

## 2. Results

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The following results represent emissions from point, area and mobile sources in the Great Lakes region for calendar year 1998. The regional emission inventory includes emissions from 672 distinct source categories and 1532 distinct processes. The source categories include emissions from 16 area sources, 8 on-road vehicle categories, 10-non-road vehicle categories, aircraft, and locomotives. Definitions of point and area sources are dependent on data collection methods, as reporting requirements for air toxics emissions are different from state to state and province, one emission source defined as an area source in one state may be covered as a point source in other states. Although these categories are covered by all states, some states and the province of Ontario may not estimate emissions for some area source categories due to the coverage of point sources and resource restrictions. For example, the Marine Vessel Loading, Ballasting, and Transit category is covered in point sources for Illinois and Indiana. No emissions were estimated for this area source category from these states.

### **Emissions from All Sources**

The 1998 emissions were estimated for 82 target compounds, however, data were only available to obtain emissions for 78 air toxins, including 16 polycyclic aromatic hydrocarbons (PAHs), 50 non-metal compounds and 12 metal compounds. Table 2-1 shows pollutant names and estimated emissions from point, area, onroad, and nonroad mobile sources.

Point sources emitted all 78 pollutants while area, onroad, and nonroad mobile sources emitted subsets of these pollutants, 65, 31, 42, respectively. Area sources dominate the total emissions for 15 PAHs, 14 non-metal compounds, and 1 metal compound, with a contribution more than 50% of the total emissions. Point sources are responsible for more than 60% of total emissions for 1 PAH, 24 non-metal compounds and 11 metal compounds. Mobile sources (including onroad and nonroad) are responsible for most emissions of 11 non-metal compounds. Among the 78 pollutants, toluene was estimated to have the highest emissions at 631,177,350 pounds, while parathion emissions are the lowest recorded at about 0.58 pounds.

### **Specific Pollutants**

A closer look was taken at the top five non-metal compounds and the top five metal compounds according to the emission totals. The source contribution of emissions for the selected 10 pollutants was analyzed by category for area and mobile sources, and the first two digits of the SIC codes for point sources. The most significant source categories and their contributions are shown in Tables 2-2 and 2-3. The selected pollutants are toluene, xylenes (includes o, m, and p), benzene, formaldehyde, methyl chloroform, lead, manganese, copper, nickel and chromium.

Table 2-1 shows the total regional emissions by source category and their percent contributions to the total emissions. More than 60 percent of the regional emissions of benzene, formaldehyde, toluene, and xylenes (isomers and mixture) are attributed to mobile sources. Emissions of methyl chloroform are dominated by area sources, with a contribution of 97.8%. Point sources dominate the emissions of the top five metal compounds.

The results shown in Table 2-1 indicate that on-road mobile sources are the most significant contributors to overall mobile source emissions. A close look was taken at the eight subcategories of highway vehicles. Table 2-2 shows that Light Duty Gasoline Vehicles (LDGV) is the dominant subcategory for on-road mobile source emissions, responsible for more than 24% of the emissions of toluene, xylenes and benzene. Although Heavy Duty Diesel Vehicles (HDDV) is the most significant source category of formaldehyde emissions with a contribution of 18.6%, LDVG contribute almost similar amounts (about 16.8%) to the total emissions of formaldehyde. The most significant contributor to the emissions of methyl chloroform is Degreasing Equipment. This area source category accounts for about 58% of the total regional emissions.

In contrast with the top five non-metal compounds, point sources dominate the emissions of the top five metal compounds, accounting for more than 77% contributions. As shown in Table 2-3, the most significant source category for lead, copper and nickel is Metal Mining industry (SIC code 10xx). Manganese and chromium emissions are dominated by the Primary Metal Industries (SIC code 33xx) and Fabricated Metal Products (SIC code 34XX), respectively.

Detailed emission distributions by standard industrial classification (SIC) codes and source classification codes (SCC) are shown in tables 2-1 through 2-4 and figures 2-1 through 2-77.

## Emission Trends

The regional emission inventory is an ongoing initiative of the air regulatory agencies in the eight Great Lakes states and the province of Ontario. The 1998 inventory is the second update since the 1996 inventory. The overall regional emissions are summarized in Table 2-5. The emission differences among years are mainly due to an expansion of area sources for some states and improvements of emission estimation methods, emission factors, and activity data. Therefore, **the results should not be viewed as a trend analysis**. A back-calculation using the 1998 approaches for 1996 and 1997 could provide emission trends, however, this is a resource intensive effort.