GREAT LAKES REGIONAL AIR TOXIC EMISSIONS INVENTORY: Point and and Area Sources and Assessment of Mercury Emissions for 1999

- Background and Objectives
- Regional Inventory Development
- 1999 Results and Emission Changes
- Mercury Assessment

BACKGROUND AND OBJECTIVES

- Great Lakes states and the Province of Ontario have been working with the Great Lakes Commission to develop a regional air toxic emissions database.
  - ✓1986 Great Lakes Toxic Substances Control Agreement
  - ✓Establish mechanism for cooperation
  - ✓Identify target compounds
  - ✓Establish protocol and common tools for emissions estimation (RAPIDS)

EMISSIONS INVENTORY DEVELOPMENT FOR THE REGION

- Followed Protocol document
- Collected data for emissions estimates and reported state data
- Use of common emission factors (FIRE 6.23) and source-specific factors
- Identified areas where improvements are needed in overall methodology and implementation

RESULTS

- Data from IL, IN, MI, MN, NY, OH,ON, PA and WI
- 674 source categories associated with 1597 processes (SCC)
- 213 Target Pollutants (Data available for estimating emissions of 197 pollutants)
  - ✓16 PAHs, 13 metals, and 168 non-metal compounds
  - ✓Point sources: 168 pollutants; Area: 133

RESULTS, continued

- **Emissions From All Sources**
  - ✓ Area Sources dominated emissions of 14 PAH and 40 non-metal compounds (>50%)
  - ✓ Point Sources responsible for > 80% of metals except CrVI and Alkylated lead
  - ✓ Pollutant with highest emissions: Toluene ; Lowest: Chloracetic Acid

Table 2-2. The most significant source categories for the top five non-metal compounds.

Pollutant Name	Emissions (lb)	Most Significant Source Category	Percent of Contribution
Toluene	340,684,671.18	Industrial Surface Coating	36.91
Xylenes (includes o, m, and p)	265,317,635.47	Industrial Surface Coating	35.11
Hydrochloric acid	247,823,277.92	Electric, Gas, and Sanitary Services (SIC code 49xx)	89.72
1,1,1-Trichloroethane	132,654,553.89	Degreasing Equipment	76.27
Trichloroethylene	103,116,931.81	Degreasing Equipment	91.73

Table 2-3. The most significant source categories for the top five metal compounds.

Pollutant Name	Emissions (lb)	Most Significant Source Category	Percent of Contribution
Manganese	1,762,820.04	Primary Metal Industries (SIC code 33xx)	56.79
Copper	1,339,884.27	Primary Metal Industries (SIC code 33xx)	85.18
Lead	1,120,053.21	Primary Metal Industries (SIC code 33xx)	63.43
Nickel	919,152.49	Primary Metal Industries (SIC code 33xx)	59.30
Chromium	440,833.52	Primary Metal Industries (SIC code 33xx)	41.43

RESULTS, continued

- **Progressive Emission Changes**
  - ✓213 pollutants in 1999; 82 in 1996-98
  - ✓Expansion of area sources
  - ✓Improvements in: Emission estimation methods, emission factors, activity data

Table 2-4. Summary of regional air toxics emissions from point and area sources (1996-1999, expressed in pounds).

Calendar Year	1996	1997	1998	1999
PAHs	29,072,422	12,888,310	14,404,640	13,903,159
Non-Metal Compounds (Excluding PAHs)	845,813,767	662,217,430	718,624,462	1,681,552,825
Metal Compounds	7,622,696	5,373,067	5,472,034	6,214,998
Total	882,510,881	680,480,803	738,503,134	1,701,672,982

MERCURY

- Added Area categories associated with mercury emissions
  - ✓Fluorescent Lamp Breakage/recycling
- Identification of emission sources with no emission factors
  - ✓47 process codes with no emission factors in FIRE

- Identification of emission sources for which emissions were not estimated
  - ✓ 51 processes codes (SCC)

TABLE 3-1: Processes associated with Mercury Emissions without Emission Factors in FIRE

SCC/AMS Codes	Process Category	Industrial Group	Emission Source
10100204	External Combustion Boilers	Electric Generation	Bituminous/Subbituminous Coal
10100205	External Combustion Boilers	Electric Generation	Bituminous/Subbituminous Coal
10100217	External Combustion Boilers	Electric Generation	Bituminous/Subbituminous Coal
10100224	External Combustion Boilers	Electric Generation	Bituminous/Subbituminous Coal
10101201	External Combustion Boilers	Electric Generation	Solid Waste

MERCURY, continued

- Corrections to previous estimates based on new information
  - ✓ICR data, stack tests
- Improvements in reporting requirements
  - ✓Addition of point sources
- Regional Mercury Emissions
  - ✓556 Industrial and area source categories
  - ✓327 process codes (SCC) and 107 process categories
  - ✓95% from Industrial point sources

Table 3-2: 1999 Great Lakes States Mercury Emission Summary by Source Category

SIC	Category Name	Emissions (pounds)	Percentage (%)
4911	Electric services	25796.48	54.66
4953	Refuse systems	4975.25	10.54
2812	Alkalies and chlorine	2742.63	5.81
8062	General medical & surgical hospitals	2571.78	5.45
4931	Electric and other services combined	879.45	1.86
1011	Iron ores	859.93	1.82
2046	Wet corn milling	835.41	1.77
3241	Cement, hydraulic	735.86	1.56
4952	Sewerage systems	711.54	1.51
LAMP BREAKAGE	Lamp Breakage	657.64	1.39
3321	Gray and ductile iron foundries	643.31	1.36
Others	Sum of other categories that have emissions less than 1% of total	5789.44	12.26
TOTAL		**47198.72**	**100.00**

Table 3-3: 1999 Great Lake States Mercury Emission Summary by Process Category

Process Category	Emissions (pounds)	Percentage (%)
COAL COMBUSTION	27163.06	57.55
INCINERATION	6814.83	14.44
UNSPECIFIED	3523.27	7.46
CHLORO-ALKALI	1081.71	2.29
SITE REMEDIATION	946.00	2.00
SOLID WASTE COMBUSTION	800.62	1.70
CEMENT MFG	733.97	1.56
LAMP BREAKAGE	657.64	1.39
GRAY IRON FOUNDRY	643.51	1.36
Others	4834.12	10.24
TOTAL	**47198.72**	**100.00**

Table 3-4: 1998-1999 Emission Comparison by Top SIC Category.

SIC	Category Name	1998 Emissions (pounds)	1999 Emissions (pounds)	Percent Change
4911	Electric services	21158.63	25796.48	22%
4953	Refuse systems	9453.6	4975.25	-47%
2812	Alkalies and chlorine	1083.75	2742.63	153%
8062	General medical & surgical hospitals	12765.54	2571.78	-80%
4931	Electric and other services combined	404.17	879.45	118%
1011	Iron ores	2179.86	859.93	-61%
2046	Wet corn milling	52.97	835.41	1477%
3241	Cement, hydraulic	3547.2	735.86	-79%
4952	Sewerage systems	201.15	711.54	254%
---	Lamp Breakage	0.00	657.64	---
---	Fluorescent Lamp Recycling	0.00	0.05	---
---	Residential Oil Combustion	9006.58	248.69	-97%
3321	Gray and ductile iron foundries	469.33	643.31	37%
TOTAL		**60322.79**	**41658.02**	

CONCLUSIONS

- Possible to conduct a consistent regional inventory
- Identify gaps and needs for improvements
- Mobile Sources Section available in May
- Working on 2001 and 2002
- Full Report available at http:\\www.glc.org\air
- Data will be available on the Internet