Chapter 7. Conclusions and Recommendations

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7.1. Conclusions

In a December 5, 2001 letter, the International Joint Commission (IJC), which has both U.S. and Canadian members, asked ATSDR to evaluate the status of U.S. AOCs. Specifically, the letter stated

> In its 11th Biennial report, the IJC intends to comment on the hazards posed by the continuing presence of hazardous materials in the AOC's. To this end, the Commission would request that ATSDR provide to the Commission information on public health assessments that it has conducted on hazardous waste sites located within any of the 33 [*sic*] United States AOC's. It would be most helpful if ATSDR could identify evaluated sites within each AOC, the Hazard Category assigned to each site, any relevant demographic information available to ATSDR concerning populations at risk, completed exposure pathways identified, and the priority substances following these pathways.

This report responds to and extends the scope of that request and aims to provide useful information on chemical inputs from a variety of sources. Most importantly, this report provides updated summaries for waste sites ATSDR assessed in each of the 26 U.S. AOCs and the associated 54 AOC counties in the Great Lakes region. The ATSDR public health assessment products for 146 sites in the Great Lakes region are updated to make them current as of the date of this report. These data are supplemented with selected additional publicly available data that track additional pollutant discharges in the region. Taken together, although not a comprehensive view of environmental pollution in the region, we consider the compiled information to be potentially useful to researchers, policy makers, and the public.

After a review of all these data, we conclude

1. As a result of both past and ongoing releases, environmental pollution in the Great Lakes region is widespread. Of some 146 hazardous waste sites located in AOC counties and evaluated by ATSDR, many have been remediated; others are still undergoing long-term remediation. However, not all sites have been remediated, and ongoing chemical releases continue.
2. Throughout the region, fish tissue monitoring detects contaminant levels above levels thought to pose a risk to human health as determined by state and federal regulatory agencies. Monitoring efforts have led to the issuance of advisories to limit fish or wildlife consumption in all but one of the 26 AOCs—Presque Isle Bay in Pennsylvania. Fish advisories that result from chemical releases into an AOC are in some cases specific to locations within that AOC, and in other instances are regional.
3. The data reported here do not reflect the totality of chemical pollution in the region. Many sources of contamination exist that are not ATSDR-evaluated sites. For example, TRI data do not reflect the totality of toxic releases: reporting

exemptions included small firms, firms from certain industry sectors, and other categories of emitters. The NPDES data did not include information on nonpoint-source water pollutants. Thus available data even taken together do not include exposures from pesticide applications, from mobile sources, or from indoor sources, The data hence provide only a partial picture of contaminants in the environment.

4. The available information on environmental pollution provides little insight on the *exposure* of people to pollutants. TRI data on chemicals used and emitted, and NPDES data on chemicals discharged into water, do not indicate whether these chemicals reach people and enter their bodies. ATSDR assessments of hazardous waste sites do, however, include analysis of exposure pathways, and, when available, do include data on how much exposure actually occurs.
5. Current data do not allow us to draw firm conclusions about relationships between critical pollutants in the Great Lakes region and potential health effects.
    - Data that are routinely collected (such as information on cancer and birth defects) are not well matched to exposure data in time or by location and therefore cannot help to assess whether the identified environmental exposures have adverse health consequences.
    - In addition, data are not routinely collected on some important health effects that might be associated with toxic exposures such as neurobehavioral, endocrine, reproductive, and immune effects.
6. Although much research on environmental contamination and related health issues has been done, more is needed. From 1992 to 2008, ATSDR's Great Lakes Human Health 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. Data from these studies have provided some useful information to important public health issues and are vital to improving and safeguarding human health in the Great Lakes region. See Appendix 4 for additional information.

The issues that motivated the IJC to request this report matter to many people. Those who live in the region, those who provide health care, and those entrusted with the public welfare, to name a few, are all interested in the quality of the Great Lakes ecosystems and environment. And given the evidence of contamination in many areas of the Great Lakes region, efforts to move toward answers in scientifically rigorous, accurate ways are well justified. Yet this report reveals that with regard to our ability to grapple with these issues, the limitations are indeed considerable.

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 environmental health 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 eight Great Lakes states, ATSDR worked at 528 sites, resulting in 756 health-related documents and a broad range of scientific and public health achievements.

Nevertheless, although activities are extensive and ongoing, this report underscores the need for additional work to permit scientists, decision makers, and the public to define and take action to prevent human health threats posed by pollutants in the Great Lakes region. Needed actions include

1. Collection of data on environmental contaminants, including characterization of air, water, soil, foods, consumer goods, and pathways of exposure.
2. Modeling of exposure pathways using appropriate information about historical environmental exposure especially to provide information about potential causes of health conditions with long latencies.
3. Increased biomonitoring to characterize amounts of chemicals in the bodies of people of the Great Lakes region.
4. Development of data linkages that permit joint analyses of the various environmental data sets and between health and environmental data.
5. Collection of data on a broader range of outcomes that may be associated with chemical exposure such as neurobehavioral, endocrine, reproductive, and immune functions.
6. Performance of analytical epidemiology studies to investigate specific hypotheses arising from the foregoing data sets including advanced techniques for measuring exposures and outcomes, careful consideration of individual variability in susceptibility including genetic analyses, careful control of confounders, and sophisticated data analysis.
7. Taking appropriate public health action based on the foregoing information such as developing standardized criteria for restrictions on human consumption of Great Lakes region fish.

Given the magnitude of needed actions, the needed additional work will require a coordinated, collaborative effort by the relevant state and federal agencies and partners.

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 Great Lakes Human Health Effects Research Program (http://www.atsdr.cdc.gov/grtlakes/program-overview.html and Appendix 4), and the Environmental Public Health Tracking program (http://www.cdc.gov/nceh/tracking/), represent important steps toward those goals.

This report suggests that such efforts are well justified.