

2. Results

The following results represent emissions from point and area sources in the Great Lakes region for calendar year 1999. The regional emission inventory includes emissions from 674 distinct source categories and 1597 distinct source classification codes (SCC). 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, 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, Hospital Sterilization category is covered in point sources for Wisconsin, but in area sources for Minnesota.

Emissions from All Sources

The 1999 emissions were estimated for 213 target compounds, however, data were only available to obtain emissions for 197 air toxins, including 16 polycyclic aromatic hydrocarbons (PAHs), 13 metal compounds, and 168 non-metal compounds. Table 2-1 shows pollutant names and estimated emissions from point and area sources.

Point sources emitted 196 pollutants while area sources emitted 133 pollutants. Area sources dominated the total emissions for 14 PAHs and 40 non-metal compounds, with a contribution more than 50% of the total emissions. Point sources were responsible for more than 80% of total emissions for all metal compounds with an exception of chromium VI and alkylated lead. About 45% emissions of chromium VI were from area sources, mainly chromium electroplating. A total of 0.68 pounds of alkylated lead were reported from petroleum storage. Point sources also contributed more than 50% of total emissions for 2 PAH, and 129 non-metal compounds. Among the 197 pollutants, toluene was estimated to have the highest emissions at 340,684,671 pounds, while chloroacetic acid emissions were the lowest recorded at about 0.22 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 to emissions for the selected 10 pollutants was analyzed by category for area 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), hydrochloric acid, 1,1,1-trichloroethane, trichloroethylene, manganese, copper, lead, nickel, and chromium.

With the exception of hydrochloric acid emissions, area sources account for more than 86% of total emissions of four out of the five top non-metal compounds. Industrial

Surface Coating category alone contributes more than 35 percent of the regional emissions of toluene, and xylenes (isomers and mixture). More than three quarters of the emissions of 1,1,1-trichloroethane and trichloroethylene are from Degreasing Equipment. On the other hand, almost all emissions of hydrochloric acid are from point sources. Electric, Gas, and Sanitary Services (SIC code 49xx) contribute a substantial fraction of hydrochloric acid emissions, 89.7%.

In contrast with the top five non-metal compounds, point sources dominate the emissions of the top five metal compounds, accounting for more than 97.8% total regional emissions. As shown in Table 2-3, the most significant source category for these metal compounds is Primary Metal Industries (SIC code 33xx). More than one-half of emissions of manganese, copper, lead and nickel and 41.4% of chromium emissions are attributed to Primary Metal Industries.

Detailed emission distributions by standard industrial classification (SIC) codes and source classification codes (SCC) are shown in Tables 2-5 and Figures 2-4 through 2-200.

Progressive Emission Changes

The 1999 inventory is the fourth one since the 1996 inventory. Eighty two pollutants were included in the regional emission inventories in 1996 - 1998 while 213 pollutants are included for 1999. The overall regional emissions from point and area sources for 1996 - 1999 are summarized in Table 2-4. The emission differences among years are mainly due to the following factors:

1. increased number of pollutants in the emission inventories,
2. an expansion of area sources, and
3. improvements of emission estimation methods, emission factors, and activity data.

For example, the chromium emission factor for residential natural gas combustion used in the 1996 inventory is 45 times higher than the revised one used in the 1997-99 inventories. The sum of emission factors for 16 PAHs in the 1999 inventory is 35% of the value in the 1997 and 1998 inventories for residential wood burning - certified, catalytic stoves. Also, the 1999 inventory contains emissions from 24 more distinct source categories and 384 more SCCs than the 1998 inventory.

Therefore, **the results should not be viewed as a trend analysis**. A back-calculation using the 1999 approaches for 1996 to 1998 could provide emission trends, however, this is a resource intensive effort.

Figures 2-1 to 2-3 show emissions of three groups of pollutants estimated from 1996 to 1999. The pollutants in PAH and metal compound groups have not changed with calendar years, so that the difference among calendar years reflects factors 2 and 3 listed above. Factors 2 and 3 also influenced emissions of non-metal compound (excluding PAHs) group. However, the primary cause of the increase of total regional emissions of non-metal compounds in 1999 is due to addition of pollutants. Some of new inventoried pollutants showing high emissions are hydrochloric acid, methanol, methyl ethyl ketone, and hexane. These pollutants are ranked in the top ten with regard to the total emissions in 1999.

Data summaries of the 1999 inventory and all previous inventories are available at the Great Lakes Commission (<http://www.glc.org>) and the Great Lakes Information Network (<http://www.great-lakes.net>) web sites. Additional information, including background documents, the emission protocol document and lists of products for the project, is located on the emission inventory project's web site (<http://www.glc.org/air>).