Appendix D: Minnesota Toxic Emissions Inventory

INTRODUCTION

The development of the Minnesota portion of the regional air toxics emission inventory follows the instructions illustrated in the protocol document and uses the Regional Air Pollution Inventory Development System (RAPIDS) to estimate emissions. However, because Minnesota does not have air toxic emission inventory reporting requirements for all industrial point sources, we have established an alternative approach for development of the Minnesota inventory that meets the protocol requirements. Using this approach, 1246 point sources were estimated to have emissions for one or more pollutants listed in the 2002 Great Lakes regional air toxics emission inventory. Also, various area sources were examined and emissions were estimated for 33 area source categories. Presented in the following sections is a detailed discussion on data acquisition, emission estimation, quality assurance and quality control plans, and uncertainties inherent in the inventory.

METHODOLOGY

Data Acquisition

The 2002 Minnesota portion of the air toxic emission inventory includes three principal source categories: point, area, and mobile sources.

Point Source Emissions

Minnesota does not have air toxic emission inventory reporting requirements for all industrial point sources. However, emission data for point sources are collected for the Minnesota criteria pollutant emission inventory (MCEI). Therefore, for the purpose of the Minnesota air toxics emission inventory, point sources are identified as facilities that are required to submit their annual inventories of criteria pollutants (carbon monoxide, nitrogen oxides, particulate matter, particulate matter smaller than 10 microns, lead, sulfur dioxide, and volatile organic compounds) to the Minnesota Pollution Control Agency (MPCA). According to this definition, there were a total of 2243 point sources in Minnesota in calendar year 2002.

Point sources were also extended to include 45 facilities that reported to TRI but not to the MCEI and 5 facilities from the 2002 tribal inventories.

To estimate emissions of air toxic pollutants from Minnesota point sources, computer software, MIRROR, was developed to convert the MCEI data into the RAPIDS computing environment.

Area Source Emissions

Area sources are stationary sources that are not required to submit criteria pollutant data to the MPCA. The categories of area sources have been determined by the Great Lakes States after reviewing the *Documentation For The Draft 2002 Nonpoint Source National Emission Inventory For Criteria And Hazardous Air Pollutants (March 2005 Version),* Emission Inventory Improvement Program (EIIP) documents and other available information.[1,2] The emission data for area sources were obtained from surveys, literature, and the submittals for the National Emission Standards for Hazardous Air Pollutants. There are 33 categories and 81 sub-categories of area sources included in Minnesota portion of the regional emission inventory. Table D-1 lists all these categories along with activity data and information sources.

Mobile Source Emissions
There are five subcategories of Mobile Source Emissions: on-road sources, non-road sources, aircraft, commercial marine vessels, and locomotives. The MPCA used air toxics emissions estimations in the Draft 2002 National Emissions Inventory (NEI) for non-road sources other than ground support equipment, recreational marine equipment, and snowmobiles.[3] MPCA used state-specific data to spatially allocate recreational marine and snowmobile emissions, and used state-specific weather data to estimate snowmobile emissions. MPCA used state-specific data to calculate emissions estimates for on-road sources, aircraft, ground support equipment, and locomotives. Emissions estimates for commercial marine vessels produced for CENRAP using state-specific data were used in place of U.S. EPA commercial marine vessel emissions estimates.

EMISSION ESTIMATION

Point Sources

RAPIDS was used to compile Minnesota's air toxics inventory for point sources. The approach was to first separately identify each device/process at each facility, and then estimate emissions for each device/process. The following describes the available emission estimation methods and their prioritization for use in the emission inventory.

Direct reporting values

Because Minnesota does not have a rule to require all point sources to report air toxics emissions, in April 2003, MPCA sent a letter to 505 facilities with regular permits. This letter was also posted on the MPCA web site along with reporting guidance. About 57% of facilities (288) responded, including refineries and other manufacturing facilities.

Also, in April 2003, a separate letter was sent to 256 facilities holding Option D air quality permits with actual VOC emissions of more than 5 tons in 2001. These facilities use paints and primers, cleaning solvents, printing solutions, and paint thinners, and are required to track monthly HAP emissions. Thirty five of these facilities had reduced their VOC emissions below 5 tons for 2002, relieving the HAP tracking requirement. Letters were also sent to 32 fiberglass fabrication facilities and 19 foundries. 269 complete responses were received (about 99% responded). The reported information was examined and appropriate emissions were used.

In addition, lead (Pb) emissions were provided by facilities for the criteria pollutant inventory. These values were adapted to the air toxics emission inventory in order to maintain the consistency in these two MPCA inventories.

Emission factors

An emission factor is defined as "a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant."[5] Emission factors can be either source-specific or generic. In the current version of RAPIDS, the emission factors from the EPA Factor Information Retrieval (FIRE) Data System, version 6.24 was used as generic emission factors.[6] In most cases, these emission factors are derived from actual measurements of the emissions from representative sources/processes, and are assumed to be the long-term averages for all facilities in the source category. The source-specific emission factors are derived from source-specific emission testing, mass balance, or chemical analysis. Therefore, they are preferred for estimating emissions from a source.

The MPCA has focused on developing source-specific emission factors. Some source-specific emission factors were developed based on the information in facility permit applications and stack testing reports. Metal Mining/Iron Ores Process and Electric Services/Coal Burning facilities were selected for this special effort. A detailed discussion on the development of emission factors and the emission inventory for these two industrial sectors was presented in two papers.[7,8]

Since FIRE does not contain emission factors for all processes, generic emission factors from similar processes were used as state-specific emission factors for processes that didn't have generic emission factors. In processes, where only controlled emission factors were available, controlled emission factors were adopted as state-specific uncontrolled emission factors.

TRI data

The TRI is compiled by the Minnesota Department of Public Safety for manufacturing point sources with certain reporting thresholds. The emission data are facility-based and of unknown accuracy. For many facilities reporting to the TRI, the emission estimates appear to be incomplete in terms of the number of pollutants included. However, when the source-specific or generic emission factors were not available, TRI emissions were used for some facilities. For the MN inventory, we incorporated TRI emissions for 56 facilities.

Area Sources

Source-specific emission factors and speciation profiles were developed for each area source category. Then, the county-level activity data were imported to RAPIDS and emission estimates were calculated by using the emission factor method and speciation method. In the speciation method, emissions of particulate matter (PM) or total organic gases (TOG) were speciated to individual air toxic compounds using speciation profiles.

Activity Data Pre-Treatment

There are different levels of source activity data available for different categories of area sources. Source activities are any parameters associated with the source that are surrogates for emissions, for example, fuel throughput, solvent usage, or population. Some source categories, such as Dry Cleaning, Chromium Electroplating, Halogenated Solvent Cleaners, need to comply with NESHAPs and the source-level or process-level activity data are available from the initial notification forms. In this case, spreadsheets were used to aggregate emission data for all similar or identical device/processes within each county. For example, for dry cleaners, county total tetrachloroethylene consumption values were calculated for all dry-to-dry machines with control, all dry-to-dry machines without control, all transfer machines with control, and all transfer machines without control, using tetrachloroethylene consumption data from each individual dry cleaner within the county.

However, for some area sources direct activity data are not available at the county level. In these cases, statewide activity data were apportioned to each county based on appropriate activity indicators. For example, fuel consumption data for Residential Fuel Combustion were calculated from the state fuel consumption by using population data. If state-level activity data were not available, appropriate surrogate activity data were used. For example, county-based population data were used as the most appropriate or applicable activity data for commercial and consumer solvent products and architectural surface coating.

Source-Specific Emission Factors and Speciation Profiles

Since FIRE versions 6.24 and 6.25 and SPECIATE version 3.2 contain few emission factors and speciation profiles for area sources, source-specific emission factors and speciation profiles were developed for the area sources included in the Minnesota portion of the regional emission inventory.[6,9] These emission factors and speciation profiles were compiled from a review of available literature. Given first preference were EPA publications or studies, such as the 2002 NEI documents and Emission Inventory Improvement Program (EIIP) documents.[2,1] If information was not available for a source category, emission factors for similar processes or sources were used as surrogates such as the use of emission factors for commercial/institution combustion to estimate emissions from residential fuel combustion.

The resulting approaches and methodologies have been documented in the emission estimation protocols for Minnesota area sources.[10]

On-Road Sources

Minnesota's 2002 statewide air toxics emissions inventory used the MOBILE6.2 Vehicle Emission Modeling Software.[11]

County air toxics emissions estimates are the sum of the emissions estimates for 26 vehicle types and up to 12 roadway types.

The 26 vehicle types included are:

- Light Duty Gas Vehicles
- Light Duty Gas Trucks 1
- Light Duty Gas Trucks 2
- Light Duty Gas Trucks 3
- Light Duty Gas Trucks 4
- Class 2b Heavy Duty Gas Vehicles
- Class 3 Heavy Duty Gas Vehicles
- Class 4 Heavy Duty Gas Vehicles
- Class 5 Heavy Duty Gas Vehicles
- Class 6 Heavy Duty Gas Vehicles
- Class 7 Heavy Duty Gas Vehicles
- Light Duty Diesel Vehicles
- Light Duty Diesel Trucks 1 And 2
- Class 2b Heavy Duty Diesel Vehicles
- Class 3 Heavy Duty Diesel Vehicles
- Class 4 Heavy Duty Diesel Vehicles
- Class 5 Heavy Duty Diesel Vehicles
- Class 6 Heavy Duty Diesel Vehicles

- Class 7 Heavy Duty Diesel Vehicles
- Class 8a Heavy Duty Diesel Vehicles
- Class 8b Heavy Duty Diesel Vehicles
- Motorcycles
- Gas Buses (School, Transit And Urban)
- Diesel Transit And Urban Buses
- Diesel School Buses
- Light Duty Diesel Trucks 3 And 4

The twelve roadway types included are:

- Rural Interstate
- Rural Local
- Rural Major Collector
- Rural Minor Arterial
- Rural Minor Collector
- Rural Other Principal Arterial
- Urban Collector
- Urban Interstate
- Urban Local
- Urban Minor Arterial
- Urban Other Freeways and expressway
- Urban Other Principal Arterial

Non-Road Sources

Minnesota's 2002 statewide air toxics emissions inventory used the Draft 2002 NEI emissions based on the NONROAD model.[3,13]

County air toxics emissions estimates are the sum of the emissions estimates for 205 equipment types in ten categories. The equipment categories included are:

- Agricultural Equipment
- Commercial Equipment
- Construction and Mining Equipment
- Industrial Equipment
- Lawn and Garden Equipment
- Logging Equipment
- Pleasure Craft
- Railroad Equipment
- Recreational Equipment

Aircraft auxiliary power units, however, were treated differently. Emissions estimates for auxiliary power units were speciated from criteria pollutant estimates generated by the Emissions and Dispersion Modeling System (EDMS) version 4.12[7] produced by the Federal Aviation Administration and commercial aircraft activity data received from the Bureau of Transportation Statistics.[8] The 1999 NEI speciation factors for commercial aircraft[9] were used for auxiliary power units.

Aircraft, Ground Support Equipment, and Auxiliary Power Units

Commercial Aircraft

MPCA used detailed Bureau of Transportation Statistics landing and takeoff (LTO) data and the Emissions and Dispersion Modeling System (EDMS) version 4.12 model data to estimate hydrocarbon emissions.[14,15] Hydrocarbon emissions were converted to VOC and TOG using NEI conversion factors.[16] Air toxics emissions were estimated by speciating VOC or TOG emissions with NEI speciation factors.[16]

Air Taxis and General Aviation

MPCA used two sources of activity data to calculate Air Taxis and General Aviation air toxics emissions estimates. One source of data was the Air Traffic Activity Data System (ATADS).[17] ATADS provides the actual number of aircraft operations for a limited number of airports. Since landing and taking off are both counted as aircraft operations, the number of LTOs is one half of the number of operations. MPCA also used information from the Terminal Area Forecast System (TAF).[18] TAF provides estimates of the number of aircraft operations for a large number of airports. For airports that were included in both ATADS and TAF, the ATADS data was used instead of the TAF activity estimate.

While there is some concern over using the TAF activity estimates, it is reasonable to use the TAF estimates for calculating air toxics emissions estimates for the following reasons:

- TAF is the official aviation activity forecast of the Federal Aviation Administration and is intended to be used by state authorities for planning purposes.
- TAF estimates are very similar to ATADS data for the Minnesota airports that are included in both data sets.
- Contact with airport managers in Minnesota indicated that TAF estimates are usually reasonable.
- Excluding the TAF estimates would underestimate the air taxi and general aviation activity in Minnesota because few airports are included in ATADS.

MPCA converted aircraft operations to LTOs, then applied NEI emission and speciation factors to estimate air toxics emissions for air taxis and general aviation.[19] MPCA estimated lead emissions by estimating the total amount of lead in aviation gasoline used in the state, dividing it by the estimated piston-engine LTOs, and multiplying by the emission fraction from *Locating and Estimating Air Emissions from Sources of Lead and Lead Compounds*.[12]

Commercial Marine Vessels

Commercial marine vessel emissions are divided into *underway* and *in port* emissions. Commercial marine vessel emissions were based on criteria emissions estimates produced by SonomaTech, Inc. for CENRAP.[24]

MPCA used a speciation method in order to calculate emissions some pollutants that were not included in the U.S. EPA's air toxics emissions estimates.

Locomotives

Line haul locomotive air toxics emissions estimation was split into three categories: Class I Railroads, Class II and Class III Railroads, and Passenger railroads. Minnesota used Class I fuel consumption data from CENRAP and contacted Class II, Class III and Passenger Railroads for fuel consumption data. For each railroad category, MPCA distributed diesel fuel to the counties of operation using either a simple average or a weighted average for each railroad.

Weighted averages were used whenever the railroad was able to provide some measure to indicate which counties had greater operations than others. The most common measure provided was the number of miles of track operated by the railroad in each county. This assumes that railroads use more fuel in counties with more track than in counties with less track. Although fuel consumption is determined by many factors, the use of weighted averages based on track length should produce more accurate distribution of air toxics emissions estimates than using simple averages. Emissions estimates were calculated using NEI emission and speciation factors as well as SPECIATE 3.2 factors.[21,9] The mercury emission factor used in calculations was 4.2e-7 lbs per gallon of diesel fuel consumed.[22]

QUALITY ASSURANCE AND QUALITY CONTROL

To develop a reasonable and comprehensive air toxic emission inventory, procedures have been developed to provide quality assurance/quality control (QA/QC) of the data throughout the entire process of emission inventory development. Quality assurance is a planned set of external activities that are conducted by personnel not directly involved in the development of the inventory to evaluate data quality. On the other hand, quality control is a planned set of internal activities conducted by inventory development personnel to ensure data accuracy and completeness.

Quality Control

The QC procedures in the inventory development include technical reviews, accuracy checks, and use of approved standardized procedures for emission calculations. The QC activities have been performed and will be performed in the following three aspects.

Activity Data

For point source, the Minnesota emission inventory data for criteria pollutants were used. Using the MCEI data minimized errors in the activity data because these data are the bases for emission fees. For this reason, facilities pay close attention to the quality of these data.

For area sources, the activity data were compared with other states data. Special attention was paid to point and area source reconciliation to eliminate double counting of emissions. This is because a given category of emissions can be comprised of both point and area sources. For example, some of the halogenated solvent cleaners are point sources and their emissions are included with the point source emissions.

Emission Results

To assess the reasonableness of estimated emission results for point sources, the process-based emissions for each pollutant were examined. The extraordinary emission values were re-calculated. The activity data and emission factors, which led to the extraordinary emissions, were verified. For area sources, the emissions were calculated using the RAPIDS software and spreadsheets. The results from these two approaches were compared and evaluated until a perfect match was reached.

Quality Assurance

The QA plan included the following activities:

- Release of the process-level emission inventories to selected facilities. Requested their voluntary validation of the emission data and estimates. The selected facilities were those having source-specific emission factors such as Metal Mining/Iron Ores Process and Electric Services/Coal Burning facilities. The information and comments in the facility responses were also incorporated into the emission inventory.
- Requested technical review at Great Lakes regional level. Minnesota emission estimates for 2002 were compared with the 2002 estimates from other Great Lakes States and emission estimates in previous years. Extraordinary values, missing pollutants, and extra pollutants were examined. Errors were corrected.
- The HAP emission data were submitted to EPA for the 2002 NEI. Additional corrections and adjustments were made based on feedbacks from EPA during the NEI QA/AC.

RESULTS AND DISCUSSION

The following results represent emissions from all point, area, and mobile sources in State of Minnesota. Emissions were estimated for the 211 target compounds in the Great Lakes regional air toxics emission inventory project. However, data were only available to obtain emissions for 155 out of the 211 air toxics. Point sources emit 148 pollutants, while area sources emit 126 pollutants. Pollutants with emissions from onroad and nonroad mobile sources are 38 and 49, respectively. The summary table (Table D-2) shows the name and the emissions of these 155 pollutants totaled by principal source category.

It was estimated that 1233 out of 2293 point sources emitted one or more pollutants listed in the summary table. We incorporated source-specific emission information from 288 large emitters, 269 facilities with Option D permits, and 152 TRI facilities. Point source emissions are from 270 distinct standard industrial classification (SIC) codes and 351 distinct source classification codes (SCC). Emissions from area sources were calculated for the 33 categories and 81 sub-categories. Toluene was estimated to have the highest emissions at 42,725,992 pounds, while Propoxur emissions are the lowest recorded at 0.000008 pounds.

Uncertainties

Although QA/QC plans were established to ensure optimum results, there are uncertainties in the Minnesota portion of the Great Lakes regional air toxics emission inventory. Some uncertainties are common for all air toxics emission inventories. For example, not all pollutants are included in the inventory and some emission factors are missing or are of poor quality, resulting in unrepresentative emission estimates. These uncertainties are not discussed here. The following discussions focus on three uncertainties specifically for Minnesota.

Source Classification Code Assignment

Since Minnesota does not have air toxic emission inventory reporting requirements, the emission data in MCEI were used for point sources. These emission data, including facility identification, device identification, process identification, and process activities, were submitted by the individual facilities. However, the quality of a key component, source classification codes

(SCC), is in question because these codes have never been reviewed by facilities in the MCEI reporting system. SCC codes are very important for estimating air toxics emissions because all emission factors are directly tied to SCC codes. It is interesting to note that the relationship of emissions and SCC codes for criteria pollutants is not as sensitive as for air toxics. An incorrect SCC assignment may still give correct emission values for criteria pollutants but lead to significant over-estimation or under-estimation of air toxics emissions.

Small Point Sources

There are 492 and 823 facilities in the MCEI with registration permit Options B and D, respectively. These facilities do not report process level throughput data and have no SCC assigned to them. Without the information, RAPIDS cannot estimate air toxics emissions for these facilities. Relying on the MCEI to convert point source emissions data to the RAPIDS computing environment caused the air toxics emission inventory to be incomplete. These sources are relative small sources, include auto body shops, small painting shops, wood furniture shops, asphalt plants, grain elevators, seed elevators, feed mills, mechanical garages, and others. Although we collected data from 256 Option D facilities and some other facilities may report to the TRI, most of these small point sources had to be treated as area sources. Since chemical species use varied from one facility to the other, our solution was to collect material usage and composition data from these facilities. There is a plan to collect more source-specific data in the future.

Control Efficiencies

Most control efficiencies used in the MCEI are default values and may not reflect the operating conditions in facilities. Therefore, uncertainties are introduced for criteria pollutant emission estimates. Due to scarce information on control efficiencies for air toxics, control efficiencies for volatile organic compounds (VOC) were used for all air toxics in VOC format. It is recognized that the control efficiencies for individual air toxics can deviate greatly from the control efficiencies for VOC. However, VOC control efficiencies have to be used until better information is obtained for each individual air toxic. Therefore, it is unlikely there will be a reduction in this uncertainty for some time.

Detection Limits

A number of source-specific emission factors as well as generic emission factors were developed by using detection limits when the measurements were lower than detection limits. This approach provides conservative results but tends to over-estimate emissions.

REFERENCES

1. U.S. Environmental Protection Agency (EPA). *Volume III - Area Sources Preferred and Alternative Methods*; *STAPPA-ALAPCO-EPA Emission Inventory Improvement Program (EIIP).* EPA-454/R-97-004c, 1997.

2. U.S. Environmental Protection Agency (EPA). *Documentation For The Draft 2002 Nonpoint Source National Emission Inventory For Criteria And Hazardous Air Pollutants (March 2005 Version),* E.H. Pechan & Associates, Inc. March 2005.

3. U.S. Environmental Protection Agency (EPA). *Draft 2002 National Emission Inventory: Mobile - Nonroad*, Research Triangle Park, NC. February 2005. ftp://ftp.epa.gov/EmisInventory/draftnei2002/mobile/nonroad/data/state_nof/

4. U.S. Environmental Protection Agency (EPA). *Hazardous Air Pollutants Data - Final 1999 NEI Version 3*, Research Triangle Park, NC. July 2003. ftp://ftp.epa.gov/pub/EmisInventory/finalnei99ver3/haps/datafiles/point/

5. U.S. Environmental Protection Agency(EPA). *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources*, Research Triangle Park, NC, 1995; AP-42, Fifth Edition.

6. U.S. Environmental Protection Agency (EPA). *Factor Information Retrieval System (FIRE), Version 6.24*, Research Triangle Park, 2004, *Version 6.25*, Research Triangle Park, NC, October 2004.

7. Jiang, Hongming; Wu, Chun Yi; and Biewen, Todd. *Metals Emissions from Taconite Ore Processing Facilities in Minnesota*; A&WMA Emission Inventory Symposium; New Orleans, LA, Dec. 1998.

8. Wu, Chun Yi and Biewen, Todd. *Minnesota Air Toxics Emission Inventory for Metal Mining and Utility facilities*; A&WMA 92nd Annual Meeting; St. Louis, MO, June 1999; Paper #99-904.

9. U.S. Environmental Protection Agency (EPA). *Volatile Organic Compounds (VOC)/Particulate Matter (PM) Speciation Data System (SPECIATE), Version 3.2*, Research Triangle Park, NC, November 1, 2002.

10. Minnesota Pollution Control Agency, Environmental Data Management Unit. *Protocols for Estimating Air Toxic Emissions from Minnesota Area Sources*, St. Paul, MN, 2005, Unpublished Manuscript.

11. U.S. Environmental Protection Agency (EPA). *MOBILE6.2 Vehicle Emission Modeling Software*, Research Triangle Park, NC, October 2002. http://www.epa.gov/otaq/m6.htm

12. U.S. Environmental Protection Agency (EPA). *Locating and Estimating Air Emissions from Sources of Lead and Lead Compounds*. May 1998. http://www.epa.gov/ttn/chief/le/index.html

13. U.S. Environmental Protection Agency (EPA). *NONROAD Model*, http://www.epa.gov/otaq/nonrdmdl.htm

14. Bureau of Transportation Statistics. *Air Carrier Statistics (Form 41 Traffic) T-100 Segment*. Accessed through TranStats: http://www.transtats.bts.gov/homepage.asp

15. Federal Aviation Administration Office of Environment and Energy. *EDMS Version 4.12*. Released October 2003. http://www.aee.faa.gov/emissions/edms/EDMShome.htm

16. Eastern Research Group, Inc. *Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory Volume I – Methodology*, Morrisville, NC, November 11, 2002; pp A1-A6. ftp://ftp.epa.gov/EmisInventory/finalnei99ver2/criteria/documentation/nonroad/nonroad_voli_nov2002.pdf

17. Federal Aviation Administration. *Air Traffic Activity Data System (ATADS),* http://www.apo.data.faa.gov/faaatadsall.HTM

18. Federal Aviation Administration. *Terminal Area Forecast System (TAF),* http://www.apo.data.faa.gov/faatafall.HTM

19. Eastern Research Group, Inc. *Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory Volume I – Methodology*, Morrisville, NC, November 11, 2002; pp A6-A18. ftp://ftp.epa.gov/EmisInventory/finalnei99ver2/criteria/documentation/nonroad/nonroad_voli_nov2002.pdf

20. U.S. Army Corps of Engineers. *Waterborne Commerce of the United States Calendar Year 1999 Part 5 National Summaries*, p 5-5. http://www.iwr.usace.army.mil/ndc/wcsc/pdf/wcusnatl99.pdf

21. Eastern Research Group, Inc. *Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory Volume I – Methodology*, Morrisville, NC, November 11, 2002; pp C1-C8. ftp://ftp.epa.gov/EmisInventory/finalnei99ver2/criteria/documentation/nonroad/nonroad_voli_nov2002.pdf

22. U.S. Environmental Protection Agency (EPA). *Procedures for Emission Inventory Preparation Volume IV: Mobile Sources*, December 1992; p 207. http://www.epa.gov/otaq/invntory/r92009.pdf

23. Minnesota Pollution Control Agency MPCA). *Mercury Emissions in Minnesota Draft: 2002 Update*, September 2002. http://www.pca.state.mn.us/news/publicnotice/pn092302-attachment.pdf, accessed in November 2002.

24. Sonoma Technology, Inc. *MN_CMV_Summary2.xls*. Provided by email from Dana Coe Sullivan to Chun Yi Wu. August 30, 2004.

INFORMATION

For more information about Minnesota's air toxics inventory, please contact:

Ms. Chun Yi Wu
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155
(P) 651-282-5855, (F) 651-297-7709
(E) chun.yi.wu@pca.state.mn.us

Area source categories and information sources for associated activity data.

Category Name	Sub-Category Name	SCC	Emission Estimation Method	Activity Data Information Source
Agricultural Pesticide Use	Corn	2461850001	Emissions calculated based on application method	Minnesota Agricultural Statistics Service
Agricultural Pesticide Use	Soybeans	2461850005	Emissions calculated based on application method	Minnesota Agricultural Statistics Service
Agricultural Pesticide Use	Spring Wheat	2461850006	Emissions calculated based on application method	Minnesota Agricultural Statistics Service
Animal Cremation	Livestock & Pets	2810060200	Apply emission factors to estimated weight of cremated animals	Census of Agriculture and survey of pet crematoria.
Architectural Surface Coating	Architectural Surface Coating	2401001000	Use per capita emission factor for VOC and apply speciation profiles to VOC emissions.	Census data
Asphalt Paving	Cutback Asphalt	2461021000	Use state-specific activity data and emission factors.	Survey of asphalt suppliers
Autobody Refinishing	Autobody Refinishing	2401005000	Use per capita emission factor for VOC and apply speciation profiles to VOC emissions.	Census data
Commercial & Consumer Product Use	Adhesives & Sealants	2460600000	Use national per capita emission factors	Census data
Commercial & Consumer Product Use	Automotive Aftermarket Products	2460400000	Use national per capita emission factors	Census data
Commercial & Consumer Product Use	Coating & Related Products	2460500000	Use national per capita emission factors	Census data
Commercial & Consumer Product Use	FIFRA-Regulated Products	2460800000	Use national per capita emission factors	Census data
Commercial & Consumer Product Use	Household Products	2460200000	Use national per capita emission factors	Census data
Commercial & Consumer Product Use	Miscellaneous	2460100000	Use national per capita emission factors	Census data
Commercial & Consumer Product Use	Personal Care Products	2460900000	Use national per capita emission factors	Census data
Commercial Cooking	Conveyorized Charbroiling	2302002100	Accept U.S. EPA estimate	U.S. EPA
Commercial Cooking	Flat Griddle Frying	2302003100	Accept U.S. EPA estimate	U.S. EPA

Category Name	Sub-Category Name	SCC	Emission Estimation Method	Activity Data Information Source
Commercial Cooking	Under-fired Charbroiling	2302002200	Accept U.S. EPA estimate	U.S. EPA
Dry Cleaning	Dry Cleaning	2420000055	Use emission factor based on solvent usage and machine type.	NESHAP submittals and survey letters
Fluorescent Lamp Breakage	Fluorescent Lamp Breakage	2861000000	Apportion state estimate of lamp breakage to counties based on population	Census data
Fluorescent Lamp Recycling	Fluorescent Lamp Recycling	2650000001	Apportion state estimate of recycling to counties based upon location of recyclers	MPCA
Forest Wildfires	Forest Wildfires	2810001000	Accept U.S. EPA estimate	U.S. EPA
Fuel Combustion - Commercial/Institutional	Coal Boiler	2103002000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI
Fuel Combustion - Commercial/Institutional	Distillate Oil Boiler	2103004000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI
Fuel Combustion - Commercial/Institutional	Distillate Oil IC Engine	2103004000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI
Fuel Combustion - Commercial/Institutional	Kerosene Boiler	2103011000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI
Fuel Combustion - Commercial/Institutional	LPG Boiler	2103007000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI
Fuel Combustion - Commercial/Institutional	Natural Gas Boiler	2103006000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI
Fuel Combustion - Commercial/Institutional	Residual Oil Boiler	2103005000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI
Fuel Combustion - Commercial/Institutional	Wood Boiler	2103008000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI
Fuel Combustion - Industrial	Coal Boiler	2102002000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI
Fuel Combustion - Industrial	Distillate Oil Boiler	2102004000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI
Fuel Combustion - Industrial	Distillate Oil IC Engine	2102004000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI

Category Name	Sub-Category Name	SCC	Emission Estimation Method	Activity Data Information Source
Fuel Combustion - Industrial	Kerosene Boiler	2102011000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI
Fuel Combustion - Industrial	LPG Boiler	2102007000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI
Fuel Combustion - Industrial	Natural Gas Boiler	2102006000	Apply emission factors to fuel consumed	U.S. Department of Energy & MCEI
Gasoline Service Stations	Stage I - Aviation Gasoline	2501080050	Use EPA emission factor for VOC and some air toxics. County activity data are allocated from state fuel consumption based on vehicle registrations. Applied speciation profiles to VOC emissions for air toxics without emission factors.	Minnesota Department of Revenue
Gasoline Service Stations	Stage I - Splash Fill	2501060052	Use EPA emission factor for VOC and some air toxics. County activity data are allocated from state fuel consumption based on vehicle registrations. Applied speciation profiles to VOC emissions for air toxics without emission factors.	Minnesota Department of Revenue
Gasoline Service Stations	Stage I - Submerged Fill with Control	2501060053	Use EPA emission factor for VOC and some air toxics. County activity data are allocated from state fuel consumption based on vehicle registrations. Applied speciation profiles to VOC emissions for air toxics without emission factors.	Minnesota Department of Revenue

Category Name	Sub-Category Name	SCC	Emission Estimation Method	Activity Data Information Source
Gasoline Service Stations	Stage I - Submerged Fill without Control	2501060051	Use EPA emission factor for VOC and some air toxics. County activity data are allocated from state fuel consumption based on vehicle registrations. Applied speciation profiles to VOC emissions for air toxics without emission factors.	Minnesota Department of Revenue
Gasoline Service Stations	Stage I - Tank Breathing	2501060201	Use EPA emission factor for VOC and some air toxics. County activity data are allocated from state fuel consumption based on vehicle registrations. Applied speciation profiles to VOC emissions for air toxics without emission factors.	Minnesota Department of Revenue
Gasoline Service Stations	Stage II - Aviation Gasoline	2501080100	Use EPA emission factor for VOC and some air toxics. County activity data are allocated from state fuel consumption based on vehicle registrations. Applied speciation profiles to VOC emissions for air toxics without emission factors.	Minnesota Department of Revenue
Gasoline Service Stations	Stage II - Spill Loss	2501060103	Use EPA emission factor for VOC and some air toxics. County activity data are allocated from state fuel consumption based on vehicle registrations. Applied speciation profiles to VOC emissions for air toxics without emission factors.	Minnesota Department of Revenue

Category Name	Sub-Category Name	SCC	Emission Estimation Method	Activity Data Information Source
Gasoline Service Stations	Stage II - Vapor Loss	2501060101	Use EPA emission factor for VOC and some air toxics. County activity data are allocated from state fuel consumption based on vehicle registrations. Applied speciation profiles to VOC emissions for air toxics without emission factors.	Minnesota Department of Revenue
Gasoline Trucks in Transit	Gasoline Trucks in Transit	2505030120	Use EPA emission factor for VOC. County activity data are allocated from state fuel consumption based on population. Apply speciation profiles to VOC emissions for air toxics.	Minnesota Department of Revenue
Grain Elevators	Grain Elevators	2801600000	Apply emission factors based on agricultural data	U.S. Department of Agriculture Data
Graphic Arts	Graphic Arts	2425000000	Apply Minnesota-specific speciation factors to VOC estimates based on population	Census Data
Hospital Sterilization	Hospital Sterilization	2850000010	Apply emission factors based on NESHAP data and hospital bed data	MPCA and Minnesota Department of Health
Human Cremation	Human Cremation	2810060100	Apply emission factors to estimated weight of cremated individuals	Minnesota Department of Health
Incineration	Commercial/Institutional	2601020000	Accept U.S. EPA estimate	U.S. EPA
Industrial Surface Coating	General Surface Coating	2401990000	Apply emission factors to employment data	Census data and MCEI
Industrial Surface Coating	High Performance Surface Coating, Water Based	2401100000	Apply per capita emission factors	Census data and MCEI
Industrial Surface Coating	High Performance Surface Coating, Solvent Based	2401100999	Apply per capita emission factors	Census data and MCEI
Mineral Processes	Mineral Processes	2305070000	Accept U.S. EPA estimate	U.S. EPA
Municipal Solid Waste Landfills	Flaring MSW Landfill gas	2620030000	Use generic emission factors.	MPCA

Category Name	Sub-Category Name	SCC	Emission Estimation Method	Activity Data Information Source
Municipal Solid Waste Landfills	Non-flaring MSW Landfills		Create a model based on AP-42, Section 2.4. Most concentrations of air toxics are obtained from MPCA landfill gas study.	MPCA
Open Burning	Household Waste (use 26-10-000-xxx for Yard Wastes)	2610030000	Accept U.S. EPA estimate	U.S. EPA
Open Burning	Land Clearing Debris (use 28-10-005-000 for Logging Debris Burning)	2610000500	Accept U.S. EPA estimate	U.S. EPA
Open Burning	Yard Waste - Brush Species Unspecified	2610000400	Accept U.S. EPA estimate	U.S. EPA
Open Burning	Yard Waste - Leaf Species Unspecified	2610000100	Accept U.S. EPA estimate	U.S. EPA
POTW Facilities	Entire Plant	2630020000	Apply emission factor to throughput data	MPCA
Prescribed Burning for Forest Management	Prescribed Forest Fires	2810015000	Accept U.S. EPA estimate	U.S. EPA
Residential Fossil Fuel Combustion	Bituminous/Subbituminous Coal	2104002000	Apply emission factor to estimated fuel consumption	U.S. Department of Energy and Census Data
Residential Fossil Fuel Combustion	Distillate Oil	2104004000	Apply emission factor to estimated fuel consumption	U.S. Department of Energy and Census Data
Residential Fossil Fuel Combustion	Kerosene	2104011000	Apply emission factor to estimated fuel consumption	U.S. Department of Energy and Census Data
Residential Fossil Fuel Combustion	Liquified Petroleum Gas (LPG)	2104007000	Apply emission factor to estimated fuel consumption	U.S. Department of Energy and Census Data
Residential Fossil Fuel Combustion	Natural Gas	2104006000	Apply emission factor to estimated fuel consumption	U.S. Department of Energy and Census Data
Residential Wood Burning	Catalytic Woodstoves: General	2104008030	Apply emission factor to estimated fuel consumption	Survey by DNR, MPCA, & Forest Service in U.S. Department of Agriculture
Residential Wood Burning	Fireplaces: General	2104008001	Apply emission factor to estimated fuel consumption	Survey by DNR, MPCA, & Forest Service in U.S. Department of Agriculture
Residential Wood Burning	Fireplaces: Insert; EPA certified; catalytic	2104008004	Apply emission factor to estimated fuel consumption	Survey by DNR, MPCA, & Forest Service in U.S. Department of

Category Name	Sub-Category Name	SCC	Emission Estimation Method	Activity Data Information Source
				Agriculture
Residential Wood Burning	Fireplaces: Insert; EPA certified; non-catalytic	2104008003	Apply emission factor to estimated fuel consumption	Survey by DNR, MPCA, & Forest Service in U.S. Department of Agriculture
Residential Wood Burning	Fireplaces: Insert; non-EPA certified	2104008002	Apply emission factor to estimated fuel consumption	Survey by DNR, MPCA, & Forest Service in U.S. Department of Agriculture
Residential Wood Burning	Non-catalytic Woodstoves: EPA certified	2104008050	Apply emission factor to estimated fuel consumption	Survey by DNR, MPCA, & Forest Service in U.S. Department of Agriculture
Residential Wood Burning	Woodstoves: General	2104008010	Apply emission factor to estimated fuel consumption	Survey by DNR, MPCA, & Forest Service in U.S. Department of Agriculture
Solvent Cleaning	Cold, Vapor, & In-Line Cleaning	2415000000	Apply emission factors to employment data	Census data and MCEI
Solvent Cleaning	Solvent Cleanup	2415000000	Apply emission factors to employment data	Census data and MCEI
Solvent Cleaning	Trichloroethylene Degreasing	2415100385	Apply emission factors to NESHAP data	NESHAP
Structure Fires	Residential Structure Fires	2810030000	Use emission factors recommended by the EIIP document based on tons of material burned. Assume the average total material burned in each fire is 1.15 ton.	Minnesota Department of Public Safety
Swimming Pools	Swimming Pools	2862000000	Accept U.S. EPA estimate	U.S. EPA
Tank & Drum Cleaning	Tank & Drum Cleaning	2461160000	Accept U.S. EPA estimate	U.S. EPA
Traffic Markings	White Latex Paint	2401008000	Mass Balance based on usage data	Minnesota Department of Transportation
Traffic Markings	Yellow Latex Paint	2401008000	Mass Balance based on usage data	Minnesota Department of Transportation

Minnesota statewide summary of emissions (lb/year)

Pollutant Name (CAS)	Point Source Emissions	Area Source Emissions	On-road Emissions	Non-road Emissions	Total Emissions
Acenaphthene (83-32-9)	70,780	5268	846.9	1605	78,500
Acenaphthylene (208-96-8)	388.7	104,600	4446	3979	113,400
Acetaldehyde (75-07-0)	619,000	1,114,000	1,577,000	1,205,000	4,515,000
Acetamide (60-35-5)		0.61			0.61
Acetonitrile (75-05-8)	1368	1.09			1369
Acetophenone (98-86-2)	440.8	1484			1925
Acrolein (107-02-8)	193,500	481,000	111,500	114,200	900,200
Acrylamide (79-06-1)	132.1				132.1
Acrylic acid (79-10-7)	15,500	21.18			15,520
Acrylonitrile (107-13-1)	2063	4675			6738
Aniline (62-53-3)	0.01				0.01
Anthracene (120-12-7)	877.9	13,040	1023	895.7	15,840
Antimony (7440-36-0)	3497	26.75		24.62	3548
Arsenic (7440-38-2)	13,590	321.8	823.6	6.61	14,740
Atrazine (1912-24-9)		257,900			257,900
Benz(a)anthracene (56-55-3)	78.24	17,050	251.5	253.4	17,630
Benzo(g,h,i)perylene (191-24-2)	75.61	8619	304.4	701.7	9701
Benzene (71-43-2)	215,300	3,896,000	6,675,000	2,603,000	13,390,000
Benzo(a)pyrene (50-32-8)	100.3	4555		199.9	4855
Benzo(b)fluoranthene (205-99-2)	14.49	4067	168.1	152.4	4402
Benzo(k)fluoranthene (207-08-9)	2.2	4164	168.1	139	4473
Benzyl chloride (100-44-7)	4013	281			4294
Beryllium (7440-41-7)	339.7	77.93		47.94	465.6
Biphenyl (92-52-4)	9623	957.8			10,580
Bromoform (75-25-2)	846	15.66			861.7
Methyl bromide (74-83-9)	21,870	1,014,000			1,036,000
1,3-Butadiene (106-99-0)	3179	431,700	655,800	675,100	1,766,000
Cadmium (7440-43-9)	2933	393.4		49.41	3376
Carbon disulfide (75-15-0)	1056	666.8			1723
Carbon tetrachloride (56-23-5)	1830	584.6			2415
Carbonyl sulfide (463-58-1)	1333	977.8			2311
Catechol (120-80-9)	122.1				122.1
Chlorine (7782-50-5)	63,930	230,400	1103		295,400
Chlorobenzene (108-90-7)	1290	327,400			328,700

Pollutant Name (CAS)	Point Source Emissions	Area Source Emissions	On-road Emissions	Non-road Emissions	Total Emissions
Chloroethane (75-00-3)	7842	47,080			54,920
Chloroform (67-66-3)	4665	384,000			388,700
2-Chloro-1,3-butadiene (126-99-8)	2.29				2.29
Chromium (7440-47-3)	14,680	534.4	1085	36.72	16,340
Chromium VI (18540-29-9)	1829	34.35	218.2	18.92	2100
Chrysene (218-01-9)	63.05	13,560	131.8	192.7	13,950
2-Chloroacetophenone (532-27-4)	151.9	2.81			154.7
Cobalt (7440-48-4)	6551	77.2		28.23	6656
Copper (7440-50-8)	25,970	377.9	733.8	5.81	27,090
Cresol (mixed isomers) (1319-77-3)	2574				2574
M-Cresol (108-39-4)	50.28				50.28
O-Cresol (95-48-7)	88.86	123.6			212.5
P-Cresol (106-44-5)	172.5	250			422.5
Cumene (98-82-8)	27,690	34,030			61,720
Cyanide (57-12-5)	56,020	1004			57,020
2,4-D (2,4-Dichlorophenoxyacetic acid) (94-75-7)		55,440			55,440
Dibenz(a,h)anthracene (53-70-3)	28.64	262.5	0.1	4.97	296.2
Dibenzofuran (132-64-9)	392	1557			1949
1,2-Dibromoethane (106-93-4)	1072	20.16			1092
Di-N-butyl phthalate (84-74-2)	1336	354.3			1690
1,2-Dichloroethane (107-06-2)	1749	2370			4119
Dichlorvos (DDVP) (62-73-7)	2				2
1,4-Dichlorobenzene (106-46-7)	1865	375,000			376,900
1,1-Dichloroethane (75-34-3)	341.1	1360			1701
1,3-Dichloropropene (542-75-6)	97.95	726,700			726,800
Diethyl sulfate (64-67-5)	0.01				0.01
Diethanolamine (111-42-2)	472.2	113.6			585.8
Diethylhexyl phthalate (117-81-7)	7085	59.54			7145
Dimethyl phthalate (131-11-3)	5290	26.63			5317
Dimethyl sulfate (77-78-1)	1041	19.27			1060
N,N-Dimethylformamide (68-12-2)	20,390	40,660			61,050
Dimethylanaline (121-69-7)	75.6				75.6
2,4-Dinitrophenol (51-28-5)	135.5	0.11			135.6
2,4-Dinitrotoluene (121-14-2)	53.6	0.11			53.71
Di-N-octyl phthalate (117-84-0)	32.56				32.56
1,4-Dioxane (123-91-1)	2520	135.6			2656

Pollutant Name (CAS)	Point Source Emissions	Area Source Emissions	On-road Emissions	Non-road Emissions	Total Emissions
Epichlorohydrin (106-89-8)	30.43				30.43
Ethyl acrylate (140-88-5)	4265	5.43			4270
Ethyl benzene (100-41-4)	217,400	491,400	2,149,000	1,279,000	4,137,000
Ethylene glycol (107-21-1)	63,230	187,300			250,500
Ethylene oxide (75-21-8)	3790	31,420			35,210
Fine mineral fibers	3619				3619
Fluoranthene (206-44-0)	326.5	18,870	1048	2066	22,310
Fluorene (86-73-7)	843.8	13,780	1760	3312	19,700
Formaldehyde (50-00-0)	986,200	2,841,000	2,313,000	2,551,000	8,691,000
Glycol ethers	860,900	2,052,000			2,913,000
Hydrochloric acid (7647-01-0)	5,601,000	739,300			6,340,000
Hexamethylene-1,6-diisocyanate (822-06-0)	6308				6308
Hexane (110-54-3)	1,756,000	3,374,000	1,561,000	1,342,000	8,033,000
Hexachlorobenzene (118-74-1)		9.88			9.88
Hydrogen fluoride (7664-39-3)	920,600	60,370			981,000
Hydrogen cyanide (74-90-8)	5660	401,900			407,600
Hydrogen sulfide (7783-06-4)	262.1				262.1
Hydroquinone (123-31-9)	6799	9436			16,240
Indeno(1,2,3-c,d)pyrene (193-39-5)	1466	4971	87.46	215.2	6740
Isophorone (78-59-1)	18,480	17,450			35,930
Lead (7439-92-1)	62,760	3094	75.54	22,950	88,880
Alkylated lead	0.68	1.42			2.1
Lindane (gamma HCH) (58-89-9)	3				3
Maleic anhydride (108-31-6)	749.6				749.6
Manganese (7439-96-5)	102,200	1539	1276	49.99	105,100
Mercury (7439-97-6)	3545	367.4	906.2	0.57	4819
Methyl ethyl ketone (78-93-3)	749,700	3,364,000			4,114,000
Methyl hydrazine (60-34-4)	3688	68.24			3756
Methyl iodide (74-88-4)	5.9				5.9
Methyl isobutyl ketone (108-10-1)	221,700	1,615,000			1,837,000
Methyl isocyanate (624-83-9)	27				27
Methyl methacrylate (80-62-6)	70,200	8.57			70,210
Methyl tert-butyl ether (1634-04-4)	785.4	122.3			907.7
Methanol (67-56-1)	1,455,000	3,624,000			5,079,000
4,4'-Methylenedianaline (101-77-9)	0.01				0.01
4,4'-Methylenediphenyl diisocyanate (101-68-8)	39,610				39,610

Pollutant Name (CAS)	Point Source Emissions	Area Source Emissions	On-road Emissions	Non-road Emissions	Total Emissions
Methyl chloride (74-87-3)	15,680	175,700			191,400
Methylene chloride (dichloromethane) (75-09-2)	179,800	613,300			793,100
Naphthalene (91-20-3)	49,020	543,300	122,500	59,150	774,000
Nickel (7440-02-0)	31,140	914.4	839	411.5	33,300
Nitrobenzene (98-95-3)	485.7				485.7
4-Nitrophenol (100-02-7)	591.2	401.7			992.9
2-Nitropropane (79-46-9)	3.29	9.77			13.06
PAH, 16		649.9		4.75	654.7
PAH, 7				0.05	0.05
Polychlorinated biphenyls (PCBs) (1336-36-3)	13.03	1284			1297
Polychlorinated dibenzodioxins, total	33.12	3.61		0.05	36.78
Polychlorinated dibenzofurans, total	0.1	0.51		0.01	0.62
Pentachlorophenol (87-86-5)	214.5	23.83			238.3
Tetrachloroethylene (Perc) (127-18-4)	150,200	316,200			466,400
Phenanthrene (85-01-8)	1229	48,910	2885	6231	59,260
Phenol (108-95-2)	229,200	91,780		84.93	321,100
P-Phenylenediamine (106-50-3)	126.6				126.6
Phosphine (7803-51-2)	3514	971.1			4485
Phosphorus (7723-14-0)	2624	35.53		44.36	2704
Phthalic anhydride (85-44-9)	1480				1480
Propionaldehyde (123-38-6)	18,090	6399	125,600	248,100	398,200
Propoxur (114-26-1)	0.00001				0.00001
Propylene dichloride (78-87-5)	744.2	303.3			1048
Propylene oxide (75-56-9)	1241				1241
Pyrene (129-00-0)	637.1	23,820	1459	2352	28,270
Quinone (106-51-4)	2223				2223
Selenium (7782-49-2)	7132	865	18.03	2.77	8018
Styrene (100-42-5)	1,239,000	373,400	446,800	175,900	2,235,000
2,3,7,8-Tetrachlorodibenzo-p-dioxin (1746-01-6)	0.0021	0.0048		0.0003	0.0072
2,3,7,8-Tetrachlorodibenzofuran (51207-31-9)	0.0191	0.0451		0.0008	0.065
1,1,1-Trichloroethane (71-55-6)	13,060	1,795,000		1.11	1,808,000
1,1,2,2-Tetrachloroethane (79-34-5)	177.4	1498			1675
Toluene (108-88-3)	1,570,000	9,975,000	14,380,000	16,800,000	42,730,000
Toluene-2,4-diisocyanate (584-84-9)	2561				2561
O-Toluidine (95-53-4)	0.21	0.54			0.75
Trichloroethylene (79-01-6)	401,700	17,610			419,300

Pollutant Name (CAS)	Point Source Emissions	Area Source Emissions	On-road Emissions	Non-road Emissions	Total Emissions
1,2,4-Trichlorobenzene (120-82-1)	11,740	49.4			11,790
1,1,2-Trichloroethane (79-00-5)	531.5				531.5
2,4,6-Trichlorophenol (88-06-2)	0.43	0.01			0.44
Triethylamine (121-44-8)	14,600	4731			19,330
Trifluralin (1582-09-8)		39,800			39,800
2,2,4-Trimethylpentane (540-84-1)	11,890	450,400	5,996,000	7,558,000	14,020,000
Vinylidene chloride (75-35-4)	516.1	2532			3048
Vinyl acetate (108-05-4)	33,030	19,130			52,160
Vinyl chloride (75-01-4)	4450	11,400			15,850
M-Xylene (108-38-3)	7436	4358			11,790
O-Xylene (95-47-6)	5488	187,400			192,900
P-Xylene (106-42-3)	1298				1298
Xylene (mixed isomers) (1330-20-7)	1,554,000	7,032,000	8,177,000	8,355,000	25,120,000