the Lower Fox River and the bay of Green Bay, which have sediments highly contaminated with PCBs. This site is the greatest contributor to the burden of PCBs in Lake Michigan. Consumption of fish from this river is a public health hazard because the PCBs have bioaccumulated into the fish at levels that could cause adverse health effects. The site has been proposed for the NPL. It has not undergone remediation.

ATSDR has not evaluated public health outcome data for this AOC.

Issues for Follow-Up

Better Brite Plating Co.: ATSDR documentation is needed for inclusion in this document.

Fox River NRDA/PCB Releases: This site is critically important in that it is the greatest source of PCB loadings to Lake Michigan, and has not been remediated.

5.7.4.2 TRI Data

The TRI on-site chemical releases for Brown County, WI, in 2001 were 2,866,676 pounds, the majority of which were released to air, followed by releases to land and surface water.

IJC critical pollutants accounted for 15,619 pounds (0.5 %) of the total on-site releases. The IJC critical pollutants released were PCBs (to air), PCDDs and PCDFs (primarily to air), lead and lead compounds (primarily to air and land), and mercury compounds (primarily to air).

The major on-site releases ($\geq 500,000$ pounds) of non-IJC chemicals were of barium compounds (primarily to land) and sulfuric acid aerosols (to air). The next largest releases (300,000-499,999 pounds) were of hydrochloric acid aerosols (to air) and nitrate compounds (primarily to surface water).

5.7.4.3 County Demographics and Health Status Indicators

Vulnerable populations in Brown County, WI, totaled 97,933. Several Brown County health status indicators compared unfavorably with both U.S. indicators and with the median of peer county indicators. These health status indicators included **infant mortality**, **white infant mortality**, **neonatal infant mortality**, and deaths from breast cancer and stroke. Indicators that exceeded the upper end of the peer county range are shown in bold.

**Table 5-28. Waste Site Contaminants that Exceeded Health-Based Screening Values
Lower Green Bay and Fox River AOC**

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						Total	
			Air	Biota	Human Material	Other Media	Soil	Water		
001336-36-3	POLYCHLORINATED BIPHENYLS	1		5				1	1	7
000050-29-3	DDT, P,P'-	5						3		3
000060-57-1	DIELDRIN	6						1		1
007439-92-1	LEAD	8					4	23	4	31
007439-97-6	MERCURY	9						1		1
		Total IJC	0	5	0	4	29	5	43	
000071-55-6	1,1,1-TRICHLOROETHANE								6	6
000075-35-4	1,1-DICHLOROETHENE								6	6
000107-06-2	1,2-DICHLOROETHANE								2	2
007429-90-5	ALUMINUM						4	16		20
007440-36-0	ANTIMONY						4	4	4	12
007440-38-2	ARSENIC						4	15	2	21
007440-39-3	BARIUM						4	20		24
000071-43-2	BENZENE								2	2
007440-41-7	BERYLLIUM						4	8	2	14
007440-43-9	CADMIUM						4	14	6	24
007440-70-2	CALCIUM						4	16		20
007440-47-3	CHROMIUM						20	40	18	78
018540-29-9	CHROMIUM, HEXAVALENT						8	4	18	30
016065-83-1	CHROMIUM, TRIVALENT							2		2
007440-48-4	COBALT						4	16		20
007440-50-8	COPPER						4	16		20
000057-12-5	CYANIDE						18	6	4	28
HZ0400-04-T	DIOXINS/FURANS, UNSPECIFIED							1		1
007439-89-6	IRON						4	16		20
007439-95-4	MAGNESIUM						4	16		20
007439-96-5	MANGANESE						4	16	4	24
007440-02-0	NICKEL						4	16	2	22
007440-09-7	POTASSIUM						4	12		16
007782-49-2	SELENIUM						4			4
007440-22-4	SILVER						4		2	6
007440-23-5	SODIUM						4	16		20
000127-18-4	TETRACHLOROETHYLENE								4	4
007440-28-0	THALLIUM								4	4
000079-01-6	TRICHLOROETHYLENE								2	2
007440-62-2	VANADIUM						4	16		20
HZ1900-01-T	VOLATILE ORGANIC COMPOUNDS N.O.S.								2	2
007440-66-6	ZINC						4	16		20
MEDEXP-00-0			2				4		8	14
				2			6	5	8	21
		Total Non-IJC	2	2	0	132	307	106	549	
		Total	2	7	0	136	336	111	592	

Table 5-29. TRI Releases (in pounds, 2001) for the Lower Green Bay and Fox River AOC

Chemical	IJC Tracking Number	Total Air Emissions	Surface Water Discharges	Under-ground Injection	Releases to Land	Total On-site Releases	Total Off-site Releases	Total On- and Off-site Releases
POLYCHLORINATED BIPHENYLS	1	2.15	0	0	0	2.15	79	81.15
DIOXIN AND DIOXIN-LIKE COMPOUNDS (PCDDs and PCDFs)	2	0.014174622	0.00000154	0	0	0.014176166	0.00034398	0.014520146
LEAD	8	64.106	No data	0	1895	1959.106	3304.105	5263.211
LEAD COMPOUNDS	8	6285.346	12.7	0	7194	13492.046	6993.295	20485.341
MERCURY COMPOUNDS	9	128.1	0.7	0	36.7	165.5	11.2	176.7
Total IJC	6479.716175	13.40000154	0	0	9125.7	15618.81618	10387.60034	26006.41652
1,2,4-TRIMETHYLBENZENE		186	0	0	0	186	1	187
1,3-BUTADIENE		151	No data	0	0	151	0	151
ACRYLAMIDE		201	No data	0	0	201	0	201
AMMONIA		18906	440	0	805	20151	805	20956
BARIIUM COMPOUNDS		6460	59	0	580000	586519	0	586519
BENZENE		622	0	0	0	622	0	622
BIPHENYL		40000	0	0	0	40000	0	40000
CHLORINE		410	0	0	0	410	0	410
CHLOROFORM		79200	112	0	0	79312	490	79802
CHROMIUM		263	No data	0	805	1068	6181	7249
CHROMIUM COMPOUNDS (EXCEPT CHROMITE ORE MINED IN THE TRANSVAAL REGION)		5	No data	0	24700	24705	49405	74110
COPPER		1	No data	0	6644	6645	13	6658
COPPER COMPOUNDS		262	3	0	28000	28265	0	28265
ETHYLBENZENE		87	0	0	0	87	0	87
HYDROCHLORIC ACID (1995 AND AFTER 'ACID AEROSOLS' ONLY)		484708	No data	0	0	484708	0	484708
HYDROGEN FLUORIDE		137000	0	0	0	137000	0	137000
MANGANESE		370	No data	0	911	1281	938	2219
METHANOL		48500	0	0	0	48500	0	48500
METHYL ETHYL KETONE		6000	No data	0	0	6000	0	6000
METHYL ISOBUTYL KETONE		500	No data	0	0	500	0	500
METHYL METHACRYLATE		18347	No data	0	0	18347	0	18347
N-HEXANE		1337	0	0	0	1337	1	1338
NICKEL		47	No data	0	14	61	3236	3297
NICKEL COMPOUNDS		810	0	0	0	810	62793	63603
NITRATE COMPOUNDS		5	460213	0	0	460218	29	460247
NITRIC ACID		8795	0	0	0	8795	0	8795
PHENOL		0	No data	0	925	925	925	1850
POLYCYCLIC AROMATIC COMPOUNDS		5.7	0	0	2.5	8.2	0	8.2
PROPYLENE		111	No data	0	0	111	0	111
STYRENE		242093	No data	0	0	242093	103	242196
SULFURIC ACID (1994 AND AFTER 'ACID AEROSOLS' ONLY)		554493	No data	0	0	554493	0	554493
TOLUENE		3304	0	0	0	3304	1	3305
VANADIUM COMPOUNDS		398	2	0	23000	23400	33000	56400
VINYL ACETATE		42473	0	0	0	42473	5	42478
XYLENE (MIXED ISOMERS)		2209	0	0	0	2209	1	2210
ZINC COMPOUNDS		1160	2	0	25000	26162	24505	50667
Total Non-IJC		1699419.7	460831	0	690806.5	2851057.2	182432	3033489.2
Total		1705899.416	460844.4	0	699932.2	2866676.016	192819.6003	3059495.617

Table 5-30. TRI Facilities Releasing IJC Critical Pollutants On-site for the Lower Green Bay and Fox River AOC

IJC Critical Pollutant	Number of Facilities	Facility Name	TRIF ID	City
Polychlorinated biphenyls	1			
Brown County, WI	1	HALRON EAST TERMINAL	54302HLRNS2220N	GREEN BAY
Dioxin and dioxin-like compounds (PCDDs and PCDFs)	4			
Brown County, WI	4	DEPERE FNDY. INC.	54115DPRFN805SS	DE PERE
		FORT JAMES OPERATING CO.	54307FRTHW1919S	GREEN BAY
		PROCTER & GAMBLE PAPER PRODS. CO.	54308THPRC501EA	GREEN BAY
		PULLIAM POWER PLANT	54303PLLMP1530N	GREEN BAY
Lead and lead compounds	13			
Brown County, WI	13	ASTRO INDS. INC.	54304STRND810PA	GREEN BAY
		BAY ENGINEERED CASTINGS INC.	54115BYNGN1900E	DE PERE
		DEPERE FNDY. INC.	54115DPRFN805SS	DE PERE
		FORT JAMES OPERATING CO.	54307FRTHW1919S	GREEN BAY
		FORT JAMES OPERATING CO.	54305JMSRV500DA	GREEN BAY
		FOX VALLEY METAL-TECH INC.	54304FXVLL1201P	GREEN BAY
		GREEN BAY PACKAGING INC. MILL & SHIPPING CONTAINER DIVS.	54302GRNBY1601N	GREEN BAY
		HALRON EAST TERMINAL	54302HLRNS2220N	GREEN BAY
		INTERNATIONAL PAPER - DE PERE FACILITY	54115NCLTP200MA	DE PERE
		PULLIAM POWER PLANT	54303PLLMP1530N	GREEN BAY
		SONOCO U. S. MILLS INC. DEPERE MILL	54115SNCSM800FO	DE PERE
		ULTRA PLATING	54306LTRPL345SP	GREEN BAY
		WESTERN LIME CORP. GREEN BAY FACILITY	54303WSTRN101JA	GREEN BAY
Mercury and mercury compounds	3			
Brown County, WI	3	FORT JAMES OPERATING CO.	54307FRTHW1919S	GREEN BAY
		GREEN BAY PACKAGING INC. MILL & SHIPPING CONTAINER DIVS.	54302GRNBY1601N	GREEN BAY
		PULLIAM POWER PLANT	54303PLLMP1530N	GREEN BAY

5.8 MENOMINEE RIVER AOC, MENOMINEE COUNTY, MI AND MARINETTE COUNTY, WI

The Menominee River AOC includes the lower 4.8 km of the Menominee River (from the Upper Scott Paper Company Dam to the river's mouth) and approximately 5 km north and south of the river's mouth along the shoreline of Green Bay. The AOC also includes the cities of Marinette and Menominee (see AOC map in the appendix).

5.8.1 Hazardous Waste Sites Relevant to the Menominee River AOC

No hazardous waste sites in Menominee County, MI, and Marinette County, WI, have been categorized by ATSDR in public health hazard categories 1-3.

5.8.2 TRI Data for the Menominee River AOC

The TRI on-site chemical releases for Menominee County, MN, and Marinette County, WI (combined) are summarized in Table 5-31. Total on-site releases in 2001 were 496,429 pounds, the majority of which were released to air, followed by releases to land.

IJC critical pollutants accounted for 993 pounds (0.2%) of the total on-site releases. The IJC critical pollutants released were PCDDs and PCDFs (to air and land), lead and lead compounds (primarily to air), and mercury compounds (primarily to air and land). The facilities that released these pollutants are listed in Table 5-32.

No non-IJC chemicals were released in quantities of at least 150,000 pounds.

5.8.3 County Demographics and Health Status Data for the Menominee River AOC

The demographic profiles, from the 2000 U.S. Census, for vulnerable populations living in the two counties of the Menominee River AOC are shown in Table 5-33.

Table 5-33. County Demographic Profiles for the Menominee River AOC

Vulnerable Population	Menominee County, MN	Marinette County, WI	Total for AOC
Children 6 years and younger	2,102	3,088	5,190
Females aged 15-44	4,710	6,757	11,467
Adults 65 years and older	4,392	4,946	9,338

According to the 2000 HRSA community health status reports, county health status indicators that compared unfavorably with those of the U.S. and also with the median of the peer counties were as follows (indicators that were above the upper limit of the peer county range are bolded):

Menominee County

Infant mortality (per 1,000 births)

- white infant mortality

Birth measures (as percent)

- no care in first trimester

Death measures (per 100,000 population)

- colon cancer
- coronary heart disease

Marinette County

Infant mortality (per 1,000 births)

- infant mortality
- white infant mortality
- post-neonatal infant mortality

Birth measures (as percent)

- no care in first trimester

Death measures (per 100,000 population)

- **breast cancer (female)**
- **coronary heart disease**

5.8.4 Summary and Conclusions for the Menominee River AOC

5.8.4.1 Hazardous Waste Sites

No hazardous waste sites in Menominee County, MI, and Marinette County, WI have been categorized by ATSDR in public health hazard categories 1-3.

5.8.4.2 TRI Data

The TRI on-site chemical releases for Menominee County, MN, and Marinette County, WI, (combined) in 2001 were 496,429 pounds, the majority of which were released to air, followed by releases to land.

IJC critical pollutants accounted for 993 pounds (0.2%) of the total on-site releases. The IJC critical pollutants released were PCDDs and PCDFs (to air and land), lead and lead compounds (primarily to air), and mercury compounds (primarily to air and land). No non-IJC chemicals were released in quantities of at least 150,000 pounds.

5.8.4.3 County Demographics and Health Status Indicators

Vulnerable populations in Menominee County, MN, totaled 11,204, and in Marinette County, WI, totaled 14,791. Health status indicators in Menominee County that compared unfavorably with both U.S. indicators and with the median of peer county indicators were white infant mortality, no care in first trimester, and deaths from colon cancer and coronary heart disease. None exceeded the peer county range. Health status indicators in Marinette County that compared unfavorably with both U.S. indicators and with the median of peer county indicators were infant mortality, white infant mortality, post-neonatal infant mortality, no care in first trimester, and deaths from **breast cancer** and **coronary heart disease**. Indicators that exceeded the peer county range are bolded.

Table 5-31. TRI Releases (in pounds, 2001) for the Menominee River AOC

Chemical	IJC Tracking Number	Total Air Emissions	Surface Water Discharges	Under-ground Injection	Releases to Land	Total On-site Releases	Total Off-site Releases	Total On- and Off-site Releases
DIOXIN AND DIOXIN-LIKE COMPOUNDS	2	0.000646771	0	0	0.00069506	0.001341831	0	0.001341831
(PCDDs and PCDFs)	3							
LEAD	8	9.3	0	0	0.01	9.31	312.010723	321.320723
LEAD COMPOUNDS	8	31.92	0	0	929.43	961.35	188	1149.35
MERCURY COMPOUNDS	9	14.2	0.1	0	7.7	22	0	22
Total IJC		55.42064677	0.1	0	937.1406951	992.6613418	500.010723	1492.672065
ALUMINUM (FUME OR DUST)		8940	0	0	0	8940	14564	23504
ALUMINUM OXIDE (FIBROUS FORMS)		250	0	0	0	250	2700	2950
AMMONIA		27250	6165	0	14	33429	2501	35930
BERYLLIUM COMPOUNDS		10	5	0	0	15	255	270
BORON TRICHLORIDE		16	0	0	0	16	0	16
CERTAIN GLYCOL ETHERS		16198	0	0	0	16198	250	16448
CHLORINE		136	0	0	0	136	0	136
CHLOROBENZENE		32	0	0	0	32	0	32
CHLOROMETHANE		1405	0	0	0	1405	0	1405
CHROMIUM		1125	255	0	3400	4780	6121	10901
CHROMIUM COMPOUNDS(EXCEPT CHROMITE ORE MINED IN THE TRANVAAL REGION)		255	5	0	0	260	3255	3515
COBALT		269	250	0	3700	4219	4527	8746
COBALT COMPOUNDS		10	5	0	0	15	255	270
COPPER		1616	250	0	70	1936	2080	4016
COPPER COMPOUNDS		255	250	0	0	505	5	510
DICHLOROMETHANE		2328	0	0	0	2328	0	2328
DIISOCYANATES		10	0	0	0	10	5	15
DIMETHYLAMINE		27	0	0	0	27	0	27
ETHYLBENZENE		10505	0	0	0	10505	0	10505
ETHYLENE GLYCOL		500	0	0	0	500	0	500
HYDROCHLORIC ACID (1995 AND AFTER 'ACID AEROSOLS' ONLY)		76072	0	0	0	76072	0	76072
HYDROQUINONE		10	0	0	0	10	0	10
MANGANESE		201	0	0	0	201	315	516
MANGANESE COMPOUNDS		255	250	0	0	505	196005	196510
METHANOL		20171	3400	0	0	23571	0	23571
METHYL ETHYL KETONE		250	0	0	0	250	0	250
METHYL ISOBUTYL KETONE		1920	0	0	0	1920	0	1920
N,N-DIMETHYLFORMAMIDE		17	0	0	0	17	0	17
N-BUTYL ALCOHOL		50875	0	0	0	50875	1235	52110
NICKEL		1274	255	0	2200	3729	8407	12136
NICKEL COMPOUNDS		500	250	0	0	750	1505	2255
NITRATE COMPOUNDS		0	33000	0	0	33000	5	33005
O-CRESOL		2	0	0	0	2	0	2
PHENOL		6361	250	0	0	6611	250	6861
STYRENE		84311	0	0	0	84311	0	84311
SULFURIC ACID (1994 AND AFTER 'ACID AEROSOLS' ONLY)		500	0	0	0	500	0	500
TOLUENE		33631	0	0	0	33631	9391	43022
TRIETHYLAMINE		5850	0	0	0	5850	0	5850
VINYL ACETATE		20465	0	0	0	20465	0	20465
XYLENE (MIXED ISOMERS)		66660	0	0	0	66660	1235	67895
ZINC COMPOUNDS		750	250	0	0	1000	33505	34505
Total Non-IJC		441212	44840	0	9384	495436	288371	783807
Total		441267.4206	44840.1	0	10321.1407	496428.6613	288871.011	785299.6721

Table 5-32. TRI Facilities Releasing IJC Critical Pollutants On-site for the Menominee River AOC

IJC Critical Pollutant	Number of Facilities	Facility Name	TRIF ID	City
Dioxin and dioxin-like compounds (PCDDs and PCDFs)	2			
Marinette County, WI	2	KARL SCHMIDT UNISIA INC. STORA ENSO N.A. NIAGARA MILL	54143KSGND1731I 54151NGRFW1101M	MARINETTE NIAGARA
Lead and lead compounds	6			
Marinette County, WI	4	DECRANE AIRCRAFT SEATING CO. INC. - APD MARINETTE CASTING CORP. KARL SCHMIDT UNISIA INC. STORA ENSO N.A. NIAGARA MILL	54157DCRNR701MA 54157MRNTT801MA 54143KSGND1731I 54151NGRFW1101M	PESHTIGO PESHTIGO MARINETTE NIAGARA
Menominee County, WI	2	GIDDINGS & LEWIS CASTINGS MENOMINEE ACQUISITION CORP.	49858DDNGS1610I 49858MNMNP144FI	MENOMINEE MENOMINEE
Mercury and mercury compounds	1			
Marinette County, WI	1	STORA ENSO N.A. NIAGARA MILL	54151NGRFW1101M	NIAGARA

5.9 MANISTIQUE RIVER AOC, SCHOOLCRAFT COUNTY, MI

The Manistique River AOC is the last 1.7 miles of the river, from the dam to the mouth of the harbor at Lake Michigan (see AOC map in the appendix).

5.9.1 Hazardous Waste Sites Relevant to the Manistique River AOC

No hazardous waste sites in Schoolcraft County, MI, have been categorized by ATSDR in public health hazard categories 1-3.

5.9.2 TRI Data for the Manistique River AOC

No releases were reported to the TRI for Schoolcraft County in 2001 (or 2000).

5.9.3 County Demographics and Health Status Data for the Manistique River AOC

The demographic profiles, from the 2000 U.S. Census, for vulnerable populations living in Schoolcraft County, MI, are as follows:

Children 6 years and younger	1,432
Females aged 15-44	3,204
Adults 65 years and older	3,306

According to the 2000 HRSA community health status reports, Schoolcraft County health status indicators that compared unfavorably with those of the U.S. and also with the median of the peer counties were as follows (indicators that were above the upper limit of the peer county range are bolded):

Infant mortality (per 1,000 births)

- infant mortality
- neonatal infant mortality

Birth measures (as percent)

- none

Death measures (per 100,000 population)

- breast cancer (female)
- **colon cancer**
- coronary health disease
- **lung cancer**

5.9.4 Summary and Conclusions for the Manistique River AOC

5.9.4.1 Hazardous Waste Sites

No hazardous waste sites in Schoolcraft County, MI, have been categorized by ATSDR in public health hazard categories 1-3.

5.9.4.2 TRI Data

No releases were reported to the TRI for Schoolcraft County in 2001 (or 2000).

5.9.4.3 County Demographics and Health Status Indicators

Vulnerable populations in Schoolcraft County, MI, totaled 7,942. Several Manistique County health status indicators compared unfavorably with both U.S. indicators and with the median of peer county indicators. These health status indicators were infant mortality, neonatal infant mortality, and deaths from breast cancer, **colon cancer**, coronary heart disease, and **lung cancer**. Indicators that were above the upper end of the peer county range are bolded.