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.

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. Great Lakes AOCs. 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 on hazardous waste sites 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.

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.

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, 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.

Maps of the individual AOCs are provided in an appendix to this document. The location and boundaries of the AOCs as depicted in the maps and described in the text are based on information provided by EPA (http://www.epa.gov/glnpo/aoc/). 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.

Figure 1-1.

U.S. and Binational Great Lakes Areas of Concern

Source: http://gleams.altarum.org/glwatershed/images/usaocs.jpg
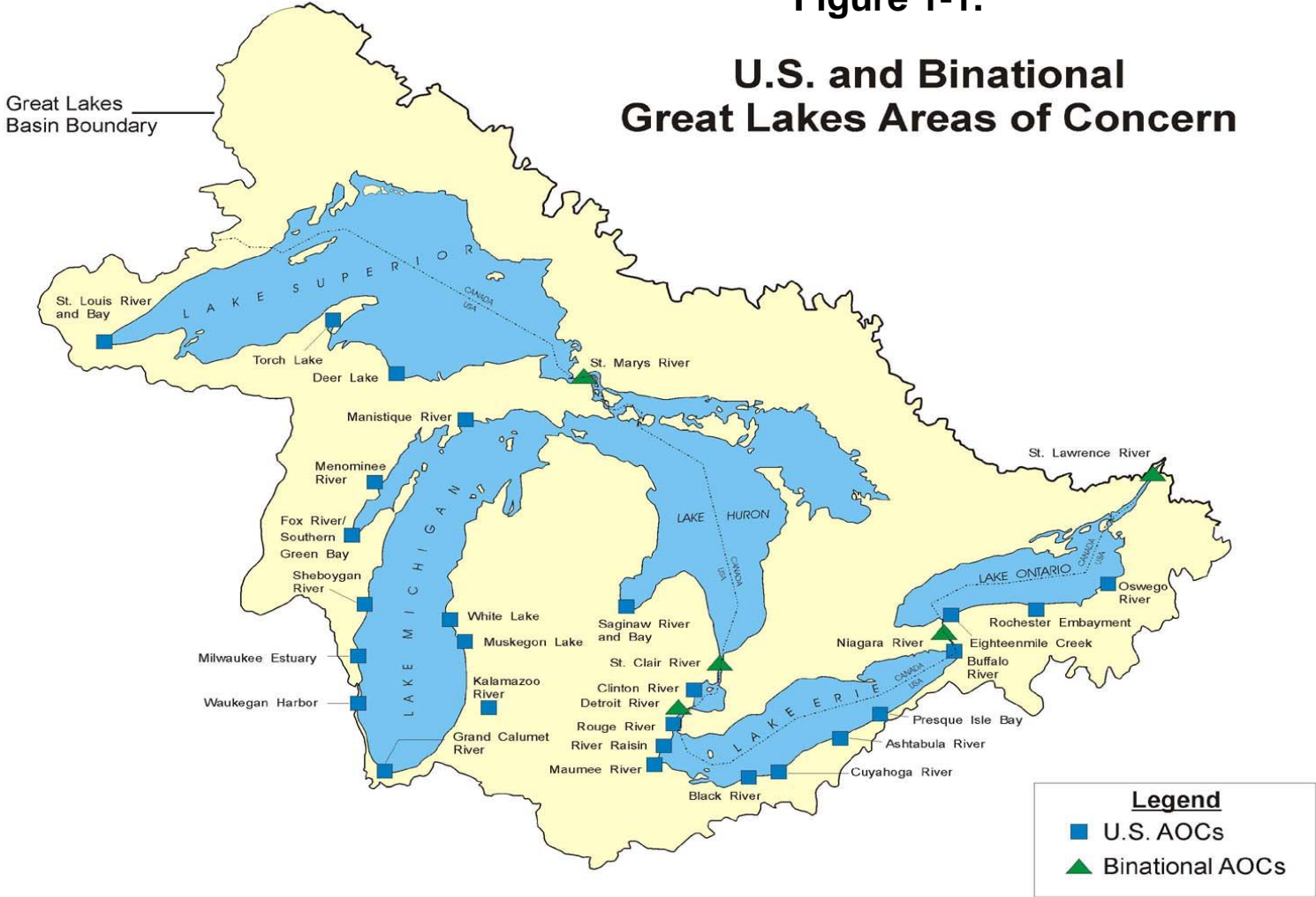
1.1 ATSDR PUBLIC HEALTH ASSESSMENTS FOR THE 26 GREAT LAKES AOCs

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 <u>quick</u> 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 (http://www.atsdr.cdc.gov/hazdat.html), 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 (http://www.epa.gov/epahome/whereyoulive.htm#regiontext).

Demographic data for the NPL sites were extracted by ATSDR from the 2000 U.S. Census (http://factfinder.census.gov/), 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 (http://www.epa.gov/tri/) 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

Health outcome data for the counties that immediately encompass and surround the 26 U.S. AOCs were obtained from *Community Health Status Reports* (http://www.phf.org/data-infra.htm) 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.