

# **Appendix I: Wisconsin Toxic Emissions Inventory**

## **BACKGROUND**

The State of Wisconsin conducted its statewide air toxic emissions inventory for the Great Lakes Air Toxic Emissions Inventory Project for calendar year 2002.

The sources inventoried were individual point sources, non-industrial area sources, and on-road and non-road mobile sources. Emissions for a total of 153 hazardous air pollutants are included in the inventory.

Wisconsin followed the Air Toxic Emissions Inventory Protocol and the area source methodologies agreed upon by the project's Technical Steering Committee in developing its portion of the regional inventory. The Regional Air Pollution Inventory Development System (RAPIDS), EPA's Non-Road Model were used in estimating emissions. Emission summaries for point, area and mobile sources for the state of Wisconsin are provided following this portion of the report document.

## **POINT SOURCES**

Point source emissions information included in the Wisconsin inventory were collected by the Bureau of Air Management of the Wisconsin Department of Natural Resources (WDNR), as part of its annual air emissions inventory process. State regulation, ch. NR 438, Wis. Adm. Code, requires detailed annual emission reports from any source with total, actual, annual emissions above a reporting threshold. The reporting threshold varies for each of the air contaminants covered by the rule. The following are the reporting thresholds (in pounds per year) for each of the pollutants inventoried for this project:

<b>Pollutant Code</b>	<b>GLC Name</b>	<b>Threshold (lb)</b>	<b>NR438 Name</b>
ACENAPHTHEN	ACENAPHTHENE		
ACENAPHTHYL	ACENAPHTHYLENE		
ACETALDEHYDE	ACETALDEHYDE	6000	Acetaldehyde
ACETAMIDE	ACETAMIDE	6000	Acetamide
ACETONITRILE	ACETONITRILE	6000	Acetonitrile
ACETOPHENONE	ACETOPHENONE	6000	Acetophenone
ACROLEIN	ACROLEIN	91	Acrolein
ACRYLIC ACID	ACRYLIC ACID	6000	Acrylic acid
ACRYLONITRIL	ACRYLONITRILE	12	Acrylonitrile
ALLYL CHLORI	ALLYL CHLORIDE	1093	Allyl chloride
ANILINE	ANILINE	3648	Aniline
ANTHRACENE	ANTHRACENE		
ANTIMONY	ANTIMONY	179	Antimony & compounds, as Sb
ARSENIC	ARSENIC	12	Arsenic and inorganic compounds, as As
ATRAZINE	ATRAZINE	1829	Atrazine
BENZ(A)ANTHR	BENZ(A)ANTHRACENE	12	Benz(a)anthracene
BENZ(GHI)PE	BENZO(G,H,I)PERYLENE		

Pollutant Code	GLC Name	Threshold (lb)	NR438 Name
BENZENE	BENZENE	150	Benzene
BENZO(A)PYRE	BENZO(A)PYRENE	12	Benzo(a)pyrene
BENZO(B)FLUO	BENZO(B)FLUORANTHENE	12	Benzo(b)fluoranthene
BENZO(K)FLUO	BENZO(K)FLUORANTHENE		
BERYLLIUM	BERYLLIUM	12	Beryllium and beryllium compounds, as Be
BIPHENYL	BIPHENYL	547	Biphenyl
BROMOFORM	BROMOFORM	6000	Bromoform
BROMOMETH	BROMOMETHANE	6000	Methyl bromide
BUTADIENE,13	1,3-BUTADIENE	6000	1,3-Butadiene
CADMIUM	CADMIUM	12	Cadmium and cadmium compounds, as Cd
CAPTAN	CAPTAN	1829	Captan
CARBON DISUL	CARBON DISULFIDE	6000	Carbon disulfide
CARBON TETRA	CARBON TETRACHLORIDE	12	Carbon tetrachloride
CARBONYL SUL	CARBONYL SULFIDE	6000	Carbonyl sulfide
CHLORAMBEN	CHLORAMBEN	6000	Chloramben
CHLORINE	CHLORINE	1093	Chlorine
CHLOROBENZ	CHLOROBENZENE	6000	Chlorobenzene (Monochlorobenzene)
CHLOROETHANE	CHLOROETHANE	6000	Ethyl chloride (Chloroethane)
CHLOROFORM	CHLOROFORM	125	Chloroform
CHLOROPRENE	CHLOROPRENE	6000	Beta-Chloroprene
CHROMIUM	CHROMIUM	1	Chromium (VI) compounds, as Cr, water insoluble
CHROMIUM	CHROMIUM	179	Chromium (III) compounds, as Cr
CHROMIUM	CHROMIUM	18	Chromium (VI) compounds, as Cr, water soluble
CHROMIUM	CHROMIUM	179	Chromium (metal)
CHROMIUM	CHROMIUM	179	Chromium (II) compounds, as Cr
CHROMIUM III	CHROMIUM (III)		
CHROMIUM VI	CHROMIUM (VI)		
CHRYSENE	CHRYSENE	12	Benzo(a)phenanthrene
COBALT	COBALT	18	Cobalt, as Co, metal, dust
COPPER	COPPER	368	Copper, dust & mists, as Cu
CRESOL MX IS	CRESOL- MIXED ISOMERS	6000	Cresol, all isomers
CRESOL,O	O-CRESOL	6000	o-Cresol
CRESOL,P	P-CRESOL	6000	p-Cresol
CUMENE	CUMENE	6000	Cumene
CYANIDE	CYANIDE		
D,2,4	2,4-D, SALTS AND ESTERS	6000	2,4-D, salts and esters
DIBENZAHAH	DIBENZO(A,H)ANTHRACENE	12	Dibenz(a,h)anthracene
DIBENZOFURAN	DIBENZOFURAN	6000	Dibenzofurans
DIBUTYL PHTH	DIBUTYL PHTHALATE	1829	Dibutyl phthalate
DIBUTYL PHTH	DIBUTYL PHTHALATE	1829	Dibutyl phthalate
DICHLORETH12	1,2-DICHLOROETHANE	12	1,2-Dichloroethane (EDC)
DICHLORVOS	DICHLORVOS	368	Dichlorvos
DICLBENZ,14	1,4-DICHLOROBENZENE	6000	p-Dichlorobenzene
DICLPROPE,13	1,3-DICHLOROPROPENE	1829	Dichloropropene
DIETHANOLAMI	DIETHANOLAMINE	5477	Diethanolamine

Pollutant Code	GLC Name	Threshold (lb)	NR438 Name
DIMETH PHTHA	DIMETHYL PHTHALATE	1829	Dimethylphthalate
DIMETH SULFA	DIMETHYL SULFATE	12	Dimethyl sulfate
DIMETHFORMAM	DIMETHYLFORMAMIDE, N,N-	6000	N,N-Dimethylformamide
DINITROPH,24	2,4-DINITROPHENOL	6000	2,4-Dinitrophenol
DIOCTYL PHTH	DIOCTYL PHTHALATE	125	Di(2-ethylhexyl) phthalate (DEHP)
DIOXANE	1,4-DIOXANE	125	1,4-Dioxane
EPICLHYDRIN	EPICHLOROHYDRIN	150	Epichlorohydrin
EPOXYBUT,12	1,2-EPOXYBUTANE	6000	1,2-Epoxybutane (1,2-Butylene oxide)
ETHYLBENZENE	ETHYLBENZENE	6000	Ethyl benzene
ETHYLENE GLY	ETHYLENE GLYCOL	6000	Ethylene glycol vapor
ETHYLENE OXI	ETHYLENE OXIDE	12	Ethylene oxide
FLUORANTHENE	FLUORANTHENE	12	Benzo(j,k)fluorene
FLUORENE	FLUORENE		
FORMALDEHYDE	FORMALDEHYDE	125	Formaldehyde
GLYCOL ETHRS	GLYCOL ETHERS (MISC.)		
HCL	HYDROCHLORIC ACID	1556	Hydrogen chloride
HEXACL-1,3-C	1,2,3,4,5,5-HEXACHLORO-1,3-CYCLOPENTADIENE	37	Hexachlorocyclopentadiene
HEXAMETHYL16	HEXAMETHYLENE-1,6-DIISOCYANATE	6000	Hexamethylene-1,6-diisocyanate
HEXANE	N-HEXANE	6000	n-Hexane
HEXCLBENZENE	HEXACHLOROBENZENE	12	Hexachlorobenzene (HCB)
HF	HYDROGEN FLUORIDE	557	Hydrogen fluoride
HYDRAZINE	HYDRAZINE	125	Hydrazine and hydrazine sulfate
HYDROGEN CYA	HYDROGEN CYANIDE	2218	Hydrogen cyanide
HYDROGEN SUL	HYDROGEN SULFIDE		
HYDROQUINONE	HYDROQUINONE	725	Hydroquinone
INDN(123CDPY	INDENO(1,2,3-C,D)PYRENE	12	Indeno(1,2,3-cd)pyrene
ISOPHORONE	ISOPHORONE	5550	Isophorone
LEAD	LEAD	6000	Lead compounds
LEAD CMP	LEAD COMPOUNDS		
MALEIC ANHYD	MALEIC ANHYDRIDE	368	Maleic anhydride
MANGANESE	MANGANESE	1114	Manganese, as Mn, dust and compounds
MERCURY	MERCURY	18	Mercury, as Hg, vapor, all forms except alkyl
MERCURY	MERCURY	3.7	Mercury, as Hg, alkyl compounds
MERCURY	MERCURY	37	Mercury, as Hg, aryl & inorganic compounds, all forms except alkyl
METEN BIS,44	4,4-METHYLENE BIS(2-CHLOROANILINE)	125	4,4'-Methylene bis(2-chloroaniline) (MOCA)
METH ETH KET	METHYL ETHYL KETONE	6000	Methyl ethyl ketone (2-Butanone) (MEK)
METH IODIDE	METHYL IODIDE	125	Methyl iodide
METH ISOBUT	METHYL ISOBUTYL KETONE	6000	Methyl isobutyl ketone
METH METHACR	METHYL METHACRYLATE	6000	Methyl methacrylate
METH TERT BU	METHYL TERT BUTYL ETHER	6000	Methyl tert-butyl ether
METHANOL	METHANOL	6000	Methanol
METHENE DIAN	4,4-METHYLENE DIANILINE	125	4,4'-Methylenedianiline (and dihydrochloride)

Pollutant Code	GLC Name	Threshold (lb)	NR438 Name
METHENE(B)4-	4,4-METHYLENEDIPHENYL DIISOCYANATE	44	Methylene bisphenyl isocyanate (MDI)
METHYL CHLOR	METHYL CHLORIDE	6000	Methyl chloride
METHYLENE CL	METHYLENE CHLORIDE	6000	Methylene chloride
NAPHTHALENE	NAPHTHALENE	6000	Naphthalene
NI SUBSULF	NICKEL SUBSULFIDE	12	Nickel subsulfide
NICKEL	NICKEL	125	Nickel compounds other than nickel subsulfide, as Ni
NICKEL CMP	NICKEL COMPOUNDS		
NITROPHENL,4	4-NITROPHENOL	6000	4-Nitrophenol
NITROPROPA,2	2-NITROPROPANE	125	2-Nitropropane
PCBS	POLYCHLORINATED BIPHENYLS (PCBS)	0.05	Polychlorinated biphenyls (PCB)
PCDD	POLYCHLORINATED DIBENZODIOXINS, TOTAL		
PCDF	POLYCHLORINATED DIBENZOFURANS, TOTAL		
PERC	TETRACHLOROETHYLENE	6000	Perchloroethylene
PHENANTHRENE	PHENANTHRENE		
PHENOL	PHENOL	6000	Phenol
PHOSGENE	PHOSGENE	147	Phosgene
PHOSPHINE	PHOSPHINE	147	Phosphine
PHOSPHORUS	PHOSPHORUS (YELLOW OR WHITE)	37	Phosphorus (yellow)
PHTHALIC ANH	PHTHALIC ANHYDRIDE	2186	Phthalic anhydride
PROPIONALDEH	PROPIONALDEHYDE	6000	Propionaldehyde
PRPLENE DICH	PROPYLENE DICHLORIDE	6000	Propylene dichloride
PRPLENE OXID	PROPYLENE OXIDE	125	Propylene oxide
PYRENE	PYRENE		
SELENIUM	SELENIUM	73	Selenium and compounds, as Se
STYRENE	STYRENE	6000	Styrene, monomer
TCDD,2378	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.00005	2,3,7,8-Tetrachlorodibenzo-p-dioxin
TCE,111	1,1,1-TRICHLOROETHANE	6000	Methyl chloroform (1,1,1-Trichloroethane)
TETCLET,1122	1,1,2,2-TETRACHLOROETHANE	2554	1,1,2,2-Tetrachloroethane
TOLUENE	TOLUENE	6000	Toluene (Toluol)
TOLUENE24DII	TOLUENE-2,4-DIISOCYANATE	15	Toluene-2,4-diisocyanate (TDI)
TOLUIDINE,O-	O-TOLUIDINE	12	o-Toluidine
TRICHLORETHY	TRICHLOROETHYLENE	6000	Trichloroethylene
TRICLETH,112	1,1,2-TRICHLOROETHANE	6000	1,1,2-Trichloroethane
TRIETHAMINE	TRIETHYLAMINE	6000	Triethylamine
TRIME-PENTAN	2,2,4-TRIMETHYLPENTANE	6000	2,2,4-Trimethylpentane
VINLIDENE CL	VINYLDENE CHLORIDE	6000	Vinylidene chloride
VINYL ACETAT	VINYL ACETATE	6000	Vinyl acetate
VINYL CHLOR	VINYL CHLORIDE	150	Vinyl chloride
XYLENE,M	M-XYLENE	6000	m-Xylene
XYLENE,O	O-XYLENE	6000	o-Xylene

Pollutant Code	GLC Name	Threshold (lb)	NR438 Name
XYLENE,P	P-XYLENE	6000	p-Xylene
XYLENES ISO	XYLENES (MIXED ISOMERS)	6000	Xylene, mixed isomers (Xylol)

The point source data submitted by Wisconsin are for calendar year 2002 and include emission estimates as reported by all sources in the state. Toxic emission estimates are made by sources and then reported to the WDNR. Sources are required to report and certify actual, annual emissions in pounds per year, and identify the method used to make the estimate. These estimates account for any emission controls in place.

Wisconsin's annual emissions inventory is not limited to any particular type of industry or process. If the total emissions for a source exceed the reporting threshold for a given pollutant, the source is required to provide information on any process emitting any amount of that pollutant. This approach should cover most source industrial categories and industrial process codes. However, many industrial source and process categories are not responsible for air emissions above any of the reporting thresholds.

## AREA SOURCES

Emissions from eighteen non-point area sources were included for the 2002 inventory project. These area sources are:

- Agricultural Pesticides
- Auto Body Refinishing
- Consumer and Commercial Solvents
- Fuel Marketing
- Human Cremation
- Structural Fires
- Publicly Owned Treatment Works (POTW)
- Residential Wood Combustion
- Stationary Fuel Combustion
- Architectural Surface Coatings
- Aviation Gasoline Distribution
- Dry Cleaning
- Graphic Arts
- Industrial Surface Coatings
- Open Burning of Residential Waste
- Residential Fuel Combustion
- Solvent Cleaning/Degreasing
- Traffic Markings

Where appropriate, area source estimates were reconciled with the state point source inventory, and adjusted to account for control requirements in non-attainment areas.

The following subsections describe the general procedures used to calculate each type of source as well as any deviations from the standard methodologies set by the project's Technical Steering Committee. SIC/NAICS and county specific employment numbers were obtained from the Wisconsin Business Patterns published by the U.S. Department of Commerce, Bureau of the Census. 2002 county population data were obtained from Bureau of Health Information of the Department of Health and Family Services (<http://www.dhfs.state.wi.us/population/index.htm>).

### *Agricultural Pesticides (Atrazine)*

The SIC code for this category is 0115 (Agricultural Production Crops, Corn). County specific corn acreage and the percent of corn crops to which Atrazine is applied were obtained from the USDA (<http://usda.mannlib.cornell.edu/usda>), and from the Wisconsin Agricultural Statistics Services ([http://www.nass.usda.gov/wi/county\\_estimates](http://www.nass.usda.gov/wi/county_estimates)).

Atrazine emission were calculated using a per acre application rate of 0.90 Lb/Acre, and an atrazine weight factor of 18%.

### ***Architectural Surface Coating***

Emissions were calculated by speciating each toxic from the total VOC content of all surface coatings used. Emissions from solvent-based coatings and water-based coatings were estimated separately, but were added together for total emissions. The total amounts of coatings used were estimated using a per capita emission factor.

### ***Auto Body Refinishing***

The NAICS code for this category is 811121 (Automotive Body, Paint, and Interior Repair and Maintenance). Emissions were calculated by speciating each toxic from total VOC emissions. VOC numbers for this source category were calculated using a state specific per employee factor of 87.28 LB VOC/employee.

### ***Aviation Gasoline Distribution***

Aviation fuel use for the Great Lakes region was obtained from the Federal Aviation Administration's (FAA) Aviation Policy and Planning Office's (APO) Terminal Area Forecast (TAF) System. Fuel was apportioned to the state and county level using the fraction of general aviation LTO cycles for each county. Emissions were calculated by multiplying specific toxic emission factors by the amount of aviation gasoline consumed. Emission factors for this category were obtained from Documentation for the Draft 2002 Nonpoint Source National Emissions Inventory for Criteria and Hazardous Air Pollutants (March 2005 Version), [ftp://ftp.epa.gov/EmisInventory/draftnei2002/nonpoint/documentation/2002\\_neidraftnpdocument\\_ation\\_mar1605.pdf](ftp://ftp.epa.gov/EmisInventory/draftnei2002/nonpoint/documentation/2002_neidraftnpdocument_ation_mar1605.pdf)

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

Emissions were calculated by multiplying the estimated 2002 county population by a per capita emission factor. Emission factors for this category were obtained from Documentation for the Draft 2002 Nonpoint Source National Emissions Inventory for Criteria and Hazardous Air Pollutants (March 2005 Version).

### ***Dry Cleaning***

This category included commercial dry cleaners. The amount of PERC (in gallons) used for dry cleaning in the state was obtained from the Wisconsin Department of Revenue. The Wisconsin Department of Revenue imposes a tax on the use of Perchloroethylene for dry cleaning. The amount of PERC was then apportioned to the counties based on population. Only those counties with dry cleaning establishments were included. A list of dry cleaning establishments was obtained from the Wisconsin Department of Commerce.

PERC emissions were calculated based on the type of type of dry cleaning machine used, and controls in place. The fractions of the average machine type/control combinations were estimated from the data from the initial notification for Dry Cleaning. Of the machines in used, 78% are dry to dry; 22% transfer machines. 83% of the dry to dry machines are controlled while 17% has no controls. Of the transfer machines, 86% have controls while 14 % are uncontrolled.

### ***Fuel Marketing***

Emissions were calculated using VOC speciation and toxic specific emission factors. VOC emission factors were based on units of gasoline dispensed. County gasoline usage was derived from county gasoline sales data provided by Wisconsin Department of Revenue.

### ***Graphic Arts***

Employment information from NAICS group 323 and 511 were used to estimate emissions. Emissions were calculated by speciating each toxic from the total VOC emissions. A VOC emission factor of 70.1 LB/employee/year was developed using emissions information from the 1996 and 1997 Wisconsin inventory for small point sources (emissions less than 5 TPY) in SIC group 27%.

### ***Human Cremation***

The SIC for this category is 7261 (Funeral Service and Crematories). Emissions for this category were calculated following the methodology indicated in the Documentation For The 1999 Base Year Nonpoint Source National Emissions Inventory for Hazardous Air Pollutants (<ftp://ftp.epa.gov/EmisInventory/draftnei99ver2/haps/documentation/>). Emissions were calculated using emission factors based on the weight cremated. The number of bodies cremated by county, in 2002, was obtained from Department of Health and Family Services, Wisconsin Bureau of Health Information. The allocation of emissions to the county level is not accurate for this source category. The numbers of bodies cremated in a particular county indicate the final disposition of the body, and not necessarily the location where the cremation took place. Crematories are not regulated in the state; therefore, the exact location of crematories is unknown.

### ***Industrial Surface Coating***

SIC/NAIC specific, per employee VOC emission factors were derived using emissions information from the WDNR air emissions inventory for industrial point sources following guidance from the EIIP documentation. Toxic emissions were calculated by speciating each toxic from the total VOC emissions. VOC numbers for all, except three AMS groups from this source category, were calculated using a per employee emission factor. VOC for the remaining three AMS groups including Miscellaneous Manufacturing, Industrial Maintenance, and Other Special Purpose, were calculated using a per capita emission factor. Toxic speciation profiles were obtained from U.S. EPA, Speciate, Version 3.2. RTP, NC.

### ***Open Burning of Residential Waste***

This category includes burning of yard wastes (leaves and brush) and residential combustible household waste. For both categories, county level household waste generation estimates were derived from statewide estimates provided by the Bureau of Solid and Hazardous Waste, of the Wisconsin Department of Natural Resources. Emission factors for this category were obtained from Documentation for the Draft 2002 Nonpoint Source National Emissions Inventory for Criteria and Hazardous Air Pollutants (March 2005 Version).

### ***Publicly Owned Treatment Works***

The SIC for this category is 4952 (Sewerage Systems). County level emissions were estimated by multiplying the annual wastewater flow rate by an emission factor. Emission factors for this category were obtained from Documentation for the Draft 2002 Nonpoint Source National

Emissions Inventory for Criteria and Hazardous Air Pollutants (March 2005 Version). Wastewater data were obtained from the WDNR, Bureau of Integrated Science Services. The amount of wastewater treated was point source adjusted to avoid the double counting.

### ***Residential Fuel Combustion***

Emissions were based on units of fuel used. Four fuel types were included with this source category: coal, distillate fuel oil, liquefied petroleum gas, and natural gas. Fuel use data were obtained from the 2002 Wisconsin Energy Statistics published by the Wisconsin Energy Bureau, Department of Administration. Fuel usage was apportioned to the county level using the fraction of total occupied households and type of fuel consumed in the year 2000. The data on the number of occupied housing units by house heating fuel was obtained from Table H40, SF3 U.S. Bureau of the Census – Prepared by the Demographic Services Center, Wisconsin Department of Administration.

### ***Residential Wood Combustion***

Calculated emissions were based on units of wood fuel used. Emission factors were available for fireplaces, and three wood burning stove types including conventional, catalytic, and non-catalytic. Wisconsin chose to apportion the 2002 county specific wood fuel use data obtained from the 2002 Wisconsin Energy Statistics into the four wood burning types based on county specific percentages. These percentages were developed from data obtained in the Residential wood fuel Consumption and Production in Wisconsin, 1994 developed by the United States Department of Agriculture, Forest Service, and the percentage of households using wood fuel, from the Housing Census.

### ***Solvent Cleaning***

The NAICS codes for this category are 417,423,551,552,554-556,753 / 326212, 44111X, 44112X, 44121X, 441222, 44711X, 44719X, 48849X, 81111X, 81112X and 811198. Emissions were calculated by speciating each toxic from the total VOC emissions. VOC emissions were calculated using a per employee emission factor. A statewide Pollution Prevention Adjustment factor of 85% was applied to the emission estimates. In addition an overall control efficiency of 30% and 8% was applied to clean-up solvent usage in the 9-county ozone non-attainment area.

### ***Stationary Fuel Combustion***

This category represents the aggregation of emissions from fuel combustion processes at commercial/institutional facilities whose emissions are below reporting levels, and which did not have to report their emissions to the Air Program's emissions inventory database. Statewide fuel use data were obtained from the 2002 Wisconsin Energy Statistics published by the Wisconsin Energy Bureau, Department of Administration. Fuel usage was reconciled with the amount in the State's point source emissions inventory, and then apportioned to the county level using employment information in the commercial/institutional sector.

### ***Structural Fires***

Emissions from this category were estimated following the methodology outlined in the Emission Inventory Improvement Program (January, 2001), Volume III, Chapter 18, Structure Fires. Information on the number of structural fires by county was obtained from the Wisconsin Department of Commerce, Field Operations Bureau, Chief of Inspection and Safety Support.

### ***Traffic Markings***

The SIC for this category is 1611 (Highway and Street Construction). Methanol was the only hazardous air pollutant identified for this source category, based on the traffic paint's Material Safety Data Sheet (MSDS). Emissions were based on total traffic paint used in each county, the air toxic weight percent in the paint used, and the paint density. Total traffic paint used in each county was calculated by apportioning the gallons of paint used in each traffic district, to the mileage percentage of paved roads in each county within the traffic district. Information on the amount of paints applied, and paint formulations were obtained from the Wisconsin Department of Transportation. The assumption was made that the reapplication rate was once per year. The miles of paved road in each county were obtained from the Wisconsin Blue Book (Highway Mileage by County and System, January 2002 (Wisconsin Blue Book, <http://www.legis.state.wi.us/lrb/bb/840-848.pdf> ). Park and forest roads were not included.

## **MOBILE SOURCES**

Emissions for mobile sources were compiled for the categories of aircrafts, locomotives, commercial marine vessels, and off-road and on-road sources. Emission estimates for aircrafts, locomotives and commercial marine vessels followed the methodology were derived using the guidance provided in the "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory" (February 2005). A description of the calculation methods, and data sources for each source inventoried follows.

### ***Aircraft Sources***

Aircraft categories included all aircraft types used for public, private, and military purposes:  
Commercial;  
Air Taxis;  
General Aviation;  
Military.

LTO cycles for commercial carriers, air taxi, general aviation, and military aircraft were obtained from Wisconsin DNR 2002 Periodic Emission Inventory. Particulate and hydrocarbon emissions were then calculated using the Emissions and Dispersion Modeling System (EDMS), version 4.01. Hydrocarbon emissions were converted VOC or TOG . HAP emissions were speciated from VOC or TOG emissions according to the aircraft type and engine type. Commercial carriers, air taxi, and general aviation emissions were speciated. Military aircraft TOG emissions were speciated in RAPIDS.

### ***Locomotives***

This category included Diesel-electric engines powered locomotives. Criteria pollutant emissions and fuel activity data for this category were obtained from the Wisconsin DNR 2002 Periodic Emission Inventory. Emissions of HAPs were estimated by speciation of VOC or PM10 emissions, or by emission factors based on fuel consumption.

### ***Commercial Marine Vessels***

This category consisted of diesel, and steam-powered vessels. Marine diesel engines and steam boilers both use residual fuels, ferry boilers use coal combustion. The vessel hours in individual

county port, fuel consumption rate, and VOC/PM emission factors were obtained from the 2002 Wisconsin Periodic Emissions Inventory.

***On-road Mobile Sources***

Emission estimates for hazardous air pollutants from USEPA's 2002 Draft National Emissions inventory were used for this category. The emission estimates were based on output from the Mobile 6.2 model. These estimates and the modeling assumptions were reviewed and found consistent with state emission estimates.

***Non-road Mobile Sources***

Emissions for this category were estimated using the National Mobile Inventory Model (NMIM).

## Wisconsin - Statewide Emissions (lb/yr)

Pollutant Name (CAS)	Point Source Emissions	Area Source Emissions	On-road Emissions	Non-road Emissions	Total Emissions
Acenaphthene (83-32-9)	0.09524	4699	1104	1051	6854
Acenaphthylene (208-96-8)	0.889	78,310	5907	2941	87,160
Acetaldehyde (75-07-0)	165,800	1701	1,000,000	725,600	1,893,000
Acetamide (60-35-5)		0.6644			0.6644
Acetonitrile (75-05-8)	247.4	795.4			1043
Acetophenone (98-86-2)	901.1	46.87			947.9
2-Acetylaminofluorene (53-96-3)	74.62				74.62
Acrolein (107-02-8)	8889	43,260	118,100	93,280	263,500
Acrylic acid (79-10-7)	36.87	10.37			47.24
Acrylonitrile (107-13-1)	2598	889			3487
Allyl chloride (107-05-1)	14.15	44.69			58.84
Anthracene (120-12-7)	0.0567	6191		90.97	6282
Antimony (7440-36-0)	11,090	3.152			11,100
Arsenic (7440-38-2)	2391	121	6.415		2518
Atrazine (1912-24-9)		247,400			247,400
Benz(a)anthracene (56-55-3)	55.12	7672	298.2	261.3	8286
Benzo(g,h,i)perylene (191-24-2)	0.02592	4028	383.7	788.1	5200
Benzene (71-43-2)	202,000	1,737,000	6,186,000	3,685,000	11,810,000
Benzo(a)pyrene (50-32-8)	20.48	2523	187.4	213.2	2944
Benzo(b)fluoranthene (205-99-2)	22.63	3100	207.5	146.9	3477
Benzo(k)fluoranthene (207-08-9)	0.01476	1196	207.5	132.5	1536
Benzyl chloride (100-44-7)		18.79			18.79
Beryllium (7440-41-7)	330.6	82.84			413.4
Biphenyl (92-52-4)	71,140	2608			73,750
Bromoform (75-25-2)	3.33				3.33
Methyl bromide (74-83-9)	7838	1,104,000			1,111,000
1,3-Butadiene (106-99-0)	2401	57.98	683,600	491,100	1,177,000
Cadmium (7440-43-9)	801	132.5			933.5
Carbon disulfide (75-15-0)	3702	9955			13,660
Carbon tetrachloride (56-23-5)	13,100	2598			15,700
Chlorine (7782-50-5)	79,340	0.00007797	1195		80,530
Chlorobenzene (108-90-7)	16,030	357,100			373,100
Chloroethane (75-00-3)	126.3	49,840			49,970
Chloroform (67-66-3)	107,400	20,260			127,700

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2-Chloro-1,3-butadiene (126-99-8)		54.77			54.77
Chromium (7440-47-3)	7786	128	1171	31.46	9116
Chromium VI (18540-29-9)	166.4	1.384	231.5	16.2	415.5
Chrysene (218-01-9)		5800	164	187.5	6151
Cobalt (7440-48-4)	5100	5.023			5105
Copper (7440-50-8)	11,740	136.8	388.4		12,260
Cresol (mixed isomers) (1319-77-3)	11,790	3.757			11,800
M-Cresol (108-39-4)	1601				1601
O-Cresol (95-48-7)					
P-Cresol (106-44-5)	71.7				71.7
Cumene (98-82-8)	16,270	13,390			29,660
Cyanide (57-12-5)	128				128
2,4-D (2,4-Dichlorophenoxyacetic acid) (94-75-7)	32.53				32.53
Dibenz(a,h)anthracene (53-70-3)	13.92	529.9	0.09605	6.159	550
Dibenzofuran (132-64-9)	0.00002023	40.63			40.63
1,2-Dibromoethane (106-93-4)	0.1				0.1
Di-N-butyl phthalate (84-74-2)	48.78	20.46			69.24
1,2-Dichloroethane (107-06-2)	314.5	65.87			380.4
Dichlorvos (DDVP) (62-73-7)	29.4				29.4
1,4-Dichlorobenzene (106-46-7)	245.1	409,600			409,800
1,1-Dichloroethane (75-34-3)	777.4				777.4
1,3-Dichloropropene (542-75-6)		790,700			790,700
Diethanolamine (111-42-2)	411	55.55			466.5
Diethylhexyl phthalate (117-81-7)	34.77	14.92			49.69
Dimethyl phthalate (131-11-3)	287.9	13.02			300.9
Dimethyl sulfate (77-78-1)	15.7	0.1334			15.83
3,3'-Dimethylbenzidine (119-93-7)	260.5				260.5
N,N-Dimethylformamide (68-12-2)	122.8	44,350			44,470
Dimethylaniline (121-69-7)	0.14	742.1			742.3
2,4-Dinitrophenol (51-28-5)	0.07383	0.00000002			0.07383
2,4-Dinitrotoluene (121-14-2)		110.7			110.7
Di-N-octyl phthalate (117-84-0)	22.15				22.15
1,4-Dioxane (123-91-1)	235.8	126.5			362.3
Epichlorohydrin (106-89-8)	488.5	10.48			499
Ethyl acrylate (140-88-5)		6.612			6.612
Ethyl benzene (100-41-4)	82,130	428,800	2,152,000	2,617,000	5,281,000

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Ethylene glycol (107-21-1)	27,330	872,400			899,700
Ethylene oxide (75-21-8)	189.6	511.2			700.7
Fluoranthene (206-44-0)	390.3	8635	1366	2121	12,510
Fluorene (86-73-7)	0.1652	10,580	2308	2860	15,740
Formaldehyde (50-00-0)	170,600	41,350	2,248,000	1,826,000	4,286,000
Glycol ethers	385,900	322,000			707,900
Hydrochloric acid (7647-01-0)	5,392,000	213,200			5,605,000
Hexachlorocyclopentadiene (77-47-4)	65.7	1.384			67.08
Hexamethylene-1,6-diisocyanate (822-06-0)	60.82				60.82
Hexane (110-54-3)	90,030	2,592,000	1,725,000	1,899,000	6,306,000
Hexachloro-1,3-butadiene (87-68-3)		1.582			1.582
Hexachlorobenzene (118-74-1)		5.062			5.062
Hydrogen fluoride (7664-39-3)	1,545,000	149.5			1,546,000
Hydrazine (302-01-2)	0.6				0.6
Hydrogen cyanide (74-90-8)	1394	448,100			449,500
Hydrogen sulfide (7783-06-4)	237,800				237,800
Hydroquinone (123-31-9)	148.2	4615			4763
Indeno(1,2,3-c,d)pyrene (193-39-5)	2.271	2668	103.7	240.6	3015
Isophorone (78-59-1)	626.4	5642			6269
Lead (7439-92-1)	12,010	289.5	76.07		12,380
Alkylated lead		16.56			16.56
Maleic anhydride (108-31-6)	723.4				723.4
Manganese (7439-96-5)	29,120	807.4	1381	33.49	31,340
Mercury (7439-97-6)	2621	95			2716
Mercury (organic) (22967-92-1)	1254				1254
Methyl ethyl ketone (78-93-3)	784,400	3,569,000			4,353,000
Methyl iodide (74-88-4)	5.1				5.1
Methyl isobutyl ketone (108-10-1)	220,000	2,817,000			3,037,000
Methyl methacrylate (80-62-6)	32,750	715.9			33,460
Methyl tert-butyl ether (1634-04-4)	7397	264.8	114,500		122,200
Methanol (67-56-1)	3,258,000	3,602,000			6,860,000
4,4'-Methylenedianiline (101-77-9)	0.45				0.45
4,4'-Methylenediphenyl diisocyanate (101-68-8)	1043				1043
Methyl chloride (74-87-3)	78,340	41,540			119,900
Methylene chloride (dichloromethane) (75-09-2)	143,600	671,700			815,300
Naphthalene (91-20-3)	40,510	447,000	148,500	28,310	664,300

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Nickel (7440-02-0)	12,190	279.4	900.3	64.73	13,430
Nitrobenzene (98-95-3)		15.03			15.03
4-Nitrophenol (100-02-7)	0.04801	0.00000001			0.04801
2-Nitropropane (79-46-9)		11.25			11.25
Polychlorinated biphenyls (PCBs) (1336-36-3)	3.26	658.1			661.4
Polychlorinated dibenzodioxins, total	0.02728	3.379	0.1084	0.03808	3.553
Polychlorinated dibenzofurans, total	0.1243	17.73	0.02041	0.006802	17.88
Pentachlorophenol (87-86-5)	0.000582	12.2			12.2
Tetrachloroethylene (Perc) (127-18-4)	46,790	398,400			445,200
Phenanthrene (85-01-8)	1.288	41,350	3798	4725	49,880
Phenol (108-95-2)	123,100	34,860		961.4	159,000
Phosphine (7803-51-2)	268.5				268.5
Phosphorus (7723-14-0)	121.2	10.69			131.9
Phthalic anhydride (85-44-9)	1				1
Propionaldehyde (123-38-6)	2.67	8.85	130,300	198,100	328,500
Propylene dichloride (78-87-5)	0.34	39.54			39.88
Propylene oxide (75-56-9)	454.8	1686			2141
Pyrene (129-00-0)	0.3392	10,160	1907	2464	14,530
Quinone (106-51-4)	0.04				0.04
Selenium (7782-49-2)	9247	415.5	18.37		9681
Styrene (100-42-5)	601,200	178,600	448,200	213,700	1,442,000
2,3,7,8-Tetrachlorodibenzo-p-dioxin (1746-01-6)	0.0002171	0.001091	0.0007113		0.002019
2,3,7,8-Tetrachlorodibenzofuran (51207-31-9)	0.014	0.01297	0.001871	0.0005971	0.02944
1,1,1-Trichloroethane (71-55-6)	121.9	1,947,000			1,947,000
1,1,2,2-Tetrachloroethane (79-34-5)	279.9	3.955			283.8
Toluene (108-88-3)	760,400	12,880,000	14,610,000	22,870,000	51,120,000
Toluene-2,4-diisocyanate (584-84-9)	177.6				177.6
O-Toluidine (95-53-4)		4.221			4.221
Trichloroethylene (79-01-6)	348,700	3379			352,100
1,2,4-Trichlorobenzene (120-82-1)		224			224
1,1,2-Trichloroethane (79-00-5)	221.7	2.768			224.5
2,4,6-Trichlorophenol (88-06-2)	0.0002506				0.0002506
Triethylamine (121-44-8)	10,310	4764			15,070
2,2,4-Trimethylpentane (540-84-1)	2984	134,700	5,222,000	9,267,000	14,630,000
Vinylidene chloride (75-35-4)	5.82	974.3			980.1
Vinyl acetate (108-05-4)	29,480	9531			39,010

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Vinyl chloride (75-01-4)	1174	15.42			1189
M-Xylene (108-38-3)	1422				1422
O-Xylene (95-47-6)	823.3	154,100		537.3	155,400
P-Xylene (106-42-3)	2.44				2.44
Xylene (mixed isomers) (1330-20-7)	717,900	12,180,000	8,240,000	11,390,000	32,530,000