

# **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 2001.

The sources inventoried were individual point sources, non-industrial area sources, and on-road and non-road mobile sources. The 2001 inventory includes an updated point source inventory, and updates and corrections to a number of area sources. The inventory also concentrated on improvements to the inventory of mercury emissions.

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 Factor Information Retrieval System (FIRE 6.23) and the Reference Tables in the Regional Air Pollution Inventory Development System (RAPIDS) were also utilized in the inventory development. Emission summaries for point and area sources for the state of Wisconsin are provided following this portion of the report document.

## **DATA SOURCES**

### **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:

**Table I-1: Pollutants Included in Inventory for the State of Wisconsin**

<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		
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

<b>Pollutant Code</b>	<b>GLC Name</b>	<b>THRESHOLD (LB)</b>	<b>NR438 NAME</b>
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
DIBENZAAN	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
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
HEXA CL-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

<b>Pollutant Code</b>	<b>GLC Name</b>	<b>THRESHOLD (LB)</b>	<b>NR438 NAME</b>
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)
METHENE(B)4-	4,4-METHYLENEDIIPHENYL 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)
PTHALIC ANH	PTHALIC ANHYDRIDE	2186	Phthalic anhydride
PROPIONALDEH	PROPIONALDEHYDE	6000	Propionaldehyde
PRPLENE DICH	PROPYLENE DICHLORIDE	6000	Propylene dichloride
PRPLENE OXID	PROPYLENE OXIDE	125	Propylene oxide

Pollutant Code	GLC Name	THRESHOLD (LB)	NR438 NAME
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	VINYLLIDENE 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
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 2001 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 (SIC) and industrial process codes (SCCs). However, many SIC and SCC codes are not responsible for air emissions above any of the reporting thresholds.

### Area Sources:

Emissions from twenty non-point area sources were included for the 2001 inventory project. These area sources are:

**Table I-2: Area Sources Inventoried by the State of Wisconsin**

- Agricultural Pesticides
- Auto Body Refinishing
- Consumer and Commercial Solvents
- Fuel Marketing
- Human Cremation
- Fluorescent Lamp Breakage
- Landfills
- Publicly Owned Treatment Works (POTW)
- Residential Wood Combustion
- Stationary Fuel Combustion
- Architectural Surface Coatings
- Aviation Gasoline Distribution
- Dry Cleaning
- Graphic Arts
- Industrial Surface Coatings
- Fluorescent Lamp Recycling
- Open Burning Forest and Wildfires
- Residential Fuel Combustion
- Solvent Cleaning
- Traffic Markings

Where appropriate, area source estimates were reconciled with the state point source inventory.

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. 2001 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***

The SIC code for this category is 0115 (Agricultural Production Crops, Corn). Emissions were calculated following the 1996 National Toxics Inventory (NTI) methodology for agricultural pesticides. 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)).

Three hazardous air pollutants were listed in the agricultural pesticides fields: (1) Atrazine; (2) Trifluralin; (3) Hexachlorobenzene. Atrazine is applied exclusively in corn crops. Atrazine used were calculated using a per acre emission factor, 0.80 Lb/Acre. Then atrazine emissions were calculated by multiplying used atrazine a weight factor, 18% of atrazine applied.

Hexachlorobenzene emissions were estimated by multiplying 8.40E-08 LB HCB/LB of atrazine used. Trifluralin is typically not used in Wisconsin.

### ***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 per employee factor, 4,238 LB VOC/employee.

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

TetraEthylLead (TEL) and ethylene dichloride emissions were estimated in aviation gasoline. Emissions were calculated following the 1999 National Emissions Inventory (NEI) methodology. Aviation fuel use data were obtained from the 2000 Wisconsin Energy Statistics published by the Wisconsin Energy Bureau, Department of Administration. Fuel was apportioned to the county level using the fraction of general aviation LTO cycles for each county. Emissions were calculated by multiplying specific toxic emission factors, i.e.  $1.78E-05$  (mass TEL/mass leaded aviation gasoline) and  $1.16836E-6$  (LB/gal gasoline).

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

Emissions were calculated by multiplying the estimated 2001 county population by a per capita emission factor.

### ***Dry Cleaning***

This category included commercial and coin operated 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.

### ***Fluorescent Lamp Breakage***

Emission estimation followed the methodology in the “Documentation for the 1999 Base Year Non-point Source National Emission Inventory for Hazardous Air Pollutants”. In 1999, 620 million lamps, containing 17 tons of Hg, were discarded in U.S. The amount of Hg discarded in Wisconsin was obtained by apportioning Wisconsin’s population to the national population. 70% of these lamps (Hg) were assumed to end up in landfills. It is assumed that 6.6% of the mercury contained n lamps is released to the atmosphere. The estimated emissions from this category are 30.5 pounds.

### ***Fluorescent Lamp Recycling***

Emissions for this category were calculated following the methodology indicated in the Documentation for the 1999 Base Year Non Point Source National Emissions Inventory for Hazardous Air Pollutants(<ftp://ftp.epa.gov/EmisInventory/draftnei99ver2/haps/documentation/>). In 1999, 620 million lamps were discarded in the U.S. The amount of lamps discarded in Wisconsin was obtained by apportioning Wisconsin’s population to the national population. A 30% recycling rate was assumed. The names and locations of fluorescent lamp-recycling

facilities were obtained from Wisconsin DNR Waste Management Program (<http://www.dnr.state.wi.us/markets/>). The number of recycled lamps for each county with lamp recycling (non drop-off) facilities was by estimated by apportioning the county population to the number of discarded lamps in the state, and multiplying that amount by the recycling rate. Mercury emissions were calculated by multiplying the number of lamps recycled by and emission factor of 0.00088-mg Hg/lamp. The estimated mercury emissions from this category amount to 0.007 pounds.

### ***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 population, statewide gasoline consumption, and county vehicle miles traveled (VMT). Stage 1 calculations for all counties, except 20 counties in or around the ozone non-attainment area of the state, where controlled submerge filling is required, included 80% uncontrolled submerge filling and 20 % uncontrolled splash filling. Information on tank filling procedures was obtained from the state's Liquid Underground Storage Tank (LUST) Program. In addition, a 15% reduction was applied to VOC emissions from transit losses, tank breathing and spillage to account for the effect of gasoline vapor pressure regulations. A rule effectiveness of 90 % and rule penetration of 100% was assumed for Stage I. This resulted in an overall control efficiency of 96.22%. Stage 2 (vehicle gas tank filling) controls were applied to a 9 county ozone non-attainment area of the state. This included 95% control with rule effectiveness and rule penetration of 90%. Reformulate gasoline (RFG) factors were also applied, if any, to the counties that sell reformulate gasoline during ozone season.

### ***Graphic Arts***

Employment information from NAICS group 323 and 511 were used to estimate emissions. The total employment data of each county was adjusted to avoid double counting by deducting 1998 point source employment data. 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 2001, 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 specific, per employee VOC emission factors were derived using emissions information from the 1997, 1998 and 1999 WDNR air emissions inventory for industrial point sources following guidance from the EIIIP 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 3.1. RTP, NC.

### ***Landfills***

The SIC for this category is 4953 (Refuse Systems). Emissions were calculated by applying the equations from the US EPA Landfill Air Emissions Estimation Model. The input variables needed to generate emissions for a single facility using these equations were tons of waste received per year, total years since the facility opened, and total years the facility has been closed. Landfill data were obtained from the WDNR, Bureau of Solid and Hazardous Waste. Emissions for each facility in a county were added to obtain emissions per county. Adjustments were made to emissions from facilities with flaring by applying a 75% capture efficiency and a 98% control efficiency in accordance to state regulations.

### ***Open Burning: Forest and Wildfires***

Emissions estimates followed the method in the “Documentation for the 1999 Base Year Non-point Source National Emission Inventory”. Emissions were obtained by multiplying pollutant emission factors by the biomass consumed in the fires. 10.4 ton biomass/acre was used to convert acreage burned to biomass consumed. WDNR Bureau of Forestry provided the number of acres burned. Emissions were estimated under two types of combustion conditions, flaming and smoldering. It was assumed 75 percent of biomass burned under flaming conditions while the other 25 percent burned under smoldering conditions.

### ***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. The emission factors for POTWs were derived by dividing the 1999 national POTW emissions, by the 1999 national flow rate in million gallons per year. As a result, POTW emission factors are in units of pounds HAP emitted per million gallons of wastewater (lb/10<sup>6</sup> gal). 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 2001 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 three wood burning stove types including conventional, catalytic, and non-catalytic. Wisconsin chose to apportion the 2001 county specific wood fuel use data obtained from the 2001 Wisconsin Energy Statistics into the three 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 331-337, 339, 488, 4411, and 8111. 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 a source control factor of 30% was applied to clean-up solvent usage in the 9-county ozone non-attainment area.

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

This category represents the aggregation of mercury emissions from fuel combustion processes at facilities whose emissions are below reporting levels, and which did not have to report their emissions to the Air Program's emissions inventory database. This source was created in an effort to improve the state and regional mercury emissions inventory. A total of 365 facilities with combustion processes associated with mercury emissions (i.e., with available emission factors in FIRE) were identified. Emissions from these facilities were estimated using RAPIDS and then aggregated at the county level. The total mercury emissions from this source category amount to 108 pounds.

### ***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 1997-1998. Park and forest roads were not included.

## **MERCURY**

One of the objectives of the regional inventory effort is to continue improving the quality and completeness of mercury emission estimates. For the 2001 inventory, emissions were estimated

from combustion point sources that did not have to report their mercury emissions to the state's emissions inventory database. The emissions from these sources were below the reporting threshold under the state emissions reporting rule, NR 438. The emissions from these sources were estimated using FIRE 6.23 emission factors, and aggregated at the county level. The aggregated mercury emissions from this category amounted to 108 pounds.

Mercury emissions from point and areas sources in the state for the year 2001 were estimated at 5,097 pounds. Of that total, approximately 3,640 pounds come from point sources, 241 pounds from non-industrial area sources, and 1,215 from mobile sources (Table 2). The mercury emissions were associated with 99 source categories and 53 process categories. Table 1 presents mercury statewide emissions by process category. The top five process categories account for approximately 88 percent of the mercury emissions.

**Table I-3: Mercury Emissions by Process Category**

<b>Process Category</b>	<b>Emissions (pounds)</b>	<b>Percent of total</b>
COAL COMBUSTION	2127.88	41.75%
CHLORO-ALKALI	1111.18	21.80%
HEAVY DUTY DIESEL VEHICLES	946.28	18.56%
MUNICIPAL INCINERATION	194.02	3.81%
RESIDENTIAL FUEL COMBUSTION	96.75	1.9%
OTHER (Less than 1.9% of total)	621.21	12.18%
TOTAL	5097.32	100.00%

**Table I-4: Wisconsin - Statewide Emissions (lb/yr)**

<b>Pollutant Code</b>	<b>Point Source Emissions (lb/yr)</b>	<b>Area Source Emissions (lb/yr)</b>	<b>On-Road Source Emissions (lb/yr)</b>	<b>Non-Road Source Emissions (lb/yr)</b>	<b>Total Emissions (lb/yr)</b>
ACENAPHTHEN	0.07	8,678.25	1,456.97	117.31	10,252.60
ACENAPHTHYL	0.46	130,084.13	7,671.99	796.68	138,553.26
ACETALDEHYDE	447,542.61	24,868.20	1,512,162.45	1,139,065.42	3,123,638.68
ACETAMIDE		0.65			0.65
ACETIC ACID	438,687.08				438,687.08
ACETIC ANHYD	3,374.00				3,374.00
ACETONITRILE	298.81	718.67			1,017.48
ACETOPHENONE	726.73	46.11			772.84
ACETYLAMIN,2	75.35				75.35
ACROLEIN	9,428.42	25,318.51	173,175.28	124,285.87	332,208.09
ACRYLAMIDE	234.90				234.90
ACRYLIC ACID	32.15	0.02			32.17
ACRYLONITRIL	1,625.67	3,684.06			5,309.73
ALLYL ALCOHO	100.00				100.00
ALLYL CHLORI	48.76	40.34			89.10
ALUMINUM	14,035.22				14,035.22
AMMONIA	991,069.32			0.65	991,069.97
ANTHRACENE	0.04	11,224.77	1,753.72	232.14	13,210.68
ANTIMONY	6,185.29	3.56E-04			6,185.29
ARSENIC	2,463.10	105.42	920.12	8.37	3,497.01
ATRAZINE		324,972.00			324,972.00
BARIUM	39,331.82				39,331.82
BENZ(A)ANTHR	197.73	16,099.28	430.31	926.78	17,654.11
BENZ(GHI)PE	0.01	7,222.48	514.85	1,806.42	9,543.76
BENZALDEHYDE	0.11				0.11
BENZENE	205,113.46	2,745,444.65	7,864,731.52	9,245,427.17	20,060,716.80
BENZIDINE	0.04				0.04
BENZO(A)PYRE	62.81	4,374.45	263.44	542.45	5,243.14
BENZO(B)FLUO	15.60	4,860.45	289.95	479.21	5,645.22
BENZO(BJK)FL	0.27	2.18E-06			0.27
BENZO(C)PHEN		225.54			225.54
BENZO(E)PYRE		7,576.89			7,576.89
BENZO(GHI)FL		7,644.08			7,644.08
BENZO(K)FLUO	0.01	1,631.80	289.95	512.62	2,434.38
BENZOFLUO		297.25			297.25
BENZYL CHLOR		17.00			17.00
BERYLLIUM	319.27	54.72		14.80	388.78
BIPHENYL	70,917.19	5,046.10			75,963.29
BORON	7.52				7.52
BRDIDLMETHAN	0.09	4,433.02			4,433.12
BROMINE	81.75				81.75
BROMOFORM	0.95				0.95
BROMOMETH	7,400.18				7,400.18

<b>Pollutant Code</b>	<b>Point Source Emissions (lb/yr)</b>	<b>Area Source Emissions (lb/yr)</b>	<b>On-Road Source Emissions (lb/yr)</b>	<b>Non-Road Source Emissions (lb/yr)</b>	<b>Total Emissions (lb/yr)</b>
BUT ACRYLATE	1.00				1.00
BUT ALC,N	427,839.07				427,839.07
BUT CARBITOL		51,195.19			51,195.19
BUT CELLOSOL	641,983.21	276,730.77			918,713.98
BUTADIENE,13	7,230.97	23,372.02	1,027,003.38	895,037.69	1,952,644.07
BUTANE	18,948.08	2,527.29			21,475.38
BW10			1,562,720.00		1,562,720.00
CADMIUM	947.60	274.78		15.61	1,237.99
CALCIUMOXIDE	65,600.91				65,600.91
CAPROLACTAM	12,015.00				12,015.00
CARBITOL		11,069.23			11,069.23
CARBON BLACK	9,364.02				9,364.02
CARBON DISUL	150,735.44	9,382.34			160,117.78
CARBON TETRA	4,095.91	2,354.06			6,449.97
CARBONYL SUL	1,809.08	285.34			2,094.42
CELLOSLV ACE	2,113.00	33,207.69			35,320.69
CELLOSOLVE	1,952.00	22,138.46			24,090.46
CFC-11	0.50				0.50
CFC-113	1.50				1.50
CHLOR DIOXID	10,689.39				10,689.39
CHLORIDE	0.25				0.25
CHLORINE	101,303.31				101,303.31
CHLOROBENZ	15,024.14	388,315.03			403,339.17
CHLOROETHANE	126.99	697.21			824.21
CHLOROFORM	159,740.18	18,789.87			178,530.05
CHLOROPHEN,2	4.82E-03				0.00
CHLOROPRENE	34.36	49.56			83.92
CHROMIUM	14,742.01	296.87	345.10	814.04	16,198.03
CHROMIUM VI	233.83		228.71		462.54
CHRYSENE		10,988.98	228.37	698.58	11,915.93
COBALT	3,030.34	14.49			3,044.83
COPPER	22,958.62	251.32	35,921.53		59,131.48
CRESOL MX IS	0.10	3.46			3.56
CRESOL,M	77.85				77.85
CRESOL,O	0.30				0.30
CRESOL,P	77.92				77.92
CROTONALDEHY	88.64				88.64
CUMENE	3,155.64	2,714.80			5,870.44
CYHEXANOL	106.00				106.00
CYHEXANONE	65,468.52				65,468.52
D,2,4	145.84				145.84
DIACETNE ALC	48,367.65				48,367.65
DIAZINON	62.00				62.00
DIBENZAHAN	1.31E-03	1,369.32		98.43	1,467.76
DIBENZOFURAN	2.16E-05	40.00			40.00

Pollutant Code	Point Source Emissions (lb/yr)	Area Source Emissions (lb/yr)	On-Road Source Emissions (lb/yr)	Non-Road Source Emissions (lb/yr)	Total Emissions (lb/yr)
DIBROMOET,12	0.96				0.96
DIBUTYL PHTH	26.54	116,473.52			116,500.06
DICHLORETH12	418.51	1,653.01			2,071.52
DICHLORVOS	31.70				31.70
DICLBENZ,14	108.45	421,571.36			421,679.81
DICLBENZEN,M	1.18				1.18
DICLBENZEN,O	9.16				9.16
DICLBENZENES	10.82	266.87			277.69
DICLETH,11-	36.27				36.27
DICLETHE,12		2,380.04			2,380.04
DICLETHYLE12	34.33				34.33
DICLPROPE,13		864,951.53			864,951.53
DIETHANOLAMI	12,544.54				12,544.54
DIETHENE TRI	37.00				37.00
DIETHYL PHTH	303.61				303.61
DIETHYLAMINE	19.17				19.17
DIMETH PHTHA	479.41				479.41
DIMETH SULFA	16.06	2.59			18.66
DIMETH SULFI		4,200.20			4,200.20
DIMETHBNZ,33	280.93				280.93
DIMETHFORMAM	118,892.88	53,088.83			171,981.72
DIMETHYLAMIN	103.42				103.42
DIMETHYLANIL		671.12			671.12
DIMETHYLB		890.97			890.97
DINITROPH,24	0.04				0.04
DINITRTOL,24		100.28			100.28
DIOCTYL PHTH	216.14				216.14
DIOCTYLPHT,N	22.37				22.37
DIOXANE	195.90	91.52			287.43
DIOXN 2378EQ		3.76E-03			0.00
EPICLHYDRIN	526.05	9.51			535.56
ETH ACETATE	165.00				165.00
ETH ACRYLATE	0.05	3.75			3.80
ETH MERCAPTA		1,109.96			1,109.96
ETHANE	27,970.96				27,970.96
ETHANOLAMINE	22,432.40				22,432.40
ETHYGLMEET	10.00				10.00
ETHYL ALC		10,835.37			10,835.37
ETHYLAMINE	85.00				85.00
ETHYLBENZENE	187,520.91	516,012.70	3,094,353.53	8,233,067.62	12,030,954.75
ETHYLENE DIB		1.62			1.62
ETHYLENE GLY	22,149.38	469,512.03			491,661.41
ETHYLENE OXI	399.93	82,092.00			82,491.94
EXPM			8,413,920.00		8,413,920.00
FLUORANTHENE	378.52	15,057.36	1,817.10	751.52	18,004.50

<b>Pollutant Code</b>	<b>Point Source Emissions (lb/yr)</b>	<b>Area Source Emissions (lb/yr)</b>	<b>On-Road Source Emissions (lb/yr)</b>	<b>Non-Road Source Emissions (lb/yr)</b>	<b>Total Emissions (lb/yr)</b>
FLUORENE	0.10	18,500.47	3,038.22	282.52	21,821.32
FLUORIDE	5,131.30				5,131.30
FLUORINE	2,294.53				2,294.53
FORMALDEHYDE	382,306.32	170,478.59	3,427,014.95	2,096,663.85	6,076,463.70
FURFURAL	22,962.80				22,962.80
FURFURYL ALC	8,042.40				8,042.40
GLYCOL ETHER	1,072,688.20				1,072,688.20
GLYCOL ETHRS	1,734.00	227,149.99			228,883.99
H2SO4	1,505,790.72				1,505,790.72
HCFC-141B	83,390.00				83,390.00
HCFC-22	155,295.00				155,295.00
HCL	7,611,179.85	1,918.76		1,371.60	7,614,470.21
HEPTANE	42.00				42.00
HEXACL-1,3-C	63.10	1.15			64.25
HEXAMETHYL16	1,705.94				1,705.94
HEXANE	134,715.73	3,063,546.35	2,363,878.47	5,186,475.09	10,748,615.64
HEXCL-13-BUT		1.44			1.44
HEXCLBENZENE		0.15			0.15
HEXYLENE GLY	9,749.10				9,749.10
HF	1,490,446.38	69.74		171.45	1,490,687.56
HPCDD1234678	1.28E-06				0.00
HXCDF,TOT	2.35E-03				0.00
HYDROGEN CYA	21,570.17				21,570.17
HYDROGEN SUL	426,676.85				426,676.85
HYDROQUINONE	54.72				54.72
INDN(123CDPY	0.01	5,592.88	141.93	112.10	5,846.92
IODINE	0.29				0.29
ISOBUT ALC	117,862.33				117,862.33
ISOPHORONE	2,038.82	5,119.44			7,158.26
ISO-PROP ALC	72.00	26,034.35			26,106.35
LEAD	13,113.27	253.76		60.88	13,427.91
LEAD,ALK		0.66			0.66
LINDANE ISO	0.02				0.02
LITHIUM	0.66				0.66
MALEIC ANHYD	14.50				14.50
MANGANESE	50,882.82	384.79	195.28	1,357.88	52,820.77
MEK PEROXIDE	1,039.27				1,039.27
MERCURY	3,640.37	241.94	1,046.41	168.51	5,097.23
METH AMYL KE	338,230.06				338,230.06
METH BUT KET	3.84				3.84
METH CARBITO		11,422.77			11,422.77
METH ETH BEN	175.40				175.40
METH ETH KET	1,248,934.31	4,236,693.26			5,485,627.57
METH IODIDE	5.60				5.60
METH ISOBUT	383,496.98	1,963,919.29			2,347,416.27

Pollutant Code	Point Source Emissions (lb/yr)	Area Source Emissions (lb/yr)	On-Road Source Emissions (lb/yr)	Non-Road Source Emissions (lb/yr)	Total Emissions (lb/yr)
METH METHACR	41,579.71	647.20			42,226.92
METH STYRENE	29,908.20				29,908.20
METH T-BUT E				9,777,008.36	9,777,008.36
METH TERT BU	15,640.82	248.78	152,668.26		168,557.86
METHANE	24,230.83			68.58	24,299.41
METHANOL	4,176,796.64	3,481,182.46			7,657,979.10
METHENE DIAN	9.29				9.29
METHENE(B)4-	2,069.77				2,069.77
METHMERCAPTA		1,035.61			1,035.61
METHYL CHLOR	37,919.55	38,997.54			76,917.09
METHYLANTHR		475.94			475.94
METHYLB,12		171.18			171.18
METHYLCHRY,5		456.86			456.86
METHYLENE CL	247,404.88	1,579,486.82			1,826,891.70
METHYLISOAMY	186,308.66				186,308.66
METHYLNAPHT2	0.17				0.17
METHYLPYRENE		523.36			523.36
MOLYBDENUM	49.38				49.38
NAPHTHA	41,614.00				41,614.00
NAPHTHALENE	40,368.08	615,608.10	191,505.39	14,057.28	861,538.85
NEODYMIUM	0.24				0.24
NI SUBSULF	135.00				135.00
NICKEL	17,004.88	352.37	436.96	807.22	18,601.43
NITRIC ACID	32,309.48				32,309.48
NITROBENZ		13.54			13.54
NITROMETHANE	592.72				592.72
NITROPHENL,2	141.28				141.28
NITROPHENL,4	0.03				0.03
NITROPROPA,2		11.12			11.12
OCDD,TOT	0.01				0.01
OCDF,TOT	0.01				0.01
PAH	7.42			3,084.65	3,092.07
PCBS	2.38				2.38
PCDD	0.02	7.41E-05			0.02
PCDF	0.09	1.79E-04			0.09
PCP	6.18E-04				0.00
PENTANE,N-	23,459.52	2,052.08			25,511.60
PERC	60,162.58	2,141,770.60			2,201,933.18
PERYLENE		493.89			493.89
PHENANTHRENE	0.92	77,189.96	4,987.69	861.37	83,039.94
PHENOL	95,905.11	3.17E-04			95,905.11
PHOSGENE		0.53			0.53
PHOSPH ACID	7,833.82				7,833.82
PHOSPHINE	104.00				104.00
PHOSPHORUS	73.95				73.95

<b>Pollutant Code</b>	<b>Point Source Emissions (lb/yr)</b>	<b>Area Source Emissions (lb/yr)</b>	<b>On-Road Source Emissions (lb/yr)</b>	<b>Non-Road Source Emissions (lb/yr)</b>	<b>Total Emissions (lb/yr)</b>
PHTHALIC ANH	162.60				162.60
POM	406.33			5,967.17	6,373.50
POTASSIUM	7,332.00				7,332.00
PROPANE	14,436.64	4,230.83			18,667.47
PROPENE	0.23				0.23
PROPIONALDEH	713.19	7.21	189,623.97	179,535.07	369,879.45
PRPLENE DICH	0.64	199.72			200.37
PRPLENE OXID	540.39	1,524.64			2,065.03
PYRENE	0.19	16,749.70	2,532.90	603.16	19,885.96
RHODIUM	0.80				0.80
RUBIDIUM	11.28				11.28
SAMARIUM	0.19				0.19
SELENIUM	8,725.13	262.84		438.51	9,426.48
SODIUM	169.20				169.20
SODIUM CYAN	308.00				308.00
SODIUMHYDROX	23,872.65				23,872.65
STODDARD	1,892,836.41				1,892,836.41
STYRENE	1,132,010.86	5,688.82	654,760.12	443,290.73	2,235,750.53
TCDD,2378	4.19E-04		4.59E-06		4.24E-04
TCDF,2378	0.01				0.01
TCDF,TOT	0.04				0.04
TCE,111	105.21	7,010,935.19			7,011,040.41
TELLURIUM	2.20				2.20
TETCLET,1122	285.49	1,614.42			1,899.90
TETRAHYDROFU	93,712.42				93,712.42
THALLIUM	551.20				551.20
THORIUM	0.16				0.16
TIN	516.80				516.80
TOG		22,738,797.01			22,738,797.01
TOLUENE	1,432,642.25	11,948,099.52	21,083,282.76	33,529,639.07	67,993,663.61
TOLUENE24DII	378.06	349.46			727.52
TOLUIDINE,O-	65.87	3.75			69.62
TRICHLORETHY	357,639.00	4,801,880.90			5,159,519.90
TRICLBNZ,124		179.81			179.81
TRICLETH,112	267.81	2.31			270.11
TRICLPHN,246	2.67E-04				0.00
TRIETHAMINE	3,700.93	4,535.59			8,236.52
TRIME-PENTAN	9,532.02	216,221.70	7,573,611.12		7,799,364.84
TRIMETHBENZE	157,231.19				157,231.19
TUNGSTEN	109.72				109.72
TW10			1,207,504.04		1,207,504.04
URANIUM	3.70				3.70
VANADIUM	5,844.82				5,844.82
VINLIDENE CL	6.13	1,048.51			1,054.63
VINYL ACETAT	46,237.93	159.60			46,397.53

<b>Pollutant Code</b>	<b>Point Source Emissions (lb/yr)</b>	<b>Area Source Emissions (lb/yr)</b>	<b>On-Road Source Emissions (lb/yr)</b>	<b>Non-Road Source Emissions (lb/yr)</b>	<b>Total Emissions (lb/yr)</b>
VINYL CHLOR	554.58	3,979.70			4,534.28
VOC		27,102,492.00			27,102,492.00
XYLENE,M	2,218.69	130,280.81			132,499.51
XYLENE,O	2,017.32	299,165.56			301,182.89
XYLENE,P	3,657.95	82,122.30			85,780.25
XYLENES ISO	1,720,148.96	10,400,020.86	11,898,890.19	36,509,505.04	60,528,565.06
YTTRIUM	0.53				0.53
ZINC	285.33				285.33
ZIRCONIUM	6,493.38				6,493.38