

7. CONCLUSIONS

To identify hazards posed by the continuing presence of hazardous substances in the 26 U.S. Great Lakes' AOCs, the IJC has requested that ATSDR identify evaluated waste sites, their hazard categories, relevant demographic information on populations at risk, and IJC critical pollutants in completed exposure pathways. This document has provided that information for the approximately 108 hazardous waste sites with health hazard categories of 1-3 in the 54 counties that encompass the 26 U.S. AOCs. TRI and NPDES release data were reviewed to assess the impact of other sources of IJC critical pollutants on the AOCs. Geographic Information Systems (GIS) maps were created, identifying the approximate boundaries of the AOCs, as well as locations of waste sites, TRI reporting facilities, NPDES discharge sites, and demographic information on vulnerable populations. These maps are available on a CD accompanying this document. County-wide health outcome data were shown to demonstrate general health status of residents living in the counties where the AOCs were located.

7.1 ATSDR PUBLIC HEALTH ASSESSMENTS FOR THE 26 GREAT LAKES AOCs

Many of the hazardous waste sites that, in the past, contributed to human exposure or to the environmental burden of the IJC critical pollutants and other contaminants have been remediated, as discussed in the site descriptions and AOC summaries in Chapters 2-6 of this document. Some U.S. AOCs do not appear to be significantly burdened by the continuing release of contaminants from hazardous waste sites. Other U.S. AOCs are impacted by the continuing presence and release of waste-site-related contaminants, particularly the AOCs on Lake Michigan. The following summary takes into account remaining problems with regard to pollutant releases, the size of nearby vulnerable populations, and health outcome data if applicable. Chapters 2-6 of this document provide detailed information on the waste sites and issues for follow up to include contaminant releases and potential adverse health outcome.

Lake Ontario (Chapter 2)

There are no ATSDR-evaluated hazardous waste sites located in Oswego River AOC and Eighteen Mile Creek AOC. Oswego River AOC was officially delisted from the list of AOCs on 6/19/06. The single ATSDR-evaluated hazardous waste site in the Rochester Embayment AOC (Rochester City of APCO) has been remediated through the joint efforts of local, county, and state governments.

Lake Erie (Chapter 3)

Ashtabula River AOC: The four waste sites in this county that had health hazard categories of 1-3 have been remediated.

Black River AOC: The Ford Road Industrial Landfill requires follow up regarding the ATSDR recommendation of more extensive monitoring to characterize the extent of contamination. No demographic data were reported for this site.

Buffalo River AOC: The Abby Street/Hickory Woods Subdivision requires follow up with regard to arsenic in playground soil. Demographic data are not available for this site. A cancer study by the New York Department of Health at the Diarsenol Company also needs a follow-up investigation. The total population for this site is 9,517 residing in the involved census tracts.

Clinton River AOC: The South Macomb Disposal Authority site requires monitoring of residential wells to determine if the chemical plume is contaminating these wells. Vulnerable populations living within 1 mile of the site total 867 residents.

Cuyahoga River AOC: The Cady Road site has had dissolved gases in well water which poses a hazard. The residents are being switched to municipal water. Vulnerable populations living within 1 mile of the site total 654 residents.

Maumee River AOC: This AOC has no ATSDR-evaluated hazardous waste sites.

Presque Isle Bay AOC: The Foamex Products site is an active manufacturing site. For the area near the manufacturing site, further investigation is required for the methylene chloride emission (peak air concentration) exceeding the ATSDR acute MRL for this substance. The Hammermill-Scott Run site requires follow up for 50 deteriorating drums at the site. No demographic data were reported for these sites.

River Raisin AOC: The Consolidated Packaging Corporation requires addition monitoring data for soil and groundwater contamination. No demographic data were reported for this site.

Rouge River AOC: The Continental Aluminum Company is an active manufacturing site and requires stack monitoring data during high release events. No demographic data were reported for this site. Rose Township Dump requires follow up for monitoring of groundwater near the site. Vulnerable populations living within 1 mile of the site total 245 residents.

Lake Huron (Chapter 4)

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
- Velsicol Chemical Corp.
- Shiawassee River
- Dow Chemical Co., Midland Location
- Tittabawassee River
- Laingsburg

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 three listed sites.

Lower Green Bay and Fox River Area of Concern

The GIS map for the Lower Green Bay and Fox River Area of Concern does not show the numerous TRI, NPDES, and CERCLIS sites (as seen in the other AOC sites discussed above). However, the Fox River NRDA/PCB Releases site located in this AOC is the greatest contributor of PCBs to Lake Michigan. Although PCB releases to the river stopped in 1970, the contamination persists and has bioaccumulated in the food chain. The site has not been remediated. Fish advisories have been issued for contaminated fish. The total population residing along the Fox River is approximately 270,000 residents.

7.4 HEALTH OUTCOME DATA

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. The county represents the smallest geographic area for which health outcome data are available. The Community Health Status Reports compare measures of birth and death (e.g., morbidity outcomes of low birth weight and mortality rates from infant deaths and from diseases such as cancer) for a county with peer counties and were utilized because of their availability. These statistics are used for research studies and to set health policy based on the observed health outcomes for a given community.

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 to the counties of interest. The health measures also are compared with the U.S. rates. 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). Health status indicators that exceed the upper limit of the 90% confidence limit of the median for the peer county range and the median of the U.S. rates are reported.

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). 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 (see Table 7.2).

The U.S. AOC county health data are an appropriate reflection of the population health characteristics of the impacted U.S. AOC. The selected health outcome data are health indicators that could be influenced by external conditions. In addition, outcomes, such as unmarried mothers or no first trimester care are indicators of socio-economic status. The U.S. Census Bureau reports that half of the unmarried mothers giving birth in the last year (2004) lived below the poverty level. Studies have shown that persons in the lower socio-economic

groups do not have access to medical care as those in the higher socio-economic groups. In instances where low birth weight (LBW) and no first trimester care (or unmarried mother status) occurred simultaneously, the lack of medical care in the first trimester of pregnancy (or unmarried mother status) could be responsible for the low birth weight infant. Further analysis of this data addressing differences based on race and income may further contribute to our understanding of these patterns of morbidity and mortality.

Great Lakes research has shown an association between prenatal exposure to PCBs and LBW. If PCBs have been detected at sites with health outcomes of LBW, the association between the potential exposure to PCBs and LBW at a site might be real or confounded by the simultaneous presence of lack of medical care during the first trimester of pregnancy (or unmarried mother status). Medical care during the first trimester of pregnancy is important to facilitate the birth of a healthy infant. Ecological biases may also be possible.

7.5 LIMITATIONS OF THE REPORT

Since this study is not an epidemiologic study, adjusting for confounding factors is not considered a limitation since no causal relationships or associations are inferred. Nevertheless, this report has certain limitations that would tend to underestimate patterns of contamination as well as potential health effects to vulnerable populations. These are:

- Since county-wide data are used to ascertain health outcomes, a dilution or underestimation of effects may result since it includes residents that are not among those most highly exposed.
- Elevated rates of certain health outcomes may be due statistically to chance alone. Chance alone may not be responsible in instances such as the association between potential exposure to PCBs at an AOC site and the simultaneous elevated occurrence of low birth weight. The association may be real, given the epidemiologic research that suggests this linkage.
- The U.S. AOCs may be located across more than one county or be confined within a much localized area in a county. In these instances, the county data may not be totally representative of the population residing in proximity to the site.
- County-wide data would not differentiate between rural or urban industrial area populations, or among lower socioeconomic or affluent areas.
- Use of existing health outcome data (rather than more sensitive health outcomes) that may miss subtle health conditions, such as functional deficits, fertility, cognition, or immune function.
- Elevated rates of certain health outcomes may be due to chance alone.
- Both the TRI, as required under TSCA, and NPDES information rely on self-reporting mechanisms. Neither source of information reflects the potential for human exposure.

7.6 SUMMARY

Based upon concern regarding pollutant burdens and health effects in the Great Lakes, Congress directed ATSDR through the Great Lakes Critical Programs Act 1990, to evaluate the health status of the citizens of the Great Lakes states from the pollutants in the waters. Current insights

derived from this evaluation effort regarding the potential for such health effects are summarized in peer reviewed literature and an Expert Panel Report (Appendix).

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. ATSDR makes no causal inferences or associations with regard to the contaminants found at these sites and certain health outcomes. The report does, however, give an overview of the pollution at these sites and the health status of residents, when contrasted to comparable populations. 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).

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.