

Chapter 7. Conclusions and Recommendations

7.1. Conclusions

The IJC requested ATSDR assistance in “evaluating the public health implications of environmental contamination in Great Lakes AOCs by providing information on ATSDR’s public health assessment products of hazardous waste sites within these AOCs.” This report extends the scope of that request by providing information on other sources of environmental contamination in the region, and from sources near but not in the AOCs.

This report summarizes the environmental information about the 26 US AOCs and the associated 54 AOC counties in the Great Lakes region. For the first time this report consolidates the findings from the ATSDR site specific public health assessment products for 150 sites in the Great Lakes region and summarizes publicly available environmental information for the 54 AOC counties. For each site addressed in this report it describes the site and addresses the current status of environmental clean up efforts at the site.

Additionally chapters 2–6 provide data from ATSDR public health site assessment products that identify sites within the Great Lakes AOCs with ongoing problems and the current status of remediation efforts.

The ATSDR site data show documented, possible, or unknown contaminant exposures in 150 sites in the 54 AOC counties. Of these, at the time of this report 81 sites no longer present a continuing source of contaminant exposure as verified by ATSDR, USEPA, or state agencies. The remaining 69 sites are in various stages of site characterization or remediation, or remediation is not planned.

The TRI and NPDES data refer to releases in 54 “AOC counties,” counties impacted by the presence of degraded ecosystems. These data show ongoing releases of critical pollutants, and other chemicals, across the Great lakes region.

Fish-tissue monitoring has documented contaminant levels above health-based values, resulting in advisories to limit fish or wildlife consumption in all 26 AOCs. with the exception of Presque Isle Bay in Pennsylvania. In some cases fish advisories are specific to locations within an AOC and result from chemical releases into the AOC, but in many instances fish advisories are regional in scale. Eight of the AOCs listed restrictions on drinking water consumption or problems with odor or taste. Specific reasons were not always available. In one instance (Grand Calumet) chemical substances in treated drinking water was cited as a reason for the listing of this impairment. The publications and public health research findings from the ATSDR Great Lakes Research Program presented in Appendix 3 document important health outcomes among persons living in the Great Lakes Basin from consumption of fish and game contaminated with persistent organic chemicals from chemical releases related to the AOCs. It is worth noting that from 1992 to the present, the Great Lakes Research Program has supported approximately \$32 million in extramural research in the Great Lakes . This represents a tangible commitment on the part of ATSDR to public health in the region.

Taken together, these bodies of knowledge provide a scientific basis for justifying future hypothesis - driven research studies capable of providing answers to important public health issues of concern in the Great Lakes Basin.

The questions that motivated this report are important. They matter to members of the public who live in the Great Lakes region, to health care providers, and to public officials. In view of evidence of contamination in many areas of the Great Lakes basin, efforts to move toward answers, in scientifically rigorous, accurate ways, are well justified. However, this report reveals considerable limitations in the ability to answer these questions.

A range of health effects may be associated with toxic exposures. At high exposure levels, these health effects may be obvious. At lower exposure levels, health effects may be more difficult to quantify and to attribute to chemicals, especially when other factors also contribute to risk, or when the health effect occurs long after the exposure. Examples include some of the most widely discussed effects of chemical exposures: cancer, reproductive abnormalities, endocrine disruption, neurobehavioral dysfunction, and developmental abnormalities.

Health data are not routinely collected on most of these outcomes. Available health data, such as vital statistics and hospital discharge data, are collected for other purposes, and address health outcomes generally not related to chemical exposures. Even health data of interest, such as those from cancer registries, are collected on different spatial and temporal scales than available environmental data, and the data bases do not link with each other. Accordingly, the available health data do not help elucidate the effects of exposure to environmental pollutants.

Given the limitations of currently available environmental and health data, the threat to human health from critical pollutants found in the Great Lakes basin cannot be clarified. This report serves to highlight the pressing need for better data, properly collected, organized, and analyzed, to help define threats to human health and optimal strategies for protecting health.

Data are available only for certain sources of environmental contamination, and under certain conditions. TRI data do not reflect the totality of toxic releases, since small firms, firms from certain industry sectors, and other categories of emitters, are exempted from reporting. The NPDES captures direct emissions to surface waters from industrial, municipal, and other “point sources,” but it includes no information on non-point source water pollutants. ATSDR health assessment products are based on available site-specific sampling data and may not fully characterize every exposure pathway or contaminant. These data, taken together, do not include exposures from pesticide applications, from mobile sources, or from indoor sources. In short, the available data provide a very partial picture of contaminants in the environment.

The available data do not indicate whether people are actually exposed. For exposure to occur, there needs to be a completed pathway from a source to people’s bodies. Discharge of a pollutant into a stream (as indicated in NPDES) does not mean that people are exposed to that pollutant, or if so, how much. Use of a chemical in a factory, as reported in TRI, does not mean that people are exposed to the chemical, or if so, to what extent.

Consider the reported releases of lead and lead compounds (2,200,000 pounds) in the Maumee River AOC; lead and lead compounds (430,000 pounds), mercury and mercury compounds (14,000 pounds), and PCBs (1,200,000 pounds) in the Rouge River AOC; and dioxin and dioxin-like compounds in the Saginaw River and Bay AOC, all primarily released to land. These releases represented disposal in Resource Conservation and Recovery Act (RCRA) Subtitle C landfills, which are authorized to accept hazardous waste for disposal and operate under very stringent guidelines. Although these RCRA-land filled releases may serve as reservoirs of these chemicals, they should not be contributing to human exposure.

To be useful for assessing potential health effects related to chemical exposures in AOCs, health data should be biologically associated with relevant exposures and be well-matched to the environmental data in space and time. In addition, data should be available that can clarify the role of other non-environmental risk factors. For example, if a chemical is suspected of contributing to premature births, other risk factors for premature birth should be known and taken into account. Ideally, these data should be available on the individual level, and not at the population level, for proper data analysis. Very little routinely collected and available health data meets these tests.

7.2. Recommendations

Understanding environmental conditions in the Great Lakes region and protecting residents from possible health effects is a priority for ATSDR and CDC. Community members in the Great Lakes region deserve accurate information provided in a timely manner. ATSDR and CDC have a number of programs that serve these aims: ATSDR conducts a range of activities at hazardous waste sites to protect the public from exposure to hazardous chemicals. Between January 2001 and February 2008 in the 8 Great Lakes states ATSDR has worked at 528 sites and this work has resulted in 756 documents.

Although there are extensive ongoing activities, this report supports the need for additional data collection and analysis to permit scientists, decision makers, and members of the public to define the threat to human health from pollutants in the Great Lakes basin.

- Additional data should be collected on environmental contaminants, including characterization of air, water, soil, foods, consumer goods, and other sources, and pathways of exposure to allow better understanding of how people are exposed to environmental chemicals.
- Restrictions on fish consumption, wildlife consumption or both exist in every AOC with the exception of Presque Isle Bay in Pennsylvania. In some cases fish advisories are specific to locations within an AOC and result from chemical releases into the AOC, but in many instances fish advisories are regional in scale. For example, consumption restrictions exist for certain fish species throughout Lakes Erie and Ontario. The report includes information about fish consumption restrictions that exist across the 26 AOCs. Each state sets its own standards for fish advisories and bans. Efforts have been made by the Great Lakes states to standardize this approach for PCBs and more recently for mercury. These practices are not, however, applied universally, and fish restrictions may vary from state to state.

- Biomonitoring should be conducted to characterize the chemicals found in the bodies of people of the Great Lakes basin. The National Exposure Report provides information about the chemicals in the US population. A parallel effort to collect biological data should be considered at the local level.
- More complete health data collection including data on outcomes linked to chemical exposures, such as neurobehavioral, endocrine, reproductive, and immune function is needed.
- There is a significant need to conduct data linkage to permit joint analyses of the various environmental data sets and linkage between health and environmental data.
- Modeling exposure pathways using appropriate information about historical environmental exposure, if available, and dose reconstruction efforts can provide useful information for health conditions with long latencies.
- Hypothesis driven analytical epidemiology studies should be developed to investigate highest priority questions arising from the data.
- Advanced techniques such as genetic analyses, careful control of confounders, and sophisticated data analytic approaches should be incorporated in any epidemiologic studies conducted.

ATSDR strongly supports the need for data collection and research to help elucidate the links between chemical contamination and health effects, in the Great Lakes region and elsewhere. Existing efforts at ATSDR and CDC, such as the Environmental Public Health Tracking program (<http://www.cdc.gov/nceh/tracking/>) and the Great Lakes Human Health Effects Research Program (<http://www.atsdr.cdc.gov/grtlakes/program-overview.html>), represent important steps toward those goals. This report suggests that further such efforts are well justified.