

**Public Health Implications of Great Lakes
Areas of Concern (AOC)**

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These experts collectively have knowledge of the environmental conditions within the Great Lakes basin and the potential health effects observed through research from the exposure to these conditions.

Scientists from the Agency for Toxic Substances and Disease Registry (ATSDR) have reviewed the peer reviewers' comments and determined which comments will be included in the profile. A listing of the peer reviewers' comments not incorporated in the report, with a brief explanation of the rationale for their exclusion, exists as part of the administrative record for this report.

The citation of the peer review panel should not be understood to imply its approval of the report's final content. The responsibility for the content of this report lies with the ATSDR.

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Executive Summary (Draft)

Public Health Implications of Hazardous Substances in the Twenty-Six U.S. Great Lakes Areas of Concern

This report was developed by the Agency for Toxic Substances and Disease Registry (ATSDR) in response to a request by the International Joint Commission (IJC) regarding the public health implications of hazardous substances found at the U.S. Areas of Concern (AOCs). This report should not be construed as a traditional analytic epidemiologic evaluation. Instead, it should be viewed as an assessment to identify the co-occurrence of elevated patterns of morbidity and mortality and environmental contamination that may merit further hypothesis-based epidemiologic study.

Despite limitations, this report provides a comprehensive evaluation of patterns of environmental contamination and the demographics of vulnerable populations in the 26 AOCs.

ATSDR identified waste sites, their hazard categories, relevant demographic information on populations at risk, and IJC critical pollutants with completed exposure pathways in the 26 U.S. AOCs. Data from over 100 hazardous waste sites where ATSDR has been involved were reviewed for 54 counties. County-wide health outcome data and U.S. Environmental Protection Agency Toxic Release Inventory (TRI) and National Pollutant Discharge Elimination System (NPDES) data were retrieved and reviewed for all 26 AOCs. Geographic Information System (GIS) maps were developed showing the hazardous waste site locations, TRI and NPDES reporting facilities, and vulnerable populations. These data were subsequently compiled into this report.

With the exception of the Manistique River AOC (Lake Michigan), all AOCs continue to be impacted by the release of IJC pollutants as determined from both the TRI and NPDES data. Lake Michigan AOCs (Grand Calumet, Kalamazoo River, Lower Green Bay and Fox River, Menominee River, Milwaukee Estuary, Muskegon Lake/White Lake, Sheboygan River, and Waukegan Harbor) continue to have contaminant problems. Lake Erie's AOCs (Ashtabula River, Black River, Buffalo River, Clinton River, Cuyahoga River, Maumee River, Presque Isle, River Raisin, and Rouge River) also have discharges of IJC critical pollutants. Lake Superior's AOCs (Deer Lake, St. Louis River and Bay, and Torch Lake) have heavy soil and sediment contamination with polycyclic aromatic hydrocarbons (PAHs). Lake Ontario AOCs (Eighteen Mile Creek, Oswego River, and Rochester Embayment) continue to have releases of IJC pollutants. Lake Huron AOC (Saginaw River and Bay AOC) also continues to be affected by the release of IJC critical pollutants.

Data presented in this report demonstrate that many of the hazardous waste sites that, in the past, contributed to human exposure or the environmental burden of the IJC critical pollutants and other contaminants were found to be remediated.

Of the over 100 hazardous waste sites assessed in the U.S. AOCs, 86 sites were identified as having a potential human health impact. Of this number, 2 were classified as *urgent public health hazards*, 47 identified as *public health hazards*, and 37 listed as *indeterminant public health hazards* as defined by the ATSDR Public Health Assessment Manual. Vulnerable

populations (i.e., children less than 6 years of age, reproductive age women, and older adults) living within a one-mile radius from the AOC hazardous waste sites included approximately 5,000 residents for the Lake Superior AOCs, over 200,000 persons for Lake Michigan AOCs, approximately 9,000 persons in the Lake Ontario AOCs, and over 7,000 residents for the Lakes Erie and Huron AOCs, respectively. These figures indicate that the total number of individuals within vulnerable populations residing within one mile of AOC hazardous waste sites totals an estimated 230,000. According to analysis of ATSDR's HazDat database for 2003, there were over 15,000 instances where contaminants of concern were found at levels above health-based screening values in a variety of media (i.e., water, air, and soil).

This report indicates that there are 25 AOCs which have not been remediated and that over 9 million residents are living within these AOC counties. The AOC county health measures (health status indicators) that compare unfavorably with the median of the peer counties and also with the U.S. population data merit further attention. Differences between the peer counties, the U.S. population data, and the U.S. AOC counties indicate elevated rates of disease beyond the norm (norm being the peer counties and the U.S. population data). While no causal inferences or associations are made in this report, of the 26 AOCs, elevated rates were observed for infant mortality in 21 AOCs, low birth weight in 6 AOCs, and premature births in 4 AOCs. Elevated cancer mortality was also seen for breast cancer in 17 AOCs, colon cancer in 16 AOCs, and lung cancer in 12 AOCs.

Future studies investigating the associations between potential exposures to contaminants found within the AOCs and health outcomes should consider examination of smaller, targeted areas near waste sites and/or other sources of contamination. These prospective analytic epidemiologic studies should address sensitive health outcomes (e.g., functional deficits in cognition, immune function, and fertility); confounding factors; critical exposure periods and disease latency; and the effect of mixtures of chemicals. Ecological studies are not being proposed. The proposed studies would use actual exposure data. Current insights derived from this study regarding the potential for such health effects are summarized in peer reviewed literature and the Expert Panel Report (Appendix).