1997 Inventory of Toxic Air Emissions

Point, Area, and Mobile Sources

April 2001

The 1997 inventory is an update of the full 1996 regional inventory which is an ongoing initiative of the air regulatory agencies in the eight Great Lake states and the province of Ontario.

Submitted by:
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On behalf of:
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New York Department of Environmental Conservation, Division of Air Resources
Ohio Environmental Protection Agency, Division of Air Pollution Control
Ontario Ministry of Environment, Environmental Monitoring and Reporting Branch
Pennsylvania Department of Environmental Protection, Air Quality Control
Wisconsin Department of Natural Resources, Bureau of Air Management

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NYDEC	New York Department of Environmental Conservation
OEPA	Ohio Environmental Protection Agency
OMS	Office of Mobile Standards
PAH	Polycyclic Aromatic Hydrocarbons
PART5	U.S. EPA's Highway Vehicle Particulate Emission Factor Model
PDEP	Pennsylvania Department of Environmental Protection
PM	Particulate Matter
POTW	Publicly Owned Treatment Works
QA/QC	Quality Assurance/Quality Control
RAPIDS	Regional Air Pollutant Inventory Development System
RFG	Reformulated Gasoline
SAMS	SIP Air Pollutant Inventory Management System
SCC	Source Classification Code
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SSD	Source Summary Database
STEPS	State Environmental Programs Systems
TANKS	Storage Tank Emissions Software
TOG	Total Organic Gases
TRI	Toxic Release Inventory
TW10	Tire Wear less than 10 microns
U.S. EPA	United States Environmental Protection Agency
USDA	United States Department of Agriculture
VOC	Volatile Organic Compound
WDNR	Wisconsin Department of Natural Resources

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The Great Lakes Regional Air Toxic Emissions Inventory has been a challenging endeavor for all involved. As an unprecedented effort to compile a regional inventory of toxic air emissions, a multitude of complex issues had to be resolved to ensure that the priorities of all Great Lakes jurisdictions - federal, state, and provincial - were adequately addressed.

This unique effort has benefited from the leadership of Orlando Cabrera-Rivera, chair of the Steering Committee for the Great Lakes Regional Air Toxic Emissions Inventory Project, Julie Wagemakers, project p9 Tc 0 t1r,t Lakes Regio.08 0 Tn20-399 -11.Buzz0 TD 0. project

1. Introduction and Inventory Objective

including point, area and mobile sources for 82 pollutants. The 1997 inventory covers point, area and mobile sources for 82 pollutants.

Inventory Methodology

(the source in this case is the area in which all of the devices are found, usually an entire county).

The area source approach is generally used for sources that are small and numerous, such as gasoline stations and dry cleaning establishments. They are not included as facility sources because the effort required to gather and estimate emissions for each individual facility is beyond the resources available for inventory development efforts. Some area sources, such as consumer products, have no analog as a facility source.

The protocol refers to certain software tools (e.g. the Regional Air Pollutant Inventory Development System (RAPIDS), discussed below) that can be used to prepare a state or province's portion of the regional inventory. However, the protocol procedures, if followed, will result in emissions data and estimates that are compatible and consistent, whether or not these software tools are used.

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The Steering Committee is composed of representatives from each of the air management programs from the eight Great Lakes states as well as Ontario and observers from U.S. EPA. A complete list of members with contact information can be found in Appendix HH. For further information on Steering Committee functions see http://www.glc.org/air/air3.html**.**

The Steering Committee worked closely with the project software development contractor, Windsor Technologies Inc., to enhance emissions estimation and reporting capabilities in RAPIDS. RAPIDS is a client/server system developed in PowerBuilder® with an ORACLE® back-end database. The software takes full advantage of Internet/Great Lakes Information Network (GLIN) connections between the states, the Great Lakes Commission and the U.S. EPA GLNPO office in Chicago.

Finally, a Quality Assurance/Quality Control (QA/QC) Committee reviewed the inventory report, established QA/QC criteria for use by all states and the province of Ontario, and ensured the report provides an accurate and useful summary of toxic air emissions at the regional level.

*At time of publication New York state data was unavailable. This will be provided at a later date.

Next steps

Collection of 1998 data for point and area sources is already underway. For the 1999 inventory, the Steering Committee will extend the pollutant list to include all 188 hazardous air pollutants identified in Section 112(b) of the CAA.

This bridges the gap between the science of inventorying toxic air emissions and the public policy debate concerning how these emissions affect human health and the environment and how they should be addressed. Follow-up by state, provincial and federal environmental protection agencies is necessary to make further progress toward these goals. The Steering Committee recommends that regulatory decisions not be based on this data alone.

Table 1-1: List of 82 targeted toxic air pollutants.

The 1997 update and all previous inventories are available online at the Great Lakes Information Network (GLIN, http://www.great-lakes.net). Additional information, including background documents, GIS maps depicting air emissions across the region, the emissions protocol document and list of products for the project are located on the emission inventory project's web site (http://www.glc.org/air/air3.html).

The air emissions inventory project is funded primarily by the U.S. EPA from the Great Lakes Geographic Initiative air program grant funds designated for regional projects that address air toxics and the Great Lakes.

The eight states and Ontario will continue to work collaboratively to improve and refine the toxics inventory and strengthen its ability to support sound regulatory decisions at all levels of government.

2. Results

The following results represent emissions from point, area and mobile sources in the Great Lakes region. These results are based on 1997 data. The regional emission inventory includes emissions from 675 distinct source categories and 1467 distinct processes. The source categories include emissions from 16 area sources, 8 on-road vehicle categories, 10-non-road vehicle categories, aircraft, and locomotives.   Definitions of point and area sources are sources. Emissions of methyl chloroform are dominated by area sources, with a contribution of 97%. Point sources dominate the emissions of the top five metal compounds.

The results shown in Table 2-1 indicate that on-road mobile sources are the most significant contributors to overall mobile source emissions. A close look was taken at the eight subcategories of highway vehicles. Table 2-2 shows that Light Duty Gasoline Vehicles (LDGV) is the dominant subcategory for on-road mobile source emissions, responsible for about 25% of the emissions of toluene, xylenes and benzene. LDVG and Heavy Duty Diesel Vehicles (HDDV) contribute in equal amounts (about 15% each) to the total emissions of formaldehyde. The most significant contributor to the emissions of methyl chloroform is Degreasing Equipment. This area source category accounts for about 68% of the total regional emissions.

In contrast with the top five non-metal compounds, point sources dominate the emissions of the top five metal compounds, accounting for more than 90% contributions. As shown on Table 2-3, the most significant source category for manganese, lead, copper and nickel is

Table 2-1: Summary of 1997 air toxics emissions from point, area, and mobile sources.

Pollutant Name	Cas No.	Emissions (lb)					Percent (%)			
		Point	Area	Onroad	Nonroad	Total	Point	Area	Onroad	Nonroad
PAHs										
Acenaphthene	83329	90.95	69,664.39			69,755.35	0.13	99.87	0.00	0.00
Acenaphthylene	208968	500.78	839,168.93			839,669.70	0.06	99.94	0.00	0.00
Anthracene	120127	17,045.06	85,127.58	19.04	178.42	102,370.11	16.65	83.16	0.02	0.17
Benz(a)anthracene	56553	24,255.94	134,194.83	174.43	2,045.30	160,670.50	15.10	83.52	0.11	1.27
Benzo(ghi)perylene	191242	2,652.46	62,513.18	372.79	3,999.06	69,537.49	3.81	89.90	0.54	5.75
Benzo(a)pyrene	50328	91,183.03	37,232.16	142.36	1,239.30	129,796.85	70.25	28.68	0.11	0.95
Benzo(b)fluoranthene	205992	89.68	38,540.47	199.86	1,055.58	39,885.60	0.22	96.63	0.50	2.65
Benzo(k)fluoranthene	207089	40.20	14,141.98	151.58	1,128.53	15,462.30	0.26	91.46	0.98	7.30
Chrysene	218019	35,590.09	87,722.18	1,681.77	1,555.14	126,549.18	28.12	69.32	1.33	1.23
Dibenz(a,h)anthracene	53703	6.78	21,542.32	24.70	214.59	21,788.39	0.03	98.87	0.11	0.98
Fluoranthene	206440	62,886.56	112,542.70	196.60	1,387.29	177,013.14	35.53	63.58	0.11	0.78
Fluorene	86737	263.14	131,437.01			131,700.15	0.20	99.80	0.00	0.00
Indeno(1,2,3-cd)pyrene										

Table 2-1: Summary of 1997 air toxics emissions from point, area, and mobile sources (continued).

		Emissions (lb)					Percent (%)			
Pollutant Name	**Cas No.**	**Point**	**Area**	**Onroad**	**Nonroad**	**Total**	**Point**	**Area**	**Onroad**	**Nonroad**
Non-Metal Compounds (Excluding PAHs) continued										
Vinyl chloride	75014	1,307,300.68	457,514.09			1,764,814.76	74.08	25.92	0.00	0.00
Xylenes (includes o, m, and p)	1330207	32,867,160.91	93,215,911.43	121,985,022.77	74,724,044.73	322,792,139.84	10.18	28.88	37.79	23.15
m-Xylenes	108383	139,286.37	984,495.59	62,331,029.71	1,096,502.57	64,551,314.23	0.22	1.53	96.56	1.70
o-Xylenes	95476	1,168,876.19	10,316,409.02	33,327,767.17	3,308,309.20	48,121,361.59	2.43	21.44	69.26	6.87
p-Xylenes	106423	7,914.94	616,259.32		109,607.91	733,782.18	1.08	83.98	0.00	14.94
Total Non-Metals		174,605,415	500,845,359	615,603,902						

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

Pollutant Name	**Cas No.**	**Emissions (lb)**	***Most Significant Source Category***	**% of Contribution**
Toluene	108883	516,504,564	Light Duty Gasoline Vehicles	26
Xylenes (includes o, m, and p)	1330207	322,792,140	Light Duty Gasoline Vehicles	23
Benzene	71432	150,000,699	Light Duty Gasoline Vehicles	31
Formaldehyde	50000	76,700,848	LDGV and Heavy Duty Diesel Vehicles	34
Methyl chloroform	71556	71,999,043	Degreasing Equipment	68

Table 2-4: Summary of 1997 air

Table 2-4: Summary of 1997 air toxics emissions by SCC (continued).

Material Code	SCC	Category	IL	IN	MI	MN	NY	OH	PA	WI	ON	Regional Emissions	Regional Percentage

Table 2-4: Summary of 1997 air toxics emissions by SCC (continued).

Material Code	SCC	Category	IL	IN	MI	MN	NY	OH	PA	WI	ON	Regional Emissions	Regional Percentage
BERYLLIUM	2104004000	OIL - RESIDENTIAL	X	X		X		X		X	X	8,915	45.61XX

Table 2-4: Summary of 1997 air toxics emissions by SCC (continued).

[redacted]	MI	MN	NY	OH	PA	WI	ON	Regional Emissions	Regional Percentage

[redacted]

Table 2-4: Summary of 1997 air toxics emissions by SCC (continued).

Material Code	SCC	Category	IL	IN	MI	MN	NY	OH	PA	WI	ON	Regional Emissions	Regional Percentage
DIBROMOET,12	2401070000	COATING - AREA SOURCE						X				8,674	20.70

Table 2-4: Summary of 1997 air toxics emissions by SCC (continued).

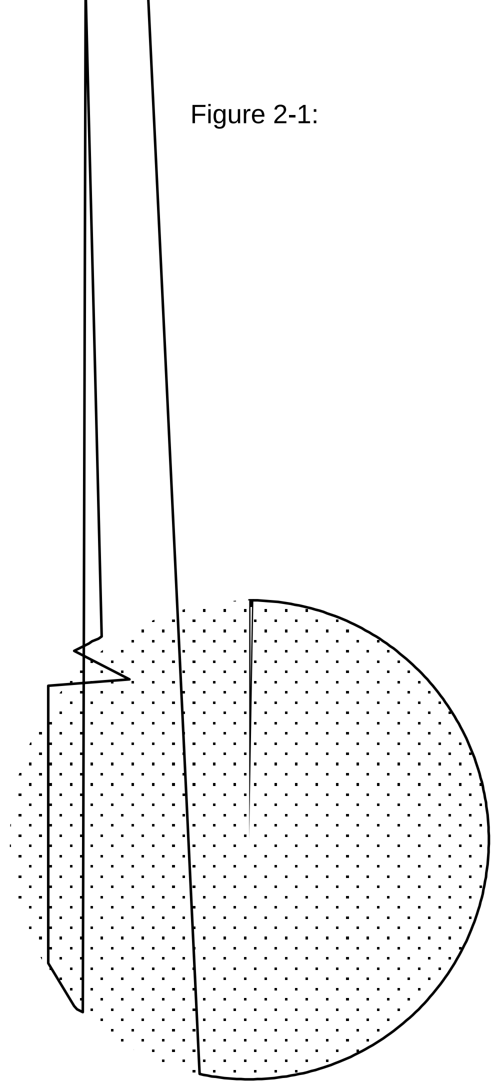
Material Code	

Table 2-4: Summary of 1997 air toxics emissions by SCC (continued).

Material Code	SCC	Category	IL	IN	MI	MN	NY	OH	PA	WI	ON	Regional Emissions	Regional Percentage
TCDD,2378	10101201	SOLID WASTE COMBUSTION								X		0	82.60

Table 2-4: Summary of 1997 air

Figure 2-1:

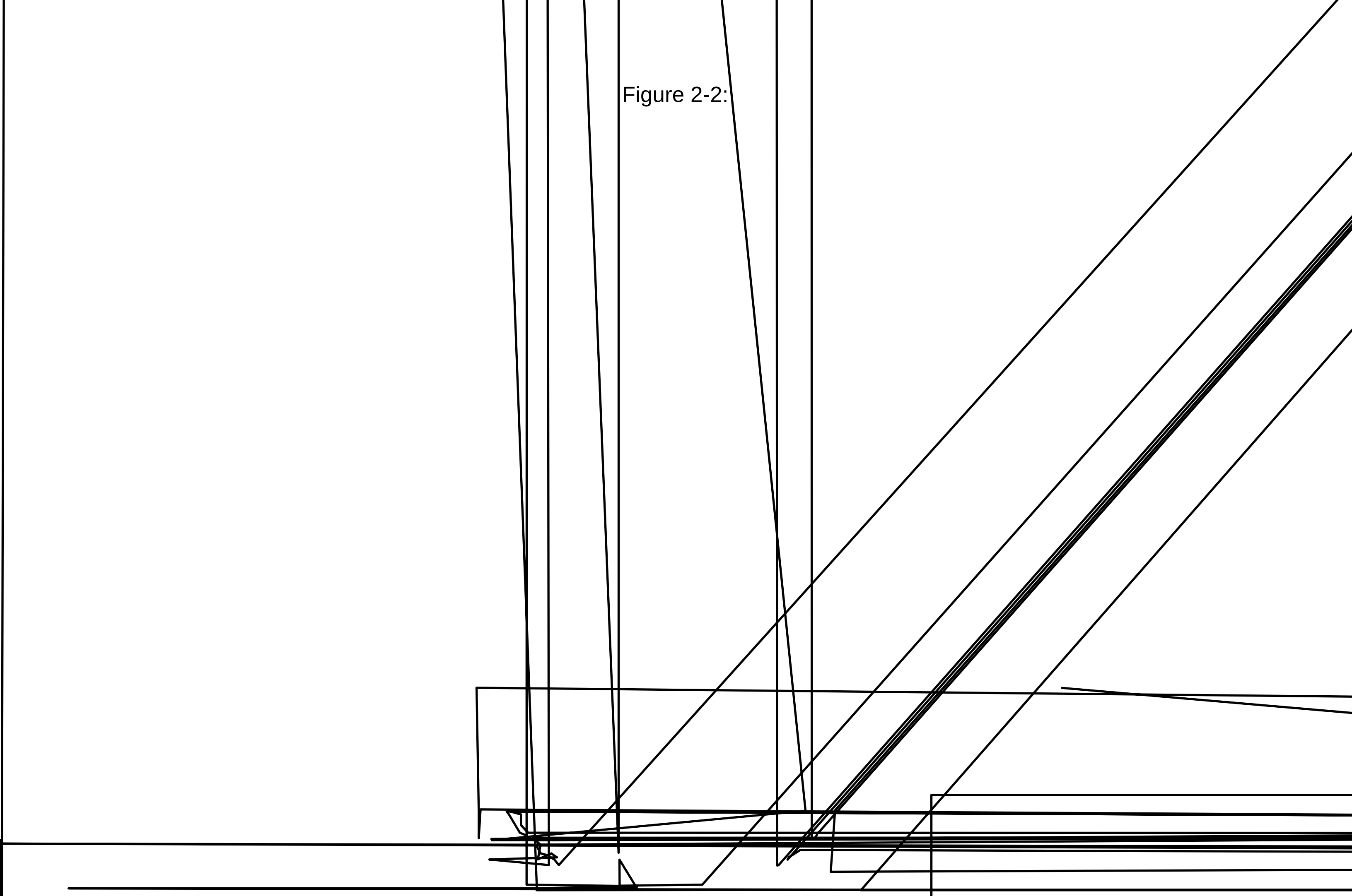


SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	104.83	x	x	x	x		x	x		x
-------	Residential Wood Combustion	69,650.51	x	x	x	x		x	x		x

Total Estimated Emissions: 69,755 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-2:



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	511.87	x	x	x	x			x		
-------	Residential Wood Combustion	839,157.84	x	x	x	x		x	x		x

Total Estimated Emissions: 839,669 lbs.

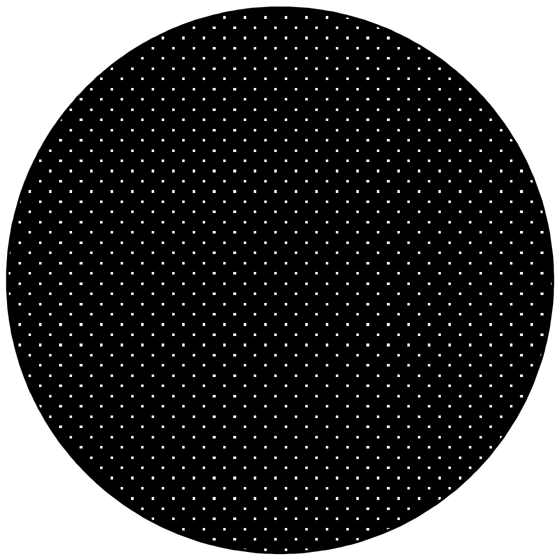
* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-3:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Lt Duty Gas Trucks (0 to 6000 lbs)	1,602,423.95	x	x	x	x		x		x	x
-------	Farming Equipment	4,040,947.46	x	x	x	x		x	x		x
-------	Construction and Mining Equipment	4,161,183.10	x	x	x	x		x	x		x

Figure 2-4:

ACROLEIN
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources



Other Sources**

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	2,992,707.88	x	x	x	x		x	x	x	x

Total Estimated Emissions: 2,992,707 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-6:

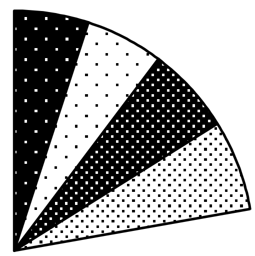
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	24,039.49	x	x	x				x		x
4953	Refuse Systems	61,093.19	x	x		x		x			x

Figure 2-7:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	2,008.73	x	x	x	x		x	x		x
3312	Blast Furnaces and Steel Mills	6,890.20	x	x		x			x		
2865	Cyclic Crudes and Intermediate	8,377.01	x					x			
-------	Residential Wood Combustion	85,094.16	x	x	x	x		x	x		x

* Each jurisdiction estimated emissions for those sources for which they had data available.

Figure 2-8:

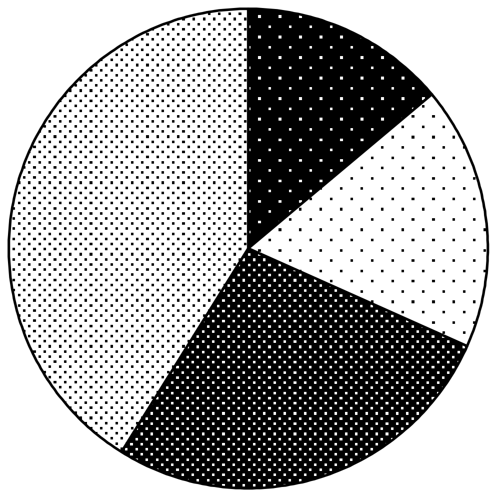


SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3431	Metal Sanitary Ware	1,500.00						x			
3842	Surgical Appliances & Supplies	1,600.00								x	
3489	Ordnance and Accessories, n.e.c.	1,710.00	x								
1011	Iron ores	1,818.78				x			x		
3312	Blast Furnaces and Steel Mills	1,831.76	x	x		x					
2611	Pulp Mills	2,064.58									x
3229	Pressed and Blown Glass, n.e.c.	2,742.00						x			
4911	Electric Services	2,846.50	x	x	x	x			x	x	
-------	Other Sources**	13,669.25	x	x	x	x		x	x	x	x

Total Estimated Emissions: 29,782 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-9:



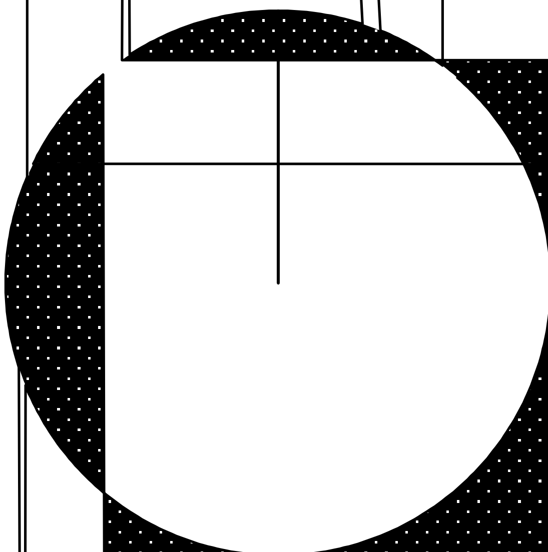
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
4911	Electric Services	40,626.34	x	x	x	x		x	x	x	x
-------	Other Sources**	52,589.63	x	x	x	x			x		
1011	Iron ores	79,910.24			x	x			x		
1061	Ferroalloy Ores Except Vanadium	121,553.00							x		

Total Estimated Emissions: 294,679 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-10:

ATRAZINE
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources



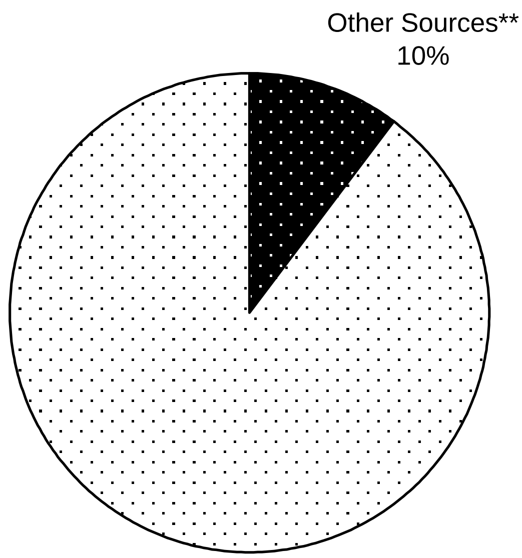
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Pesticide	6,129,361.91	x	x	x	x		x			x

Total Estimated Emissions: 6,129,361 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-12:

BENZO(GHI)PERYLENE
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources



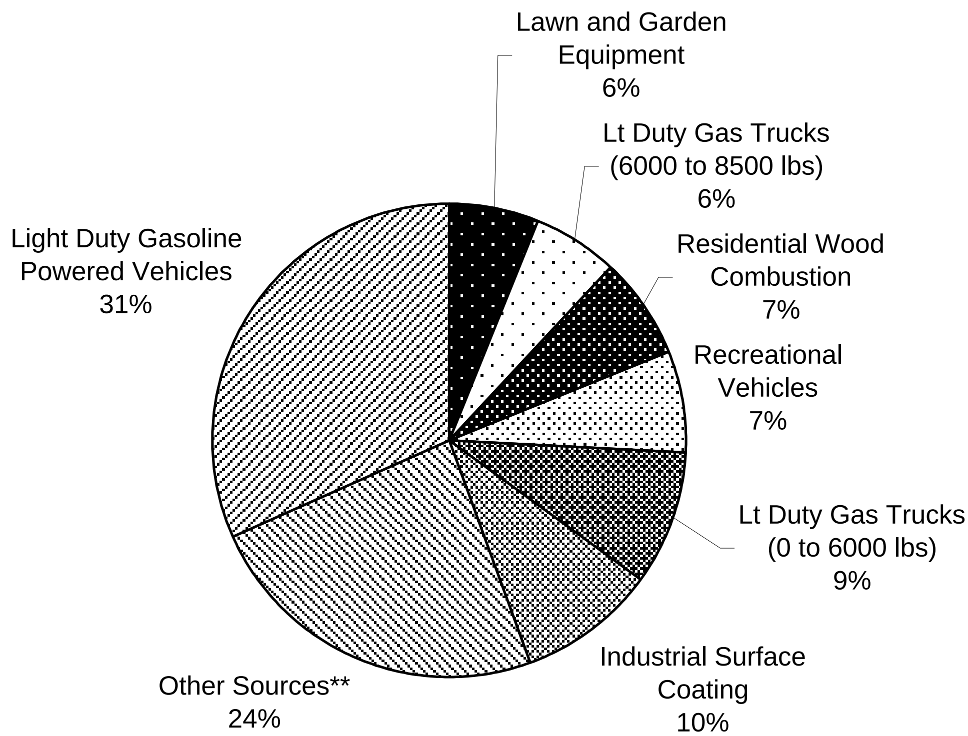
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	7,075.84	x	x	x	x		x	x	x	x
-------	Residential Wood Combustion	62,461.66	x	x	x	x		x	x		x

Total Estimated Emissions: 69,537 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-13:

BENZENE
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Lawn and Garden Equipment	8,964,452.49	x	x		x		x	x	x	x
-------	Lt Duty Gas Trucks (6000 to 8500 lbs)	9,126,135.25	x	x	x	x		x		x	x
-------	Residential Wood Combustion	10,081,321.24		x	x	x		x	x		x
-------	Recreational Vehicles	10,695,919.36	x	x		x		x	x	x	x
-------	Lt Duty Gas Trucks (0 to 6000 lbs)	13,458,270.10	x	x	x	x		x		x	x
-------	Industrial Surface Coating	14,384,479.18						x			x
-------	Other Sources**	35,666,567.03	x	x	x	x		x	x	x	x
-------	Light Duty Gasoline Powered Vehicles	47,623,554.20	x	x	x	x		x	x	x	x

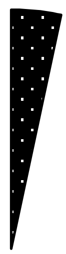
Total Estimated Emissions: 150,000,698 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-14:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	11,829.36	x	x	x	x		x	x		x
3312	Blast Furnaces and Steel Mills	20,800.59	x	x	x	x			x		
-------	Residential Wood Combustion	37,229.56	x	x	x	x		x	x		x
2911	Petroleum Refining	59,937.35	x	x	x	x			x	x	

Figure 2-15:



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	1,351.09	x	x		x		x	x		x
-------	Residential Wood Combustion	38,534.52	x	x	x	x		x	x		x

Total Estimated Emissions: 39,885 lbs.

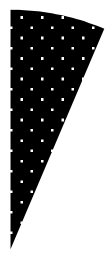
* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-16:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	1,326.21	x	x	x	x		x	x		x
-------	Residential Wood Combustion	14,136.09	x	x	x	x		x	x		x

Figure 2-17:

Figure 2-18:

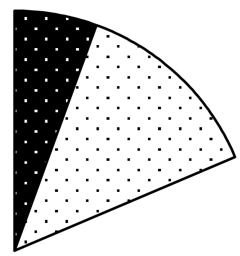


SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Recreational Vehicles	955,601.05	x	x		x		x	x		x
5541	Gasoline Service Stations	1,028,637.16	x					x			
-------	Lawn and Garden Equipment	1,117,316.85	x	x		x		x	x		x
-------	Lt Duty Gas Trucks (6000 to 8500 lbs)	1,204,668.56	x	x	x	x		x		x	x
-------	Lt Duty Gas Trucks (0 to 6000 lbs)	1,736,186.58	x	x	x	x		x		x	x
-------	Other Sources**	2,987,130.23	x	x	x	x		x	x	x	x
-------	Light Duty Gasoline Powered Vehicles	6,122,637.87	x	x	x	x		x	x	x	x

Total Estimated Emissions: 15,152,178 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-19:



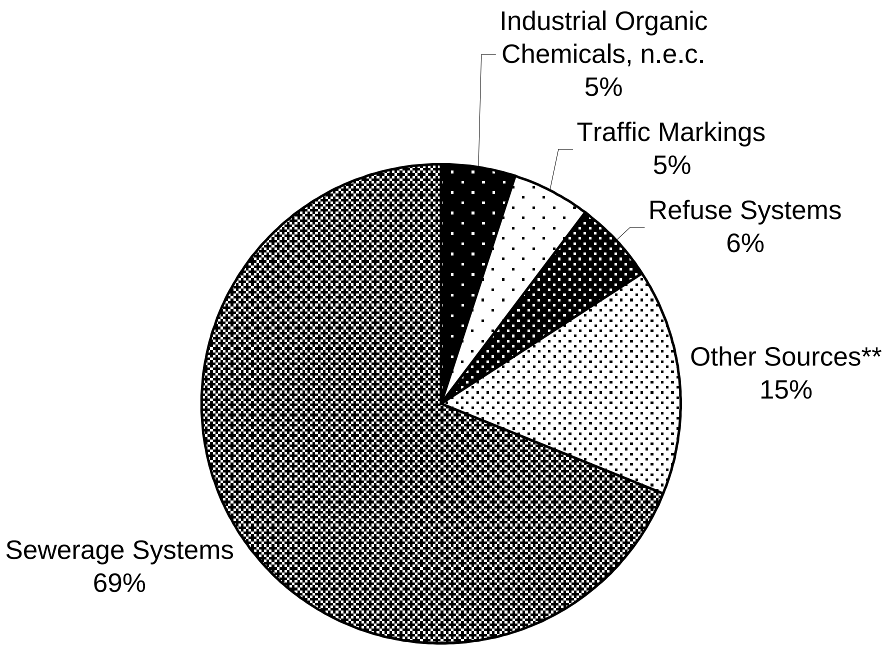
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3363	Aluminum Die-castings	3,503.86	x		x						
4911	Electric Services	8,378.00	x	x	x	x			x		x
4953	Refuse Systems	8,808.07	x	x	x	x			x	x	
-------	Residential Oil Combustion	9,303.39	x	x		x		x	x		x
3341	Secondary Nonferrous Metals	11,781.36	x	x		x				x	x
-------	Other Sources**	21,719.15	x	x	x	x		x	x	x	x

Total Estimated Emissions: 63,493 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure: 2-20:

CARBON TETRACHLORIDE
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources

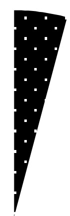


SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
2869	Industrial Organic Chemicals, n.e.c.	2,818.00						x		x	
-------	Traffic Markings	2,889.60		x				x	x		x
4953	Refuse Systems	3,164.75	x	x	x	x		x	x	x	x
-------	Other Sources**	8,520.66	x	x	x	x			x	x	x
4952	Sewerage Systems	38,657.31	x	x	x	x		x	x		x

Total Estimated Emissions: 56,050 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-21:

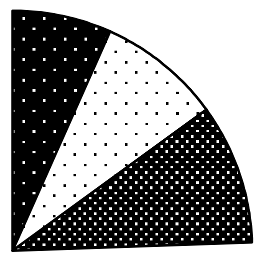


SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	45,752.55	x	x	x	x		x	x	x	x
-------	Consumer and Commercial Solvent Use	61,112.18	x	x	x			x		x	x
2611	Pulp Mills	158,477.44							x		x
4952	Sewerage Systems	180,255.88	x	x	x	x		x	x	x	x
2621	Paper Mills Except Building Paper	622,658.20				x				x	x

Total Estimated Emissions: 1,068,256 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-22:



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3315	Steel Wire and Related Products	32,891.26	x	x				x			x
4911	Electric Services	42,487.02	x	x	x	x			x	x	x
3728	Aircraft Equipment, n.e.c.	47,740.63	x					x	x		
3312	Blast Furnaces and Steel Mills	94,191.97	x	x	x	x		x	x	x	x
-------	Other Sources**	284,473.65	x	x	x	x		x	x	x	x

Total Estimated Emissions: 501,784 lbs.

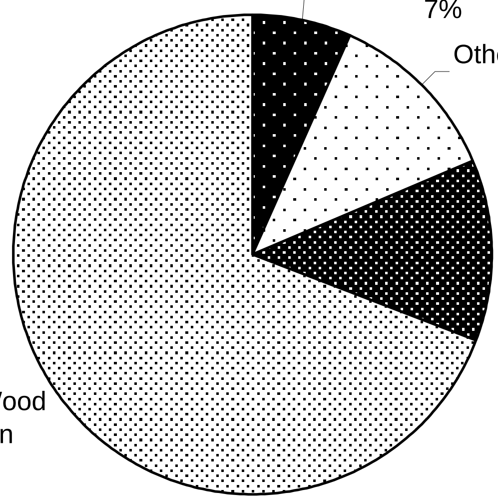
* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-23:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3489	Ordnance and Accessories, n.e.c.	2,960.54	x			x					
3432	Plumbing Fittings & Brass Good	3,003.05	x								
-------	Other Sources**	4,391.21	x	x	x	x			x		
3471	Electroplat./Polish./Anodiz./Coloring	5,541.52	x	x		x					
4911	Electric Services	6,179.39	x	x	x	x			x		

Figure 2-24:

CHRYSENE
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
7261	Funeral Service and Crematories	8,397.96	x		x				x		
-------	Other Sources**	15,044.64	x	x	x	x		x	x		x
3334	Primary Aluminum	15,437.00		x							
-------	Residential Wood Combustion	87,669.59	x	x	x	x		x	x		x

Total Estimated Emissions: 126,549 lbs.

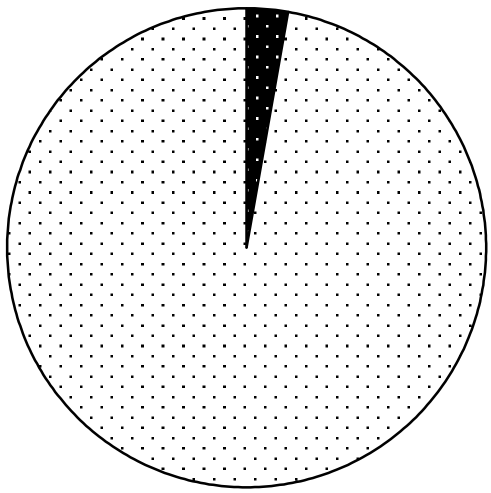
* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-25:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3356	Nonferrous Rolling and Drawing	3,050.03	x	x					x		

Figure 2-26:

COKE OVEN GS



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	63,198.00		x							
3312	Blast Furnaces and Steel Mills	2,114,158.47	x	x	x					x	

Total Estimated Emissions: 2,177,356 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-27:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3366	Copper Foundries	65,892.81	x	x				x	x		x
3339	Primary Nonferrous Metals, n.e.c.	150,462.01	x						x		
-------	Light Duty Gasoline Powered Vehicles	170,240.47	x	x	x	x		x	x	x	x

Figure 2-28:

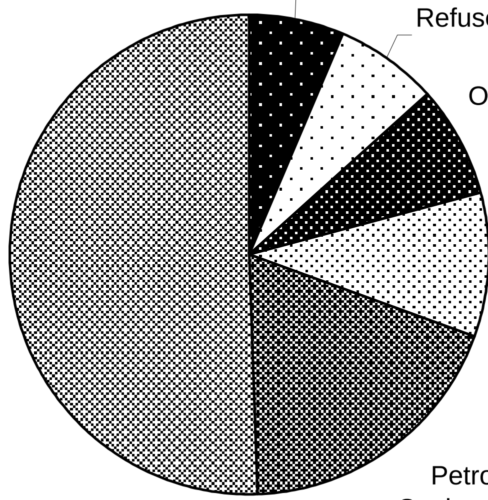
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	1,346.25	x	x	x	x		x	x		x
-------	Residential Wood Combustion	20,442.14	x	x	x	x		x	x		x

Figure 2-29:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	33.17	x	x	x	x		x	x		x

Figure 2-31:

ETHYLENE DICHLORIDE
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources



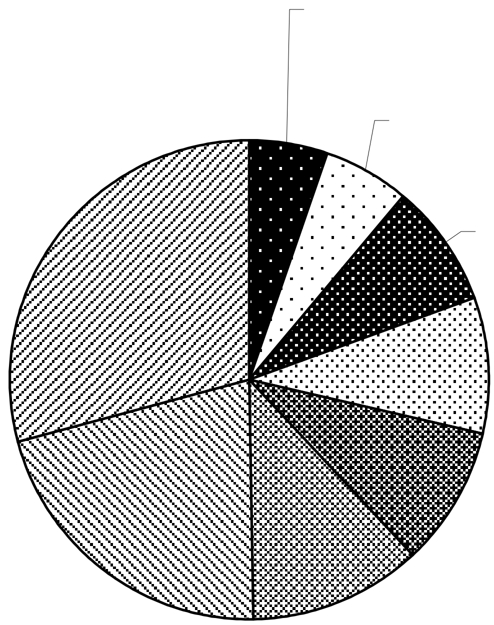
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
5541	Gasoline Service Stations	6,387.58	x		x			x	x		x
4953	Refuse Systems	6,959.49	x	x	x	x		x	x		x
-------	Other Sources**	7,607.35	x	x	x	x		x	x		x
4952	Sewerage Systems	10,036.16	x	x		x			x		x
5171	Petroleum Bulk Stations & Terminals	19,021.00	x		x						
2869	Industrial Organic Chemicals, n.e.c.	51,064.30	x	x					x		x

Total Estimated Emissions: 101,075 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-32:

DIETHYLHEXYL PHTHALATE
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3069	Fabricated Rubber Products, n.e.c.	2,333.00		x				x	x		
3052	Rubber and Plastics Hose and Belting	2,595.00						x	x		
3089	Plastics Products, n.e.c.	3,666.00		x		x		x	x		
4911	Electric Services	4,114.28	x	x							x
3713	Truck and Bus Bodies	4,166.00		x							
2899	Chemical Preparations, n.e.c.	5,072.00							x		
2511	Wood Household Furniture	9,412.00								x	x
-------	Other Sources**	12,889.92	x	x	x	x		x	x	x	x

Total Estimated Emissions: 44,248 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-33:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
4911	Electric Services	1,320.46				x					
2711	Newspapers	1,460.00		x							
-------	Other Sources**	1,688.18		x	x	x			x		x
2431	Millwork	7,180.00									x
2063	Beet Sugar	12,517.10				x					

Total Estimated Emissions: 24,165 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

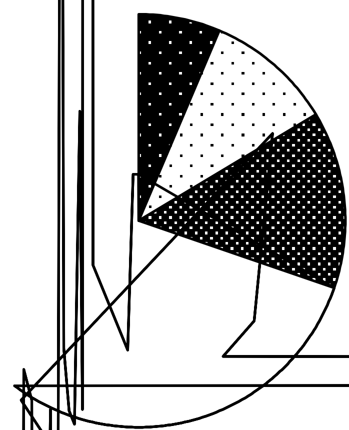
Figure 2-34:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Lt Duty Gas Trucks (6000 to 8500 lbs)	3,777,230.87	x	x	x	x		x		x	x
-------	Architectural Surface Coating	4,420,154.57		x	x	x		x	x		x
-------	Lawn and Garden Equipment	4,951,043.62	x	x		x		x	x	x	x
-------	Lt Duty Gas Trucks (0 to 6000 lbs)	5,398,064.76	x	x	x	x		x		x	x
-------	Recreational Vehicles	9,533,501.59	x	x		x		x	x	x	x
-------	Other Sources**	14,972,801.69	x	x	x	x		x	x	x	x
-------	Light Duty Gasoline Powered Vehicles	19,303,312.38	x	x	x	x		x	x	x	x

Total Estimated Emissions: 62,356,109 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-35:



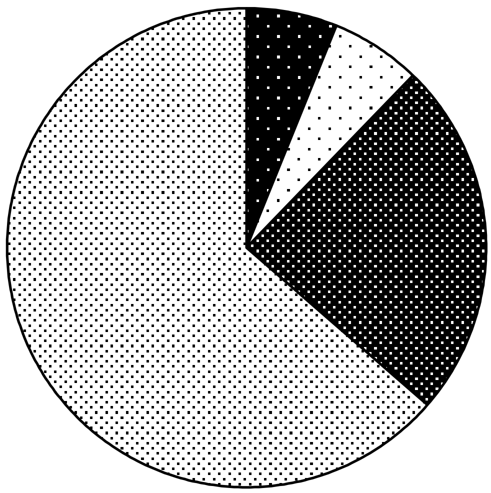
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Nonindustrial Solvents	70,779.86				x					
-------	Other Sources**	114,079.52	x	x	x	x			x	x	x
8062	General Medical & Surgical Hospitals	154,517.89	x	x	x	x				x	x
-------	Consumer and Commercial Solvent Use	779,865.20	x	x	x			x		x	x

Total Estimated Emissions: 1,119,242 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-36:

FLUORANTHENE



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	10,593.47	x	x	x	x		x	x		x
8062	General Medical & Surgical Hospitals	11,042.40	x	x	x	x			x		
3334	Primary Aluminum	42,947.00		x							
-------	Residential Wood Combustion	112,430.27	x	x	x	x		x	x		x

Total Estimated Emissions: 177,013 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-37:

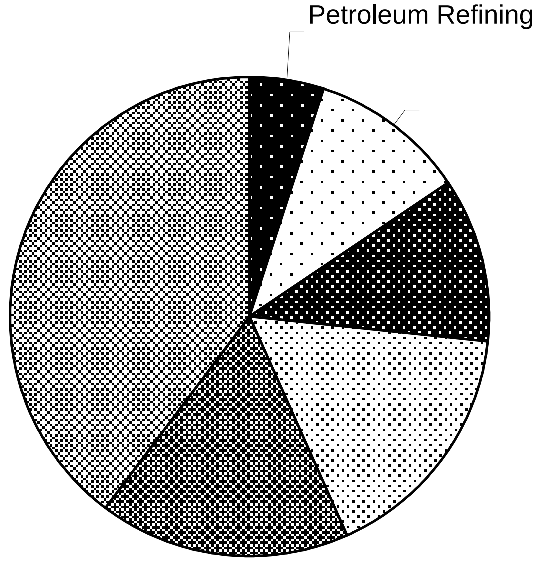
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	366.31	x	x	x	x		x	x		x
-------	Residential Wood Combustion	131,333.84	x	x	x	x			x		x

Total Estimated Emissions: 131,700 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-38:

FORMALDEHYDE
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources

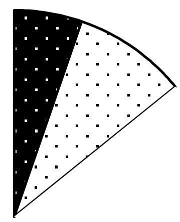


SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
2911	Petroleum Refining	3,862,656.25	x	x		x				x	x
-------	Farming Equipment	8,165,285.30	x	x	x	x		x	x		x
-------	Construction and Mining Equipment	8,401,505.45	x	x	x	x		x	x		x
-------	Heavy Duty Diesel Powered Vehicles	12,800,725.55	x	x	x	x		x	x	x	x
-------	Light Duty Gasoline Powered Vehicles	12,973,042.10	x	x	x	x		x	x	x	x
-------	Other Sources**	30,497,633.74	x	x	x	x		x	x	x	x

Total Estimated Emissions: 76,700,848 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-39:



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Graphic Arts	1,085,979.41		x					x		
-------	Consumer and Commercial Solvent Use	1,772,366.40	x	x	x			x			x
3411	Metal Cans	2,307,120.21	x	x		x				x	x
-------	Industrial Surface Coating	6,803,447.90	x	x		x		x			x
-------	Other Sources**	8,244,319.44	x	x		x		x	x	x	x

Total Estimated Emissions: 20,213,233 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-40:

Figure 2-41:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3011	Tires and Inner Tubes	6.00		x							
3061	Mechanical Rubber Goods	9.00		x							

Total Estimated Emissions: 15 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

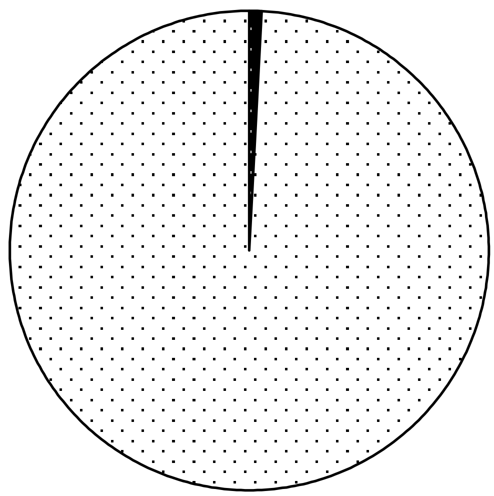
Figure 2-42:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	1.06		x					x		
3241	Cement, Hydraulic	7.86							x		
-------	Pesticide	17.73	x	x		x					x

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.

Figure 2-43:

HYDRAZINE
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
2821	Plastics Materials and Resins	4.00	x								
4911	Electric Services	452.00							x		

Total Estimated Emissions: 456 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

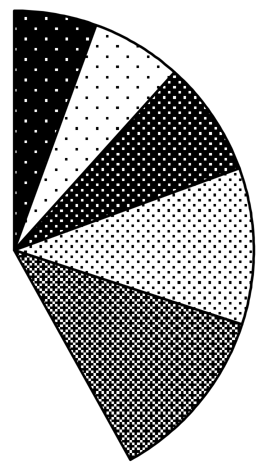
Figure 2-44:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	358.87	x	x	x	x		x	x		x
-------	Residential Wood Combustion	71,818.47	x	x	x	x		x	x		x

Total Estimated Emissions: 72,177 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-45:

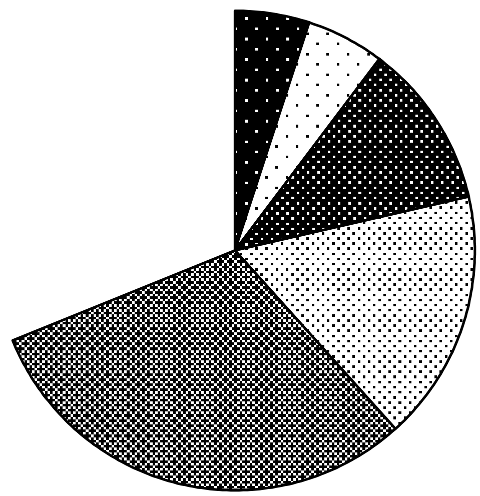


SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3211	Flat Glass	67,720.26	x							x	
3312	Blast Furnaces and Steel Mills	76,693.88	x	x	x	x		x	x	x	x
3321	Gray Iron Foundries	96,435.57	x	x	x	x			x	x	x
4911	Electric Services	127,129.50	x	x	x	x			x		x
1061	Ferroalloy Ores Except Vanadium	148,381.00							x		
1011	Iron ores	152,737.80			x	x			x		
3339	Primary Nonferrous Metals, n.e.c.	177,766.01	x						x	x	
-------	Other Sources**	384,654.12	x	x	x	x		x	x	x	x

Total Estimated Emissions: 1,231,518 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-46:



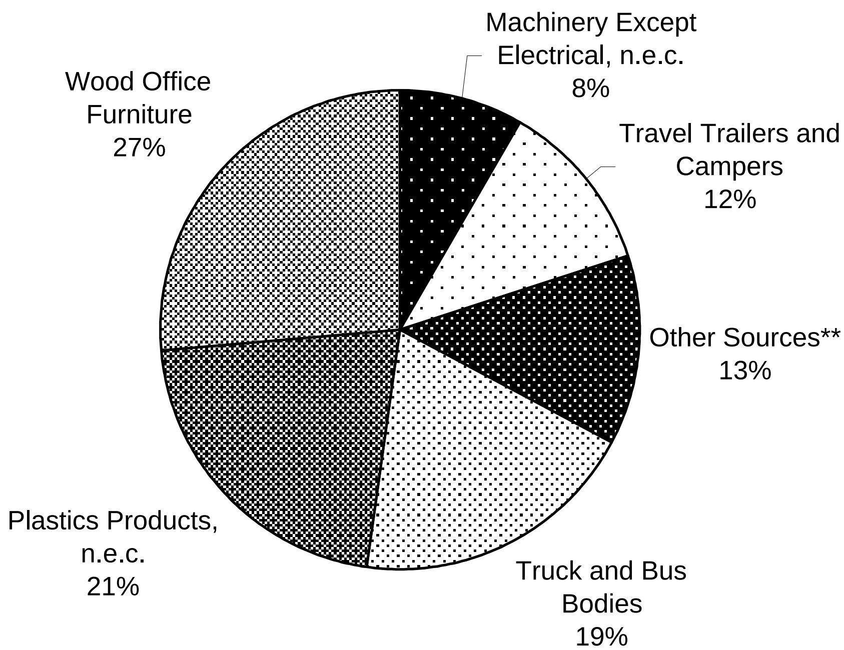
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3441	Fabricated Structural Metal	71,229.10	x	x		x		x	x		x
4911	Electric Services	74,055.55	x	x	x	x			x	x	x
3321	Gray Iron Foundries	158,729.27	x	x	x	x		x	x	x	x
1011	Iron ores	236,550.16			x	x			x		
-------	Other Sources**	432,819.30	x	x	x	x		x	x	x	x
3312	Blast Furnaces and Steel Mills	438,890.89	x	x	x	x		x	x	x	x

Total Estimated Emissions: 1,412,274 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-48:

METHYLENE DIPHENYL DIISOCYANATE
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources



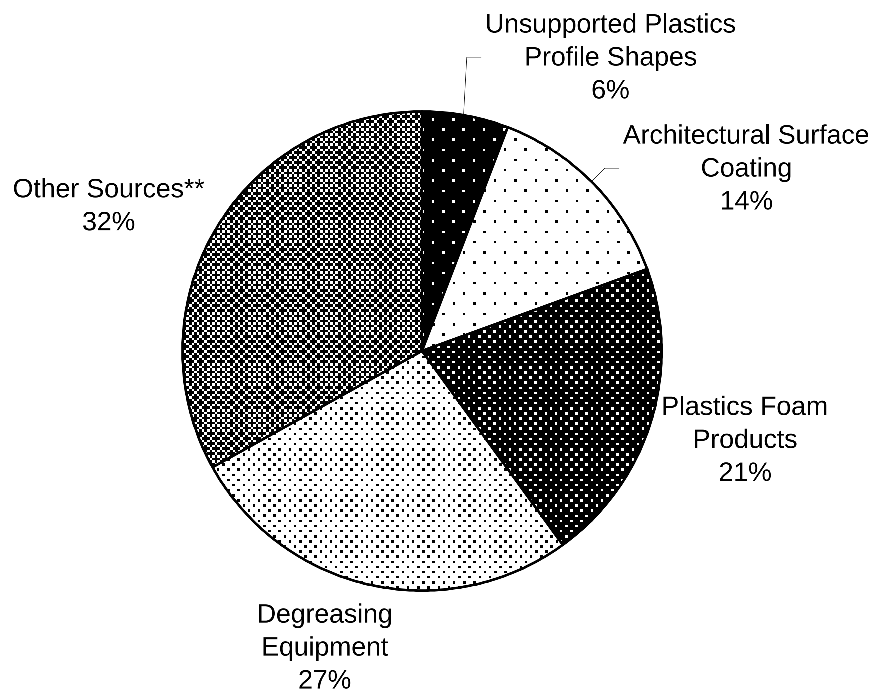
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3599	Machinery Except Electrical, n.e.c.	8,403.00		x							
3792	Travel Trailers and Campers	11,686.05		x							
-------	Other Sources**	13,011.59	x	x		x			x		x
3713	Truck and Bus Bodies	19,656.00		x							
3089	Plastics Products, n.e.c.	21,696.29		x							x
2521	Wood Office Furniture	26,675.00		x							

Total Estimated Emissions: 101,127 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-49:

METHYLENE CHLORIDE
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3082	Unsupported Plastics Profile Shapes	2,008,270.00		x						x	
-------	Architectural Surface Coating	4,553,503.46	x	x	x	x		x	x		x
3086	Plastics Foam Products	6,910,890.15	x	x	x	x		x	x	x	x
-------	Degreasing Equipment	9,069,189.08	x	x	x	x		x		x	x
-------	Other Sources**	11,157,954.64	x	x	x	x		x	x	x	x

Total Estimated Emissions: 33,699,807 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-50:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Lt Duty Gas Trucks (0 to 6000 lbs)	828,916.67	x	x	x	x		x		x	x
5541	Gasoline Service Stations	952,947.71			x	x		x	x		x
-------	Residential Wood Combustion	1,723,881.78	x	x	x	x		x	x		x
7532	Top and Body Repair and Paint Shops	2,084,546.78	x	x	x	x		x		x	x
-------	Consumer and Commercial Solvent Use	2,292,406.95	x	x	x			x		x	x
-------	Other Sources**	2,795,143.56	x	x	x	x		x	x	x	x
-------	Light Duty Gasoline Powered Vehicles	2,931,569.04	x	x	x	x		x	x	x	x

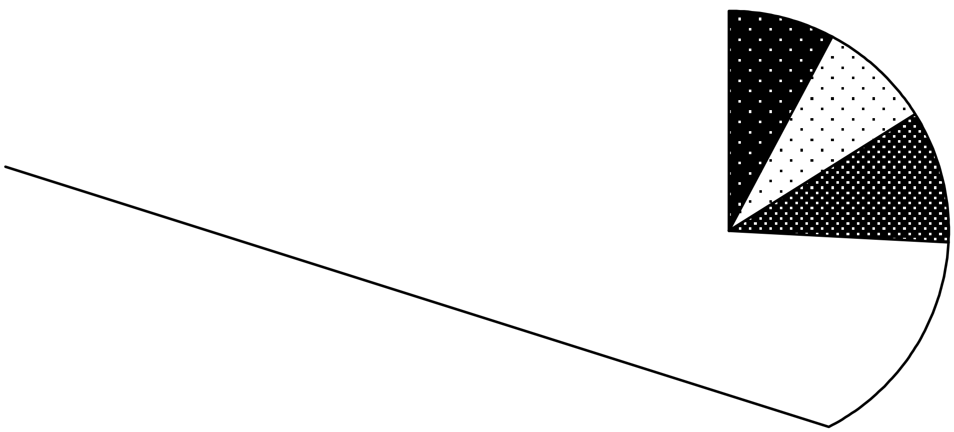
Total Estimated Emissions: 13,609,412 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-52:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	7.59	x	x	x	x			x		x
4911	Electric Services	236.23							x		x

Figure 2-53:

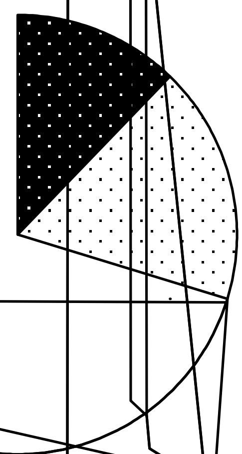


SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
2013	Sausages and other prepared meats	0.77	x			x					
4911	Electric Services	0.83	x	x	x	x			x		
3523	Farm Machinery and Equipment	0.94	x								
4953	Refuse Systems	1.65	x	x		x					
-------	Other Sources**	1.82	x	x	x	x			x		
-------	Residential Wood Combustion	3.87				x					

Total Estimated Emissions: 9.88 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-54:



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
2435	Hardwood Veneer and Plywood	3.68	x	x	x				x		
-------	Other Sources**	5.40	x	x	x	x			x		
-------	Residential Wood Combustion	21.35				x					

Total Estimated Emissions: 30.43 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-55:

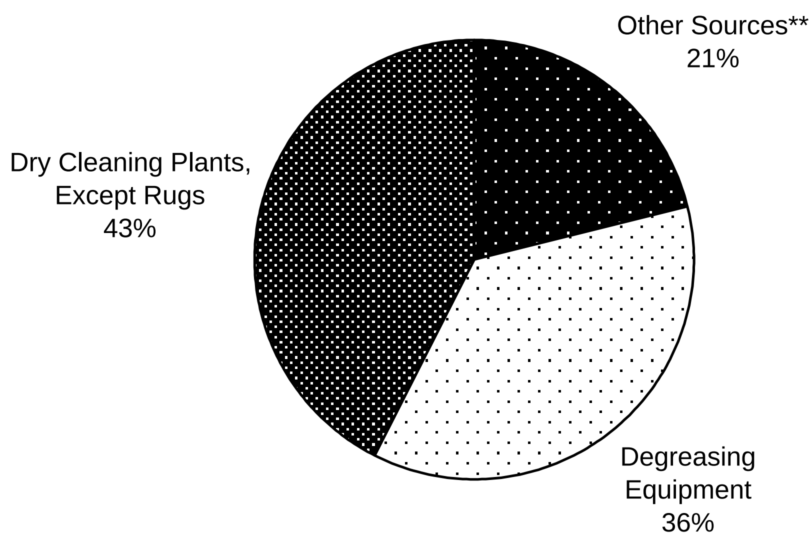
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3241	Cement, Hydraulic	1.00		x							
3061	Mechanical Rubber Goods	3.00		x							

Total Estimated Emissions: 4 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-56:

TETRACHLOROETHYLENE
(PERCHLOROETHYLENE)
1997 Estimated Emissions* by Source Category for
Point, Area, and Mobile Sources



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	7,990,967.06	x	x	x	x		x	x	x	x
-------	Degreasing Equipment	13,792,445.09	x	x	x			x		x	x
7216	Dry Cleaning Plants, Except Rugs	16,014,961.98	x		x	x			x		x

Total Estimated Emissions: 37,798,374 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-57:

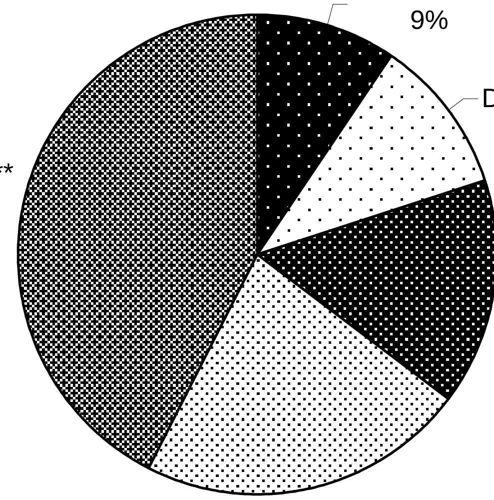
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	4,094.95	x	x	x	x		x	x	x	x
-------	Residential Wood Combustion	1,984,847.02	x	x	x	x		x	x		x

Total Estimated Emissions: 1,988,941 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-58:

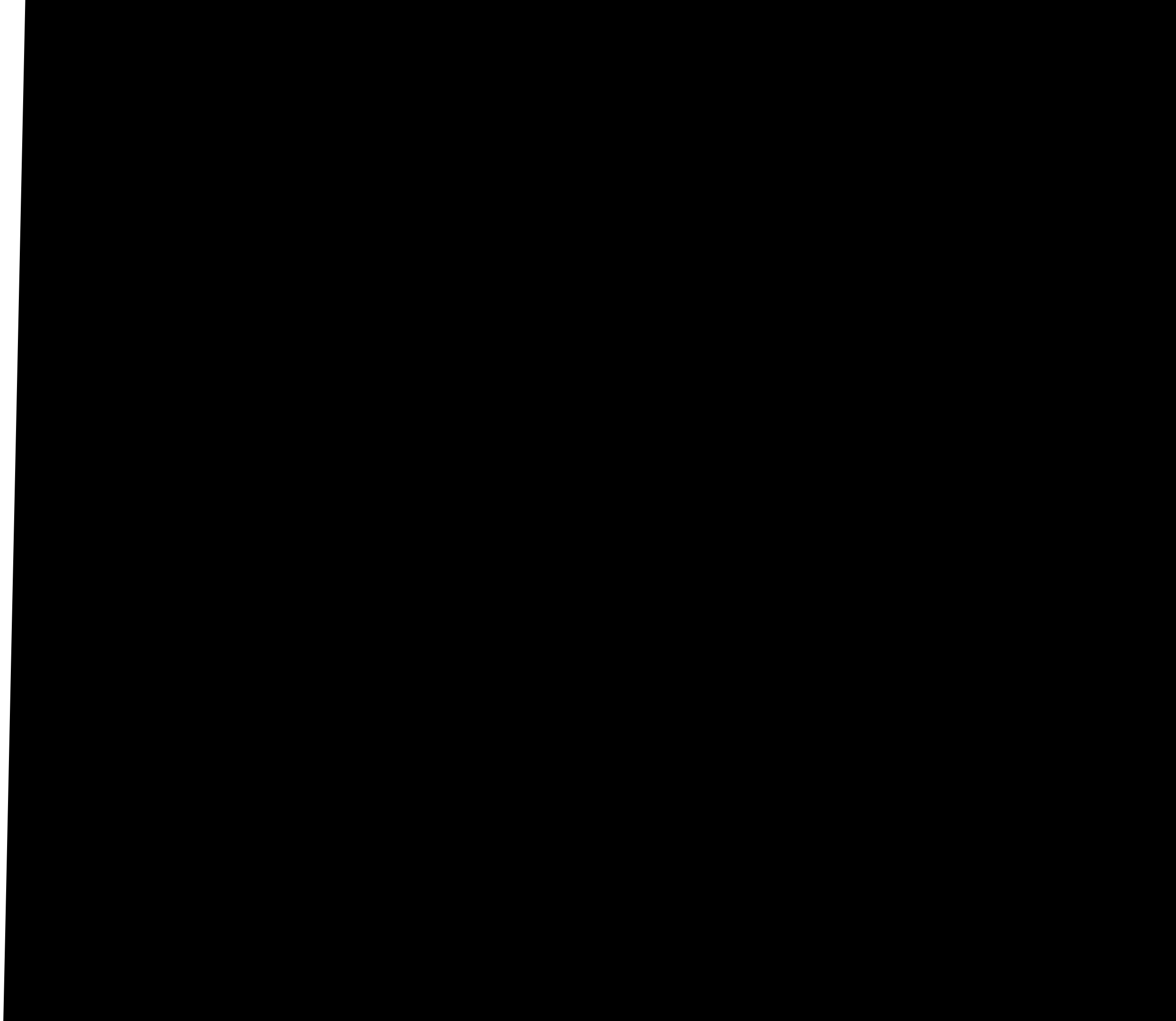
PHENOL
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
3296	Mineral Wool	231,013.32		x	x				x	x	
3357	Nonferrous Wire Drawing/Insulating	259,540.00	x	x					x		
2899	Chemical Preparations, n.e.c.	377,718.86	x	x	x						
3312	Blast Furnaces and Steel Mills	547,783.20		x					x	x	
-------	Other Sources**	1,042,161.13	x	x	x	x		x	x	x	x

Total Estimated Emissions: 2,458,216 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	1.19	x	x							x
2833	Medicinals and Botanicals	160.00		x							

Total Estimated Emissions: 161.19 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-60:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI

Figure 2-61:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Lt Duty Gas Trucks (6000 to 8500 lbs)	1,649,895.27	x	x	x	x		x		x	x
-------	Lt Duty Gas Trucks (0 to 6000 lbs)	2,145,150.89	x	x	x	x		x		x	x
3732	Boat Building and Repairing	3,437,102.51	x	x	x	x		x			x
3089	Plastics Products, n.e.c.	4,145,905.14	x	x	x	x		x	x	x	x
-------	Light Duty Gasoline Vehicles	8,915,445.15	x	x	x	x		x	x	x	x
-------	Other Sources**	10,293,499.29	x	x	x	x		x	x	x	x

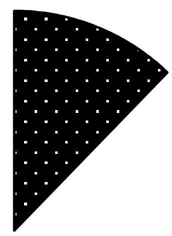
Figure 2-62:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	0.01	x	x	x	x			x		x
-------	Residential Wood Combustion	0.01				x					
4931	Elec. & Other Services Combined	0.10			x	x					x

Total Estimated Emissions: 0.12 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-63:



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	12.61	x	x	x	x			x		x
2611	Pulp Mills	20.73			x				x		
2621	Paper Mills Except Building Paper	69.76			x				x		

Total Estimated Emissions: 103.10 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

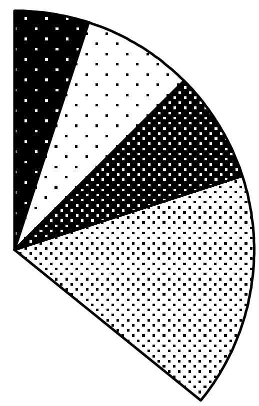
Figure 2-64:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	5,690,224.97	x	x	x	x		x	x	x	x
-------	Consumer and Commercial Solvent Use	16,973,619.96	x	x	x			x			x
-------	Degreasing Equipment	49,335,198.10	x	x	x	x		x		x	x

Total Estimated Emissions: 71,999,043 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-65:



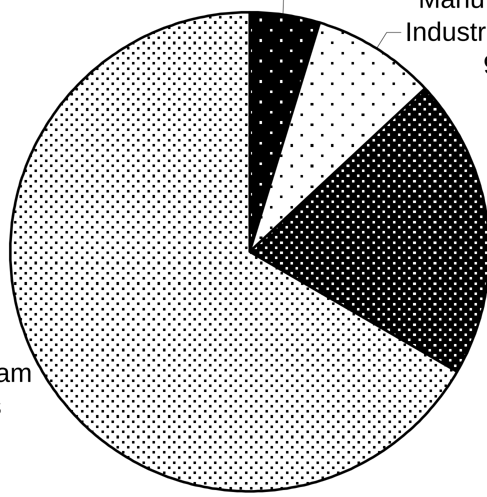
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Lt Duty Gas Trucks (6000 to 8500 lbs)	26,249,102.17	x	x	x	x		x		x	x
-------	Lt Duty Gas Trucks (0 to 6000 lbs)	37,611,204.40	x	x	x	x		x		x	x
-------	Recreational Vehicles	38,948,662.73	x	x		x		x	x	x	x
-------	Industrial Surface Coating	81,606,839.89	x	x	x	x		x	x	x	x
-------	Light Duty Gasoline Vehicles	133,906,452.30	x	x	x	x		x	x	x	x
-------	Other Sources**	198,182,302.10	x	x	x	x		x	x	x	x

Total Estimated Emissions: 516,504,563 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-66:

2,4-TOLUENE DIISOCYANATE
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	228.69		x		x					x
3999	Manufacturing Industries, n.e.c.	420.00		x							
2851	Paints and Allied Products	998.00	x								
3086	Plastics Foam Products	3,293.60	x	x							x

Total Estimated Emissions: 4,940 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-67:

Figure 2-68:

Figure 2-69:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	1.21		x					x		
3241	Cement, Hydraulic	24.00		x							
4953	Refuse Systems	276.00							x		

Figure 2-70:

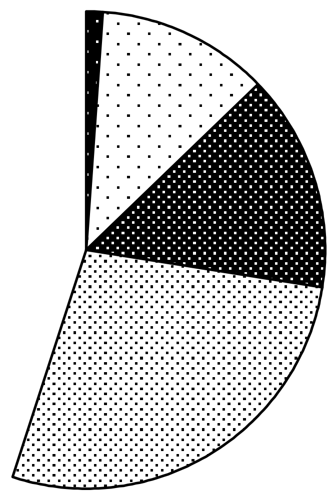
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI

Figure 2-71:

Figure 2-72:

SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	7,116,762.11									

Figure 2-74:



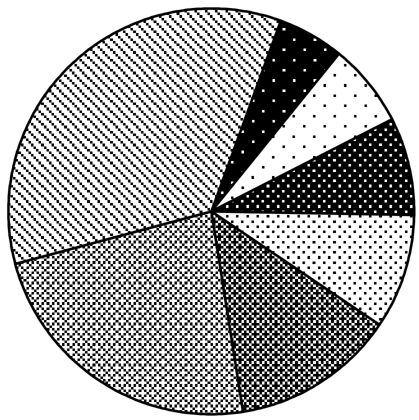
SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Other Sources**	7,914.94	x	x	x	x			x	x	x
-------	Industrial Surface Coating	84,909.04		x				x			x
-------	Pleasure Craft	109,607.91		x							
5541	Gasoline Service Stations	201,900.22				x		x	x		x
-------	Degreasing Equipment	329,450.06		x	x			x			x

Total Estimated Emissions: 733,782 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

Figure 2-75:

XYLENES(ISO)
1997 Estimated Emissions* by Source Category for Point, Area, and Mobile Sources



SIC	DESCRIPTION	EMISSIONS (LB)	IL	IN	MI	MN	NY	OH	ON	PA	WI
-------	Lawn and Garden Equipment	16,992,971.98	x	x		x		x	x		x
-------	Lt Duty Gas Trucks (0 to 6000 lbs)	21,194,352.68	x	x	x	x		x		x	x
-------	Industrial Surface Coating	25,463,811.56	x	x	x	x		x	x	x	x
7532	Top and Body Repair and Paint Shops	29,512,720.14	x	x	x	x		x		x	x
-------	Recreational Vehicles	41,789,425.70	x	x		x		x	x		x
-------	Light Duty Gasoline Vehicles	75,462,152.10	x	x	x	x		x	x	x	x
-------	Other Sources**	112,376,705.68	x	x	x	x		x	x	x	x

Total Estimated Emissions: 322,792,139 lbs.

* Each jurisdiction estimated emissions for those sources for which they had data available.
** Other Sources: Individually less than five percent of the total.
(X) Denotes jurisdictions that have contributed emissions data for this pollutant.

3. Conclusion

The air regulatory agencies in the eight Great Lakes states and province of Ontario agree that a collaborative effort is vital to successfully implementing an annual inventory of airborne toxic pollutant emissions for the Great Lakes region. They have been working cooperatively towards this goal since 1989.

The emissions inventory will assist in the successful implementation of key provisions of the Great Lakes Toxic Substances Control Agreement, signed by the Great Lakes governors and premiers in 1986. In addition, this work is consistent with the state activities for the implementation of the Urban Area Source Program required under sections 112(c) and 112(k) under the Clean Air Act Amendments of 1990 and the assessment of atmospheric deposition to the Great Lakes under the efforts of the U.S. EPA's Great Waters Program.

The emphasis of this project was to prepare a reliable and technically accurate inventory of estimated emissions for the 82 target compounds in the Great Lakes region and not a set of individual state/provincial inventories. As a regional effort, a high level of coordination was necessary to ensure consistency. The project team established Quality Assurance/Quality Control (QA/QC) criteria to provide an accurate and useful summary of toxic air emissions at the regional level. The QA/QC plan outlines procedures to maximize the quality and accuracy of the regional inventory's data and estimates. Once a quality controlled and quality assured emissions inventory has been established, regional scientists and researchers can begin to work separately and in concert to define and regulate sources; evaluate control technology; establish guidelines for siting new facilities; and reduce airborne deposition of persistent toxic chemicals to the Great Lakes.

The overall benefit of maintaining an annual inventory of air toxic emission sources ultimately belongs to organizations that are able to use the data. The 1997 inventory data, as well as the 1993 and 1996 inventories, will be made available to researchers and interested parties from the U.S. EPA's GLNPO server.

Finally, the next phase of project development will include online access to the compiled inventory of toxic emissions from point, area and mobile sources via the Great Lakes Information Network and enhanced data access from RAPIDS. While in GLIN, one will be able to use an Internet Geographic Information System to cartographically view the toxic air emissions for the Great Lakes region. Enhancements to RAPIDS will enable raw emissions data to be exported in formats compatible to a variety of analytical programs. Using established dissemination functions as a tool, decision makers and the general public will be able to make better informed decisions that help reduce toxic pollution, protect and restore habitats and support intergovernmental partnerships. Timely access to a comprehensive inventory will provide the foundation for sound public policy decisions.

Appendices

Previous inventories identified shortcomings in the emission rates for some organic materials (e.g., methylene chloride, dibutyl phthalate, etc.). To address this shortcoming, Illinois supplemented its emission data with TRI reported data for 1997. Emission sources obtained through TRI had to be match by address to match emission sources from ISSIS. Sources that couldn't be matched were not included in the inventory. Where matches were established, a further analysis was done to associate the emissions with a specific device at the source.

Two source categories typically identified as area sources were inventoried as point sources. One of these sources was chrome plating. Due to time constraints, emissions were calculated from permitted allowable amp-hours and standard emission factors.

The second area source inventoried as a point source were landfills. Data was obtained from the Illinois EPA's "Nonhazardous Solid Waste Management and Landfill Capacity in Illinois" report dated December 1998. Emissions were then calculated using the EIIP/AP-42 methodology. For sources with flaring and gas-to-energy systems, a capture percent of 75% and a destruction efficiency of 90% was assumed.

Area Source Emissions

Area sources were primarily calculated using EIIP methods and speciation profiles contained in RAPIDS. A description of the calculation methods, assumptions and data sources for each area source inventoried follows.

Architectural Coating

The EIIP methodology was followed. Nationwide production estimates were obtained from the Census Bureau report "MA28F – Paint and Allied Products", August 1998 (www.census.gov/cir/www/ma28f.html). These values were then apportioned to county level using population. Emissions were then calculated by using per capita factors.

Autobody Refinishing

Employment data was obtained from the Census Bureau report "1997 County Business Patterns", September 1999 (www.census.gov/prod/www/abs/cbptotal.html). RAPIDS had an emission factor of 0.84 lb. VOC/person. The EIIP section had factors of 3519 lb. VOC/employee and 2.3 lb. VOC/person. These numbers were then used to obtain a per employee factor, to be consistent with other RAPIDS users, that was based upon RAPIDS data. This value was 1285.2 lb. VOC/employee. Emissions were then speciated using profile 1194.

Chrome Plating

Inventoried as a point source.

Consumer Solvent Use

County population was multiplied by the overall emission factor, from EIIP, to obtain emissions. Emission factors for individual categories (e.g., personal care products, household products, etc.) was not used.

Dry Cleaning

Employment data was obtained from the Census Bureau report "1997 County Business Patterns", September 1999 (www.census.gov/prod/www/abs/cbptotal.html). The EIIP emission factors were then used to calculate perchloroethylene emissions.

Ethylene Oxide Sterilizers

Inventoried as a point source.

Gasoline Marketing

The amount of gasoline and gasohol sold in Illinois was obtained from *Monthly Gasoline Reported by States 1997* (Federal Highway Administration Highway Statistics, Table MF-33GA, September 1998) . Use was apportioned to county by VMT (vehicle miles traveled). Emissions were calculated as follows:

Tank Filling (Stage I) – Used EIIP calculation methodology assuming balanced operation in combination with speciation profile 1190.

Vehicle Refueling (Stage II) – Multiplied monthly gasoline use times the monthly emission factor obtained from MOBILE 5b in combination with speciation profile 1190.

Underground Tank Breathing – Used EIIP calculation methodology in combination with speciation profile 1190.

Gasoline Trucks in Transit – Used EIIP calculation methodology in combination with speciation profile 1190.

Graphic Arts

Inventoried as a point source.

Incineration/Crematories

Inventoried as a point source.

Industrial Surface Coating

Employment data was obtained from the Census Bureau report "1997 County Business Patterns", September 1999 (www.census.gov/prod/www/abs/cbptotal.html) for the SIC categories of 25, 34, 35 and 37. The per employee EIIP emission factors were then used to calculate TOG emissions. Emissions were speciated by using profile 1003.

The calculated emissions were then converted to controlled emissions by assuming 90% control efficiency, 90% rule effectiveness and 90% rule penetration. The point source inventory values for solvent cleaning were then subtracted from the calculated emissions to obtain area source emissions.

Landfills

Inventoried as a point source.

Pesticides

Obtained pesticide use and application by county from *Agricultural Chemical Usage 1997 Field Crops Summary* (National Agricultural Statistics Service (www.agr.state.il.us/agstats/ctyest/1997Main.htm). Emission factors from EIIP were then used to calculate emissions.

Publicly Owned Treatment Works (POTWs)

Data from USEPA's 1996 NTI inventory was used.

Residential Fuel Combustion

The amount of fuel burned in Illinois was obtained from the *State Energy Data Report 1997* (Department of Energy, Energy Information Administration, DOE/EIA-2014(97), September 1999). Use by county was apportioned by the number of houses in a county (1990 census) divided by the total number of houses in the state in the following manner:

Natural gas – apportioned to county level by residences in county
Fuel oil – apportioned to county level by residences burning wood in county
Kerosene – apportioned to county level by residences burning wood in county
Coal – apportioned to county level by residences burning wood in county

The county-wide fuel use was then multiplied by the emission factors for commercial/institutional natural gas fired boilers < 10 million BTU/hr to obtain emissions for the county.

Residential Wood Combustion

The amount of wood burned in Illinois was obtained from the *State Energy Data Report 1997* (Department of Energy, Energy Information Administration, DOE/EIA-2014(97), September 1999). Use by county was apportioned by the number of houses in a county (1990 census) that burned wood.

EIIP emission factors for non-catalytic stoves were then used to calculate emissions.

Solvent Cleaning

Employment data was obtained from the Census Bureau report "1997 County Business Patterns", September 1999 (www.census.gov/prod/www/abs/cbptotal.html) for the SIC categories of 25, 33, 34, 35, 36, 37, 38, 39 and 55. The per employee EIIP emission factors were then used to calculate TOG emissions. Emissions were speciated by using profile 1195.

The calculated emissions were then converted to controlled emissions by assuming 90% control efficiency, 80% rule effectiveness and 90% rule penetration. The point source inventory values for solvent cleaning were then subtracted from the calculated emissions to obtain area source emissions.

Structure Fires

The number of fires in Illinois was obtained from the National Fire Data Center (NFIRS Fire Profile www.usfa.fema.gov/nfirs/nfirs_query.cfm). The state-wide number of structure and residential fires was apportioned to the county level by the number of houses in a county (1990 census). The EIIP methodology was then used to calculate emissions.

Traffic Lane Markings

Coating specifications and use were obtained from the Illinois Department of Transportation. Coating use was available by district so coating use was apportioned at the county level by the percentage of miles of roads in the county compared to the total miles of roads in the district. This data was obtained for the previous 1993 inventory. Since the source category did not comprise a significant portion of the 1993 inventory, it was assumed that coating use was the same for 1997 as it was in 1993. Emissions were speciated using profile 2438.

Mobile Source Emissions

Emissions for mobile sources were calculated for the categories of aircraft, off-road and on-road sources. A description of the calculation methods, assumptions and data sources for each source inventoried follows.

Aircraft

The number of operations (landings and takeoffs) for each airport were obtained from Illinois' 1996 ozone inventory. For O'Hare and Midway airports, data had been previously obtained from Landrum & Brown via the Chicago Department of Aviation (March 1998) on the design day flights from those airports. This data included operations for specific aircraft types and engine types.

For O'Hare and Midway, emissions were calculated by using emission factors from the FAA Engine Emission Database (FAEED) version 2.1 specific to the engine type being inventoried. Default time-in-modes (TIM) were used. Since the daily count of flights was given, this value was multiplied by 366 to obtain the annual number of flights. For airports other than O'Hare and Midway, emissions were calculated by using "average" emission factors from AP-42. Once VOC emissions were calculated, they were converted to TOG and speciated to obtain the pollutants of interest.

Emissions for 1996 were grown to 1997 values by using data from the FAA (www.apo.data.faa.gov/faaatadsall.htm). Airports not included in this report were assumed to have the same activity as 1996.

Off-road Mobile Sources

Off-road mobile sources were calculated using USEPA's NONROAD model with the default parameters. Output from the model was for the pollutant TOG which was then speciated to obtain the pollutants of interest. A review of the data showed snowmobile emissions to be higher in urban areas than rural areas. This implied an improper surrogate was being used to calculate activity. Snowmobile emissions were removed from the inventory.

On-road Mobile Sources

Annual VMT by road type for each county was obtained from the Illinois Department of Transportation. Using conversion factors, these values were converted to monthly VMT values and then apportioned to vehicle types.

Next, USEPA's MOBILE 5b model was run for each county for each month of 1997 to obtain emission factors of TOG. The inputs into the model included average speed for the road type, monthly maximum and average temperatures from the National Weather Service, fleet mix and appropriate inspection and maintenance values (if appropriate). If a county did not have a National Weather Service site which recorded temperature, the nearest site to that county was used. Emission factors output from the MOBILE model were then multiplied by VMT to obtain TOG emissions. These emissions were then speciated to obtain the pollutants of interest.

Particulate matter emissions from on-road mobile sources were calculated using USEPA's PART5 model. The inputs into the model included average speed for the road type, fleet mix, particle size, average vehicle weight, number of wheels and number of precipitation days. The number of precipitation days was obtained from the National Weather Service. Emission factors output from the PART5 model were then multiplied by VMT to obtain particulate emissions. These emissions were then speciated to obtain the pollutants of interest. No roadway dust emissions were included.

INFORMATION

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Appendix B: Indiana Toxic Emissions Inventory

CALCULATION METHODS

Point Sources

The 1997 point source inventory was compiled the same way as in 1996. Data contained in the point source inventory include estimates made by the state using information provided by point sources and emission factors from FIRE 6.01, voluntarily reported toxics emissions data, and data from the U.S.EPA's Community Right to Know Toxic Release Inventory (TRI). Please refer to the 1996 documentation for further details.

Area Sources

The 1997 area source emission estimates were projected from the 1996 Great Lakes Air Toxics Emission Inventory estimates. Readers are encouraged to review the 1996 documentation for more details on how those estimates were made. In general, most of the 1996 area source emission estimates were based on either employment or population data, and were projected to 1997 accordingly. No new area source categories were inventoried for 1997. The following explains how categories were changed from the 1996 inventory.

Architectural Surface Coating and Consumer and Commercial Solvent Use

Statewide population estimates were obtained from the U.S. Department of Census for 1997 and were used to project the 1996 estimates to 1997.

Auto Body Refinishing

The statewide increase in employment in SIC Code 7532 between 1996 and 1997 from County Business Patterns was used to estimate 1997. For Clark, Floyd, Lake and Porter counties a 70% control efficiency and an 80% rule effectiveness was applied beginning in 1997, due to a new rule promulgated as part of IDEM's ozone control plans for these counties.

Traffic Markings

Estimates for 1997 were projected from 1996 estimates based on the amount of money used on road maintenance during those years. This information was obtained from the U.S. Census Bureau and Federal Highway Administration.

Agricultural Pesticide Use

The 1997 emission estimates for atrazine use were recalculated using data on the acres of corn planted and Atrazine usage obtained from the Purdue Agricultural Statistics web page and an emission factor of 360 pounds of atrazine/ton applied. Also for 1997 the pollutant hexachlorobenzene was added. The emissions of this pollutant are based on the amount of atrazine used. The emission factor used is 8.4e-8 lb. hexachlorobenzene/lb. of atrazine. No data were available on the usage of trifluralin.

Commercial/Industrial Dry Cleaning Operations

Employment data from County Business Patterns for 7212 were checked to see if any significant change had occurred for this area source from 1996 estimates. The Perchloroethylene Dry Cleaning NESHAP was effective late 1996. For the 1997 inventory a 44% control efficiency and an 80% rule effectiveness was applied.

Industrial Surface Coatings

Industrial surface coating activities in the 1996 inventory were made using employment data and population data and were adjusted accordingly for the 1997 estimates.

Gasoline Dispensing

New estimates were made for gasoline service stations. Activity data and county VOC totals were estimated the same as in 1996. Gas sales information for 1997 was obtained from U.S. DOT. Average speciation profiles from EPA's Bulk Gasoline MACT Background Information Document were used and are shown below:

HAP	Weight % VOC
Benzene	0.9
Ethylbenzene	0.10
Toluene	1.3
Xylenes iso	0.5

Graphic Arts

County Business Patterns data for SIC 2752 were used to project 1996 estimates for 1997.

Solvent Metal Cleaning

1996 estimates were projected to 1997 using County Business Patterns for each SIC involved in this source.

Residential Fossil Fuel Combustion

This source category uses data from the Energy Information Administration for residential fossil fuel use. Changes in fossil fuel use from 1995 (used for the 1996 inventory) to 1997 were used to estimate emissions.

Municipal Solid Waste Landfills and Public Owned Treatment Works

These source categories were not changed.

Mobile Source Emissions

New mobile source estimates were made for 1997 due to the availability of new toxic speciation profiles and HAP emission factors since the 1996 inventory effort.

Onroad Sources

Onroad toxic emissions were calculated either directly using HAP emission factors, or using speciation profiles applied to evaporative and exhaust hydrocarbon (HC) and particulate matter (PM) emissions estimates. HC and PM estimates were made using EPA's Mobile 5b and Part 5 models, and VMT from the Indiana Department of Transportation. Please refer the 1996 documentation for further details on the methodology. New toxic speciation profiles from Rapids that were used for 1997 are shown below:

VEHICLE TYPE	SPECIATED MATERIAL	SPECIATION CODE
ALL VEHICLES	BW10	G031
GAS	EVHC	G008
GAS	EXHC	G001
GAS	EXPM	G004
HD DIESEL	EXHC	G003
HD DIESEL	EXPM	G006
LD DIESEL	EXHC	G002
LD DIESEL	EXPM	G005

GAS includes all gasoline vehicles (Light Duty Gas Vehicles, Trucks, Motorcycles and Heavy Duty Gas Vehicles)
LD DIESEL includes Light Duty Diesel Vehicles and Light Duty Diesel Trucks
HD DIESEL includes Heavy Duty Diesel Vehicles

For benzene, 1,3-butadiene, acetaldehyde, and formaldehyde estimates, emission factors from EPA 1996 National Toxics Inventory were used to estimate emissions from gasoline vehicles. For the PAH constituent estimates, emission factors from Rapids were used. For all other HAP estimates the speciation profiles listed above were used.

No estimates were made for tire wear or road dust for the 1997 inventory.

Nonroad Sources

In general, the same methodology that was used for the 1996 inventory was followed for nonroad estimates. One change made was that estimates from EPA's nonroad model were compiled so that separate evaporative and exhaust emissions were available. Evaporative emission estimates include evaporative losses from the crankcase, hot soak and diurnal losses, and evaporative running and resting losses. Another change from the 1996 inventory involved records with SCC codes rejected by Rapids. In 1996 those estimates were not included. For 1997 these estimates have been included with a blank SCC code, with the SCC code from the nonroad model included in the process comment text field. New speciation profiles from Rapids used are shown below:

ENGINE TYPE	SPECIATED MATERIAL	SPECIATION CODE
2S GAS	EVHC	G018
2S GAS	EXHC	G011
2S GAS	EXPM	G014
4S GAS	EVHC	G019
4S GAS	EXHC	G012
4S GAS	EXPM	G015
DIESEL	EXHC	

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http://www.fhwa.dot.gov/ohim/hs97/mf21.pdf
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2. Pesticide Data
http://www.aes.purdue.edu/agstat/annbul/9899/pg51.html

3. Household Energy Data
http://www.eia.doe.gov/emeu/recs/contents.html
http://www.eia.doe.gov/emeu/sep/in/frame.html

4. Highway Expenditures
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http://www.fhwa.dot.gov/ohim/hs98/tables/sf1.pdf
http://www.census.gov/ftp/pub/industry/1/ma28f97.pdf

5. Population
http://www.census.gov/population/estimates/county/co-99-3/99C3_18.txt
http://www.census.gov/population/estimates/state/st-99-3.txt

6. County Business Patterns
http://www.census.gov/epcd/cbp/map/97data/18/999.txt

RESULTS

The pollutant totals for the 1997 inventory may differ from totals in the 1996 inventory due to many reasons. A few of these possible reasons are discussed below.

For area sources, the change in the methodology for 1997 for gasoline service stations provides more complete estimates for this category. The FIRE emissions factors used in 1996 were found to be incomplete. Other changes include a correction to the emission factor used to estimate atrazine emissions, and the application of control efficiencies and rule effectiveness to the perchloroethylene dry cleaning, and auto refinishing categories.

For both on and off road mobile sources, the use of new emission factors and speciation profiles resulted in significant changes to this inventory. For aircraft an error was discovered in the 1996 activity data which was corrected for the 1997 inventory. Commercial marine vessel estimates were not included in the 1997 inventory.

The attached tables provide summaries of Indiana's emission totals by source type and by county.

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Table B-1: Indiana - Statewide Summary of Emissions (lbs./yr.)

	Point Sources	Area Sources	Mobile Sources	Nonroad Sources	Total
ACENAPHTHEN	29.25	2,732.33			2,761.58
ACENAPHTHYL	59.16	30,963.21			31,022.37
ACETALDEHYDE	198,240.37		1,621,278.04	2,007,714.91	3,827,233.31
ACROLEIN	16,928.59		241,240.49	77,313.06	335,482.14
ACRYLONITRIL	3,356.50	8,612.94			11,969.44
ANTHRACENE	1,586.29	3,643.09	11.35	13.01	5,253.73
ANTIMONY	4,695.96				4,695.96
ARSENIC	28,012.09	74.76	10.65	1.21	28,098.71
ATRAZINE		1,226,914.35			1,226,914.35
BENZ(A)ANTHR	12,637.56	10,928.45	97.68	176.53	23,840.22
BENZ(GHI)PE	1.78	910.85	204.31	345.13	1,462.06
BENZENE	329,164.88	1,748,120.08	5,698,653.30	2,458,218.32	10,234,156.58
BENZO(A)PYRE	10,860.67	1,821.57	78.82	104.26	12,865.32
BENZO(B)FLUO	0.35	1,821.67	110.94	91.35	2,024.31B)FLUO

Table B-1: Indiana - Statewide Summary of Emissions (lbs./yr.) (continued)

	Point Sources	Area Sources	Mobile Sources	Nonroad Sources	Total

Table B-2: Indiana Pollutant Codes

Code	Pollutant	
ACENAPHTHEN	Acenaphthene	83-32-9
ACENAPHTHYL	Acenaphthylene	208-96-8

ACETALDEHYDA12 re f 494.88 682.32 94.88 672.72 0.48 galdehcylenHTHEN

Table B-2: Indiana Pollutant Codes

TRICHLORETHY	Trichloroethylene	79-01-6
TRICLPHN,246	2,4,6-Trichlorophenol	88-06-2
TRIFULURALIN	Trifluralin	1582-09-8
VINYL CHLOR	Vinyl Chloride	75-01-4
XYLENE,M	m-Xylene	108-38-3
XYLENE,O	o-Xylene	95-47-6
XYLENE,P	p-Xylene	106-42-3
XYLENE,ISO	Xylenes Isomers	1330-20-7

Appendix C: Michigan Toxic Emissions Inventory

INTRODUCTION

The State of Michigan conducted its 1997 portion of the Great Lakes Region air toxic emissions inventory by updating the calendar year 1996 data. With a 1990 population of 9,295,297, Michigan represents 10.7 percent of the total population of the Great Lakes Region.

The 1996 inventory included all point sources from the Michigan 1996 criteria pollutant Emission Inventory System (EIS) and ten area source categories. Namely, residential wood burning, architectural surface coating, dry cleaning, consumer and commercial solvent use, solvent cleaning/cleanup, graphic arts, industrial surface coating, pesticides-agricultural and of point source criteria pollutant VOC were estimated as area source emissions. Factors from the EPA speciate tables are acceptable for area and mobile source emission calculations but they are suspect when applied to individual process information and should be used only susples are ut incorrect emission factors were deleted. (5) Calculation protocols were challenged for any, suspected out of range, emissions estimates. The list of corrected SCC codes includes:

1-02-004-01 – all toxic metals except Copper were deleted, not in FIRE 6.22.

2-02-002-02 – all toxic emissions except Mercury were deleted, not in FIRE 6.22.

2-02-002-52 – Formaldehyde was recalculated, bad emission factor.

3-01-999-99 – deleted all toxic emissions, unsubstantiated.

3-04-999-99 – deleted Mercury emissions, unsubstantiated.

3-05-002-01 – deleted Lead emissions, bad emission factor.

3-99-999-94 – deleted Mercury emissions, unsubstantiated.

Area Source Emissions

Residential Wood Burning

Michigan followed the methodology in the Regional Protocol using state energy data reports. However, to convert wood use from cords to tons, Michigan used the method

Pesticides – Agricultural and Non-agricultural

The Regional Protocol was followed. State specific emission factors for ATRAZINE and TRIFLURALIN were obtained from Michigan State University.

Gasoline Marketing (Stage I and II)

The Regional Protocol recommendation to utilize the EIIP guidance was followed. All gasoline marketing (stage I and stage II) emissions are included in this inventory except for emissions from vehicle refueling, which were not estimated.

Auto Body Refinishing

The EIIP methodology was followed. Alternate method one, the apportionment of national data, was the specific method utilized.

Landfills

This area source category was covered as a point source in Michigan's inventory.

Traffic Markings

Michigan will follow the Regional Protocol. This utilizes the EIIP recommendations. Michigan will use alternate method one. Michigan is waiting for MSDS data. Traffic marking emissions will be added to the inventory when available.

1997 Update Area Source Emissions

Architectural Surface Coating

This category was estimated consistent with the Regional Protocol.

Auto-body Refinishing

The Regional Protocol recommendation to use the EIIP methodology was followed. Alternate method one, the apportionment of national data, was the specific method utilized.

Consumer and Commercial Solvent Use

Michigan used the preferred method from the EIIP guidance.

1997 Update New Area Source Categories

Hospital Sterilizers

Michigan followed the methodology in the Regional Protocol. The first method, assuming the operation of each hospital sterilizer at given conditions, was used.

Human Cremation

Michigan followed the recommendations of the Regional Protocol. The human cremations per county for 1997 were obtained from the Michigan Department of Community Health. Emission factors from the NTI were then applied.

1997 Update Mobile Source Emissions

Michigan was unable to estimate mobile source emissions for the 1996 Inventory. These emissions have been completed. The mobile source emissions for the year 1996 are included with the emissions reported in this 1997 Update.

On-Road Mobile Emissions

On-road mobile source air toxic emissions were speciated from on-road mobile source emissions estimates for EXHC-exhaust hc, EVHC-evaporative hc, EXPM-exhaust PM10, BW10-brake wear PM10, and TW10-tire wear PM10, supplied by the EPA Final 1996 NET Ver. 3, emissions inventory for Michigan posted on the EPA ftp server in January, 2000. The latest draft version of the EPA mobile source model was used by EPA to develop the emission factors used for the above emissions estimates. RAPIDS import files were generated containing the on-road mobile source estimates and were imported into RAPIDS. The toxic emissions were then calculated using the RAPIDS on-road toxic speciation profiles. The final estimated toxic emissions were then submitted to the Rapids QA/QC committee for quality assurance.

Off-Road Mobile Emissions

The off-road mobile source air toxic emissions were estimated using the off-road mobile source emissions for TOG, and PM10 generated for each off-road process using the June, 2000 draft EPA off-road emission inventory model.

RVP and temperature values for the annual emissions runs were added. The maximum and minimum temperature values selected were consistent with the values used for the

RAPIDS import files were generated containing the off-road and aircraft, mobile source emissions and were imported into RAPIDS. The toxic emissions were then calculated using the RAPIDS off-road and aircraft toxic speciation profiles. The final speciated toxic emissions were then submitted to the RAPIDS QA/QC committee for quality assurance.

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Table C-1: Michigan - Statewide Summary of Emissions (lbs./yr.)

	Point Sources	Area Sources	Mobile Sources	Nonroad Sources	Total
ACENAPHTHEN	14.64	7,148.51			7,163.15
ACENAPHTHYL	164.23	80,995.00			81,159.23
ACETALDEHYDE	11,271.51		1,883,479.58	680,241.99	2,574,993.09
ACROLEIN	14.90		275,083.41	182.85	275,281.16
ACRYLONITRIL	2,279.88				2,279.88
ANTHRACENE	141.89	9,530.80		0.00	9,672.70
ANTIMONY	246.65				246.65
ARSENIC	3,738.65	0.64	14.29		3,753.58
ATRAZINE		1,858,748.76			1,858,748.76
BENZ(A)ANTHR	932.72	28,592.41		0.01	29,525.14
BENZ(GHI)PE	2.88	2,382.69		0.01	2,385.58
BENZENE	247,264.72	3,610,953.79	12,681,043.35	575,865.87	17,115,127.74
BENZO(A)PYRE	8,223.70	4,765.40		0.01	12,989.10
BENZO(B)FLUO	0.18	4,765.40		0.00	4,765.58
BENZO(K)FLUO		2,382.69		0.00	2,382.69
BERYLLIUM	289.86	0.03			289.89
BUTADIENE,13	0.17		1,639,157.93	185.14	1,639,343.23
CADMIUM	7,239.28	55.06			7,294.34
CARBON TETRA	1.50	0.00			1.50
CHLOROFORM	3.50	9,691.95			9,695.45
CHROMIUM	8,181.19	1.79	288.87		8,471.86
CHROMIUM VI	34.11				34.11
CHRYSENE	711.46	11,916.00		0.00	12,627.46
COBALT	385.11				385.11
COKE OVEN GS	343,173.85				343,173.85
COPPER	5,149.66		58,784.97		63,934.63
DIBENZAHAN	0.08	2,382.69		0.00	2,382.77
DIBROMOET,12	0.21	306.49			306.71
DIBUTYL PHTH	14.70	232,429.70			232,444.40
DICHLORETH12	16.93	3,200.23			3,217.16
DIEYLHEX PHT	293.76				293.76
DIOCTYL PHTH	74.46				74.46
ETHYLBENZENE	10,911.38	951,538.28	5,388,275.29	220,417.91	6,571,142.86
ETHYLENE OXI	27,767.50	147,762.08			175,529.58
FLUORANTHENE	403.32	14,296.20		0.02	14,699.54
FLUORENE	36.03	16,678.93			16,714.96
FORMALDEHYDE	656,478.04	12,399.50	4,877,195.28	2,012,972.53	7,559,045.36
GLYCOL ETHRS		395,944.68			395,944.68
INDN(123CDPY	1.37	4,765.40		0.00	4,766.77
LEAD	63,811.57		14,200.74		78,012.30
MANGANESE	54,540.57	262.11	523.97		55,326.65
MERCURY	16,545.02	69.84	261.51		16,876.37
METHYLENE CL	506,507.16	2,839,828.09			3,346,335.25
NAPHTHALENE	12,505.15	980,440.02	804,617.64	9.55	1,797,572.36
NICKEL	8,976.60	3.40	359.56		9,339.55
PCBS	2.86				2.86
PCDD	0.8531				0.8531
PCDF	0.7427				0.7427
PERC	492,030.29	10,286,237.70			10,778,267.99
PHENANTHRENE	314.20	582,570.73		0.07	582,885.00
PHENOL	7,256.14			26.53	7,282.67
PYRENE	62.57	11,913.48		0.02	11,976.07
STYRENE	172,141.08		2,972,171.21	38.18	3,144,350.47
TCDD,2378	0.0025				0.0025
TCDF,2378	97.1618				97.1618
TCE,111	170,915.89	13,115,379.71			13,286,295.60
TOLUENE	8,036,082.97	22,609,843.36	37,019,594.57	980,422.65	68,645,943.54
TRICHLORETHY	1,608,830.54	8,829,438.90			10,438,269.44
TRIFLURALIN		35,374.21			35,374.21

VINYL 476.72 re f 477.48 164.64 89.28 0.7 155.4 89477.48 164.64 89.28 0.7 155.4 ,77.48 6T2.14e f 45.48 192.36.48 6T2.

[redacted]

Appendix D: Minnesota Toxic Emissions Inventory

INTRODUCTION

Generally, 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 the emissions. However, because Minnesota does not have air toxic emission inventory reporting requirements for after reviewing the Emission Inventory Improvement Program (EIIP) documents and other available information. 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 19 source categories included in Minnesota portion of the regional emission inventory: Agricultural Pesticide Applications, Architectural Surface Coatings, Auto Body Refinishing, Chromium Electroplating, Consumer and Commercial Products, Commercial Dry Cleaning, Gasoline Marketing, Graphic Arts, Hospital Sterilizers, Human Cremation, Industrial Surface Coating, Marine Vessel Loading, Municipal Solid Waste Landfills, Public-Owned Treatment Works, Residential Fuel Combustion, Residential Wood Burning, Solvent Cleaners, Structure Fires, and Traffic Marking. Table D - 1 lists all these categories along with activity data and information sources.

Mobile Source Emissions

Mobile sources are non-stationary sources including four subcategories: on-road sources, non-road sources, aircraft, and locomotives. Although an emission factor method is preferred to estimate air toxics emissions, the information was only available for some air toxics emitted from on-road sources. In most cases, the air toxics emissions were estimated by using a speciation method which speciates total organic gases (TOG), particulate matter (PM), and/or particulate matter smaller than 10 microns (PM10) to individual air toxics. The TOG, PM, and/or PM10 emission factors were obtained from respective information sources for the four mobile source subcategories. The emission factors and speciation profiles for air toxics were directly from the 1996 National Toxics Inventory (NTI) with a supplement of speciation factors from EPA SPECIATE 1.5 for the pollutants not included in the NTI[8]. The detailed data collection and emission estimation for each subcategory is discussed in the Emission Estimation Section.

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 that was identified. The following describes the available emission estimation methods and their prioritization for use in the emission inventory.

1. Direct reporting values

   Because Minnesota does not have a rule to mandate point sources to report air toxics emissions, in May 1999, MPCA sent a letter to the top 182 emitters based on the sum of PM and VOC emissions to request that they voluntarily provide emission information. Some facilities responded, including refineries and other manufacturing facilities. This reported information was examined and appropriate emissions were used.

   Also, lead (Pb) emissions were available in the emission inventory for criteria pollutants and reviewed by facilities. These values were adapted to the air toxics emission inventory in order to maintain the consistency in these two MPCA inventories.

2. 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."[1] 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 6.22, are used as generic emission factors.[2] 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. Some source-specific emission factors were developed based on the information in facility permit applications.

   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. These two industrial sectors are not covered by the TRI report but contributed almost 50% of PM emissions from point sources in 1997. A detailed discussion on the development of emission factors and the emission inventory for these two industrial sectors was presented in two papers.[3,4]

   In addition, we also developed source-specific emission factors for municipal solid waste incinerators, chromium electroplating facilities, some paper mills, and some facilities manufacturing wood products.

   We have noticed that a number of measurements from stack tests or chemical analyses are lower than detection limits. In these situations, the detection limits were used in place of the measurements.

3. TRI data

   The TRI report is prepared 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.

Area Source Emissions

For area sources, the activity data were pre-treated to a county-level by using spreadsheets. Also, 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, county total PCE 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 PCE 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 version 6.22 and SPECIATE version 3.0 only contain scarce 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.[2, 5] These emission factors and speciation profiles were compiled from a review of available literature. EPA publications or studies, such as Emission Inventory Improvement Program (EIIP) documents, were given first preference.[6] Information from the California Air Resource Board and other resources were also incorporated. 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.[7]

Mobile Source Emissions

On-Road Mobile sources

U.S. EPA's Mobile5b[9] and Part5[10] models produced total organic gases (TOG) and particulate matter (PM10) emission factors for 87 counties in Minnesota. The TOG factors included exhaust (tailpipe) and engine evaporative factors. Refueling losses from vehicles were covered in a separate area source category. Exhaust PM10 emission factors were obtained along with PM10 factors for brake and tire wear.

The on-road fleet in each county was broken down into eight vehicle types:

Light Duty Gasoline Vehicles (LDGV)

Light Duty Gasoline Trucks; gross vehicle weight rating 0-6000 lbs. (LDGT1)

Light Duty Gasoline Trucks; gross vehicle weight rating 6001-8500 lbs. (LDGT2)

Heavy Duty Gasoline Vehicles (HDGV)

Light Duty Diesel Vehicles (LDDV)

Light Duty Diesel Trucks (LDDT)

Heavy Duty Diesel Vehicles (HDDV)

Motorcycles (MC)

Each of the emission factors were combined with the appropriate activity factor, vehicle miles traveled (VMT), to obtain TOG and PM10 emissions.

Mobile5b Emission Factors for TOG. U.S. EPA's Mobile5b model uses many factors to create TOG emission factors for on-road vehicles, including ambient temperature, gasoline type, and inspection/maintenance program effects. To account for some of these factors, the MPCA calculated TOG emission factors for four different areas of the state:

1. Twin Cities Metropolitan Area: Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington counties. Some vehicles in the metro area were required to participate in an inspection/maintenance (I/M) program in 1997.
2. Northeast Minnesota
3. Northwest Minnesota
4. Central Minnesota

The latter three areas did not have an I/M program, but TOG emission factors were calculated separately to account for variations in ambient temperature. In addition, separate emission factors were calculated for each season to account for seasonal temperature changes on emissions.

MPCA calculated TOG emission factors for seven speed classes that represent 12 roadway functional classes. The factors were specific to vehicle type, season, geographic area, and roadway type. The emission factors were combined with county and functional class-specific VMT activity data to obtain TOG estimates for all 87 counties in Minnesota.

PART5 Emission Factors for PM10. U.S. EPA's Part5 model produces VMT-based PM10 emission factors but with fewer inputs than the Mobile5b model for TOG. For example, PM10 emissions are not as sensitive to temperature as TOG. MPCA calculated PM10, brake wear, and tire wear emission factors for each county in Minnesota.

Vehicle Miles Traveled Activity Data. The Minnesota Department of Transportation (Mn/DOT) provided VMT data from its Traffic Information System. Mn/DOT provided the VMT data broken down by functional class for each county in Minnesota. MPCA estimated VMT for each vehicle type using the Mobile5b model's default fleet breakdown.

The Minnesota Department of Transportation (Mn/DOT) provided VMT data from its Traffic Information System. Mn/DOT provided the VMT data broken down by functional class for each county in Minnesota. MPCA estimated VMT for each vehicle type using the Mobile5b model's default fleet breakdown.

time-in-mode (TIM) and state-specific landing and takeoff operations (LTO) data. The U.S. Department of Transportation provided detailed LTO information[11]. Air toxics emissions were speciated from the TOG emissions.

Locomotives

Locomotive emissions were calculated using fuel use-based emission factors for volatile organic compounds (VOC) and PM10[12]. Individual railway companies with operations in

The source-specific emission factors for point sources that were developed in Minnesota were based on stack testing data, mass balance, chemical analysis results, available literature, and engineering calculations. These emission factors were reviewed by both the MPCA and the individual facilities. Most of these emission factors were derived from facility air quality permit applications.

For area and mobile sources, the 1996 National Toxics Inventory documents were reviewed. The appropriate methodologies and emission factors were used in the 1997 emission inventory.

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. For mobile sources, emission estimates were compared with the 1996 NTI data. Efforts were made to find the cause of the differences. Necessary corrections were taken accordingly.

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 selection of these facilities was based on the source-specific emission factor development efforts. The information and comments in the facility responses were also incorporated in the emission inventory.
- Requested technical review at Great Lakes regional level. Minnesota emission estimates were compared with estimates from other Great Lakes States. Extraordinary values, missing pollutants, and extra pollutants were examined.

RESULTS AND DISCUSSIONS

Emissions were estimated for the 82 target compounds in the Great Lakes regional air toxics emission inventory project. However, data were only available to obtain emissions for 66 out of the 82 air toxics. Point sources emit 62 pollutants, area source also emit 62 pollutants while mobile sources emit 31 pollutants. The summary table (Table D-2) shows the name and the emissions of these 66 pollutants totaled by principal source category.

It was estimated that 1018 out of 2787 point sources emitted one or more pollutants listed in the summary table. Point source emissions are from 214 distinct standard industrial classification (SIC) codes and 219 distinct source classification codes (SCC). Emissions from area sources were calculated for the 19 categories mentioned in the previous section and 32 distinct SCCs. Emissions of mobile sources were from four subcategories and 262 SCCs.

Table D-2 lumps emissions from non-road sources, aircraft, and locomotives to a nonroad category to distinguish emissions from onroad vehicles.

UNCERTAINTIES

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INFORMATION

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Ms. Chun Yi

Table D-1: Area source categories and information sources for their activity data.

Source Categories	Sub-Source Category	Emission Estimation Method	Activity Data Information Source
Agricultural Pesticide Application		Use vapor pressure of the active ingredients to determine per acre emission factors. Consider pesticide application and formulation type.	MD of Agricultural U.S. Department of AgriculturalMD tion

Source Categories	Sub-Source Category	Emission Estimation Method	Activity Data Information Source
Industrial Surface Coating		Use employee-based emission factors for VOC and apply sepciation profiles to VOC emissions.	Census data
Landfills		Create a model based on AP-42, Section 2.4. Most concentrations of air toxics are obtained from MPCA landfill gas study. Use facility-specific activity information.	MPCA Ground Water and Solid Waste Division
Marine Vessel Loading, Ballasting, and Transit		VOC emissions based on estimates of amount and type of products transported to or from the inventory area by waterways and the traffic classification. Air toxics emissions are assumed to be proportional to their vapor phase weight concentrations.	US Army Corps of Engineers
Public Owned Treatment Works		Survey to gather annual influent flowrate and chlorine consumption. Treat big facilities based on actual processes. Assume a typical plant then use emission factors for small facilities.	MPCA Water Quality Division, WWTIR
Residential Fuel Combustion		Use population-based fuel consumption and both state -specific and generic emission factors.	Asibd fuel consumption and both state -specific

Asibd fuel consumption and both state -specific

Use

Table D-2: Minnesota - Statewide Summary of Emissions (lbs./yr.)

	Point Sources	Area Sources	Mobile Sources	Nonroad Sources	Total
ACENAPHTHEN	16.81	14,466.35			14,483.16
ACENAPHTHYL	133.10	289,658.61			289,791.71
ACETALDEHYDE	201,261.56	637.35	1,739,657.83	1,997,499.01	3,939,055.76
ACROLEIN	92,851.74	0.93	155,690.17	91,506.14	340,048.98
ACRYLONITRIL		8,129.83			8,129.83
ANTHRACENE	51.91	19,819.82	8.06	19.38	19,899.16
ANTIMONY	2,585.90	680.98			3,266.89
ARSENIC	21,483.92	109.80	3.59	0.40	21,597.71

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Appendix E: New York Toxic Emissions Inventory

INFORMATION

New York's emission estimates are part of the regional report, but the state report was unavailable at time of publication.

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Appendix F: Ohio Toxic Emissions Inventory

BACKGROUND

The State of Ohio developed a comprehensive toxic emission inventory for the Great Lakes Air Toxic Emission Inventory Project for calendar year 1997. The inventory is a major improvement to the 1996 inventory by including additional area and mobile source inventories. Future inventories will continue to build on existing inventories and receive additional enhancements in order to produce a better estimate of the State's Toxic Profile. In most cases, Ohio followed the Air Toxic Emissions Inventory Protocol for the Great Lakes Commission in developing its contribution to the regional inventory. Collection of activity data presented a major challenge to Ohio and in some cases assumptions were made to produce realistic estimates. The point and area source calculations were performed outside of RAPIDS and the emission estimates were then imported in RAPIDS. Mobile source activity data were imported in RAPIDS and the emission estimate was performed in RAPIDS.

CALCULATION METHODS

Point Sources

Ohio is in the process of converting criteria pollutant information from the state's Emission Inventory System (EIS) into RAPIDS and apply Fire emission factors in estimating toxic at the process level. The application being developed, OSTRICH, is not yet completed. Ohio decided to follow a similar approach to the one used for the 1996 inventory year and utilized the Toxic Release Inventory (TRI) data to fulfil the point source inventory requirement. This data is considered of high confidence and it has been quality assured. There are 1600 TRI

Consumer and commercial Solvents

County population and the 7.84 lbs. VOC/person emission factor were employed to estimate VOC emissions. Toxic emissions were calculated using EIIP recommended factors.

Dry Cleaning

The two major types of dry cleaning operations are coin operated with SIC code 7215 and SIC 7216. County employment and the EIIP recommended toxic emission factors of 52 lbs. perc/employee for SIC 7215 and 1200 lbs. of perc/employee for SIC 7211 were used in the percloroethylene estimate.

Gasoline Marketing

The amount of gasoline sales in Ohio for year 1997 was provided from the National Energy Information. Use of gasoline sales was apportioned to county by VMT (Vehicles Miles Traveled). In the emission calculation of Stage I operations, Ohio assumed that 95% of the loadings are submerged and 5% are splashed in the underground tank. In the emission calculation of Stage II operations, 16 counties are

were u AD /F04.44 c 0.017/F01 0.0142 Tw (52 lbs.) Tj 35.0 fr6t and 16 TD 21.2217 Tc 0.0217

Consumer ahestionEIIP recommended

Pesticide Use

From the U.S. Dept of Agriculture chemical application rates and acres treated for corn, soybeans, wheat, oat field crops were obtained. Pesticide apportionment was accomplished by multiplying the state pesticide usage by the ratio of county to the state harvested acres. Emissions were calculated by using emission factors published in: *Air and Waste Management Association. M. Trevor Scholtz, Carol F. Slama, Eva C.*

Aircraft

Air traffic activity from Ohio's 11 major airports was received from Office of Airline Information Bureau of Transportation Statistics. The aircraft landings and take offs were grouped for each aircraft and engine type and imported in RAPIDS. Emissions were estimated within RAPIDS.

Locomotives

Gross Ton Miles (GTM) of the two major transportation companies in Ohio (Norfolk and CSX) were provided directly from the companies. Hydrocarbon emissions were calculated using the actual gross ton miles and dividing by an efficiency factor to determine the fuel utilized on an individualized line segment. The efficiency factor is based on 1997 data and is calculated to be 702.9 gross ton miles/gal of diesel fuel. The factor is assumed to include the emissions from yard units, line of road units and pushers. Toxic emissions were calculated outside of RAPIDS using the speciation profiles of diesel fuel.

RESULTS

Ohio's Great Lakes Toxic Inventory included toxic estimates of 67 substances out of the 82 Great Lakes Air Toxics. The summary table provides you with the county and the emissions of these 65 pollutants from point, area, on-road and non-road sources.

INFORMATION

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Table F-2: Ohio Pollutant Codes

Code	Pollutant	CAS Number
ACENAPHTHEN	Acenaphthene	83-32-9
ACENAPHTHYL	Acenaphthylene	208-96-8
ACETALDEHYDE	Acetaldehyde	75-07-0
ACROLEIN	Acrolein	107-02-8
ANTHRACENE	Anthracene	120-12-7
ANTIMONY	Antimony	7440-36-0
ARSENIC	Arsenic	7440-38-2
BENZ(A)ANTHR	Benz(a)anthracene	56-55-3
BENZ(GHI)PE	Benzo(g,h,i)perylene	191-24-2
BENZENE	Benzene	71-43-2
BENZO(A)PYRE	Benzo(a)pyrene	50-32-8
BENZO(B)FLUO	Benzo(b)fluoranthene	205-99-2
BENZO(K)FLUO	Benzo(k)fluoranthene	207-08-9
BERYLLIUM	Beryllium	7440-41-7
BUTADIENE,13	1,3-Butadiene	106-99-0
CADMIUM	Cadmium	7440-43-9
CARBON TETRA	Carbon Tetrachloride	56-23-5
CHLOROFORM	Chloroform	67-66-3
CHROMIUM	Chromium	7440-47-3
CHRYSENE	Chrysene	218-01-9
COBALT	Cobalt	7440-48-4
COPPER	Copper	7440-50-8
DIBENZAHAN	Dibenzo(a,h)anthracene	53-70-3
DIBROMOET,12	1,2-Dibromoethane	106-93-4
DIBUTYL PHTH	Dibutyl Phthalate	84-74-2
DICHLORETH12	1,2-Dichloroethane	107-06-2
DIEYLHEX PHT	Diethylhexyl Phthalate	117-81-7
ETHYLBENZENE	Ethylbenzene	100-41-4
ETHYLENE OXI	Ethylene Oxide	75-21-8
FLUORANTHENE		

Appendix G: Ontario Toxic Emissions Inventory

BACKGROUND

The province of Ontario, Canada, has prepared an air toxic emissions inventory on the target compounds for the Great Lakes Regional Air Toxic Emissions Inventory Project for the 1997 calendar year. This 1997 emissions inventory includes point, area and mobile sources. Ontario followed the Air Toxic Emissions Inventory Protocol and the emission source methodologies agreed upon by the project's Technical Steering Committee in developing the regional inventory where applicable. Emissions related information was collected from domestic regulatory and voluntary inventories for point sources, statistical organizations (i.e., Statistics Canada) for area sources, and the Ontario Ministry of Transportation for mobile sources. These sources of information were deposited into Ontario's Regional Air Pollution Inventory Development System (RAPIDS Version 2.0) and emissions were compiled using its reference tables and the air toxic emission factors from the Factor Information Retrieval System (FIRE) and source specific profiles.

DATA SOURCES

Point Sources:
The point source emissions inventory contains industrial process and release information provided by regulatory and voluntary reporting programs, which include the National Pollutant Release Inventory (NPRI), the Strategic Option Processes (SOP), the National Emissions Reduction Master Plan (NERM) of the Canadian Chemical Producers Association, and the

Dry Cleaning
A tetrachloroethylene (perchloroethylene) emission factor of 0.362 lb/person/year was developed using provincial emissions from a provincial solvent usage survey. The provincial total was distributed to the county level using population statistics.

Fuel Marketing
Emissions for fuel marketing were estimated using VOC speciation and toxic specific emission factors that were applied to county level fuel sales statistics. Emissions were estimated for Trucks in Transit Losses, Stage I Losses (Gasoline Retail Operations - Balanced Submerged Filling), and Stage II Losses (Filling Vehicle Gas Tanks - Vapour Loss and Liquid Spill Loss w/o Control).

Graphic Arts
Emissions for graphic arts were estimated using employee based emission factors. The SIC specific employee data were taken from Statistics Canada's 1997 "Manufacturing Industries of Canada: National and Provincial Areas" document. The Canadian SIC used for this category is 281X (Commercial Printing Industries). The total provincial emissions were apportioned to the county level using population statistics.

Industrial Surface Coating
The Canadian SIC codes used for this category are 2521, 254X, 256X, 26XX, 3042, 305X, 31XX, 32XX, 331X, 332X. The total VOC emissions from these SIC codes were calculated using employee based emission factors. VOC numbers for the Other Product Coatings, High Performance Coatings, and Other Special Purpose Coatings source categories were calculated using population based emission factors. Both categories of VOC emissions were speciated into the GLC targeted air toxics.

Publicly Owned Treatment Works (POTW)
POTW emissions were estimated using effluent flow information from POTWs in Ontario. The individual POTW facilities were separated into facilities with the dewatering process and those without. Specific sets of flow based emission factors from FIRE were used to estimate emissions.

Residential Wood Combustion
Emission estimations were based upon merchantable fuelwood statistics. Softwood and hardwood statistics for merchantable fuelwood were provided by the National Forestry Database. Emission factors were used for the three wood burning stove types used in Ontario: conventional, catalytic, and non-catalytic. Total provincial wood stove emissions were apportioned to the county level according to regional wood use statistics and rural dwelling statistics taken from an Ontario Ministry of Natural Resources wood use study and Statistics Canada respectively.

Residential Fuel Combustion
Residential Fuel Combustion emissions were estimated using residential fuel consumption data from Statistics Canada and emission factors. The two fuel types for which targeted toxic

emissions were estimated are fuel oil and natural gas. Fuel use was apportioned to the county level according to population statistics.

Traffic Markings

Emissions for traffic markings were based on total traffic paint used in each county, the air toxic volume percent of the paint used, and the air toxic density. The total amount of traffic paint used was estimated by applying a paint use factor to the road length statistics provided by the Ontario Ministry of Transportation. Road length was apportioned to the county level using population statistics.

Mobile Sources:

The mobile source inventory included 2 major categories, on-road sources and non-road sources. The 1997 Ontario mobile source inventory included 13 source sectors (7 in the on-road and 6 in the non-road categories). The mobile source sector profile includes emissions data for 39 of the 82 targeted toxics on the GLC substance list.

On-road Mobile Sources

The on-road mobile sources include the vehicle categories as defined by the U.S. transportation model MOBILE 5. These are light-duty gasoline vehicles (LDGV), light-duty gasoline trucks (LDGT), heavy-duty gasoline vehicles (HDGV), light-duty diesel vehicles (LDDV), light-duty diesel trucks (LDDT), heavy-duty diesel vehicles (HDDV), and motorcycles (MC).

The Canadian version of the MOBILE model (MOBILE 5C) was used to estimate the evaporative and exhaust related VOC emissions of on-road vehicles. The PART5 model was used to estimate the particulate matter (PM) emissions. Toxic substance speciation profiles were applied to VOC and PM emissions to obtain the toxic emission values.

Non-road Mobile Sources

Non-road mobile sources include the following categories: i) off-road gasoline engines/vehicles; ii) off-road diesel engines/vehicles; iii) off-road equipment; and iv) locomotives, marine engines, and aviation. The following sections give details on the emission estimation methodologies associated with non-road mobile sources.

Off-road Gasoline Engines/Vehicles

The fuel consumption of off-road gasoline engines/vehicles was obtained from provincial statistics and used to estimate VOC and PM emissions. Corresponding toxic substance speciation profiles were applied to the VOC and PM emissions to obtain the toxic emission values.

Off-road Diesel Engines/Vehicles

The fuel consumption of off-road diesel engines/vehicles was obtained from provincial statistics and used to estimate VOC and PM emissions. Corresponding toxic substance speciation profiles were applied to the VOC and PM emissions to obtain the toxic emission values.

Off-road Equipment
The estimated number of off-road equipment (e.g., lawnmowers) was obtained from a federal Environment Canada field survey and used to estimate VOC and PM emissions. Corresponding toxic substance speciation profiles were applied to the VOC and PM emissions to obtain the toxic emission values.

Locomotives
The fuel consumption of locomotives was obtained from provincial statistics and used to estimate VOC and PM emissions. Corresponding toxic substance speciation profiles were applied to the VOC and PM emissions to obtain the toxic emission values.

Marine Engines
The fuel consumption and the operating statistics (i.e., movement) of marine engines (i.e., vessels) was obtained from provincial statistics, whereas the number of pleasure crafts was estimated via the federal Census. This information was used to estimate VOC and PM emissions. Corresponding toxic substance speciation profiles were applied to the VOC and PM emissions to obtain the toxic emission values.

Aviation
The aircraft movement statistics for each airport were obtained from the Ontario Ministry of Transportation to derive the landing-takeoff (LTO) cycles. Corresponding toxic substance speciation profiles were applied to the estimated VOC and PM emissions to obtain the toxic emission values.

QUALITY CHECK ACTIVITIES

During the development of this air toxics inventory, quality check activities, such as technical reviews and accuracy checks, were performed to ensure that the most appropriate emission profiles were used for each source.

UNCERTAINTIES

The emission estimates in this air toxic emissions inventory were based on the best available source information and source emission profiles. The use of NPRI data in the point source sector profile is limited to larger sources. Additional point sources from major industrial sectors were included (from SOP, NERM, and ARET inventories) in this inventory's point source sector profile.

Uncertainties exist when using emission factor tables, which vary in terms of data quality. In preparing this emission inventory, Ontario has further updated some of the RAPIDS emission factor tables with the most recent information from FIRE, AP-42, and EIIP.

RESULTS

Ontario's 1997 Great Lakes Regional Air Toxic Emissions Inventory included estimates for 67 of the 82 targeted toxics on the GLC substance list. There are 9,567 estimates for 632 different point sources, 9,032 estimates for 9 area source sectors and 33,745 estimates for 13 mobile source sectors. There are 185 SCC codes and 205 SIC codes included in this Ontario inventory. The point, area, and mobile source emissions for each county in Ontario are provided in Ontario's County Emissions table.

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Appendix H: Pennsylvania Toxic Emissions Inventory

METHODOLOGY

Point Source Methodology

PA Department of Environmental Protection's Bureau of Air Quality, as part of its annual air emissions inventory process, collected point source emissions information included in the Pennsylvania inventory. Every January, PA DEP mails preprinted forms to every active facility in the emission inventory. Facilities are required to submit activity data for the previous year. This data includes operating schedules, throughputs, fuel usage, and emission estimates. The reports are to be completed and notarized and sent to Pa DEP by March 1st. Regional inspectors then verify and enter the data into the emission inventory database. The data is then quality assured and completed by September. Where directly reported toxics data existed for 1997, that data was broken down into its component scc-level emissions and entered into Rapids. Since a there were still a number of facilities that did not report their actual toxic emissions for 1997, It was sometimes necessary to use emission factors from the Factor Information Retrieval System (FIRE) and apply them to the annual throughputs for each 02.76 4sw (scc-alityfromtrievaCode) aSCCpply thgensche thrn factors s. The r.tioaget cohis ds,-0.0024 5ach 02.mgy

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INFORMATION

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Table H-3: Pennsylvania Pollutant Codes

Code	Pollutant	CAS Number
ACETALDEHYDE	Acetaldehyde	75-07-0
ACROLEIN	Acrolein	107-02-8
ACRYLONITRIL	Acrylonitrile	107-13-1

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 1997. With a 1997 population of 5,216,380, Wisconsin represents 5.6 percent of the total population of the overall Great Lakes region.

The sources inventoried were individual point sources, non-industrial area sources, and mobile on-road and non-road sources. The 1997 inventory update includes the addition of emissions from Human Cremation and Locomotives. Wisconsin followed the Air Toxic Emissions Inventory Protocol and the area source methodologies agreed upon by the projects

Table I-1: Reporting thresholds (in pounds per year) for each of the pollutants inventoried for this project.

PCBS	Total polychlorinated biphenyls (PCBs)	Polychlorinated biphenyls (PCB)	0.05
PCDD	Total polychlorinated dibenzodioxins (PCDDs)		
PCDF	Total polychlorinated dibenzofurans (PCDFs)		
PCP	Pentachlorophenol	Pentachlorophenol	179
PENTCLNITBEN	Pentachloronitrobenzene (quintobenzene)	Pentachloronitrobenzene (Quintobenzene) (PCNB)	6000
PERC	Tetrachloroethylene (Perchloroethylene)	Perchloroethylene	6000
PHENANTHRENE	Phenanthrene		
PHENOL	Phenol	Phenol	6000
PHOSGENE	Phosgene	Phosgene	147
PYRENE	Pyrene		
STYRENE	Styrene	Styrene, monomer	6000
TCDD,2378	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.00005
TCDF,2378	2,3,7,8-tetrachlorodibenzo-furan (TCDF)		
TCE,111	Methyl chloroform (1,1,1-Trichloroethane)	Methyl chloroform (1,1,1-Trichloroethane)	6000
TOLUENE	Toluene	Toluene (Toluol)	6000
TOLUENE24DII	2,4-Toluene diisocyanate	Toluene-2,4-diisocyanate (TDI)	15
TRICHLORETHY	Trichloroethylene	Trichloroethylene	6000
TRICLPHN,245	2,4,5-Trichlorophenol	2,4,5-Trichlorophenol	6000
TRICLPHN,246	2,4,6-Trichlorophenol	2,4,6-Trichlorophenol	6000
TRIFLURALIN	Trifluralin	Trifluralin	6000
VINYL CHLOR	Vinyl chloride	Vinyl chloride	150
XYLENES ISO	Xylenes (includes o, m, and p)	Xylene, mixed isomers (Xylol)	6000

The point source data submitted by Wisconsin are for calendar year 1997 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.

For the 1997 Great Lakes Inventory, point source data have been added from the Environmental Protection Agency’s Community Right to Know Toxic Release Inventory (TRI). The TRI data were added to include some pollutants not reported to the state inventory because emission levels were below the reporting threshold or to include pollutants that may have been reported in the state inventory as part of volatile organic compounds (VOC), but were reported to TRI as individual toxics.

Agricultural Pesticides

The SIC code for this category is 0115 (Agricultural Production Crops, Corn). Atrazine emissions were calculated using a per acre emission factor. Atrazine is applied exclusively in corn crops. The information on state total acres of corn and the percent of corn crops to which Atrazine is applied was obtained from the USDA (http://usda.mannlib.cornell.edu/usda). The County specific corn acreage was obtained from the 1997 Census of Agriculture, which was carried out by the National Agricultural Statistics Service of USDA (http://www.nass.usda.gov/census). Hexachlorobenzene emissions were derived from atrazine emissions following the 1996 National Toxics Inventory (NTI) methodology for agricultural pesticides.

Architectural Surface Coating

Emissions were calculated by speciating each toxic from the total VOC content of all surface coatings used. The total amounts of coatings used were estimated using a per capita emission factor.

Auto Body Refinishing

The SIC for this category is 7532 (Top and Body Repair and Paint Shops). Emissions were calculated by speciating each toxic from total VOC emissions. VOC numbers for this source category were calculated using a per employee factor.

Consumer and Commercial Solvents

Emissions were calculated by multiplying the estimated 1997 county population by a per capita emission factor.

Dry Cleaning

The SICs for this category are 7211 (Power Laundries, Family, and Commercial) and 7215 (Coin-operated Laundries and Dry Cleaning). This category included commercial and coin operated dry cleaners. Perchloroethylene emissions were calculated from a per employee emission factor. The calculated emissions were reduced by 30% to account for state regulations for this source type.

Fuel Marketing

The SIC for this category is 5541 (Gasoline Service Stations). 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

Publicly Owned Treatment Works

The SIC for this category is 4952 (Sewerage Systems). For this category, a methodology developed by the Minnesota Pollution Control Agency was used. The methodology assumes a typical POTW configuration and related processes. Emissions are calculated using generic emission factors and effluent wastewater flow data. Wastewater data were obtained from the WDNR, Bureau of Integrated Science Services.

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 petro gas, and natural gas. Fuel use data were obtained from the 1998 Wisconsin Energy Statistics published by the Wisconsin Energy Bureau, Department of Administration. Fuel was apportioned to the county level using the fraction of total households for each county.

Residential Wood Combustion

Calculated emissions were based on units of wood fuel used. Emission factors were available for three

Mobile Source Emissions

On-Road Mobile Sources

WDNR calculated estimates of 1997 annual total organic gases (TOG) and PM10 emissions for each of Wisconsin's 72 counties. Emissions were broken down into tailpipe exhaust hydrocarbon (EXHC) and all evaporative hydrocarbon (EVHC). Emissions from vehicle refueling were calculated separately. PM10 emissions were divided into tailpipe exhaust emissions (EXPM), break-wear emissions (BW10), and tire-wear emissions (TW10). Fugitive dust emissions were not included. Within each of these counties, the emission estimates included individual emission estimates for each of the eight types of highway vehicles. These types are:

Light-Duty Gasoline Vehicles (passenger cars) [LDGV]
Light-Duty Gasoline Trucks 0-6000 lbs. gross vehicle weight rating [LDGT1]
Light-Duty Gasoline Trucks 6001-8500 lbs. gross vehicle weight rating [LDGT2]
Heavy-Duty Gasoline Vehicles [HDGV]
Light-Duty Diesel Vehicles [LDDV]
Light-Duty Diesel Trucks [LDDT]
Heavy-Duty Diesel Vehicles [HDDV]
Motorcycles [MC]

In general, the emission estimates were obtained by multiplying an activity factor by an emission factor. The activity factor was VMT. The TOG emission factors were obtained from the U.S. EPA's MOBILEwi0act2s timates were 30a-Mar-93ions were

Table I-2: Summary of the Wisconsin 1997 Statewide VMT Estimates

Vehicle Type	Average Daily VMT	Annual VMT	VMT Distribution
LDGV	91,658,733	33,455,437,456	62.3%
LDGT1	31,996,420	11,678,693,231	21.7%
LDGT2	10,166,412	3,710,740,291	6.9%
HDDV	8,146,862	2,973,604,532	5.5%
HDGV	3,130,771	1,142,731,326	2.1%
LDDV	1,059,661	386,776,285	0.7%
MC	752,930	274,819,540	0.5%
LDDT	294,412	107,460,526	0.2%
All	147,206,200	53,730,263,188	100.0%

SEWRPC and WDOT also provided monthly VMT adjustment factors, which allowed WDNR to calculate VMTs for each month of the year.

Additionally, for each of the seven SEWRPC counties, SEWRPC provided a distribution of the county total VMT into 14 speed classes (12 speed classes for travel on freeways, the same 12 speed classes for travel on standard arterials, and 2 additional speed classes for travel on the off-network roadways). And, for each of the 65 non-SEWRPC counties, WDOT provided VMT estimates for each of the 12 HPMS functional classes.

MOBILE5a Emission Factors for TOG

The WDNR calculated sets of MOBILE5a TOG emission factors for the following four regions of the state:

(1) Six Severe Nonattainment Counties for Ozone: Kenosha, Milwaukee, Ozaukee, Racine, Washington, and Waukesha Counties. (These six counties, all in the SEWRPC planning region, are subject to both a vehicle inspection and maintenance (I/M) program and to federal reformulated gasoline (RFG).)
(2) Walworth County. (This is the only county in the SEWRPC planning region that is not subject to I/M and not subject to RFG.)
(3) Sheboygan County. (This is the only county outside of the SEWRPC planning region that is subject to I/M. It is not subject to RFG.)
(4) Remaining 64 Counties of Wisconsin. (These counties, all outside of the SEWRPC planning region, are not subject to I/M and are not subject to RFG.)

For regions (1) and (2), which comprise the seven SEWPPC counties, WDNR computed month-specific and vehicle-type-specific emission factors for the 14 different speed classes provided by SEWRPC. And, for regions (3) and (4), which comprise the 65 non-SEWRPC counties, WDNR computed month-specific and vehicle-type-specific emission factors for 12 different speeds provided by WDOT (one speed for each of the 12 HPMS functional classes).

For each of the eight vehicle types within each of the 72 counties, WDNR then computed final monthly emission factors for each of the 12 months by taking a VMT-weighted average of the month-specific emission factors for each of the different speeds. These monthly emission factors were then multiplied by the monthly VMT to obtain monthly emission estimates for each of the eight vehicle types within each of the 72 counties. These monthly emission estimates were then summed to obtain annual emission estimates.

<u>PART5 Emission Factors for PM10</u>

The WDNR's methodology for calculating PM10 emission factors was consistent with its methodology for calculating TOG emission factors described above. Since the PART5 model required a smaller set of inputs than MOBILE5a, some of the complexities of the VOC emission factor calculation were not necessary in calculating the PM10 emission factors. For example, the calculation of monthly emission factors was not necessary since the PART5 model does not include inputs for the modeling parameters that vary significantly by month of the 2necear (e.g., ambi wittempge tunotand fudoevoion lity)Tj 0 -27.84 TD /I using intelligent import Method I. Intelligent import Method I allows the user to supply SCC specific activity data by season for the purposes of emission estimation.

Aircraft

Toxic pollutants were speciated from TOG data estimations for each aircraft type. A more detailed description of the components and procedures used follows.

TOG Estimation

TOG data were calculated from the application of an emission factor based on time-in-mode (TIM), the amount of time spent in each phase of the lift off and landing cycle for a particular aircraft, and the number of landings and take-offs for the same aircraft type (LTO). Default data were used for the TIM estimates. LTO data for each county were obtained from the US Department of Transportation, Bureau of Transportation Statistics; 1996 Airport Activity Statistics document. TOG estimates were incorporated using intelligent import Method II. Intelligent import Method II allows the user to supply pre-calculated TOG estimates by aircraft type for emission estimation. The 1997 estimates were calculated by applying a growth factor of six percent to the LTO data for 1996. The LTO growth factor was obtained from the Wisconsin Department of Transportation, Aeronautics Program.

Locomotives

The SIC for this category is 1611. For this category, we adopted the 1996 National Toxics Inventory methodology (http://www.epa.gov/ttn/chief/nti/nonrdrpt.pdf). Toxic emissions were calculated by speciating each toxic from VOC and PM10 emissions. The VOC/PM10 emissions for each county were calculated by multiplying the county consumption of distillate fuel oil on railroad by a VOC/PM10 emission factor per ton of distillate fuel oil consumed. The county distillate fuel oil consumption was calculated by apportioning the total state consumption based on railroad mileage in each county. The state fuel consumption data were obtained from the 1997 Wisconsin Energy Statistics published by the Wisconsin Energy Bureau, Department of Administration. The railroad mileage was obtained from the Wisconsin Department of Transportation. The VOC/PM10 emission factors were calculated by dividing the national locomotive VOC/PM10 emissions by the total national consumption of distillate on railroad given in the 1996 NTI.

INFORMATION

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

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Table I-3: Wisconsin - Statewide Summary of Emissions (lb./yr.)

Point Sources

Table I-4: Wisconsin Pollutant Codes

Code	Pollutant	CAS Number
ACENAPHTHEN	Acenaphthene	83-32-9
ACENAPHTHYL	Acenaphthylene	208-96-8
ACETALDEHYDE	Acetaldehyde	75-07-0
ACROLEIN	Acrolein	107-02-8
ACRYLAMIDE	Acrylamide	79-06-1
ACRYLONITRIL	Acrylonitrile	107-13-1
ANTHRACENE	Anthracene	

Ant.48 60 Tw00.92 [illegible]

Appendix J: Architectural Surface Coating

PREFERRED EMISSION CALCULATION METHODS

1. Survey
   EIIP (Volume III - Area Sources) describes the ideal survey in detail.

2. Apply speciation profiles to the VOC emission estimate.
   Although the survey approach is the preferred method of emission estimation, it is costly and time consuming. Applying speciation profiles to a VOC emission estimate is the more feasible alternative. Architectural surface coating speciation profiles are obtained from the California Air Resource Board Speciation Manual (CARB, 1991, VOC Profile 196 and 717). The pollutants pertinent to RAPIDS for the solvent-based paint profile are Ethylbenzene, Isomers of Xylene and Toluene and for the water-based paint profile are Benzene and Methylene Chloride. All compounds are classified as VOC. The speciation profiles listed for the compounds are given in Table J-1.

Table J-1: Speciation Profile for Architectural Surface Coating (CARB, 1991)

Air Toxin (TOX)		Speciation (TOX/VOC), % by wt
Solvent based paints	Ethylbenzene	4.3
	Isomers of Xylene	2.6
	Toluene	5.2
Water based paints	Benzene	0.3
	Methylene chloride	5.5

Table J-2: VOC Emission Factors and Paint Usage Factors

Paint Type	VOC Emission Factor (lb./gal)	Usage Factors (gal/person)
Solvent-Based Paint	3.87	0.59
Water-Based Paint	0.74	1.82

VOC EMISSION ESTIMATE

The following equations provide an estimation of VOC emissions using the population data, the paint usage factors and the appropriate emission factors.

$$\mathbf{VOC_{wb} = Population * 1.82\ gal/person * (0.74\ lb./gal)}$$
$$\mathbf{VOC_{sb} = Population * 0.59\ gal/person * (3.87\ lb./gal)}$$

where,

VOC_{wb} = Total VOC emitted from water-based paint for a county
VOC_{sb} = Total VOC emitted from solvent-based paint for a county

Using the estimated VOC emissions calculated above for each paint type, the TOX emissions from solvent-based and water-based paints were calculated by applying the appropriate speciation profiles from Table J-1 for the two paints in the following equation.

$$\mathbf{E = VOC * TOX/VOC}$$

where,

E = Emissions of a pollutant, lb./yr.
VOC = Total VOC for a county for each paint type, lb./yr.
TOX/VOC

Appendix K: Asphalt Paving

OVERVIEW

Based on available data and discussions with state and industry professionals in the field of asphalt paving, the State of Michigan has concluded that the area source category of asphalt paving is not a significant source of HAPS. Furthermore, the State of Michigan suggests that the Regional Inventory not spend any more time on this category. The basis for these conclusions is detailed below.

The Michigan Dept. of Transportation (MDOT) indicated that they used 4,595,000 gallons of emulsified asphalt in 1997. MDOT, and the county departments of transportation, only use cutback asphalt for filling potholes but the quantity is not tracked. Michigan DEQ, Air Quality Division (AQD) staff decided that they would apportion the state emulsified asphalt data to the county level via Vehicle Mile Traveled (VMT) estimates.

AQD staff contacted the Asphalt Institute, but opted not to use their data. They could provide a statewide total estimate for cutback and emulsified asphalts, but only if Michigan purchased their asphalt usage report ($1,000.00 for a one year volume).

Mr. Homer indicated that the asphalt industry as a whole has made a major transition to emulsified asphalt, but cutback solvents are still used in smaller quantities for specific instances, such as priming wet rock or winter application of asphalt. Based on his recommendation, and the available data, AQD staff feels that the area source category of asphalt paving is not a significant contributor to toxics in the State of Michigan.

Below, the AQD has provided an evaluation of EIIP alternative methods deemed most feasible, for any states or provinces that wish to continue with an inventory based on asphalt paving.

Alternative Method One

Table K-2: EIIP Table 17.5-3 - Asphalt Paving Emission Factors

Asphalt Type	**Volume-based [a] (lb VOC/Barrel Asphalt)**
Cutback asphalt	88
Emulsified asphalt	9.2

[a] Assuming that the density of asphalt is similar to that of water, 8.34 lbs/gal, one barrel (42 gal) of asphalt weighs 350 lbs.

Once the data have been collected, emissions are estimated as follows.

Equation 1:

$$\text{Mass Emissions} = \text{Volume Usage Emission Factor} * \text{Volume Used (Barrels of Asphalt)}$$

Hazardous Air Pollutants

The simplest way to collect the necessary composition information to determine HAP emissions is for the inventory preparer to request material safety data sheets (MSDS) or manufacturer technical data sheets (TDSs) from the DOTs receiving the survey. The weight percent of each HAP is taken from the MSDS or TDS, then is multiplied by the weight of VOC emissions estimated by any of the alternative methods, to determine the speciated emissions (see Equations 17.4-8 and 17.4-9).

Equation 2:

$$\text{Mass Emissions for Each HAP} = \text{VOC Mass Emissions} * \text{Weight Fraction of Each HAP}$$

Equation 3:

$$\text{Weight Fraction of Each HAP} = \frac{\text{Weight of Each HAP}}{\text{Weight of VOC Emitted}}$$

As an alternative, the inventory preparer may solicit HAP information from local vendors or a few representative DOTs to establish typical compositions for the asphalt types used in the inventory area. This information will then be applied to the VOC estimate to determine the speciated HAP emissions.

REFERENCES

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Appendix L: Autobody Refinishing

The following is a summary of preferred and alternative methodologies for estimating toxic emissions from the auto body refinishing area source category. All quotes and information contained within are from the source, Emission Inventory Improvement Program, Volume 3, Chapter 11, *Auto Body Refinishing*.

OVERVIEW

"Auto body refinishing is the repairing of worn or damaged automobiles, light trucks, and other vehicles, and refers to any coating applications that occur subsequent to those at original equipment manufacture (OEM) assembly plants." "This source category covers solvent emissions from the refinishing of automobiles, including paint solvents, thinning solvents, and solvents used for surface preparation and cleanup." Auto body refinishing also, can be both an area and a point source (SIC 7532). Therefore, states will need to adjust their area source estimations by removing total point source emissions.

ASC: 2401005000

VOC emissions are influenced by

1) VOC content of the product used
2) Transfer efficiency of spraying equipment
3) Cleanup/housekeeping practices
4) Regulations

METHODOLOGY

Table L-1: Descriptions of Different Methods for Calculating Emissions

Methods	Description
Preferred Method – Survey	Gather detailed information from auto body refinishing operations. This may include information on activity (number of partial/complete refinishing jobs performed, temporal resolution of activity, etc.), number of employees, product use by product category, type of equipment used, pollution control measures used, business projections, etc. These data are then reviewed and compiled to develop an accurate description of the auto body refinishing activity in the survey area. Emission factors can be developed from specific product data such as Material Data Safety Sheets or can be based on typical VOC content ranges for product types.
Alternate Method 1 - Apportion National Data	Use national data on the number of refinishing jobs performed in year, apportion to inventory area by population to estimate activity. Use estimate of typical amount of surface preparation, coating, and cleaning products and typical VOC contents to estimate emissions.
Alternate Method 2 - Per Employee Factor	Use per employee emission factor and number of employees in inventory area to estimate emissions.
Alternate Method 3 - Per Capita Factor	Use per capita emission factor and population in inventory area to estimate emissions.

Table L-2: Data Elements Needed for Each Method

Data Element	Method

SPECIATION

ASC: 2401005000

Profile Name Auto Body Repair
Profile Code: 1194

000071-43-2	Benzene	0.0151 lbs./lbs. VOC
000084-74-2	Dibutyl Phthalate	0.0001 lbs./lbs. VOC
000091-20-3	Naphthalene	0.0146 lbs./lbs. VOC
000108-88-3	Toluene	0.0865 lbs./lbs. VOC
001330-20-7	Xylene, (m, o, & p mixture)	0.2067 lbs./lbs. VOC

Adjusting for regulations and control

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

Adjustments to preferred survey method

CAE SUB A~=~(UAE SUB A)[1~-~(CE)(RP)(RE)]

Adjustments to other methods using emission factors and activity data

CAE SUB A~=~(EF SUB A)(Q)[1~-~(CE)(RP)(RE)]

An example calculation to determine CE is included below and based on the following background information:

New York had a regulation in place affecting the NY Metropolitan Area (NYMA) nonattainment area before the inventory year being developed. This regulation established controlled VOC limits of:

Touch up/repair products = 6.2 lbs. VOC/gal (lacquers)
Full paint job products = 5.0 lbs./gal (enamels)

The average 1990 uncontrolled VOC content = 6.75 lbs. VOC/gal per "Meeting the 15-Percent Rate-of-Progress Requirement Under the Clean Air Act," dated September 1993 as provided by STAPPA/ALAPCO. Additional information provided by EPA document, Reduction of Volatile Organic Compound Emissions from Automobile Refinishing, indicates that:

53% of total usage is for full paint jobs
47% is for touch up/repair jobs

Because New York State's existing regulation (6NYCRR Part 228) limits VOC below this uncontrolled average VOC content value, the calculation below needs to be made to estimate control efficiency.

CE=(0.47[(6.75-6.2)/6.75]+(0.53[(6.75-5.0)/6.75])*100
CE=17.6%

RP=50% based on good engineering judgement
RE=80% EPA default based on good engineering judgement

Any federal regulations affecting the area source need to also, be considered. In the case of auto body refinishing, a federal regulation was promulgated in September, 1998.   While it is arguable that VOC limits in auto body refinishing coatings have decreased in anticipation of this regulation, it is most likely that adjustments to actual emissions would be made beginning with the 1999 inventory year.

Appendix M: Consumer &Commercial Solvent Use

OVERVIEW

Example:

To estimate VOC emissions from personal care products:

Emissions = Population x Per Capita Emission Factor

Given a population of 1 million persons for a particular area, the VOC emissions from personal care products would be:
1,000,000 persons x 2.32 lbs. VOC's/person/year = 2,320,000 lb. VOC/year
= 1,160 tons VOC/year

HAP's

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

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

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

C Perform a survey of distributors and retailers or consumers of consumer 2.oi Tw iF1i6te e003p

C

C V

D V H

EMISSION FACTORS

Table M-1: Consumer and Commercial Solvent Product Categories and Emission Factors

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

SPECIATION

ASC: 2465000000

Profile code: 0197 - didn't use speciation factors associated with this profile code but those provide by EIIP below.

Table M-2: Per Capita Consumer and Commercial Solvent HAP Emission Factors (lb./yr./person)

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

Table M-3: Per Capita Consumer and Commercial Solvent HAP Emission Factors by Category (lb./yr./person).

Pollutant	Personal Care Products	Household Products	Automotive Aftermarket Products	Adhesives & Sealants	FIFRA-Regulated Products[b]	Coatings & Related Products	Misc.	Overall Emission Factor (lb./yr./person)
Acetamide	1.38E-07							1.38E-07
Acetophenone						8.53E-06		8.53E-06
Acrylic acid				3.94E-09				3.94E-09
Benzene			4.72E-06					4.72E-06
Carbon tetrachloride						4.10E-10		4.10E-10
Chlorobenzene					7.16E-02	1.51E-05		7.16E-02
Chloroform								

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

Adjusting for regulations and control of VOC and HAP’s

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

Appendix N: Chromium Electroplating

Chromium electroplating and anodizing operations include hard chromium, decorative chromium, decorative trivalent chromium, and chromic acid anodizing. Chromium electroplating and anodizing operations produce chromic acid mists. As these mists escape into the air, chromium emissions are released. As a result, these operations produce significant emissions of hexavalent chromium and chromium compounds. This section will focus on chromium emissions from chromic acid operations, hard and decorative hexavalent chromium electroplating operations. Decorative trivalent electroplating operations will not be included due to lack of information available for estimating emissions. Chromium electroplating and anodizing operations are regulated by the NESHAP for Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks, finalized on January 25, 1995.

Source Identification

Chromium electroplating operations are classified under the Standard Industrial Classification Code (SIC) 3471 - Plating and Polishing.

The following codes were found for chromium electroplating operations in the Source Classification Code (SCC) list:

3	Industrial Processes
309	Fabricated Metal Products
309010	Electroplating Operations
30901018	Hard Chromium Electroplating - Uncontrolled
30901028	Decorative Chromium Electroplating - Uncontrolled
30901038	Chromic Acid Anodizing Tank - Uncontrolled and Packed Scrubber

The following codes were found for electroplating and anodizing operations in the Area and Mobile Source Code (AMS) list:

A23	Industrial Processes
A2309	Fabricated Metals
A2309100	Coating, Engraving, and Allied Services
A2309100010	Electroplating
A2309100050	Anodizing

Pollutants

The targeted pollutant emissions of concern for chromium electroplating operations are Chromium and Chromium VI (hexavalent chromium).

Emission Factors

There were no emission factors found for any of the applicable AMS codes in the FIRE database. The following emission factors were found in FIRE for the corresponding SCC codes.

Emission Estimation

Total chromium emissions from hard and decorative chromium electroplating for each county are calculated by multiplying the total production ampere-hours per year by the appropriate emission factors in Table N-1. The following equation is an example calculation used to determine the chromium emissions at each facility.

$$E = EF \times PR$$

where:	E	=	Chromium emissions (lb./yr.)
	EF	=	Chromium emission factor from FIRE (lb./A-hr)
	PR	=	total production rectifier ampere-hours per year (Amp-hr/yr.)

Emissions from chromic anodizing tanks were calculated using the operating hours of the

Table N-2: Facility-Specific Information for 1997

Facility Name	County	Tank type	1997 Activity	Units	EIS?

United Defense (Anoka) Anoka hard 1,400,000 Amp-hr anodizing ; printed overlapping as: UnitedlDefe50d Dej -0.00308 Tc 0Tw Anoka 14.3855 0 Td hard (Anoka)Tj 1,400,0003 Tc 6.3735 0 Td 0.72 2 0.00133 Tc anodizing35

Table N-3: Chromium Emissions (lbs.) by County

Appendix O: Drycleaners

General Hierarchy of Methods

Coin operated

- local per facility emission factor (through survey/permits)
- local per machine factor from commercial dry cleaners
- national per employee emission factor

Commercial/Industrial

- local per facility solvent consumption (through survey/permits)
- local per employee factors (through surveys/permits)
- national employee factors
- national per capita factors

Data Requirements

The data requirements for calculating emissions from dry cleaners depends upon the methods used. These elements are described perfectly in the EIIP document on dry cleaning (Volume III: Area Sources - Chapter 4: Dry Cleaning). The data items include:

- type of solvent used
- amount of solvent used
- number of employees
- number of employees by SIC
- machines per facility
- type of machines
- control methods
- number of facilities
- applicable emission factors (can be per facility, per machine, per employee or per capita and be a national value or a local (source specific) value)

Pollutants emitted by dry cleaners pertinent to RAPIDS

- 1,1,1-trichloroethane (second most common)
- Ethylbenzene
- Naphthalene
- Perchloroethylene (most common)
- Toluene
- Xylenes

Emission Factors

From EIIP

Table O-1: Drycleaner Emission Factors

Subcategory	Reactive VOC (lb./year/employee)	Total Organics (lb./year/employee)
All solvents (total)	1,800	2,300
Halogenated Solvents		
PERC, TCA and CFC 113		980
Coin Operated		52
Commercial/Industrial		1,200
Mineral Spirits and Other Unspecified Solvents	1,800	1,800

On a per-unit basis: 0.8 tons/facility-year (assumes that average coin-op facility has two dry cleaning units and each emits 0.4 tons of PERC per year.

From AP-42

Commercial: 1.3 lb./year/person (all nonmethane VOC)
Coin Operated: 0.4 lb./year/person (all nonmethane VOC)

Appendix P: Gasoline Marketing

DESCRIPTION OF EMISSION SOURCES

Currently, there are essentially two types of fuel dispensed at gasoline service stations to consumers in the Great Lakes States and Ontario, unleaded gasoline and diesel. As a result of the low volatility of diesel fuel, the evaporative emissions from diesel fuel at service stations are very small and considered negligible. However, the evaporative emissions from gasoline fuel are significant and will be discussed in this section. The following emissions are covered:

a) Delivery trucks in transit;
b) Stage I (transfer of gasoline from tank trucks to storage tanks at service stations);
c) Stage II (transfer of gasoline from storage tanks at service stations to the vehicle gasoline tank);
d) Gasoline station storage tanks; and
e) Spillage.

GASOLINE TRUCKS IN TRANSIT

Introduction

Evaporative emissions of gasoline vapor occur (1) from loaded tank trucks during the transportation of gasoline from the bulk terminals/plants to the gasoline service stations, and (2) from empty tank trucks returning from service stations to bulk terminals/plants.

Source Identification

There is no uniquely defined SIC that categorizes the emissions resulting from the transportation of gasoline between bulk terminals/plants and service stations. This type of emission occurs neither at the bulk terminals/plants nor the service stations. Since the transportation of gasoline is part of the services provided by the bulk terminals/plants to their customers (service stations), the SIC of 5171 in the Standard Industrial Classification Code

Table P-1: SCC Codes for Transportation of Gasoline

Table P-3: Emission Factors for Gasoline Truck in Transit

Pollutant	Emission Factors		Remarks	Reference
SCC 40600162:	Petroleum and Solvent Evaporation Transportation and Marketing of Petroleum Products Tank Cars and Trucks Gasoline: Loaded with Fuel (Transit Losses)			
VOC	5.000E-3 [1]	Lb. per 1000 Gallons Transferred	UNCONTROLLED	EIIP/FIRE
Benzene	9.000E-3	Lb. per lb. of VOC	UNCONTROLLED	HAP SPECIATE

Facility Identification

As recommended by the Emission Inventory Improvement Program, the county-level fuel sales statistics should be obtained by survey data or from other sources (e.g. tax department, statistics agencies). If county-level statistics are not readily available, the state/province total fuel sales should be obtained from the relevant department. This state/province total fuel sales data must be apportioned to the county level based on such factors as:

a) gasoline service stations $-sales in each county;
b) previous county-level sales survey data;
c)

Source Identification

Gasoline service stations are categorized under SIC 5541 in the Standard Industrial Classification Code 1972, and under 44711 (gasoline service station with convenience store) and 44719 (other gasoline service station) in the North America Industry Classification System 1997 (NAICS).

There are also Source Classification Codes (SCC) and Area Mobile Source Codes (AMS) that describe the evaporative emissions from gasoline service station operations. Table P-4 shows the SCC regarding gasoline service station operations.

Table P-4: SCC Codes for Gasoline Service Stations (Stage I and II)

FIRE SCC Code	**Description**	
406003	Petroleum and Solvent Evaporation Transportation and Marketing of Petroleum Products Gasoline Retail Operations - Stage I	
40600301	Splashing Filling	
40600302	Submerged Filling w/o Controls	
40600305	Unloading	
40600306		

A2501060102	Displacement Loss/Controlled	40600403
A2501060103	Spillage	40600402
A250106020	Storage and Transport Petroleum and Petroleum Product Storage Gasoline Service Stations: Underground Tank	
A2501060200	Total	
A2501060201	Breathing and Emptying	40600307

Emission Factors Identification

There are four sources of information that contain emission factors regarding gasoline service station operation, i) AP42-Chapter 5 Section 2[1], ii) Emission Inventory Improvement Program, Volume III, Chapter 11[2], iii) FIRE 6.1 (Factor Information Retrieval System Version 6.1)[3], iv) MOBILE 5B Transportation model[4] and v) other technical documents[5]. A search of the first three sources revealed some emission factors for Benzene, 1,3-Butadiene, 1,2-Dibromoethane, 1,2-Dichloroethane, Ethylbenzene, Toluene, VOC, and Xylene. Only 1,2-Dichloroethane and Ethylbenzene are included in the GLC 49 substance list.

Since the emissions from gasoline service stations are inventoried under area sources, the AMS code will be used to identify the sources. In FIRE 6, there are no associated emission factors for the AMS code for gasoline service stations. The emission factors from the equivalent SCC codes will be applied as state-specific emission factors. A state-specific VOC speciation profile will be created for the HAPs shown in Table P-5 when there are no direct emission factors for the concerned HAPs in FIRE. The following table presented a summary of the available emission factors.

Table P-5: Emission Factors for Gasoline Service Stations (Stage I and II)

[redacted]

FIRE

[redacted]

Ethylbenzene	1.000E-3	Lb. per lb. of VOC	UNCONTROLLED	HAP SPECIATE
Naphthalene	5.000E-3	Lb. per lb. of VOC	UNCONTROLLED	HAP SPECIATE
SCC 40600401: Petroleum and Solvent Evaporation AMS A2501060101	Transportation and Marketing of Petroleum Products Filling Vehicle Gas Tanks - Stage II Vapor Loss w/o Control			
Benzene	6.590E-2	Lb. per 1000 Gal Gas Stored	UNCONTROLLED	FIRE
Toluene	9.940E-2	Lb. per Ton Gas Stored	UNCONTROLLED	FIRE
Xylene, mixed isomers	4.050E0	mg per L Gas Stored	UNCONTROLLED	FIRE
Xylene, meta	1.710E-2	Lb. per Ton Gas Stored	UNCONTROLLED	FIRE
Xylene, ortho	6.620E-3	Lb. per Ton Gas Stored	UNCONTROLLED	FIRE

[redacted]

The Stage I emissions of a specific pollutant from gasoline filling operations in a county is estimated by the following formula:

$$EM_{fill} = [\ (BQ * P_{splash} * EF_{splash}) + (BQ * P_{submerged} * EF_{submerged}) + (BQ * P_{balsub} * EF_{balsub})\ ] \ / \ 100{,}000$$

Where EM_{fill} = Annual emission of a pollutant in a county (lb./yr.)

BQ = Total annual consumption of gasoline in a county (gal)

The Stage II emissions of a specific pollutant from vehicle refueling in a county is estimated by the following formula:

$$EM_{refuel} = BQ * P_{refuel} * EF_{refuel} + BQ * P_{refuel\_con} * EF_{refuel\_con}$$

Where

EM_{refuel}	=	Annual emission of a pollutant in a county (lb./yr.)
BQ	=	Total annual consumption/throughput of gasoline in a county (gal)
P_{refuel}	=	Percentage of gasoline dispensed without Stage II control (%)
EF_{refuel}	=	Emission factor of pollutant for vehicle refueling without Stage II control (lb./gal)
P_{refuel_con}	=	Percentage of gasoline dispensed with Stage II control (%)
EF_{refuel_con}	=	Emission factor of pollutant for vehicle refueling with Stage II control (lb./gal)

Stage II: Motor Vehicle Refueling - Spill

Appendix Q: Graphic Arts

POLLUTANTS OF CONCERN

The following HAPs are associated with the this source category

*Toluene
*Xylene
*Trychloroethylene
Toluene Diisoyanate
Dibuthyl Phthalate

* Obtained from those reported by establishments in SIC 27%% to the Wisconsin emissions inventory.

AMS CODES FOR THIS CATEGORY

A2425000 All Processes
A2425010 Lithography
A2425020 Letterpress
A2425030 Rotogravure
A2425040 Flexography

EMISSION FACTORS

No toxic emission factors were found in FIRE, EIIP or AP-42.
The following speciation factors were found:

SCC: 2425040000, 2425040999
Profile Code: 1086
Process: Printing/Flexographic
Pollutant: Toluene
EF: 0.0648lb./lb. TOG

AMS: 242500000, 2425000999
Profile Code: 1191

Pollutant: Dibuthyl Phthalate
EF: 0.09999lb./lb. TOG

Pollutant: Toluene Diisoyanate
EF: 0.0003lb./lb. TOG

EIIP'S EMISSION ESTIMATION METHODOLOGY REVIEW

VOCs:

Release to the atmosphere are from evaporation of the VOC contained in the raw materials used in the process (inks, fountain solutions and cleaning agents).

The three main approaches to estimating VOC emissions:

Facility Survey
Ink sales emission factor method
Per capita emission factor method (NOT RECOMMENDED FOR HAPs)

The facility survey method provides the most accurate information. The Ink sales emission factor method is recommended over the per capita method for speciating HAPs.

DATA NEEDS

For facility survey

Type of printing
Number of employees involved in the printing operation
Amount of VOC or HAPs contained in the raw materials and solvents (weigh %), and amount of material recycled
Controls used

For Ink Sales Emission Factor Method

- Ink sales for the state or data from the US Census Bureau
- Uncontrolled point source emissions from graphic arts operations
- Controls used in region (Note: controls may also include local state regulations)

Advantages of Method

- Inks are common to all printers and not used by any other sources
- VOC content of the inks is consistent
- Consistency of the printing process (same VOC content used in the same type of printing process)

Summary of Method:

- Obtain amount of ink produced in pounds, in the US (Ref. Census of Manufacturer's, Industry Series for SIC Code 289, Miscellaneous Chemical Products).

  (Note: I checked with the National Association of Printing Ink Manufacturers about the availability of ink sales data per state. That information is not available. Also, the NAPIM does not agree with this method).

- Apportion nationwide ink amount to the state level by the ration between state and national employment in printing and publishing (SIC Code 27). This information can be obtained from the Census Bureau's report Statistics for industry Groups and Industries. State information is also available from the state's departments of industry.

- Correct for point sources in the state.
- Apportion statewide ink sales data for each type of printing.
- Table 7.5-2, Chapter 3 EIIP, offers VOC emission factors for VOC per pound of ink used.

REFERENCES

Environmental Protection Agency (EPA). *STAPPA-ALAPCO-EPA Emission Inventory Improvement Program (EIIP).* Volume III - Area Sources Preferred and Alternative Methods. July 1997.

Personal communication, National Association of Printing Ink Manufacturer's

Appendix R: Hospital Sterilizers

SOURCE IDENTIFICATION

Hospital sterilization is covered by Area and Mobile Source (AMS) code 2850000010: Hospitals – Sterilization Procedures. Standard Industrial Classification (SIC) code 8060 – Hospitals and North American Industrial Classification System (NAICS) code 622xx: Hospitals also describe the hospital sterilization category.

POLLUTANTS

Ethylene oxide (EO) is the only pollutant identified.

AIR TOXIC EMISSION ESTIMATION

Two methods are available to estimate emissions from ethylene oxide sterilizers. The first method assumes each hospital operates a sterilizer at given conditions. The second uses an EPA emission factor based on the number of beds in a hospital to estimate ethylene oxide emissions.

Hospital data for the first method can be obtained from state Health Departments. State NESHAP databases may also contain data on facilities with ethylene oxide sterilizers.

An ethylene oxide cartridge, assumed to be adequate for one sterilization cycle, contains 3.54 ounces of EO (0.22 lb).

If the sterilizer were assumed to operate continuously over the course of a year and complete one-quarter of a cycle per hour, the annual emissions of EO would be:

0.22 lb EO/cycle * 0.25 cycle/hr = 0.055 lb EO/hr

0.055 lb EO/hr * 8769 hr/yr = 481.8 lb/yr

481.8 lb/yr * 2000 lb/ton = 0.241 ton/yr.

Each hospital would emit 0.241 tons of EO annually under the assumption of one sterilizer per hospital.

If facilities with hospital sterilizers were required to use Best Available Control Technology (BACT) with 99.9% control efficiency, the following emissions would result:

0.22 lb EO/cycle * (1-0.999) = 0.00022 lb EO/cycle

0.00022 lb EO/cycle * 0.25 cycle/hr = 0.000055 lb EO/hr

0.000055 lb/hr * 8760 hr/yr = 0.4818 lb/yr

0.4818 lb/yr * 2000 lb/ton = 0.000241 tons/yr.

The second method uses emission factors based on hospital size. EPA developed EO emission factors for hospitals depending on the number of bed in the hospital:

Nationwide Emission Factors for EO from Hospital Sterilization

Hospital Size	# Beds	Emission Factors9 Tw A 2000 lb/toO

Appendix S: Human Cremation

METHODOLOGY

Source Identification

Protocol Section 3.2.1-SIC codes
SIC code 7261-Funeral Service and Crematories

Protocol Section 3.2.2-SCC/AMS codes
SCC 2601020000-Waste Disposal, Treatment and Recovery-On-site Incineration

Protocol Section 3.2.3-New SCC/AMS codes
The SCC code given above is the most appropriate one that could be found. A new SCC code may need to assign to this area source.

Protocol Section 3.3-Pollutants
Pollutants identified include Arsenic, Beryllium, Cadmium, Chromium, Formaldehyde, Mercury and Nickel.

Air Toxic Emission Estimation

Emissions were calculated using emission factors based on the weight cremated. The number of bodies cremated was obtained from Department of Health and Family Services, Wisconsin Bureau of Health Information. An average weight of 150 LB per body was assumed.

Emissions = Bodies Cremated * Average Weight (LB) * Factor (LB/ton) * ton/2000LB

Nationwide Emissions Factors for Human Cremation

Pollutant

REFERENCES

United States Environmental Protection Agency (U.S. EPA). *Documentation for the 1996 Base Year National Toxics Inventory for Area Sources.* Appendix A, A-24, A-25. March 27, 2000.

Appendix T: Industrial Surface Coatings

ASSOCIATED TOXIC POLLUTANTS

The EPA's *Speciate*

Pennsylvania has used the employee emission factors for these categories that were found in the EPA's May 1991 procedures document. Other per capita emission factors used were all

Appendix U: Marine Vessel Loading & Transit

AMS-SCC Code 2505020120

Method 1

The first method was found in AP 42 Chapter 5: *Petroleum Refining*. The method involves applying VOC emission factors to the amount of fuel transferred. There are several VOC emission factors based on previous barge load and vessel tank condition. In RAPIDS, the speciation profile for barge loading is 1190. The speciation profile is based on Total Organics (TOG). It is assumed that a 1:1 ratio exists for VOC: TOG.

Table U-1: Speciation Profiles for Toxins Associated with Marine Vessel Loading:

Toxic

Appendix V: Municipal Landfills

PREFERRED METHOD (landfill based)

The preferred method requires the following information:

- landfill design capacity, amount of refuse in place or annual refuse acceptance rate
- methane generation rate
- potential methane generation capacity
- NMOC concentration in landfill gas
- Toxics concentration in landfill gas
- years the landfill has been in operation
- controls in place
- has the landfill been used for disposal of hazardous waste?

The calculation methodology is AP-42. The LAEEM program (Landfill Air Emissions Estimation Model) calculates emissions using AP-42 methodology

- provides defaults for methane generation rate, potential methane generation capacity and NMOC concentration. AP-42 also provides concentrations for HAPs.

The alternative methods are really variations on the preferred method. The difference is in the detail of data needed to calculate or the assumptions made. For all methods, the minimum information for using AP-42 or LAEEM is waste in place and the open and close dates for the landfills. Some examples of simplifying assumptions are:

- acreage of the landfills and landfill depth substituted for waste in place
- assumptions for open and close dates (opened 25 years before inventory year or if only the closed date is known, assume waste received for 10 years)
- estimate waste in place by using estimate of capacity and percent filled

ALTERNATIVE METHOD (population based)

Information needed:

- population figures for the inventory year and the 24 years previous
- use the waste generation factor of 0.69 tons/person/year of waste generated
- convert to Mg by multiplying by 0.9072
- use the annual waste estimates in LAEEM or calculate average annual waste estimates and use that value in the equation

state could then calculate emissions. Basically, this method is creating an emission factor in one or more states to be used by others.

Really the only method to calculate emissions is by using the LAEEM/AP-42 method. How you use this methodology depends upon your available data. Having states create emission factors for others to use remains to be seen. My recommendation is to use the preferred method.

Appendix W: Open Burning

OVERVIEW

This area source category includes three categories.

- Municipal Solid Waste (MSW) burning
- Land clearing waste burning
- Yard waste burning

METHODOLOGIES

MSW Burning (Table 16.3-1 of EIIP)

Method	**Activity Data Required**
Preferred local estimate of MSW open burned times emission factor	tons of waste burned
Alternate 1 local estimate of MSW generated then subtract the amount disposed of by other means	tons of waste generated

DATA SOURCES

- State or Local Air Quality Agencies
- Federal, state and local forest service and agricultural extension agents
- Local planning departments
- State or local transportation departments
- Local health and sanitation departments
- Local fire and public safety departments

CONCLUSION

If it is readily available to you, calculating emissions by amount of waste burned is the appropriate method. In many places, the burning of municipal waste may be banned so that source may not be applicable. It will probably be difficult to get data for the yard waste burning. It may be possible to get data from open burning of landscape waste from any permitting programs your Agency may have.

But overall, I'd say with the time it would take to get good (any) data, this could be an area source category to skip.

REFERENCES

United States Environmental Protection Agency (U.S. EPA). *EIIP document Volume III: Chapter 16: Open Burning.* May 08, 2000.

Appendix X: Pesticides

AGRICULTURAL PESTICIDES

Emission factors for pesticides in FIRE are in Kg per hectare. The conversion to acres is 1 hectare equals 2.47 acres. The number of acres harvested for each crop by county can be found in the 1992 Census of agriculture.

http://www.nass.usda.gov/census/census92/atlas92/datafile/**st.txt
** insert 2 letter state abbreviation

A list of active ingredients used on a given crop can be obtained from each state's Department of Agriculture. For example, in Ohio, atrizine is the ingredient used almost exclusively on corn. Most commonly used pesticides on crops can be found at:

http://130.118.109.185/pnsp/crop/corn.html.

Substitute wheat, soybean, etc. in the address for other crops.

Once you know the method of application (emission factors are broken down by application method) multiply the appropriate emission factor from FIRE by the number of hectares harvested per county for that crop to get each county's emissions.

Example

Adams County

15792 acres of corn harvested. Converting to hectares equals 39006 hectares. Atrizine applied by **spraying** has an emission factor of 1.800E-1 kg per hectare of pesticide applied.

Multiply 1.800E-1 * 39006 to obtain atrizine emissions used in Adams County in 1992. Multiply by .0011023 to get tons used.

7.7 tons atrizine used in

NON AGRICULTURAL PESTICIDES

Since non agriculture use of pesticides account for less than 25% of all pesticide use, the use of per capita emission factor is justified when compared with a survey approach of government agencies, commercial exterminators, lawn care companies, and consumers pesticide buying habits.

A per capita FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) emission factor is 1.78 E+00 RVOC (lbs./yr./person).

If active ingredient is known, the total tons of FIFRA used in 1992 in the US was 1411632.3.

Appendix Y: Prescribed Burns & Forest Fires

METHODOLOGY

Michigan recommends that the Great Lakes states and provinces utilize the following method for calculating emissions from forest and wildfires.

For Michigan, the number of forest fires (tree, brush and grass wildfires) is available at the county level from the Michigan Department of State Police, Fire Marshall Division, Fire Incident Count database. The other states may be able to obtain similar information from their own local or state police and fire response agencies, or natural resources management agencies.

If county data is not available, a state total number for forest and wildfires may be available, which can be apportioned to the county level by acres forested, or some other basis which might correlate to the number of forest fires. This data may be available from the natural resources management agencies in each state.

Based on data supplied by the Michigan Department of Natural Resources, Forest Management Division, Michigan assumed that the fuel loading for each fire was 2.0 tons per acre. It was assumed, based on available data, that each fire burned one acre if in an urbanized county, and 4.54 acres if in a rural county.

If fire acreage data is not available, the other Great Lakes states may use Michigan's numbers for a default acreage per fire value.

The document *Documentation for the 1996 Base Year National Toxics Inventory for Area Sources* provided a different fuel loading value for forest and wildfires. A biomass consumption rate of 10.4 tons per acre was selected. 75% of the biomass was presumed to burn under flaming conditions, and 25% under smoldering conditions. In the absence of state specific data, Michigan recommends that these values be used.

The following calculation should be utilized to estimate emissions from forest and wildfires:

$$\text{Emissions} = \text{emission factor} * \begin{array}{c}\text{number of acres}\\ \text{burned}\end{array} * \begin{array}{c}\text{fuel loading}\\ \text{per acre}\end{array}$$

Or, if NTI fuel loading values are used:

$$\text{Emissions (flaming)} = \text{Number of acres burned} * \frac{\text{biomass consumption}}{\text{acre}} * 75\%\ (\text{flaming}) * \text{emission factor (flaming)}$$

$$\text{Emissions (smoldering)} = \text{Number of acres burned} * \frac{\text{biomass consumption}}{\text{acre}} * 25\%\ (\text{smoldering}) * \text{emission factor (smoldering)}$$

The range of available emission factors is presented below.

NTI Emission Factors

Emission factors from the NTI document, for pollutants that are on the list of EPA toxics, are shown below.

HAP	Flaming Fuel Emission Factor	Smoldering Fuel Emission Factor
1,3-butadiene	2.40E-01	9.00E-01
2,3,7,8-TCDD TEQ	2.00E-09	2.00E-09
acetaldehyde	4.73E-01	2.14E-01
acrolein	4.68E-01	2.92E-01
benz(a)anthracene	6.20E-03	6.20E-03
benzene	6.60E-01	2.52E+00
benzo(a)pyrene	1.48E-03	1.48E-03
chrysene	6.20E-03	6.20E-03
fluoranthene	6.73E-03	6.73E-03
formaldehyde	1.50E+00	5.80E+00
methyl chloride	1.01E-02	4.83E-01
o,m,p-xylene	2.79E-01	1.31E-01
toluene	6.55E-01	3.08E-01

RAPIDS' SCC/AMS Code Lookup

2810001000: (Miscellaneous Area Sources, Other Combustion, Forest Wildfires)

Emittant Material Code	Emittant Unit Code	Throughput Material Code	Throughput Unit Code	Amount	Exponent	Quality	EPA Date
BUTADIENE,13	LB	VEGETATION	TON	9.0	E -1	U	08/08/94

Please note that these emission factors are identical to several emission factors presented

fltrble	burned			piled conifer, no mineral soil
PM, total	1.20 E1 lb. per tons waste burned	B	EPA 1995	Logging slash debris, dozer piled conifer, no mineral soil
PM, total	2.00 E1 lb. per tons waste burned	D	EPA 1995	Chaparral, grasslands
PM, total	2.80 E1 lb. per tons waste burned	B	EPA 1995	Range fire, juniper slash
PM, total	3.00 E1 lb. per tons waste burned	C	EPA 1995	Chaparral Emissions represent Heading phase
PM, total	3.000E1 - 3.400E1 lb. per tons waste burned	D	EPA 1995	Line fire, conifer, Palmetto/gallberry
PM, total	3.20 E1 lb. per tons waste burned	A	EPA 1995	Range fire, chaparral shrub communities
PM, total	3.40 E1 lb. per tons waste burned	A	EPA 1995	Conifer, short needle
PM, total	3.60 E1 lb. per tons waste burned	A	EPA 1995	Broadcast logging slash, hardwood
PM, total	4.00 E1 lb. per tons waste burned	B	EPA 1995	Conifer, long needle
PM, total	4.000E1 - 1.000E2 lb. per tons waste burned	D	EPA 1995	Line fire, conifer, long needle pine
PM, total	4.60 E1 lb. per tons waste burned	B	EPA 1995	Range fire, sagebrush
PM, total	5.00 E1 lb. per tons waste burned	D	EPA 1995	Logging slash debris, 10-30% mineral soil, smoldering emissions
PM, total	7.00 E1 lb. per tons waste burned	D	EPA 1995	Logging slash debris, 25% organic soil, smoldering emissions
VOC	1.040E1 lb. per tons waste burned	B	EPA 1995	range fire, juniper slash
VOC	1.120E1 lb. per tons waste burned	A	EPA 1995	conifer, short needle
VOC	1.140E1 lb. per tons waste burned	B	EPA 1995	conifer, long needle
VOC	1.200E1 lb. per tons waste burned	B	EPA 1995	range fire, juniper slash
VOC	1.220E1 lb. per tons waste burned	A	EPA 1995	broadcast logging slash
VOC	1.240E1 lb. per tons waste burned	B	EPA 1995	range fire, sagebrush
VOC	1.280E1 lb. per tons waste burned	A	EPA 1995	broadcast logging slash
VOC	1.380E1 lb. per tons waste burned	B	EPA 1995	range fire, sagebrush
VOC	2.500E1 lb. per tons waste burned	A	EPA 1995	range fire, chaparral shrub communities
VOC	3.600E0 lb. per tons waste burned	B	EPA 1995	range fire, logging slash debris, dozer piled conifer, no mineral soil
VOC	5.600E0 lb. per tons waste burned	C	EPA 1995	chaparral
VOC	7.000E0 lb. per tons waste burned	A	EPA 1995	conifer, short needle

VOC	7.000E0 lb. per tons waste burned	C	EPA 1995	chaparral
VOC	8.400E0 lb. per tons waste burned	B	EPA 1995	conifer, long needle
VOC	9.000E0 lb. per tons waste burned	A	EPA 1995	range fire, chaparral shrub communities

Fluorene
Indeno(123-cd)pyrene
Naphthalene
Phenanthrene
Pyrene
Xylene, ortho

REFERENCES

Michigan Department of Environmental Quality, Air Quality Division. 1996 State Implementation Plan Submittal. 1999.

Eastern Research Group, Inc. *Documentation for the 1996 Base Year National Toxics Inventory for Area Sources.* April 27, 1999.

Environmental Protection Agency (EPA). *STAPPA-ALAPCO-EPA Emission Inventory Improvement Program (EIIP).* Volume III - Area Sources Preferred and Alternative Methods. Chapter 2, Residential Woodburning. September 1997.

Because the emissions from POTWs will be classified as area source emissions, the AMS code A2630020000, wastewater treatment-publicly owned-total processed, will be used to classify emissions in the inventory system.

POLLUTANTS

The FIRE database contained emission factors for the pollutants and processes listed in below.

Table Z-1: Processes with Available Emission Factors for Pollutants of Concern

Pollutant	Processes with Available Emission Factors
1,1,1-Trichloroethane	50100707, 50100715, 50100720, 50100731, 50100734, 50100760, 50100761, 50100771, 50100791, 50100792, 50100793
1,2-Dichloroethane	50100707, 50100734, 50100760
Acetaldehyde	50100793
Benzene	50100707, 50100715, 50700720, 50100731, 50100734, 50100740, 50100760, 50100771, 50100781, 50100791, 50100792, 50100793
Carbon tetrachloride	50100707, 50100720, 50100731, 50100740, 50100760, 50100792
Chloroform	50100707, 50100715, 50700720, 50100731, 50100734, 50100740, 50100760, 50100771, 50100781, 50100791, 50100792
Ethylbenzene	50100707, 50100760
Ethylene dibromide	50100760
Formaldehyde	50100715, 50700720, 50100731, 50100734, 50100740, 50100760, 50100771, 50100781, 50100791, 50100792, 50100793
Methylene chloride	50100707, 50100715, 50700720, 50100731, 50100734, 50100740, 50100760, 50100771, 50100781, 50100791, 50100792, 50100793
Perchloroethylene	50100707, 50100715, 50700720, 50100731, 50100734, 50100740, 50100760, 50100761, 50100771, 50100781, 50100792, 50100793
Styrene	50100715, 50100720, 50100734, 50100771, 50100781, 50100792
Toluene	50100707, 50100715, 50700720, 50100731, 50100734, 50100740, 50100760, 50100761, 50100771, 50100781, 50100791, 50100792, 50100793
Trichloroethylene	50100707, 50100715, 50700720, 50100731, 50100734, 50100760, 50100761, 50100771, 50100781, 50100791, 50100792
Vinyl chloride	50100760, 50100781, 50100792
Vinylidene chloride	50100720, 50100734, 50100761, 50100771, 50100781, 50100792
Xylenes	50100707, 50100715, 50700720, 50100731, 50100734, 50100740, 50100760, 50100761, 50100771, 50100781, 50100791, 50100792, 50100793

EMISSION FACTORS

The compounds and their concentrations in wastewater vary with time for each facility. There are no practical or feasible methods to accurately estimate emissions based on this time variation without continuous monitoring (Water Environment Federation, 1995). Therefore, emission factors are developed based on the estimation of the volatilization of the compounds from the discharge influent of the individual processes and operations. Emission factors for the various treatment processes were available from FIRE for all the SCCs listed in the "Source Identification" section except for SCC 50100789 and SCC 50100719, which are sludge digester

Emissions will not be considered for many of the small treatment facilities. Most of these facilities have stabilization ponds, surface water discharges, and spray irrigations. This means that these smaller treatment facilities virtually do not have any treatment processes. With a stabilization pond and a surface water discharge or spray irrigation, the wastewater flowrate is small enough that the wastewater has time to biodegrade. In addition, not much emissions information is available for these types of treatment processes.

In summary, there are a total of 204 POTW facilities with treatment processes in Minnesota for 1996. This **excludes** the POTWs with stabilization ponds, surface water discharges, and spray irrigation systems.

The 1996 volumetric flowrates of annual discharge and chlorine consumption for the POTWs were available from the Water Quality Division. Chlorine consumption rates were obtained from the Water Quality Division in average pounds per day for each month chlorine was used at the facility. Those rates were converted to monthly rates by multiplying by the number of days in each month, then added to arrive at an annual total.

Table 3 includes total volumetric flowrates and/or chlorine consumption data for all counties in Minnesota. If all the facilities in a county have stabilization ponds, surface discharges, or spray irrigations and no influent flowrate data available, the county is not included in Table 3.

Three facilities have sludge incinerators. The emissions from these incinerators were included in the point source inventory because they are included as part of the EIS. Therefore, incinerator emissions will not be included in this portion of the inventory. However, toxic emissions from all other processes at these facilities will be included in the area source inventory.

EMISSION ESTIMATION

As mentioned in the "Emission Factor" section, estimating air emissions from wastewater collection, treatment, and storage systems for each POTW is very complex due to the variation of treatment processes from one POTW to the next. Hence, AP-42 was used as a reference to characterize the standard equipment in each POTW facility to provide statewide emission estimations.

Total emissions of a county is estimated by summing the emissions emitted by the annual flow from each treatment plant and the emissions from the chlorine for disinfecting. The following equation provides an example:

E

Appendix AA. Residential Fuel Combustion

INTRODUCTION

[redacted]

Table AA-3: Pollutants and Emission Factors for Natural Gas
Pollutants and emission factors from natural gas combustion were taken from AP 42 (which are same as in Fire 6.22) and are presented below. Emission factors units are provided on a volume basis (Lb./MM SCF) and energy basis (Lb./MM Btu). To convert to an energy basis, divide the volume basis by a heating value of 1,020 MMBTU/MMSCF.

Pollutant	Emission Factor (Lb./MMSCF)	Emission Factor (Lb./MMbtu)	Emission Factor Source
Acenaphthene	1.8E-6	1.8E-9	10300603 Uncontrolled Factor
Acenapthylene	1.8E-6	1.8E-9	10300603 Uncontrolled Factor
Anthracene	2.4E-6	2.4E-9	10300603 Uncontrolled Factor
Benz(a)anthracene	1.8E-6	1.8E-9	10300603 Uncontrolled Factor
Benzo(a)pyrene	1.2E-6	1.2E-9	10300603 Uncontrolled Factor
Benzo(b)fluoranthene	1.8E-6	1.8E-9	10300603 Uncontrolled Factor
Benzene	2.1E-3	2.1E-6	10300603 Uncontrolled Factor
Benzo(g,h,i)perylene	1.2E-6	1.2E-9	10300603 Uncontrolled Factor
Benzo(k)fluoranthene	1.8E-6	1.8E-9	10300603 Uncontrolled Factor
Dibenz(a,h)anthracene	8.5E-4	4.5E-7	10300603 Uncontrolled Factor
Fluoranthene	3E-6	3E-9	10300603 Uncontrolled Factor
Fluorene	2.8E-6	2.8E-9	10300603 Uncontrolled Factor
Formaldehyde	7.5E-2	7.5E-5	10300603 Uncontrolled Factor
Naphthalene	6.1E-4	6.1E-7	10300603 Uncontrolled Factor
Phenanthrene	1.7E-5	1.7E-8	10300603 Uncontrolled Factor
Pyrene	5E-6	5E-9	10300603 Uncontrolled Factor
Toluene	3.4E-3	3.4E-6	10300603 Uncontrolled Factor
Arsenic	2E-4	2E-7	10300603 Uncontrolled Factor
Beryllium	1.2E-5	1.2E-8	10300603 Uncontrolled Factor
Cadmium	1.1E-3	1.1E-6	10300603 Uncontrolled Factor
Chromium	1.4E-3	1.4E-6	10300603 Uncontrolled Factor
Cobalt	8.4E-5	8.4E-8	10300603 Uncontrolled Factor
Copper	8.5E-4	8.5E-7	10300603 Uncontrolled Factor
Lead	5E-4	5E-7	10300603 Uncontrolled Factor
Manganese	3.8E-4	3.8E-7	10300603 Uncontrolled Factor
Mercury	2.6E-4	2.6E-7	10300603 Uncontrolled Factor

Table AA-4: Pollutants and Emission Factors for Liquid Petroleum Gas

The AP 42 and Fire database provide only emission factors for criteria pollutants and the speciation profile in the speciate database is in question because of the high emission factors that result from it. The speciate profile for LPG and natural gas was used in the 1996 methodology and resulted to an overestimate of metals. However, emission factors for speciated organic and metal compounds for natural gas combustion were published in 1998 in AP42 but not for liquefied petroleum gases. In most cases, natural gas emission factors dropped by a factor of 100 or 1000 times. The speciation profile for LPG and natural gas is expected to be similar. The combustion processes that use LPG are very similar to those that use natural gas. For the above reasons, the decision is to use the natural gas emission factors and adjust them by the PM and TOC ratios of LPG to natural gas as shown in the table below:

Pollutant	Natural Gas Lb./MMSCF	Natural Gas[1] Lb./MMbtu	LPG Lb./1000 gal	LPG[2] Lb./MMbtu	ratio[3]

PM

Filterable44 5.52 TD /F0 7.92 Tf G and nat0m bya TD /F0 12 176 549.24 66.72 0.72 re fE 176 549.24 yi

Table AA-5: The ratios calculated above are used to adjust the emission factors of the natural gas pollutant table. The natural gas emission factors (expressed in Lb./MMBTU) are multiplied by either, 39.5 for organics or 0.5 for metals, to calculate propane emission factors in Lb./MMBTU. Since activity data for LPG are given in Barrels (42gallons/barrel), LPG units are better expressed on a volume basis (Lb./1000 gal). To convert to a volume basis, multiply the Lb./MMBTU emission factor by a heating value of 91.5 MMBTU/1000 gal for propane.

Pollutant	Emission Factor (Lb./100 Gal)	Emission Factor (Lb./MMBtu)	Emission Factor Source
Acentaphthene	6.5E-6	7.1E-8	10300603 Uncontrolled Adjusted
Acenapthylene	6.5E-6	7.1E-8	10300603 Uncontrolled Adjusted
Anthracene	8.7E-6	9.5E-8	10300603 Uncontrolled Adjusted
Benz(a)anthracene	6.5E-6	7.1E-8	10300603 Uncontrolled Adjusted
Benzo(a)pyrene	4.3E-6	4.7E-8	10300603 Uncontrolled Adjusted
Benzo(b)fluoranthene	6.5E-6	7.1E-8	10300603 Uncontrolled Adjusted
Benzene	7.6E-3	8.3E-5	10300603 Uncontrolled Adjusted
Benzo(g,h,i)perylene	4.3E-6	4.7E-8	10300603 Uncontrolled Adjusted
Benzo(k)fluoranthene	6.5E-6	7.1E-8	10300603 Uncontrolled Adjusted
Dibenz(a,h)anthracene	1.6E-3	1.8E-5	10300603 Uncontrolled Adjusted
Fluoranthene	1.1E-5	1.2E-7	10300603 Uncontrolled Adjusted
Fluorene	1.08E-5	1.1E-7	10300603 Uncontrolled Adjusted
Formaldehyde	1.6E-1	1.8E-3	10300603 Uncontrolled Adjusted
Napthalene	2.2E-3	2.4E-5	10300603 Uncontrolled Adjusted
Phenanthrene	6.1E-5	6.7E-7	10300603 Uncontrolled Adjusted
Pyrene	2.1E-5	2.3E-7	10300603 Uncontrolled Adjusted
Toluene	1.2E-2	1.3E-4	10300603 Uncontrolled Adjusted
Arsenic	9.2E-6	1E-7	10300603 Uncontrolled Adjusted
Berylium	5.5E-7	6E-9	10300603 Uncontrolled Adjusted
Cadmium	5.0E-5	5.5E-7	10300603 Uncontrolled Adjusted
Chromium	6.4E-5	7E-7	10300603 Uncontrolled Adjusted
Cobalt	7.7E-6	8.4E-8	10300603 Uncontrolled Adjusted
Copper	3.9E-5	4.3E-7	10300603 Uncontrolled Adjusted
Lead	2.3E-5	2.5E-7	10300603 Uncontrolled Adjusted
Manganese	1.7E-5	1.9E-7	10300603 Uncontrolled Adjusted
Mercury	1.2E-5	1.3E-7	10300603 Uncontrolled Adjusted

Appendix BB: Residential

EMISSION FACTORS

Since there was not any information found in the FIRE database for furnaces, the emission factors for furnaces are assumed to be grouped with wood burning stoves.

There are many variations in device design and operation characteristics of fireplace, furnace and woodstove burning. Hence, assumptions were made in order to provide the most accurate emission estimates. When considering emission factors for emission estimation, factors for non-catalytic conventional stoves were used, as they were the most conservative factors available. There were five pollutants for which there were no emission factors listed under non-catalytic conventional stoves in FIRE 6.22. For those pollutants, the emission factors listed under non-catalytic general stoves were used instead. Also, there were four instances where no emission factors were available for either non-catalytic conventional or non-catalytic general stoves. General woodstove emission factors were used in those cases. Emission factors for the criteria pollutants were available for residential fireplaces. Thus, emission factors from A2104008050, A2104008051, A2104008001, and A2104008010 were chosen for the emission estimate calculations. They are listed in Table BB-1.

Table BB-1: Emission Factors for Residential Wood Burning

Pollutant	Emission Factor (lb./ton)	AMS Code	Reference
Acenaphthene	0.010	A2104008050	FIRE 6.22
Acenaphthylene	0.212	A2104008051	FIRE 6.22
Anthracene	0.014	A2104008051	FIRE 6.22
Benzene	1.938	A2104008051	FIRE 6.22
Benz(a)	0.012	A2104008050	FIRE 6.22

county was placed in one of 5 survey units (Refer to Table BB-3 for all the counties listed under the 5 survey units). The survey supplied information relative to total volume of wood consumed for pleasure, supplemental and primary heating, average number of cords burned per survey unit,

EMISSION ESTIMATION

The total estimated residential consumption of wood burned for each county was determined by taking the average number of cords of wood burned per household in the survey unit (Table BB-3) and multiplying by the number of households that burn wood for pleasure and the number of households that burn wood for supplemental and primary heating, respectively. Combine cords burned for pleasure and heating to arrive at a county-wide total. See Table BB-3 for the total number of cords of wood burned per county for all the counties in Minnesota. The 1997 Household data for the state and all the counties were obtained from the Minnesota Planning.[2] Calculation example:

$$T = (HP * PA) + (HH * WA)$$

Where	T	= Total number of cords burned in a county
	HP	= # of Households in county that burn wood for pleasure
	HH	= # of Households in county that burn wood for heating
	PA	= Average cords burned/household-yr. for pleasure
	HA	= Average cords burned/household-yr. for heating.

Total emissions of a pollutant from residential wood burning for each county are achieved by multiplying the total number of cords burned in each county by the density of wood, 2 tons of dry wood per cord[3] and the appropriate emission factor.

Calculation example:

$$TE = T*D*EF$$

Where	TE	= Total emissions of a pollutant (lb./yr.)
	T	= Total cords burned in county
	D	= Density of wood (2 Tons dry wood/Cord)
	EF	= Emission factor for the pollutant (lb./ton)

All calculations were verified by spreadsheets and RAPIDS.

REFERENCES

Minnesota Department of Natural Resources (DNR), 1996. 1995-1996 Minnesota residential Fuelwood Survey.

Minnesota Planning, Population and Household Estimates: County Estimates. http://www.mnplan.state.mn.us/demography/demogpop.html. Accessed 5/19/00.

Dahlman, Rick, 1995. Minnesota Department of Natural Resources. August 07, 1995.

EPA, STAPPA, ALAPCO, Emission Inventory Improvement Program (EIIP), Volume III, July 1997, Chapter 2.

Appendix CC: Industrial Solvent Cleaning

METHODOLOGY

In this category, the use of solvents is broken into two broad classifications. The classifications are solvent cleaning (which is composed of cold cleaning and vapor/in-line cleaning), and solvent cleanup (predominantly wipe cleaning of external surfaces). Michigan recommends that the main emphasis be on solvent cleaning, as that will be the primary source of emissions.

EIIP Preferred Method

Solvent Cleaning Equipment

<u>Cold Cleaners</u>
Conduct survey of suppliers, until cold cleaner NSPS is promulgated.

<u>Vapor/In-line Cleaners</u>
Facility specific data submitted per the halogenated solvent cleaning NESHAP; or data from facilities permitted as VOC and/or HAP sources.

EIIP Alternative Method

Solvent Cleaning Equipment (both Cold Cleaners and Vapor/In-line Cleaners)

<u>Surveys</u>
Useable only if data available for reasonable subset of facilities.

<u>Emission factors</u>
EIIP Table 6.5-2 provides per capita and per employee emission factors, as reproduced below. Throughput for per capita emission factors may be found with the U.S. Department of Commerce, Bureau of the Census (http://www.census.gov/population/www/estimates/countypop.html), in the form of *County Population Estimates for July 1, 1998 and Population Change for July 1, 1997 to July 1, 1998* for individual states. County population estimates for 1997 are provided here.

Recommended Method for Solvent Cleaning Equipment

Michigan opted to utilize the per capita emission factor from Table 6.5-2 of EIIP for

Great Lakes Toxics

AMS codes were found for the following SIC groups.

SIC	AMS CODE	DESCRIPTION	INDUSTRY DESCRIPTION
25	2415005000	TOTAL: ALL SOLVENTS	FURNITURE & FIXTURES
33	2415010000	TOTAL: ALL SOLVENTS	PRIMARY METAL INDUSTRY
33	2415015000	TOTAL: ALL SOLVENTS	SECONDARY METAL INDUSTRY
34	2415020000	TOTAL: ALL SOLVENTS	FABRICATED METAL
35	2415025000	TOTAL: ALL SOLVENTS	INDUSTRIAL MACHINERY & EQUIPMENT
36	2415030000	TOTAL: ALL SOLVENTS	ELECTRONIC AND OTHER ELEC

trichloroethylene	0.210900 LB/LB TOG
xylene, m	

Appendix DD: Traffic Markings

PREFERRED METOHD: Survey of Traffic Marking Usage

Data requirements of the preferred method as per EIIP Document Volume III: Chapter 14 - Traffic Markings.

- product type, including thinning and cleanup solvents
- product amount used by type (gallon)
- product density (lb./gallon)
- estimates of the proportion of products used during the inventory season
- VOC/solvent content or air toxic/solvent content of each product type (lb./gallon or weight percent), depending on the inventory type

ALTERNATIVE METHODS

Data requirement of each alternative approach

1. Alternative Method One: National traffic paint sales and National Paint & Coating Association (NPCA) emission factor
    - National traffic paint usage
    - National and state spending for highway maintenance
    - State and county paved lane miles (preferred approach) or state and county population
    - Proportion of solvent- versus water-based coatings for the state or county to develop a local emission factor from the NPCA solvent and water-based coating factors, or the NPCA national average emission factor

2. Alternative Method Two: Lane miles emission factor
    - Traffic lane miles painted (preferred approach) or total lane miles
    - Proportion of solvent- versus water-based coatings for the state or county to develop a local emission factor (preferred approach), or the solvent-based emission factor

3. Alternative Method Three: Per capita emission factor
    - National traffic paint sales data, in gallons
    - National population and inventory area population figures for the inventory year
    - NPCA per-gallon emission factor

CHOOSING A METHOD & CALCULATING EMISSIONS

All of the alternative methods, even the preferred method to an extent, are based on an assumed proportional relationship between traffic marking usage and some acceptable and accessible surrogate measurement for county/state/national level, i.e. highway maintenance spending, population, traffic lane miles, etc. While the survey method may be a necessity in some states, others need to consider issues of cost and complexity before undertaking this method. A state may have some but not all of the necessary information to do a thorough survey method, i.e. you know the solvent usage from the paint but not the solvent usage from the thinning and cleanup activities, the paint usage provided by the state highway department is categorized by districts or subdivision of the state that cuts across county boundaries, etc. You may start out trying to do a survey method only to combine it with one of the alternative methods when you have insufficient information. Once a baseline survey method has been established, using a smaller sample size or updating traffic marking coating usage maybe sufficient in following years. Using the Preferred Method, Alternative Method One or Three will give the county-based pain usage. Alternative Method Two assumes 16 gallons of traffic paint of either solvent- or water-based paint are used for every mile counted (EPA, 1988). The air toxic emission factors are available from EIIP Document Volume III: Chapter 14 - Traffic Markings. The equation for calculating air toxic emissions is the following:

Air Toxic Emissions = County Traffic Paint Usage * Air Toxic Volume % * Air Toxic Density

Table DD-1: Pollutants emitted of interest to RAPIDS and Species Profile

AIR Toxic	Volume Percent (%)	Density (lb./gal)
Carbon tetrachloride	0.009	12.19
Ethylbenzene	0.009	7.24
Glycol ethers	0.040	7.01
Naphthalene	0.002	9.55NaStyre

Appendix EE: Index of SIC Codes

SIC	DESCRIPTION
01	Agricultural Production-crops
011	Cash Grains
0111	Wheat
0112	

SIC	DESCRIPTION
1051	Bauxite and Other Aluminum Ore
106	Ferroalloy Ores, Except Vanadium
1061	Ferroalloy Ores Except Vanadium
108	Metal Mining Services
1081	Metal Mining Services
109	Miscellaneous Metal Ores
1092	Mercury Ores
1094	Uranium-Radium-Vanadium Ores
1099	Metal Ores, n.e.c.
1111	Anthracite
1112	Anthracite Mining Services
12	Coal Mining
1211	Bituminous Coal and Lignite
1213	Bituminous & Lignite Mine Services
122	Bituminous Coal and Lignite Mining
1221	Bituminous Coal & Lignite - Surface
1222	Bituminous Coal & Lignite - Underground
123	Anthracite Mining
1231	Anthracite Mining
124	Coal Mining Services
1241	Coal Mining Services
13	Oil and Gas Extraction
131	Crude Petroleum and Natural Gas
1311	Crude Petroleum & Natural Gas
132	Natural Gas Liquids
1321	Natural Gas Liquids
138	Oil and Gas Field Services
1381	Drilling Oil and Gas Wells
1382	Oil and Gas Exploration Service
1389	Oil and Gas Field Services, n.e.c.
14	Mining and Quarrying of Nonmetallic Minerals
141	Dimension Stone
1411	Dimension Stone
142	Crushed & Broken Stone, Including Riprap
1422	Crushed and Broken Limestone
1423	Crushed and Broken Granite
1429	Crushed and Broken Stone, n.e.c.
144	Sand and Gravel
1442	Construction Sand and Gravel
1446	Industrial Sand
145	Clay, Ceramic, and Refractory Minerals
1452	Bentonite
1453	Fire Clay
1454	Fullers Earth
1455	Kaolin and Ball Clay
1459	Clay and Related Minerals, n.e.c.
147	Chemical & Fertilizer Mineral Mining
1472	Barite
1473	Fluorspar
1474	Potash Soda & Borate Minerals

1475Tw -3 -1.(4pracite 1 Tc 0.00331a0114 TwthBoraRock)Tj -0.90156 Tc 0.90150 Tw -3 -1.0833 Td 71446666Rockialltals1329 Tc 3 0 T

9423 4pracite .00105 Tw 3 0 Td (Chemicay a & Fertilizer Mining)Tj 0 Tc 0 Tw -3 -1.1667 Td 8142

1381

Talcashapimestoda

n.e.c

145

n.e.c147Construct-specstriTradei

SIC	DESCRIPTION
2021	Creamery Butter
2022	Cheese Natural and Processed
2023	Condensed and Evaporated Milk
2024	Ice Cream and Frozen Desserts
2026	Fluid Milk
203	Preserved Fruits and Vegetables
2032	Canned Specialties
2033	Canned Fruits and Vegetables
2034	Dehydrated Fruits/Vegetable Soups
2035	Pickles Sauces and Salad Dress
2037	Frozen Fruits and Vegetables
2038	Frozen Specialties
204	Grain Mill Products
2041	Flour & Other Grain Mill Prod
2042	Grain Mill Products
2043	Cereal Breakfast Foods
2044	Rice Milling
2045	Blended and Prepared Flour
2046	Wet Corn Milling
2047	Dog Cat and Other Pet Food
2048	Prepared Feeds, n.e.c.
205	Bakery Products
2051	Bread Cake and Related Product
2052	Cookies and Crackers
2053	Frozen Bakery Products, Except Bread
206	Sugar and Confectionery Products
2061	Raw Cane Sugar
2062	Cane Sugar Refining
2063	Beet Sugar
2064	Candy and Other Confectionery Products
2065	Confectionery Products
2066	Chocolate and Cocoa Products
2067	Chewing Gum
2068	Salted and Roasted Nuts and Seeds
207	Fats and Oils
2074	Cottonseed Oil Mills
2075	Soybean Oil Mills
2076	Vegetable Oil Mills, n.e.c.

2

SIC	DESCRIPTION
2323	Men's and Boys' Neckwear
2325	Men's and Boy's Trousers and Slacks
2326	Men's and Boy's Work Clothing
2327	Men & Boys Separate Trousers
2328	Men's and Boys' Work Clothing
2329	Men's and Boys' Clothing, n.e.c.
233	Outerwear: Women, Misses, & Juniors
2331	Women's & Misses' Blouses & Shirts
2335	Women's and Misses' Dresses
2337	Women's & Misses Suits & Coats
2339	Women's & Misses Outerwear n.e.c.
234	Undergarments: Women, Misses, Childrens, & Infants
2341	Women's & Children's Underwear
2342	Brassieres and Allied Garments
235	Hats, Caps, and Millinery
2351	Millinery
2352	Hats & Caps Except Millinery
2353	Hats, Caps, and Millinery
236	Outerwear: Girls, Children, & Infants
2361	Children's Dresses and Blouses
2363	Children's Coats and Suits
2369	Children's Outerwear, n.e.c.
237	Fur Goods
2371	Fur Goods
238	Miscellaneous Apparel & Accessories
2381	Fabric Dress and Work Gloves
2384	Robes and Dressing Gowns
2385	Waterproof Outergarments
2386	Leather & Sheep Lined Clothing
2387	Apparel Belts
2389	Apparel and Accessories, n.e.c.
239	Misc. Fabricated Textile Products
2391	Curtains and Draperies
2392	House Furnishings, n.e.c.
2393	Textile Bags
2394	Canvas and Related Products
2395	Pleating and Stitching
2396	Automotive & Apparel Trimmings
2397	Schiffli Machine Embroideries
2399	Fabricated Textile Products
24	Lumber & Wood Products, Except Furniture
241	Logging
2411	Logging
242	Sawmills and Planing Mills
2421	Sawmills & Planing Mills General
2426	Hardwood Dimension & Flooring
2429	Special Product Sawmills, n.e.c.
243	Millwork, Veneer, Plywood & Structural Members
2431	Millwork
2434	Wood Kitchen Cabinets
2435	Hardwood Veneer and Plywood
2436	Softwood Veneer and Plywood
2439	Structural Wood Members, n.e.c.
244	Wood Containers
2441	Nailed Wood Boxes and Shook
2448	Wood Pallets and Skids
2449	Wood Containers, n.e.c.

SIC	DESCRIPTION
245	Wood Buildings and Mobile Homes
2451	Mobile Homes
2452	Prefabricated Wood Buildings
249	Miscellaneous Wood Products
2491	Wood Preserving
2492	Particleboard
2493	Reconstituted Wood Products
2499	Wood Products, n.e.c.
25	Furniture and Fixtures
251	Household Furniture
2511	Wood Household Furniture
2512	Uphols(i)2.2(r)4.3e 2434 Wood Kitc Saitc & 2467 -1.1733 T.2(or

SIC	DESCRIPTION
2675	Die-cut Paper and Board
2676	Sanitary Paper Products
2677	Envelopes
2678	Stationery Products
2679	Converted Paper Products, n.e.c.
27	Printing, Publishing and Allied Industries
271	Newspapers: Publishing, or Publishing & Printing
2711	Newspapers
272	Periodicals: Publishing, or Publishing & Printing
2721	Periodicals
273	Books
2731	Book Publishing
2732	Book Printing
274	Miscellaneous Publishing
2741	Miscellaneous Publishing
275	Commercial Printing
2751	Commercial Printing Letterpress
2752	Commercial Printing Lithograph
2753	Engraving and Plate Printing
2754	Commercial Printing, Gravure
2759	Commercial Printing, n.e.c.
276	Manifold Business Forms
2761	Manifold Business Forms
277	Greeting Cards
2771	Greeting Card Publishing
278	Blankbooks, Looseleaf Binders, & Bookbinding & Related Work
2782	Blankbooks & Looseleaf Binders
2789	Bookbinding and Related Work
279	Service Industries for the Printing Trade
2791	Typesetting
2793	Photoengraving
2794	Electrotyping and Stereotyping
2795	Lithographic Platemaking Services
2796	Platemaking Services
28	Chemicals and Allied Products
281	Industrial Inorganic Chemicals
2812	Alkalies and Chlorine
2813	Industrial Gases
2816	Inorganic Pigments
2819	Industrial Inorganic Chemicals
282	Plastics Materials and Synthetics
2821	Plastics Materials and Resins
2822	Synthetic Rubber
2823	Cellulosic Man-Made Fibers
2824	Organic Fibers, Noncellulosic
283	Drugs
2831	Biological Products
2833	Medicinals and Botanicals
2834	Pharmaceutical Preparations
2835	Diagnostic Substances
2836	Biological Products, Except Diagnostic
284	Soap, Cleaners, and Toilet Goods
2841	Soap and Other Detergents
2842	Polishes and Sanitation Goods
2843	Surface Active Agents
2844	Toilet Preparations

SIC	DESCRIPTION
285	Paints, Varnishes, Lacquers, Enamels, & Allied Products
2851	Paints and Allied Products
286	Industrial Organic Chemicals
2861	Gum and Wood Chemicals
2865	Cyclic Crudes and Intermediate
2869	Industrial Organic Chemicals, n.e.c.
287	Agricultural Chemicals
2873	Nitrogenous Fertilizers
2874	Phosphatic Fertilizers
2875	Fertilizers, Mixing Only

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SIC	DESCRIPTION
3142	House Slippers
3143	Men's Footwear, Except Athletic
3144	Women's Footwear, Except Athletic
3149	Footwear, Except Rubber, n.e.c.
315	Leather Gloves and Mittens
3151	Leather Gloves and Mittens
316	Luggage
3161	Luggage
317	Handbags and Personal Leather Goods
3171	Women's Handbags and Purses
3172	Personal Leather Goods, n.e.c.
319	Leather Goods, n.e.c.
3199	Leather Goods, n.e.c.
32	Stone, Clay, Glass and Concrete Pr3171 Haneood.6(1)8.1(g)10.44Footw0.00 F 4(Footw)20.l Cl69(C)59es

SIC	DESCRIPTION
345	Screw Machine Products, Bolts, Nuts, Screws, Rivets, and Washers
3451	Screw Machine Products
3452	Bolts Nuts Rivets & Washers
346	Metal Forgings and Stampings
3462	Iron and Steel Forgings
3463	Nonferrous Forgings
3465	Automotive Stampings
3466	Crowns and Closures
3469	Metal Stampings, n.e.c.
347	Coating, Engraving, and Allied Services
3471	Electroplating, Polishing, Anodizing, and Coloring
3479	Metal Coating and Allied Services, n.e.c.
348	Ordnance and Accessories, Except Vehicles and Guided Missiles
3482	Small Arms Ammunition
3483	Ammunition, Exc. For Small Arm
3484	Small Arms
3489	Ordnance and Accessories, n.e.c.
349	Misc. Fabricated Metal Products
3491	Industrial Valves
3492	Fluid Power Valves and Hose Fittings
3493	Steel Springs, Except Wire
3494	Valves and Pipe Fittings
3495	Wire Springs
3496	Misc. Fabricated Wire Products
3497	Metal Foil and Leaf
3498	Fabricated Pipe and Fittings
3499	Fabricated Metal Products, n.e.c.
35	Industrial and Commercial Machinery & Computer Equipment
351	Engines and Turbines
3511	Turbines and Turbine Generator
3519	Internal Combustion Engines
352	Farm and Garden Machinery and Equipment
3523	Farm Machinery and Equipment
3524	Lawn and Garden Equipment
353	Construction, Mining, and Materials Handling Machinery & Equipment
3531	Construction Machinery
3532	Mining Machinery
3533	Oil Field Machinery
3534	Elevators and Moving Stairways
3535	Conveyors and Conveying Equipment
3536	Hoists, Cranes, and Monorails
3537	Industrial Trucks and Tractors
354	Metalworking Machinery and Equipment
3541	Machine Tools Metal Cutting Types
3542	Machine Tools Metal Forming Types
3543	Industrial Patterns
3544	Special Dies/Tools/Jigs/Fixtures
3545	Machine Tool A

SIC	DESCRIPTION

SIC	DESCRIPTION
3991	Brooms and Brushes
3993	Signs and Advertising Displays
3995	Burial Caskets
3996	Hard Surface Floor Coverings
3999	Manufacturing Industries, n.e.c.
40	Railroad Transportation
401	Railroads
4011	Railroads, Line-haul Operating
4013	Switching & Terminal Services
4041	Railway Express Service
41	Local & Suburban Transit & Interurban Hwy Pass
411	Local and Suburban Passenger Transportation
4111	Local and Suburban Transit
4119	Local Passenger Transportation
412	Taxicabs
4121	Taxicabs
413	Intercity and Rural Bus Transportation

SIC	DESCRIPTION
5159	Farm-product Raw Materials, n.e.c.
516	Chemicals and Allied Products
5161	Chemicals and Allied Products
5162	Plastics Materials and Basic Shapes
5169	Chemicals and Allied Products, n.e.c.
517	Petroleum and Petroleum Products
5171	Petroleum Bulk Stations & Terminals
5172	Petroleum Products, n.e.c.
518	Beer, Wine, and Distilled Alcoholic Beverages
5181	Beer and Ale
5182	Wines and Distilled Beverages
519	Misc. Nondurable Goods
5191	Farm Supplies
5192	Books, Periodicals and Newspapers
5193	Flowers and Florists Supplies
5194	Tobacco and Tobacco Products
5198	Paints, Varnishes, and Supplies
5199	Nondurable Goods, n.e.c.
52	Building Materials, Hardware, Garden Supply, Mobil
521	Lumber and Other Building Materials Dealers
5211	Lumber and Other Building Materials
523	Paint, Glass, and Wallpaper Stores
5231	Paint, Glass, and Wallpaper Stores
525	Hardware Stores
5251	Hardware Stores
526	Retail Nurseries, Lawn & Garden Supply Stores
5261	Retail Nurseries and Garden Stores
527	Mobile Home Dealers
5271	Mobile Home Dealers
53	General Merchandise Stores
531	Department Stores
5311	Department Stores
533	Variety Stores
5331	Variety Stores
539	Misc. General Merchandise Stores
5399	Misc. General Merchandise Stores
54	Food Stores
541	Grocery Stores
5411	Grocery Stores
542	Meat and Seafood Markets, Including Freezer Provisioners
5421	Meat and Fish Markets
5422	Freezer and Locker Meat Provisions
5423	Meat and Fish (Seafood) Market
543	Fruit and Vegetable Markets
5431	Fruit Stores and Vegetable Markets
544	Candy, Nut, and Confectionery Stores
5441	Candy, Nut, and Confectionery
545	Dairy Products Stores
5451	Dairy Products Stores
546	Retail Bakeries
5461	Retail Bakeries
5462	Retail Bakeries-Baking and Selling
5463	Retail Bakeries-Selling Only
5490	Miscellaneous Food Stores
5499	Miscellaneous Food Stores
55	Automotive Dealers and Gasoline Service Stations

SIC	DESCRIPTION
551	Motor Vehicle Dealers (New & Used)
5511	New and Used Car Dealers
552	Motor Vehicle Dealers (Used Only)
5521	Used Car Dealers
553	Auto and Home Supply Stores
5531	Auto and Home Supply Stores
554	Gasoline Service Stations
5541	Gasoline Service Stations
555	Boat Dealers
5551	Boat Dealers
556	Recreational Vehicle Dealers
5561	Recreational Vehicle Dealers
557	Motorcycle Dealers
5571	Motorcycle Dealers
559	Automotive Dealer, n.e.c.
5599	Automotive Dealers, n.e.c.
56	Apparel and Accessory Stores
561	Men's & Boys' Clothing & Accessory Stores
5611	Men's & Boys' Clothing & Accessory Stores
562	Women's Clothing Stores
5621	Women's Ready-to-wear Stores
563	Women's Accessory & Specialty Stores
5631	Women's Accessory and Specialty Stores
5632	Women's Accessory and Specialty Stores
564	Children's & Infants' Wear Stores
5641	Children's and Infants' Wear Stores
565	Family Clothing Stores
5651	Family Clothing Stores
566	Shoe Stores
5661	Shoe Stores
5681	Furriers and Fur Shops
569	Misc. Apparel & Accessory Stores
5699	Miscellaneous Apparel & Access
57	Home Furniture, Furnishings & Equipment Stores
571	Home Furniture & Furnishings Stores
5712	Furniture Stores
5713	Floor Covering Stores
5714	Drapery and Upholstery Stores
5719	Misc. Home Furnishings Stores
572	Household Appliance Stores
5722	Household Appliance Stores
573	Radio, Television, Consumer Electronics, and Music Stores
5731	Radio, Television and Electronic Stores
5732	Radio and Television Stores
5733	Music Stores
5734	Computer and Software Stores
5735	Record and Prerecorded Tape Stores
5736	Musical Instrument Stores
58	Eating and Drinking Places
581	Eating and Drinking Places
5812	Eating Places
5813	Drinking Places
59	Miscellaneous Retail
591	Drug Stores and Proprietary Stores
5912	Drug Stores and Proprietary Stores
592	Liquor Stores
5921	Liquor Stores

SIC	DESCRIPTION
593	Used Merchandise Stores
5931	Used Merchandise Stores
5932	Used Merchandise Stores
594	Misc. Shopping Goods Stores
5941	Sporting Goods and Bicycle Shops
5942	Book Stores
5943	Stationery Stores
5944	Jewelry Stores
5945	Hobby, Toy, and Game Shops
5946	Camera & Photographic Supply Stores
5947	Gift, Novelty, and Souvenir Shops
5948	Luggage and Leather Goods Store
5949	Sewing, Needlework, and Piece Goods Stores
596	Nonstore Retailers
5961	Mail Order Houses
5962	Merchandising Machine Operator
5963	Direct Selling Organizations
598	Fuel Dealers
5982	Fuel and Ice Dealers, n.e.c.
5983	Fuel Oil Dealers
5984	Liquefied Petroleum Gas Dealers
5989	Fuel Dealers, n.e.c.
599	Retail Stores, n.e.c.
5992	Florists
5993	Cigar Stores and Stands
5994	News Dealers and Newsstands
5995	Optical Goods Stores
5999	Miscellaneous Retail Stores, n.e.c.
60	Depository Institutions
601	Central Reserve Depository Institutions
6011	Federal Reserve Banks
6019	Central Reserve Depository, n.e.c.
602	Commercial Banks
6021	National Commercial Banks
6022	State Banks, Federal Reserve
6023	State Banks, Not Fed. Reserve
6024	State Banks, Not Fed Reserve, Not FDIC
6025	National Banks, Federal Reserve
6026	National Banks, Not Fed. Reserve

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SIC	DESCRIPTION
639	Insurance Carriers, n.e.c.
6399	Insurance Carriers, n.e.c.
64	Insurance Agents, Brokers and Service
641	Insurance Agents, Brokers, and Service

SIC	DESCRIPTION
7373	Computer Integrated Systems Design
7374	Data Processing Services
7375	Information Retrieval Services
7376	Computer Facilities Management
7377	Computer Rental and Leasing
7378	Computer Maintenance and Repair
7379	Computer Related Services, n.e.c.
738	Miscellaneous Business Services
7381	Detective and Armored Car Services
7382	Security Systems Services
7383	News Syndicate
7384	Photofinishing Laboratories
7389	Business Services, n.e.c.
7391	Research & Development Laboratories
7392	Management and Public Relations
7393	Detective and Protective Services
7394	Equipment Rental and Leasing
7395	Photofinishing Laboratories
7396	Trading Stamp Services
7397	Commercial Testing Laboratories
7399	Business Services, n.e.c.
75	Automotive Repair, Services & Parking
751	Automotive Rental and Leasing, Without Drivers
7512	Passenger Car Rental and Leasing
7513	Truck Rental and Leasing
7514	Passenger Car Rental
7515	Passenger Car Leasing
7519	Utility Trailer Rental
752	Automobile Parking
7521	Automobile Parking
7523	Parking Lots
7525	Parking Structures
753	Automotive Repair Shops
7531	Top and Body Repair Shops
7532	Top and Body Repair and Paint Shops
7533	Auto Exhaust System Repair Shops
7534	Tire Retreading and Repair Shops
7535	Paint Shops
7536	Automotive Glass Replacement Shops
7537	Automotive Transmission Repair Shops
7538	General Automotive Repair Shop
7539	Automotive Repair Shops, n.e.c.
754	Automotive Services, Except Repair
7542	Car Washes
7549	Automotive Services, n.e.c.
76	Miscellaneous Repair Services
7620	Electrical Repair Shops
7622	Radio and Television Repair
7623	Refrigeration Service and Repair Shops
7629	Elect7.6(s)ll0Shops

SIC	DESCRIPTION
8071	Medical Laboratories
8072	Dental Laboratories
808	Home Health Care Services
8081	Outpatient Care Facilities
8082	Home Health Care Services
809	Misc. Health & Allied Services, n.e.c.
8091	Health and Allied Services, n.e.c.
8092	Kidney Dialysis Centers
8099	Health and Allied Services, n.e.c.
81	Legal Services
811	Legal Services
8111	Legal Services
82	Educational Services
821	Elementary and Secondary Schools
8211	Elementary and Secondary Schools
822	Colleges, Universities, Professional Schools, & Junior Colleges
8221	Colleges and Universities, n.e.c.
8222	Junior Colleges
823	Libraries
8231	Libraries and Information Centers
824	Vocational Schools
8241	Correspondence Schools
8243	Data Processing Schools
8244	Business and Secretarial Schools
8249	Vocational School, n.e.c.
829	Schools & Educational Services, n.e.c.
8299	Schools & Educational Services
83	Social Services
832	Individual and Family Social Services
8321	Individual and Family Services
8322	Individual and Family Services
833	Job Training, Vocational Rehabilitation Services
8331	Job Training and Related Services
835	Child Day Care Services
8351	Child Day Care Services
836	Residential Care
8361	Residential Care
839	Social Services, n.e.c.
8399	Social Services, n.e.c.
84	Museums, Art Galleries & Botanical & Zoological Gardens
841	Museums and Art Galleries
8411	Museums and Art Galleries
8412	Museums and Art Galleries
842	Arboreta, Botanical, or Zoological Gardens
8421	Botanical and Zoological Gardens
8422	Botanical and Zoological Gardens
86	Membership Organizations
861	Business Associations
8611	Business Associations
862	Professional Membership Organizations
8621	Professional Organizations
863	Labor Unions/similar Labor Organizations
8631	Labor Organizations
864	Civic, Social, & Fraternal Associations
8641	Civic and Social Associations
865	Political Organizations

SIC	DESCRIPTION
8651	Political Organizations
866	Religious Organizations
8661	Religious Organizations
869	Membership Organizations, n.e.c.
8699	Membership Organizations, n.e.c.
87	Engineering, Accounting, Research, Management
871	Engineering, Architectural, & Surveying Services
8711	Engineering Services
8712	Architectural Services
8713	Surveying Services

SIC	DESCRIPTION
9431	Public Health Program Administration
944	Social, Human Resource & Income Maintenance Program Administration
9441	Admin of Social & Manpower Programs
945	Veterans' Affairs (Except Health & Insurance) Administration
9451	Administration of Veterans' Affairs
95	Admin. of Environmental, Quality & Housing Program
951	Environmental Quality Programs Administration
9511	Air, Water, & Solid Waste Management
9512	Land, Mineral, Wildlife Conservation
953	Housing & Urban Development Programs Administration
9531	Housing Programs
9532	Urban and Community Development
96	Administration of Economic Programs
961	General Economic Program Administration
9611	Admin of General Economic Programs
962	Transportation Programs Regulation & Administration
9621	Regulation, Administration of Transportation
963	Communications, electric, gas, & Utilities

Appendix FF: Index of SCC/AMS Codes

SCC Code	Description
2201001000	Light Duty Gasoline Vehicles (LDGV), Total: All Road Types
2201001110	Light Duty Gasoline Vehicles (LDGV), Interstate: Rural Total
2201001111	Light Duty Gasoline Vehicles (LDGV), Interstate: Rural Time 1
2201001112	Light Duty Gasoline Vehicles (LDGV), Interstate: Rural Time 2
2201001113	Light Duty Gasoline Vehicles (LDGV), Interstate: Rural Time 3
2201001114	Light Duty Gasoline Vehicles (LDGV), Interstate: Rural Time 4
2201001130	Light Duty Gasoline Vehicles (LDGV), Other Principal Arterial: Rural Total
2201001131	Light Duty Gasoline Vehicles (LDGV), Other Principal Arterial: Rural Time 1
2201001132	Light Duty Gasoline Vehicles (LDGV), Other Principal Arterial: Rural Time 2
2201001133	Light Duty Gasoline Vehicles (LDGV), Other Principal Arterial: Rural Time 3
2201001134	Light Duty Gasoline Vehicles (LDGV), Other Principal Arterial: Rural Time 4
2201001150	Light Duty Gasoline Vehicles (LDGV), Minor Arterial: Rural Total
2201001151	Light Duty Gasoline Vehicles (LDGV), Minor Arterial: Rural Time 1
2201001152	Light Duty Gasoline Vehicles (LDGV), Minor Arterial: Rural Time 2

SCC Code	Description
2201001290	Light Duty Gasoline Vehicles (LDGV), Minor Arterial: Urban Total
2201001291	Light Duty Gasoline Vehicles (LDGV), Minor Arterial: Urban Time 1
2201001292	Light Duty Gasoline Vehicles (LDGV), Minor Arterial: Urban Time 2
2201001293	Light Duty Gasoline Vehicles (LDGV), Minor Arterial: Urban Time 3
2201001294	Light Duty Gasoline Vehicles (LDGV), Minor Arterial: Urban Time 4
2201001310	Light Duty Gasoline Vehicles (LDGV), Collector: Urban Total
2201001311	Light Duty Gasoline Vehicles (LDGV), Collector: Urban Time 1
2201001312	Light Duty Gasoline Vehicles (LDGV), Collector: Urban Time 2
2201001313	Light Duty Gasoline Vehicles (LDGV), Collector: Urban Time 3
2201001314	Light Duty Gasoline Vehicles (LDGV), Collector: Urban Time 4
2201001330	Light Duty Gasoline Vehicles (LDGV), Local: Urban Total
2201001331	Light Duty Gasoline Vehicles (LDGV), Local: Urban Time 1
2201001332	Light Duty Gasoline Vehicles (LDGV), Local: Urban Time 2
2201001333	Light Duty Gasoline Vehicles (LDGV), Local: Urban Time 3
2201001334	Light Duty Gasoline Vehicles (LDGV), Local: Urban Time 4
2201020000	Light Duty Gasoline Trucks 1 (LDGT1), Total: All Road Types
2201020110	Light Duty Gasoline Trucks 1 (LDGT1), Interstate: Rural Total
2201020111	Light Duty Gasoline Trucks 1 (LDGT1), Interstate: Rural Time 1
2201020112	Light Duty Gasoline Trucks 1 (LDGT1), Interstate: Rural Time 2
2201020113	Light Duty Gasoline Trucks 1 (LDGT1), Interstate: Rural Time 3
2201020114	Light Duty Gasoline Trucks 1 (LDGT1), Interstate: Rural Time 4
2201020130	Light Duty Gasoline Trucks 1 (LDGT1), Other Principal Arterial: Rural Total
2201020131	Light Duty Gasoline Trucks 1 (LDGT1), Other Principal Arterial: Rural Time 1
2201020132	Light Duty Gasoline Trucks 1 (LDGT1), Other Principal Arterial: Rural Time 2
2201020133	Light Duty Gasoline Trucks 1 (LDGT1), Other Principal Arterial: Rural Time 3
2201020134	Light Duty Gasoline Trucks 1 (LDGT1), Other Principal Arterial: Rural Time 4
2201020150	Light Duty Gasoline Trucks 1 (LDGT1), Minor Arterial: Rural Total
2201020151	Light Duty Gasoline Trucks 1 (LDGT1), Minor Arterial: Rural Time 1
2201020152	Light Duty Gasoline Trucks 1 (LDGT1), Minor Arterial: Rural Time 2
2201020153	Light Duty Gasoline Trucks 1 (LDGT1), Minor Arterial: Rural Time 3
2201020154	Light Duty Gasoline Trucks 1 (LDGT1), Minor Arterial: Rural Time 4
2201020170	Light Duty Gasoline Trucks 1 (LDGT1), Major Collector: Rural Total
2201020171	Light Duty Gasoline Trucks 1 (LDGT1), Major Collector: Rural Time 1
2201020172	Light Duty Gasoline Trucks 1 (LDGT1), Major Collector: Rural Time 2
2201020173	Light Duty Gasoline Trucks 1 (LDGT1), Major Collector: Rural Time 3
2201020174	Light Duty Gasoline Trucks 1 (LDGT1), Major Collector: Rural Time 4
2201020190	Light Duty Gasoline Trucks 1 (LDGT1), Minor Collector: Rural Total
2201020191	Light Duty Gasoline Trucks 1 (LDGT1), Minor Collector: Rural Time 1
2201020192	Light Duty Gasoline Trucks 1 (LDGT1), Minor Collector: Rural Time 2
2201020193	Light Duty Gasoline Trucks 1 (LDGT1), Minor Collector: Rural Time 3
2201020194	Light Duty Gasoline Trucks 1 (LDGT1), Minor Collector: Rural Time 4
2201020210	Light Duty Gasoline Trucks 1 (LDGT1), Local: Rural Total
2201020211	Light Duty Gasoline Trucks 1 (LDGT1), Local: Rural Time 1
2201020212	Light Duty Gasoline Trucks 1 (LDGT1), Local: Rural Time 2
2201020213	Light Duty Gasoline Trucks 1 (LDGT1), Local: Rural Time 3
2201020214	Light Duty Gasoline Trucks 1 (LDGT1), Local: Rural Time 4
2201020230	Light Duty Gasoline Trucks 1 (LDGT1), Interstate: Urban Total
2201020231	Light Duty Gasoline Trucks 1 (LDGT1), Interstate: Urban Time 1
2201020232	Light Duty Gasoline Trucks 1 (LDGT1), Interstate: Urban Time 2
2201020233	Light Duty Gasoline Trucks 1 (LDGT1), Interstate: Urban Time 3
2201020234	Light Duty Gasoline Trucks 1 (LDGT1), Interstate: Urban Time 4
2201020250	Light Duty Gasoline Trucks 1 (LDGT1), Other Freeways and Expressways: Urban TotalLDGT1),48 0.72 re f 46

SCC Code	Description
2201020251	Light Duty Gasoline Trucks 1 (LDGT1), Other Freeways and Expressways: Urban Time 1
2201020252	Light Duty Gasoline Trucks 1 (LDGT1), Other Freeways and Expressways: Urban Time 2
2201020253	Light Duty Gasoline Trucks 1 (LDGT1), Other Freeways and Expressways: Urban Time 3
2201020254	Light Duty Gasoline Trucks 1 (LDGT1), Other Freeways and Expressways: Urban Time 4
2201020270	Light Duty Gasoline Trucks 1 (LDGT1), Other Principal Arterial: Urban Total
2201020271	Light Duty Gasoline Trucks 1 (LDGT1), Other Principal Arterial: Urban Time 1
2201020272	Light Duty Gasoline Trucks 1 (LDGT1), Other Principal Arterial: Urban Time 2
2201020273	Light Duty Gasoline Trucks 1 (LDGT1), Other Principal Arterial: Urban Time 3
2201020274	Light Duty Gasoline Trucks 1 (LDGT1), Other Principal Arterial: Urban Time 4
2201020290	Light Duty Gasoline Trucks 1 (LDGT1), Minor Arterial: Urban Total
2201020291	Light Duty Gasoline Trucks 1 (LDGT1), Minor Arterial: Urban Time 1
2201020292	Light Duty Gasoline Trucks 1 (LDGT1), Minor Arterial: Urban Time 2
2201020293	Light Duty Gasoline Trucks 1 (LDGT1), Minor Arterial: Urban Time 3
2201020294	Light Duty Gasoline Trucks 1 (LDGT1), Minor Arterial: Urban Time 4
2201020310	Light Duty Gasoline Trucks 1 (LDGT1), Collector: Urban Total
2201020311	Light Duty Gasoline Trucks 1 (LDGT1), Collector: Urban Time 1
2201020312	Light Duty Gasoline Trucks 1 (LDGT1), Collector: Urban Time 2
2201020313	Light Duty Gasoline Trucks 1 (LDGT1), Collector: Urban Time 3
2201020314	Light Duty Gasoline Trucks 1 (LDGT1), Collector: Urban Time 4
2201020330	Light Duty Gasoline Trucks 1 (LDGT1), Local: Urban Total
2201020331	Light Duty Gasoline Trucks 1 (LDGT1), Local: Urban Time 1
2201020332	Light Duty Gasoline Trucks 1 (LDGT1), Local: Urban Time 2
2201020333	Light Duty Gasoline Trucks 1 (LDGT1), Local: Urban Time 3
2201020334	Light Duty Gasoline Trucks 1 (LDGT1), Local: Urban Time 4
2201040000	Light Duty Gasoline Trucks 2 (LDGT2), Total: All Road Types
2201040110	Light Duty Gasoline Trucks 2 (LDGT2), Interstate: Rural Total
2201040111	Light Duty Gasoline Trucks 2 (LDGT2), Interstate: Rural Time 1
2201040112	Light Duty Gasoline Trucks 2 (LDGT2), Interstate: Rural Time 2
2201040113	Light Duty Gasoline Trucks 2 (LDGT2), Interstate: Rural Time 3
2201040114	Light Duty Gasoline Trucks 2 (LDGT2), Interstate: Rural Time 4
2201040130	Light Duty Gasoline Trucks 2 (LDGT2), Other Principal Arterial: Rural Total
2201040131	Light Duty Gasoline Trucks 2 (LDGT2), Other Principal Arterial: Rural Time 1
2201040132	Light Duty Gasoline Trucks 2 (LDGT2), Other Principal Arterial: Rural Time 2
2201040133	Light Duty Gasoline Trucks 2 (LDGT2), Other Principal Arterial: Rural Time 3
2201040134	Light Duty Gasoline Trucks 2 (LDGT2), Other Principal Arterial: Rural Time 4
2201040150	Light Duty Gasoline Trucks 2 (LDGT2), Minor Arterial: Rural Total

SCC Code	Description
2201040213	

SCC Code	Description
2201060190	Light Duty Gasoline Trucks 1 & 2 (LDGT), Minor Collector: Rural Total
2201060191	Light Duty Gasoline Trucks 1 & 2 (LDGT), Minor Collector: Rural Time 1

SCC Code	Description
2201070152	Heavy Duty Gasoline Vehicles (HDGV), Minor Arterial: Rural Time 2

SCC Code	Description
2201080114	Motorcycles (MC), Interstate: Rural Time 4
2201080130	Motorcycles (MC), Other Principal Arterial: Rural Total
2201080131	Motorcycles (MC), Other Principal Arterial: Rural Time 1
2201080132	Motorcycles (MC), Other Principal Arterial: Rural Time 2
2201080133	Motorcycles (MC), Other Principal Arterial: Rural Time 3
2201080134	Motorcycles (MC), Other Principal Arterial: Rural Time 4
2201080150	Motorcycles (MC), Minor Arterial: Rural Total
2201080151	Motorcycles (MC), Minor Arterial: Rural Time 1
2201080152	Motorcycles (MC), Minor Arterial: Rural Time 2
2201080153	Motorcycles (MC), Minor Arterial: Rural Time 3
2201080154	Motorcycles (MC), Minor Arterial: Rural Time 4
2201080170	Motorcycles (MC), Major Collector: Rural Total
2201080171	Motorcycles (MC), Major Collector: Rural Time 1
2201080172	Motorcycles (MC), Major Collector: Rural Time 2
2201080173	Motorcycles (MC), Major Collector: Rural Time 3
2201080174	Motorcycles (MC), Major Collector: Rural Time 4
2201080190	Motorcycles (MC), Minor Collector: Rural Total
2201080191	Motorcycles (MC), Minor Collector: Rural Time 1
2201080192	Motorcycles (MC), Minor Collector: Rural Time 2
2201080193	Motorcycles (MC), Minor Collector: Rural Time 3
2201080194	Motorcycles (MC), Minor Collector: Rural Time 4
2201080210	Motorcycles (MC), Local: Rural Total
2201080211	Motorcycles (MC), Local: Rural Time 1
2201080212	Motorcycles (MC), Local: Rural Time 2
2201080213	Motorcycles (MC), Local: Rural Time 3
2201080214	Motorcycles (MC), Local: Rural Time 4
2201080230	Motorcycles (MC), Interstate: Urban Total
2201080231	Motorcycles (MC), Interstate: Urban Time 1
2201080232	Motorcycles (MC), Interstate: Urban Time 2
2201080233	Motorcycles (MC), Interstate: Urban Time 3
2201080234	Motorcycles (MC), Interstate: Urban Time 4
2201080250	Motorcycles (MC), Other Freeways and Expressways: Urban Total

SCC Code	Description
2201080332	Motorcycles (MC), Local: Urban Time 2
2201080333	Motorcycles (MC), Local: Urban Time 3
2201080334	Motorcycles (MC), Local: Urban Time 4
2230001000	Light Duty Diesel Vehicles (LDDV), Total: All Road Types
2230001110	Light Duty Diesel Vehicles (LDDV), Interstate: Rural Total
2230001111	Light Duty Diesel Vehicles (LDDV), Interstate: Rural Time 1
2230001112	Light Duty Diesel Vehicles (LDDV), Interstate: Rural Time 2
[redacted]	Light Duty Diesel Vehicles (LDDV), Interstate: Rural Time 3

SCC Code	Description
2230001294	Light Duty Diesel Vehicles (LDDV), Minor Arterial: Urban Time 4
2230001310	Light Duty Diesel Vehicles (LDDV), Collector: Urban Total
2230001311	Light Duty Diesel Vehicles (LDDV), Collector: Urban Time 1
2230001312	Light Duty Diesel Vehicles (LDDV), Collector: Urban Time 2
2230001313	Light Duty Diesel Vehicles (LDDV), Collector: Urban Time 3
2230001314	Light Duty Diesel Vehicles (LDDV), Collector: Urban Time 4
2230001330	Light Duty Diesel Vehicles (LDDV), Local: Urban Total
2230001331	Light Duty Diesel Vehicles (LDDV), Local: Urban Time 1
2230001332	Light Duty Diesel Vehicles (LDDV), Local: Urban Time 2
2230001333	Light Duty Diesel Vehicles (LDDV), Local: Urban Time 3
2230001334	Light Duty Diesel Vehicles (LDDV), Local: Urban Time 4
2230060000	Light Duty Diesel Trucks (LDDT), Total: All Road Types
2230060110	Light Duty Diesel Trucks (LDDT), Interstate: Rural Total
2230060111	Light Duty Diesel Trucks (LDDT), Interstate: Rural Time 1
2230060112	Light Duty Diesel Trucks (LDDT), Interstate: Rural Time 2
2230060113	Light Duty Diesel Trucks (LDDT), Interstate: Rural Time 3
2230060114	Light Duty Diesel Trucks (LDDT), Interstate: Rural Time 4
2230060130	Light Duty Diesel Trucks (LDDT), Other Principal Arterial: Rural Total
2230060131	Light Duty Diesel Trucks (LDDT), Other Principal Arterial: Rural Time 1
2230060132	Light Duty Diesel Trucks (LDDT), Other Principal Arterial: Rural Time 2
2230060133	Light Duty Diesel Trucks (LDDT), Other Principal Arterial: Rural Time 3
2230060134	Light Duty Diesel Trucks (LDDT), Other Principal Arterial: Rural Time 4
2230060150	Light Duty Diesel Trucks (LDDT), Minor Arterial: Rural Total
2230060151	Light Duty Diesel Trucks (LDDT), Minor Arterial: Rural Time 1
2230060152	Light Duty Diesel Trucks (LDDT), Minor Arterial: Rural Time 2
2230060153	Light Duty Diesel Trucks (LDDT), Minor Arterial: Rural Time 3
2230060154	Light Duty Diesel Trucks (LDDT), Minor Arterial: Rural Time 4
2230060170	Light Duty Diesel Trucks (LDDT), Major Collector: Rural Total
2230060171	Light Duty Diesel Trucks (LDDT), Major Collector: Rural Time 1
2230060172	Light Duty Diesel Trucks (LDDT), Major Collector: Rural Time 2
2230060173	Light Duty Diesel Trucks (LDDT), Major Collector: Rural Time 3
2230060174	Light Duty Diesel Trucks (LDDT), Major Collector: Rural Time 4
2230060190	Light Duty Diesel Trucks (LDDT), Minor Collector: Rural Total
2230060191	Light Duty Diesel Trucks (LDDT), Minor Collector: Rural Time 1
2230060192	Light Duty Diesel Trucks (LDDT), Minor Collector: Rural Time 2
2230060193	Light Duty Diesel Trucks (LDDT), Minor Collector: Rural Time 3
2230060194	Light Duty Diesel Trucks (LDDT), Minor Collector: Rural Time 4
2230060210	Light Duty Diesel Trucks (LDDT), Local: Rural Total
2230060211	Light Duty Diesel Trucks (LDDT), Local: Rural Time 1
2230060212	Light Duty Diesel Trucks (LDDT), Local: Rural Time 2
2230060213	Light Duty Diesel Trucks (LDDT), Local: Rural Time 3
2230060214	Light Duty Diesel Trucks (LDDT), Local: Rural Time 4
2230060230	Light Duty Diesel Trucks (LDDT), Interstate: Urban Total
2230060231	Light Duty Diesel Trucks (LDDT), Interstate: Urban Time 1
2230060232	Light Duty Diesel Trucks (LDDT), Interstate: Urban Time 2
2230060233	Light Duty Diesel Trucks (LDDT), Interstate: Urban Time 3
2230060234	Light Duty Diesel Trucks (LDDT), Interstate: Urban Time 4
2230060250	Light Duty Diesel Trucks (LDDT), Other Freeways and Expressways: Urban Total
2230060251	Light Duty Diesel Trucks (LDDT), Other Freeways and Expressways: Urban Time 1
2230060252	Light Duty Diesel Trucks (LDDT), Other Freeways and Expressways: Urban Time 2
2230060253	Light Duty Diesel Trucks (LDDT), Other Freeways and Expressways: Urban Time 3
2230060254	Light Duty Diesel Trucks (LDDT), Other Freeways and Expressways: Urban Time 4
2230060270	Light Duty Diesel Trucks (LDDT), Other Principal Arterial: Urban Total

SCC Code	Description
2230060271	Light Duty Diesel Trucks (LDDT), Other Principal Arterial8 re f 107.16 719.4 45072 696.72 .721FF -

SCC Code	Description
2230070233	Heavy Duty Diesel Vehicles (HDDV), Interstate: Urban Time 3
2230070234	Heavy Duty Diesel Vehicles (HDDV), Interstate: Urban Time 4
2230070250	Heavy Duty Diesel Vehicles (HDDV), Other Freeways and Expressways: Urban Total
2230070251	Heavy Duty Diesel Vehicles (HDDV), Other Freeways and Expressways: Urban Time 1
2230070252	Heavy Duty Diesel Vehicles (HDDV), Other Freeways and Expressways: Urban Time 2
2230070253	Heavy Duty Diesel Vehicles (HDDV), Other Freeways and Expressways: Urban Time 3
2230070254	Heavy Duty Diesel Vehicles (HDDV), Other Freeways and Expressways: Urban Time 4
2230070270	Heavy Duty Diesel Vehicles (HDDV), Other Principal Arterial: Urban Total
2230070271	Heavy Duty Diesel Vehicles (HDDV), Other Principal Arterial: Urban Time 1
2230070272	Heavy Duty Diesel Vehicles (HDDV), Other Principal Arterial: Urban Time 2
2230070273	Heavy Duty Diesel Vehicles (HDDV), Other Principal Arterial: Urban Time 3
2230070274	Heavy Duty Diesel Vehicles (HDDV), Other Principal Arterial: Urban Time 4
2230070290	Heavy Duty Diesel Vehicles (HDDV), Minor Arterial: Urban Total
2230070291	Heavy Duty Diesel Vehicles (HDDV), Minor Arterial: Urban Time 1
2230070292	Heavy Duty Diesel Vehicles (HDDV), Minor Arterial: Urban Time 2
2230070293	Heavy Duty Diesel Vehicles (HDDV), Minor Arterial: Urban Time 3
2230070294	Heavy Duty Diesel Vehicles (HDDV), Minor Arterial: Urban Time 4
2230070310	Heavy Duty Diesel Vehicles (HDDV), Collector: Urban Total
2230070311	Heavy Duty Diesel Vehicles (HDDV), Collector: Urban Time 1
2230070312	Heavy Duty Diesel Vehicles (HDDV), Collector: Urban Time 2
2230070313	Heavy Duty Diesel Vehicles (HDDV), Collector: Urban Time 3
2230070314	Heavy Duty Diesel Vehicles (HDDV), Collector: Urban Time 4
2230070330	Heavy Duty Diesel Vehicles (HDDV), Local: Urban Total
2230070331	Heavy Duty Diesel Vehicles (HDDV), Local: Urban Time 1
2230070332	Heavy Duty Diesel Vehicles (HDDV), Local: Urban Time 2
2230070333	Heavy Duty Diesel Vehicles (HDDV), Local: Urban Time 3
2230070334	Heavy Duty Diesel Vehicles (HDDV), Local: Urban Time 4
2260000000	All Off-highway Vehicle: Gasoline, 2-Stroke, Total
2260001000	Gasoline, 2-Stroke, Recreational Vehicles, Total
2260001010	Gasoline, 2-Stroke, Recreational Vehicles, Motorcycles: Off-Road
2260001020	Gasoline, 2-Stroke, Recreational Vehicles, Snowmobiles
2260001030	Gasoline, 2-Stroke, Recreational Vehicles, All Terrain Vehicles
2260001040	Gasoline, 2-Stroke, Recreational Vehicles, Minibikes
2260001050	Gasoline, 2-Stroke, Recreational Vehicles, Golf Carts
2260001060	Gasoline, 2-Stroke, Recreational Vehicles, Speciality Vehicle Carts
2260002000	Gasoline, 2-Stroke, Construction Equipment, Total
2260002003	Gasoline, 2-Stroke, Construction Equipment, Asphalt Pavers
2260002006	Gasoline, 2-Stroke, Construction Equipment, Tampers/Rammers
2260002009	Gasoline, 2-Stroke, Construction Equipment, Plate Compactors
2260002012	Gasoline, 2-Stroke, Construction Equipment, Concrete Pavers
2260002015	Gasoline, 2-Stroke, Construction Equipment, Rollers
2260002018	Gasoline, 2-Stroke, Construction Equipment, Scrapers
2260002021	Gasoline, 2-Stroke, Construction Equipment, Paving Equipment
2260002024	Gasoline, 2-Stroke, Construction Equipment, Surfacing Equipment
2260002027	Gasoline, 2-Stroke, Construction Equipment, Signal Boards
2260002030	Gasoline, 2-Stroke, Construction Equipment, Trenchers
2260002033	Gasoline, 2-Stroke, Construction Equipment, Bore/Drill Rigs
2260002036	Gasoline, 2-Stroke, Construction Equipment, Excavators
2260002039	Gasoline, 2-Stroke, Construction Equipment, Concrete/Industrial Saws
2260002042	Gasoline, 2-Stroke, Construction Equipment, Cement and Mortar Mixers
2260002045	Gasoline, 2-Stroke, Construction Equipment, Cranes
2260002048	Gasoline, 2-Stroke, Construction Equipment, Graders
2260002051	Gasoline, 2-Stroke, Construction Equipment, Off-highway Trucks

SCC Code	Description
2260002054	Gasoline, 2-Stroke, Construction Equipment, Crushing/Processing Equipment
2260002057	Gasoline, 2-Stroke, Construction Equipment, Rough Terrain Forklifts
2260002060	Gasoline, 2-Stroke, Construction Equipment, Rubber Tire Loaders
2260002063	Gasoline, 2-Stroke, Construction Equipment, Rubber Tire Dozers
2260002066	Gasoline, 2-Stroke, Construction Equipment, Tractors/Loaders/Backhoes
2260002069	[redacted]

Gasoline, 2-Sn Equipment, Skid StOff-Highwayrs

SCC Code	Description
2265004040	Gasoline, 4-Stroke, Lawn and Garden Equipment, Rear Engine Riding Mowers
2265004045	Gasoline, 4-Stroke, Lawn and Garden Equipment, Front Mowers
2265004050	Gasoline, 4-Stroke, Lawn and Garden Equipment, Shredders < 5 HP
2265004055	Gasoline, 4-Stroke, Lawn and Garden Equipment, Lawn and Garden Tractors
2265004060	Gasoline, 4-Stroke, Lawn and Garden Equipment, Wood Splitters
2265004065	Gasoline, 4-Stroke, Lawn and Garden Equipment, Chippers/Stump Grinders
2265004070	Gasoline, 4-Stroke, Lawn and Garden Equipment, Commercial Turf Equipment
2265004075	Gasoline, 4-Stroke, Lawn and Garden Equipment, Other Lawn and Garden Equipment
2265005000	Gasoline, 4-Stroke, Farm Equipment, Total
2265005010	Gasoline, 4-Stroke, Farm Equipment, 2-Wheel Tractors
2265005015	Gasoline, 4-Stroke, Farm Equipment, Agricultural Tractors
2265005020	Gasoline, 4-Stroke, Farm Equipment, Combines
2265005025	Gasoline, 4-Stroke, Farm Equipment, Balers
2265005030	Gasoline, 4-Stroke, Farm Equipment, Agricultural Mowers
2265005035	Gasoline, 4-Stroke, Farm Equipment, Sprayers
2265005040	Gasoline, 4-Stroke, Farm Equipment, Tillers > 5 HP
2265005045	Gasoline, 4-Stroke, Farm Equipment, Swathers
2265005050	Gasoline, 4-Stroke, Farm Equipment, Hydro-power Units
2265005055	Gasoline, 4-Stroke, Farm Equipment, Other Agricultural Equipment
2265006000	Gasoline, 4-Stroke, Light Commercial, Total
2265006005	Gasoline, 4-Stroke, Light Commercial, Generator Sets < 50 HP
2265006010	Gasoline, 4-Stroke, Light Commercial, Pumps < 50 HP
2265006015	Gasoline, 4-Stroke, Light Commercial, Air Compressors < 50 HP
2265006020	Gasoline, 4-Stroke, Light Commercial, Gas Compressors < 50 HP
2265006025	Gasoline, 4-Stroke, Light Commercial, Welders < 50 HP
2265006030	Gasoline, 4-Stroke, Light Commercial, Pressure Washers < 50 HP
2265007000	Gasoline, 4-Stroke, Logging Equipment, Total
2265007005	Gasoline, 4-Stroke, Logging Equipment, Chain Saws > 4 HP
2265007010	Gasoline, 4-Stroke, Logging Equipment, Shredders > 5 HP
2265007015	Gasoline, 4-Stroke, Logging Equipment, Skidders
2265007020	Gasoline, 4-Stroke, Logging Equipment, Fellers/Bunchers
2265008000	Gasoline, 4-Stroke, Airport Service Equipment, Total
2265008005	Gasoline, 4-Stroke, Airport Service Equipment, Airport Support Equipment
2265008010	Gasoline, 4-Stroke, Airport Service Equipment, Terminal Tractors
2270000000	All Off-Highway Vehicle: Diesel, Total
2270001000	Diesel, Recreational Vehicles, Total
2270001010	Diesel, Recreational Vehicles, Motorcycles: Off-Road
2270001020	Diesel, Recreational Vehicles, Snowmobiles
2270001030	Diesel, Recreational Vehicles, All Terrain Vehicles
2270001040	Diesel, Recreational Vehicles, Minibikes
2270001050	Diesel, Recreational Vehicles, Golf Carts
2270001060	Diesel, Recreational Vehicles, Speciality Vehicle Carts
2270002000	Diesel, Construction Equipment, Total
2270002003	Diesel, Construction Equipment, Asphalt Pavers
2270002006	Diesel, Construction Equipment, Tampers/Rammers
2270002009	Diesel, Construction Equipment, Plate Compactors
2270002012	Diesel, Construction Equipment, Concrete Pavers
2270002015	Diesel, Construction Equipment, Rollers
2270002018	Diesel, Construction Equipment, Scrapers
2270002021	Diesel, Construction Equipment, Paving Equipment
2270002024	Diesel, Construction Equipment, Surfacing Equipment
2270002027	Diesel, Construction Equipment, Signal Boards
2270002030	Diesel, Construction Equipment, Trenchers

SCC Code	Description
2270002033	

SCC Code	Description
2270006020	Diesel, Light Commercial, Gas Compressors < 50 HP
2270006025	Diesel, Light Commercial, Welders < 50 HP
2270006030	Diesel, Light Commercial, Pressure Washers < 50 HP
2270007000	Diesel, Logging Equipment, Total
2270007005	Diesel, Logging Equipment, Chain Saws > 4 HP
2270007010	Diesel, Logging Equipment, Shredders > 5 HP
2270007015	Diesel, Logging Equipment, Skidders
2270007020	Diesel, Logging Equipment, Fellers/Bunchers
2270008000	Diesel, Airport Service Equipment, Total
2270008005	Diesel, Airport Service Equipment, Airport Support Equipment
[redacted]	Diesel, Airport Service Equipment, Terminal Tractors
[redacted]	[redacted]es and Operations, Total
[redacted]	[redacted]t, Total
[redacted]	[redacted]aft, Total: All Types
[redacted]	[redacted], Total
[redacted]	[redacted]
[redacted]	[redacted]ry Power Units, Total
[redacted]	[redacted]s, Total
[redacted]	[redacted]ing: All Fuels, All Processes
[redacted]	[redacted]ing: All Fuels, Displacement Loss/Uncontrolled
[redacted]	[redacted]ing: All Fuels, Displacement Loss/Controlled
[redacted]	[redacted]ing: All Fuels, Spillage
[redacted]	[redacted]ing: All Fuels, Underground Tank: Total
[redacted]	[redacted]ing: All Fuels, Underground Tank: Breathing and Emptying
[redacted]	[redacted] Vessel Types
[redacted]	[redacted]g Vessels
[redacted]	[redacted]sels
[redacted]	[redacted]ssels
[redacted]	[redacted]essels
[redacted]	[redacted]ll Vessel Types
[redacted]	[redacted]ing Vessels
[redacted]	[redacted]essels
[redacted]	[redacted] Vessels
[redacted]	[redacted] Vessels
[redacted]	[redacted] All Vessel Types
[redacted]	[redacted]Going Vessels
[redacted]	[redacted] Vessels
[redacted]	[redacted]g Vessels
[redacted]	[redacted]ry Vessels
[redacted]	[redacted] All Vessel Types
[redacted]	[redacted]Going Vessels
[redacted]	[redacted] Vessels
[redacted]	[redacted]g Vessels
[redacted]	[redacted]ry Vessels
[redacted]	[redacted] Gasoline 2-Stroke, Total
[redacted]	[redacted] Gasoline 2-Stroke, Inboards
[redacted]	[redacted] Gasoline 2-Stroke, Outboards
[redacted]	[redacted] Gasoline 2-Stroke, Sterndrive
[redacted]	[redacted] Gasoline 2-Stroke, Sailboat Auxiliary Inboard
[redacted]	[redacted] Gasoline 2-Stroke, Sailboat Auxiliary Outboard
[redacted]	[redacted] Gasoline 4-Stroke, Total

SCC Code	Description
2282010015	Pleasure Craft, Gasoline 4-Stroke, Sterndrive
2282010020	Pleasure Craft, Gasoline 4-Stroke, Sailboat Auxiliary Inboard
2282010025	Pleasure Craft, Gasoline 4-Stroke, Sailboat Auxiliary Outboard
2282020000	Pleasure Craft, Diesel, Total
2282020005	Pleasure Craft, Diesel, Inboards
2282020010	Pleasure Craft, Diesel, Outboards
2282020015	Pleasure Craft, Diesel, Sterndrive
2282020020	Pleasure Craft, Diesel, Sailboat Auxiliary Inboard
2282020025	Pleasure Craft, Diesel, Sailboat Auxiliary Outboard
2285002000	Diesel, Total
2285002005	Diesel, Line Haul Locomotives
2285002010	Diesel, Yard Locomotives
2294000000	All Paved Roads, Total: Fugitives
2294000001	All Paved Roads, Total: Average Conditions - Fugitives
2294000002	All Paved Roads, Total: Sanding/Salting - Fugitives
2294005000	Interstate/Arterial, Total: Fugitives
2294005001	Interstate/Arterial, Total: Average Conditions - Fugitives
2294005002	Interstate/Arterial, Total: Sanding/Salting - Fugitives
2294010000	All Other Public Paved Roads, Total: Fugitives
2294010001	All Other Public Paved Roads, Total: Average Conditions - Fugitives
2294010002	All Other Public Paved Roads, Total: Sanding/Salting - Fugitives
2294015000	Industrial Roads, Total: Fugitives
2294015001	Industrial Roads, Total: Average Conditions - Fugitives
2294015002	Industrial Roads, Total: Sanding/Salting - Fugitives
2296000000	All Unpaved Roads, Total: Fugitives
2296005000	Public Unpaved Roads, Total: Fugitives
2296010000	Industrial Unpaved Roads, Total: Fugitives

Trichloroethylene	79-01-6	In Preparation

OBSERVERS

Dr. Suzanne King
Air Division
U.S. EPA-Region V - AR-18J