SUMMARY REPORT

OF REVIEWER COMMENTS

ON THE REPORT ON

PUBLIC HEALTH IMPLICATIONS OF HAZARDOUS SUBSTANCES IN THE TWENTY-SIX U.S. GREAT LAKES AREAS OF CONCERN

Submitted to:

The Agency for Toxic Substances and Disease Registry
4770 Buford Highway
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Submitted by:

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July 7, 2004

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SECTION 1

PEER REVIEWERS' SUMMARY REPORTS ON GREAT LAKES AOC DOCUMENT

PEER REVIEWER COMMENTS FROM

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May 25, 2004

Ms. Andreas Lord
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110 Hartwell Avenue
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Dear Ms. Lord:

Attached is my review of the draft of the report entitled, "Public Health Implications of Hazardous Substances in the Twenty-six U.S. Great Lakes Areas of Concern". Also enclosed is an invoice in the amount of $2,000 for work completed on ERG Task No. 42, under ATSDR Contract No. 200-1999-00058.

Question 1: Is the report written in a manner understood by those with expertise in the subject matter as well as the general public?

In general, this is an excellent report containing adequate detail on technical issues, but written in a fashion that is easily understandable by the non-expert. There is an enormous amount of data in the report, and the inclusion of the TRI data adds much to the available information.

Question 2: Has this report adequately identified the evaluated waste sites located in the 26 US AOCs?

There is a major lack in the failure to consider the AOCs that are on the Canadian borders. At least for those in New York (the Niagara River and the St. Lawrence River), the major polluted sites are on the US side of the border, and even if that is not the case there should have been a review of the dangers to the US population whether or not the major source of the contamination originated on the US side.

On the other hand, the evaluations of the 26 US AOCs that are not bi-national is excellent. However, I do have major problems with the categories of some of these sites, which will be detailed at the end of this report. I find many of these categories to be overly conservative, in that it appears to me that the degree of hazard to human health is clearly much stronger than the assigned category would indicate. These issues are dealt with under question 12.

I very much appreciate the inclusion of information on the TRI and the contaminants that are not listed as IJC critical pollutants. All of these sources contribute to human ill health, and the report provides one of the best summaries of total exposures available.

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Question 3: Is the explanation of the hazard categories sufficient so that the significance for their use is clearly understood?

The short answer is "no". My major problem is with category 3, Indeterminate Public Health Hazard. I would suggest that this should be broken down into two different categories, the first being "Possible Public Health Hazard" and the second "Indeterminate Public Health Hazard". "Indeterminate" suggests that there is just not enough information on the levels of contaminants. However, as detailed below, you list a number of sites in category 3 in the face of clearly elevated levels of contaminants but with less well documented human exposure. For example, the first listing of the Fulton Terminals. You report that there is danger in the event of unauthorized entry to the site, ingestion of contaminated groundwater and use of the Oswego River for fishing. There is massive fishing in the Oswego River at least every fall, and I'm sure that a fence is only a challenge for kids. I do not believe this is an appropriate category for this site. If contaminate levels are elevated on site, with humans having any access, or if contaminates migrate off-site, there is a strong possibility of there being a public health hazard. Without this additional category of "Possible Health Hazard" I will argue strongly that some of the sites listed as a category 3 should be a category 2.

On a related issue, I strongly object to the use of FDA fish consumption levels for PCBs, rather than those of EPA. The FDA value of 2 ppm is a standard for interstate commerce. It was never based solely on consideration of health effects, but with a major consideration of the economy to the fishing industry. It is outdated, having been created long before many of the dangers of PCB exposure were understood, and has never been revised since being established, I believe in 1984. The FDA regulatory standards do not deal at all with frequency of fish consumption. Obviously, the important issues are not only what the contaminant levels are in the fish one eats, but how frequently you eat them. The EPA fish advisories were specifically created to deal with sports fishing, which is what is of consideration here, and considers both contaminant levels and frequency of consumption. They are based entirely on human health considerations, not concern for the economy of industrial activities. They are 40-fold more restrictive, and are designed to protect human health. The humans of concern here are not commercial fisherman, and their health should be protected using only health considerations in the advisories and in developing the categories of risk.

Question 4: Is the relevant demographic information on populations at risk sufficient?

Yes, it is sufficient, but I question how important it is. Is the risk any less important if only a few people are exposed? In my judgment, the site characterization should be the same whether three kids sneak onto the site and are exposed as a result, or 3 million people that live nearby. The demographic information is perhaps valuable in setting priorities for clean-up, but in my judgment is not very important with regard to categorizing the risk.

Question 5: Are the IJC critical pollutants adequately discussed?

Yes - and this is very well done.

Question 6: Is the topic of completed exposure pathways sufficiently discussed?

No. There is never a definition of what is even meant by "completed exposure pathways". Again with the first listing there is the statement (which is the first using the term "completed exposure

pathways") "Groundwater flows into the Oswego River. The site was fenced and groundwater was not used for drinking water, so completed exposure pathways did not exist". This sentence makes no sense whatsoever. If the groundwater flows into the Oswego River that is certainly an exposure pathway for anyone who fishes or swims in the River. Do you really mean "documented exposure pathways"?

In terms of exposure pathways, I also feel that there is inadequate attention to inhalation of substances in the vapor phase coming from the sites, and such exposure is certainly not going to be contained by fences. Many of my recent publications have dealt with disease people show in excess if they live in a zip code that contains or abuts a hazardous waste site containing PCBs, dioxins/furans or persistent pesticides. As in the Health Canada studies from 1998 of hospitalizations in residents near the 17 AOCs in Ontario, we have found elevations in thyroid disease, female genital disease, infectious respiratory diseases and low birth weight in these residents in New York, even though zip code of residence is a very poor measure of exposure. In addition, we will be submitting reports shortly showing a significant elevation of a number of chronic diseases, including hypertension, diabetes, ischemic heart disease and stroke, in these zip codes, again consistent with the Health Canada reports.

If I understand what you are trying to say here, I believe the proper term would be "Documented exposure pathways." Whatever you mean it must be defined, at the very least.

Question 7: Is the relationship between the completed exposure pathways and the IJC critical pollutants explained sufficiently so that there is clarity about a potential effect from this completed exposure pathway?

As indicated above, I don't know what you mean by "completed exposure pathways", so clearly I can't answer this question. There is clear delineation of which are IJC critical pollutants and which are not.

Question 8: Does the USEPA TRI data give adequate support to the impact from other sources of IJC critical pollutants?

The TRI data is very valuable. What is missing is information on air emissions from the AOCs themselves, as discussed above. Both forms of air emissions are going to travel much further and in different directions from ground water contamination, and certainly should be considered.

Question 9: Do the GIS maps enhance the understanding of the potential hazard from the IJC critical pollutants at particular hazardous waste sites?

Yes, indeed. These are very valuable.

Question 10: Are the potential associations between health effects observed and the potential exposure to critical pollutants reasonable?

The information presented on former Health Consultations and reports by state agencies is valuable. However, in my judgment, there is a grossly inadequate amount of health outcome information available at all of these sites, and this should be clearly indicated. This kind of information is simply not captured in the other health status indicators, such as infant mortality and lack of prenatal care.

Question 11: Are the limitations of the report sufficiently discussed?

In general the answer is "yes", with some exceptions. There is a clear indication of when there is inadequate information on contaminant levels and migration, but the problems discussed above are not sufficiently discussed. In addition, the statements regarding what ATSDR classified each site as in various periods of time is confusing. Why would a site go from a category 2 to a category 4 to a category 2 in subsequent years? I assume this is on the basis of new information, but the way this is reported seems arbitrary.

Question 12: Were the conclusions drawn from the data appropriate and accurately documented in the report?

Many of the conclusions are reasonable, but some are not. Those that I have a particular problem with are as follows:

2.1.1.1. Fulton Terminals. I discussed this one above. I believe this should be rated in category 2, not 3. This is true even if a new category of "Possible Public Health Hazard" were to be established.

2.1.1.3. Volney Municipal Landfill. How can you call this an Indeterminate Public Health Hazard and follow that classification by the statement "because of the outward radial spread of a contaminated groundwater plume which poses a potential threat to the health and safety of nearby residents...".

3.2.1.2. Hammermill-Scott Run Site: I don't have a problem with the category, but do have a problem with some statements. With deteriorating drums containing unknown substances it is certainly inappropriate to say there is no public health risk from hazardous chemicals migrating off site. It is also inappropriate to assume that there is no fishing in Scott Run. I doubt very much that there is any stream for which there is no fishing, and the hazards should not be qualified on the basis of whether or not ATSDR knows about whether or not there is fishing.

3.2.1.3. Lord Shope Landfill: This one is very wrong, since it is rated as a category 4. Ignoring lead and arsenic in well water just because they are not documented as coming from the site is inappropriate. It is also not appropriate to ignore VOCs and metal in groundwater just because you don't <u>know</u> someone is drinking it. This should be labeled, "Possible public health hazard".

3.3.1.1. Big D Campground: This should be a category 2. You have documented groundwater contamination with VOC and heavy metals.

3.3.1.2. Fields Brook: This is rated as a category 4, but I think should be a category 3. Uranium dust is highly toxic, and only recently is there any real attention to how toxic it is, thanks to the military use of depleted uranium.

3.3.1.3. Laskin Poplar Oil. This should be rated as a category 2. You have documented contamination with PCBs, dioxins, lead and mercury. The roads were oiled with this stuff, and you have documented groundwater contamination. Just because one does not know that groundwater is used for drinking purposes is not adequate justification for a category 3 rating.

3.5.1.1. Ford Road Industrial Landfill. This should be a category 2, not 3. When you have an unlined landfill without an approved cap with visible drums, with documented elevated levels of

PCBs, B(a)P, arsenic and lead in the Black River it is not appropriate to classify this site in category 3.

3.7.1.1. Consolidate Packaging Corp. This site should be listed as a category 2 hazard. You have documented excessive level of contaminants, reports of children fishing in the lagoon, elevated PCBs in the fish in the River Raisin, contaminants in groundwater, etc. If the only issue were the incomplete monitoring data a category 3 would be justified, but you have much more than that here.

3.8.1.15. Rose Township Dump. This site should also be listed as a category 2 health hazard. You have documented groundwater contamination in an area where residents depend upon groundwater for drinking. You know there is sediment contamination so, of course, the fish are contaminated whether or not they were tested. This Indeterminate category is simply not appropriate.

3.9.1.1. G & H Landfill. This site should also be a category 2, or at least a new category of Possible Human Health Hazard. You have a clearly contaminated site with groundwater flowing toward the Clinton River. How much more evidence do you need?

4.1.1.7. Veisicol Chemical. This should definitely be a category 2. To use the fact that a fish advisory has been issued as a basis of a category 3 is totally unacceptable. Most people don't even know about advisories, and even if they do, they pay no attention. The fact that remediation is underway does not alter the reality that at present this site poses a public health risk.

4.1.1.12. Dow Chemical Co. It is outrageous to classify this site as a category 3!!! You have documented high levels of dioxins and furans in soils on site, some of the most dangerous compounds known, with a history of migration off-site including contamination of fish in the Tittabawassee River, plus evidence of air releases for a long time. There has been a history of floods that have overwhelmed the wastewater treatment facility. You have documented high levels of TEQs in residential areas, with higher-than-expected cancer rates. What more do you need? This site should probably be a category 1.

4.1.1.13. Tittabawassee River. The same is true for this site - it should be a category 1. You have documented contamination of soils, sediments and fish with dioxins.

4.1.1.15. Laingsburg. This is one where the new category of "Possible Human Health Hazard" would be appropriate. The contaminants are mostly VOCs, but there are residences nearby that depend upon groundwater for drinking. It seems likely that they are contaminated, but clearly there is not proof.

5.1.1.8. Ruddiman Drain Area. This one is clearly inappropriately classified. You have documented PCB and lead contamination in a creek that is less than 100 feet from apartments and a school. You don't have to know any more than children are exposed by fishing, wading and swimming in the water.

5.1.1.10. Thermo-Chem Incorporated. This should be a category 2. It is totally inappropriate to use FDA regulatory standards for PCBs in fish as an indicator of safety!!! The fact that there are no residences near the site does not mean that no one is fishing and exposed.

5.2.1.2. Allied Paper/Portage Creek/Kalamazoo River. How you can categorize this as a category 4 is totally beyond me!!! You have fish with PCB levels that exceed even the ridiculous FDA standard, with clear evidence that people are eating the fish. The text is totally inconsistent with the public health category. This site should be at least a category 2 - perhaps even a category 1 site.

5.3.1.5. Ninth Avenue Dump. Another totally inappropriate category. How can you say Indeterminate Public Health Hazard when you have documented migration of PCBs, B(a)P, lead and benzene in groundwater, sediments and soils with discharges into Lake Michigan? As long you have PCBs flowing into Lake Michigan you have an urgent public health hazard!

5.4.1.6. Yeoman Creek Landfill. This is rated a category 4, which is not adequately protective. You give a clear statement that there is concern about migration of PCBs into the Yeoman's Creek as well as flammable gases into buildings. This certainly does not sound like a No Apparent Public Health Hazard! In addition, statements that "access to the site is restricted" does not mean that no one has access. This should be listed as a "Possible Human Health Hazard."

Question 13: Does the report adequately summarize the public health implications of hazardous substances in the 26 Great Lakes AOCs?

Yes and no. The summary of the contaminants present and the degree of migration offsite appears to be excellent, and this report is a very valuable resource. However, I do not believe that this report presents a characterization of the human health hazards to an adequate degree at many of the sites, as indicated above under question 12. It is imperative that ATSDR not understate human health hazards. Until there is clear evidence that a site does not pose a hazard to human health, it is totally inappropriate to rank it as "indeterminate", in this reviewer's judgment. There are assumptions that I feel are unjustified - for example, assuming that just because a site is fenced that children and others don't get in. And the use of FDA fish advisories, which are more designed to protect industry than people, when the EPA guidelines were developed specifically for the Great Lakes and are based only on health considerations, is totally unjustified. I am sure there are pressures from the industries to minimize the public health concerns, but it is the responsibility of ATSDR to protect human health, not Dow Chemical and other polluters.

Minor typos and corrections needed:

Page 10, line 2 - should be NY, not OH. Page 146, fifth line from bottom. I assume this should be Public Health Hazard (category 2, not category 4. Page 150, 12th and 13th line from bottom. I assume this also should be Public Health Hazard (category 2). Page 185, second paragraph from top. I assume this should be "Indeterminate Public Health Hazard". Page 185, third paragraph, third line. Should be FDA, not PDA. Thank you for the opportunity to review this important document.

Sincerely,

David O. Carpenter, MD
Professor & Director
Institute for Health and the Environment

Attachments

PEER REVIEWER COMMENTS FROM

Michael Gilbertson, MS Ecology
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Peer Review of:-
Public Health Implications of Hazardous Substances in the Twenty-Six U.S. Great Lakes Areas of Concern

In Fulfillment of Consultant Agreement
0127.00.042.001/2
Between:-
Eastern Research Group Incorporated,
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And

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I have read the draft report titled "Public Health Implications of Hazardous Substances in the Twenty-Six U.S. Areas of Concern" prepared by the Agency for Toxic Substances and Disease Registry, Centers for Disease Control and Prevention, and the Syracuse Research Corporation. The report is a remarkable synthesis of information that has been prepared from a series of data sources listed in Section 8 of the report on page 305. For anyone interested in the continuing seriousness of pollution of the Great Lakes, particularly with persistent toxic substances, the report is a useful summary of the status of the extensive remedial activities that have been undertaken, of the work that still needs to be done, and of indices of community health.

In general, I feel that the report assumes that the reader is familiar with the material. For example, the Introduction contains an all too brief reference to the Great Lakes Water Quality Agreement. The non-specialist reader might benefit from some further brief context of the Boundary Waters Treaty and the special long-term U.S. relationship with Canada with regard to water pollution control in these shared international water bodies. Similarly, I also think that there needs to be some general acknowledgement of the status of the Canadian Areas of Concern. All this work used to be undertaken on a bilateral basis, particularly through the International Joint Commission. While ATSDR is not directly responsible for maintaining bilateral working relations between the U.S. and Canada on Great Lakes water quality, the relationship needs to be fostered in this kind of document. Similarly, I feel that there should be more of an acknowledgment in the Introduction and in the Conclusions, of the Areas of Concern in the Connecting Channels since several of these have been (Niagara River AOC), or still are (Detroit River AOC) dominant sources of chemicals to the lakes.

The following comments are offered in the spirit of cooperation since such a document has a utility that is potentially far beyond the narrow bounds of its origins or of the methodological limitations. I have organized my comments on the basis of the following headings:- Why was the work undertaken?; Who is the intended audience?; History and limitations of :- the Remedial Action Plan approach; the Critical Pollutants approach; and the health endpoints selected. Appendix 1 comprises page-by-page specific comments, and suggested corrections to typographical errors. Appendix 2 contains answers to the specific questions sent to reviewers.

I must also lay bare some of my biases since these will color my evaluation of the draft report. Part of my recent experience is from working with the Health Canada health data and statistics for the 17 Canadian Areas of Concern. That work, which had its origins in discussions in the IJC Human Health Committee in 1986, lead to a rich data set, which has still not yet been completely interpreted. The detail of the Health Canada data set and the quality of the work that was undertaken colors my review of the ATSDR and my response under the five headings listed above.

A second bias is that epidemiology, after more than thirty successful years of applying mathematics and computers to large databases, has reached a crisis with "risk factors" becoming ever more marginal. The ATSDR report is a quasi-epidemiological approach to community health in the Areas of Concern and therefore my biases come into play. The solution advocated by leading epidemiologists is to reconnect to public health and to place the results in a social,

economic and political setting (See references by Susser, M. and Susser, E. 1996 a & b, American Journal of Public Health 86(5):668-673 & 674-677; Pearce, N. 1996. American Journal of Public Health 86(5):678-683; and Pekkanen, J. and Pearce, N. 2001. Environmental Health Perspectives. 109(1):1-5). I have therefore, in making comments on the ATSDR report not been shy about bringing in the social, economic and political context if I feel it contributes to the critical analysis of this work.

Another bias, related to the previous one, is my disappointment with the Parties and with the International Joint Commission in not following through with the leadership they showed during the late 1980s and early 1990s in implementing the Great Lakes Water Quality Agreement under the presidency of George Bush senior. As former U.S. IJC Chairman Gordon Durnil noted in his book titled "The Making of a Conservative Environmentalist" the chemical industry got into the new White House of President Clinton to make sure that the new U.S. commissioners "were not as green as the current bunch." A process of dismantling environmental agencies has characterized the past eleven years, which even had former U.S. EPA Administrator Russell Train decrying the destruction of the bureaucracy (Train, R. (2003). E.P.-Eh? The EPA just isn't like it was in the good ol' (Nixon) days. September 22 edition of Grist). That is why it is a particular pleasure to see the initiative shown by the Agency for Toxic Substances and Disease Registry and the Centers for Disease Control and Prevention in providing this new synthesis linking information on the Areas of Concern with data from the Toxic Release Inventory and from Community Health Status Reports.

Why was the work undertaken?

I am left, after reading the document, with a question about its purpose. On page 1 of the Introduction, the report records that:-

> "In an upcoming Biennial Report, the International Joint Commission (IJC) intends to comment on the hazards posed by the continuing presence of hazardous substances in the 26 U.S. AOCs. To this end, the Commission asked [the] Agency for Toxic Substances and Disease Registry (ATSDR) to provide and evaluate information on public health assessments that it has conducted on hazardous waste sites within the 26 AOCs."

I recall that there was no small disappointment in ATSDR four-years-ago, when the 10th Biennial Report omitted any mention of the enormous scientific advances that had been made in telling the Great Lakes human health story after the St Lawrence – Great Lakes Health Conference held in Montreal in 1997. I am not sure that I sense any greater enthusiasm within IJC at the moment, in preparing the 12th Biennial Report to Governments on Water Quality, for inclusion of any mention of Areas of Concern, Remedial Action Plans or Lakewide Management Plans for Critical Pollutants. This product, however, is much too valuable to allow it to be presented to only one audience and this leads to my second question.

Who is the intended audience?

I don't think I am giving away any state secrets when I say that there is little support among the Parties to the Great Lakes Water Quality Agreement for implementing Annex 2 of the Great Lakes Water Quality Agreement. True, there are Remedial Action Plans that are being

implemented, particularly under court order. For example, there has been a thorough job done at Massena in New York State doing the remedial work on the waste sites at Reynolds Aluminum, Alcoa and the GM foundry and removing contaminated sediments from the St Lawrence River. Similarly, there are other massive undertakings that have been accomplished over the past twenty years at the dumpsites at Niagara Falls, New York and remedial work on the PCB soil and sediment contamination at Waukegan, Illinois. But these are exceptions and, in too many cases, the preparation of Remedial Action Plans for Areas of Concern, and Lakewide Management Plans for Critical Pollutants, have been exercises in denial and funding for coordinators has largely been curtailed or terminated.

If there is to be a resurgence of commitment by the Parties to implementing the Great Lakes Water Quality Agreement, and Annex 2 in particular, it will be through the public becoming aware of the injury to health or property that is still occurring from exposures to chemicals. The Parties and the Commission have little intention of elaborating the evidence of injury to health and property since this would compel allocations of funds from government and industry for cleanup. By linking the community health indicators for the Areas of Concern on the U.S. side of the Great Lakes, ATSDR has contributed to the process of generating hypotheses about chemically-induced injury to health and thereby contributed to the possibility of a resurgence of commitment to implementing Annex 2. For these reasons, I believe that it is important that the documents should be made available to the general public and efforts should be made to explain them at public meetings associated with the Remedial Action Plans process to inform the participants. To a large extent, the RAP and LaMP processes have been taken over by the fisheries biologists introducing a myriad of "ecosystem stressors" other than chemical pollutants. Anything that could help the meetings get back on track would be in the public interest and this ATSDR document could help in that process.

A third audience might be other health researchers in the Great Lakes basin. The linking of the various databases on the status of the AOCs, the relevant TRI data and community health indicators might provide new hypotheses. This was the purpose of the Health Canada exercise in collecting the health data and statistics for the 17 Canadian Areas of Concern. There are two problems with this approach. First, the community health indicators that are available for the U.S. AOCs may have little connection to possible exposures to pollutants. The exceptions, as have been brought out in the conclusions on page 303, are the three "possible associations" of thyroid disease at Buffalo River AOC; bladder cancer and benzidine compounds at Muskegon Lake AOC; and increased birth weight from fish eating at Sheboygan River AOC. The second problem with this approach is bureaucratic. Health authorities in both countries seem to be reluctant to generate new hypotheses. The modus operandi within health bureaucracies seems to be "Don't bring me problems for which you do not have a solution." Scientists linking these kinds of databases to generate new hypotheses are likely to find themselves bringing forward serious environmental health issues occurring within communities for which senior health administrators feel they do not have solutions. In this sense, health researchers need encouragement and protection if they are to contribute scientific knowledge that will lead to health protection in AOCs affected by exposures to pollutants.

History and Limitations of the Remedial Action Plan Process.

I think it is important in writing this ATSDR document to give a bit more of the context of the origins of Annex 2 on Remedial Action Plans and Lakewide Management Plans for Critical Pollutants. In the late 1970s and early 1980s, the International Joint Commission was disturbed about the lack of progress that was being made in meeting water quality objectives at many locations on the Great Lakes. In the mid-1980s, there was an initiative within the Great Lakes Water Quality Board to respond. The Board members named 42 locations where water quality was chronically out of compliance. The Board proposed a process for developing Remedial Action Plans and this was eventually codified in 1987 in the Protocol amending the 1978 Great Lakes Water Quality Agreement. This process, which is set out in section 4 (a) (i)-(viii) included:- problem definition and causes of "beneficial use impairments"; evaluation and selection of additional remedial measures; identification of individual or agency responsible for implementation; evaluation of implementation and effectiveness. One of the limitations of the approach was that the negotiators omitted consideration of "injury to health" as an impairment of beneficial use and it has consequently been difficult to ensure that this topic is kept at the center of the RAP process.

A second limitation of the Remedial Action Plans concerns delineation of the Areas of Concern. Some of the chemicals that are persistent, toxic and bioaccumulated in food-chains, are redistributed and have the potential to cause injury to health and property far from the point of discharge. For example, the 400 tons of mercury released by Dow Chemical at Sarnia, Ontario, was redistributed down the St Clair River, into Lake St Clair, down the Detroit River and into the western basin of Lake Erie. The question arises where the boundaries of the Areas of Concern should be drawn and thus what population is potentially at risk. This has immediate relevance for the preparation of the ATSDR report. Even though the report is on "hazardous waste sites within the 26 AOCs" people far from the narrowly defined AOCs can be exposed to chemicals that have been released to the environment and have been redistributed. In this sense, the ATSDR report needs to make reference to the IJC's Ecosystem Approach, which is a multimedia approach to the sources of pollutants (including hazardous waste sites), the complex pathways by which pollutants are distributed and redistributed and the multiplicity of routes of exposures of populations within communities.

History and Limitations of Critical Pollutants

In the mid-1970s, the Great Lakes Water Quality Board initiated a process for collecting the names of all substances that had been identified in samples from the Great Lakes. These were published as Appendix E of the Great Lakes Water Quality Board report to the Commission in 1976 and 1978. Another list was included in the 1987 Great Lakes Water Quality Board report to the Commission. All my books are packed for the move, but I think there were around 400 chemicals named and thus far too many to address individually. The idea of "Critical Pollutants" arose from radiation protection and was based on the idea that people are exposed to many sources of radiation, but they are likely to be affected by only one specific source and exposure pathway. The National Academy of Sciences first advocated this concept of applying Critical Pathway Analysis from radiation protection to chemicals in 1975 in a report entitled Principles for Evaluating Chemicals in the Environment (p. 59).

The concept was developed through the Great Lakes Water Quality Board in the mid-1980s and the Board after naming "The Top Ten" and "The Dirty Dozen" settled on the 11 Critical Pollutants. The concept was later incorporated by the Parties into the 1987 Protocol for development of Lakewide Management Plans (not Remedial Action Plans), though the list of 11 Critical Pollutants was not. It has proved a useful way of focusing work on the pollutants that were causing harm in the large lakewide systems, rather than in the local Areas of Concern. In a sense, there is a need to distinguish in the ATSDR document why there is a continuing focus on the 11 Critical Pollutants (developed for Lakewide Management Plans), particularly when there are several other substances that potentially could be causing effects in the local communities. Is it because the work is responding to the IJC request? Is it that these substances might be of priority concern because if they are released from local areas to the larger lakewide systems they can cause injury far from the sources?

History and Limitations of the Health Endpoints.

The indicators that have been included in the document were those that were readily available on the Community Health Status Reports web site (http://www.phf.org/data-infra.htm). These are general indicators of health within a community and may or may not have a relationship to community exposures to pollutants and particularly to persistent toxic substances. For example, 'infant mortality' and 'low birth weight' may be linked within particular communities to exposures to pollutants and these may be useful in generating hypotheses for further testing. It is, however, difficult to see how data on 'unmarried mothers' might be an indicator that is of relevance to Annex 2 of the Great Lakes Water Quality Agreement.

Here my bias from analyzing the Health Canada health data and statistics for the 17 Canadian Areas of Concern comes out. Health Canada chose more than 70 health endpoints that had been linked in the literature to exposures to pollutants. There is a new chart that has been published on the Protecting Our Health web site (http://www.protectingourhealth.org) that lists more than 120 diseases that have been linked with exposures to pollutants. The certainty/uncertainty of the relationships between the diseases and the exposures to specific pollutants has been evaluated into three categories and the citations for the links are referenced to the primary literature. The result is a thoroughly credible listing of pollutant-induced diseases that could be used by epidemiologists as a means to search for clusters and outbreaks of diseases and conditions that might be related to particular economic activities in which particular compounds are used at particular locations.

As part of the "Who is the Audience" theme, I think that further explanation on the statistical aspects of the health status indicators would be useful. I went to the web site on the Community Health Status Reports, but there was a note stating that the site had been removed October 2002. What is the significance of choosing the 10^{th} and 90^{th} percentiles and how can you explain this significance more fully to the general public?

Evaluation and Conclusions

The Agency for Toxic Substances and Disease Registry has initiated a preliminary process for linking information on the status of Remedial Action Plans with data on releases of toxic substances and with indicators of community health. The conclusions that have been reached through this process are measured and responsible and a few "Possible Associations" have been listed, but not overstated. I believe that the document should be made available to the general public as well as being supplied to the International Joint Commission for information in preparing the 12th Biennial Report.

I also believe that further work needs to be undertaken to generate hypotheses about links between pollution in Areas of Concern and the incidences of particular diseases and conditions. This further work needs to consider a far larger number of chemicals than the "IJC 11 Critical Pollutants" relying on the extensive work that has already been undertaken in compiling lists of chemicals associated with particular diseases.

Community health has become an environmental justice issue. Those who are disadvantaged tend to live closer to hazardous waste sites and to suffer higher incidences of disease. The "externalities" of industrial production during the past century are having untold effects and costs on communities around the world, but particularly in the Great Lakes basin. Any process for recommitting the Parties to the implementation of the Great Lakes Water Quality Agreement would contribute to the attainment of the goals of environmental justice and the reduction of health care costs.

The central policy of the Great Lakes Water Quality Agreement is derived from Article IV of the Boundary Waters Treaty and states that the Parties agree not to pollute their side of the boundary waters to the injury of health and property on the other. By compiling data on toxic releases and health indicators for the communities in the Areas of Concern, ATSDR is contributing to the process of maintaining a focus on injury to health from pollution of the boundary waters. This is quite contrary to the politics of the current and previous administrations, but I believe, it is an essential prerequisite to bringing about improvements to human health in these communities.

The introduction contains reference to the way that the document might be used to "support relative rankings across AOCs." If the Parties become committed again to the implementation of the Great Lakes Water Quality Agreement, particularly in relation to Annex 2, this process of deciding priorities through consideration of "contaminants, exposure pathways, health outcome data, and vulnerable populations" would become important criteria.

Finally, the purpose of the Great Lakes Water Quality Agreement is concerned with "injury to health" from transboundary water pollution, "particularly by persistent toxic substances." Monitoring data indicate that persistent toxic substances remain at concentrations associated with significant effects on human health. Because of the prevailing politics in both countries, the Parties to the Great Lakes Water Quality Agreement are reluctant to implement the provisions of Annex 2 concerning Remedial Action Plans and Lakewide Management Plans for Critical Pollutants. If any further progress is to be made it will be through the process of the

health authorities and their scientists making statements about the injury that continues from exposures to persistent toxic substances. Within the present political milieux there is frank antagonism to the use of the word "injury" and to statements linking effects on human health to exposures to environmental pollutants. This political stalemate will change, but only when environmental health specialists make the statements. Might I recommend that the ATSDR use its well established intellectual and moral authority to lead a renewed effort within the Parties and within IJC to bring the issue of pollutant-induced injury to human health, to the attention of senior managers and commissioners as well as the general public?

Appendix 1. Typographical Errors in and Detailed Comments on the Draft ATSDR Report

Page 8. Under Demographic data: 15044 should be 15-44. There are other places in the document (e.g. page 9) where this occurs and it might be worth doing a word search for them.

Oswego County is in NY, not OH.

I wanted more information on the four cancers in young male workers at the Eastside Sewage Treatment Plant. The suggestion is made (p. 8) that the short intervals between start of employment and development of cancers were "inconsistent" with long latency period for most adult cancers. Similarly, the statement is made (p. 10) that the public health outcome data do not indicate any association of cancer in nearby workers with site-related exposure. There are certain scenarios, particularly with mixtures, by which the number of tumors in organisms can be increased and the latency period can be reduced. I think the inconsistency and the lack of association may be overstated.

Page 16. Definitely my favorite! Second to last line 'dumpling' should be 'dumping.'

Page 36. 2/3 down, another contender – 'pine tar itch' should be 'pine tar pitch'

Page 39. The finding of "an apparent increased prevalence of thyroid conditions among residents of the Abby Street/Hickory Woods Subdivision site" may need a further comment on the implications. Of particular concern are the recent findings of effects on child neurodevelopment.

Page 102. The excess of brain cancer in men and women in the Snow Woods area of Dearborn, Michigan is interesting. After reading the account I feel that the conclusion is too strong when it states that "the elevated occurrence of brain tumors seen in one of the communities near the site is not attributable to site contaminants." It is difficult to prove a negative, but I think this overstates what can be concluded based on the information presented. 6 lines up from the Conclusions, there is a 'snow woods' that should have capitals.

Page 137. Just a point of consistency. On page 263 you mention the NRDA for the Fox River. There was an NRDA done on the Saginaw River. Does it need to be referred to?

Page 139. 2nd line of 4.1.1.2 has 'Bay Count' which should be 'Bay County.' Similarly, 6 lines on, 'asbestos panels are not being removed' rather than '.....not been removed."

Page 140. I was surprised by the rating 3 for this site. I assume that the Demographics are for the population exposed at the site rather than the population exposed from drinking the water.

Page 143. I really liked the way that the story of the PBB contamination was told.

Page 147. Public Health Outcome Data. Too many negatives! Do you mean "a lack of ..... evidence that humans had not been significantly exposed to site-related contaminants"?

Page 148. It is difficult to know how to respond to the negative findings for Midland, Michigan. Perhaps it is best if I ask a series of questions. The first question is why the ATSDR rating for this site is only 3? Granted there are critical pieces of information lacking, but is there not sufficient known about dioxin/furan sources, environmental concentrations, exposure pathways and levels in the Midland area that the site would warrant a higher rating of 1 or 2?

Page 149. A second question is who undertook the three studies, whether they were peer-reviewed and whether they have been published.

For the cancer study for the general population of Midland (zip code areas 48640 and 48642), is there any reason to believe that the basic incidence data are reliable? Has any further work been undertaken to determine whether there are clusters of cancer within the (upwind) 48640 zip code area and any attempt to correlate this with any exposure and source? Page 153 – It seems that there is a need for hypotheses for this observation. Is it possible that there might be a socio-economic component to this, with affluent managers and plant workers who are occupationally exposed, living upwind? Are the rates for Michigan elevated compared to the rest of the United States?

For the worker mortality study, who undertook this work and who were they paid by? Have there been problems in the past with previous epidemiological studies, with misclassification of exposed and unexposed workers with consequent loss of statistical power? There seems to be evidence of a healthy worker effect which is not uncommon in occupational health epidemiology. What were the specific cancers in the workers that were higher than in the unexposed employees? Could any of these specific cancers be related to exposures to chemicals manufactured by Dow?

For the birth defects study, are the data reliable? Are the people of Midland unexposed to the dioxins/furans from nearly 100 years of manufacturing chlorinated organic chemicals? Are there special mechanisms operating in the Midland, Michigan community that mean that they are insensitive to exposures to dioxins/furans and other teratogens? Correct 'ancephaly' to 'anencephaly'. There are other measures that might be looked at to see whether there are teratogenic effects occurring. For example, it might be worth looking at sex ratio.

Page 150. Correct 'solvers' to solvents'. In Category of Public Health Hazard – strike the second 'soil'.

Page 151. 4.1.1.15 – 6th line – 'tans' should be 'tanks'. 7 lines down – 'similarly contaminated and had a floating oily layer.....'

Page 153. 5 lines from the bottom – 'considerably' should be 'considerable'.

Page 184. 5.2.1.1. – 3 lines down – 'loater' should be 'later'.

Page 202. Bottom of the page – Conclusions: should be bold.

Page 237. 'turn of the century' needs to be clarified – we are in another one now!

Page 276. 1st line after table 6-1 – 'sites' should be 'site'.

Appendix 2: Answers to Questions

1. Is the report written in a manner understood by those with expertise in the subject matter as well as the general public?

Those with expertise in the subject matter would be easily able to read this report and understand the specific and general information. I feel that in its present form, the material would be difficult for the general public to relate to.

2. Has the report adequately identified the evaluated waste sites located in the 26 U.S. AOCs?

To the best of my limited knowledge, this has been achieved in this document.

3. Is the explanation of the hazard categories sufficient so that the significance for their use is clearly understood?

Generally, the scheme would seem to work satisfactorily. But then I came to the dioxin situation at Midland, and I had to wonder. Could so much dioxin be stored in and around Midland, and such high concentrations be present in soils, particularly after the 1986 flood that caused massive reproductive failure in fish-eating birds in Saginaw Bay, and still the site only gets a 3 because of missing evidence?

4. Is the relevant demographic information on populations at risk sufficient?

I feel that each of the key concepts in the methodology deserves a heading, an explanation of the concept and details of the methodology and ways that the information can be linked. At the moment, I think too many of these key concepts are compressed and will be difficult, even for the educated reader to follow.

5. Is the IJC critical pollutants adequately discussed?

Again, this deserves a heading. What is the relevance of the IJC list of critical pollutants and what are its limitations in relation to this exercise on health in the AOCs?

6. Is the topic of completed exposure pathways sufficiently discussed?

Needs a heading and detailed discussion of concepts and limitations.

7. Is the relationship between the completed exposure pathways and the IJC critical pollutants explained sufficiently so that there is clarity about a potential effect from this completed exposure pathway?

At the moment, the document states (page 1) that these "pollutants are persistent, bioaccumulative, and harmful to the ecosystem and human health." I think there needs to be much more.

8. Does the USEPA TRI data give adequate support to the impact from other sources of IJC critical pollutants?

I am not sure what this question is really asking. If it is about "other sources" within an Area of Concern that may or may not have been accounted for, only the authors know. "Impact" is an ambiguous word in this context. Does it refer to exposure or to effects?

9. Do the GIS maps enhance the understanding of the potential hazard from the IJC critical pollutants at particular hazardous waste sites?

The GIS maps are particularly useful for the reader in understanding the physical locations of the Areas of Concern and the various activities that have caused the contamination.

10. Are the potential associations between health effects observed and the potential exposure to critical pollutants reasonable?

This is probably the weakest part of the methodology and needs to be expanded with its own heading.

11. Are the limitations of the report sufficiently discussed?

Good question. Again, I bring the experience of analyzing the health data and statistics for the AOCs that Health Canada assembled. Health Canada had an elaborate explanation of limitations under the headings of "data", "statistics" and "etiology." It might be worth reviewing their methodology to see whether there are ideas that could be applied.

12. Were the conclusions drawn from the data appropriate and accurately documented in the report?

Within the limitations of the methodology, the conclusions were appropriate and accurate. I think that this kind of work is essential for the implementation of the Great Lakes Water Quality Agreement. There were really only three "possible associations." I believe that there are many more pollutant-associated health effects that are occurring within the Areas of Concern on both sides of the border. These can only be uncovered by looking at more health endpoints more directly linked to exposures to pollutants. For example, I believe, based on my analysis of the Health Canada health data and statistics for cerebral palsy hospitalization in the 17 Canadian Areas of Concern that there is evidence of congenital Minamata disease. How many more of those possible associations are lurking in the data?

13. Does the report adequately summarize the public health implications of hazardous substances in the 26 Great Lakes AOCs?

Again, within the limitations of the methodology it has done a credible job. But there is much more to find, using more elaborate methodologies.

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June 25, 2004

Review of the Public Health Implications of Hazardous Substances in twenty-six U.S. Great Lakes Areas of Concern Report.

Peter Orris, MD, MPH

General Comment:

A massive amount of work has gone into compiling this excellent reference document. Placing all this information in one location and systematizing its presentation is a very important service. The most of the available necessary information is here and collected and organized well. The presentation is not yet developed to be usable by the public or interested scientists outside of the very small group familiar with all aspects of this type of evaluation. I think this extends to some at ATSDR and EPA and a few in academia only and not the general public. Certainly not a newly interested health scientist or public interest activist learning about the field and try to understand the situation in their community or around their lake.

There are still major problems with the overall presentation most can be fixed by an English rewrite by someone trained in writing about health topics for the general public. As yet it still fails the "The Scientific American" test. That is the material should by understandable with some work by a scientist/logical thinker trained in another area of science/logic. I will make a list of these areas but reviewing a few of them by conference call with the authors may be productive in fully developing the kinds of changes I believe necessary.

1. The Introduction does not contain untreatable explanations of what the subdivisions of each area assessment are. The health implications of the material is not clear nor are the evaluative terms defined in a way allowing lay understanding.
2. The area summaries themselves appear frequently put together without adequate allowance to explain what – for instance – "Indeterminate public Health Hazard" means in individual areas.
3. The 1.2 explanation of the TRI data is illustrative "The TRI is a publicly available EPA data base of information on toxic chemical releases in the United States, as reported by certain covered industries and by federal facilities". Why reported? What's covered? Why certain only? etc. Would it not be better to add a brief few sentences saying the TRI was passed in and requires reporting but no quality control done.
4. End of 1.2 says that "This document focuses on on-site releases as most relevant...." What are on-site releases? What are not on-site releases? Why are on-site releases most relevant?

Again give this to a science writer and let them figure out how to say this in English not ATSDR/EPA jargon and figure out what an educated member of the public knows and how to explain what the data is based on.

This problem permeates the specific reviews as well.

The Maps are great but more of the demographic overlays and an ability to enlarge would be wonderful. In future wind modeling and dosage information would be helpful. Mapquest software might be off the shelf useful or the GIS approach of EPA and others. I know ATSDR has a GIS project for several years and suspect the presentation software and manipulative ability is better than the PDF files I have been given.

Finally, let me say that the document appears truncated at the point one would hope a simple understandable English sentence or 2 would appear describing the potential health impacts of the information. This is true in each area summary and surprisingly and most frustratingly in the conclusions (7). For example the section under "Lake Erie" ends with "Sediment and fish contain high levels of PCBs. An epidemiologic study in 1988 reported no evidence for excess cancer mortalities associated with the Fields Brook site. Vulnerable populations within 1 mile of the site number close to 6,000" Should that cause concern? Is the mortality study the final word? Is the Fields Brook Site the only concern in the area? Are PCBs the only pollutants?,

Each AOC summary and conclusion needs a summary short paragraph with wording such as "despite the inability to identify human health impacts here, concern remains as exposure levels to ____ remain in an area associated with _____ in children"
Or in the reverse "no human health effects were identified in the AOC and none expected due to a lack of adequate exposure to the identified pollutants. No additional assessment is needed as this site no longer presents a threat to health."

Where I have specific comments below, I will illustrate them utilizing the Calumet Harbor and surrounding area reports.

Now to my answers to your questions – following your numbers:

1. The report has the available raw material for a knowledgeable reviewer who spends to the time to study the definitions to find the information needed to make local decisions.
It is difficult to read and on occasion skips critical information such as P. 198 "An ATSDR review of cancer incidence data for Griffith to be comparable to those of the US" could use an extra sentence indicating what cancer incidence data – Indiana Cancer Registry? And what US comparison?

2. The report has fully identified the evaluated waste sites.

3. It is useful to have the hazard categories identified and the schema clarified. It is not clear what use this characterization will have for communities potentially impacted by the sites. Especially the large number of "Indeterminate" determinations.

4. The demographics are not adequate to understand the characteristics of the communities. I would add total population, density, housing characteristics egg. Single or multiple dwellings, racial or ethic characteristics, and economic status. All should be readily available from the same sources. Further, I am unclear as to how the data was found for exactly a one mile radius in each case.

5. The IJC critical pollutants were adequately discussed given an understanding of the IJC methodology in identifying pollutants of concern.

6. Completed exposure pathways are discussed fully. Think use of common language about whether or not people are exposed, and if so- when, where, and who, would have made these sections easier to understand quickly. For instance on p. 199 it is not clear why if there is no completed pathway is the ground water being remediated and soil treated.

7. This relationship is unclear in the individual text and the repeated statement that the pathway is not completed but the following critical pollutants are present is confusing. These two statements should be separated and language used to clarify the different concepts.

8. The TRI data does help to understand the relative contributions from theses sources. But without comparison information and integration into the summary information it is not user friendly. Finally, without a site specific (AOC specific) orientation of a few sentences it is very hard to follow.

9. Yes but only slightly. First Step – see above comments.

10. Yes but the terminology dismisses potential problems and only stresses existing completed pathways.

11. Yes the limitations of the data and its availability are sufficient.

12. Yes but calling these conclusions is an overstatement. There appears to have been a decision made not to make statements about the potential public health impact of these AOCs. Estimates of risk in the conclusions would have been helpful or even more qualitative statements.

13. No see above comments.

Final comments:

This is a wonderful first draft of a critically important project. It is usable as it stands for all of the groups targeted, but not very useable, in its current form. The IJC staff, EPA, ATSDR, CEC, State Public Health Environmental Officers, very specialized academics, and possibly some very educated members of the general public will find this material very helpful. Others will find it a beginning and possibly a frustration that leads to further study- always a positive outcome for us all.

Again – I am available any time to review this on a page by page basis.

All the best,

Peter Orris, MD, MPH.

SECTION 2

ADDITIONAL REFERENCES AND DATA SUBMITTED BY THE PEER REVIEWERS

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SECTION 3

ANNOTATED PAGES FROM PEER REVIEWERS' PROFILE DOCUMENTS

ANNOTATED PAGES FROM

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materials from 1936 to 1960, and stored oil and asphalt in tanks on-site. From 1972, the site was used as a storage area for materials scheduled for incineration at the Pollution Abatement Services site. The site was partially remediated in 1981-1986 by removal of all storage tanks, and in 1986-1987 by removal of contaminated soil and tar-like waste, and by secure fencing. Information regarding this site is taken from the 1988 ATSDR health assessment and the 2003 EPA NPL fact sheet.

Category of Public Health Hazard: In 1988, ATSDR concluded that the site was an *Indeterminate Public Health Hazard* (category 3), because of the potential threat to human health in the event of unauthorized entry to the site, ingestion of contaminated groundwater (should it migrate offsite), and use of the Oswego River adjacent to the site for recreation (including fishing). Although there was no evidence that human exposure to site-related contaminants was currently occurring or had occurred in the past, some critical information was missing, including adequate monitoring data for the adjacent Oswego River, monitoring data for edible fish tissues, and monitoring data for ambient air.

Contaminants of Concern in Completed Exposure Pathways: None identified. IJC critical pollutants that exceeded health-based screening values were lead and PCBs in soil and lead in groundwater, but levels of contamination were not exceptionally high. Groundwater and soil also were contaminated with VOCs, including vinyl chloride and benzene. Groundwater flows into the Oswego River. The site was fenced and groundwater was not used for drinking water, so completed exposure pathways did not exist. Monitoring data for air, surface water, sediment, and fish were inadequate.

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

Children 6 years and younger	728
Females aged 15-44	1,421
Adults 65 and older	980

Public Health Outcome Data: Although no health outcome data were specifically discussed in this 1988 health assessment, ATSDR stated that it was not aware of any specific health complaints directly attributable to this waste site.

Conclusions: The Fulton Terminals Site may have contributed to the environmental burden of the IJC critical pollutants lead and PCBs in the past, as well as other pollutants, including VOCs and metals. Critical information to characterize exposures was, however, missing. Since the time of the health assessment, soil cleanup has been completed, groundwater has been remediated, and long term groundwater monitoring is underway. The primary concern for the cleanup was the VOC contamination.

2.1.1.2 Pollution Abatement Services

The Pollution Abatement Services site occupies 15.6 acres on the northeastern edge of the City of Oswego, Oswego County, NY. Pollution Abatement Services operated a high temperature liquid chemical waste incinerator from 1970 to 1977. Liquid wastes were collected and stored on-site in drums, open lagoons, and above-ground storage tanks. Lagoon overflows and releases of liquid waste into the nearby creeks that drained into Lake Ontario close to the AOC were common between 1973 and 1976. Extensive remediation of the site has occurred since that time. Information regarding this site is taken from the 1997 ATSDR public health assessment and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: This site was classified as posing an *Indeterminate Public Health Hazard* (category 3) because of the outward radial spread of a contaminated groundwater plume which poses a potential threat to the health and safety of nearby residents that rely on private wells for potable water and the lack of adequate monitoring data for these wells. An additional concern was that corrosion of the buried waste drums may lead to releases of additional contaminants in the future.

Contaminants of Concern in Completed Exposure Pathways: None determined, but data were not adequate. Contaminants of concern did not include IJC critical pollutants. Contaminants that exceeded health-based screening values in on-site groundwater were vinyl chloride, arsenic, and selenium. Residential well-water monitoring data were not adequate to determine if completed exposure pathways existed and to allow an assessment of the potential public health impact of well water use. Sediments from streams adjacent to the site contained contaminants as well, but were not compared with screening values. Whether these streams flow into the Oswego River was not discussed.

Demographic Data: Twenty-five households relying on private wells for potable water are located within 1,000 feet of landfill boundaries.

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

Children 6 years and younger	75
Females aged 15044	146
Adults 65 and older	70

Public Health Outcome Data: Not reported.

Conclusions: Based on the 1987 ATSDR health assessment, this site may have contributed to environmental burdens of contaminants other than the IJC critical pollutants, and was a concern for future releases as corrosion of the buried drums would be expected to release more pollutants. At the time the health assessment was completed, critical data were missing.

Subsequent site remediation activities include capping, leachate collection and treatment, and groundwater extraction and treatment. The use of groundwater intermittently contaminated with VOCs is now prevented by institutional controls. Surface water and sediment in the vicinity of the site is not contaminated at levels that pose an ecological or human health threat.

2.1.2 TRI Data for the Oswego River AOC

The TRI on-site chemical releases for Oswego County, NY are summarized in Table 2-3. Total on-site releases in 2001 were 204,417 pounds, primarily to air. Very little was released to surface water, and even less to land.

Only 171.3 pounds (0.08%) of the total on-site releases were IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (primarily to air), lead and lead compounds (to air), and mercury (to land). The facilities that released these pollutants are listed in Table 2-4.

There were no releases of non-IJC chemicals ≥100,000 pounds. Releases in the range of 50,000-99,999 pounds were ozone (to air) and n-butyl alcohol (primarily to air.)

2.1.3 County Demographics and Health Status Data for the Oswego River AOC

The demographic profile, from the 2000 U.S. Census, for vulnerable populations living in Oswego County, ~~OH~~ NY, is as follows:

Children 6 years and younger	11,122
Females aged 15-44	27,269
Adults 65 and older	13,875

According to the 2000 HRSA community health status reports, Oswego 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)
- white infant mortality

Birth measures (as percent)
- unmarried mothers

Death measures (per 100,000 population)
- colon cancer

2.1.4 Summary and Conclusions for the Oswego River AOC

2.1.4.1 Hazardous Waste Sites

Three hazardous waste sites in Oswego County have ever been characterized in public health hazard categories 1-3. Based on the documents for these sites, there is no clear evidence of site-related contaminants in completed exposure pathways at concentrations that exceed health-based screening concentrations. Although critical information to characterize past exposure and releases was missing for the sites at the time of the ATSDR public health assessments in the late 1980s, all three sites have been remediated since that time. Chemicals of concern at these sites included the IJC critical pollutants PCBs (soil) and lead (soil and groundwater) at the Fulton Terminals and Pollution Abatement Services sites.

Public health outcome data, available for the Pollution Abatement Services Site, did not indicate any association of cancer in nearby workers with site-related exposure.

2.1.4.2 TRI Data

The TRI on-site chemical releases for Oswego County, NY in 2001 totaled 204,417 pounds, primarily to air.

Only 171.3 pounds (0.08%) of the total on-site releases were IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (primarily to air), lead and lead compounds (to air), and mercury (to land). The facilities that released these pollutants are listed in Table 2-4.

There were no releases of non-IJC chemicals ≥100,000 pounds.

Table 2-2. Waste Site Contaminants that Exceeded Health-Based Screening Values
Oswego River AOC

CAS No.	Chemical Name	IJC Tracking Number	Number of Records						
			Air	Biota	Human Material	Other Media	Soil	Water	Total
053469-21-9	AROCLOR 1242	1				2			2
012672-29-6	AROCLOR 1248	1				2	4		6
011097-69-1	AROCLOR 1254	1				1	3		4
011096-82-5	AROCLOR 1260	1				2			2
000050-32-8	BENZO(A)PYRENE	4					2	2	4
000060-57-1	DIELDRIN	6					1	1	2
007439-92-1	LEAD	8				1	1	1	3
007439-97-6	MERCURY	9					4	4	8
		Total IJC	0	0	0	8	17	10	31
000075-34-3	1,1-DICHLOROETHANE						1	1	2
000107-06-2	1,2-DICHLOROETHANE						1	1	2
000156-60-5	1,2-DICHLOROETHENE, TRANS-						1	1	2
000120-83-2	2,4-DICHLOROPHENOL						1	1	2
000105-67-9	2,4-DIMETHYLPHENOL						2	2	4
000078-93-3	2-BUTANONE						2	2	4
000091-57-6	2-METHYLNAPHTHALENE						2	2	4
000083-32-9	ACENAPHTHENE						2	2	4
000067-64-1	ACETONE					1			1
000107-13-1	ACRYLONITRILE					1			1
007429-90-5	ALUMINUM			1			4	4	9
000120-12-7	ANTHRACENE						4	4	8
007440-36-0	ANTIMONY						2	2	4
007440-38-2	ARSENIC			1		2	4	4	11
007440-39-3	BARIUM						3	3	6
000071-43-2	BENZENE					1	1	1	3
000056-55-3	BENZO(A)ANTHRACENE						2	2	4
000203-33-8	BENZO(A)FLUORANTHENE						1	1	2
000205-99-2	BENZO(B)FLUORANTHENE						2	2	4
000207-08-9	BENZO(K)FLUORANTHENE						3	3	6
007440-41-7	BERYLLIUM						4	4	8
000085-68-7	BUTYL BENZYL PHTHALATE						1	1	2
007440-43-9	CADMIUM					2	3		5
007440-70-2	CALCIUM			1			4		5
000108-90-7	CHLOROBENZENE					1	1	1	3
000075-00-3	CHLOROETHANE						1	1	2
007440-47-3	CHROMIUM					1	4		5
018540-29-9	CHROMIUM, HEXAVALENT						3		3
000218-01-9	CHRYSENE						2	2	4
007440-48-4	COBALT						2		2
007440-50-8	COPPER			1			3		4
000106-44-5	CRESOL, PARA-						2	2	4
000057-12-5	CYANIDE					1	1	1	3
000117-81-7	DI(2-ETHYLHEXYL)PHTHALATE						4	4	8
000084-74-2	DI-N-BUTYL PHTHALATE						1	1	2
000117-84-0	DI-N-OCTYL PHTHALATE						1	1	2
000072-20-8	ENDRIN			1					1
000100-41-4	ETHYLBENZENE					2	1	1	4
000206-44-0	FLUORANTHENE						2	2	4
000086-73-7	FLUORENE						3	3	6
001024-57-3	HEPTACHLOR EPOXIDE			1			2	2	5
000319-84-6	HEXACHLOROCYCLOHEXANE, ALPHA-					2			2
000319-85-7	HEXACHLOROCYCLOHEXANE, BETA-					2			2
007439-89-6	IRON						2	2	4
000078-59-1	ISOPHORONE						1	1	2
000067-63-0	ISOPROPANOL					1			1
007439-95-4	MAGNESIUM						4	4	8
007439-96-5	MANGANESE						4	4	8
000108-10-1	METHYL ISOBUTYL KETONE					2	1	1	4

2.2 ROCHESTER EMBAYMENT AOC, MONROE COUNTY, NY

The Rochester Embayment AOC includes the Rochester Embayment, an area of Lake Ontario formed by the indentation of the shoreline of Monroe County, NY and includes approximately 6 miles of the Genesee River that is influenced by lake levels, from the river's mouth to the Lower Falls (see AOC map in the appendix). The drainage area consists of the entire Genesee River Basin and parts of two other drainage basins.

2.2.1 Hazardous Waste Sites Relevant to the Rochester Embayment AOC

ATSDR has evaluated the data for one hazardous waste site in Monroe County, and reached conclusions regarding the public health threat posed by this site, which is summarized in Table 2-5, along with information regarding the date and type of assessment, and the type and location of the site:

Table 2-5. Hazardous Waste Sites in Monroe County, NY

Site Name	Public Health Hazard Category	EPA NPL Status	Site ID	City
Rochester City of – APCO Site	2 (2000 HC)	Non NPL	NYR000042770	Rochester

2 = Public Health Hazard
HC = Health Consultation

For hazardous waste sites in Monroe County that *at any time* had Public Health Hazard Categories of 1-3, (1 site) the total number of chemicals present at concentrations exceeding health-based screening concentrations was 32, as summarized in Table 2-6. Most of the records were for the soil media groups.

Five records were for IJC critical pollutants, all in soil. These IJC critical pollutants were: carcinogenic PAHs [which would include B(a)P], lead, and mercury. The IJC chemicals accounted for 15% of the total detections above health-based screening values.

Further evaluation of the data for this site was conducted by ATSDR, and is summarized in the following section.

2.2.1.1 Rochester City of – APCO Site (Former APCO Property Brownfield Site)

This site covers about 5 acres in the City of Rochester, Monroe County, NY. The site was used by general contracting firms since at least the 1930s until the City foreclosed on the property in 1996. The site includes a construction and demolition debris disposal area and underground storage tanks areas that have soil and groundwater contaminated with VOCs. The tanks were used for gasoline and diesel fuel and some of them were leaking. Stained surface soils with elevated PAHs were thought to be associated with dumpling/spillage of used motor oil. Information on this site is taken from the 2000 ATSDR health consultation.

2.3.1.1 Barker Chemical

Barker Chemical is a 10-acre site in Somerset, Niagara County, NY, approximately 7.5 miles east of Eighteen Mile Creek. Barker Chemical was formerly an agricultural chemical manufacturer that produced fungicides and herbicides from the 1930s through the 1960s. The site includes several abandoned buildings, three lagoons, an aboveground tank, and an area of shallow standing water near the buildings. Although partially fenced, the site has been used extensively for recreational activities. The information on this site is taken from the 2000 health consultation performed by ATSDR as part of a Brownfields project, and from HazDat.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) because of the potential health risk for children and adults accessing the site.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutant lead, and another metal (arsenic) were detected at levels in surface soil that would pose a health threat to children or adults from long-term incidental injection. Monitoring data were limited, and did not include pesticides. The on-site waste lagoons and tributaries contained liquid of a very low pH that could result in severe burns from direct skin contact. Groundwater had not been monitored.

Demographics: Not reported, but a residential area is located about 500 yards from the site boundary.

Public Health Outcome Data: None reported.

Conclusions: This site contains the IJC critical pollutant lead, and also arsenic, at concentrations of health concern in onsite soil. The pH of liquids in on-site lagoons and tributaries was very low. Although the site formerly was engaged in pesticide manufacture, no monitoring for organic pesticides had been performed. No groundwater monitoring data were available.

2.3.2 TRI Data for the Eighteen Mile Creek AOC

The TRI on-site chemical releases for Niagara County are summarized in Table 2-11. Because they are for the entire county, and because industrial activity is concentrated in or near the Niagara River AOC, these data are more relevant to the binational Niagara River AOC than to the Eighteen Mile Creek AOC. Total on-site releases in 2001 were 3,174,559 pounds, the majority of which were released to air, followed by releases to soil, and then surface water.

Of the total on-site releases, 63,282 pounds were IJC critical pollutants. The IJC critical pollutants released were PCBs (to air), PCDDs and PCDFs (primarily to air), lead compounds and mercury compounds (primarily to land), and hexachlorobenzene (to surface water). The facilities that released these pollutants are listed in Table 2-12. Most of these facilities are located in the city of Niagara Falls, and thus are relevant to the binational Niagara River AOC rather than to the Eighteen Mile Creek AOC.

Releases of IJC critical pollutants relevant to the Eighteen Mile Creek AOC are of PCDDs and PCDFs from a facility in Barker, of lead compounds from a facility in Barker and one in Lockport, and of mercury compounds from a facility in Barker.

The major releases (≥500,000 pounds) of non-IJC chemicals were of manganese compounds and barium compounds (primarily to land).

- Of the 49 children in the subdivision who were screened during 1994-2000, 31 had values less than 5 µg/dL, 12 had values of 5-9.9 µg/dL, and 6 had values greater than or equal to 10 µg/dL. Further analyses revealed a significant correlation between blood lead levels for children in older homes and soil lead levels at their homes; the age of housing was highly predictive of soil lead levels.

Conclusions: This site, a residential area with contamination by lead from leaded paint and past industrial activities, and PAHs [as B(a)P equivalents] from combustion including past industrial activities, may contribute slightly to the burden of IJC critical pollutants. Elevated levels of aldrin and dieldrin were found in soil at one location, but these IJC critical pollutants do not appear to have been widespread contaminants at this site. Concentrations of arsenic (not an IJC critical pollutant) in soil at a playground were high enough to be considered a public health hazard.

ATSDR recommended follow-up on the thyroid conditions among Hickory Woods residents, because the prevalence was elevated, in comparison with the general population.

3.1.1.2 Diarsenol Company (Kingsley Park)

This site is the grounds of the former Diarsenol Company pharmaceutical manufacturing plant, approximately 2.5 miles north of the AOC. The pharmaceutical plant produced an arsenic-based medication from 1930 to 1948, and was reported to have stored waste materials and unused product on open ground beside the facility. The property was purchased by the City of Buffalo in 1968 and was used as a public recreation area (called Kingsley Park) until 1988, when it was closed because of concerns regarding contamination. Information regarding this site is taken from the 1994 ATSDR public health assessment.

Category of Public Health Hazard: ATSDR concluded that this site posed a public health hazard prior to 1991 because nearby residents and park users may have been exposed to levels of arsenic, lead, and PAHs that exceed health-based values. In 1991, remediation was performed by excavation and removal of soil to a minimum of 1-foot depth from the site and the bordering yards, and replacement with clean soil, and seeding with grass. ATSDR concluded that present and future exposure to site-related contaminates was unlikely because of the remediation.

Contaminants of concern in Completed Exposure Pathways: None. Prior to 1991, residents were exposed to the IJC priority critical pollutants carcinogenic PAHs [including B(a)P] and lead, as well as to arsenic, at levels that could adverse health effects. Completed exposure pathways were ingestion, skin contact, and possibly inhalation of contaminants in surface soil and ingestion of leafy vegetables grown on contaminated soil. Arsenic was considered site-related. The source of lead, which was higher off-site than on-site, was thought to be leaded paint on older buildings and gasoline. PAHs were found at levels typical of urban soils and were thought to be related to urban air quality and combustion of fossil fuels.

Demographics: Kingsley Park is in census tract 33.02 and borders 32.02. The combined total population for these tracts is 9,517, of which 16% was under 10 years of age and 16% was 65 or older.

Public Health Outcome Data:

- The NYS DOH is conducting a cancer study in the Kingsley Park area.
- The Erie County Health Department conducted a blood lead and urinary arsenic screening program for residents of all ages in the community, but participation was limited. The screening blood lead level was 25 µg/dL (previous CDC guideline). Only 2 of the 305 samples showed elevated blood

leads (one child, born after the park was closed, had 25 µg/dL, and one older person had 29 µg/dL). Testing of 304 community residents for urinary arsenic revealed that all had levels below 10 µg/L; the health-based screening value was 50 µg/L.

Conclusions: Although this site may have contributed slightly to human exposure and the burden of the IJC critical pollutants lead and PAHs in the past, these pollutants are not considered related to the manufacturing activities that occurred at the site, but rather to leaded paint, combustion of leaded gasoline and fossil fuels, and to urban air quality. The site may also have contributed to arsenic pollution; arsenic was a site-related contaminant. The site has been remediated by removal and replacement of the contaminated soil.

3.1.1.3 Ernst Steel Site

This site is located approximately 2 miles north of the AOC. The western portion of the 10-acre site reportedly contained paint sludge, metal shavings, machine cutting oil, and other waste dumped up until 1980. Access to this area is not restricted. Information regarding this site is taken from the 1990 ATSDR health consultation.

Category of Public Health Hazard: ATSDR concluded that this site posed a Public Health Hazard due to the levels of lead and chromium found on-site and the potential for the public to frequent the site.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutant lead and also chromium were present in soil at concentrations that were anticipated to have adverse health effects through ingestion and inhalation of dust by nearby residents, including children, who may frequently traverse the site or play on-site. The contamination with lead and chromium was considered site-related. Insufficient data were available to determine if off-site migration through runoff, air dispersion, or contamination of groundwater were occurring.

Demographics: Not reported. A residential area was located nearby.

Public Health Outcome Data: Not reported.

Conclusions: This site may have contributed to the environmental burden of lead, an IJC critical pollutant, and also chromium. Issues for further investigation include the lack of information regarding possible offsite migration or contamination of groundwater by lead and chromium, and the lack of monitoring data for organic contaminants that may be present from the machine cutting oil and other unknown organics that may have been dumped.

3.1.1.4 Newstead Site

The Newstead housing site is a 6-acre parcel of land located on Fletcher Road in Newstead, Erie County, NY, several miles northeast of the AOC. It contains a residence and associated play area and barn, plus a fallow field, a garden, and an area that had reportedly been used for disposal of old chemicals and paints from a paint manufacturing firm in Buffalo. In 1985, a site inspection revealed (an unspecified number of) protruding 55 gallon drums and waste material of tar-like and resinous consistency on the surface of the ground. Information regarding this site is taken from the 1992 ATSDR lead initiative summary report and from HazDat.

Category of Public Health Hazard: In 1989, ATSDR issued a public health advisory (category 1, Urgent Public Health Hazard) due to high levels of lead and cadmium in soil and physical hazards. A further assessment in 1992 did not provide a health hazard category, but recommended that further actions await the results of a Remedial Investigation/Feasibility Study.

Contaminants of Concern in Completed Exposure Pathways: In the past, when people were living at the site, exposure to soil contaminated with very high concentrations of the IJC critical pollutant lead and also high concentrations of cadmium probably occurred during routine domestic activities (playing, lawn care, gardening). Although the site has been fenced, there is still a concern for exposure to trespassers. Groundwater was monitored, but results are not mentioned in the discussion of contaminants of concern, and are not on HazDat.

Demographics: Two adults and two children under 5 years of age formerly resided on the site. There area is relatively rural, but there are some neighbors.

Public Health Outcome Data: The past residents of the site, who had been relocated sometime after 1985 and before 1989, were tested in 1991 for blood lead and cadmium levels and urinary cadmium levels by the NYS DOH. The levels of contaminants were reported to be within the ranges of the general population.

Conclusions: Lead and cadmium contamination of soil has not been remediated, but apparently has not resulted in groundwater contamination. The site is fenced. The location of the site with regard to streams feeding into the Buffalo River is not available in the materials reviewed for this report, but the site is not near the AOC.

3.1.1.5 Pfohl Brothers Landfill

The Pfohl Brothers Landfill, a 120-acre site, is located in the northeastern portion of Erie County, NY, several miles northeast of the Buffalo River AOC. It is near Ellicott Creek, which drains into the Niagara River rather than the Buffalo River. It was in operation from 1932 to 1971, and accepted both municipal and industrial wastes. The industrial wastes included pine tar itch, waste paints and thinners, waste cutting oils, phenolic tar, and PCB laden oil and capacitors. Information regarding this site was taken from the 1995 ATSDR public health assessment for this site.

Category of Public Health Hazard: ATSDR concluded In 1995 that this site represents *No Apparent Public Health Hazard* (category 4) because the data do not indicate that exposure to contaminants is high enough to cause adverse effects. Removal and remedial activities have greatly reduced the likelihood of exposure to site-related contamination.

ATSDR further concluded that this site is an *Indeterminate Public Health Hazard* (category 3) for past exposures because the data were not adequate to conduct a groundwater contaminant trend analysis.

Chemicals of Concern in Completed Exposure Pathways: None currently. A large number of contaminants, including the IJC critical pollutants carcinogenic PAHs, PCBs, lead, and mercury, exceeded health-based comparison concentrations in one or more of the following media: on-site soil, waste materials, leachate, and surface water, and off-site sediments (Aero Lake). Based on further estimation of exposure doses, ATSDR concluded that none exceeded health guideline doses. Potentially site-related contaminants were not found above background or health-based comparison levels in fish in Aero Lake and Ellicott Creek. Data for groundwater including on- and off-site monitoring wells and

private drinking water wells were not adequate to determine whether contaminants, and particularly PCBs and metals, have migrated off-site and to what extent. Additional more systematic monitoring was to be conducted.

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	942
Adults 65 and older	1,157

Public Health Outcome Data:

- NYS DOH surveys conducted in 1990 included the 60 residents of 20 nearby households, 35% of which were children age 17 or younger, and a few former area residents and former and current employees of the town of Cheektowaga who may have come into contract with site contaminants. The NYS DOH concluded that the survey did not reveal any unusual patterns of illnesses.
- Blood lead screenings of 20 children living near the site, conducted in 1991 by the NYS DOH, found a maximum blood lead level of 8 µg/dL, which was below the CDC action level of 10 µg/dL.
- NYS DOH conducted initial and follow-up studies of cancer incidence for 1978-1987 in three census tracts that comprise the site and Ellicott Creek areas. Observed rates were significantly greater than expected (based on other areas of NY with similar population densities) for all cancers in women, breast cancer in women, and prostate cancer in men. Most of the excess cancer in women was accounted for by breast cancer (130 versus 105 expected), and the breast cancer excess was accounted for by the census tract (100.01) in which the landfill is located. Few of the cases, however, had exposure to landfill contaminants, and there was no geographical clustering of cases around the landfill. The excess prostate cancer in men (79 observed versus 49 expected) was mostly accounted for by the landfill census tract (100.01), but geographic analysis revealed no clustering around the landfill. ATSDR concluded that the occurrence of cancer is probably not related to the site.

Conclusions: Although this site probably contributed to human and environmental exposure burdens for the IJC critical pollutants carcinogenic PAHs, PCBs, lead, and mercury in the past, completed exposure pathways do not appear to exist following remediation activities and fencing of the site. Groundwater monitoring was to be continued. Public health outcome did not indicate unusual patterns of illnesses. The occurrence of cancer did not appear to be site-related.

3.1.2 TRI Data for the Buffalo River AOC

The TRI on-site chemical releases for Erie County, NY are summarized in Table 3-3. Total on-site releases in 2001 were 5,269,495 pounds, the majority of which were released to air, followed by releases to water. Little was released to soil.

Of the total on-site releases, 9387 pounds (0.2%) were accounted for by IJC critical pollutants. The IJC critical pollutants released on-site were PCDDs and PCDFs (to air), lead and lead compounds (to air and water), and mercury and mercury compounds (to air). The facilities that released these pollutants are listed in Table 3-4.

The major releases (≥500,000 pounds total on-site) of non-IJC chemicals were of hydrochloric acid aerosols, ammonia, and carbon disulfide (primarily to air). Other non-IJC chemicals released in substantial on-site quantities (300,000-499,999 pounds) were sulfuric acid aerosols, toluene, and hydrogen fluoride (primarily to air).

3.1.3 County Demographics and Health Status Data for the Buffalo River AOC

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

Children 6 years and younger	82,897
Females aged 15-44	197,414
Adults 65 and older	151,258

According to the 2000 HRSA community health status reports, Erie 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)
- **black infant mortality**
- neonatal infant mortality

Birth measures (as percent)
- none

Death measures (per 100,000 population)
- breast cancer (female)
- colon cancer
- coronary heart disease
- lung cancer

3.1.4 Summary and Conclusions for the Buffalo River AOC, Erie County, NY

3.1.4.1 Hazardous Waste Sites

ATSDR has categorized five sites in Erie County , NY in health hazard categories 1-3 at some time in their assessment history. Based on the documents for these sites reviewed in Section 3.1.1, there is no clear evidence that human exposure to waste-site-related IJC critical pollutants is currently occurring at concentrations or doses that exceed health-based screening values. Most of these sites have been remediated by removal of contaminated soil and waste-containing barrels, or exposure is prevented through the use of institutional controls (fencing, covering contaminated soil). A possible exception is the Ernst Steel Site, which had not been fenced or remediated as of the 1990 ATSDR health consultation, and was contaminated with the IJC critical pollutant lead (and also with chromium). Also, the non-IJC pollutant arsenic was present in playground soil at the Abby Street/Hickory Woods Subdivision at levels considered a public health hazard as of ATSDR's 2001 health consultation.

In the past, the hazardous waste sites may have contributed to the environmental burden of the IJC critical pollutants, particularly PCBs, B(a)P, lead, and mercury. Lead was a site-related soil contaminant at three sites, but was considered due to leaded paint on older buildings and the historical contribution of leaded

gasoline at the other two sites. B(a)P also was considered related to urban air quality rather than to be specifically site-related for two of the three sites at which it exceeded health-based comparison values. It is possible that some of the sites are still releasing pollutants, as discussed under Issues for Follow-Up.

The most common exposure pathways for these contaminants were ingestion and dermal contact with contaminated soil.

Public health outcome data, available for three of the sites, generally did not indicate unusual rates of health conditions, or did not indicate an association with site-related exposures. The exception was an apparent increased prevalence of thyroid conditions among residents of the Abby Street/Hickory Woods Subdivision site.

Issues for Follow-Up

Abby Street/Hickory Woods Subdivision: ATSDR concluded that follow up of the thyroid conditions is needed. High arsenic levels in playground soil appear to have been a subject for follow up by the NYS DOH, but the health consultation is not clear on this point (pertinent text was missing from page 29 of the consultation).

Diarsenol Company (Kingsley Park): The NYS DOH is conducting a cancer study in the Kingsley Park area.

Newstead Site: As of ATSDR's 1992 assessment, this site had high levels of lead and cadmium in soil from disposal of old chemicals and paint from paint manufacturing. It had been fenced, but not remediated, and was undergoing a remedial investigation/feasibility study.

Ernst Steel: Data for organic contaminants that may be present from machine cutting oil that was dumped at this site were not available, and no information regarding potential off-site migration or potential contamination of groundwater by known contaminants (lead and chromium) was available.

3.1.4.2 TRI Data

On-site TRI releases in Erie County, NY, totaled 5,269,495 pounds, the majority of which were released to air, followed by releases to water. Considerably less was released to soil.

The IJC critical pollutants accounted for 9,387 pounds or 0.2% of the total on-site releases. The IJC critical pollutants released were PCDDs and PCDFs (to air); lead and lead compounds (to air and water); and mercury and mercury compounds (to air).

The major releases (≥500,000 pounds total on-site) of non-IJC chemicals were of hydrochloric acid aerosols, ammonia, and carbon disulfide (primarily to air).

3.1.4.2 County Demographics and Health Status Indicators

Vulnerable populations totaled 431,569. Several Erie County, NY, health status indicators compared unfavorably with both U.S. indicators and with the median of peer county indicators. These health status indicators included black infant mortality, neonatal infant mortality, and deaths from various cancers (breast, colon, and lung), and coronary heart disease.

Corry Area Middle-High School, located approximately 2,000 feet west of the plant, and to nearby residents. Information regarding this site is taken from the 2001 ATSDR health consultation on this site.

Category of Public Health Hazard: Because the air sampling data may not be representative of long-term or peak exposure patterns, ATSDR classified the emissions from the plant as an *Indeterminate Public Health Hazard* (category 3).

Contaminants of Concern in Completed Exposure Pathways: The conclusion was that the air sampling and monitoring data, from four consecutive days in April 2000, were not adequate to be representative of long-term or peak exposure patterns. The data indicate completed exposure pathways (inhalation) to methylene chloride for residents near the plant, and possibly for the school students, at time-integrated concentrations below ATSDR's MRLs for intermediate and chronic exposure. In addition, for residents near the plant, peak air concentrations of methylene chloride exceeded ATSDR's acute MRL. Toluene diisocyanate isomers in air were not above detection limits.

Demographics: Not reported. The facility is located near a school and residential areas.

Public Health Outcome Data: Not reported.

Conclusions: The site is not associated with IJC critical pollutants. As the Foamex Products Site is an active manufacturing facility rather than a hazardous waste site, its releases also are taken into account in the TRI section of this document.

3.2.1.2 Hammermill – Scott Run Site

This site is located approximately 10 miles east of the City of Erie, in the Harborcreek Township, Erie County, PA. This 5 acre, heavily wooded site was used by the Hammermill Paper Company for disposal of pulp and paper waste in the 1960s. Wood mulch was stored/piled on the site and various wastes, including drummed waste, were dumped into two dug lagoons. The number of drums was estimated at 50 in 1988, and 27 were observed in 2001. Some were partially buried and in various stages of decay; others may not have been visible due to the thick vegetation or sediment deposition. The site is currently part of a recreational park. Information regarding this site was taken from the 1998 ATSDR health consultation for this site.

Category of Public Health Hazard: The site was classified as a category 1 *Public Health Hazard* for people visiting the site due to physical dangers from drowning (lagoons) and falling (foot bridge). There is a potential risk of exposure to chemicals in the drums, but the drum contents have not been adequately characterized. ATSDR concluded that there is no public health risk from hazardous chemicals migrating from the site in surface water and sediment based on 1988 data, but that the potential for additional and new ~~contamination exists as the drums continue~~ to deteriorate.

Contaminants of Concern in Completed Exposure Pathways: Inadequate data. Metals, including the IJC critical pollutant lead, and also arsenic, cadmium, and chromium, were found in the contents of the only drum that was sampled. Analysis of soil and sediment did not reveal any chemicals at levels that would be expected to cause adverse health effects. Although the IJC critical pollutant DDT was detected in sediments on-site at the outlet of a lagoon, in a marsh close to Scott Run, and off-site in Scott Run (but upstream, so not site-related), it was not present at levels high enough to impact health, and no fishing was known to occur in Scott Run or the stream into which it flows, which flows into Lake Erie approximately 10 miles east of the AOC.

Demographics: Not reported.

Public Health Outcome Data: Not reported.

Conclusions: Contaminants from the Hammermill-Scott Run site do not appear to be migrating offsite. The deteriorating barrels may release additional as-yet-unknown chemicals, however, and the monitoring data are old (1988) and incomplete. Because there were reported to be only 50 barrels dumped at the site, the amount of potentially hazardous waste is not large.

3.2.1.3 Lord Shope Landfill

This site is located approximately 17 miles west of the City of Erie, PA. The NPL site of about 30 acres includes the 4-acre landfill and adjacent areas of contaminated soil and surface and groundwater. Lord Corporation wastes were dumped at the landfill from about 1954 to 1979, and consisted primarily of debris, but included rubber scrap, organic and inorganic chemicals, solvents, cooling oils, acids, and caustics. Remedial actions in 1982-1983 included removal of exposed drums, containment and removal of 20,000 gallons of leachate, re-grading and capping of the landfill, construction of an upgradient subsurface groundwater diversion wall, and fencing of the site. Additional remediation, initiated after the 1989 public health assessment, included removal of VOCs from the landfill and surrounding soils through vapor stripping and extraction, removal of VOCs from groundwater by vapor stripping, and discharge of treated groundwater to a tributary of Elk Creek. This phase of remediation is ongoing. Information regarding this site was taken from the 1989 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: In 1989, ATSDR concluded that the site posed an *Indeterminate Public Health Hazard* (category 3) because the characterization of on-site and off-site contamination was incomplete. The available data indicated that long-term oral exposure to lead from private wells and dermal exposure to arsenic in off-site surface water were of public health concern. More recently, an ATSDR site review and update (not provided for inclusion in this document) concluded that the site poses *No Apparent Public Health Hazard* (category 4).

Contaminants of Concern in Completed Exposure Pathways: None. In the past, concentrations of the IJC critical pollutant lead in off-site residential well water presented a long-term public health concern for ingestion, but it could not be determined whether they were site-related. Concentrations of arsenic in off-site surface water were considered a possible dermal contact threat, but it could not be determined whether the contamination was attributable to the site. On-site groundwater contained VOCs and metals at levels considered a potential concern for public health, but there was no exposure to this groundwater. There were no monitoring data for surface soil.

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

Children 6 years and younger	26
Females aged 15-44	75
Adults 65 and older	35

Public Health Outcome Data: Not reported.

Conclusions: This site has been remediated through removal of contaminants and fencing, and remediation continues through air stripping. The vulnerable populations living within 1 mile of this site are relatively small.

3.2.1.4 Mill Creek Dump

This approximately 85-acre site is 2 miles west of the City of Erie and less than 2 miles from Presque Isle Bay. Originally a wetland, most of the site was filled with foundry sand and other industrial and municipal wastes containing VOCs, SVOCs, PCBs, PAHs, and heavy metals during its use as an unpermitted landfill between 1941 and 1981. Drums of hazardous liquids were removed from the site in 1983, and some fencing was completed, but access to most of the site was unrestricted. Information regarding this site was taken from the 1989 ATSDR public health assessment, the 1993 ATSDR site review and update, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: Based on the 1989 public health assessment, ATSDR concluded that the site was an *Indeterminate Public Health Hazard* (category 3) because of potential migration of contaminated groundwater during extended droughts to an upgradient public water supply well field. In the 1993 site review and update, ATSDR concluded that the site is a Public Health Hazard (category 2) to area residents, workers, and site intruders because of exposure to contaminated soil, sediment, and surface water, airborne dust during riding of recreational vehicles, and contaminated groundwater during flooding of basements. Not all of the contaminated groundwater is site-related.

Contaminants of Concern in Completed Exposure Pathways: Not explicitly described in the 1993 assessment, but appeared to be the IJC critical pollutants PCBs and lead, as well as other heavy metals and PAHs, in on-site soil through ingestion of soil and inhalation of entrained dust; VOCs and lead in on-site surface water; PAHs and lead in on-site sediment; and VOCs in groundwater by inhalation and direct contact during flooding of basements. The greatest concern in the earlier (1989) assessment was the potential during drought conditions for groundwater contaminated with the IJC critical pollutant lead as well as VOCs to migrate to the upgradient public water supply well field, which could lead to exposure through ingestion, dermal contact, and inhalation.

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

Children 6 years and younger	90
Females aged 15-44	2,289
Adults 65 and older	2,055

Public Health Outcome Data: Not reported.

Conclusions: Since the time of the most recent ATSDR assessment (1993 site review and update), the landfill has been capped and a flood retention basin constructed. These measures, and continued groundwater treatment and monitoring, should be eliminating the threat of human exposure to site contaminants.

3.3.1.1 Big D Campground

This site includes a former sand and gravel pit, which was used as a landfill for waste products. It was no longer in operation as a landfill, and had been capped at the time of the ATSDR health assessment in 1989. According to the EPA fact sheet, the landfill site had included drums containing halogenated and non-halogenated solvents, caustics, oily wastes, toluene diisocyanate (TDI), TDI residue contaminated with monochlorobenzene and carbon tetrachloride, and monoethylamine. The soils were contaminated with many of these compounds. Groundwater was contaminated with volatile organic compounds and heavy metals, including barium, chromium, and lead. Information regarding this site is taken from the 1989 ATSDR preliminary 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) because of the potential threat to human health from exposure to contaminants and the lack of monitoring data. 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: No monitoring data were available to ATSDR at the time this health assessment was conducted (1989). No completed exposure pathways were determined. Private wells were within the vicinity of the site, and one well on the campground supplied potable water to campers. Conneaut Creek is about one-half mile from the site. Potential pathways included ingestion and direct contract with contaminated groundwater, surface water, soil, and possible ingestion of bioaccumulated contaminants in the food chain, as well as inhalation of volatilized contaminants or contaminants entrained in air. Since that time, the site has been remediated.

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

Children 6 years and younger	56
Females aged 15-44	119
Adults 65 and older	82

Public Health Outcome Data: Not reported.

Conclusions: This site may have contributed to the environmental burden of the IJC critical pollutant lead, as well as other contaminants including VOCs. As reported in the EPA NPL fact sheet, extensive remediation of the site, including on-site incineration of wastes and disposal of the resulting ash in the landfill, capping, vegetating, installation of a runoff treatment system, and installation of a groundwater extraction system, has largely eliminated releases of contaminants from the site.

3.3.1.2 Fields Brook

The Fields Brook site is the six square-mile watershed of Fields Brook, which flows through the City of Ashtabula into Ashtabula River, which in turn discharges into Lake Eire, the source of drinking water for the city of Ashtabula. The brook flows through an industrial area that is one of the largest and most diversified areas of chemical plants in Ohio, and is the principal receiving stream for many industrial discharges. The site extends from within the City of Ashtabula to east of the city. Sediments from Fields Brook were contaminated with PCBs, VOCs, PAHs, heavy metals (including mercury and lead), phthalates, and low-level radionuclides. VOCs and PCBs were detected in fish. The information for this

site is taken from the 1996 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: In the 1986 public health assessment (not provided for inclusion in this document), ATSDR concluded that this site was an *Indeterminate Public Health Hazard* (category 3). In the 1996 public health assessment, which specifically dealt with a single industrial site, Reactive Metals Incorporated, located within the Fields Brook site, ATSDR concluded that the Reactive Metals, Inc. site constitutes *No Apparent Public Health Hazard* (category 4); Reactive Metals Inc. was assessed because it released uranium dusts between 1962 and 1990. Exposure to on-site uranium-contaminated soil is prevented by fencing. There is slight uranium contamination of soil just outside the fence, but levels are too low to present a human health risk from either chemical toxicity or radiological effects.

Contaminants in Completed Exposure Pathways: None identified. For the 1986 assessment of the entire Fields Brook site, contaminants of concern for potential completed exposure pathways included the IJC critical pollutant PCBs in sediment and fish, and VOCs, and the 1996 assessment states that new data were not provided to alleviate those concerns. Potential exposure pathways included absorption through skin or through ingestion. Further detail was not provided in the available source, the 1996 public health assessment, and ATSDR assumed, in the absence of new data to the contrary, that Fields Brook is still contaminated at levels discussed in the 1986 assessment.

The 1996 health assessment states that for the Reactive Metals, Inc. portion of the site, there are no contaminants in completed exposure pathways at levels that would be expected cause adverse health effects.

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

Children 6 years and younger	1,122
Females aged 15-44	2,508
Adults 65 and older	2,123

Public Health Outcome Data: The Ohio Department of Public Health completed an epidemiological study of cancers associated with the Fields Brook site in 1988. The final document found no evidence for excess cancer mortalities associated with the Fields Brook site.

Conclusions: The six square-mile Fields Brook site, which is the watershed of Fields Brook, located in a highly industrialized area including many chemical plants, contributed to the environmental burden of the critical IJC pollutants PCBs, mercury, and lead. Remediation activities, described in the EPA NPL fact sheet, have included removal and treatment or containment of PCB-contaminated soil and sediment, and of mining residuals. Low-level radionuclides (primarily radium isotopes) and dense non-aqueous phase liquid have been discovered and are being remediated. Several industrial facilities are potentially recontaminating Fields Brook sediment.

3.3.1.3 Laskin Poplar Oil

The Laskin Poplar Oil company site is a 9-acre site located in Jefferson Township of Ashtabula County, OH. It is a former waste oil storage site, with 37 aboveground, inground, and underground oil storage tanks or pits. The oil was contaminated with PCBs and other hazardous substances. Fluid was removed from the tanks in 1981, but sludge residues in the tanks and pits were a concern. The owners formerly

used the oil to heat a greenhouse on the property, and for road oiling. Information regarding this site was taken from the 1987 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: Based on its 1989 public health assessment, ATSDR concluded that the site posed an *Indeterminate Public Health Hazard* (category 3) because of the contaminated sludge remaining in the tanks and pits, which could potentially be released due to fire or some act of nature, and which was not well characterized. In addition, soil and the boiler house where the oil was burned were highly contaminated, and contaminants may have an impact on the local creek. 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 in Completed Exposure Pathways: None demonstrated. Contaminants of concern included the IJC critical contaminants PCBs, 2,3,7,8-TCDD, lead, and mercury in soil and sediment. PAHs and VOCs also were of concern in soil, sediments, and groundwater. Potential pathways included soil ingestion, dermal absorption, or inhalation of reentrained dust, contact with sediments and/or surface water, and food chain. Groundwater, although contaminated, was not in use as a source of drinking water, but could flow into nearby Cemetery Creek.

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

Children 6 years and younger	331
Females aged 15-44	714
Adults 65 and older	553

Public Health Outcome Data: None.

Conclusions: In the past, the Laskin Poplar Oil site probably contributed to the environmental burden of the IJC critical pollutants PCBs, 2,3,7,8-TCDD, lead, and mercury. Based on the EPA NPL Fact Sheet for this site, extensive site remediation has been performed, including removal and/or off-site and on-site incineration of waste oil, sludges, soils, and other materials, lowering of the water table, and capping. It therefore appears unlikely that any completed exposure pathways exist at the present, or that releases from the site are currently occurring.

3.3.1.4 New Lyme Landfill

This 40-acre landfill was in operation from 1969 to 1978, with most of waste coming from industrial and commercial sources. It is located about 20 miles south of the city of Ashtabula, in Ashtabula County, OH. Information regarding this site was taken from the 1987 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: On the basis of the 1986 public health assessment, ATSDR concluded that the site was an *Indeterminate Public Health Hazard* (category 3). The major concern appeared to be possible future exposure if the site were to be developed residentially. ATSDR, based on its subsequent site review and update (not provided for inclusion in this document), then concluded that the site posed *No Apparent Health Hazard* (category 4).

pesticides, catalysts, sanitary sewage sludges, paint sludges, latex sludges, and small quantities of unknown hazardous wastes. The wastes were frequently burned after dumping; several areas of exposed ash are visible. Closing and capping of the landfills was not completed under EPA supervision or guidelines, the cap is sagging, and a number of drums and other wastes including ash are visible. The landfill is unlined. No study of landfill gas has been conducted. Information regarding this site is taken from the 2002 ATSDR health consultation for the site.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) because of the lack of current environmental monitoring data and the fact that the available data do not provide a complete picture of the extent of contamination.

Contaminants of Concern in Completed Exposure Pathways: None identified, but few samples had been obtained and analyzed, and the data were from a 1993 investigation, and thus, outdated. Concern was focused on sediments in the Black River and an intermittent tributary leading to the Black River, in which elevated levels of PAHs, including the IJC critical pollutant B(a)P, and elevated levels of the IJC critical pollutants PCBs and lead were found, as well as the non-IJC pollutant arsenic. The data were inadequate, however, to determine whether contaminants are leaching from the landfill into the Black River. Contaminants in surface water did not exceed background, but there was concern that ingestion or contact with surface water and sediments could be a pathway of exposure to contaminants from this site.

Demographics: Not reported, but several residences are located within 1 mile of the site.

Public Health Outcome Data: Not reported.

Conclusions: The Ford Road Industrial Landfill site may have contributed and may continue to contribute to the Black River AOC's environmental burden of the IJC critical pollutants PCBs, B(a)P, and lead, as well as other contaminants, but the sampling and monitoring data were inadequate to characterize the extent of contamination at the site, and whether transport into the Black River is occurring. Surface water flows into the Black River, and groundwater flow is expected to be towards the Black River. The landfill is unlined, the cap is not adequate, access to the site is not restricted, and closure was not performed under EPA supervision and guidelines.

3.5.1.2 Republic Steel Corp. Quarry

The site includes a 4-acre quarry and a few acres of wooded land surrounding the quarry. It was originally a sandstone quarry. From 1950 to1975, Republic Steel Corp. used the quarry as a disposal site for waste pickle liquor consisting of sulfuric acid and dissolved metal oxides, and for rinse water from pickling operations. The waste was carried from the plant to the quarry by a ditch. Information regarding this site is taken from the 1989 ATSDR preliminary health assessment for this site, HazDat, and the 2003 EPA NPL fact sheet for the site.

Category of Public Health Hazard: This site was categorized by the 1989 ATSDR health assessment as an *Indeterminate Public Health Hazard* (category 3) because of the potential threat to human health from exposure to contaminants in quarry water and sediment, soil and dust, and possibly in fish. Contaminants of concern included the IJC critical pollutants B(a)P and lead. A subsequent ATSDR site review and update (not provided for inclusion in this document) concluded that the site poses *No Apparent Public Health Hazard* (category 4). The site was remediated after the original 1989 health assessment was completed.

construction of the plant. The site is bordered by a waste water treatment plant, a closed industrial landfill, and a residential area. The Raisin River flows east-southeast less than 200 feet north of the site, emptying into Lake Erie approximately 2 miles from the site. Another industrial facility is located on the opposite bank of the river, and two toxic waste sites associated with PCB and heavy metal contaminated sediments are slightly downstream on the opposite bank of the river. Information regarding this site is taken from the 1995 ATSDR health consultation.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) because of the potential threat to human health from exposure to contaminants and incomplete monitoring data.

Contaminants of Concern in Completed Exposure Pathways: None identified. There were no data regarding concentrations of contaminants in surface soil; the shallowest soil samples were considerably deeper than the 3-inch depth recommended by ATSDR. Concentrations of many contaminants, including the IJC critical pollutants PCBs, B(a)P, lead, and mercury in soil and sediment exceeded health-based screening values, but further assessment indicated that trespassers were not likely to be exposed at levels of potential human health risk. The concentrations of PAHs including B(a)P were considered comparable to background concentrations in urban soil. The sediment in the lagoons is contaminated with the IJC critical pollutant PCBs. Children reportedly fished in the lagoons before they were fenced; fish and turtles have been seen in the drainage ditch. No data were available on contaminant concentrations in fish from the lagoons and ditch, but fish taken from the River Raisin near the site contained elevated concentrations of PCBs. The Consolidated Packaging Corporation is one (of many) possible sources for the PCB contamination of the fish. Groundwater at the site contains various contaminants, including PCBs, at concentrations above health-based screening values, but there are no producing wells. Groundwater flow, however, is towards the northeast, and is thought to discharge into the River Raisin.

Demographics: Not reported, but a residential area is adjacent to the site.

Public Health Outcome Data: Not reported.

Conclusions: This site may have contributed and may continue to contribute to the environmental burden of the IJC critical pollutants PCBs, lead, and mercury, and possibly B(a)P. Human on-site exposure does not appear to be occurring at levels of concern, but data for surface soil are not available, so there is uncertainty regarding this source of exposure. The site, however, has not been remediated, and PCBs have been detected at above health-based screening values in on-site groundwater that is thought to discharge to the River Raisin.

3.7.2 TRI Data for the River Raisin AOC

The TRI on-site chemical releases for Monroe County, MI are summarized in Table 3-28. Total on-site releases in 2001 were 16,700,032 pounds, the majority of which were released to air, followed by releases to soil. Very little was released to surface water.

Of the total on-site releases, 66,177 pounds (0.4%) were accounted for IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (primarily to land), mercury and mercury compounds (to air and land), and hexachlorobenzene (to air). The facilities that released these pollutants are listed in Table 3-29.

The major on-site releases (≥500,000 pounds) of non-IJC chemicals were of hydrochloric acid, ethylene, sulfuric acid, and hydrogen fluoride (to air); and barium compounds (primarily to land).

3.7.3 County Demographics and Health Status Data for the River Raisin AOC

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

Children 6 years and younger	13,834
Females aged 15-44	31,020
Adults 65 and older	16,222

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 Monroe County MI were as follows (indicators that were above the upper limit of the peer county range are bolded):

Infant mortality (per 1,000 births)
- post-neonatal infant mortality

Death measures (per 100,000 population)
- colon cancer
- **coronary heart disease**
- lung cancer
- stroke

3.7.4 Summary and Conclusions for the River Raisin AOC, Monroe County, MI

3.7.4.1 Hazardous Waste Sites

Only one hazardous waste site, the Consolidated Packaging Corporation, in Monroe County, MI has been assessed by ATSDR with a Public Health Hazard category in the range of 1-3. The soil and sediment at this site is contaminated with the IJC critical pollutants PCBs, B(a)P, lead, and mercury at concentrations that exceeded health-based screening values. On-site groundwater, contaminated with PCBs, may discharge into the River Raisin. The site is considered an Indeterminate Public Health Hazard (category 3) because monitoring data are inadequate to determine if chemicals in completed exposure pathways pose a public health hazard.

Issues for Follow-Up

Consolidated Packaging Corporation: In its 2002 health consultation, ATSDR recommended additional monitoring to determine concentrations of contaminants in surface soil. Additional issues for follow-up include determining whether groundwater contaminated with PCBs actually is discharging to the River Raisin.

could be nearly 17 tons. Information regarding this site is taken from the 1992 ATSDR preliminary public health assessment and the 2003 EPA NPL fact sheet.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) because of the presence of hazardous substances on the site and the difficulty of maintaining site security.

Contaminants of Concern in Completed Exposure Pathways: Inhalation of PCB-contaminated fugitive dusts was considered a principal route of exposure because PCBs were found in particulates in rain gutters of nearly homes. However, the sampling appears to have been performed before the removal of PCB-contaminated soil from yards to the site, and the covering of the mounds of soil. PCBs also were found in the storm sewers that drain the site and empty into the Detroit River. The greatest concern, however, was for direct exposure of trespassers to the PBC-contaminated soil on-site. Nevertheless, blood samples from the surrounding residents, taken before any remediation of the site and surrounding area, did not indicate that exposures exceeded those of the general population.

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

Children 6 years and younger	1,444
Females aged 15-44	3,199
Adults 65 and older	1,734

Public Health Outcome Data: ATSDR noted that an evaluation of health outcome data will be conducted in future public health assessments of the site. The results of a 1986 Michigan Department of Public Health study of 235 blood samples from people living in the residential area surrounding the site showed no remarkably high PCB concentrations compared with the general population. Blood lead, checked in 60 subjects, were higher than the then CDC level of concern of 25 µg/DL in 5 subjects, 3 of whom were 3 years or less in age, and were therefore unlikely to have been on the site.

Conclusions: This site may have contributed to the environmental burden of the IJC critical pollutants PCBs and lead. As reported in the EPA fact sheet, extensive remediation of the site, including removal of the contaminated soils and disposal offsite in a TSCA landfill and cleanup of the sewer line, was conducted and completed in 1996. The site was deleted from the NPL in 1997. Thus, the site is no longer releasing or acting as a reservoir of contaminants.

3.8.1.2 Ford Motor Co. Allen Part Clay Mine

The Allen Park Clay Mine landfill, located in Allen Park (Wayne County, MI) is operated by the Ford Motor company, which developed a clay mine on the site before 1956. Starting in 1956, the area has been filled with wastes from the Ford Motor Company Rouge River Plant. Some of these wastes (electric arc furnace dust and decanter tank tar sludge) are classified by EPA as hazardous. From 1980 to 1986, the hazardous wastes were deposited separately in a hazardous waste management area at the site. This area was closed in 1986, the leachate collection system was expanded, and a clay cap was installed. Information regarding this site is taken from the 1994 ATSDR preliminary public health assessment

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) because additional information was needed to evaluate possible air exposure pathways, particularly with regard to past exposures to airborne carcinogenic PAHs.

3.8.1.3 Gratiot Trailer Park

The Gratiot Trailer Park is an abandoned 16-acre trailer park in northeast Detroit (Wayne County). The property contains three abandoned buildings, about 20 collapsed, overturned, and burned trailers, abandoned cars and boats, abandoned above-ground storage tanks, and trash from unauthorized dumping. Although the site is partially fenced, access to the site is not effectively restricted. The site is surrounded by industrial properties, airport property, and a park. The information on this site is taken from the 1999 health consultation performed by ATSDR as part of a Brownfields project.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) because of the physical hazards from the trash, trailers, tanks, and other debris, and the lack of effective restriction of access. Also some contaminants in soil are present at concentrations high enough to be of concern, and abandoned buildings contain asbestos in amounts that require special removal, and probably contain lead paint.

Contaminants of Concern in Completed Exposure Pathways: Not explicitly discussed. Several contaminants were found in soil at levels above Michigan's health-based clean-up values. These contaminants included the IJC critical pollutants PCBs, lead, and B(a)P, and other contaminants such as arsenic, copper, and manganese. In general, trespassers were considered unlikely to be exposed to doses that would cause adverse health effects. If the site were developed for residential use, however, these contaminants might pose health risks. Groundwater was not sampled because it not considered useful for household purposes.

Demographics: Not reported for this non-NPL site.

Public Health Outcome Data: Not reported.

Conclusions: This soil at this site contains elevated concentrations of several IJC critical pollutants, but the site does not appear to be a major source of these contaminants, and migration off-site has not been investigated. Trespassers do not appear likely to experience exposures high enough cause adverse health effects. The physical hazards posed by the site are of greater concern.

3.8.1.4 Joy Road Dump/Holiday Park/Holiday Nature Preserve

The Joy Road/Holiday Park Dump is located in the City of Westland (Wayne County), where unauthorized and undocumented dumping of household waste occurred. Rainwater runoff flows from the property into Tonquish Creek, which empties into the Middle Branch of the Rouge River approximately 1 mile from the property. The information on this site was taken from the 2000 health consultation performed by ATSDR as part of a Brownfields project.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 2) because of the physicals hazards from the rubbish and waste coming to the surface and the lack of monitoring data.

Contaminants of Concern in Completed Exposure Pathways: None identified. Although soil in the dump areas contained the IJC critical pollutant lead, and also arsenic and copper, at concentrations above health-based screening values, no one is likely to be exposed to a degree that would be likely to result in adverse health effects. Mercury was also present in soil and surface water, but no ATSDR health-based screening values were available for those media.

be of concern if the water were used for drinking water, but it is not. Fish in the Clinton River are contaminated with PCBs, but this contamination does not appear to be related to 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	489
Females aged 15-44	997
Adults 65 and older	346

Public Health Outcome Data: None reported. Because there are no indications that humans have been significantly exposed to site-related contaminants, ATSDR concluded that an evaluation of health outcome data was not indicated.

Conclusions: This site does not result in exposure of humans to contaminants at levels that are considered hazardous to health. The site has been remediated through capping, fencing, and restriction of groundwater use. It is possible that in the past, this site has contributed to Clinton River burdens of heavy metals including the IJC critical pollutant lead.

3.8.1.15 Rose Township Dump

The Rose Township Dump (Rose Township/Demode Road site) is a 110-acre site located in the northwest corner of Oakland County, MI. From 1966 to 1968, paint sludges and other wastes from Detroit area industries were discharged onto surface soil and into shallow lagoons, and drums containing wastes were left on the surface or buried. Dumping continued intermittently through 1971. Cleanup was initiated in 1971, and intensified in 1979-1980 with the removal of leaking and bulging drums. Additional drums of wastes plus about 20 cubic yards of PCB-contaminated soil were removed in 1985 and 1986. In 1988, ATSDR conducted a public health assessment, which is the source of much of the information presented here. Additional information, from the 2003 EPA NPL fact sheet for this site, indicates that starting in 1992, remediation by on-site incineration of soil, groundwater treatment, and soil vapor extraction of subsurface soils has occurred. EPA's 5-year review in 2002 found that complete capture of the groundwater plume is not occurring. Groundwater treatment may be continued for 10-30 years.

Category of Public Health Hazard: This site was categorized in 1888 by ATSDR as an *Indeterminate Public Health Hazard* (category 3) because the limited off-site monitoring precluded a determination of the public health impact.

Contaminants of Concern in Completed Exposure Pathways: Not explicitly discussed in the 1988 health assessment. ATSDR's concerns were for incidental ingestion and dermal exposure to contaminated surface water, soil, and sediment by trespassers engaged in recreational activities on site. The contaminants in soil at elevated concentrations included the IJC critical pollutants PCBs and lead, as well as other chemicals including arsenic and VOCs such as toluene and trichloroethylene. Some of these contaminants were found in surface water as well. On-site groundwater contained VOCs including toluene and vinyl chloride, and also PCBs. Although monitoring of nearby residential wells did not indicate contamination by site chemicals, testing did not include all site-related chemicals. The residents of Rose Township depend on groundwater for their drinking water. ATSDR was concerned about the possible contamination of fish with PCBs and lead, since marsh sediments were contaminated with these chemicals, but fish were not analyzed, and levels of contamination in sediment were not reported in the health assessment or in HazDat.

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

Children 6 years and younger	66
Females aged 15-44	138
Adults 65 and older	41

Public Health Outcome Data: None reported.

Conclusions: This site is likely to have contributed to the environmental burden of the IJC critical pollutants PCBs and lead, as well as other contaminants including VOCs. Data regarding off-site migration were incomplete, but surface water drains into marshes, wetlands, and the heads of two (unspecified) rivers via local streams, and into local lakes and ponds. As reported in the EPA fact sheet, extensive remediation of the site, including on-site incineration of soil, vapor extraction of subsurface soil, and groundwater extraction and treatment has largely eliminated releases of contaminants from the site, with the exception of groundwater. Complete capture of the groundwater plume was not occurring, but residential wells were not yet affected. Groundwater treatment is anticipated to continue for 10-30 years in order to reach clean-up goals.

3.8.1.16 Springfield Township Dump

This 4-acre site is located in Oakland County, approximately 35 miles northwest of Detroit, MI. Between 1966 and 1968, liquid wastes and sludges were dumped into an on-site pit, and approximately 1,500 drums of waste materials were also deposited on the site. Drum contents included paint sludges, solvents, PCBs, oils, and grease. In 1979-1980, the drums were removed and disposed of offsite. In 1983, approximately 711 tons of contaminated soil were removed for offsite disposal. Public access to the site is restricted by fencing, and there are no signs of trespassing. Further remediation has occurred since the time that ATSDR prepared its public health assessment. The information on this site is taken from the 1988 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) because of the lack of monitoring data for a potential exposure pathway, consumption ~~of potentially contaminated wildlife.~~

Contaminants of Concern in Completed Exposure Pathways: None identified. On-site soil was contaminated with the IJC critical pollutants PCBs and lead, as well as other contaminants including VOCs and cadmium. On-site sludges contained PCBs and dieldrin (1 sample). No completed exposure pathway exists for these media, and off-site monitoring indicated that migration to adjacent wetlands was not significant. On-site groundwater in the area of the former disposal pit was contaminated above EPA MCLs with trichloroethene and 1,1-dichloroethene, but off-site monitoring and domestic wells are not contaminated with site-related chemicals. Future migration to residential wells is possible based on the apparent direction of groundwater flow towards a cluster of residences northeast of the site. Given the potential for some of the site contaminants to bioaccumulate (e.g., PCBs), ATSDR was concerned about the lack of data regarding contaminant levels in tissues of game animals.

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

Children 6 years and younger	149

Table 3-37. Hazardous Waste Sites in Macomb County, MI

Site Name	Public Health Hazard Category	EPA NPL Status	Site ID	City
G & H Landfill	3 (1989 HA) 3 (1992 HA)	Final	MID980410823	Utica
Liquid Disposal, Ind.	3 (1987 HA) 3 (n.d. SR)	Final	MID067340711	Utica
South Macomb Disposal Authority	3 (1989 HA) 2 (1995 HA)	Final	MID069826170	Macomb Township

2 = Public Health Hazard, 3 = Indeterminate Public Health Hazard
HA = Public Health Assessment, SR = Site Review and Update
n.d. = no date provided

For hazardous waste sites in Oakland and Macomb Counties (combined) 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 926, as shown in Table 3-38. 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 143 (15%) of these records. The IJC records were most numerous for the soil and water media groups. The IJC critical pollutants that have been found at Oakland County and Macomb County hazardous waste sites at concentrations exceeding health-based screening values are: PCBs, TCDD, B(A)P, DDT and metabolites, aldrin/dieldrin, lead, mercury, and hexachlorobenzene. Details are provided in Table 3-39.

Further evaluation of the data for the sites with Public Health Hazard Categories of 1-3 was conducted by ATSDR in the Public Health Assessment and other health-related documents listed in the table. The evaluations for Oakland County, MI were already discussed in Sections 3.8.11 through 3.8.16. The evaluations for waste sites in Macomb County are discussed in the following subsections.

3.9.1.1 G & H Landfill

The G & H Landfill is an approximately 70-acre site located in Shelby Township, Macomb County, MI, between the cities of Utica and Rochester. The landfill was a waste oil recovery facility from 1955 to 1967, and also was used as an industrial and municipal landfill from 1955 to 1974. Waste oil containing PCBs was dumped into unlined ponds, and waste solvents and paint sludges were landfilled along with municipal waste. The site is bordered by the Clinton River; groundwater flow is towards the river. The information regarding this site is taken from the 1989 and 1992 public health assessments conducted by ATSDR, and from 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 a 1989 public health assessment by ATSDR ~~because of the potential threat~~ to human health from exposure to contaminants at concentrations that may result in adverse health effects. The 1992 public health assessment concluded that the conclusions drawn in the original assessment do not need to be changed.

Contaminants of Concern in Completed Exposure Pathways: None. Contaminants of concern included the IJC critical pollutants PCBs and lead, and other contaminants such as VOCs, including the BTEXs and chlorinated VOCs, and PAHs (concentrations of B(a)P or carcinogenic PAHs were not reported). Exposure on-site was considered unlikely (except for remediation workers), because the site was fenced. The 1989 health assessment was concerned that nearby residents and business might be exposed through the use of contaminated groundwater for potable and non-potable purposes and through the consumption of fish and game from the Clinton River area, and that monitoring was not adequate to assess the potential hazard. Fish (carp) in the Clinton River have high PCB levels, but there are other sources of pollution in addition to the G & H Landfill. Additional monitoring data taken into account in the 1992 health assessment did not indicate the need for any significant change in these conclusions. Since that time, nearby residences and small businesses have been switched to the municipal water supply, and the site has undergone remediation through construction of a cap, a slurry wall, and application of a groundwater extraction and treatment system, which will operate for at least 30 years (starting in 1999).

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

Children 6 years and younger	594
Females aged 15-44	1,455
Adults 65 and older	564

Public Health Outcome Data: A 1982 health outcome study that investigated infant mortality, low birth weight, age-adjusted death rates from cancer, heart disease, stroke, and accidents in Selby Township (where the G & H Landfill is located) with State and County rates found that rates in Selby Township were either comparable or lower than in the comparison populations.

Conclusions: This site may have contributed to the environmental burden of the IJC critical pollutants PCBs and lead, as well as other contaminants including VOCs, in the past. Remediation of the site aimed at physically and hydraulically containing the contaminants onsite has been instituted, which should minimize release of contaminants and exposure of humans.

3.9.1.2 Liquid Disposal, Inc.

This former sand and gravel pit, located in Shelby Township, Macomb County, MI, is bordered by wetlands, the Clinton River, and an auto junkyard. It was used as a landfill from 1964 to 1968. From 1968 through 1982, the site was used as a liquid waste incineration facility for volatile and semi-volatile chemicals including paint thinners, sludges, contaminated oils, and greases. Wastes were stored in a lagoon, below- and above-ground tanks, and drums prior to incineration. As of 1987, the contents of the lagoons had been removed or stabilized, and the storage tanks and other containers were removed from the site; a crude leachate collection system was used with a sump pump to direct leachate back into the incinerator pit. Information regarding this site is taken from the 1987 ATSDR health assessment, HazDat, and the 2003 EPA NPL fact sheet for the site.

Category of Public Health Hazard: In the 1987 health assessment, this site was categorized as an *Indeterminate Public Health Hazard* (category 3) because of the threat to human health from potential exposure to contaminants in soils and leachate in recreation areas near the site. A subsequent site review and update (not provided for inclusion in this document) reached the same conclusion regarding category of public health hazard.

produced a variety of chemicals, including PBBs and DDT, at the Velsicol Chemical site plant from 1936 to 1978. Velsicol completed construction of a containment system at this site in 1985. This system consisted of a slurry wall around the entire site and a clay cap over the site. Information regarding this site is taken from the 1988 ATSDR preliminary health assessment, HazDat, and the 2003 EPA NPL fact sheet.

Category of Public Health Hazard: In 1988, ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3) because exposure to PBBs through the food chain (fish and wildlife) has occurred and may possibly still be occurring, even though a fish consumption advisory was issued. A subsequent site review and update (not provided for inclusion in this document) also placed the site in this health hazard category.

Contaminants of Concern in Completed Exposure Pathways: None identified in the 1988 health assessment. The potential exposure of concern was to PBBs bioaccumlated in fish and wildlife. ATSDR noted that fish and river water and sediment concentrations of PBBs were declining. Subsequent developments included deterioration of the slurry wall in 1994, admitting water into the containment system; discovery of very high levels of DDT and metabolites in sediment of the Pine River/St. Louis impoundment; and the migration of dense non-aqueous phase liquids (DNAPL) from the containment area into the glacial till underlying the river sediments. The sediment and DNAPL are being removed and treated, according to the EPA NPL fact sheet.

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

Children 6 years and younger	365
Females aged 15-44	821
Adults 65 and older	676

Public Health Outcome Data: In 1976, the Michigan Department of Public Health recruited many Velsicol workers for a PBB health study, which placed workers and their families in a registry to study the long-term effects of PBB exposure. The study, conducted in cooperation with the CDC, FDA, and EPA, was in operation at the time of the 1988 health assessment. No conclusions were reported.

Conclusions: This site has contributed to the environmental burden of the IJC critical pollutant DDT and metabolites, and also PBBs, with particular impacts on the Pine River/St. Louis impoundment sediments and fish. According to the EPA NPL fact sheet, although PBB concentrations are declining, DDT and metabolite concentrations in sediment are not. Remediation is underway. In addition, dense non-aqueous phase liquids have migrated from the site into the glacial till under the river sediments and are also being remediated.

4.1.1.8 Hedblum Industries

The Hedblum Industries site is a 10-acre parcel located in Oscoda, Iosco County, MI, 1.2 miles west of Lake Huron. The site was leased to a series of industrial forms that manufactured parts for the automotive industry. Waste chemicals, including an estimated 4,000 gallons of spent trichloroethylene from a degreasing operation, were dumped in a pit near the main building. A pipe connecting an underground storage tank for trichloroethylene leaked. A number of residential wells in the area were found to be contaminated in 1973-1977. Most of the residents in the area of contamination were connected to municipal water in 1978, but a number were not. Trichloroethylene also was found in the

bayou into which groundwater from the site discharges; the bayou feeds the Au Sable River. The information regarding this site is taken from the 1989 ATSDR 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) because of the potential threat to human health from exposure to trichloroethylene and other VOCs.

Contaminants of Concern in Completed Exposure Pathways: None identified. No IJC critical pollutants are associated with this site. TCE has been identified in residential well water; eight households were estimated to have used contaminated well water at their household for an indeterminate time before they were switched to municipal water, but data were not adequate to measure the risks. Some residents still have not switched to municipal water, and others use well water for gardens and lawns. Exposure pathways include ingestion, dermal contact, and inhalation of trichloroethylene volatilized from the water. As of 1990, no VOC contaminants were detected in residential wells. The groundwater is being treated by a system constructed in 1992.

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

Children 6 years and younger	135
Females aged 15-44	331
Adults 65 and older	349

Public Health Outcome Data: None reported.

Conclusions: This site has contributed to human exposure and to the environmental burden of trichloroethylene in the past through contamination of groundwater used for household water and discharge of contaminated groundwater into a bayou feeding the Au Sable River. The groundwater, however, has been under remediation since 1992.

4.1.1.9 Metamora Landfill

This 160-acre site, located near the village of Metamora, Lapeer County, MI, contains a 25-acre landfill and 2 drum disposal areas, which may have contained many thousands of drums, believed to contain primarily paint and solvents. Testing of the drum wastes revealed that they contained VOCs, SVOCs, PAHs, and metals, at concentrations as high as 15%, and PCBs at as much as 1,200,000 ppb. As of 1990, excavation and off-site disposal of the drums and associated contaminated soil was underway. The information regarding this site was taken from the 1992 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: This site was categorized in the 1992 health assessment (and in an earlier health assessment, not provided for inclusion) as an *Indeterminate Public Health Hazard* (category 3) because although no current exposures at levels of concern had been documented, there was the potential for future exposure through groundwater use as household water. A subsequent ATSDR site review and update (not provided for inclusion in this document) concluded that the site poses *No Apparent Public Health Hazard* (category 4).

Contaminants of Concern in Completed Exposure Pathways: None. In 1992, ATSDR was concerned about the potential for exposure to VOCs and metals (particularly arsenic) at concentrations that may result in adverse health effects if, in the future, the shallow groundwater plume extends as far private wells that tap the shallow aquifer. Although the IJC critical pollutant PCBs was found at high concentrations in drums at the site, no further mention was made of this pollutant in the health assessment, implying that it had not contaminated the environment significantly. Site remediation has included the incineration of approximately 35,000 drums and 10,000 tons of soil offsite, and inclusion of minimally contaminated soil under a landfill cap. Groundwater studies in 1997, 1999, and 2000 indicate the VOC groundwater plume is stabilized. Therefore, monitored natural attenuation has been adopted as the remedy for groundwater.

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

Children 6 years and younger	98
Females aged 15-44	205
Adults 65 and older	93

Public Health Outcome Data: Local health authorities have said that they have received no complaints of adverse health effects that can be plausibly associated with the site. Because ATSDR's analysis of the potential for human exposure to site-related chemicals did not indicate that adverse health effects were likely, no further investigation of health outcome data was performed.

Conclusions: This site may have contributed to the environmental burden of VOCs, but it has been remediated. As reported in the EPA fact sheet, extensive remediation of the site, including on-site incineration of wastes and disposal of the resulting ash in the landfill, capping, vegetating, installation of a runoff treatment system, and installation of a groundwater extraction system, has largely eliminated releases of contaminants from the site.

4.1.1.10 Spiegelberg and Rasmussen Dump Sites

The 115-acre Spiegelberg Site and the 33-acre Rasmussen Dump are two separate sites in Livingston County, MI, that share a common property line. They are considered together in ATSDR health assessments. Both sites were used for the disposal of municipal and industrial wastes. Paint wastes were disposed on the Spiegelberg Site, and drummed industrial wastes were disposed on the Rasmussen site. Many of the drums were removed, along with contaminated soil, in 1984. A few residences are located on the sites. Information regarding these sites is taken from the 1989 public health assessment and the 1992 public health assessment addendum prepared by ATSDR, and from the 2003 EPA NPL fact sheets for the sites.

Category of Public Health Hazard: These sites were categorized as an *Indeterminate Public Health Hazard* (category 3) in 1989 because of the potential threat to human health from exposure to contaminants at levels that may result in adverse health effects and incomplete monitoring data. In the 1992 health assessment, the sites were categorized as *Public Health Hazards* (category 4) because of the threat of exposure to contaminated groundwater that was likely to occur unless the remedial actions indicated for this site were carried out.

Contaminants of Concern in Completed Exposure Pathways: None. In 1989, chemicals of concern in potential exposure pathways included the IJC critical pollutants PCBs (groundwater and soil)

10 ppm PCBs, and of the river to 5 ppm PCBs for the first mile only, is occurring, and is expected to be completed in fall 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	397
Females aged 15-44	885
Adults 65 and older	615

Public Health Outcome Data: None reported.

Conclusions: This Cast Forge Company's releases of PCBs to the Shiawassee River greatly contributed to the environmental burden of the IJC critical pollutant PCBs. Remediation of the company property, floodplain, and first mile of the river will mitigate, but not eliminate, the contamination.

4.1.1.12 Dow Chemical Co., Michigan Division, Midland Location

The Dow Chemical Company plant in the city of Midland, Midland County, MI was the subject of an ATSDR health consultation that was triggered by community concerns regarding high levels of PCDDs in soil in Midland and in fish in the nearby Tittabawassee River downstream of Midland. The Dow plant encompasses approximately 1,900 acres on the southern perimeter of the city. The Tittabawassee River forms the southern boundary of the plant site and flows southeast to join with the Saginaw River in the vicinity of the city of Saginaw. A variety of chemicals have been produced at this Dow plant, including Agent Orange [which contains 2,4,5-trichlorophenoxyacetic acid (2,4,5-T)], and 2,4,5-trichlorophenol. PCDDs and PCDFs are known to be impurities in some chlorinated phenolic chemicals, such as 2,4,5-trichlorophenol and 2,4,5-T. Chlorophenol production started in 1915. Wastes generated from this process were initially transferred to 600 acres of on-site waste ponds. During high flow periods in the early 1900s, wastes from these ponds were intentionally released to the Tittabawassee River. Some site waste has been and is taken by truck from the Dow plant to local landfills. Since that time, Dow has operated its own wastewater treatment plant on-site, but a significant flood in 1986 overwhelmed the wastewater treatment plant and flooded areas of the plant where soils were contaminated with PCDDs. The runoff and untreated or partially treated chemical wastes entered the Tittabawassee River. Two incinerators are used for treatment of liquid and solid hazardous and non-hazardous wastes generated from manufacturing at the plant. Incineration of chlorine-containing wastes also produces PCDDs and PCDFs. Information regarding this site is taken from the 2002 health consultation prepared by ATSDR. This health consultation focused on contamination of Midland soil. A separate health consultation was prepared regarding contamination in the Tittabawassee River floodplain near the city of Saginaw, in Saginaw County (see section 4.1.1.13).

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) because the data necessary to determine if dioxin contaminated soil in the Midland area poses a public health risk are not available.

Contaminants of Concern in Completed Exposure Pathways: Not identified. The IJC critical pollutants PCDDs and PCDFs were found at very high concentrations (expressed as total toxic equivalent (TEQ) concentrations in soil at the Dow plant. The residential areas to the northeast are expected to have the highest impact from historical incinerator emissions, but no data are available concerning dioxin concentrations in these areas of Midland. Most of the TEQ concentration data for the community fall

within the range (>50 but <1000 ppt TEQs) that triggers additional ATSDR evaluation, including consideration of background and bioavailability data in order to evaluate the incremental contribution of soil exposure; this information was not available.

Demographics: Residential neighborhoods are located in close proximity to the northeast perimeter of the Dow plant and within a quarter of a mile from a soil sampling site where total TEQs were above the ATSDR action level of 1,000 ppt.

Public Health Outcome Data:

- An analysis of cancer incidence data for zip codes 48640 (southwest area of Midland including the Dow plant site) and 48642 (area northeast of the Dow plant) as compared with Midland County, Bay County, and the state of Michigan showed no elevated incidences of specific cancer types in these two zip code areas. There was a higher-than-expected incidence of all cancers combined in 48640 (but not 48642) as compared with Midland County, Bay County, and the state of Michigan for individual years 1994 through 1998 and all years combined, but interpretation of this data is difficult.
- A Dow Cohort mortality study of workers in the Midland plant compared 2,187 male employees who worked at any time between 1940 and 1983 in areas of the plant where there was potential exposure to dioxin, with exposure classified on the basis of job history. Causes of death were compared to those of the U.S. population and an internal "unexposed" group of employees. Rates for all causes of death were lower in the exposed cohort than in the U.S. population, but were slightly higher for some cancers than in the unexposed employees. The relevance of this study to the non-Dow-employee residents of the community was considered questionable by ATSDR.
- An analysis of birth defects data for 1992 through 1996 from the Michigan Birth Defects Registry did not show any consistent pattern of excesses in any particular category or for birth defects overall for Midland County (about 1,000 births/year). No excess was seen for types of birth defects, such as anecephaly, spina bifida, and cleft lip, which had been reported as related to dioxin exposure.

Conclusions: This site has contributed to the environmental burden of the IJC critical pollutants PCDDs and PCDFs. Whether residents of the community near the plant experienced a level of exposure sufficient to be considered a public health risk could not be determined due to the lack of soil monitoring data in the critical areas and other data deficiencies.

4.1.1.13 Tittabawassee River

The Dow Chemical Company plant in the city of Midland, Midland County, MI was the subject of an ATSDR health consultation that was triggered by community concerns regarding high levels of PCDDs in soil in the city of Midland and in fish in the nearby Tittabawassee River downstream of Midland. An additional concern arose when sampling of the Tittabawassee floodplain near the confluence of the Tittabawassee and Saginaw Rivers revealed high levels of dioxin contamination. The soil contamination issue was considered in the ATSDR health consultation on the Dow Chemical Co. site, presented in Section 4.1.1.12, which provides a description of the plant location and releases to the environment. The issue of contamination of the floodplain of the Tittabawassee River is considered in a separate 2002 ATSDR health consultation, summarized below. The Tittabawassee floodplain area that is potentially of concern extends from the City of Midland in Midland County to the City of Saginaw in Saginaw County. The sampling sites were within Saginaw County.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) because of the potential threat to human health from exposure to PCDDs and PCDFs and the lack of monitoring data for the residential area.

Contaminants of Concern in Completed Exposure Pathways: Elevated dioxin TEQs (as high as 7,261 ppt, includes PCDDs and PCDFs) were found in soil samples from a floodplain area near the confluence of the Tittabawassee and Saginaw Rivers in Saginaw County, analyzed as part of a wetland mitigation project, and in other floodplain areas (golf course, wildlife refuge) upstream from the mitigation site. These levels were considered to be high enough to pose an urgent public health hazard if people were routinely exposed to soil at these locations, but ATSDR concluded that the level of exposure on these properties is not known, and was concerned regarding the lack of sampling on nearby residential properties. The only known source of dioxin contamination was the Dow Chemical Company plant upstream at Midland. ATSDR concluded that the contamination likely resulted from deposition of contaminated river sediments in the Tittabawassee River floodplain. As discussed in Section 4.1.1.12, fish in the Tittabawassee River below the city of Midland have elevated levels of PCDDs and PCBs. Based on the floodplain soil data together with the fish data, ATSDR concluded that dioxin contamination may be widespread throughout the Tittabawassee River watershed below Midland.

Demographics: Twelve homes are located adjacent to the river less than half a mile upstream from the mitigation site where very high TEQs were detected. Numerous other residential properties are located within the floodplain upstream of the wetland mitigation site.

Public Health Outcome Data: None reported.

Conclusions: This site is contaminated with the IJC critical pollutants PCDDs and PCDFs, probably from releases from the Dow Chemical Company plant upstream at Midland, Midland County.

4.1.1.14 Lufkin Rule

The 14-acre Lufkin Rule property is a large abandoned industrial property in a mostly residential area of Saginaw, Saginaw County MI. After being sold, the property was rented out to a large number of tenants. In 1994, a dry cleaning establishment on the property burned, and the remnants were later demolished. Since that time, the entire property has been vacant. Drums of dry-cleaning solvers, transformers, capacitors, and other electrical equipment containing PCBs were found on the property. Some of the equipment had been scavenged, and the PCB-containing oil spilled on the ground. The PCB-containing oil and soil, drummed solvents, and other waste materials were removed in 1995 for disposal at an approved facility. Information regarding this site is taken from the ATSDR 1997 health consultation.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 3) because of the physical hazards in the abandoned and decrepit buildings on the property, and contaminants in soil that would soil pose health hazards to anyone working on the property for long periods. The site is not secured from trespassers, and there is evidence of extensive trespassing.

Contaminants of Concern in Completed Exposure Pathways: None identified. There are hot spots of soil contamination with the IJC critical pollutant PCBs and also of bis(2-3ethylhexyl)phthalate that could pose health hazards through inadvertent ingestion to anyone working in those areas for long periods or visiting those areas daily over a long period of time, but this exposure scenario was considered unlikely. Levels of the IJC critical pollutants B(a)P and lead in soil and storm sewer sediment exceeded health based screening values, but were within ranges typically found in urban areas. Groundwater was contaminated with trichloroethylene, but is not used as a drinking water source. Levels of trichloroethylene and other VOCs in storm sewer water were above drinking water standards, and indicate release from the site through runoff.

Demographics: Not reported, but the site is located in a residential area.

Public Health Outcome Data: None reported.

Conclusions: This site may have contributed to the environmental burden of the IJC critical pollutant PCBs, and also of VOCs, but the extent of on-site contamination is limited.

4.1.1.15 Laingsburg

The Laingsburg property is a former gasoline and automotive service station located in the city of Laingsburg, Shiawassee County, MI, which stopped operations in 1984, and since then, has been used for automotive repair and body shop work. In 2000, a health consultation was performed by ATSDR as part of a Brownfields project; that document is the source of information regarding this site. Records indicate that there may have been three underground fuel storage tanks on the property, and there is no clear indication that the tanks were removed from the property.

Category of Public Health Hazard: This site was categorized 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.

Contaminants of Concern in Completed Exposure Pathways: Not reported. Access to the site was denied, so no on-site monitoring data are available. Subsurface soil sampled around the perimeter of the site contained trimethylbenzene and xylenes above screening values for industrial or commercial use. Shallow groundwater at the site perimeter was similarly contaminated had a floating oily layer liquid (one monitoring well) containing trimethylbenzenes and other VOCs. Concentrations exceeded drinking water standards or screening levels. The contamination was consistent with gasoline leaking from the underground storage tanks.

Demographics: Not reported, but there are eight private wells within 0.2 miles of the site, and Laingsburg has no municipal water system; residents use individual private wells.

Public Health Outcome Data: None reported.

Conclusions: This site may be releasing gasoline from underground storage tanks, but access to the site was denied and the available monitoring data are inadequate to assess the potential threat to public health.

4.1.2 TRI Data for the Saginaw River and Bay AOC

The TRI on-site chemical releases for the 21 counties (combined) that are relevant to this AOC are summarized in Table 4-3. Total on-site releases for the 21 counties in 2001 were 7,831,200 pounds, the majority of which were released to air, followed by releases to soil. Considerably less was released to surface water.

The IJC critical pollutants accounted for 92,142 pounds or 1.2% of the total on-site releases. The IJC critical pollutants released were PCDDs and PCDFs (primarily to land), lead and lead compounds (primarily to land); and mercury and mercury compounds (primarily to air and land). The facilities that

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

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 addition 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.

5.2.1.2 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

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:

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

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

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.

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 (≥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

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) in the 1989 ATSDR public health assessment because of the risk to human health from possible exposure to hazardous substances through dermal contact, ingestion, or inhalation of contaminated soil or sediments. In the 2001 health consultation (not provided for inclusion in this document), ATSDR concluded that the site is a *Public Health Hazard.*

Contaminants of Concern in Completed Exposure Pathways: None identified by the 1989 ATSDR health assessment. For both sites, PAHs are the primary contaminants of concern. Data for individual PAHs were not reported, but it is likely that the IJC critical pollutant B(a)P was present at levels of concern. Soil, surface water, groundwater, and sediments are contaminated with a variety of hazardous substances including PAHs, SVOCs, heavy metals, and VOCs. ATSDR's more recent documentation for the site, the 2001 health consultation, may provide information regarding contaminants in completed exposure pathways, but as mentioned previously, was not provided for inclusion in this document. According to the NPL fact sheet for this site, remediation activities have included removal of tar seeps, contaminated soil, and sediments; and solidification of some wastes in-place, with capping. Additional sediment requires remediation, and groundwater, which discharges to the river, is being evaluated.

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

Children 6 years and younger	417
Females aged 15-44	934
Adults 65 and older	756

Public Health Outcome Data: Not reported.

Conclusions: This site appears to have contributed to the contaminant burden of the St. Louis River, particularly with regard to PAHs, and probably including IJC critical pollutant B(a)P. Further conclusions may be drawn at such time as more recent ATSDR documentation for this site is provided for inclusion in this document.

6.3.1.1 Koppers Company Superior Plant

The Koppers facility in the Town of Superior, Douglas County, WI, contaminated the Crawford Creek basin soils and sediments with chemicals related to wood treatment processes. Information regarding this site is taken from the 2003 ATSDR health consultation for the site.

Category of Public Health Hazard: ATSDR concluded that the contaminated soils and sediments are a public health hazard in its 2001 health consultation (not provided for inclusion in this document). This site was categorized by ATSDR as an *Indeterminate Public Health Hazard* (category 3) for PCDD and PCDF contamination of fish in its 2003 health consultation.

Contaminants of Concern in Completed Exposure Pathways: According to the summary in the 2003 health consultation, the 2001 health consultation concluded that creosote wastes and PAHs in the soils and sediments of lower Crawford Creek are a human health concern. PCDDs and PCDFs were also present in these media, but the contamination was not well characterized and apparently was not at levels of health concern. Further monitoring, including of fish and wildlife, was needed. The 2003 health consultation evaluated the adequacy of modeled fish concentrations as a basis for assessing health risk.

ATSDR concluded that it could not, on the basis of that information, confidently conclude that fish from Crawford Creek and the Nemadji River basis do not contain unsafe levels of PCDDs and PCDFs, and that fish in those areas therefore pose an indeterminate health risk.

Demographics: Not reported.

Public Health Outcome Data: Not reported.

Conclusions: The Koppers facility has contaminated the Crawford Creek basin with PAHs, probably including the IJC critical pollutant B(a)P, and other creosote-related chemicals at levels of public health concern. Whether PCDDs and PCDFs have accumulated in fish to levels of concern could not be determined.

6.3.2 TRI Data for the St. Louis River and Bay AOC

The TRI on-site chemical releases for St. Louis and Carlton Counties, MN, and Douglas County, WI, are summarized in Table 6-11. Total on-site releases in 2001 were 1,253,524 pounds, the majority of which were released to air, followed by releases to land. St. Louis County accounted for 37%, Carlton County accounted for 46%, and Douglas County accounted for 17% of the total on-site releases.

IJC critical pollutants accounted for 4,417 pounds (0.4 %) of the total on-site releases. The IJC critical pollutants released were PCDDs and PCDFs (to air and land), lead and lead compounds (to air and land), and mercury compounds (primarily to air). The facilities that released these pollutants are listed in Table 6-12.

The largest on-site release (300,000-499,999 pounds) of non-IJC chemicals was of methanol (to air). The next largest release category (150,000-299,999 pounds) also had only one chemical, barium compounds (primarily to land).

6.3.3 County Demographics and Health Status Data for the St. Louis River and Bay AOC

The demographic profile, from the 2000 U.S. Census, for vulnerable populations living in the three counties of this AOC is shown in Table 6-13.

Table 6-13. County Demographic Profiles for the St. Louis River and Bay AOC

Vulnerable population	St. Louis County, MN	Carlton County, MN	Douglas County, WI	Total for AOC
Children 6 years and younger	14,995	2,631	1,288	18,914
Females aged 15-44	41,312	6,140	3,047	50,499
Adults 65 years and older	32,274	4,784	3,903	40,961

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 this AOC were as follows (no indicators were above the upper limit of the peer county range):

St. Louis County, MN

Infant mortality (per 1,000 births)

- none

of PCBs. An epidemiological study in 1988 reported no evidence for excess cancer mortalities associated with the Fields Brook Site. Vulnerable populations within 1 mile of this site number close to 6,000.

Lake Huron

Only one U.S. AOC, The Saginaw River and Bay AOC, is located on Lake Huron. This AOC has five hazardous waste sites that may be continuing to release IJC critical pollutants (PCDDs, PCDFs, PCBs, and/or DDT and metabolites), but as discussed in Chapter 4, additional data are needed to assess their impacts, and some of the sites are under remediation.

- Bay City Middlegrounds (Section 4.1.1.1)
- Velsicol Chemical Corp. (Section 4.1.1.7)
- Shiawassee River (Section 4.1.1.11)
- Dow Chemical Co., Midland Location (Section 4.1.1.12)
- Tittabawassee River (Section 4.1.1.13)

Vulnerable populations residing near the first three listed sites consisted of about 3,000 or fewer people per site. Data on vulnerable populations were not reported for the last two listed sites.

Lake Michigan

Kalamazoo River AOC, Allegan and Kalamazoo Counties, MI: Most of the six hazardous waste sites of concern in this AOC have been remediated or institutional controls have been put in place to eliminate completed exposure pathways. The exception is the **Allied Paper/Portage Creek/Kalamazoo River site** (Section 5.2.1.2), which is heavily contaminated with PCBs from the paper industry, and constitutes a major source of continuing exposure and potential loading to Lake Michigan. The site covers a very large geographical area, including 75 acres in the city of Kalamazoo, and also Portage Creek and at least 35 miles of the Kalamazoo River. Remediation of PCB-contaminated soil and sediment was in the early phases. Public health outcome data are not available. Because human exposure to PCBs at levels of public health concern may be occurring, the site (as of ATSDR's 1991 public health assessment) was being considered for a study to investigate fish ingestion and serum PCB levels. Vulnerable populations within 1 mile of the site are large, totaling nearly 33,000 people.

Waukegan Harbor AOC, Lake County, IL: One hazardous waste site in this AOC, the **Outboard Marine Corp.** (Section 5.4.1.4), has been characterized as one of the major sources of PCBs discharging into Waukegan Harbor, contributing to the contamination of sediment and fish. This site is under remediation, together with contaminated sediments in the harbor. Dredged sediments are being treated on-site. No public health outcome data were reported for the site. Vulnerable populations within 1 mile of this site total about 7,000 people.

Milwaukee Estuary AOC, Milwaukee County WI: Two sites in this AOC continue to contribute to the burden of ICJ critical pollutants and to human exposure. The **Former Tannery** site (Section 5.5.1.3), although a small, non-NPL site, 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. No public health outcome data were reported for this site. Vulnerable populations were not discussed, but over 100 families live within a short walk to the site. The **Moss-American Co., Inc.** (Kerr-McGee Oil Co., Section 5.5.1.4), an 88-acre wood preserving site, contaminated on-site soil and the sediments of the Little Menominee River with PAHs, including B(a)P, and with PCDDs, PCDFs, and lead. The site itself has been remediated, and some of the contaminated sediment was removed. Remediation of the remaining sediment, principally contaminated with PAHs, is under design. No public

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hazardous substances
are many more than the
11 critical pollutants.

Almost 20 years ago.

1985

These critical pollutants
were for Lakewide Mgmt Plans
rather than AOCs & RAPs.

There maybe many more
substances that are of concern
in the AOCs & exposures
of populations

Hazardous waste sites only part of AOC problem definition. Contrast how much has been done on hazardous waste sites compared to in situ contaminated sediments.

1. INTRODUCTION

The Great Lakes Areas of Concern (AOCs) are severely degraded geographic areas within the Great Lakes Basin. The AOCs are defined by the U.S.-Canada Great Lakes Water Quality Agreement (Annex 2 of the 1987 Protocol) as "geographic areas that fail to meet the general or specific objectives of the agreement where such failure has caused or is likely to cause impairment of beneficial use of the area's ability to support aquatic life." The U.S. and ~~Canadian governments~~ have identified 43 such areas; 26 in U.S. waters, 17 in Canadian waters, and 5 shared between the U.S. and Canada on connecting river systems (binational AOCs). All of these AOCs are impacted by chemical contaminants from either local sources and/or remote sources of pollution. No organization has conducted a systematic evaluation of the contribution of hazardous waste sites to the environmental chemical contaminant burden and its impact on public health.

These need to be included

In an upcoming Biennial Report, [redacted] To this end, the Commission asked Agency for Toxic Substances and Disease Registry (ATSDR) to provide and evaluate information on public health assessments that it has conducted [redacted] within the 26 AOCs. Specifically, the Commission asked if ATSDR could identify evaluated sites, the Hazard Category assigned to each site, relevant demographic information on the populations at risk, completed exposure pathways identified, and the critical pollutants following these pathways.

No longer true if ever. How can IJC use this?

The IJC has identified 11 critical pollutants as the focus for efforts to reduce loadings to the Great Lakes. These pollutants are persistent, bioaccumulative, and harmful to the ecosystem and human health. Table 1-1 lists the critical pollutants, along with relevant synonyms or designations used in ATSDR's HazDat data base and in U.S. Environmental Protection Agency's (EPA) Toxics Release Inventory (TRI). A tracking number has been assigned to each IJC critical pollutant to enable tracking of records that provide information regarding these pollutants in these data bases.

What other substances need to be considered?

Table 1-1. International Joint Commission (IJC) Great Lakes 11 Critical Pollutants

IJC Tracking Number*	Critical Pollutant, Synonyms, Relevant Contaminants in HazDat and TRI
1	PCBs (polychlorinated biphenyls), Aroclors
2	Dioxins, PCDDs (polychlorinated dibenzo-p-dioxins), TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin), other polychlorinated dioxin congeners
3	Furans, PCDFs (polychlorinated dibenzofurans), TCDF (2,3,7,8-tetrachlorodibenzofuran), other polychlorinated dibenzofuran congeners
2 & 3	Dioxins and dioxin-like compounds
4	B(a)P [benzo(a)pyrene]; carcinogenic PAHs
5	DDT and metabolites, p,p'- and o,p'-DDT, DDE, and DDD
6	Aldrin/dieldrin
7	Mirex
8	Alkyl-lead, alkylated lead, tetraethyl lead, lead compounds
9	Mercury, methyl mercury, mercury compounds
10	Toxaphene
11	Hexachlorobenzene

*Number assigned to the pollutant(s) by ATSDR to enable tracking of HazDat and TRI records that provide data relevant to that pollutant. The number does not reflect priority.

Think of the disappointment if IJC said nothing in the Biennial Report.

[redacted] of the individual AOCs are provided in an appendix to this document. The [redacted] of the AOCs as depicted in the maps and described in the text are based on information provided by EPA [redacted] The maps show the ATSDR-assessed hazardous wastes sites in the AOC counties, and also the CERCLA sites, TRI release sites, schools, hospitals, and population density.

The discussion of the Great Lakes AOCs in this document is organized geographically by Lake and from east to west around the lake shoreline. This was done because of the overlap of counties among some AOCs, and of AOCs within a county. A map showing the locations of the U.S. (and binational) AOCs is provided in Figure 1-1. An alphabetical list of the AOCs with page numbers is provided immediately after the table of contents. An alphabetical list of the hazardous waste sites with section numbers and geographical location (state, county, AOC, and Great Lake) is provided in a table at the end of Chapter 8.

In addition to evaluating information on public health assessments for hazardous waste sites within the 26 U.S. AOCs, this document evaluates data on industrial sources of chemical emissions, and on county-wide health outcomes, in order to provide a fuller perspective on potential impacts on environmental burdens and public health. The information in this document may support relative rankings across AOCs taking into account contaminants, exposure pathways, health outcome data, and vulnerable populations.

1.1 ATSDR PUBLIC HEALTH ASSESSMENTS FOR THE 26 GREAT LAKES AOCs

ATSDR has conducted public health assessments, health consultations, and other assessments on more than 100 hazardous waste sites relevant to the 26 areas of concern. These sites include National Priorities List (NPL) sites, Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) sites, and other sites. As described in its *Public Health Assessment Guidance Manuals* (1992, updated in 2002), ATSDR categorizes the degree of public health hazard posed by such sites as defined in Table 1-2.

Table 1-2. Public Health Hazard Conclusion Categories

Category	Definition
1. Urgent Public Health Hazard	Applies to sites that have certain physical hazards or evidence of short-term (less than 1 year), site-related *exposure to hazardous substances that could result in adverse health effects and require quick intervention to stop people from being exposed.*
2. Public Health Hazard	Applies to sites that have certain physical hazards or evidence of chronic, site-related *exposure to hazardous substances that could result in adverse health effects.*
3. Indeterminate public Health Hazard	Applies to sites where *critical information is lacking* (missing or has not yet been gathered) to support a judgment regarding the level of public health hazard.
4. No Apparent Public Health Hazard	Applies to sites where exposure to site-related chemical might have occurred in the past or is still occurring, but *the exposures are not at levels expected to cause adverse health effects.*
5. No Public Health Hazard	Applies to sites where *no exposure* to site-related hazardous substances exists.

The following analyses of the potential impacts of hazardous waste sites on the 26 US AOCs is based on data from HazDat, ATSDR's Hazardous Substance Release/Health Effects Database [redacted] and on ATSDR public health assessments and health consultations, and related assessments. Using HazDat, ATSDR has extracted data for contaminants that exceed human health screening concentrations at hazardous waste sites with public health hazard categories of 1, 2, or 3. These data are used to give a general picture of what chemicals were, *at some point in the assessment of a site,* present at concentrations that indicated a need for further evaluation. The ATSDR public health assessments, consultations, and related assessments provide a further analysis of the significance to public health of these chemicals, including whether or not completed exposure pathways exist or existed for the chemicals. For NPL sites that may have been remediated subsequent to ATSDR evaluation, information regarding the current status of the site was obtained from the EPA NPL fact sheets [redacted]

Demographic data for the NPL sites were extracted by ATSDR from the 2000 U.S. Census [redacted] and are reported on the AOC maps in the appendix and also in the text of this document. The maps present the locations and demographic data for all NPL sites, but the data analyses in this document focus on sites with hazard categories of 1-3. For non-NPL sites, demographic data were taken from the health assessment documents.

1.2 TRI DATA FOR THE 26 GREAT LAKES AOCs

The TRI is a publicly available EPA data base [redacted] of information on toxic chemical releases in the United States, as reported by certain covered industries and by federal facilities. The TRI identifies the reporting facilities; chemicals manufactured, processed, and used at the facilities; and estimated annual amounts of these chemicals released. The releases of the some of the IJC critical pollutants are reported through the TRI. These critical pollutants are PCBs, PCDDs, and PCDFs, aldrin, lead and lead compounds, mercury and mercury compounds, toxaphene, and hexachlorobenzene. TRI data are included in this report to provide an indication of the potential impact of chemicals released from industrial sources on the Great Lakes AOCs. This document focuses on on-site releases as most relevant to exposures in the Great Lakes AOCs.

1.3 COUNTY HEALTH OUTCOME DATA FOR THE 26 GREAT LAKES AOCs

removed from web site October 2002.

Health outcome data for the counties that immediately encompass and surround the 26 U.S. AOCs were obtained from [redacted] produced in 2000 by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services. These reports compare measures of birth and death (such as low birth weight, infant mortality, and cancer mortality) for a county with "peer counties." The peer counties are other counties and county-like geographic areas (usually 20 or more) that are similar in population size and density, poverty and age structure. The health measures also are compared with the U.S. rates. The county health measures (health status indicators) that compare unfavorably with the median of the peer counties and also with the U.S. are considered to merit attention. Health status indicators that exceed the upper limit of the peer county range and also exceed U.S. rates are highlighted in this document. The peer county range is the range from the 10th percentile to the 90th percentile and, thus, encompasses 80% of all peer county values.

Les ratio.

What does this really mean in assessment terms. — who is the audience. What is the significance of 80%?

no morbidity data.

Who is the audience
why was the work undertaken
A little of the history of AOCs. & Critical pollutants.
Similar work undertaken in Canada.
Different approaches. —
Need to move past 11 Critical pollutants.
Need to move past birth & death & low birth weight.
Need to get to ICD Classification.
New website of diseases and the chemicals associated with them.

Category of Public Health Hazard: In 1988, ATSDR concluded that the site was an *Indeterminate Public Health Hazard* (category 3). In 1997, ATSDR concluded that currently the site poses *No Apparent Public Health Hazard* (category 4). Although the site posed a public health hazard prior to 1977 when the EPA initiated site cleanup, remedial actions have eliminated the potential for current and future exposures to site contaminants.

Contaminants of Concern in Completed Exposure Pathways: In 1988, data were not adequate to determine if completed exposure pathways existed. Contaminated media were surface water, groundwater, and soil, as well as fish tissue from off-site streams. Contaminants of concern included the IJC critical pollutants PCBs, dieldrin, and lead. Other contaminants of concern were VOCs, cyanide, and metals. As of 1997, ATSDR concluded that there are no completed exposure pathways.

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

Children 6 years and younger	398
Females aged 15044	942
Adults 65 and older	1,157

Public Health Outcome Data: In response to community concern regarding cancer in young male employees at the nearby Eastside Sewage Treatment Plant who might have been exposed to industrial wastes during plant processing or contaminants at the Pollution Abatement Services site, the NYS DOH completed a cancer incidence investigation in 1986. The NYS DOH did not detect a statistically significant increase in cancer incidence among workers at the Eastside Sewage Treatment Plant in comparison with either the Westside Sewage Treatment Plant workers or the general population. Two of the cancer types observed are known to be common among men of the age group examined, and the remaining two types of cancer had no known risk factors in common. In addition, the four cancers arose at relatively short intervals from the start of employment at the Eastside Sewage Treatment Plant (<10 years), which is inconsistent with the usual long latency period for most adult cancers (10-20 years).

More detail, what cancers types.

Conclusions: The Pollution Abatement Services site, prior to remediation, may have released contaminants into the environment, including the IJC critical pollutants dieldrin, PCBs, and lead, as well as other contaminants including VOCs, other metals, and cyanide. Releases into streams draining into Lake Ontario occurred. The Pollution Abatement Services site is no longer contributing to the human exposure or the environmental burden of IJC critical pollutants or other contaminants.

could be promotion, reducing latency, increasing # of cancers

2.1.1.3 Volney Municipal Landfill, Volney, Oswego County, NY

This unlined landfill, located approximately 2 miles from the Oswego River and upstream from the AOC, operated as a municipal waste disposal facility for residential, commercial, and light industrial operations from 1969 to 1983. Expansion of the landfill in the mid 1970s included the installation of a leachate collection and drainage system in some sections. In 1974-1975, up to 8,000 barrels containing residues of chemical sludge from a hazardous waste treatment facility were accepted, and between 50 and 200 of these contained liquid wastes that were incorporated into the daily fill. Closure of the landfill included installation of some controls including an impermeable cap over the landfill, and two-foot soil cap on the uppermost side slopes, surface water controls, a venting system for gases, and planting of vegetative cover. Information regarding this site is taken from the 1987 ATSDR public health assessment and the 2003 EPA NPL fact sheet.

2.1.3 County Demographics and Health Status Data for the Oswego River AOC

The demographic profile, from the 2000 U.S. Census, for vulnerable populations living in Oswego County, [redacted] as follows:

Children 6 years and younger	11,122
Females aged 15-44	27,269
Adults 65 and older	13,875

According to the 2000 HRSA community health status reports, Oswego 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)
- white infant mortality

Birth measures (as percent)
- unmarried mothers

Death measures (per 100,000 population)
- colon cancer

2.1.4 Summary and Conclusions for the Oswego River AOC

2.1.4.1 Hazardous Waste Sites

Three hazardous waste sites in Oswego County have ever been characterized in public health hazard categories 1-3. Based on the documents for these sites, there is no clear evidence of site-related contaminants in completed exposure pathways at concentrations that exceed health-based screening concentrations. Although critical information to characterize past exposure and releases was missing for the sites at the time of the ATSDR public health assessments in the late 1980s, all three sites have been remediated since that time. Chemicals of concern at these sites included the IJC critical pollutants PCBs (soil) and lead (soil and groundwater) at the Fulton Terminals and Pollution Abatement Services sites.

Public health outcome data, available for the Pollution Abatement Services Site, did not indicate any association of cancer in nearby workers with site-related exposure.

2.1.4.2 TRI Data

The TRI on-site chemical releases for Oswego County, NY in 2001 totaled 204,417 pounds, primarily to air.

Only 171.3 pounds (0.08%) of the total on-site releases were IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (primarily to air), lead and lead compounds (to air), and mercury (to land). The facilities that released these pollutants are listed in Table 2-4.

There were no releases of non-IJC chemicals ≥100,000 pounds.

2.2 ROCHESTER EMBAYMENT AOC, MONROE COUNTY, NY

The Rochester Embayment AOC includes the Rochester Embayment, an area of Lake Ontario formed by the indentation of the shoreline of Monroe County, NY and includes approximately 6 miles of the Genesee River that is influenced by lake levels, from the river's mouth to the Lower Falls (see AOC map in the appendix). The drainage area consists of the entire Genesee River Basin and parts of two other drainage basins.

2.2.1 Hazardous Waste Sites Relevant to the Rochester Embayment AOC

ATSDR has evaluated the data for one hazardous waste site in Monroe County, and reached conclusions regarding the public health threat posed by this site, which is summarized in Table 2-5, along with information regarding the date and type of assessment, and the type and location of the site:

Table 2-5. Hazardous Waste Sites in Monroe County, NY

Site Name	Public Health Hazard Category	EPA NPL Status	Site ID	City
Rochester City of – APCO Site	2 (2000 HC)	Non NPL	NYR000042770	Rochester

2 = Public Health Hazard
HC = Health Consultation

For hazardous waste sites in Monroe County that *at any time* had Public Health Hazard Categories of 1-3, (1 site) the total number of chemicals present at concentrations exceeding health-based screening concentrations was 32, as summarized in Table 2-6. Most of the records were for the soil media groups.

Five records were for IJC critical pollutants, all in soil. These IJC critical pollutants were: carcinogenic PAHs [which would include B(a)P], lead, and mercury. The IJC chemicals accounted for 15% of the total detections above health-based screening values.

Further evaluation of the data for this site was conducted by ATSDR, and is summarized in the following section.

2.2.1.1 Rochester City of – APCO Site (Former APCO Property Brownfield Site)

This site covers about 5 acres in the City of Rochester, Monroe County, NY. The site was used by general contracting firms since at least the 1930s until the City foreclosed on the property in 1996. The site includes a construction and demolition debris disposal area and underground storage tanks areas that have soil and groundwater contaminated with VOCs. The tanks were used for gasoline and diesel fuel and some of them were leaking. Stained surface soils with elevated PAHs were thought to be associated with dumping/spillage of used motor oil. Information on this site is taken from the 2000 ATSDR health consultation.

According to the 2000 HRSA community health status reports, Monroe County (NY) health status indicators that compared unfavorably with those of the U.S. and also with the median of the peer counties were as follows (no indicators were above the upper limit of the peer county range):

Infant mortality (per 1,000 births)
- black infant mortality
- neonatal infant mortality

Birth measures (as percent)
- no care in first trimester

Death measures (per 100,000 population)
- None

2.2.4 Summary and Conclusions for the Rochester Embayment AOC

2.2.4.1 Hazardous Waste Sites

One site, a Brownfields site, in Monroe County, NY has ever been categorized by ATSDR in health hazard categories 1-3. Exposures to site-related contaminants are not currently occurring, but the Rochester City of – APCO site is a potential source of the IJC critical pollutants B(a)P, lead, and mercury (in soil), as well as other contaminants such as BTEX (in groundwater). The site is relatively small, however, compared with waste disposal sites. In January 2000, ATSDR recommended its remediation.

Issues for Follow-Up

Rochester City of – APCO site: A contaminated Brownfields site that has not been cleaned up.

2.2.4.2 TRI Data

The TRI on-site chemical releases for Monroe County, NY in 2001 were 6,967,728 pounds, the majority of which were released to air, followed by releases to surface water.

Only 2017 pounds (0.03%) of the total on-site releases were IJC critical pollutants. The IJC critical pollutants released we[redacted](primarily to air and surface water), lead and lead compounds (primarily to surface water and less to air), a[redacted](primarily to air).

The major releases (≥500,000 pounds) of non-IJC chemicals were of hydrochloric acid aerosol, dichloromethane, and sulfuric acid aerosols (solely or primarily to air), and nitrate compounds (primarily to surface water).

2.2.4.3 County Demographics and Health Status Indicators

Vulnerable populations for Monroe County, NY, totaled 323,484. Only three Monroe County health status indicators compared unfavorable with both U.S. indicators and with the median of peer county

Table 2-8. TRI Facilities Releasing IJC Critical Pollutants On-site for the Rochester Embayment AOC

IJC Critical Pollutant	Number of Facilities	Facility Name	TRIF ID	City
Dioxin and dioxin-like compounds	**2**			
(PCDDs and PCDFs)				
Monroe County, NY	2	EASTMAN KODAK CO. KODAK PARK	14652STMNK1669L	ROCHESTER
		RUSSELL STATION	14612RSSLL1101B	ROCHESTER
Lead and lead compounds	**8**			
Monroe County, NY	8	AMETEK POWER INSTRUMENTS	14605MTKPW255NU	ROCHESTER
		EASTMAN KODAK CO. KODAK PARK	14652STMNK1669L	ROCHESTER
		FISHER SCIENTIFIC CO. L.L.C.	14616FSHRS140BE	ROCHESTER
		PFEIFFER GLASS CO.		
		HARRIS CORP. RF COMMUNICATIONS DIV.	14609RFCMM570CU	ROCHESTER
		PJC TECHS. INC. METRO CIRCUITS DIV.	14613PJCTC205LA	ROCHESTER
		RUSSELL STATION	14612RSSLL1101B	ROCHESTER
		SABIN METAL CORP.	14546SBNMT1647W	SCOTTSVILLE
		SEN DEC CORP.	14450SNDCC151PE	FAIRPORT
[redacted]	**3**			
	3	EASTMAN KODAK CO. KODAK PARK	14652STMNK1669L	[redacted]
		FISHER SCIENTIFIC CO. L.L.C.	14616FSHRS140BE	[redacted]
		PFEIFFER GLASS CO.		
		RUSSELL STATION	14612RSSLL1101B	[redacted]

2.3 EIGHTEEN MILE CREEK AOC, NIAGARA COUNTY, NY

The Eighteen Mile Creek AOC is located in the town of Newfane, Niagara County, NY. The creek flows from south to north. It discharges into Lake Ontario through Olcott Harbor, approximately 18 miles east of the mouth of the Niagara River. The AOC includes Olcott Harbor and extends almost two miles upstream, to just below the Burt Dam, which is the farthest point at which backwater conditions exist during Lake Ontario's highest monthly average lake level (see AOC map in the appendix).

2.3.1 Hazardous Waste Sites Relevant to the Eighteen Mile Creek AOC

Two AOCs are located in Niagara County: The Niagara River AOC (located in Niagara and Erie Counties, NY) and the Eighteen Mile Creek AOC. The Niagara River AOC is a binational (U.S.-Canada) AOC not included in this document.

ATSDR has performed health assessments for seven hazardous waste sites in Niagara County. Six of these are located on or very close to the Niagara River, mostly in the city of Niagara Falls, and are relevant to the Niagara River AOC. These six are the Forest Glen Mobile Home Subdivision, Hooker (102nd Street), Hooker (Hyde Park), Hooker (S Area), Love Canal, and Niagara County Refuse sites. Five have been classified as *Indeterminate Public Health Hazards* (category 3) at some point in their assessment, and one, Love Canal, was classified as an Urgent Public Health Hazard in 1985. All six sites relevant to the Niagara River AOC have been remediated according to ATSDR documentation and the 2003 EPA NPL sites. Because they do not appear to be relevant to the Eighteen Mile Creek AOC, they will not be discussed further here.

The remaining site, Barker Chemical, is not located in the Niagara River AOC, but rather is approximately 7.5 miles east of the Eighteen Mile Creek. ATSDR has evaluated the data for this site and reached a conclusion regarding its public health threat. This conclusion, and information regarding the type and location of the site, and the date and type of assessment document, are summarized in Table 2-9.

Table 2-9. Hazardous Waste Sites in Niagara County, NY, Relevant to Eighteen Mile Creek AOC

Site Name	Public Health Hazard Category	EPA NPL Status	Site ID	City
Barker Chemical	[redacted] (2000 HC)	Non NPL	NYN000204285	Somerset

2 = Public Health Hazard
HC = Health Consultation

For this hazardous waste site, the total number of chemicals present at concentrations exceeding health-based screening concentrations was 15, as summarized in Table 2-10. Most of the records were for the soil media group.

The only IJC critical pollutant was lead, which accounted for 5 records (33% of the total). Lead was found mainly in the soil media group. Further evaluation of this site, provided by ATSDR in the health consultation listed in the table, is provided in the following section.

2.3.1.1 Barker Chemical

Barker Chemical is a 10-acre site in Somerset, Niagara County, NY, approximately 7.5 miles east of Eighteen Mile Creek. Barker Chemical was formerly an agricultural chemical manufacturer that produced fungicides and herbicides from the 1930s through the 1960s. The site includes several abandoned buildings, three lagoons, an aboveground tank, and an area of shallow standing water near the buildings. Although partially fenced, the site has been used extensively for recreational activities. The information on this site is taken from the 2000 health consultation performed by ATSDR as part of a Brownfields project, and from HazDat.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category [redacted] because of the potential health risk for children and adults accessing the site.

Contaminants of Concern in Completed Exposure Pathways: The IJC critical pollutant lead, and another metal (arsenic) were detected at levels in surface soil that would pose a health threat to children or adults from long-term incidental injection. Monitoring data were limited, and did not include pesticides. The on-site waste lagoons and tributaries contained liquid of a very low pH that could result in severe burns from direct skin contact. Groundwater had not been monitored.

Demographics: Not reported, but a residential area is located about 500 yards from the site boundary.

Public Health Outcome Data: None reported.

Conclusions: This site contains the IJC critical pollutant lead, and also arsenic, at concentrations of health concern in onsite soil. The pH of liquids in on-site lagoons and tributaries was very low. Although the site formerly was engaged in pesticide manufacture, no monitoring for organic pesticides had been performed. No groundwater monitoring data were available.

2.3.2 TRI Data for the Eighteen Mile Creek AOC

The TRI on-site chemical releases for Niagara County are summarized in Table 2-11. Because they are for the entire county, and because industrial activity is concentrated in or near the Niagara River AOC, these data are more relevant to the binational Niagara River AOC than to the Eighteen Mile Creek AOC. Total on-site releases in 2001 were 3,174,559 pounds, the majority of which were released to air, followed by releases to soil, and then surface water.

Of the total on-site releases, 63,282 pounds were IJC critical pollutants. The IJC critical pollutants released were PCBs (to air), PCDDs and PCDFs (primarily to air), lead compounds and mercury compounds (primarily to land), and hexachlorobenzene (to surface water). The facilities that released these pollutants are listed in Table 2-12. Most of these facilities are located in the city of Niagara Falls, and thus are relevant to the binational Niagara River AOC rather than to the Eighteen Mile Creek AOC.

Releases of IJC critical pollutants relevant to the Eighteen Mile Creek AOC are of PCDDs and PCDFs from a facility in Barker, of lead compounds from a facility in Barker and one in Lockport, and of [redacted] compounds from a facility in Barker.

The major releases (≥500,000 pounds) of non-IJC chemicals were of manganese compounds and barium compounds (primarily to land).

2.3.3 County Demographics and Health Status Data for the Eighteen Mile Creek AOC

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

Children 6 years and younger	18,996
Females aged 15-44	46,034
Adults 65 and older	33,884

These demographics, and also the community heath status indicators summarized below, are likely to be heavily weighted by the City of Niagara Falls, and thus not particularly relevant to the Eighteen Mile Creek AOC, located in a relative rural region.

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 Niagara County were as follows (indicators that were above the upper limit of the peer county range are bolded):

Infant mortality (per 1,000 births)
- [redacted]

Birth measures (as percent)
- [redacted]
- [redacted]

Death measures (per 100,000 population)
- [redacted]
- [redacted]
- [redacted]
- [redacted]

2.3.4 Summary and Conclusions for the Eighteen Mile Creek AOC

2.3.4.1 Hazardous Waste Sites

Most of the waste sites in Niagara County that have been evaluated by ATSDR are located on the Niagara River and are relevant to the binational Niagara River AOC (not included in this document), rather than to the Eighteen Mile Creek AOC.

The one ATSDR-evaluated site that is located near the Eighteen Mile Creek AOC, Barker Chemical, has the IJC critical pollutant lead in soil at concentrations that would pose a health risk. Other health hazards included arsenic in soil and a very low pH in onsite lagoons. The extent of contamination has not been well characterized, including whether organic contaminants including pesticides may be present, and the site had not been cleaned up or secured from recreational use as of ATSDR's assessment in 2000.

Issues for Follow-Up

Barker Chemical: ATSDR recommended that further characterization of the contaminants be performed to characterize on-site contamination and whether contaminants are migrating off-site, and that access to the site be restricted.

2.3.4.2 TRI Data

Many of the reported releases in Niagara County may not be relevant to the Eighteen Mile Creek AOC because of the heavy concentration of industry in the vicinity of the Niagara River, which is a separate AOC. Releases of IJC critical pollutants that are more relevant to the Eighteen Mile Creek AOC are of [redacted] from a facility in Barker, of lead compounds from a facility in Barker and one in Lockport, and of mercury compounds from a facility in Barker.

2.3.4.3 County Demographics and Health Status Indicators

Vulnerable populations in Niagara County totaled 403,870. These demographics, and the health status indicators for Niagara County, are probably heavily influenced by Niagara Falls, and therefore are not particularly relevant to the Eighteen Mile Creek AOC, located in a relatively rural area of the county.

and metabolites, aldrin/dieldrin, lead, mercury, and hexachlorobenzene. Details are provided in Table 3-3.

ATSDR provides further evaluation of these data in the Public Health Assessments and other health-related documents listed in Table 3-1. The evaluations for the five sites with Public Health Hazard Categories of 1-3 are discussed in the following subsections.

3.1.1.1 Abby Street/Hickory Woods Subdivision

This subdivision is located within the AOC, near a former steel and coke manufacturing property, and within a half-mile of the river, which lies to the north and west of the subdivision. The area includes about 80 homes, three vacant lots, and a playground. Most of the houses are built on fill. Information on this site is taken from the 2001 ATSDR health consultation for this site.

Category of Public Health Hazard: In 1999, ATSDR concluded that several unfenced vacant lots in the subdivision posed a *Public Health Hazard* (category [redacted] for people living next to these lots; the lots were covered with crushed stone over geo-textile mats, apparently due to a concern for elevated B(a)P equivalents in soil. Three residential lots and one undeveloped lot were excavated to remove PAH-contaminated soil, assessed as B(a)P equivalents. Additional monitoring of soil and of sump water in the subdivision was undertaken.

In 2001, ATSDR concluded that the levels of arsenic contamination in surface soil at a playground are a public health hazard.

Contaminants of Concern in Completed Exposure Pathways: Not explicitly discussed, but completed exposure pathways appeared to be soil ingestion and soil contact in yards, vacant lots, and a playground. The contaminants that exceeded health-based screening values in soil were the IJC critical pollutants PAHs [as B(a)P equivalents] and lead. The IJC critical pollutants aldrin and dieldrin—in single samples—required further investigation. The source of lead was thought to be lead paint, and possibly historical contributions from leaded gasoline, and emissions from industry. Levels of lead and PAHs were comparable to or lower than those of two other Buffalo area neighborhoods. [redacted]

Demographics: Approximately 80 homes were located in this subdivision.

Public Health Outcome Data:

NYS DOH survey: NYS DOH conducted a survey of the residents to investigate potential exposures and health conditions. Among the 201 residents who participated:

- Ten (or 5%) reported [redacted] (primarily hypothyroid); they had resided in the subdivision for at least 5 years (average 10 years). Six of the affected residents were under age 45. Among the general U.S. population of all ages, the rate of thyroid disease was 1.7%. Further follow-up of the thyroid problems was planned.
- The rates and types of cancer reported among the participants did not reveal an unusual pattern of cancer incidence.

NYS DOH analysis of childhood blood lead levels: Data from the universal screening of children under the age of six were analyzed:

Category of Public Health Hazard: In 1989, ATSDR issued a public health advisory (category 1, Urgent Public Health Hazard) due to high levels of lead and cadmium in soil and physical hazards. A further assessment in 1992 did not provide a health hazard category, but recommended that further actions await the results of a Remedial Investigation/Feasibility Study.

Contaminants of Concern in Completed Exposure Pathways: In the past, when people were living at the site, exposure to soil contaminated with very high concentrations of the IJC critical pollutant lead and also high concentrations of cadmium probably occurred during routine domestic activities (playing, lawn care, gardening). Although the site has been fenced, there is still a concern for exposure to trespassers. Groundwater was monitored, but results are not mentioned in the discussion of contaminants of concern, and are not on HazDat.

Demographics: Two adults and two children under 5 years of age formerly resided on the site. There area is relatively rural, but there are some neighbors.

Public Health Outcome Data: The past residents of the site, who had been relocated sometime after 1985 and before 1989, were tested in 1991 for blood lead and cadmium levels and urinary cadmium levels by the NYS DOH. The levels of contaminants were reported to be within the ranges of the general population.

Conclusions: Lead and cadmium contamination of soil has not been remediated, but apparently has not resulted in groundwater contamination. The site is fenced. The location of the site with regard to streams feeding into the Buffalo River is not available in the materials reviewed for this report, but the site is not near the AOC.

3.1.1.5 Pfohl Brothers Landfill

The Pfohl Brothers Landfill, a 120-acre site, is located in the northeastern portion of Erie County, NY, several miles northeast of the Buffalo River AOC. It is near Ellicott Creek, which drains into the Niagara River rather than the Buffalo River. It was in operation from 1952 to 1971, and accepted both municipal and industrial wastes. The industrial wastes included pine tar pitch, waste paints and thinners, waste cutting oils, phenolic tar, and PCB laden oil and capacitors. Information regarding this site was taken from the 1995 ATSDR public health assessment for this site.

Category of Public Health Hazard: ATSDR concluded in 1995 that this site represents *No Apparent Public Health Hazard* (category 4) because the data do not indicate that exposure to contaminants is high enough to cause adverse effects. Removal and remedial activities have greatly reduced the likelihood of exposure to site-related contamination.

ATSDR further concluded that this site is an *Indeterminate Public Health Hazard* (category 3) for past exposures because the data were not adequate to conduct a groundwater contaminant trend analysis.

Chemicals of Concern in Completed Exposure Pathways: None currently. A large number of contaminants, including the IJC critical pollutants carcinogenic PAHs, PCBs, lead, and mercury, exceeded health-based comparison concentrations in one or more of the following media: on-site soil, waste materials, leachate, and surface water, and off-site sediments (Aero Lake). Based on further estimation of exposure doses, ATSDR concluded that none exceeded health guideline doses. Potentially site-related contaminants were not found above background or health-based comparison levels in fish in Aero Lake and Ellicott Creek. Data for groundwater including on- and off-site monitoring wells and

private drinking water wells were not adequate to determine whether contaminants, and particularly PCBs and metals, have migrated off-site and to what extent. Additional more systematic monitoring was to be conducted.

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	942
Adults 65 and older	1,157

Public Health Outcome Data:

- NYS DOH surveys conducted in 1990 included the 60 residents of 20 nearby households, 35% of which were children age 17 or younger, and a few former area residents and former and current employees of the town of Cheektowaga who may have come into contract with site contaminants. The NYS DOH concluded that the survey did not reveal any unusual patterns of illnesses.
- Blood lead screenings of 20 children living near the site, conducted in 1991 by the NYS DOH, found a maximum blood lead level of 8 µg/dL, which was below the CDC action level of 10 µg/dL.
- NYS DOH conducted initial and follow-up studies of incidence for 1978-1987 in three census tracts that comprise the site and Ellicott Creek areas. Observed rates were than expected (based on other areas of NY with similar population densities) for all cancers, current breast cancer in women, and prostate cancer in men. Most of the excess cancer in women was accounted for by breast cancer, and the excess was accounted for by the census tract (100.01) in which the landfill is located. Few of the cases, however, had exposure to landfill contaminants, and there was no geographical clustering of cases around the landfill. The excess in men was mostly accounted for by the landfill census tract (100.01), but geographic analysis revealed no clustering around the landfill. [redacted]

Conclusions: Although this site probably contributed to human and environmental exposure burdens for the IJC critical pollutants carcinogenic PAHs, PCBs, lead, and mercury in the past, completed exposure pathways do not appear to exist following remediation activities and fencing of the site. Groundwater monitoring was to be continued. Public health outcome did not indicate unusual patterns of illnesses. [redacted]

3.1.2 TRI Data for the Buffalo River AOC

The TRI on-site chemical releases for Erie County, NY are summarized in Table 3-3. Total on-site releases in 2001 were 5,269,495 pounds, the majority of which were released to air, followed by releases to water. Little was released to soil.

Of the total on-site releases, 9387 pounds (0.2%) were accounted for by IJC critical pollutants. The IJC critical pollutants released on-site were PCDDs and PCDFs (to air), lead and lead compounds (to air and water), and [redacted] The facilities that released these pollutants are listed in Table 3-4.

The major releases (≥500,000 pounds total on-site) of non-IJC chemicals were of hydrochloric acid aerosols, ammonia, and carbon disulfide (primarily to air). Other non-IJC chemicals released in substantial on-site quantities (300,000-499,999 pounds) were sulfuric acid aerosols, toluene, and hydrogen fluoride (primarily to air).

3.1.3 County Demographics and Health Status Data for the Buffalo River AOC

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

Children 6 years and younger	82,897
Females aged 15-44	197,414
Adults 65 and older	151,258

According to the 2000 HRSA community health status reports, Erie 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)
- [redacted]
- neonatal infant mortality

Birth measures (as percent)
- none

Death measures (per 100,000 population)
- breast cancer (female)
- colon cancer
- coronary heart disease
- lung cancer

3.1.4 Summary and Conclusions for the Buffalo River AOC, Erie County, NY

3.1.4.1 Hazardous Waste Sites

ATSDR has categorized five sites in Erie County , NY in health hazard categories 1-3 at some time in their assessment history. Based on the documents for these sites reviewed in Section 3.1.1, there is no clear evidence that human exposure to waste-site-related IJC critical pollutants is currently occurring at concentrations or doses that exceed health-based screening values. Most of these sites have been remediated by removal of contaminated soil and waste-containing barrels, or exposure is prevented through the use of institutional controls (fencing, covering contaminated soil). A possible exception is the Ernst Steel Site, which had not been fenced or remediated as of the 1990 ATSDR health consultation, and was contaminated with the IJC critical pollutant lead (and also with chromium). Also, the non-IJC pollutant arsenic was present in playground soil at the Abby Street/Hickory Woods Subdivision at levels considered a public health hazard as of ATSDR's 2001 health consultation.

In the past, the hazardous waste sites may have contributed to the environmental burden of the IJC critical pollutants, particularly PCBs, B(a)P, lead, and mercury. Lead was a site-related soil contaminant at three sites, but was considered due to leaded paint on older buildings and the historical contribution of leaded

gasoline at the other two sites. B(a)P also was considered related to urban air quality rather than to be specifically site-related for two of the three sites at which it exceeded health-based comparison values. It is possible that some of the sites are still releasing pollutants, as discussed under Issues for Follow-Up.

The most common exposure pathways for these contaminants were ingestion and dermal contact with contaminated soil.

Public health outcome data, available for three of the sites, generally did not indicate unusual rates of health conditions, or did not indicate an association with site-related exposures. The exception was an apparent increased prevalence of t[redacted]

Issues for Follow-Up

Abby Street/Hickory Woods Subdivision: ATSDR concluded that follow up of the [redacted]. High arsenic levels in playground soil appear to have been a subject for follow up by the NYS DOH, but the health consultation is not clear on this point (pertinent text was missing from page 29 of the consultation).

Diarsenol Company (Kingsley Park): The NYS DOH is conducting a cancer study in the Kingsley Park area.

Newstead Site: As of ATSDR's 1992 assessment, this site had high levels of lead and cadmium in soil from disposal of old chemicals and paint from paint manufacturing. It had been fenced, but not remediated, and was undergoing a remedial investigation/feasibility study.

Ernst Steel: Data for organic contaminants that may be present from machine cutting oil that was dumped at this site were not available, and no information regarding potential off-site migration or potential contamination of groundwater by known contaminants (lead and chromium) was available.

3.1.4.2 TRI Data

On-site TRI releases in Erie County, NY, totaled 5,269,495 pounds, the majority of which were released to air, followed by releases to water. Considerably less was released to soil.

The IJC critical pollutants accounted for 9,387 pounds or 0.2% of the total on-site releases. The IJC critical pollutants released were PCDDs and PCDFs (to air); lead and lead compounds (to air and water); and mercury and mercury compounds (to air).

The major releases (≥500,000 pounds total on-site) of non-IJC chemicals were of hydrochloric acid aerosols, ammonia, and carbon disulfide (primarily to air).

3.1.4.2 County Demographics and Health Status Indicators

Vulnerable populations totaled 431,569. Several Erie County, NY, health status indicators compared unfavorably with both U.S. indicators and with the median of peer county indicators. These health status indicators included black infant mortality, neonatal infant mortality, and deaths from various cancers (breast, colon, and lung), and coronary heart disease.

3.2 PRESQUE ISLE BAY AOC, ERIE COUNTY, PA

The Presque Isle Bay AOC is located in northwest Pennsylvania on the southern shore of Lake Erie. The watershed primarily includes urban and industrial areas within the City of Erie and Millcreek Township. The primary tributaries are Mill Creek (including Garrison Run) and Cascade Creek, which account for about two-thirds of the water flowing into the bay (see the AOC map in the appendix).

3.2.1 Hazardous Waste Sites Relevant to the Presque Isle Bay AOC

ATSDR has evaluated the data for an industrial site and three hazardous waste sites in Erie County PA, 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, are summarized in Table 3-5:

Table 3-5. Hazardous Waste Sites in Erie County, PA

Site Name	Public Health Hazard Category	EPA NPL Status	Site ID	City
Foamex Products Site (Corry Area Middle-High School)	2 (2001 HC)	Non NPL	PAD005029517	Corry
Hammermill – Scott Run Site	2 (1998 HC)	Non NPL	PAD981114648	Harborcreek Township
Lord-Shope Landfill	2 (1989 HA) 4 (n.d. SR)	Final	PAD980508931	Girard Township
Mill Creek Dump	2 (1989 HA) 3 (1993 SR)	Final	PAD980231690	Erie

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

For sites in Erie County, PA that *at any time* had Public Health Hazard Categories of 1-3, the number of contaminant records in HazDat that exceeded health-based screening concentrations was 552, as shown in Table 3-6. Most of the records were for the soil and water media groups.

The IJC Great Lakes critical pollutants account for 90 (16%) of these records, with the majority for soil, followed by water. The specific IJC critical pollutants whose concentrations exceeded health-based screening values are: PCBs, DDT, dieldrin, lead, and mercury. Details are provided in Table 3-7.

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

3.2.1.1 Foamex Products Site (Corry Area Middle-High School)

The Foamex Products Site is an active manufacturing facility located in Corry, Erie County, PA. ATSDR was asked to evaluate whether air emissions from this facility present a public health hazard to students of

Corry Area Middle-High School, located approximately 2,000 feet west of the plant, and to nearby residents. Information regarding this site is taken from the 2001 ATSDR health consultation on this site.

Category of Public Health Hazard: Because the air sampling data may not be representative of long-term or peak exposure patterns, ATSDR classified the emissions from the plant as an *Indeterminate Public Health Hazard* (category 3).

Contaminants of Concern in Completed Exposure Pathways: The conclusion was that the air sampling and monitoring data, from four consecutive days in April 2000, were not adequate to be representative of long-term or peak exposure patterns. The data indicate completed exposure pathways (inhalation) to methylene chloride for residents near the plant, and possibly for the school students, at time-integrated concentrations below ATSDR's MRLs for intermediate and chronic exposure. In addition, for residents near the plant, peak air concentrations of methylene chloride exceeded ATSDR's acute MRL. Toluene diisocyanate isomers in air were not above detection limits.

Demographics: Not reported. The facility is located near a school and residential areas.

Public Health Outcome Data: Not reported.

Conclusions: The site is not associated with IJC critical pollutants. As the Foamex Products Site is an active manufacturing facility rather than a hazardous waste site, its releases also are taken into account in the TRI section of this document.

3.2.1.2 Hammermill – Scott Run Site

This site is located approximately 10 miles east of the City of Erie, in the Harborcreek Township, Erie County, PA. This 5 acre, heavily wooded site was used by the Hammermill Paper Company for disposal of pulp and paper waste in the 1960s. Wood mulch was stored/piled on the site and various wastes, including drummed waste, were dumped into two dug lagoons. The number of drums was estimated at 50 in 1988, and 27 were observed in 2001. Some were partially buried and in various stages of decay; others may not have been visible due to the thick vegetation or sediment deposition. The site is currently part of a recreational park. Information regarding this site was taken from the 1998 ATSDR health consultation for this site.

Category of Public Health Hazard: The site was classified as a categ[redacted]for people visiting the site due to physical dangers from drowning (lagoons) and falling (foot bridge). There is a potential risk of exposure to chemicals in the drums, but the drum contents have not been adequately characterized. ATSDR concluded that there is no public health risk from hazardous chemicals migrating from the site in surface water and sediment based on 1988 data, but that the potential for additional and new contamination exists as the drums continue to deteriorate.

Contaminants of Concern in Completed Exposure Pathways: Inadequate data. Metals, including the IJC critical pollutant lead, and also arsenic, cadmium, and chromium, were found in the contents of the only drum that was sampled. Analysis of soil and sediment did not reveal any chemicals at levels that would be expected to cause adverse health effects. Although the IJC critical pollutant DDT was detected in sediments on-site at the outlet of a lagoon, in a marsh close to Scott Run, and off-site in Scott Run (but upstream, so not site-related), it was not present at levels high enough to impact health, and no fishing was known to occur in Scott Run or the stream into which it flows, which flows into Lake Erie approximately 10 miles east of the AOC.

3.2.2 TRI Data for the Presque Isle Bay AOC, Erie County, PA

The TRI on-site chemical releases for Erie County, PA are summarized in Table 3-7. Total on-site releases in 2001 were 3,688,175 pounds, primarily to air. Considerably less was released to land, and very little to surface water.

Only 7,974 pounds (0.2%) of this total was accounted for by IJC critical pollutants. The IJC critical pollutants released [redacted] (primarily to air), [redacted] compounds (to air and land), and [redacted]). The facilities that released these IJC critical pollutants are listed in Table 3-8.

The major on-site releases (≥500,000 pounds) of non-IJC chemicals were of dichloromethane, methanol, and hydrochloric acid aerosols (primarily to air). No chemicals were released in the 300,000-499,999 pound range.

3.2.3 County Demographics and Health Status Data for the Presque Bay AOC

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

Children 6 years and younger	25,115
Females aged 15-44	59,958
Adults 65 and older	40,256

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

Infant mortality (per 1,000 births)
- [redacted]

Birth measures (as percent)
- unmarried mothers
- no care in first trimester

Death measures (per 100,000 population)
- [redacted]

3.2.4 Summary and Conclusions for the Presque Isle Bay AOC, Erie County, PA

3.2.4.1 Hazardous Waste Sites

Only four sites in Erie County, PA, have been categorized by ATSDR in health hazard categories 1-3 at some time in their assessment history. One of these sites was an active manufacturing facility rather than a hazardous waste site, and did not release IJC critical pollutants.

Two of the sites have been remediated and are not expected to be contributing to human or environmental exposure. One of the remediated sites, the Mill Creek Dump, may have contributed to human exposure and the environmental burden of the IJC critical pollutants PCBs and lead in the past. The other remediated site was a potential, but not confirmed, source of lead in off-site residential well water in the past.

The fourth site, the Hammermill-Scott Run site, has not been remediated. It was thought to contain approximately 50 deteriorating drums of waste when assessed by ATSDR in 1998. The drum contents had not been adequately characterized, and the only available monitoring data were old (1988). The amount of potential hazardous waste, however, is not large. Demographic data were not available for this site.

Public health outcome data were not reported for any of the four sites.

Issues for Follow-Up

The Hammermill-Scott Run site has not been remediated and may release wastes from the estimated 50 deteriorating drums on site. The contents of the drums have not been adequately characterized.

3.2.4.2 TRI Data

The TRI total on-site chemical releases for Erie County, PA, in 2001 were 3,688,175 pounds.

Only 0.2% of this total was accounted for by IJC critical pollutants. The IJC critical pollutants released were [redacted] (primarily to air), [redacted] pounds (to air and land), [redacted] (to air and land).

The major on-site releases (≥500,000 pounds) of non-IJC chemicals were of dichloromethane, methanol, and hydrochloric acid aerosols (primarily to air).

3.2.4.3 County Demographics and Health Status Indicators

Vulnerable populations in Erie County, PA, totaled 125,329. Several Erie County, PA, 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 measures (total, white, black, and neonatal), birth measures (unmarried mothers, no care in first trimester), and deaths from breast cancer, coronary heart disease, and lung cancer. None exceeded the upper end of the peer county range.

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

Infant mortality (per 1,000 births)
- none

Birth measures (as percent)
- unmarried mothers

Death measures (per 100,000 population)
- breast cancer (female)
- colon cancer

3.3.4 Summary and Conclusions for the Ashtabula River AOC

3.3.4.1 Hazardous Waste Sites

ATSDR has categorized four sites in Ashtabula County, OH, in health hazard categories 1-3 at some time in their assessment history. Based on these assessments, and on updated information from the 2003 EPA NPL fact sheets for the sites, most of the sites have been remediated and no longer are releasing contaminants and contributing to public health risk. The Fields Brook site (Section 3.3.1.2), which is a very large site impacted by many industrial releases, is under remediation and may still pose a threat. It was contaminated with the IJC critical pollutants [redacted]

Issues for Follow Up

Monitor the progress of remediation of the Fields Brook site.

3.3.4.2 TRI Data

The TRI on-site chemical releases for Ashtabula County in 2001 were 6,138,371 pounds, primarily to air.

Only 1,970 pounds (0.03%) of this total were accounted for by IJC critical pollutants. The IJC critical pollutants released were [redacted] (primarily to land), [redacted] pounds (to air and land), and [redacted] (primarily to air).

The major release (5,400,000 pounds) of non-IJC chemicals was of carbonyl sulfide (88% of total on-site releases) to air. No other non-IJC releases occurred of a 300,000 pound magnitude or greater.

3.3.4.3 County Demographics and Health Status Indicators

Vulnerable populations in Ashtabula County, OH, totaled 45,327. Only three health status indicators for Ashtabula County compared unfavorably with the U.S. and with the median of the peer counties: the percentage of unmarried mothers and deaths from [redacted] None exceeded the upper limit of the peer county range.

the migration of underlying oil and gas to the upper water-bearing zones. The information regarding this site is taken from the 2002 ATSDR health consultation (public comment release) and HazDat.

Category of Public Health Hazard: An earlier health consultation (not provided for inclusion in this document) had classified the site as *No Apparent Public Health Hazard* (category 4). In the 2002 health consultation, ATSDR concluded that the [redacted]

Contaminants of Concern in Completed Exposure Pathways: No IJC critical pollutants were found in completed exposure pathways at exposure levels that were considered harmful. The dissolved gases found in the well water (e.g., methane, sulfides) were consistent with oil and gas deposits. The urgent public health hazard is due to outgasing of combustible VOCs, including methane, from the private well water such that concentrations near two wellheads were at explosive levels, and levels in two basements were near the explosive level. In addition, hydrogen sulfide in the private well water presents a public health hazard because the resulting indoor air concentrations could cause adverse health effects from inhalation exposure. Ingestion of sodium at the levels found in the well water may be harmful to residents with high blood pressure or who are on low sodium diets.

Demographics: Demographic profile, from the 1990 U.S. Census, for vulnerable populations living within 1 mile of this site:

Children 6 years and younger	128
Females aged 15-44	334
Adults 65 and older	192

This distribution, however, included people who are not exposed because they do not use private water wells as their drinking water and household water source. Only the residents in the 25 houses on the west half of Cady Road are affected.

Public Health Outcome Data: None. Residents have complained of a number of health concerns, however, including lightheadedness, blacking out, shortness of breath, fatigue, and headaches. These complaints would be consistent with high-level exposure to the chemicals in completed exposure pathways.

Conclusions: Whether the contaminants in the aquifer used for drinking water wells on Cady Road resulted from human activities (oil and natural gas extraction) or from geological activity is unclear, but the contamination with VOCs such as methane poses an explosive health hazard and with hydrogen sulfide poses a health hazard due to inhalation. No IJC critical pollutants are implicated. The suggested solution to this problem is switching the residents to municipal water.

3.4.2. TRI Data for the Cuyahoga AOC, Cuyahoga and Summit Counties, OH

The TRI on-site chemical releases for Cuyahoga and Summit Counties (combined) are summarized in Table 3-15. Total on-site releases in 2001 were 5,037,090 pounds, the majority of which were released to air, followed by releases to soil. Very little was released to surface water. Cuyahoga County accounted for 68% and Summit County accounted for 32% of the total on-site releases.

Only 75,042 pounds (1.5%) of the total on-site releases were IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (primarily to air), lead and lead compounds (primarily to air

and land), and mercury and mercury compounds (primarily to air). The facilities that released these pollutants are listed in Table 3-16.

The major releases (≥500,000 pounds) of non-IJC chemicals were of zinc compounds (primarily to land) and 1-chloro-1,1-difluoroethane (primarily to air). Other non-IJC chemicals released in substantial on-site quantities (300,000-499,999 pounds) were hydrochloric acid, toluene, methyl ethyl ketone, sulfuric acid, and trichloroethylene (primarily to air), and manganese compounds (primarily to land)

3.4.3 County Demographics and Health Status Data for the Cuyahoga River AOC

The demographic profile, from the 2000 U.S. Census, for vulnerable populations living in Cuyahoga and Summit Counties, OH, is as shown in Table 3-17:

Table 3-17. County Demographic Profiles for the Cuyahoga River AOC

Vulnerable population	Cuyahoga County	Summit County	Total for AOC
Children 6 years and younger	129,863	51,062	180,925
Females aged 15-44	296,262	115,325	411,587
Adults 65 years and older	217,161	76,572	293,733

According to the 2000 HRSA community health status reports, health status indicators that compared unfavorably with the U.S. indicators and also with the median of the peer counties for the two counties relevant to the Cuyahoga River AOC were as follows [redacted]

Cuyahoga County:

Infant mortality (per 1,000 births)

- [redacted]
- [redacted]
- black infant mortality
- [redacted]
- 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)

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

Summit County:

Birth measures (as percent)

- premature births

Death measures (per 100,000 population)

- lung cancer

3.4.4 Summary and Conclusions for the Cuyahoga River AOC

3.4.4.1 Hazardous Waste Sites

Only one hazardous waste site in Cuyahoga and Summit Counties has ever been categorized by ATSDR with a public health hazard category in the range of 1-3. The Cady Road site in Cuyahoga County has well water contaminated with dissolved gases consistent with oil and gas deposits, which present an [redacted] The residents of this area are to be switched to municipal water. No IJC critical pollutants are associated with the site.

3.4.4.2 TRI Data

The TRI on-site chemical releases for Cuyahoga and Summit Counties (combined) in 2001 were 5,037,090 pounds, the majority of which were released to air, followed by releases to soil. Cuyahoga County accounted for 68% and Summit County accounted for 32% of the total on-site releases.

Only 75,042 pounds (1.5%) of the total on-site releases were IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (primarily to air), lead and lead compounds (primarily to air and land), and mercury and mercury compounds (primarily to air). The facilities that released these pollutants are listed in Table 3-16.

The major releases (≥500,000 pounds) of non-IJC chemicals were of zinc compounds (primarily to land) and 1-chloro-1,1-difluoroethane (primarily to air). Other non-IJC chemicals released in substantial on-site quantities (300,000-499,999 pounds) were, hydrochloric acid, toluene, methyl ethyl ketone, sulfuric acid, and trichloroethylene (primarily to air), and manganese compounds (primarily to land).

3.4.4.3 County Demographics and Health Status Indicators

Vulnerable populations in Cuyahoga County and Summit County OH, totaled 643,286 and 242,959, respectively. Many health status indicators for Cuyahoga County compared unfavorably with the U.S. and with the median of the peer counties, and three infant mortality indicators were above the upper limit of the peer county range. In contrast, only two health status indicators for Summit County compared unfavorably with the U.S. and with the median of the peer counties. None exceeded the upper limit of the peer county range.

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

Infant mortality (per 1,000 births)

- [redacted]
- [redacted]
- [redacted]

Birth Measures (as percent)

- [redacted]
- no care in first trimester

Death measures (per 100,000 population)

- [redacted]
- colon cancer
- coronary heart disease
- lung cancer

3.5.4 Summary and Conclusions for the Black River AOC, Lorain County, OH

3.5.4.1 Hazardous Waste Sites

Only two hazardous waste sites in Lorain County have ever been categorized by ATSDR in health hazard categories 1-3. Based on the documents for these sites reviewed in Section 3.1.1, there is no clear evidence that human exposure to site-related IJC critical pollutants is currently occurring at concentrations or doses that exceed health-based screening values. The Republic Steel Quarry Site has been remediated by removal of contaminated soil and exposure is prevented by restriction of access to the site. Contaminants remain in the quarry sediment, but are below the mixing zone. In the past, this site may have contributed to the environmental burden of the IJC critical pollutants B(a)P and lead, and it still may serve as a reservoir of these contaminants.

The Ford Road Industrial Landfill, however, has not been investigated adequately, nor has it been remediated, nor is exposure prevented by restricting access to the site. It is situated on the Black River and surface water and groundwater flow is toward the Black River. This site may have contributed and may continue to contribute to the Black River AOC's environmental burden of the IJC critical pollutants PCBs, B(a)P, and lead, as well as other contaminants, but the sampling and monitoring data were inadequate to characterize the extent of contamination at the site or potential migration of contaminants to the Black River.

Public health outcome data were not available for these sites.

Issues for Follow-Up

Ford Road Industrial Landfill—In its 2002 health consultation, ATSDR concluded that up-to-date and more extensive monitoring data are needed to characterize the extent of the contamination and whether contaminants are leaching from the landfill into the Black River. Sampling of fish tissue may be needed. Access to the site should be restricted to protect children from the exposed drums and waste.

Republic Steel Corp. Quarry—Continued periodic monitoring of quarry surface water, quarry fish tissue, and groundwater were recommended by EPA in 1998 (as per the EPA NPL fact sheet for this site) and had been recommended by ATSDR in the 1989 health assessment. ATSDR's site review and assessment document may present additional information, but was not provided for inclusion in this document.

3.5.4.2 TRI Data

On-site TRI releases in Lorain County totaled 2,940,333.5 pounds, primarily to air. Of this, 9,594 pounds (0.3%) were IJC critical pollutants. The IJC critical pollutants were PCDDs and PCDFs (to air), aldrin (to air), lead and lead compounds (to air and surface water), mercury and mercury compounds (primarily to air), toxaphene (to air), and hexachlorobenzene (to air).

3.5.4.3 County Demographics and Health Status Indicators

Members of vulnerable populations in Lorain County totaled 124,078. A number of Lorain County health status indicators compared unfavorably with both U.S. indicators and with the median of peer county indicators. These included infant mortality measures (**infant mortality, white infant mortality, neonatal infant mortality**), birth measures (**higher percent unmarried mothers** and no care in first trimester), and deaths from various cancers (**breast**, colon, and lung) and coronary heart disease. Indicators that were higher than the upper limit of the range for peer counties are shown in bold type.

3.6.3 County Demographics and Health Status Data for the Maumee River AOC

The demographic profile, from the 2000 U.S. Census, for vulnerable populations living in the three counties of this AOC is shown in Table 3-25.

Table 3-25. County Demographic Profiles for the Maumee River AOC

Vulnerable population	Lucas County	Ottawa County	Wood County	Total for AOC
Children 6 years and younger	44,499	3,160	10,068	57,727
Females aged 15-44	100,352	7,746	29,708	137,806
Adults 65 years and older	59,441	6,710	13,315	79,466

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 Cuyahoga River AOC were as follows (indicators that were above the upper limit of the peer county range are bolded):

Lucas County:

Infant mortality measures (per 1,000 births)

- black infant mortality
- post-neonatal infant mortality

Birth measures (as percent)

- premature births
- unmarried mothers

Death measures (per 100,000 population)

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

Ottawa County

Infant mortality measures (per 1,000 births)

- [redacted]
- [redacted]
- neonatal infant mortality
- [redacted]

Death measures (per 100,000 population)

- coronary heart disease

Wood County

Infant mortality measures (per 1,000 births)

- white infant mortality

Death measures (per 100,000 population)

- breast cancer
- [redacted]
- [redacted]

3.7 RIVER RAISIN AOC, MONROE COUNTY, MI

The River Raisin AOC, located in the southeastern part of Michigan's lower peninsula, is defined as the lower (2.6 mile) portion of the River Raisin, downstream from Dam #6 at Winchester Bridge in the City of Monroe, and extending one-half mile out into Lake Erie along the near shore, both north and south, for one mile (see AOC map in the appendix).

3.7.1 Hazardous Waste Sites Relevant to the River Raisin AOC

ATSDR has evaluated the data for two hazardous waste sites in Monroe County, 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 3-26.

Table 3-26. Hazardous Waste Sites in Monroe County, MI

Site Name, County	Public Health Hazard Category	EPA NPL Status	Site ID	City
Consolidated Packaging Corp.	3 (1995 HC)	Non NPL	MID980999882	Monroe
Novaco Industries	5 (1988 HA)	Deleted Post SARA	MID084566900	Temperance

3 = Indeterminate Public Health Hazard, 5 = No Public Health Hazard
HA = Public Health Assessment, HC = Health Consultation

For hazardous waste sites in Monroe County MI that *at any time* had Public Health Hazard Categories of 1-3 (only 1 site—Consolidated Packaging Corp.), the number of contaminant records in HazDat that exceeded health based-screening values was 107, as shown in Table 3-27. Most of the records were for the soil media group; water had the next highest number of records.

The IJC Great Lakes critical pollutants accounted for 20 of these records (19%), with the majority for the biota and soil media groups. The IJC critical pollutants that have been found at Monroe County, MI hazardous waste sites at concentrations exceeding health-based screening values are: [redacted] Details are provided in Table 3-28.

Further evaluation of the data for the Consolidated Packaging Corp. site was conducted by ATSDR in the health consultation listed in Table 3-26. This evaluation is discussed in the following subsection.

3.7.1.1 Consolidated Packaging Corp.

This 97-acre site, located on the east side of the city of Monroe, Monroe County, MI, was formerly occupied by a paper and paperboard plant that was in operation from 1898 through 1978. The plant structures have been demolished. The site includes seven lagoons formerly used for waste water disposal, storage, and treatment; these lagoons constitute a large proportion of the site. Overflow from the lagoons formerly flowed through drainage ditches into the nearby River Raisin. The site was originally wetlands, which were filled with various materials, including commercial and industrial wastes, prior to

construction of the plant. The site is bordered by a waste water treatment plant, a closed industrial landfill, and a residential area. The Raisin River flows east-southeast less than 200 feet north of the site, emptying into Lake Erie approximately 2 miles from the site. Another industrial facility is located on the opposite bank of the river, and two toxic waste sites associated with PCB and heavy metal contaminated sediments are slightly downstream on the opposite bank of the river. Information regarding this site is taken from the 1995 ATSDR health consultation.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) because of the potential threat to human health from exposure to contaminants and incomplete monitoring data.

Contaminants of Concern in Completed Exposure Pathways: None identified. There were no data regarding concentrations of contaminants in surface soil; the shallowest soil samples were considerably deeper than the 3-inch depth recommended by ATSDR. Concentrations of many contaminants, including the IJC critical pollutants PCBs, B(a)P, lead, and mercury in soil and sediment exceeded health-based screening values, but further assessment indicated that trespassers were not likely to be exposed at levels of potential human health risk. The concentrations of PAHs including B(a)P were considered comparable to background concentrations in urban soil. The sediment in the lagoons is contaminated with the IJC critical pollutant PCBs. Children reportedly fished in the lagoons before they were fenced; fish and turtles have been seen in the drainage ditch. No data were available on contaminant concentrations in fish from the lagoons and ditch, but fish taken from the River Raisin near the site contained elevated concentrations of PCBs. The Consolidated Packaging Corporation is one (of many) possible sources for the PCB contamination of the fish. Groundwater at the site contains various contaminants, including PCBs, at concentrations above health-based screening values, but there are no producing wells. Groundwater flow, however, is towards the northeast, and is thought to discharge into the River Raisin.

Demographics: Not reported, but a residential area is adjacent to the site.

Public Health Outcome Data: Not reported.

Conclusions: This site may have contributed and may continue to contribute to the environmental burden of the [redacted] Human on-site exposure does not appear to be occurring at levels of concern, but data for surface soil are not available, so there is uncertainty regarding this source of exposure. The site, however, has not been remediated, and PCBs have been detected at above health-based screening values in on-site groundwater that is thought to discharge to the River Raisin.

3.7.2 TRI Data for the River Raisin AOC

The TRI on-site chemical releases for Monroe County, MI are summarized in Table 3-28. Total on-site releases in 2001 were 16,700,032 pounds, the majority of which were released to air, followed by releases to soil. Very little was released to surface water.

Of the total on-site releases, 66,177 pounds (0.4%) were accounted for IJC critical pollutants. The IJC critical pollutants released were PCDDs and PCDFs (to air), lead and lead compounds (primarily to land), mercury and mercury compounds (to air and land), and hexachlorobenzene (to air). The facilities that released these pollutants are listed in Table 3-29.

3.7.4.2 TRI Data

On-site TRI releases in Monroe County MI totaled 16,700,032 pounds, the majority of which were released to air, followed by releases to soil. Releases to water were minimal. Of this, only 66,177 pounds 0.4% was IJC critical pollutants. The IJC critical pollutants were [redacted] (released to air), [redacted] (primarily to land), [redacted] to air and land), and [redacted] (to air). The major on-site releases (≥500,000 pounds) of non-IJC chemicals were of hydrochloric acid, ethylene, sulfuric acid, and hydrogen fluoride (to air); and barium compounds (primarily to land).

3.7.4.3 County Demographics and Health Status Indicators

Vulnerable populations for Monroe County, MI, totaled 61,076. A few Monroe County health status indicators compared unfavorably with both U.S. indicators and with the median of peer county indicators. These included post-neonatal infant mortality, and deaths from various cancers (**colon** and lung), coronary heart disease, and stroke. Indicators that were higher than the upper limit of the range for peer counties are shown in bold type.

3.8 ROUGE RIVER AOC, WAYNE AND OAKLAND COUNTIES, MI

The Rouge River has four main branches primarily flowing through Wayne and Oakland Counties. It discharges into the Detroit River near the south end of Zug Island. Oakland County is relevant not only to the Rouge River AOC, but also to the Clinton River AOC, discussed in Section 3.9 of this document (see AOC maps in the appendix).

3.8.1 Hazardous Waste Sites Relevant to the Rouge River AOC

ATSDR has evaluated the data for hazardous waste sites in Wayne and Oakland 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 Tables 3-30 and 3-31, for sites that had public heath hazard categories of 1-3 at some point during their assessment history. There are 16 sites altogether: 10 in Wayne County and 6 in Oakland County.

Table 3-30. Hazardous Waste Sites in Wayne County, MI

Site Name	Public Health Hazard Category	EPA NPL Status	Site ID	City
Carter Industrials, Inc.	[redacted]1992 HA)	Deleted Post SARA	MID980274179	Detroit
Ford Motor Co. Allen Park Clay Mine	3 (1994 HA)	Non NPL	MID980568711	Allen Park
Gratoit Trailer Park	[redacted]1999 HC)	---	MISFN0507941	Detroit
Joy Road Dump/Holiday Park/Holiday Nature Preserve	[redacted]2000 HC)	---	MISFN0507950	Westland
Lower Ecorse Creek Dump	[redacted]1993 HV) 4 (1995 HA)	Final	MID985574227	Wyandotte
Master Metals Inc. #2	[redacted]1997 HC)	Non-NPL	MID039108824	Detroit
Packard Plant	[redacted]1998 HC)	Non-NPL	MIR000037689	Detroit
Proposed Beard Street School	3 (2001 HC) 5 (2002 HC)	---	MIXCRA704000	Detroit
Wholesale Russell/Mack	[redacted]1997 HC)	Non-NPL	MIXCRA327000, MISFN0507878	
Old World Trade Center	[redacted]1997 HC)	Non-NPL	MI0001094465	Detroit

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, HV = Health Advisory

could be nearly 17 tons. Information regarding this site is taken from the 1992 ATSDR preliminary public health assessment and the 2003 EPA NPL fact sheet.

Category of Public Health Hazard: This site was categorized as a [redacted] because of the presence of hazardous substances on the site and the difficulty of maintaining site security.

Contaminants of Concern in Completed Exposure Pathways: Inhalation of PCB-contaminated fugitive dusts was considered a principal route of exposure because PCBs were found in particulates in rain gutters of nearly homes. However, the sampling appears to have been performed before the removal of PCB-contaminated soil from yards to the site, and the covering of the mounds of soil. PCBs also were found in the storm sewers that drain the site and empty into the Detroit River. The greatest concern, however, was for direct exposure of trespassers to the PBC-contaminated soil on-site. Nevertheless, blood samples from the surrounding residents, taken before any remediation of the site and surrounding area, did not indicate that exposures exceeded those of the general population.

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

Children 6 years and younger	1,444
Females aged 15-44	3,199
Adults 65 and older	1,734

Public Health Outcome Data: ATSDR noted that an evaluation of health outcome data will be conducted in future public health assessments of the site. The results of a 1986 Michigan Department of Public Health study of 235 blood samples from people living in the residential area surrounding the site showed no remarkably high PCB concentrations compared with the general population. Blood lead, checked in 60 subjects, were higher than the then CDC level of concern of 25 µg/DL in 5 subjects, 3 of whom were 3 years or less in age, and were therefore unlikely to have been on the site.

Conclusions: This site may have contributed to the environmental burden of the IJC critical pollutants PCBs and lead. As reported in the EPA fact sheet, extensive remediation of the site, including removal of the contaminated soils and disposal offsite in a TSCA landfill and cleanup of the sewer line, was conducted and completed in 1996. The site was deleted from the NPL in 1997. Thus, the site is no longer releasing or acting as a reservoir of contaminants.

3.8.1.2 Ford Motor Co. Allen Part Clay Mine

The Allen Park Clay Mine landfill, located in Allen Park (Wayne County, MI) is operated by the Ford Motor company, which developed a clay mine on the site before 1956. Starting in 1956, the area has been filled with wastes from the Ford Motor Company Rouge River Plant. Some of these wastes (electric arc furnace dust and decanter tank tar sludge) are classified by EPA as hazardous. From 1980 to 1986, the hazardous wastes were deposited separately in a hazardous waste management area at the site. This area was closed in 1986, the leachate collection system was expanded, and a clay cap was installed. Information regarding this site is taken from the 1994 ATSDR preliminary public health assessment

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) because additional information was needed to evaluate possible air exposure pathways, particularly with regard to past exposures to airborne carcinogenic PAHs.

Contaminants of Concern in Completed Exposure Pathways: None identified. Air monitoring, however, did not include analysis for PAHs, and carcinogenic PAHs were found at concentrations above health-based screening values in several on-site media including sediments, and a storm-water drain and treatment pond. Lead and cadmium concentrations also were elevated in on-site groundwater, but no completed exposure pathway exists. Carcinogenic PAHs may include B(a)P, an IJC critical pollutant, and lead is an IJC critical pollutant. Lead and B(a)P are IJC critical pollutants.

Demographics: Not reported for this non-NPL site.

Public Health Outcome Data: [redacted] conducted two studies of cancer incidence for the communities surrounding the site, and ATSDR performed an evaluation and follow-up.

- 1983 Cancer Study: The occurrence of cancer from 1973 to 1981 was evaluated in two census tracts comprised by the Snow Woods area of Darborn. In comparison with rates for the City of Dearborn, Wayne County, and the tri-county area (Wayne, Oakland, and Macomb Counties), the only statistically significant excesses of cancer were [redacted] in both men and women and liver cancer in women. Comparisons were made by age and sex for the white population only, because the neighborhoods were predominantly white. Risk factors such as occupational history, smoking, alcohol use, and residential history were not taken into account.
- 1989 Cancer Study: This study was a follow-up and expansion of the 1983 study. The study included a total of 10 census tracts included in the communities of Snow Woods, Melvindale, and Allen Park, which surround the Allen Park Clay Mine, and considered cancer occurrence from 1973 to 1986. The comparison communities were the City of Dearborn (excluding Snow Woods) and Wayne County (excluding the three study communities). Methods of comparison were similar to the 1983 study, except that for the brain cancer cases, occupational, smoking, and residential histories were obtained from relatives by telephone interview. The total numbers of cancer cases for the study area were lower than expected based on rates for the comparison populations of City of Dearborn and Wayne County. The only higher-than-expected cancer rate was in Snow Woods residents, with 16 cases of brain cancer over the 14-year study period, versus 6 expected. Although histories for 2 of the 16 cases could not be determined, 9 of the 16 were found to have lived near the site for 20 years or more. All but one of the seven men with brain cancer smoked and five of the seven had worked in occupations with exposure to car engine exhaust for 3-42 years. However, only one of the women with brain cancer smoked and there was no consistent occupational history among the women.
- ATSDR Evaluation: [redacted] ATSDR evaluated the current information on the number of brain and liver cancers in the study communities from 1973 to 1990. An excess in brain cancer rates occurred in snow woods from 1973 to 1990, but liver cancer rates in the three study communities were comparable to those in Wayne County and the other surrounding counties, Macomb and Oakland. The excess brain cancers could not, however, be attributed to the Allen Park Clay Mine site, because no completed environmental and human exposure pathways were found for the site, and the information about potential pathways does not indicate that the site contaminants (e.g., lead and carcinogenic PAHs) are at concentrations that may be related to brain cancer.

Conclusions: This site may have contributed to the environmental burden of the IJC critical pollutants B(a)P and lead, as well as other contaminants including cadmium. There are no known completed exposure pathways for human populations, however, and the elevated occurrence of brain tumors seen in one of the communities near the site is not attributable to site contaminants.

Too definite uncertain

Females aged 15-44	278
Adults 65 and older	65

Public Health Outcome Data: None reported.

Conclusions: This site may have contributed to the environmental burden of the IJC critical pollutants PCBs and lead, as well as other contaminants including VOCs, but off-site migration did not appear to be occurring in 1989. As reported in the EPA fact sheet, extensive remediation of the site, including on-site soil-washing and/or off-site disposal of about 12,000 cubic yards of PCB-laden soils, in-situ soil vapor extraction of VOCs from subsurface soils, onsite solidification of metals-laden soils, groundwater extraction and treatment, and installation of a soil cover and vegetation. The soil vapor extraction is expected to continue for 2-5 years and the groundwater treatment for another 2-5 years beyond the soil vapor extraction before cleanup levels are reached.

3.8.2 TRI Data for the Rouge River AOC

The TRI on-site chemical releases for Wayne and Oakland Counties (combined) are summarized in Table 3-33. Total on-site releases in 2001 were 24,621,119 pounds, the majority of which were released to air and land. Little was released to surface water. Wayne County accounted for 89% and Oakland County accounted for 11% of the total on-site releases.

Of the total on-site releases, [redacted] (6.9%) was IJC critical pollutants. The IJC critical pollutants released were [redacted] (primarily to air), and [redacted] (>1,000,000 pounds), [redacted] compounds (>400,000 pounds), [redacted] (primarily to land). The facilities that released these pollutants are listed in [redacted].

The major releases (≥500,000 pounds) of non-IJC chemicals were of hydrochloric acid aerosols, xylenes, certain glycol ethers, n-butyl alcohol, and toluene (primarily to air); and nickel compounds, selenium, and arsenic compounds (primarily to land).

3.8.3 County Demographics and Health Status Data for the Rouge River AOC

The demographic profile, from the 2000 U.S. Census, for vulnerable populations living in the two counties of this AOC is shown in Table 3-35.

Table 3-35. County Demographic Profiles for the Rouge River AOC

Vulnerable population	Wayne County	Oakland County	Total for AOC
Children 6 years and younger	219,731	113,971	333,702
Females aged 15-44	454,698	261,556	716,254
Adults 65 years and older	248,982	134,969	383,951

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 Rouge River AOC were as follows (indicators that were above the upper limit of the peer county range are bolded):

Wayne County, MI:

Infant mortality (per 1,000 births)

- [redacted]
- black infant mortality
- [redacted]
- [redacted]

Birth measures (as percent)

- [redacted]
- [redacted]
- [redacted]
- unmarried mothers
- no care in first trimester

Death measures (per 100,000 population)

- [redacted]
- colon cancer
- coronary heart disease
- [redacted]
- lung cancer
- stroke

Oakland County, MI:

Infant mortality (per 1,000 births)

- black infant mortality

Birth measures (as percent)

- none

Death measures (per 100,000 population)

- stroke

3.8.4 Summary and Conclusions for the Rouge River AOC

Two Michigan counties are relevant to this AOC: Wayne County and Oakland County. Oakland County also impacts the Clinton River AOC (Section 3.9).

3.8.4.1 Hazardous Waste Sites

Wayne County: Seven of the 10 waste sites in Wayne County (reviewed in Sections 3.8.1.1 through 3.8.1.10) were assessed by ATSDR as part of Brownfields projects. For two of these sites, the major health concerns were not for chemical exposure. The remaining five sites all were contaminated with lead, and some were contaminated with B(a)P and one with PCBs. The extent of contamination—with lead—was high at only one of these sites, the Master Metals Inc. #2 site. Only one of the sites (Proposed Beard Street School) has been cleaned up.

The three hazardous waste sites (Carter Industrials, Inc.; Ford Motor Co. Allen Park Clay Mine; Lower Ecorse Creek) in Wayne County have been remediated through clean up or institutional controls. There is no evidence that human exposure to site-related contaminants is currently occurring at concentrations or doses that exceed health-based screening values.

3.8.4.3 County Demographics and Health Status Indicators

[redacted]

In contrast, Oakland County (vulnerable populations 510,496) had only two health status indicators that compared unfavorably with those of the U.S. and also with the median of the peer counties: these were black infant mortality and deaths from stroke. Neither was above the range of the peer counties.

Table 3-41. County Demographic Profiles for the Maumee River AOC

Vulnerable population	Ottawa County	Macomb County	Total for AOC
Children 6 years and younger	3160	72321	75481
Females aged 15-44	7746	168445	176191
Adults 65 years and older	6710	107651	114361

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 Clinton River AOC were as follows (indicators that were above the upper limit of the peer county range are bolded):

Oakland County:

Infant mortality (per 1,000 births)
- black infant mortality

Birth Measures (as percent)
- none

Death measures (per 100,000 population)
- stroke

Macomb County:

Infant mortality (per 1,000 births)
- white infant mortality

Birth measures (as percent)
- none

Death measures (per 100,000 population)
- [redacted]
- colon cancer
- [redacted]
- lung cancer
- stroke

3.9.4 Summary and Conclusions for the Clinton River AOC

Two Michigan counties are relevant to this AOC: Oakland County and Macomb County. Oakland County also impacts the Rouge River AOC (Section 3.8).

3.9.4.1 Hazardous Waste Sites

Oakland County: The five hazardous waste sites in Oakland County have undergone remediation, and there is no evidence that human exposure is occurring to site-related contaminants of concern. Groundwater at two sites, however, is still undergoing extraction and treatment, and vapor extraction of subsurface soil is ongoing at one site.

In the past, three of the waste sites may have contributed to the environmental burden of the IJC critical pollutants lead (all 3) and PCBs (2 sites); these pollutants were found primarily in soil.

The sixth site in this county was an active manufacturing facility that reports through TRI.

Macomb County: The three hazardous waste sites in Macomb County have undergone remediation. One site, the South Macomb Disposal Authority, may still be releasing contaminants, as the leachate plume (to groundwater) was not contained.

These waste sites may have contributed to the environmental burden of the IJC critical pollutants lead (3 sites, PCBs (2 sites), and aldrin (1 site) in the past.

Issues for Follow-Up

Rose Township Dump (Oakland County): Complete capture of the groundwater plume was not occurring as of 2002, but residential wells were not yet affected. There is the potential, however, for residential wells to be affected in the future.

South Macomb Disposal Authority (Macomb County): As of 1995, leachate controls did not capture the entire plume, so there was concern for future contamination of residential wells. Additional remedial action is underway.

3.9.4.2 TRI Data

The TRI on-site chemical releases for Oakland and Macomb Counties (combined) in 2001 were 3,580,901 pounds, primarily released to air. Very little was released to surface water or land. Oakland County accounted for 76% and Macomb County accounted for 24% of the total on-site releases.

Only 298.7 pounds (0.008 %) of the total on-site releases were accounted for by IJC critical pollutants. The IJC critical pollutants released were lead and lead compounds (primarily to air and land), and mercury and mercury compounds (primarily to air). The facilities that released these pollutants are listed in Table 3-40.

The major release of non-IJC chemicals (≥500,000 pounds) was [redacted] (to air).

3.9.4.3 County Demographics and Health Status Indicators

Oakland County (vulnerable populations 510,496) had only two health status indicators that compared unfavorably with those of the U.S. and also with the median of the peer counties: these were black infant mortality and deaths from stroke. Neither was above the range of the peer counties.

Macomb County (vulnerable populations 348,417) had several health status indicators that compared unfavorably with those of the U.S. and with the median of the peer counties, including white infant mortality, and deaths from [redacted] lon cancer, [redacted] lung cancer, and stroke. The indicators that also were elevated above the upper limit of the peer county range are shown in bold.

You mention the NRDA/PCB releases on Fox River p. 263. So you need to mention NRDA for Saginaw River?

4. LAKE HURON

Lake Huron has only one U.S. Great Lakes AOC, the Saginaw River and Bay AOC.

4.1 SAGINAW RIVER AND BAY AOC, ARENAC, BAY, CLARE, GENESEE, GLADWIN, GRATIOT, HURON, IOSCO, ISABELLA, LAPEER, LIVINGSTON, MECOSTA, MIDLAND, MONTCALM, OGEMAW, OSCEOLA, ROSCOMMON, SAGINAW, SANILAC, SHIAWASSEE, AND TUSCOLA COUNTIES, MI

The Saginaw River and Bay AOC includes all of Saginaw Bay out to its interface with open Lake Huron at an imaginary line drawn between Au Sable Point and Point Aux Barques, as well as the entire 35 km length of the Saginaw River, which flows into Saginaw Bay (see AOC map in the appendix).

4.1.1 Hazardous Waste Sites Relevant to the Saginaw River and Bay AOC

ATSDR has evaluated the data for hazardous waste sites in the 21 counties relevant to this AOC, 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 4-1, for sites that had public heath hazard categories of 1-3 at some point during their assessment history, and all NPL sites. Not all counties had waste sites in these categories.

For hazardous waste sites in the relevant Michigan 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 1550, as shown in Table 4-2. Most of the records were for the soil media group; the water media group had the next highest number of records.

The IJC Great Lakes critical pollutants accounted for 197 (13%) of these records, with the majority for the soil media group. The specific IJC critical pollutants whose concentrations exceeded health-based screening values are: [redacted] Details are provided in Table 4-2.

Further evaluations of the data for the sites with Public Health Hazard Categories of 1-3, as conducted by ATSDR in the Public Health Assessment and other health-related documents listed in the table, are discussed in the following subsections.

4.1.1.1 Bay City Middlegrounds

The Bay City Middlegrounds site is an abandoned 40-acre landfill located on Middleground Island in the Saginaw River in southwestern Bay City, Bay County, MI. It operated as a landfill from 1956 to 1984. The landfill is partially capped, and has a leachate collection system. The cap was not fully sealed to the lower cap, and leachate has seeped out into ditches along the nearby roads. It was fenced on three sides, but not on the fourth, which borders the river, at the time that the 1996 health assessment was prepared by ATSDR. Information on this site is taken from that health assessment and from the 2003 EPA NPL fact sheet for this site.

soil were well above background, but lower than 400 ppm. Groundwater contaminated with PCBs discharges from the site into the Saginaw River, and PCBs have been found in the river water and sediment, at higher concentrations downstream of the site than upstream. Methylene chloride, detected in air at concentrations of human health concern including upwind of the site, may not be site-related.

Bioaccumulation of the PCBs through the food chain into fish that are ingested by humans is considered a pathway of great concern. Although this site is not the only source of PCBs discharged to the river, it contributes to the contamination, and levels of PCBs in fish are high enough to pose a risk of adverse health effects. This site was proposed for the NPL in 1995.

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

Children 6 years and younger	793
Females aged 15-44	1,662
Adults 65 and older	1,000

Public Health Outcome Data: The Michigan Department of Community Health evaluated cancer incidence data for the area because of community health concerns. Statistics for 1990-1992 showed no statistically significant difference in cancer incidence or mortality between Bay County and Michigan as a whole. Cancer incidence for the zip code area including the site and Bay City west of the Saginaw River (48706) and for the zip code area including Bay City east of the Saginaw River (48708) for 1990 through 1993 indicate a slight, statistically significant elevation in incidence and rate for the entire period 1990-1993 (but not for any single year) in 48706, as compared with age- and sex-specific incidence rats for Michigan. None of the incidences or rates for 48708 were statistically significantly increased.

Conclusions: This site has contributed and continues to contribute to the environmental burden of the IJC critical pollutants PCBs, which are discharging from the landfill into the Saginaw River. PCBs are the major concern. PCB concentrations in fish are high enough to pose a health threat, and although this site is not the only contributor, concentrations in the river water and sediment are higher downstream than upstream of the site.

4.1.1.2 Keit Property

The Keit property is approximately 18 acres of wetlands, grasslands, and woods in southwest Bay City, Bay County, MI. It was used for agriculture since 1886. A large portion of the property has been filled in with material reportedly generated during a sewer project in the 1980s. ATSDR performed a health consultation on this site in 1998, as part of a Brownfields project; the information regarding this site is taken from that report, and from HazDat.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) because of the potential threat to human health from exposure to asbestos if the asbestos panels are not ~~been~~ removed from the property before it is used for a park.

Contaminants of Concern in Completed Exposure Pathways: None identified. Soil concentrations of the IJC critical pollutant B(a)P exceeded health based screening values in a few locations, but were considered typical for urban soils. Subsurface soil in one location contained PCBs above health-based screening values, but this was not a generalized finding, and surface soil concentrations of PCBs were not of concern. The primary hazard was a pile of Transite panels,

containing 40% chrysotile asbestos. If the panels are allowed to weather or are handled improperly, they could release asbestos fibers.

Demographics: Not reported.

Public Health Outcome Data: Not reported.

Conclusions: This site does not appear to have contributed significantly to the environmental burden of IJC critical pollutants or other chemicals, or to direct human exposure at levels that currently pose a health risk.

4.1.1.3 Clare Water Supply

This site, a municipal water supply wellfield, is located in Clare, Clare County, MI. Information regarding this site is taken from the 1989 ATSDR preliminary public health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3) in 1989 because of the potential threat to human health from exposure to municipal water containing VOCs, and the lack of up-to-date data to determine whether cleanup efforts have ameliorated the hazard. A subsequent ATSDR site review and update (not provided for inclusion in this document) also concluded that the site was a category 3.

Contaminants of Concern in Completed Exposure Pathways: No IJC critical pollutants were discussed. In 1985, VOCs, including trichloroethylene and other chlorinated compounds, and also benzene and xylenes were present in the groundwater used as the municipal water supply at concentrations that pose a public health concern. Past completed exposure pathways included ingestion, inhalation, and dermal contact with the water. Contaminated soil from the suspected industrial sites northwest of the wellfield was then removed, but updated monitoring data were not available at the time of the 1989 health assessment. Air strippers were installed in 1991 and are removing over 90% of the volatile contaminants from the water supply. Additional remedial action, including groundwater collection and extraction initiated in 1996, soil vapor extraction initiated in 1999, and *in situ* ozonation of groundwater hot spots, is expected to continue for an indefinite number of years until cleanup goals are achieved.

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

Children 6 years and younger	323
Females aged 15-44	718
Adults 65 and older	640

Public Health Outcome Data: Not reported.

Conclusions: This site has contributed to the environmental burden of VOCs and to human exposure. Remediation efforts, which are ongoing, are minimizing current and future impacts.

4.1.1.4 Berlin and Farrow

This 40-acre site, located in Gaines Township near Swartz Creek, Genesee County, MI, was used as a licensed waste incinerator from 1971 to 1978. Violations included construction and operation of unlicensed waste lagoons and underground storage tanks, and burial of liquid wastes. Information regarding this site is taken from the 1992 interim public health assessment performed by ATSDR, HazDat, and the 2003 EPA NPL fact sheet. Cleanup activities prior to 1992 included removal of contaminated lagoon sludges and soils, removal of underground tanks and their contents, and removal of barrels. The chemicals in these materials included organochlorine intermediates (hexachlorobenzene, hexachlorcyclopentadienes, and octachlorocyclopentene) used in the production of certain pesticides, and also PCBs, benzene, and ethylbenzene.

Category of Public Health Hazard: In an early (1985) health assessment (not provided for inclusion in this document), ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3). In the 1992 interim public health assessment, this site was categorized as a *Public Health Hazard* (category [redacted]) because of the risk to human health from exposure to contaminants that may result in adverse health effects. Since that time, however, remediation of the site has been completed.

Contaminants of Concern in Completed Exposure Pathways: Not explicitly discussed. On-site soil and sediment contained high levels of the IJC critical pollutant hexachlorobenzene; on-site surface water also was contaminated. Off-site sediment in the Slocum Drain, a stream draining the site, was contaminated with high levels of hexachlorobenzene. Off-site garden soil also contained hexachlorobenzene, but at much lower concentrations. Comparisons with health-based screening values were not presented for hexachlorobenzene. On-site soil and groundwater were contaminated with VOCs, including vinyl chloride and benzene at levels of concern for human health. PCBs, found in drums removed from the site, were not detected in sampling of site media as reported in the 1992 ATSDR health assessment. None of the off-site residential wells were contaminated with any of these compounds. From 1995 to 1996 final cleanup of the site was accomplished by excavation and removal of all remaining contaminated materials (soils, sediments, and aquifer materials), for disposal in a RCRA landfill. The site meets standards for unrestricted use and was deleted from the NPL in 1998.

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

Children 6 years and younger	54
Females aged 15-44	148
Adults 65 and older	55

Public Health Outcome Data: Health surveys of households within the approximately 2 square miles surrounding the site were conducted in 1981. Surveys of a random sampling of the population, followed by a survey of all 122 households (418 people) found that respiratory symptoms were statistically significantly higher among persons who reported exposure to incinerator smoke as compared with those who reported no exposure to incinerator smoke. This information may suggest that the former industrial activity (incineration of hazardous wastes) at the site was potentially linked to health problems, but it does not provide insight into the potential health hazard from waste site-related contaminants.

Laboratory analyses of blood samples from 52 local residents revealed the presence of PCBs, DDT, and DDE at concentrations within the ranges generally found in Michigan residents, and thus, do not indicate a specific impact from the waste site.

Conclusions: In the past, this site contributed to the environmental burden of the IJC critical pollutant hexachlorobenzene, as well as other contaminants including VOCs. Although PCBs had been found in barrels at the site, they were not detected in environmental media. As reported in the EPA fact sheet, remediation of the site through removal and proper disposal of all contaminated materials and media is complete, and the site was deleted from the NPL list in 1998.

4.1.1.5 Forest Waste Products

This 112-acre site is located 2 miles northwest of Otisville, Genesee County, MI. It includes an 11-acre landfill, which accepted general refuse and industrial and liquid waste from 1972 to 1978. Nine lagoons in another area of the site, covering a total of about 1 acre, also were used for disposal of industrial waste. Wastes included sludge and residues from a chemical warehouse fire, roofing material contaminated with PCBs, and cattle feed contaminated with PBBs. In 1978, the landfill was covered with soil. An estimated 3,000 waste drums may have been buried in the landfill. As of ATSDR's 1994 public health assessment, the site had been fenced, the waste material in the lagoons excavated and disposed off-site, and some of the drums removed and disposed off-site. The information on this waste site is taken from the 1994 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 a 1988 health assessment (not provided for inclusion in this document) as well as in the 1994 health assessment. The rationale in the 1994 assessment was that although human exposure did not appear to be occurring at levels of concern, uncertainty exists regarding the large number of drums reported to be buried in the landfill, which may release their contents into the environment.

Contaminants of Concern in Completed Exposure Pathways: The only chemical found at levels of concern for human health in a completed exposure pathway was arsenic, found in residential wells near the site, but the arsenic was thought to be of natural origin, rather than site-related. Although the IJC critical pollutant PCBs were disposed at the site, and formerly were found in subsurface soil, the PCBs had been removed during earlier remediation actions. Several contaminants were found at levels of concern in potential exposure pathways, including the IJC critical pollutant B(a)P, but the concentration of B(a)P in soil was not significantly above that commonly found in agricultural soil. VOCs have been found in groundwater, but not in residential wells. The IJC critical pollutants DDT and metabolites were found in game captured at the site boundary, but these contaminants were not site-related.

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

Children 6 years and younger	34
Females aged 15-44	81
Adults 65 and older	48

Public Health Outcome Data: Health outcome data were not evaluated in conducting the 1994 public health assessment because there were no indications that humans had been significantly exposed to site-related contaminants, and no record of community reports of illnesses or health effects associated with the site.

Conclusions: Whether this site contributed to environmental contamination with IJC critical pollutant PCBs in the past is uncertain. No current exposure of humans to site-related contaminants at levels of concern is known to be occurring. Additional remediation activities, as described in the EPA NPL fact

sheet, included excavation and removal of buried drums and associated contaminated soil, and installation of a landfill cap. Monitoring of groundwater continues, particularly of a plume of VOCs that is migrating northward off the property.

4.1.1.6 Gratiot County Landfill

This 40-acre landfill site is located [redacted]. This landfill accepted general refuse, but was owned by a chemical corporation ([redacted], and disposed of chemicals wastes, including 269,000 pounds o[redacted] prior to 1977. The information regarding this site is taken from the 1982 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 1982 health assessment, which focused [redacted] because of the potential threat to human health from exposure to contaminants and the poor quality of the support document that presented the monitoring data. A subsequent site review and update by ATSDR (not provided for inclusion in this report) ranked the site as *No Apparent Health Hazard* (category 4), possibly because remedial activities had mitigated the hazard. Remedial actions in 1984 included construction of a slurry wall and clay cap, and regrading of the landfill to minimize migration of contaminants from the landfill. In 1992, monitoring of the effectiveness of these remedies indicated that the slurry wall was ineffective in halting groundwater flow, and that VOCs [redacted] were detected outside the slurry wall. A groundwater extraction system, constructed in 1998, appears to be effective in containing the plume. Further options are being evaluated by the Michigan Department of Environmental Quality, according to the EPA NPL fact sheet.

Contaminants of Concern in Completed Exposure Pathways: Not reported. The 1982 health assessment by ATSDR was primarily a review of a technical report regarding potential control strategies for the PBB contamination at the site. PBBs were detected in groundwater at concentrations above health-based screening values. No IJC critical pollutants were mentioned in the health assessment or the NPL fact sheet, but VOCs were apparently released 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	170
Females aged 15-44	390
Adults 65 and older	252

Public Health Outcome Data: None reported.

Conclusions: This site may have contributed to the environmental burden of PBBs and VOCs in the past. The PBBs and VOCs have not been removed, but rather are contained by a slurry wall, cap, and groundwater extraction system.

4.1.1.7 Velsicol Chemical

This 52-acre site is located in the City of St. Louis, Gratiot County, MI, and is surrounded on three sides by the Pine River, which drains into the Tittabawasse River, which joins the Saginaw River near the city of Saginaw. [redacted]

produced a variety of chemicals, including PBBs and DDT, at the Velsicol Chemical site plant from 1936 to 1978. Velsicol completed construction of a containment system at this site in 1985. This system consisted of a slurry wall around the entire site and a clay cap over the site. Information regarding this site is taken from the 1988 ATSDR preliminary health assessment, HazDat, and the 2003 EPA NPL fact sheet.

Category of Public Health Hazard: In 1988, ATSDR categorized this site as an *Indeterminate Public Health Hazard* (category 3) because exposure to PBBs through the food chain (fish and wildlife) has occurred and may possibly still be occurring, even though a fish consumption advisory was issued. A subsequent site review and update (not provided for inclusion in this document) also placed the site in this health hazard category.

Contaminants of Concern in Completed Exposure Pathways: None identified in the 1988 health assessment. The potential exposure of concern was to PBBs bioaccumlated in fish and wildlife. ATSDR noted that fish and river water and sediment concentrations of PBBs were declining. Subsequent developments included deterioration of the slurry wall in 1994, admitting water into the containment system; discovery of very high levels of DDT and metabolites in sediment of the Pine River/St. Louis impoundment; and the migration of dense non-aqueous phase liquids (DNAPL) from the containment area into the glacial till underlying the river sediments. The sediment and DNAPL are being removed and treated, according to the EPA NPL fact sheet.

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

Children 6 years and younger	365
Females aged 15-44	821
Adults 65 and older	676

Public Health Outcome Data: In 1976, the Michigan Department of Public Health recruited many Velsicol workers for a PBB health study, which placed workers and their familie[redacted]o study the long-term effects of PBB exposure. The study, conducted in cooperation with the CDC, FDA, and EPA, was in operation at the time of the 1988 health assessment. [redacted]

Conclusions: This site has contributed to the environmental burden of the IJC critical pollutant DDT and metabolites, and also PBBs, with particular impacts on the Pine River/St. Louis impoundment sediments and fish. According to the EPA NPL fact sheet, although PBB concentrations are declining, DDT and metabolite concentrations in sediment are not. Remediation is underway. In addition, dense non-aqueous phase liquids have migrated from the site into the glacial till under the river sediments and are also being remediated.

4.1.1.8 Hedblum Industries

The Hedblum Industries site is a 10-acre parcel located in Oscoda, Iosco County, MI, 1.2 miles west of Lake Huron. The site was leased to a series of industrial forms that manufactured parts for the automotive industry. Waste chemicals, including an estimated 4,000 gallons of spent trichloroethylene from a degreasing operation, were dumped in a pit near the main building. A pipe connecting an underground storage tank fo[redacted]aked. A number of residential wells in the area were found to be contaminated in 1973-1977. Most of the residents in the area of contamination were connected to municipal water in 1978, but a number were not. Trichloroethylene also was found in the

bayou into which groundwater from the site discharges; the bayou feeds the Au Sable River. The information regarding this site is taken from the 1989 ATSDR 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) because of the potential threat to human health from exposure to trichloroethylene and other VOCs.

Contaminants of Concern in Completed Exposure Pathways: None identified. No IJC critical pollutants are associated with this site. TCE has been identified in residential well water; eight households were estimated to have used contaminated well water at their household for an indeterminate time before they were switched to municipal water, but data were not adequate to measure the risks. Some residents still have not switched to municipal water, and others use well water for gardens and lawns. Exposure pathways include ingestion, dermal contact, and inhalation of trichloroethylene volatilized from the water. As of 1990, no VOC contaminants were detected in residential wells. The groundwater is being treated by a system constructed in 1992.

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

Children 6 years and younger	135
Females aged 15-44	331
Adults 65 and older	349

Public Health Outcome Data: None reported.

Conclusions: This site has contributed to human exposure and to the environmental burden of trichloroethylene in the past through contamination of groundwater used for household water and discharge of contaminated groundwater into a bayou feeding the Au Sable River. The groundwater, however, has been under remediation since 1992.

4.1.1.9 Metamora Landfill

This 160-acre site, located near the village of Metamora, Lapeer County, MI, contains a 25-acre landfill and 2 drum disposal areas, which may have contained many thousands of drums, believed to contain primarily paint and solvents. Testing of the drum wastes revealed that they contained VOCs, SVOCs, PAHs, and metals, at concentrations as high as 15%, and PCBs at as much as 1,200,000 ppb. As of 1990, excavation and off-site disposal of the drums and associated contaminated soil was underway. The information regarding this site was taken from the 1992 ATSDR public health assessment, HazDat, and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: This site was categorized in the 1992 health assessment (and in [redacted] as an *Indeterminate Public Health Hazard* (category 3) because although no current exposures at levels of concern had been documented, there was the potential for future exposure through groundwater use as household water. A subsequent ATSDR site review and update (not provided for inclusion in this document) concluded that the site poses *No Apparent Public Health Hazard* (category 4).

and lead (groundwater and soil). Other contaminants of concern in potential exposure pathways were VOCs, including vinyl chloride and methylene chloride, in groundwater. In 1992, additional testing results were found to support the findings from the 1989 health assessment. Subsequent remedial actions included the removal of additional drums and contaminated soil, with disposal offsite, installation of a landfill cap, and installation of groundwater treatment. These actions have been found to be protective of public health and the environment.

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

	Spiegelberg	Rasmussen
Children 6 years and younger	119	59
Females aged 15-44	223	121
Adults 65 years and older	73	54

Public Health Outcome Data: Health outcome data were not evaluated because of a lack of community health concerns and of evidence that humans had not been significantly exposed to site-related contaminants.

Too many negatives,

Conclusions: This site may have contributed to the environmental burden of the IJC critical pollutant PCBs and lead, as well as other contaminants including VOCs, in the past. Remediation of these sites, including removal of much of the contamination, groundwater treatment, and ongoing monitoring make it unlikely that there will be further releases of contaminants or exposure of human populations.

4.1.1.11 Shiawassee River

The Shiawassee River site, Livingston County, MI was contaminated by the Cast Forge Company, which discharged wastewater contaminated by hydraulic fluids containing PCBs into the South Branch of the Shiawassee River from 1969 to 1973. From 1973 to 1977, waster was discharged into a 400,000 gallon lagoon on-site. Discharges and overflows from this lagoon contaminated nearby wetlands and the Shiawassee River. Starting in 1982, the company removed the lagoon, cleaned up the PCB-contaminated soil and sediment from its property, and provided funds for restoration of the river. Dredging of the South Branch began in 1982, but only the first mile downstream from the plant was treated, removing approximately 2,600 pounds of PCBs. Both the company property and the river were still contaminated as of the ATSDR 1989 health assessment, from which information on this site is taken. Additional more recent information is taken from HazDat and the 2003 EPA NPL fact sheet for this site.

Category of Public Health Hazard: In the 1989 health assessment, this site was categorized as an *Indeterminate Public Health Hazard* (category 3) because of the risk to human health that could result from potential exposure to PCBs at levels that may result in adverse health effects. A subsequent ATSDR site review and update (not provided for inclusion in this document) concluded that the site is a *Public Health Hazard* (category 2).

Contaminants of Concern in Completed Exposure Pathways: Not identified. The concern was for potential exposure pathways including direct contact with PCB-contaminated river sediments or by eating PCB-contaminated fish or wildlife. PCB levels in fish tissue downstream from Cast Forge were very high; advisories against consumptions of fish from the contaminated zone were issued in 1979. The NPL fact sheet reports that remediation of the flood plan and contaminated areas near Cast Forge to

Note:
Comments made regarding p. 149 - 146

How does Michigan compare with rates in the rest of the US?

This is unbelievable. Midland, MI is the place for PCDD & PCDF in the basin. For this to be believable there would have to be some mechanism for non-exposure and no effect.

There might be other neonatal effects that should be looked at, e.g. sex-ratio, low-birth weight, infant mortality.

Suspicions about company manipulating outcomes — people sent away to die elsewhere!

within the range (>50 but <1000 ppt TEQs) that triggers additional ATSDR evaluation, including consideration of background and bioavailability data in order to evaluate the incremental contribution of soil exposure; this information was not available.

Demographics: Residential neighborhoods are located in close proximity to the northeast perimeter of the Dow plant and within a quarter of a mile from a soil sampling site where total TEQs were above the ATSDR action level of 1,000 ppt.

Public Health Outcome Data:

- An analysis of cancer incidence data for zip codes 48640 (southwest area of Midland including the Dow plant site) and 48642 (area northeast of the Dow plant) as compared with Midland County, Bay County, and the state of Michigan showed no elevated incidences of specific cancer types in these two zip code areas. There was a higher-than-expected incidence of all cancers combined in 48640 (but not 48642) as compared with Midland County, Bay County, and the state of Michigan for individual years 1994 through 1998 and all years combined, but interpretation of this data is difficult.
- A Dow Cohort mortality study of workers in the Midland plant compared 2,187 male employees who worked at any time between 1940 and 1983 in areas of the plant where there was potential exposure to dioxin, with exposure classified on the basis of job history. Causes of death were compared to those of the U.S. population and an internal "unexposed" group of employees. Rates for all causes of death were lower in the exposed cohort than in the U.S. population, but were slightly higher for some cancers than in the unexposed employees. The relevance of this study to the non-Dow-employee residents of the community was considered questionable by ATSDR.
- An analysis of birth defects data for 1992 through 1996 from the Michigan Birth Defects Registry did not show any consistent pattern of excesses in any particular category or for birth defects overall for Midland County (about 1,000 births/year). No excess was seen for types of birth defects, such as anecephaly, spina bifida, and cleft lip, which had been reported as related to dioxin exposure.

Conclusions: This site has contributed to the environmental burden of the IJC critical pollutants PCDDs and PCDFs. Whether residents of the community near the plant experienced a level of exposure sufficient to be considered a public health risk could not be determined due to the lack of soil monitoring data in the critical areas and other data deficiencies.

4.1.1.13 Tittabawassee River

The Dow Chemical Company plant in the city of Midland, Midland County, MI was the subject of an ATSDR health consultation that was triggered by community concerns regarding high levels of PCDDs in soil in the city of Midland and in fish in the nearby Tittabawassee River downstream of Midland. An additional concern arose when sampling of the Tittabawassee floodplain near the confluence of the Tittabawassee and Saginaw Rivers revealed high levels of dioxin contamination. The soil contamination issue was considered in the ATSDR health consultation on the Dow Chemical Co. site, presented in Section 4.1.1.12, which provides a description of the plant location and releases to the environment. The issue of contamination of the floodplain of the Tittabawassee River is considered in a separate 2002 ATSDR health consultation, summarized below. The Tittabawassee floodplain area that is potentially of concern extends from the City of Midland in Midland County to the City of Saginaw in Saginaw County. The sampling sites were within Saginaw County.

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) because of the potential threat to human health from exposure to PCDDs and PCDFs and the lack of monitoring data for the residential area.

Contaminants of Concern in Completed Exposure Pathways: Elevated dioxin TEQs (as high as 7,261 ppt, includes PCDDs and PCDFs) were found in soil samples from a floodplain area near the confluence of the Tittabawassee and Saginaw Rivers in Saginaw County, analyzed as part of a wetland mitigation project, and in other floodplain areas (golf course, wildlife refuge) upstream from the mitigation site. These levels were considered to be high enough to pose an urgent public health hazard if people were routinely exposed to soil at these locations, but ATSDR concluded that the level of exposure on these properties is not known, and was concerned regarding the lack of sampling on nearby residential properties. The only known source of dioxin contamination was the Dow Chemical Company plant upstream at Midland. ATSDR concluded that the contamination likely resulted from deposition of contaminated river sediments in the Tittabawassee River floodplain. As discussed in Section 4.1.1.12, fish in the Tittabawassee River below the city of Midland have elevated levels of PCDDs and PCBs. Based on the floodplain soil data together with the fish data, ATSDR concluded that dioxin contamination may be widespread throughout the Tittabawassee River watershed below Midland.

Demographics: Twelve homes are located adjacent to the river less than half a mile upstream from the mitigation site where very high TEQs were detected. Numerous other residential properties are located within the floodplain upstream of the wetland mitigation site.

Public Health Outcome Data: None reported.

Conclusions: This site is contaminated with the IJC critical pollutants PCDDs and PCDFs, probably from releases from the Dow Chemical Company plant upstream at Midland, Midland County.

4.1.1.14 Lufkin Rule

The 14-acre Lufkin Rule property is a large abandoned industrial property in a mostly residential area of Saginaw, Saginaw County MI. After being sold, the property was rented out to a large number of tenants. In 1994, a dry cleaning establishment on the property burned, and the remnants were later demolished. Since that time, the entire property has been vacant. Drums of dry-cleaning solvents, transformers, capacitors, and other electrical equipment containing PCBs were found on the property. Some of the equipment had been scavenged, and the PCB-containing oil spilled on the ground. The PCB-containing oil and soil, drummed solvents, and other waste materials were removed in 1995 for disposal at an approved facility. Information regarding this site is taken from the ATSDR 1997 health consultation.

Category of Public Health Hazard: This site was categorized as a *Public Health Hazard* (category 3) because of the physical hazards in the abandoned and decrepit buildings on the property, and contaminants in soil that would ~~soil~~ pose health hazards to anyone working on the property for long periods. The site is not secured from trespassers, and there is evidence of extensive trespassing.

Contaminants of Concern in Completed Exposure Pathways: None identified. There are hot spots of soil contamination with the IJC critical pollutant PCBs and also of bis(2-3ethylhexyl)phthalate that could pose health hazards through inadvertent ingestion to anyone working in those areas for long periods or visiting those areas daily over a long period of time, but this exposure scenario was considered unlikely. Levels of the IJC critical pollutants B(a)P and lead in soil and storm sewer sediment exceeded health based screening values, but were within ranges typically found in urban areas. Groundwater was contaminated with trichloroethylene, but is not used as a drinking water source. Levels of trichloroethylene and other VOCs in storm sewer water were above drinking water standards, and indicate release from the site through runoff.

Demographics: Not reported, but the site is located in a residential area.

Public Health Outcome Data: None reported.

Conclusions: This site may have contributed to the environmental burden of the IJC critical pollutant PCBs, and also of VOCs, but the extent of on-site contamination is limited.

4.1.1.15 Laingsburg

The Laingsburg property is a former gasoline and automotive service station located in the city of Laingsburg, Shiawassee County, MI, which stopped operations in 1984, and since then, has been used for automotive repair and body shop work. In 2000, a health consultation was performed by ATSDR as part of a Brownfields project; that document is the source of information regarding this site. Records indicate that there may have been three underground fuel storage tanks on the property, and there is no clear indication that the tanks were removed from the property.

Category of Public Health Hazard: This site was categorized 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.

Contaminants of Concern in Completed Exposure Pathways: Not reported. Access to the site was denied, so no on-site monitoring data are available. Subsurface soil sampled around the perimeter of the site contained trimethylbenzene and xylenes above screening values for industrial or commercial use. Shallow groundwater at the site perimeter was similarly contaminated and had a floating oily layer liquid (one monitoring well) containing trimethylbenzenes and other VOCs. Concentrations exceeded drinking water standards or screening levels. The contamination was consistent with gasoline leaking from the underground storage tanks.

Demographics: Not reported, but there are eight private wells within 0.2 miles of the site, and Laingsburg has no municipal water system; residents use individual private wells.

Public Health Outcome Data: None reported.

Conclusions: This site may be releasing gasoline from underground storage tanks, but access to the site was denied and the available monitoring data are inadequate to assess the potential threat to public health.

4.1.2 TRI Data for the Saginaw River and Bay AOC

The TRI on-site chemical releases for the 21 counties (combined) that are relevant to this AOC are summarized in Table 4-3. Total on-site releases for the 21 counties in 2001 were 7,831,200 pounds, the majority of which were released to air, followed by releases to soil. Considerably less was released to surface water.

The IJC critical pollutants accounted for 92,142 pounds or 1.2% of the total on-site releases. The IJC critical pollutants released we[redacted] (primarily to land[redacted]ompounds (primarily to land); a[redacted](primarily to air and land). The facilities that

released these pollutants are listed in Table 4-4. [redacted] were the focus of ATSDR health consultations for soil contamination by the [redacted] in the city of Midland, Midland County, MI (Section 4.1.1.10) and for contamination of the Tittabawassee River Flood Plain south of Midland (Section 4.1.1.11). The major TRI releases of these chemicals in the counties relevant to the Saginaw River and Bay AOC were in Midland County, by the Dow Chemical Company (1,618 pounds total on-site releases, primarily to land). Much smaller amounts were reported released by other facilities in Bay County and Saginaw County.

The major releases (≥500,000 pounds) of non-IJC chemicals were of hydrochloric acid aerosols to air and barium compounds (primarily to land). Other non-IJC chemicals released in substantial on-site quantities (300,000-499,999 pounds) were toluene (primarily to air); and barium compounds, manganese compounds, and zinc compounds (primarily to land); and ammonia (to air, water and land).

Looking at total on-site releases of all chemicals combined, the counties with the highest reported releases, 500,000-1,000,000 pounds, were Midland and Saginaw Counties. Counties with total on-site releases of 250,000-499,999 pounds were Bay, Genesee, and Huron counties. Counties in the range of 100,000-249,000 pounds total on-site releases were Montcalm, Osceola, and Sanilac. Counties in the range of 10,000-99,000 pounds total on-site releases were Gratiot, Isabella, Lapeer, Livingston, Mecosta, Ogemaw, Shiawassee, and Tuscola. Counties in the range of 0-9,999 pounds total on-site releases were Arenac, Clare, Gladwin, Iosco, and Roscommon.

4.1.3 County Demographics and Health Status Data for the Saginaw River and Bay AOC

The demographic profiles, from the 2000 U.S. Census, for vulnerable populations living in the 21 counties of this AOC are shown in Table 4-5.

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 21 counties of this AOC were as shown in Table 4-5.

4.1.4 Summary and Conclusions for the Saginaw River and Bay AOC

4.1.4.1 Hazardous Waste Sites

Sixteen sites in the counties relevant to the Saginaw River and Bay AOC have been categorized by ATSDR in health hazard categories 1-3 at some time in their assessment history. Several of these sites have completed exposure pathways to the [redacted] sed these pollutants into the rivers that ultimately feed the Saginaw River. Sites that have not yet been completely remediated (as of this writing) and may be continuing to serve as a source of exposure are:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

[redacted]

Comments made re: p. 153 of AOC report - ERG

There may be a socio-economic component to this. Richer people work in the Dow Plant and live upwind.

A pathway of major concern for these chemicals is bioaccumulation through the food chain into fish that are ingested by humans. Incidental ingestion, direct dermal contact, and inhalation of soil and dust from PCDD- and PCDF-contaminated soil also were of concern.

Public health outcome data, available for four of the sites, generally did not indicate unusual rates of health conditions, or consisted of occupational data, which were considered of questionable relevance to the general population. An analysis of cancer incidence data for the Dow Chemical Co. site found no elevated incidences of specific cancer types in the two zip code areas studied, as compared with county and state. A higher-than-expected incidence of all cancers combined was seen in the zip code area upwind and including the site, but not the zip code area downwind of the site, which was considered more highly contaminated with PCDDs and PCDFs from the Dow Chemical Company's on-site incineration of chemical wastes. ATSDR considered that interpretation of these data was problematic.

Issues for Follow-Up

The sites listed as still possibly contributing to environmental contamination and human exposure may need follow-up to determine whether the potential hazards have been mitigated. Additional monitoring data and other data also were needed to more fully assess the hazard.

4.1.4.2 TRI Data

On-site TRI releases in the 21 counties (combined) of the Saginaw River and Bay AOC totaled 7,831,200 pounds, the majority of which were released to air, followed by releases to soil. Considerably less was released to surface water.

The highest release counties, Midland and Saginaw Counties, accounted for 10.5 and 12.3%, respectively, of the total on-site releases. The lowest release counties, Arenac, Gladwin, and Roscommon, had zero reported releases.

The IJC critical pollutants accounted for 92,142 pounds or 1.2% of the total on-site releases. The IJC critical pollutants released were PCDDs and PCDFs (primarily to land); lead and lead compounds (primarily to land); and mercury and mercury compounds (primarily to air and land).

The major releases (≥500,000 pounds) of non-IJC chemicals were of hydrochloric acid aerosols, xylenes, certain glycol ethers, n-butyl alcohol, and toluene (primarily to air); and nickel compounds, selenium, and arsenic compounds (primarily to land).

4.1.4.3 County Demographics and Health Status Indicators

There is considerable variation across counties of the Saginaw River and Bay AOC in vulnerable population demographics and in the pattern of health indicators that compared unfavorably with U.S. indicators and with the peer counties' indicators. The two counties with the highest vulnerable population demographics, Genesee and Saginaw, also had the greatest number of unfavorable health status indicators.

We want details like in the previous sections. (Section 4.1.3 and Table 4-5.)

Table 4-5. County Health Status Indicators that Compared Unfavorably with U.S. Indicators and with the Median of the Peer Counties*
Saginaw River and Bay AOC

	Arenac	Bay	Clare	Genesee	Gladwin	Gratiot
Demographic Profile						
Children 6 years and younger	1333	9543	2656	45136	2034	3532
Females aged 15-44	3159	22560	5707	96320	4522	8420
Adults 65 years and older	2860	16170	5398	50607	4768	5723
Infant Mortality (per 1,000 births)						
Infant mortality	X	X		X		X
White infant mortality	X	X		X	X	X
Black infant mortality				[redacted]		
Neonatal infant mortality		X		X	X	X
Post-neonatal infant mortality	[redacted]			[redacted]		
Birth Measures (%)						
Low Birth Wt				X		
Very Low Birth Wt				X		
Premature Births						
Teen Mothers						
Older Mothers						
Unmarried Mothers	X		X	X		
No care in 1st trimester					X	
Death measures (per 100,000)						
Breast cancer (female)	[redacted]			X	X	X
Colon Cancer		X	X	X		
Coronary heart disease	[redacted]					
Homicide						
Lung cancer			X	X	X	
Stroke						X

	Huron	Iosco	Isabella	Lapeer	Livingston
Demographic Profile					
Children 6 years and younger	2871	1893	4614	8606	16313
Females aged 15-44	6400	4537	18980	18585	33324
Adults 65 years and older	7006	5897	5722	8399	13037
Infant Mortality (per 1,000 births)					
Infant mortality					
White infant mortality					
Black infant mortality					
Neonatal infant mortality					
Post-neonatal infant mortality	X				
Birth Measures (%)					
Low Birth Wt					
Very Low Birth Wt					
Premature Births					
Teen Mothers					
Older Mothers					
Unmarried Mothers		X			
No care in 1st trimester	X		X		
Death measures (per 100,000)					
Breast cancer (female)	X	[redacted]			X
Colon Cancer	X	X		X	X
Coronary heart disease	[redacted]				
Homicide					
Lung cancer		[redacted]		X	
Stroke	[redacted]	X	X	X	

Table 4-5. County Health Status Indicators that Compared Unfavorably with U.S. Indicators and with the Median of the Peer Counties*
Saginaw River and Bay AOC

	Mecosta	Midland	Montcalm	Ogemaw	Osceola
Demographic Profile					
Children 6 years and younger	3389	7817	5771	1661	2074
Females aged 15-44	8914	17613	12262	3809	4606
Adults 65 years and older	5339	9975	7421	4064	3284
Infant Mortality (per 1,000 births)					
Infant mortality					
White infant mortality		X		X	
Black infant mortality					
Neonatal infant mortality	X			X	
Post-neonatal infant mortality			X		
Birth Measures (%)					
Low Birth Wt					
Very Low Birth Wt				X	
Premature Births					
Teen Mothers					
Older Mothers					
Unmarried Mothers				X	
No care in 1st trimester	[redacted]		X		X
Death measures (per 100,000)					
Breast cancer (female)		X		X	
Colon Cancer	X	X		X	
Coronary heart disease	X	X		X	X
Homicide					
Lung cancer			X		X
Stroke				X	

	Roscommon	Saginaw	Sanilac	Shiawassee	Tuscola
Demographic Profile					
Children 6 years and younger	1620	20416	4153	6960	5105
Females aged 15-44	3939	44058	8693	15124	11828
Adults 65 years and older	6054	28331	6865	8581	7450
Infant Mortality (per 1,000 births)					
Infant mortality	X	X			[redacted]
White infant mortality	X				X
Black infant mortality		X			
Neonatal infant mortality	X	X			**X**
Post-neonatal infant mortality					X
Birth Measures (%)					
Low Birth Wt		[redacted]			
Very Low Birth Wt					
Premature Births		X			
Teen Mothers					
Older Mothers					
Unmarried Mothers	X	**X**			
No care in 1st trimester			X		
Death measures (per 100,000)					
Breast cancer (female)	X				[redacted]
Colon Cancer		X		X	X
Coronary heart disease	X	X	[redacted]		[redacted]
Homicide		X			
Lung cancer	X				
Stroke	X	X	X	X	

*Sources: 2000 U.S. Census; 2000 HRSA Community Health Status Indicators Reports

X = Indicators that compared unfavorably with both the U.S. and the median of the peer counties
X = Indicators that also were above the upper end of the peer county range

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 benzidene, 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-N^4N^4-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.

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, hexachlorcyclopentadiene, 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.

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.

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 form 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 [redacted] pounds (to air, surface water, and land), and [redacted] to air and land). The facilities that released these pollutants are listed in Table 5-4.

The major release (≥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).

- 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.

only the site - or the lake?

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 [redacted] (to air, surface water, and land), and [redacted] air and land).

Always Hard Knee Together.

The major release (≥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. [redacted]

[redacted] The population in Muskegon County is much more concentrated around the Muskegon Lake AOC than the White Lake AOC.

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 later 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 contami[redacted] 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 [redacted] 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. [redacted] om 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.

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 w[redacted] (primarily to air)[redacted] 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 [redacted] (to air), [redacted] primarily to air), and [redacted] (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 morality, 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.

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.

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.

5.3.3 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)

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- lung cancer
- stroke

Cook County:

Infant mortality (per 1,000 births)

- infant mortality
- white infant mortality
- [redacted]
- neonatal infant mortality
- [redacted]

Birth measures (as percent)

- low birth weight
- very low birth weight
- [redacted]

- 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 [redacted] (to air), [redacted] mostly to surface water and land), [redacted] primarily to air), and [redacted] (to air).

The major release (≥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 [redacted] Cook County). The most striking increase was in the [redacted] rate, which was [redacted] Lake County, IN, than in the U.S. as a whole and than the upper end of the peer county range.

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

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 to1987. 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.

19th to 20th

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;

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 [redacted]) 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

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: [redacted] 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

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 ≥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 Sheboyban 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 ≥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 unfavorable 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.

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. [redacted] 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, [redacted] 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 [redacted] 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 [redacted] The facilities that released these pollutants are listed in Table 5-30.

The major on-site releases (≥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)

- [redacted]

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).

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 [redacted]. 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)

- [redacted]
- [redacted]

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 [redacted]
Indicators that exceeded the peer county range are bolded.

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)
- [redacted]
- coronary health disease
- [redacted]

6. LAKE SUPERIOR

6.1 DEER LAKE AOC, MARQUETTE COUNTY, MI

The Deer Lake AOC includes the Carp River watershed, which is composed of Deer Lake, Carp Creek, and the Carp River downstream about 20 miles to Lake Superior in Marquette (see AOC map in the appendix). Deer Lake was polluted with mercury from industrial activities (processing of gold ore in the 1880s and assaying test conducted on ore samples from another facility), leading to very high levels of mercury in the fish.

6.1.1 Hazardous Waste Sites Relevant to the Deer Lake AOC

ATSDR has evaluated the data for hazardous waste sites in Marquette County, 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 6-1, for the site that had a public health hazard category of 1-3 at some time during its assessment history.

Table 6-1. Hazardous Waste Sites in Marquette County, MI

Site Name	Public Health Hazard Category	EPA NPL Status	Site ID	City
Cliff/Dow Dump	3 (1988 HA)	Deleted Post SARA	MID980608970	Marquette

3 = Indeterminate Public Health Hazard
HA = Public Health Assessment

For this hazardous waste sites the number of contaminant records in HazDat that exceeded health based-screening values was 30, as shown in Table 6-2. Most of the records were for the soil and water media groups. None of the contaminants were IJC Great Lakes critical pollutants.

Further evaluation of the data for this site was conducted by ATSDR in the public health assessment document listed in the table. This evaluation is discussed in the following subsection.

6.1.1.1 Cliff/Dow Dump

The 2-acre Cliff/Dow Dump, located in the city of Marquette, Marquette County MI, received wastes from the Cliffs-Dow Chemical Company, which manufactured charcoal at a facility 2 miles from the site. Information regarding this site is taken from the 1988 ATSDR public health assessment 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) by ATSDR because the site had not been characterized adequately to determine if off-site exposure to contaminants had occurred, particularly to contaminants in groundwater, and because contaminants were present at levels of health concern.

Contaminants of Concern in Completed Exposure Pathways: None. Contaminants of concern in groundwater were VOCs, and naphthalenes and phenanthrene. No IJC critical pollutants were discussed. Since the time of ATSDR's assessment, the site has been remediated by removal of waste and fill, replacement with clean fill, and vegetating the fill. Natural attenuation of the groundwater contamination resulted in acceptable levels by 1997. The site was deleted from the NPL in 2000 and deed restrictions on the use of the site and groundwater have been removed.

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

Children 6 years and younger	137
Females aged 15-44	808
Adults 65 and older	157

Public Health Outcome Data: Not reported.

Conclusions: ATSDR's assessment of this site occurred in 1988; site data were not complete, but did not identify IJC critical pollutants as contaminants of concern. The site has been completely remediated since that time.

6.1.2 TRI Data for the Deer Lake AOC

The TRI on-site chemical releases for Marquette County, MI, are summarized in Table 6-3. Total on-site releases in 2001 were 1,000,114 pounds, the majority of which were released to air, followed by releases to land.

IJC critical pollutants accounted for 3214 pounds (0.3 %) of the total on-site releases. The IJC critical pollutants released were [redacted] (primarily to land) and [redacted] (primarily to air and land). The facilities that released these pollutants are listed in Table 6-4.

The largest release (400,000 pounds) of non-IJC chemicals was of hydrochloric acid aerosols to air. The next largest releases (150,000-299,999 pounds) were of barium compounds (primarily to land) and hydrogen fluoride (to air).

6.1.3 County Demographics and Health Status Data for the Deer Lake AOC

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

Children 6 years and younger	4,705
Females aged 15-44	14,166
Adults 65 years and older	8,739

According to the 2000 HRSA community health status reports, Marquette 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):

6.3 ST. LOUIS RIVER AND BAY AOC, ST. LOUIS AND CARLTON COUNTIES, MN AND DOUGLAS COUNTY, WI

The St. Louis River and Bay AOC is the 39 miles of the St. Louis River below Cloquet, MN (see AOC map in the appendix).

6.3.1 Hazardous Waste Sites Relevant to the St. Louis River and Bay AOC

ATSDR has evaluated the data for hazardous waste sites in the counties relevant to this AOC, 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 6-9, for sites that had public health hazard categories of 1-3 at some point during their assessment history. (No waste sites in Carlton County, MN, were assessed.)

Table 6-9. Hazardous Waste Sites in St. Louis and Carlton Counties, MN, and Douglas County, WI

Site Name, County	Public Health Hazard Category	EPA NPL Status	Site ID	City
Arrowhead Refinery Co., St Louis	3 (1986 HA) 2 (1993 HA)	Final	MND980823975	Hermantown
St. Louis River site, St. Louis	3 (1989 HA) 2 (2001 HC)	Final	MND039045430	St. Louis County
Koppers Co. Superior Plant, Douglas	2 (2001 HC) 3 (2003 HC)	Non NPL	WID006179493	Superior

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

For hazardous waste sites relevant to this AOC 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 737, as shown in Table 6-10. Most of the records were for the soil and water media groups.

The IJC Great Lakes critical pollutants accounted for 80 (11%) of these records, with the majority for the soil media group. The IJC critical pollutants that have been found at these hazardous waste sites at concentrations exceeding health-based screening values are: [redacted] Details are provided in Table 6-11.

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.

6.3.1.1 Arrowhead Refinery Company

The 10-acre Arrowhead Refinery site is located about 8 miles northwest of Duluth in Hermantown, St. Louis County, MN. Prior to 1945, the facility re-tinned milk cans. From 1945 to 1977, Arrowhead Refinery recycled waste oil. In 1977, it was ordered to stop on-site dumping of a waste sludge from the

Category of Public Health Hazard: This site was categorized as an *Indeterminate Public Health Hazard* (category 3) in the 1989 ATSDR public health assessment because of the risk to human health from possible exposure to hazardous substances through dermal contact, ingestion, or inhalation of contaminated soil or sediments. In the 2001 health consultation (not provided for inclusion in this document), ATSDR concluded that the site is a *Public Health Hazard.*

Contaminants of Concern in Completed Exposure Pathways: None identified by the 1989 ATSDR health assessment. For both sites, PAHs are the primary contaminants of concern. Data for individual PAHs were not reported, but it is likely that the IJC critical pollutant B(a)P was present at levels of concern. Soil, surface water, groundwater, and sediments are contaminated with a variety of hazardous substances including PAHs, SVOCs, heavy metals, and VOCs. ATSDR's more recent documentation for the site, the 2001 health consultation, may provide information regarding contaminants in completed exposure pathways, but as mentioned previously, was not provided for inclusion in this document. According to the NPL fact sheet for this site, remediation activities have included removal of tar seeps, contaminated soil, and sediments; and solidification of some wastes in-place, with capping. Additional sediment requires remediation, and groundwater, which discharges to the river, is being evaluated.

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

Children 6 years and younger	417
Females aged 15-44	934
Adults 65 and older	756

Public Health Outcome Data: Not reported.

Conclusions: This site appears to have contributed to the contaminant burden of the St. Louis River, particularly with regard to PAHs, and probably including IJC critical pollutant B(a)P. Further conclusions may be drawn at such time as more recent ATSDR documentation for this site is provided for inclusion in this document.

6.3.1.1 Koppers Company Superior Plant

The Koppers facility in the Town of Superior, Douglas County, WI, contaminated the Crawford Creek basin soils and sediments with chemicals related to wood treatment processes. Information regarding this site is taken from the 2003 ATSDR health consultation for the site.

Category of Public Health Hazard: ATSDR concluded that the contaminated soils and sediments are a public health hazard in its 2001 health consultation (not provided for inclusion in this document). This site was categorized by ATSDR as an *Indeterminate Public Health Hazard* (category 3) for PCDD and PCDF contamination of fish in its 2003 health consultation.

Contaminants of Concern in Completed Exposure Pathways: According to the summary in the 2003 health consultation, the 2001 health consultation concluded that creosote wastes and PAHs in the soils and sediments of lower Crawford Creek are a human health concern. PCDDs and PCDFs were also present in these media, but the contamination was not well characterized and apparently was not at levels of health concern. Further monitoring, including of fish and wildlife, was needed. The 2003 health consultation evaluated the adequacy of modeled fish concentrations as a basis for assessing health risk.

ATSDR concluded that it could not, on the basis of that information, confidently conclude that fish from Crawford Creek and the Nemadji River basis do not contain unsafe levels of PCDDs and PCDFs, and that fish in those areas therefore pose an indeterminate health risk.

Demographics: Not reported.

Public Health Outcome Data: Not reported.

Conclusions: The Koppers facility has contaminated the Crawford Creek basin with PAHs, probably including the IJC critical pollutant B(a)P, and other creosote-related chemicals at levels of public health concern. Whether PCDDs and PCDFs have accumulated in fish to levels of concern could not be determined.

6.3.2 TRI Data for the St. Louis River and Bay AOC

The TRI on-site chemical releases for St. Louis and Carlton Counties, MN, and Douglas County, WI, are summarized in Table 6-11. Total on-site releases in 2001 were 1,253,524 pounds, the majority of which were released to air, followed by releases to land. St. Louis County accounted for 37%, Carlton County accounted for 46%, and Douglas County accounted for 17% of the total on-site releases.

IJC critical pollutants accounted for 4,417 pounds (0.4 %) of the total on-site releases. The IJC critical pollutants released were [redacted] The facilities that released these pollutants are listed in Table 6-12.

The largest on-site release (300,000-499,999 pounds) of non-IJC chemicals was of methanol (to air). The next largest release category (150,000-299,999 pounds) also had only one chemical, barium compounds (primarily to land).

6.3.3 County Demographics and Health Status Data for the St. Louis River and Bay AOC

The demographic profile, from the 2000 U.S. Census, for vulnerable populations living in the three counties of this AOC is shown in Table 6-13.

Table 6-13. County Demographic Profiles for the St. Louis River and Bay AOC

Vulnerable population	St. Louis County, MN	Carlton County, MN	Douglas County, WI	Total for AOC
Children 6 years and younger	14,995	2,631	1,288	18,914
Females aged 15-44	41,312	6,140	3,047	50,499
Adults 65 years and older	32,274	4,784	3,903	40,961

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 this AOC were as follows (no indicators were above the upper limit of the peer county range):

St. Louis County, MN

Infant mortality (per 1,000 births)

- none

Birth measures (as percent)
- none

Death measures (per 100,000 population)
- stroke

Carlton County, MN

Infant mortality (per 1,000 births)
- none

Birth measures (as percent)
- none

Death measures (per 100,000 population)
- stroke

Douglas County, WI

Infant mortality (per 1,000 births)
- infant mortality
- post-neonatal infant mortality

Birth measures (as percent)
- none

Death measures (per 100,000 population)
- breast cancer (female)
- colon cancer
- coronary health disease
- stroke

6.3.4 Summary and Conclusions for the St. Louis River and Bay AOC

6.3.4.1 Hazardous Waste Sites

Three hazardous waste sites relevant to this AOC were evaluated by ATSDR as public health hazard categories 1-3. The IJC critical pollutant B(a)P [or total PAHs, probably including B(a)P], was a contaminant of concern at all three sites, and in a completed exposure pathway (form soil and sediment) at one site. Information for the other two sites was not provided so as to determine completed exposure pathways, but one of those sites has been completely remediated and the other partially remediated.

Issues for Follow-Up

St. Louis River site: Information regarding completed exposure pathways may be available in the 2001 ATSDR health consultation, which was not provided for inclusion in this document. This site (comprising two sites on the river) has not been completely remediated, and appears to have contributed significantly to the river's burden of contaminants, including B(a)P.

Koppers Co. Superior Plant: ATSDR was concerned that the levels of PCDDs and PCDFs in sediment of the nearby creek may bioaccumulate into fish at levels of concern. None of the site-related contaminants in the creek soil and sediments had been cleaned up as of the 2003 ATSDR health consultation.

health outcome data were reported for this site. Vulnerable populations within 1 mile of the site number about 5,600 people.

Sheboygan River AOC, Sheboygan County, WI: The **Sheboyagan Harbor & River** itself, from Sheboygan Falls to Lake Michigan and extending into the harbor, is an NPL site. PCBs, primarily from the Tecumseh Products Company, contaminate river bank soil, sediments, and fish and waterfowl is at levels that may be associated with adverse health effects, even though some of the PCB-contaminated media have been removed or immobilized. The site may be contributing to PCB contamination of Lake Michigan. 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. Vulnerable populations living with 1 mile of the site include about 17,300 people.

Lower Green Bay and Fox River AOC, Brown County, WI: The **Fox River NRDA/PCB Releases** site (Section 5.7.1.2) is reported to be the greatest contributor of PCBs to Lake Michigan. Sediments are heavily contaminated with PCBs released from seven pulp and paper companies located on the river. Fish and other wildlife are contaminated. Other IJC critical pollutants also contaminate the sediment, but do not contribute significant health risk relative to that posed by PCBs. The site has not been remediated, but has been proposed for the NPL. No public health outcome data were reported for this site. Vulnerable populations were reported only for those living with 1 mile of the Fox River Paper Company, and thus do not represent the entire site. The total population residing in the communities along the river is approximately 270,000, so vulnerable populations will be large.

Lake Superior

St. Louis River and Bay AOC, St. Louis and Carlton Counties, NM, and Douglas County, WI: The major site in this AOC is the approximately 900-acre **St. Louis River Site** (Section 6.3.1.2), which actually comprises two very large sites located on the river. These sites were involved in steel, coke, and tar manufacturing. Heavy contamination of the soil and river sediments with PAHs, probably including B(a)P, occurred. The sites are partially remediated, but additional sediment requires remediation, and groundwater is under evaluation. No public health outcome data were reported for the site. Vulnerable populations living within 1 mile of the site total about 900 people.

7.2 TRI DATA FOR THE 26 U.S. GREAT LAKES AOCs

Estimated annual chemical releases by certain industries and federal facilities are reported through the TRI (http://www.epa.gov/tri/). The following IJC critical pollutants are included: PCBs, PCDDs, and PCDFs, aldrin, lead and lead compounds, mercury and mercury compounds, toxaphene, and hexachlorobenzene.

The TRI data for IJC critical pollutant releases in the counties encompassing the 26 U.S. Great Lakes AOCs are summarized in Table 7-1. All of the 26 U.S. Great Lakes AOCs, except for the Manistique River AOC (Lake Michigan) continue to be impacted by the release of IJC critical pollutants from industrial facilities. The disproportionately large estimated releases of lead and lead compounds (2,200,000 pounds) in the Maumee River AOC, [redacted] (430,000 pounds), [redacted] compounds (14,000), and PCBs (1,200,000) in the Rouge River AOC, and [redacted] compounds in the Saginaw River and Bay AOC, were primarily releases to land. Further investigation of these releases to land indicated that they [redacted] which are authorized to accept hazardous waste for disposal and operate

under very stringent guidelines. Although these RCRA-landfilled releases may serve as reservoirs of these chemicals, they should not be contributing to exposure. No portion of the large release of lead and lead compounds in the Grand Calumet AOC (430,000 pounds to surface water and land) was disposed in a RCRA landfill. Further information regarding the TRI release data was provided in Chapters 2-6 of this document.

7.3 [redacted]

Health outcome data for the counties encompassing the U.S. Great Lakes AOCs were obtained from the 2000 HRSA *Community Health Status Report* [redacted] No particular patterns among the TRI release data, waste site contaminant data, and county-wide health outcome data were observed in terms of possible associations for follow up. This result is not surprising, for the following reasons:

- Health impacts may be restricted to much smaller areas located near specific waste sites or industrial facilities.
- Impacts may be reflected in more sensitive or specific health outcomes, such as central nervous system birth defects.
- Critical exposure periods and latency for different types of health outcome data (such as developmental effects or cancer) complicate the detection of possible associations when using health outcome data and contaminant data from discrete time periods.
- Potential confounding factors, such as smoking, drinking, and occupational exposures, were not taken into account in the county-wide health outcome data.

A few of the public health outcome evaluations in ATSDR's public health assessments and health consultations, however, did identify p[redacted]th waste-site-related exposures in the U.S. AOCs. These possible associations included:

- Buffalo River AOC, Erie County, NY—Abby Street/Hickory Woods Subdivision: In a 2001 health consultation, ATSDR concluded that the prevalence of thyroid disease (primarily hypothyroid) in the residents of this subdivision (as compared with the U.S. populations) was unusually high, and needed follow up. Contaminants of concern in past or current completed exposure pathways included the IJC critical pollutants lead and PAHs [as B(a)P equivalents], and also arsenic. PCB ?
- Muskegon Lake AOC, Muskegon County, MI—Bofors Nobel Incorporated: Health outcome data, evaluated in 1992 and 1996 ATSDR public health assessments, suggest that the site-related exposure to the bladder carcinogens benzidine and 3,3'-dichlorobenzidine (non-IJC pollutants) may have been associated with a slight increase in bladder cancer incidence (for 1 year only) and in total invasive cancer incidence (for 1 year only). 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 Nobel site and two other facilities in Michigan where similar chemicals were manufactured or used. Data are not yet available from this study.
- Sheboygan River AOC, Sheboygan County, WI—Sheboyagan Harbor & River: 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. PCBs contaminate the fish at levels of concern.

As that all,

Table 7-1. TRI Releases of IJC Critical Pollutants in the 26 U.S. AOCs*

Section in Document	Great Lake	AOC	State	County Name	Lead and Lead Compounds	Mercury and Mercury Compounds	Dioxin	PCBs	Hexa-chloro-benzene	Toxa-phene	Aldrin
2.1	ONTARIO	OSWEGO RIVER	NY	OSWEGO	130	25	0.006	0	0	0	0
2.2	ONTARIO	ROCHESTER EMBAYMENT	NY	MONROE	1,900	160	0.015	0	0	0	0
2.3	ONTARIO	EIGHTEEN MILE CREEK*	NY	NIAGARA	61,000	570	0.007	226	0.3	0	0
3.1	ERIE	BUFFALO RIVER	NY	ERIE	9,100	320	0.0006	0	0	0	0
3.2	ERIE	PRESQUE ISLE BAY	PA	ERIE	7,900	47	0.002	0	0	0	0
3.3	ERIE	ASHTABULA RIVER	OH	ASHTABULA	440	1,500	[redacted]	0	0	0	0
3.4	ERIE	CUYAHOGA RIVER	OH	CUYAHOGA, SUMMIT	75,000	59	0.007	0	0	0	0
3.5	ERIE	BLACK RIVER	OH	LORAIN	9,300	330	0.005	0	0.23	0.1	0.03
3.6	ERIE	MAUMEE RIVER	OH	LUCAS, OTTAWA, WOOD	2,200,000	560	0.008	51	0	0	0
3.7	ERIE	RIVER RAISIN	MI	MONROE	65,000	1,300	0.008	0	14	0	0
3.8	ERIE	ROUGE RIVER	MI	OAKLAND, WAYNE	430,000	[redacted]	0.004	[redacted]	[redacted]	[redacted]	0
3.9	ERIE	CLINTON RIVER	MI	MACOMB, OAKLAND	290	12	0	0	0	0	0
4.1	HURON	SAGINAW RIVER AND BAY	MI	21 COUNTIES	92,000	470	1.6	0	0	0	0
5.1	MICHIGAN	MUSKEGON LAKE, WHITE LAKE	MI	MUSKEGON	12,000	200	0.001	0	0	0	0
5.2	MICHIGAN	KALAMAZOO RIVER	MI	ALLEGAN, KALAMAZOO	2,200	30	0.0003	0	0	0	0
5.3	MICHIGAN	GRAND CALUMET	IL	COOK/LAKE	430,000	1,800	0.028	0	4.9	0	0
5.4	MICHIGAN	WAUKEGAN HARBOR	IL	LAKE	4,300	320	0.003	0	0	0	0
5.5	MICHIGAN	MILWAUKEE ESTUARY	WI	MILWAUKEE	10,000	150	0.005	0	0	0	0
5.6	MICHIGAN	SHEBOYGAN RIVER	WI	SHEBOYGAN	9,500	230	0.009	0	0	0	0
5.7	MICHIGAN	LOWER GREEN BAY& FOX RIVER	WI	BROWN	15,000	170	0.014	2.2	0	0	0
5.8	MICHIGAN	MENOMINEE RIVER	WI	MARINETTE, MENOMINEE	970	22	0.001	0	0	0	0
5.9	MICHIGAN	MANISTIQUE RIVER	MI	SCHOOLCRAFT	0	0	0	0	0	0	0
6.1	SUPERIOR	DEER LAKE	MI	MARQUETTE	3,000	160	0.002	0	0	0	0
6.2	SUPERIOR	TORCH LAKE	MI	HOUGHTON	0.33	0	0	0	0	0	0
6.3	SUPERIOR	ST LOUIS RIVER & BAY	MN	CARLTON, DOUGLAS, ST. LOUIS	4400	35	0.004	0	0	0	0
				Total	**3,400,000**	**22,000**	**2.02**	**1,200,000**	**4,300**	**1,700**	**0.03**

*2001 Total on-site releases, in pounds, rounded to 1-2 significant figures. Details are provided in the TRI tables in Chapters 2-6.

ANNOTATED PAGES FROM

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