# Appendix E: New York Toxic Emissions Inventory

## BACKGROUND

The State of New York compiled its statewide air toxic emissions inventory for the Great Lakes Air Toxic Emission Inventory Project for the calendar year 1999 for 578 point sources and 21 area source categories.

## CALCULATION METHODS

### Point Source Emissions

New York State used data from the Factor Information Retrieval System (FIRE), AP-42 and Continuous Emission Monitoring (CEM) systems to calculate emissions for 578 point sources outside of RAPIDS. Emission estimates calculated were then imported into RAPIDS.

Any owner or operator of a facility in New York State that is required to obtain a Title V permit pursuant to 6 NYCRR 201-6 must submit an emission statement to the Department for any calendar year in which the facility is required to have a Title V permit.

If the actual emissions of a facility equals or exceeds the facility reporting threshold for any regulated air pollutant, emissions of all regulated air pollutants emitted must be reported even if the other regulated air pollutants are emitted at a level below their respective thresholds. Regulated air pollutants must be reported as individual chemicals (chemical abstract number) as listed in the facility's certificates to operate issued pursuant to 6 NYCRR Part 201.

Any facility with a source(s) subject to the Federal new source performance standards (NSPS) set forth in 40 CFR 60, or to the national emission standards for hazardous air pollutants (NESHAPS) set forth in 40 CFR 61, is subject to the requirements of this Subpart, except for the following: (1) sources subject to 40 CFR 60, subpart AAA, standards of performance for new residential wood heaters; and (2) sources subject to 40 CFR 61, subpart M, NESHAPS for asbestos, section 61.145, standards for demolition and renovation.

Emission statements include facility level information, consisting of (i) verification of full name of facility; (ii) verification of parent company name; (iii) verification of street address (physical location) of the facility; (iv) verification of four digit SIC code(s) for the facility; (v) calendar year reportable emissions; (vi) total facility fuel use and fuel sulfur content and heat value (for combustion installations); and (vii) fugitive emissions.

Emission statements also include emission point level information, consisting of (i) average hours of operation per day (peak ozone and carbon monoxide seasons); (ii) average days of operation per week (peak ozone and carbon monoxide seasons); (iii) weeks of operation per year (seasonal and annual); (iv) hours of operation per year; (v) percentage annual throughput

(percentage of annual activity by season) and (vi) verification of latitude and longitude.

Emission statements also include process level information, consisting of (i) maximum heat input (for combustion installations); (ii) quantity of fuels consumed (for combustion installations); (iii) estimated actual annual reportable emissions, for each air regulated air pollutant emitted, (in units of pounds per year); (iv) estimated emissions method (see subdivision 202-2.4(b) of this subpart); (v) emission factor(s) (if used to determine actual emissions); (vi) primary and secondary control equipment identification code(s); (vii) control efficiencies achieved by the control equipment; (viii) annual process rate; and (ix) peak ozone season daily process rate.

Petroleum, volatile organic liquid, and fuel storage and distribution facilities must provide the following additional information: (i) tank capacity (including maximum and average liquid height, and working volume); and (ii) throughput associated with tanks and loading racks (including turnovers per year).

The Department maintains a list of 189 compounds or materials listed by Chemical Abstract Number ("CAS") that are considered hazardous air pollutants "HAPs" subject to the reporting requirements of Subpart 6 NYCRR 202-2.

## Area Source Emissions

### ***Asphalt Paving***

VOCs (Volatile Organic Compounds) Emissions from Asphalt Paving were based on actual data obtained from the New York State (NYS) Department of Transportation's Environmental Analysis Bureau, Air Quality Section for each county in the state. The data included the total amount of Asphalt Concrete, Crack Fill, and Emulsions that was applied in each county during 1999. The emission factor was derived from the emission factor for Emulsified Asphalt listed in EIIP's Asphalt Paving (Page 17.5-8, Table 17.5-2, Volume III: Chapter 17).

No point source adjustments are required for this area source category. Emissions are included in Appendix E tables.

### ***Agricultural Pesticides***

Estimating emissions from the use of Atrazine and Trifluralin were based on actual pesticides use (gallons or pounds) that was calculated from data compiled by the NYSDEC Division of Solid And Hazardous Materials, Bureau of Pesticide Management and EPA's Office of Pesticide Programs (Pesticide Product Label System (PPLS) - Search). Emission factor for Atrazine is from the FIRE 6.23 Database (Area Source Code: A2461800000) while the emission factor for Trifluralin is from the following: Air and Waste Management Association, M. Trevor Scholtz, Carol F. Slama, Eva C. Voldner. Pesticide Emission Factor from Agricultural Soils. June 13 -18, 1993.

No point source adjustments are required for this area source category. Emissions are included in

Appendix E tables.

***Forest Fires***

Emissions from Forest Fires were based on actual acres burned per county in 1999. This data was supplied by the NYSDEC Division of Lands And Forests but it reflects only the fires that NYSDEC personnel responded to. The fuel loading factor (tons/acre) was based on USEPA's AP-42 (Section 13.1.1, Table 13.1-1, Page 13.1-2; Fig. 13.1-1, Page 13.1-3) and the NYSDEC Division of Lands And Forests. The emissions factors (lbs./ton burned) were taken from USEPA's AP-42 (Section 13.1.1, Page 13.1-3) for Total Particulate, Carbon Monoxide, NOx and VOC while the emissions factors for the Hazardous Air Pollutants (HAPs) were from USEPA's Documentation For The 1996 Base Year National Toxics Inventory For Area Sources dated May 31, 2001 (See Appendix A; Page A-30). Using the actual acres burned per county, the calculated fuel loading factor and the appropriate emission factors for Total Particulate, Carbon Monoxide, NOx, VOC and HAPs (Flaming and Smoldering Fuel Types) the emissions from Forest Fires were calculated.

No point source adjustments are required for this area source category. Hazardous Air Pollutants (HAPs) emissions are included in the Appendix E tables.

**Structure Fires**

1999 emissions estimates for Structure Fires were based on the actual number of structure fires per county provided by the NYS Department of State's Office of Fire Prevention And Control. The fuel loading factor (tons/fire) and the appropriate emission factors (lbs/ton) were from EIIP, Volume III, Chapter 18, Structure Fires, Pages 18.4-2 and 18.4-5, Revised Final January 2001. Using the above data the emissions from structure fires were calculated per county in NYS.

Emissions are included in the Appendix E tables. No point source adjustments are required for this area source category.

***MSW Landfills***

Estimating emissions from MSW Landfills were based on actual MSW Landfill data compiled from the NYSDEC Division of Solid And Hazardous Materials for the years 1988 through 1999. Utilizing the landfill data and the appropriate default values from Section 2.4, Pages 2.4-3 and 2.4-4 of USEPA's AP-42 for C(Non-Methane Organic Compounds(NMOCs)), Lo (Methane generation potential), and k (Methane generation rate constant, yr^-1) the emissions for NMOCs and the associated Hazardous Air Pollutants (HAPs) were calculated using EPA's Landfill Air Emissions Estimation Model (LAEEM). It was assumed that the landfill data was for Co-Disposal, therefore the C(NMOC) value of 2,420 ppmv as Hexane was entered into the LAEEM. Since NYS receives 25 inches or more of rain per year the default value 0.04/yr was used for k and entered into the LAEEM.

Currently speciated point source emissions have been subtracted from the landfill area source emissions by county, and are included in the Appendix E tables. Appendix E and this report will be amended to reflect any point source adjustment modification.

***Architectural Coatings***

For areas outside of the New York City Metropolitan Area (NYCMA), an emission factor of 2.4 lbs VOC/capita/yr was used. For the NYCMA, an emission factor of 1.6 lbs VOC/capita/yr was used along with 9.3% Control Efficiency, 100% Rule Penetration and 100% Rule Effectiveness. All activity is assumed to occur 7 days per week, 52 weeks per year, and is higher in the summer than in the winter (EPA default seasonal adjustment factor: 1.3).

Emissions are included in the Appendix E tables. A point source adjustment is not required for this area source category.

A new EIIP methodology is in the works but not ready yet; therefore the previous one based on population and emission factors was used. Since more stringent regulations exist for the New York City Metropolitan Area, (NYCMA), a lower emission factor was used for these counties.

***Autobody Refinishing***

Population and an emission factor of 2.3 lbs VOC per capita was used along with a 17.6% Control Efficiency, 50% Rule Penetration and 80% Rule Effectiveness. Activity is assumed to occur 5 days/week, 52 weeks/yr (uniform).

No point source adjustments were applicable. Emissions are included in Appendix E tables.

***Dry Cleaning***

Actual facility data was used. Point source emissions have been subtracted from Area Source emissions by county for SIC 7216. Emissions are included in Appendix E tables.

***Ethylene Oxide Sterilizers***

Real data about the size, (or number of beds), and number of hospitals per size was provided by the New York Department of Health, (DOH). Ethylene Oxide Emission Factors: 1.05 kg/yr/bed for large hospitals > 500 beds; 0.63 kg/yr/bed for medium hospitals of 200 - 500 beds; and 0.82 kg/yr/bed for small hospitals less than 200 beds. Activity is assumed to occur 7 days/week, 52 weeks/yr, and uniform throughout the year.

Point source emissions were subtracted from area source emissions per county to avoid double-counting. Emissions are included in Appendix E tables.

***Graphic Arts***

For areas outside of the New York City Metropolitan Area (NYCMA), an emission factor of 1.3 lbs VOC/capita/yr was used. For the NYCMA, an emission factor of 1.3 lbs VOC/capita/yr was used along with 75% Control Efficiency, 100% Rule Penetration and 80% Rule Effectiveness. All activity is assumed to occur uniformly 5 days per week, 52 weeks per year.

A point source adjustment is required for this area source category, but has not been performed.

***Human Cremation***

Resident deaths data was provided by the New York State Department of Health, and Cremations as percentage of deaths (22%) was provided by Cremation Association of North America. Each body is assumed to weigh 150 pounds. Emission factors (lb/ton) used were 0.0004 for Arsenic, 0.000148 for Cadmium, 0.000399 for Chromium, 0.0439 for Mercury and 0.000509 for Nickel.

Emissions are included in the Appendix E tables. No point source adjustments are required for this area source category.

***Traffic Markings***

For areas outside of the New York City Metropolitan Area (NYCMA), an emission factor of 0.5 lbs VOC/capita/yr was used. For the NYCMA, an emission factor of 0.5 lbs VOC/capita/yr was used along with 33% Control Efficiency, 100% Rule Penetration and 80% Rule Effectiveness. All activity is assumed to occur uniformly 5 days per week, 52 weeks per year.

Emissions are included in the Appendix E tables. No point source adjustments are required for this area source category

***Commercial Bakeries***

An emission factor of 0.35 lb VOC/capita/year was used, based on a per capita consumption of 70 pounds per person and emissions for the sponge-dough method of 5 lbs VOC per 1,000 pounds baked. Activity is assumed to occur 5 days per week, 52 weeks per year.

A point source adjustment is required for this area source category, but has not been performed.

***Gasoline Marketing (Stage I and II)***

The calculation methodology followed for estimating area source emissions for this category was taken from the Emission Inventory Improvement Program (EIIP) *Volume 3 Chapter 11, Gasoline Marketing (Stage I and II), April 2001*. This methodology involves employing an emission factor relating emissions to the volume of gasoline distributed.

There are four sources of information that contain emission factors regarding gasoline service operations. They are:

i) AP-42, Chapter 5, Section 2,
ii) EIIP, Volume III, Chapter 11,
iii) FIRE 6.22,
iv) other technical documents.

These sources offer factors which are applied to gasoline consumption rates for each county in order to estimate emissions of toxic substances from tank filling, tank breathing, tank emptying, and vehicle fueling operations. Tank filling operations are further broken out to include splash

filling, submerged filling w/o controls, and balanced submerged filling. Due to the lack of information concerning gas filling distribution in New York State, it is assumed that gasoline consumption is evenly distributed among these three filling operations.

Emission factors for toluene (submerged filling and balanced submerged filling operations) and xylenes (each of the filling operations) are expressed in units of mg/L, while factors for each of the other contaminants are given in units of lb/1000 gal. Emission factors with units of mg/L were converted to lb/1000 gal. to achieve a consistent format among factors. The units for each of the toxic contaminants also varied from gallons of gas transferred, stored, pumped, and processed. In order to apply each factor to gasoline usage, it is assumed that all units can be equated simply to lb/1000 gal.

VOC emissions for tank breathing, tank emptying, and vehicle fueling operations were speciated according to USEPA, Technical Guidance – Stage II Vapour Recovery Systems for Control of Vehicle Refueling Emissions at Gasoline Dispensing Facilities, Volume I, EPA-450/3-91-022a, November 1991. Toxic emission estimates are provided for each county according to appropriate area source code (ASC).

Emissions are included in the Appendix E tables. No point source adjustment is required.

***Marine Vessel Loading, Ballasting, and Transit Emission Calculations***

The calculation methodology followed for estimating area source emissions for this category was taken from the Emission Inventory Improvement Program (EIIP) *Volume 3 Chapter 12, Marine Vessel Loading, Ballasting, and Transit, May 1998* document.

The *Waterborne Commerce of the United States* publication was used to obtain data on the movements of commodities and vessels at individual ports and harbors on individual waterways and canals of New York for the 1999 calendar year. Upon following EIIP guidance, a table identifying New York State waterways, petroleum products by fuel type, emission points, and traffic classifications was created. These values were then summed and converted to appropriate units for application of EIIP emission factors for each classification. According to 6 NYSCRR Part 229.3(f) facilities loading more than 15,000 gallons/day must operate a vapor control system which reduces total VOC emissions by 90% by wt. This control was applied to the Vessel Loading classification. The *Waterborne Commerce of the United States* publication indicates that zero values presented in the tables represent less than 500 tons but more than 0. New York's estimation replaces each zero found in the table with 0.25 or 250 tons (the average of 0-500). Upon calculating the total VOC value for each waterway, the emissions were distributed to the appropriate counties within the state according to the allocation breakdown identified in the 1990 stationary area sources report prepared by RADIAN Corp (revised July 1993). Once total VOC emission were distributed, they were speciated according to EPA AP-42 Chapter 5: *Petroleum Refining* speciation profiles in order to calculate the amount of relevant toxic substances contained in each. The ASC (SCC) used to classify total fuels was 2505020000 (marine vessel total: all products), as taken from FIRE 6.22. A further breakdown for each fuel type is possible, but is a much more in depth procedure and requires a tedious summation of each fuel from each

waterway for each of the affected counties. This further breakdown creates room for error and doesn't appear to enhance these area source emission estimates.

Emissions are included in the Appendix E tables. No point source emissions adjustments have been made, but may be necessary. Appendix E and this report will be amended if necessary.

***Solvent Cleaning 1999***

EIIP Alternative Method

Emission factors:

EIIP Table 6.5-2 provides per capita and per employee emission factors, as reproduced below. Per capita figures were obtained from the U.S. Census Bureau website (county population estimates).

Per capita emission factors from Table 6.5-2 are used for calculating total solvent cleaning emissions at the county level. The document, *Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone: Volume I: General Guidance for Stationary Sources* (EPA, 1991), states "Using per capita factors assumes that emissions in a given area can be reasonably associated with population. This assumption is valid over broad areas for certain activities such as dry cleaning, architectural surface coating, small degreasing operations and solvent evaporation from household and commercial products".

**Table E-1 Per Capita and Per Employee Solvent Cleaning Emission Factors (EPA, 1991)**

| Subcategory | SIC Codes | Per Capita Factor (lb/yr/person) | | Per Employee Factor (lb/yr/person) | |
|---|---|---|---|---|---|
| | | VOCs | Organics | VOCs | Organics |
| Solvent cleaning (total) | 25, 33-39, 417, 423, 551, 552, 554-556, 753 | 4.3 | 7.2 | 87 | 144 |
| Cold Cleaning | | | | | |
| Automobile Repair | 417, 423, 551, 552, 554-556, 753 | 2.5 | 2.5 | 270 | 270 |
| Manufacturing | 25, 33-39 | 1.1 | 1.1 | 24 | 24 |
| Vapor and In-Line Cleaning | | | | | |
| Electronics and Electrical | 36 | 0.21 | 1.1 | 29 | 150 |
| Other | 25, 33-39, 417, 423, 551, 552, 554-556, 753 | 0.49 | 25 | 9.8 | 49 |

VOC emissions are equated to Total Organic Compounds (TOC) based on the ratio of emissions factors (7.2/4.3) in order for the speciation profile to be applied. TOCs are speciated according to the RAPIDS Generic Speciation Factor table below.

| | |
|---|---|
| benzene | 0.01 lb/lb TOG |
| cumene | 0.0003 lb/lb TOG |
| hexane | 0.004 lb/lb TOG |
| methyl ethyl ketone | 0.011 lb/lb TOG |
| methyl chloride | 0.041 lb/lb TOG |
| napthalene | 0.0003 lb/lb TOG |
| perchloroethylene | 0.074 lb/lb TOG |
| 1,1,1 trichloroethylene | 0.2229 lb/lb TOG |
| toluene | 0.0829 lb/lb TOG |
| trichloroethylene | 0.2109 lb/lb TOG |
| xylene, m | 0.0023 lb/lb TOG |
| xylene, o | 0.0017 lb/lb TOG |
| xylene, p | 0.0023 lb/lb TOG |
| xylenes iso | 0.034 lb/lb TOG |

***Industrial Surface Coatings 1999***

EIIP Alternative Method

Emission factors:

Throughput for per employee emission factors was provided by the New York State Department of Labor, Division of Research and Statistics. 1999 county employee estimates for each SIC are were used to estimate VOC and Organic emissions. Emission Factors: Emission Inventory Improvement Program (EIIP), Industrial Surface Coating, Table 8.5-1, Page 8.5-2, Volume III, Chapter 8. The calculation incorporates control efficiencies according to 6NYCRR Part 228.2.b.13, 80% rule effectiveness, and appropriate rule penetration rates for the New York Metropolitan Area (NYMA) and Upstate New York.

**Table E-2: Per Employee VOC Emission Factors**

| Category: | | Per Employee VOC Emission Factor (lb/yr) |
|---|---|---|
| 240102 | Furniture And Fixtures | 944 |
| 240104 | Metal Containers | 6,029 |
| 2401070000 | Automobiles (NEW) | 794 |
| 2401055000 | Machinery And Equipment | 77 |
| 2401060000 | Appliances | 463 |
| 240107 | Other Transportation Equipment | 35 |
| 2401045000 | Sheet, Strip And Coil | 2,877 |
| 2401015000 | Factory Finished Wood | 131 |
| 2401065000 | Electrical Insulation | 290 |
| 2401080000 | Marine Coatings | 308 |

Emissions from this area source category are not included in the Appendix E tables because they are not speciated. Unspeciated VOC emissions by county totaling 38,087,111 lbs have been provided to the GLC in Microsoft Access format.

## ***Consumer and Commercial Solvents***

Overview

All quotes and information contained within are from the source, Emission Inventory Improvement Program, Volume 3, Chapter 5, *Consumer and Commercial Solvent Use*. The consumer and commercial solvent source category includes a wide array of products including personal care products, household cleaning products and household pesticides. However, all VOC emitting products used by businesses, institutions and numerous industrial manufacturing operations are also included. Products included in this category are shown in Table 1. The majority of VOC's introduced into the atmosphere from this category is a result of evaporation of the solvent contained in the product or from the propellant. There are two methods for estimating emissions for consumer and commercial solvent use recommended by the Emissions Inventory Improvement Program (EIIP). The choice as to which one is employed depends on the desired level of accuracy as well as available data and resources.

ASC: 2465000000

Methodology

The two methodologies for estimating emissions of VOC's and HAP's from this source category are outlined below.

**VOC's**

- Use of national average per capita emission factors adjusted for state or local emission limits.
- Surveying consumer and commercial product use or sales in the inventory area.

The former population based method is preferred for emissions estimating. Surveying may be more accurate but will be quite expensive if done correctly. The procedure for the preferred method is outlined below:

- Identify applicable state and local regulations;
- Create a database or spreadsheet with per capita emission factors for the source categories of interest;
- Obtain population data for the base year of interest and allocate it to geographic areas as needed;
- Multiply per capita emission factors by population to obtain overall emissions estimates;
- Adjust estimated emissions for applicable regulations as needed.

Example:
To estimate VOC emissions from personal care products:

Emissions = Population x Per Capita Emission Factor E-10E-10

Given a population of 1 million persons for a particular area, the VOC emissions from personal care products would be:

1,000,000 persons x 2.32 lbs VOC's/person/year = 2,320,000 lb VOC/year
= 1,160 tons VOC/year

**HAP's**

- Use of national average per capita emission factors adjusted for state or local emission limits.
- Identify speciation profiles and apply them to the VOC emissions estimate developed using the alternative method.

The population based method is again the preferred method with adjustments made for state and local regulations on this industry.

An alternative procedure for estimating VOC and HAP emissions would include:

- Perform a survey of distributors and retailers or consumers of consumer and commercial products in the inventory region;
- Obtain data on the amounts of products sold or used in the inventory region;
- Estimate the total amount of VOC's (or HAP's) emitted in the inventory region from consumer and commercial products.

<u>Data Needed</u>

Data needs for estimating the emissions of VOC's and HAP's from this source category are as follows:

Population-based method:

- Population in the inventory area.

- National average per capita emission factors.
- Information on state and local regulations.

Survey method:

- Product type.
- Product amount distributed or used by type (weight or volume).
- Product density.

Emission Factors

**Table E-3: Consumer and Commercial Solvent Product Categories and Emission Factors**

| Per Capita Emission Factor (lb VOC/Person) | Product Category |
|---|---|
| 2.32 | Personal Care Products |
| 0.79 | Household Products |
| 1.36 | Automotive Aftermarket Products |
| 0.57 | Adhesives and Sealants |
| 1.78 | FIFRA-Regulated Products |
| 0.95 | Coatings and Related Products |
| 0.07 | Miscellaneous Products |
| 7.84 | Total for All Consumer and Commercial Products |

Speciation

ASC: 2465000000
Profile code: 0197 - didn't use speciation factors associated with this profile code but, those provided by EIIP below

**Table E-4: Per Capita Consumer and Commercial Solvent HAP (GLC) Emission Factors (lb/yr/person)**

| Chemical name | Per Capita Emission Factor (lb /Person) | CAS code |
|---|---|---|
| Benzene | 4.72e-06 | 000071-43-2 |
| Carbon tetrachloride | 4.10e-10 | 000056-23-5 |
| Chloroform | 9.91e-04 | 000067-66-3 |
| Dibenzofuran | 8.07e-06 | |
| Ethylene dichloride | 4.65e-06 | 000107-06-2 |
| Ethyl benzene | 2.07e-03 | 000100-41-4 |
| Ethylene oxide | 1.51e-02 | 000075-21-8 |
| Formaldehyde | 1.26e-03 | 000050-00-0 |
| Glycol ethers | 4.04e-02 | 000075-09-2 |
| Methylene Chloride | 3.64e-02 | |
| Naphthalene | 4.61e-02 | 000091-20-3 |
| Perchloroethylene | 2.82e-02 | 000127-18-4 |
| Toluene | 4.29e-01 | 000108-88-3 |
| 1,1,1-Trichloroethane | 3.87e-01 | 000071-55-6 |
| Trichloroethylene | 4.86e-04 | 000079-01-6 |
| Xylenes, m,o, & p | 2.03e-01 | 001330-20-7 |

**Table E-5: Per Capita Consumer and Commercial Solvent HAP Emission Factors by Category (lb/yr/person)**

| Pollutant | Personal Care Products | Household Products | Automotive Aftermarket Products | Adhesives & Sealants | FIFRA-Regulated Products[b] | Coatings & Related Products | Misc. | Overall Emission Factor (lb HAP/yr/person) |
|---|---|---|---|---|---|---|---|---|
| Acetamide | | 1.38E-07 | | | | | | 1.38E-07 |
| Acetophenone | | | | | | 8.53E-06 | | 8.53E-06 |
| Acrylic acid | | | | 3.94E-09 | | | | 3.94E-09 |
| Benzene | | | 4.72E-06 | | | | | 4.72E-06 |
| Carbon tetrachloride | | | | | | 4.10E-10 | | 4.10E-10 |
| Chlorobenzene | | | | | 7.16E-02 | 1.51E-05 | | 7.16E-02 |
| Chloroform | | | 3.60E-05 | | | 9.55E-04 | | 9.91E-04 |
| Dibenzofurans | | | | 8.07E-06 | | | | 8.07E-06 |
| 1,4-Dichlorobenzene | | 4.79E-02 | | | 3.52E-02 | | | 8.31E-02 |
| 1,2-Dichloroethane | 4.62E-06 | 3.52E-08 | | | | | | 4.65E-06 |
| 1,3-Dichloropropene | | | | | 1.60E-01 | | | 1.60E-01 |
| Dimethyl formamide | 2.71E-05 | | 2.78E-08 | 2.29E-07 | | | 7.43E-06 | 3.49E-05 |
| 1,4-Dioxane | | | | 1.09E-05 | | | | 1.09E-05 |
| Ethyl benzene | | 2.56E-06 | 7.51E-05 | 1.36E-05 | 1.30E-03 | 6.86E-04 | | 2.07E-03 |
| Ethylene oxide | | | | | 1.51E-02 | | | 1.51E-02 |
| Formaldehyde | | 6.74E-06 | | 2.51E-05 | 3.81E-04 | 8.55E-04 | | 1.26E-03 |
| Glycol ethers | 1.52E-05 | 5.31E-03 | 2.69E-02 | 1.28E-04 | 5.65E-03 | 2.24E-03 | 2.42E-04 | 4.04E-02 |
| Hexane | | 2.09E-03 | 3.53E-03 | 7.83E-02 | | 2.39E-03 | | 8.63E-02 |
| Hydrochloric acid | | 1.75E-06 | | | | | | 1.75E-06 |
| Hydrogen fluoride | | 8.75E-08 | 1.41E-05 | | | | | 1.41E-05 |
| Isophorone | | | | | 9.47E-04 | | | 9.47E-04 |
| Methanol | 5.67E-07 | 6.66E-04 | 6.61E-01 | 6.82E-04 | 9.48E-04 | 1.60E-02 | 1.84E-02 | 6.97E-01 |
| Methyl bromide | | | | | 2.22E-01 | | | 2.22E-01 |
| Methyl ethyl ketone | 1.75E-05 | 4.49E-04 | 3.04E-03 | 3.91E-02 | 2.01E-05 | 7.94E-03 | 1.01E-05 | 5.06E-02 |
| Methyl isobutyl ketone | | 1.08E-04 | 8.73E-04 | 1.24E-03 | 9.01E-05 | 5.26E-03 | | 7.57E-03 |
| Methyl-tert-butyl ether | | | 2.36E-05 | | | | | 2.36E-05 |
| Methylene chloride | | 2.39E-03 | 4.83E-03 | 8.78E-03 | 6.81E-04 | 1.97E-02 | 2.38E-05 | 3.64E-02 |
| Naphthalene | | 5.52E-07 | 2.26E-06 | 1.07E-04 | 4.60E-02 | 5.75E-06 | | 4.61E-02 |
| 2-Nitropropane | | | | 2.12E-06 | | | | 2.12E-06 |
| Perchloroethylene | | 2.96E-03 | 2.35E-02 | 6.75E-04 | 1.92E-04 | 1.48E-04 | 7.53E-04 | 2.82E-02 |
| Toluene | 3.41E-03 | 5.82E-04 | 2.49E-02 | 8.43E-02 | | 3.16E-01 | 2.46E-06 | 4.29E-01 |
| 1,1,1-Trichloroethane | 7.45E-04 | 2.85E-02 | 7.63E-02 | 2.14E-01 | 5.99E-02 | 7.69E-03 | 2.46E-04 | 3.87E-01 |
| Trichloroethylene | | 4.34E-05 | 2.67E-04 | 3.88E-05 | | 1.37E-04 | | 4.86E-04 |
| Triethylamine | | | | | 3.13E-04 | 5.26E-04 | | 8.39E-04 |
| Vinyl acetate | | | | 4.94E-08 | | | | 4.94E-08 |
| Xylenes | | 3.28E-03 | 1.20E-02 | 9.76E-03 | 1.37E-01 | 4.05E-02 | 4.31E-04 | 2.03E-01 |
| | 0.0042201 | 0.0942901 | 0.837295808 | 0.437170872 | 0.757322 | 0.42105638 | 0.02012 | 2.57007653175 |

When estimating emissions using emission factors, each state and province will need to use the latest published emission factors available. It is important that point source estimates are subtracted out from the area source estimates. Additional work may need to be performed, as demonstrated below, in order to account for regulations and controls on the industry.

Adjusting for regulations and control of VOC and HAP's

| | | |
|---|---|---|
| $EF_A$ | = | emission factor for pollutant A |
| Q | = | activity factor for category |
| CE | = | control efficiency/100 |
| RP | = | rule penetration/100 |
| RE | = | rule effectiveness/100 |
| $UAE_A$ | = | uncontrolled area source emissions of pollutant A |
| $CAE_A$ | = | controlled area source emissions of pollutant A |

Adjustments to preferred method using emissions factors and activity data

Adjustments to survey method

Example:

New York has a regulation in place affecting various product subcategories of the categories listed in Table 3. Hair spray, antiperspirants, deodorants, and all purpose cleaners had limits on the % VOC by weight of the products in these subcategories pursuant to 6NYCRR Part 235. The products regulated make up only parts of several categories listed in Table 3. Therefore, when estimating emissions, CE and RP need to be calculated per affected category (see Table 3) as follows:

RP = per capita emissions of regulated portion of category/per capita emissions of all products in category)*100

RE = 80% EPA default based on good engineering judgement (RE of 100 for federal regulation)

CE = (Uncontrolled VOC content - controlled VOC content)/uncontrolled VOC *100

Calculate speciated contaminant and VOC emission estimates with CE, RE, & RP calculated for the relevant category using the formula for the preferred method above.

Refer to Appendix A of the Emission Inventory Improvement Program, Volume 3, Chapter 5, *Consumer and Commercial Solvent Use* for additional information on product types per category and associated per capita emissions estimates.

Spatial and temporal resolution

Emissions would most appropriately be represented by county except where attainment designations require a further breakdown. Consumer and commercial product use is not influenced by season. While some exceptions can be noted as with pesticide use and with products like windshield washer (which typically has a higher VOC content in colder climates and seasons), there is no significant difference in the use between seasons. Daily resolution of product use is 7 days per week.

Emissions from this area source category are included in the Appendix E tables. No point source emissions adjustment is required because New York State does not require these emissions to be reported on emission statements.

***POTW's***

The POTW inventory methodology was not available at time of publication. Emissions from this area source category are included in the Appendix E tables. A point source adjustment is required for this area source category, but has not been performed.

***Chromium Electroplating***

Chrome Electroplating emissions were calculated from real data, facility by facility. Chromium compounds emissions were converted to Chromium emissions.
Emissions from this area source category are included in the Appendix E tables. A point source emissions adjustment is required and has been performed.

***Mercury***

Population (1999 population data per County received from NYS Empire State Development on 04/24/2001) and an emissions factor of 2.5473 * 10^-5 lbs Mercury per capita. The emission factor was calculated based on EPA's Mercury Study Report to Congress / Volume II: An Inventory of Anthropogenic Mercury Emissions in the United States (EPA-452/R-97-004), Pages E-1 and E-2, Table E-1. [Emission Factor calculation: (0.55 grams mercury per person per year )*( 0.002204623 lbs/grams) = 0.001213 lbs mercury per person per year * 0.021 (Page E-2, Table E-1 of the above mentioned EPA Document) = 2.5473 *10^-5 lbs mercury per person per year]

Emissions are included in the Appendix E tables. No point source adjustment is required for this area source area source category.

# INFORMATION

For more information about New York's emissions inventory, please contact:

Mr. Robert Bielawa
New York State
Department of Environmental Conservation
Bureau of Air Quality Planning
Division of Air Resources
625 Broadway
Albany, NY  12233-3251

(P) 518-402-8396
(F) 518-402-9035
(E) bxbielaw@gw.dec.state.ny.us

# E-6: New York - Statewide Emissions (lb/yr)

| Pollutant | Point Sources | Area Sources | Total |
|---|---|---|---|
| ACENAPTHENE | 2604.16 | 0 | 2604.16 |
| ACENAPTHTHYL | 0 | 0 | 0 |
| ACETALDEHYDE | 75151.155 | 26305.389 | 101456.544 |
| ACROLEIN | 19719.4808 | 245220.9197 | 264940.4005 |
| ACRYLAMIDE | 0 | 0 | 0 |
| ACRYLONITRIL | 10084.894 | 21955.4099 | 32040.3039 |
| ANTHRACENE | 554.01 | 0 | 554.01 |
| ANTIMONY | 29897.792 | 0 | 29897.792 |
| ARSENIC | 19214.5162 | 0 | 19214.5162 |
| ATRIZINE | 0 | 120278.0078 | 120278.0078 |
| BENZ (A) ANTHR | 80 | 399.12698 | 479.12698 |
| BENZ (GHI) PE | 0 | 0 | 0 |
| BENZENE | 305041.189 | 3840934.855 | 4145976.044 |
| BENZO (A) PYRE | 30.6099 | 94.93689 | 125.54679 |
| BENZO (B) FLUO | 8.76 | 0 | 8.76 |
| BENZO (K) FLUO | 0 | 0 | 0 |
| BERYLLIUM | 20.7007 | 0 | 20.7007 |
| BUTADIENE,13 | 28492.6654 | 7603027.804 | 7631520.469 |
| CADMIUM | 6015.459 | 0 | 6015.459 |
| CARBON TETRA | 15167.9849 | 12459.578 | 27627.5629 |
| CHLOROFORM | 11157.3169 | 70805.409 | 81962.7259 |
| CHROMIUM | 19067.1257 | 0 | 19067.1257 |
| CHROMIUM VI | 0 | 7779.918 | 7779.918 |
| CHRYSENE | 17.5 | 399.1349 | 416.6349 |
| COBALT | 41356.345 | 0 | 41356.345 |
| COKE OVEN GAS | 0 | 0 | 0 |
| COPPER | 36058.989 | 0 | 36058.989 |
| DIBENZAHAN | 9 | 0 | 9 |
| BIBROMOET,12 | 411.1007 | 484.3617 | 895.4624 |
| DIBUTYL PHTH | 27949.4458 | 1450014.416 | 1477963.861 |
| DICHLOROETH12 | 20138.262 | 7562.27589 | 27700.53789 |
| DIEYLHEX PHT | 3928.29 | 0 | 3928.29 |
| ETHYLBENZENE | 144914.134 | 2000421.541 | 2145335.675 |
| ETHYLENE OXI | 5517.238 | 391867.6279 | 397384.8659 |
| FLUORANTHENE | 1473.47 | 433.25589 | 1906.72589 |
| FLUORENE | 0 | 0 | 0 |
| FORMALDEHYDE | 998719.363 | 223553.5269 | 1222272.89 |
| GLYCOL ETHRS | 132 | 0 | 132 |
| HEXCLBENZENE | 0 | 0 | 0 |
| INDN(123CDPY | 0 | 0.06 | 0.06 |
| LEAD | 62330.561 | 10.291763 | 62340.85276 |
| MANGANESE | 14788.724 | 196.3604 | 14985.0844 |
| MERCURY | 2144.879 | 465.86638 | 2610.74538 |
| METHENE(B)4- | 62693.6911 | 0 | 62693.6911 |
| METHYLENE CL | 1614878.78 | 6697310.366 | 8312189.146 |
| NAPHTHALENE | 27124.48159 | 2846096.348 | 2873220.83 |
| NICKEL | 40612.5098 | 0 | 40612.5098 |
| PCDD | 0 | 0 | 0 |
| PCDF | 0 | 0 | 0 |
| PERC | 123175.627 | 14999809 | 15122984.63 |
| PHENANTHRENE | 2892.91 | 0 | 2892.91 |
| PHENOL | 178750.731 | 0 | 178750.731 |
| PHOSGENE | 456.11 | 0 | 456.11 |
| PYRENE | 2146 | 0 | 2146 |
| STYRENE | 140405.43 | 223341.117 | 363746.547 |
| TCDD,2378 | 13.0988 | 0 | 13.0988 |
| TCDF,2378 | 0 | 0 | 0 |
| TCE,111 | 31599.437 | 34600367.99 | 34631967.43 |
| TOLUENE | 2944453.47 | 32101180.03 | 35045633.5 |
| TOLUENE24DII | 357.76 | 4410.8738 | 4768.6338 |
| TRICHLORETHY | 335139.14 | 26320094.06 | 26655233.2 |
| TRIFLURALIN | 184.9 | 12756.328 | 12941.228 |
| VINYL CHLOR | 16945.355 | 250342.088 | 267287.443 |
| XYLENES ISO | 794149.404 | 23504702.39 | 24298851.8 |