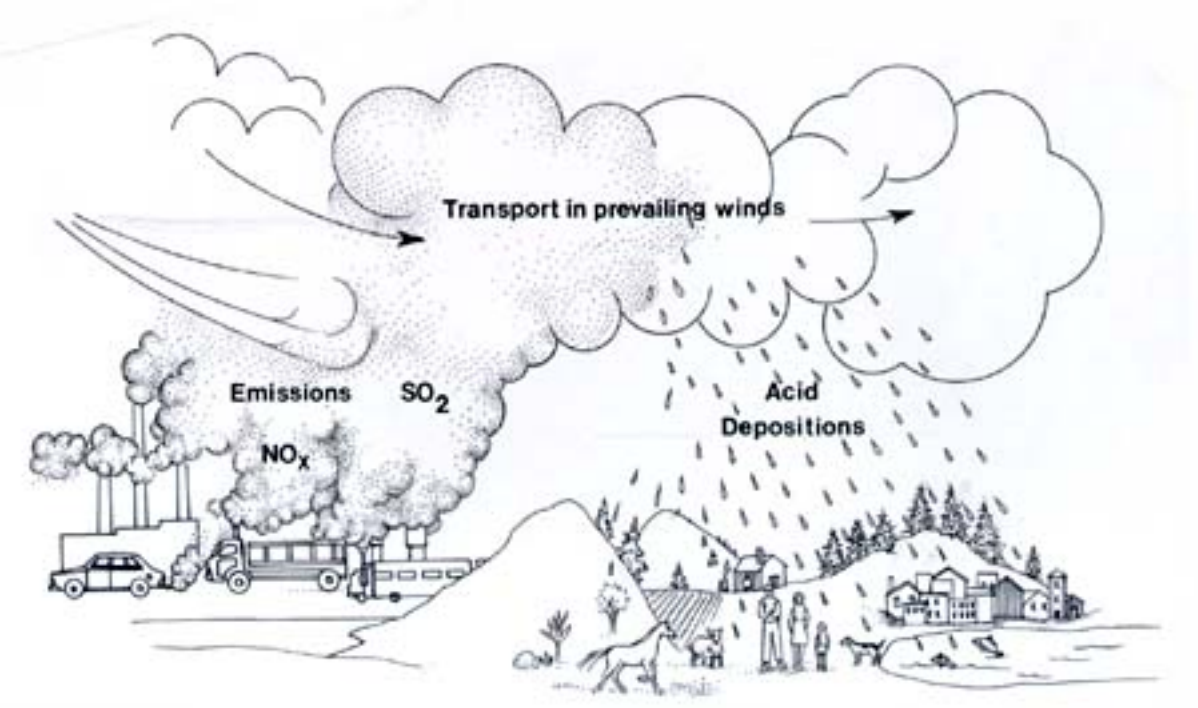
2004 Wisconsin
Sulfur Dioxide and Nitrogen Oxides Emissions Report



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Acknowledgments

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History

In 1986, Wisconsin enacted one of the first and strongest acid rain control laws in the nation. This law, found under sections 285.41 through 285.49, Wis. Stats., states the sulfur dioxide and nitrogen oxides emission rates and goals for Wisconsin. The 2004 Sulfur Dioxide and Nitrogen Oxides Report is the twentieth annual report of its kind since 1980 required under s. 285.11(12), Wis. Stats., (air pollution control). This report compiles sulfur dioxide and nitrogen oxides emissions from Wisconsin's five major utilities, as well as large, small, and area sources, as defined below, and compares these emission rates to the limits and goals specified in s. 285.41 – 285.49, Wis. Stats.

Effects of Sulfur Dioxide and Nitrogen Oxides

Sulfur dioxide and nitrogen oxides can cause many problems when released into the atmosphere. Children and the elderly are especially susceptible to the health effects of these pollutants which include lung tissue irritation, airway constriction, and decreased immune system efficiency. In addition to harmful health impacts, these pollutants can also cause negative environmental impacts. Both have been shown to contribute to acid rain and nitrogen oxides contribute to the production of ground level ozone.

Acid Rain

In recent history, the acid rain phenomenon has brought destruction to thousands of lakes, streams, forests, and monuments in the United States, Canada, and parts of Europe. Sulfur dioxide and nitrogen oxide emissions are the main causes of acid rain. Coal-fired power plants along with pulp and paper mills are the main producers of sulfur dioxide emissions, while coal-fired power plants, factories, vehicles, and home furnaces are the most significant sources of nitrogen oxide emissions in Wisconsin. While in the air, these chemicals react with oxygen and moisture to form sulfuric, nitric and nitrous acid. These acids then return to land as precipitation in the form of rain, snow, or fog. Pollutant-free rain has a pH value of 5.0 to 6.0, on a scale where 14 is the least acidic, 0 the most acidic, and 7 neutral. The Wisconsin Department of Natural Resources considers rain to be acidic if it has a pH less than 5.0. In the early 1980s, pH values ranged from 4.4 in southeastern Wisconsin to 4.8 in northwestern Wisconsin. The acid rain control law helped to improve that range by 2004 to 4.95 in the southeast and 5.44 in the northwest. A pH goal of 4.7 or greater is established in the state law.

Controlling Acid Rain

Controlling acid rain is directly related to managing the combustion of fossil fuels. The byproducts of fuel combustion contain large amounts of nitrogen oxides which are emitted into the atmosphere and produce acid rain. The same is true for fuels that contain sulfur (such as coal and fuel oils) which emit sulfur dioxide when combusted. According to the 2005 Wisconsin Energy Statistics published by the Department of Administration's

Wisconsin Energy Bureau, 82 percent of the energy resources that Wisconsin consumed in 2004 were fossil fuel resources. Coal comprised 30.4 percent of the energy resources consumed in 2004, while petroleum and natural gas comprised 29.2 percent and 21.6 percent, respectively.

It is obvious that one way to control acid rain is to reduce the amount of sulfur dioxide and nitrogen oxides emitted into the atmosphere. This can best be accomplished by decreasing the use of fossil fuels used in utilities and increasing the use of alternative energy resources such as solar, wind, hydroelectric, and nuclear. During 2004 nuclear energy consumption accounted for only 7.3 percent of the total energy resources consumed in Wisconsin and renewable energy resources accounted for a mere 4.3 percent.

Another way to control acid rain is through energy conservation. Reductions in fossil fuel combustion are directly correlated to reductions in energy demand. Energy conservation is voluntary; therefore, this method of reducing sulfur dioxide and nitrogen oxide emissions could be effective only if participation is high. Combustion related alternatives that can be implemented at major utilities include switching to low-sulfur coal and/or low-sulfur petroleum products. Emission reductions at other sources can be accomplished by using more fuel-efficient vehicles or electric hybrid vehicles, and replacing old home furnaces with newer, more efficient furnaces. Major utilities in Wisconsin have now switched to low-sulfur coal in order to comply with acid rain laws. In the future, cars powered by fuel cells, electricity, or alternative fuels may also contribute to controlling acid rain.

Wisconsin's Acid Rain Law

The state's acid rain control law was enacted in April of 1986. In addition to striving for a precipitation pH level above 4.7 throughout the state, standards for nitrogen oxides and sulfur dioxide emissions were created for each type of source. The primary goal is to reduce sulfur dioxide emissions to 50 percent of 1980 levels. A definition of each source and the emission limits and goals that affect those source types is as follows:

Major Utility

Under the acid rain law, a major utility is defined as any electric utility or electrical cooperative with $2.5 million or more in annual gross operating revenues that has sulfur dioxide emissions of 5000 tons or more in any year after 1979 from all stationary sources in Wisconsin.
Wisconsin has five major utilities:

- Alliant Energy (formerly Wisconsin Power & Light)
- Dairyland Power Cooperative
- Madison Gas and Electric Company
- Wisconsin Electric Power Company (WE Energies)
- Wisconsin Public Service Corporation

Three goals, two for sulfur dioxide and one for nitrogen oxides emissions, are established for major utilities under the acid rain control law. Effective January 1, 1993, each major utility must limit their annual average sulfur dioxide emissions to 1.20 pounds of sulfur dioxide per million British thermal units (mmBtu) of heat input generated from fossil fuel-fired boilers located in Wisconsin. Also effective January 1, 1993, the total annual sulfur dioxide emissions from all major utilities are not to exceed 250,000 tons in any year. After 1991, the goal for nitrogen oxide emissions from all major utilities is not to exceed 135,000 total tons per year.

Large Source

A large source is defined in the acid rain law as any stationary source in Wisconsin, other than a fossil fuel-fired boiler under ownership or control of a major utility that has a five-year sulfur dioxide emissions average of 1,000 tons or more per year for the most recent five-year period. The large source had to be operational before May 2, 1986, and boilers subject to the new source performance standards (NSPS) for sulfur dioxide emissions established under s. 285.27(1), Wis. Stats. are excluded. Wisconsin's acid rain law does not specifically define large sources of nitrogen oxides. For this report, a large nitrogen oxides emission source is defined as any source other than a fossil fuel-fired boiler under the ownership or control of a major utility that emitted 1,000 tons or more of nitrogen oxides in the current year.

The acid rain law established the goal that all large sources in Wisconsin not exceed 75,000 tons of sulfur dioxide emissions per year. For state-owned large sources, the law also set a goal of not exceeding an average of 1.50 pounds of sulfur dioxide per mmBtu heat input per year for each source.

Small Source

Small sources consist of all of the stationary sulfur dioxide or nitrogen oxides emission sources listed in the Wisconsin Air Emissions Inventory maintained by the Department of Natural Resources that are neither large sources nor major utilities. In terms of emissions, small sources emit on average for the most recent five-year period less than 1000 tons of sulfur dioxide emissions per year and less than 1000 tons of nitrogen oxides emissions for the current year.

Area Source

Sources that are too small or too difficult to be surveyed individually, such as home furnaces and automobiles, are classified as area sources. They are called area sources because their emissions are totaled and reported collectively for geographic areas such as cities, counties, or states. The Department of Natural Resources does not routinely determine area source emissions. Area source sulfur dioxide and nitrogen oxides emissions from 1980 were estimated in the Wisconsin Acid Deposition Emission Inventory, which was produced as part of the Wisconsin Cooperative Acid Deposition Research Program. That estimate has been used to approximate 1980 to 2004 area source emissions for this report.

Federal Acid Rain Program

In 1990 Title IV of the Clean Air Act was set into law with primary goals of reducing sulfur dioxide emissions to 10 million tons below 1980 levels and nitrogen oxides emissions to 2 million tons below 1980 levels.

Sulfur Dioxide Reductions

The law provided a two-phase tightening of restrictions placed on fossil fuel-fired boilers to achieve the desired goal for sulfur dioxide emissions. With a total of 445 units affected, Phase I began in 1995 with an initial 263 units at 110 mostly coal-burning electric utility plants located in 21 eastern and midwestern states. An additional 182 units joined Phase I as substitution or compensating units, which creates 445 total units affected by Phase I. Phase II began January 1, 2000 and capped the combined sulfur dioxide emissions generated at 8.95 million tons per year for Phase I affected units and other electric utility units serving generators over 25 MW. The Federal Acid Rain Program grants sulfur dioxide emission "allowances" to facilities based on a facility's average heat input (in mmBtu) for 1985 through 1987. Facilities affected by Phase I are allocated allowances equivalent to 2.50 pounds of sulfur dioxide per mmBtu. The number of sulfur dioxide allowances allocated is based on an emission rate of 1.20 pounds per mmBtu during Phase II. Each affected source must have enough allowances to cover its sulfur dioxide emissions in a given year.

Wisconsin has 13 utility units affected by Phase I and approximately 70 utility units affected by Phase II. The 5 major utilities in Wisconsin are required by the Wisconsin acid rain control law to limit sulfur dioxide emissions to 1.20 pounds per mmBtu and 1.50 pounds per mmBtu for state owned facilities since 1993. For Phase I, Wisconsin utilities have met the required 2.50 pounds per mmBtu limit. In 2004 Wisconsin major utilities met Phase II emission limits as well.

Nitrogen Oxides Reductions

In 1997, the beginning of Phase I, the nitrogen oxides reduction program established nitrogen oxides limitations for dry bottom wall-fired boilers and tangentially fired boilers. The annual limitations set are 0.50 pounds of nitrogen oxides per mmBtu for dry bottom wall-fired boilers, and 0.45 pounds of nitrogen oxides per mmBtu for tangentially fired boilers. Beginning in 2000, the Phase II program enacted new nitrogen oxides emission limitations for dry bottom wall-fired and tangentially fired boilers and it also established limits for other types of boilers.

For more information on the federal acid rain program, see the EPA's Acid Rain Program Home Page: http://www.epa.gov/acidrain

Data Summary

Sulfur Dioxide Emissions

Wisconsin stationary sources emitted 263,447 tons of sulfur dioxide in 2004. These emissions are down 62 percent from the 1980 level of 686,399 tons. Figure 1 represents Wisconsin's sulfur dioxide emissions for the time period of 1980 to 2004.

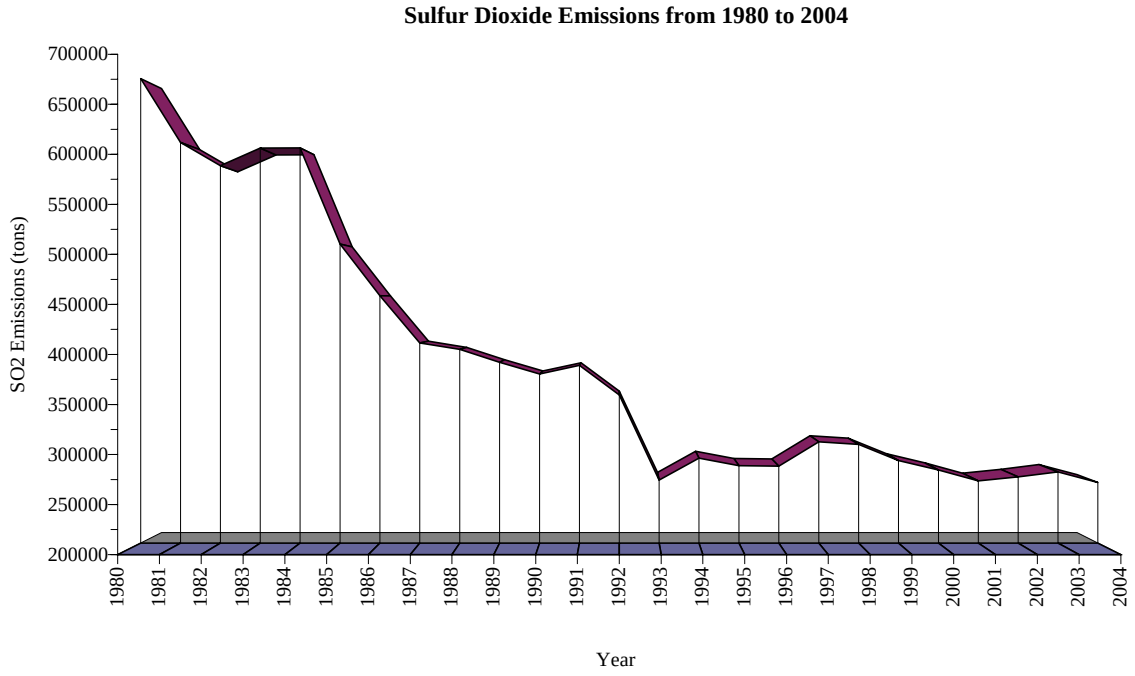

Figure 1. Time history of Wisconsin's sulfur dioxide emissions per year.

Major utilities alone reduced sulfur dioxide emissions from 506,954 tons in 1980 to 173,879 tons in 2004, a reduction of 66 percent below 1980 levels. Large sources reduced emissions from 144,439 tons in 1980 to 58,546 tons in 2004, a 59 percent reduction, and paper mills alone (a subset of large sources) reduced emissions from 127,339 tons in 1980 to 52,865 tons in 2004, also a 59 percent reduction. The total major utility emissions for 2004 are 76,121 tons below the annual goal of 250,000 tons established in Wisconsin's acid rain control law. Large source emissions in 2004 are 16,454 tons below the annual goal of 75,000 tons. Figures 2 and 3 represent sulfur dioxide emissions from Wisconsin's major utilities and large sources in reference to their emission goals.

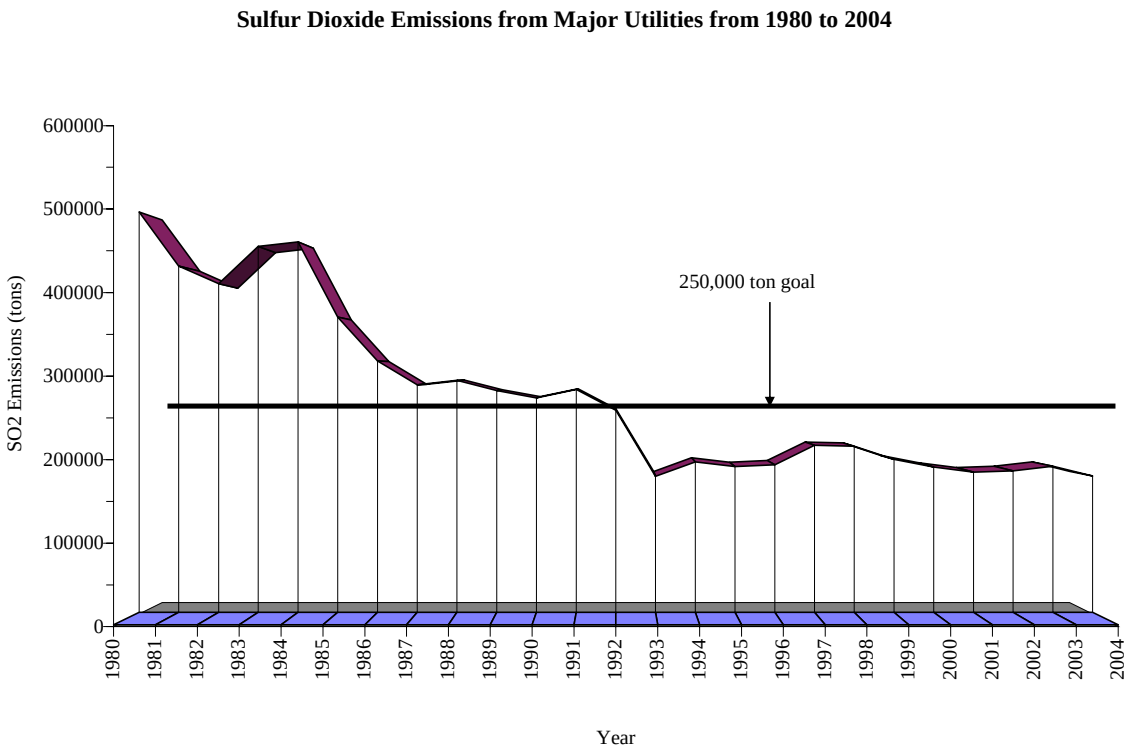

Figure 2. Time history for major utilities' sulfur dioxide emissions in Wisconsin.

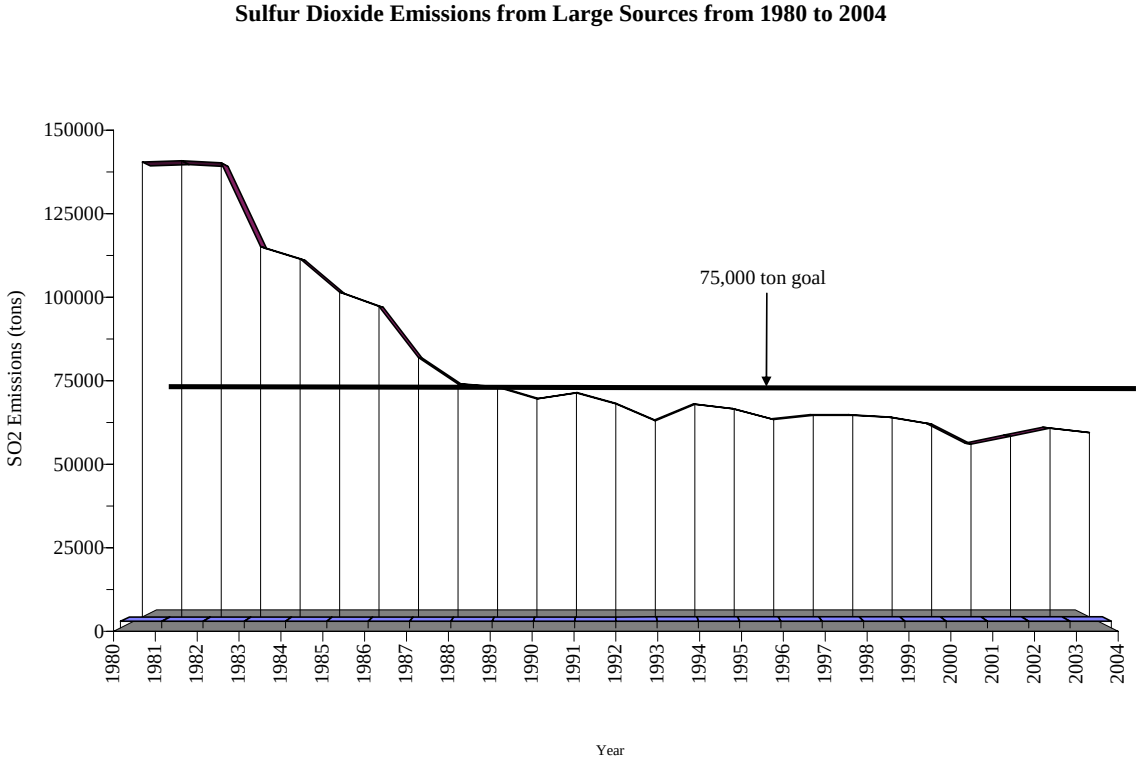

Figure 3. Time history for large sources' sulfur dioxide emissions in Wisconsin.

Major utilities account for 66.0 percent of total stationary source sulfur dioxide emissions in 2004. Large sources account for 22.2 percent, 20 percent from paper mills alone. Collectively, 88.2 percent of the sulfur dioxide emissions originated from major utilities and large sources. The remaining 11.8 percent originated from area and small sources. Figure 4 represents the contribution of each source towards Wisconsin's total stationary source sulfur dioxide emissions.

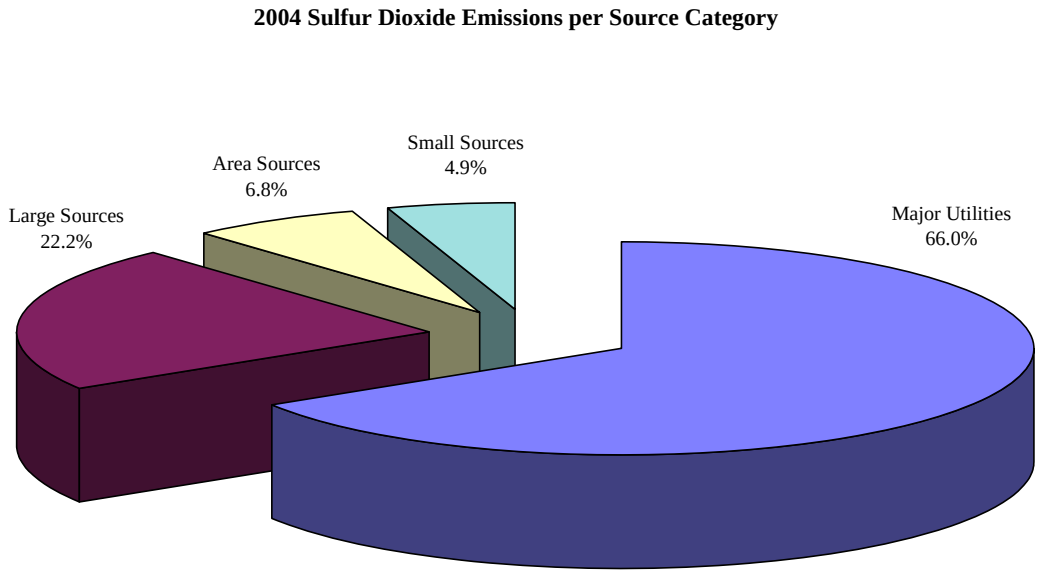

Figure 4. Breakdown of Wisconsin's 2004 sulfur dioxide emissions by source category.

In 2004, all of the five major utilities of Wisconsin have sulfur dioxide emission rates below the 1.20 pounds of sulfur dioxide per mmBtu of energy input established in the Federal and state acid rain programs. Wisconsin's one large, state-owned source, the University of Wisconsin-Madison Charter Street heating plant, also has a sulfur dioxide emission rate below the standard of 1.50 pounds of sulfur dioxide per mmBtu of energy input required in Wisconsin's acid rain control law for state owned facilities.

Nitrogen Oxides Emissions

Stationary sources emitted a total of 149,307 tons of nitrogen oxides in 2004. The 2004 nitrogen oxides emissions are 20 percent below the 1980 nitrogen oxides emission levels. Between 1980 and 2004, major utilities decreased nitrogen oxides emissions by 31 percent (from 108,606 to74,598 tons). Nitrogen oxides emissions from the major utilities have remained below the 135,000-ton goal set in Wisconsin's acid rain control law. Figure 5 represents the emissions from the major utilities from 1980 to 2004. Large sources emitted 19,577 tons of nitrogen oxides in 2004, a 21 percent reduction from 1980 levels.

Major utilities account for 50 percent of the total stationary source nitrogen oxides emissions. Collectively, major utilities and large sources account for 63.1 percent of nitrogen oxides emissions. The remaining 36.9 percent originated from area and small sources. Figure 6 below represents the contribution of each source towards Wisconsin's total stationary source nitrogen oxides emissions.

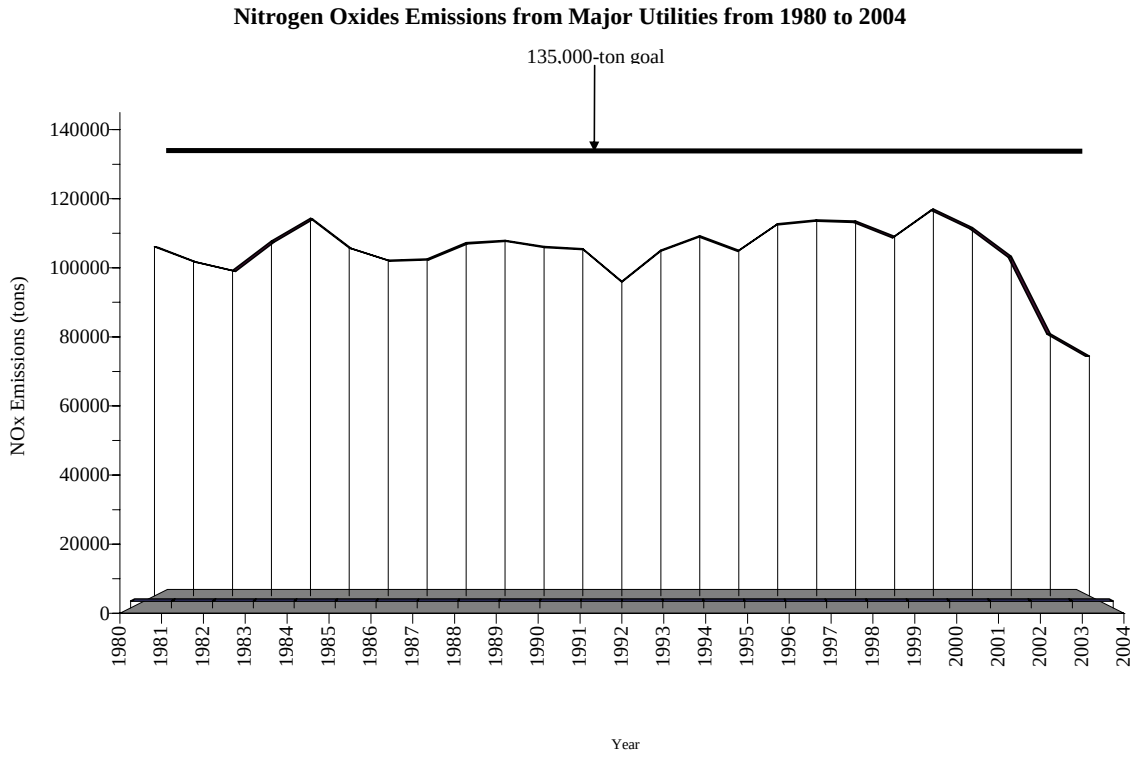

Figure 5. Time history for major utilities' nitrogen oxides emissions in Wisconsin.

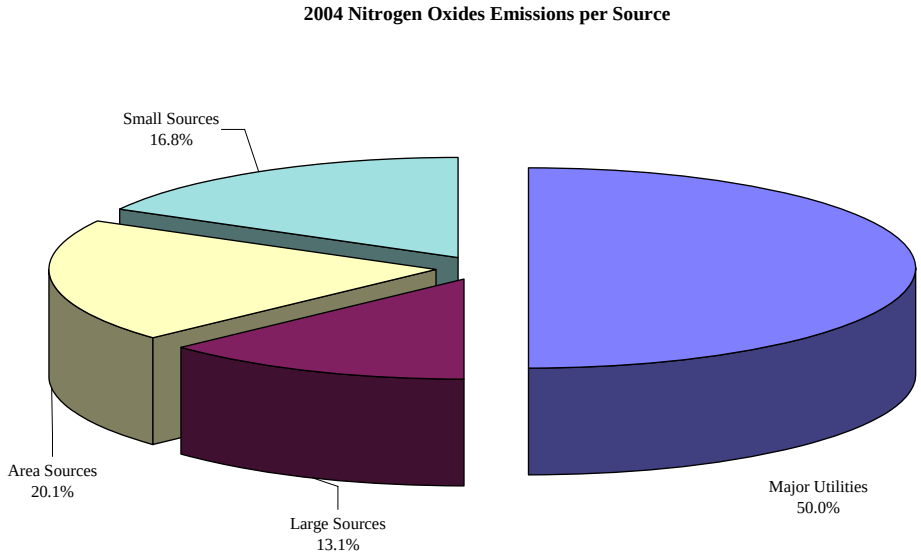

Figure 6. Breakdown of Wisconsin's 2004 nitrogen oxides emissions by source category.

Quality Assurance of Data

The data presented in this report for stationary point sources was derived primarily from two sources: the 2004 Air Emissions Inventory File and the 2004 sulfur dioxide emission summaries that Wisconsin's major utilities submit for the acid rain control law. The area source estimate was derived from the Wisconsin Acid Deposition Emission Inventory.

Sources submitting information to the emission inventory certify the information submitted is accurate. In addition, the DNR regional staff reviewed the data for accuracy. Federal and state acid rain laws often require continuous emission monitoring of sulfur dioxide and nitrogen oxides for large sources, so the measurement and reporting of these emissions should be accurate.

The corporate averages were determined from the 2004 sulfur dioxide emission summaries submitted by the major utilities. Please note that some power plant boilers are owned by more than one major utility. Jointly owned facilities have emissions credited to the appropriate utility on the basis of the energy generated for that utility. Only utility-operated boiler units were considered in determining the annual average emission rates.

Tables and Appendices

The following tables and appendices were created from major utility emissions data sheets submitted by the utilities and data obtained from the 2004 Air Emissions Inventory File. The tables and appendices provide historical information about Wisconsin's sulfur dioxide and nitrogen oxides emissions since 1980.

Several of the boilers operated by major utilities are co-owned. Total emissions from these boilers are listed under the majority owner for all tables and appendices except for Appendix C. In Appendix C, the emissions are broken down to show the portion of emissions that each major utility contributed to for co-owned boilers.

Table 1: Wisconsin Stationary Source Sulfur Dioxide Emissions Arranged by Category from 1980 to 2004

Values listed in tons of sulfur dioxide emitted

Year	Major Utilities			Large Sources				Area Sources	Small Sources	Total Emissions
	Pre-NSPS	NSPS	Total	Minor Utilities	Paper Mills	Other Facilities	Total			
1980	483,280	23,674	506,954	6,668	127,339	10,432	144,439	18,000	17,006	686,399
1981	409,320	29,527	438,847	7,360	122,363	15,124	144,847	18,000	17,868	619,562
1982	386,410	30,264	416,674	6,746	119,301	18,150	144,197	18,000	16,448	595,319
1983	425,814	37,859	463,673	4,526	99,729	13,370	117,625	18,000	14,475	613,773
1984	435,515	33,726	469,241	4,966	97,540	11,277	113,783	18,000	12,892	613,916
1985	334,732	39,668	374,400	5,525	87,464	10,147	103,136	18,000	17,526	513,062
1986	269,682	49,519	319,201	4,726	85,396	8,542	98,664	18,000	23,313	459,178
1987	230,882	58,209	289,091	2,490	70,658	9,204	82,352	18,000	20,234	409,677
1988	242,831	51,950	294,781	3,111	62,059	8,837	74,007	18,000	16,135	402,923
1989	222,739	59,027	281,766	2,879	61,955	8,129	72,963	18,000	16,706	389,435
1990	210,078	62,514	272,592	1,866	60,500	6,868	69,234	18,000	17,214	377,040
1991	220,487	62,798	283,285	3,284	57,521	10,370	71,175	18,000	13,712	386,172
1992	196,694	60,249	256,943	1,985	57,140	8,552	67,677	18,000	12,470	355,090
1993	116,814	56,776	173,590	2,280	53,923	6,125	62,328	18,000	11,954	265,872
1994	120,989	70,728	191,717	2,565	60,386	4,547	67,498	18,000	11,833	289,048
1995	116,236	69,654	185,890	2,267	59,525	4,245	66,037	18,000	11,270	281,197
1996	122,395	65,723	188,118	1,771	56,967	3,974	62,712	18,000	11,804	280,634
1997	142,484	70,180	212,665	1,877	58,033	4,140	64,050	18,000	11,468	306,183
1998	143,446	68,076	211,522	3,980	55,853	4,216	64,049	18,000	9,830	303,401
1999	122,938	71,870	194,808	2,770	56,717	3,866	63,353	18,000	10,368	286,528
2000	120,754	64,473	185,227	3,282	54,258	3,720	61,260	18,000	12,002	276,489
2001	112,839	65,969	178,808	3,052	47,988	3,828	54,868	18,000	13,472	265,148
2002	113,771	66,715	180,487	3,750	50,629	3,006	57,385	18,000	9,200	269,343
2003	116,593	69,653	186,246	3,304	53,797	2,870	59,971	18,000	10,430	274,647
2004	104,357	69,522	173,879	3,142	52,865	2,539	58,546	18,000	13,022	263,447
% Change from 1980 Levels			**-66%**				**-59%**		**-23%**	**-62%**

Table 2A: Wisconsin 2004 Major Utility Sulfur Dioxide Emissions Arranged By Facility

Facility Name	Location	SO_2 Emissions (tons)	Percent of Total SO_2 Emissions
Pre-NSPS			
Alliant (WP&L), Blackhawk	Beloit	0	
Alliant (WP&L), Columbia 1	Pardeeville	14,845	
Alliant (WP&L), Edgewater 3&4	Sheboygan	7,721	
Alliant (WP&L), Nelson Dewey	Cassville	17,194	
Alliant (WP&L), Rock River	Beloit	8	
Alliant (WP&L), Sheepskin	Edgerton	0	
Dairyland Power Alma 1-5	Alma	7,675	
Dairyland Power, Genoa	Genoa	10,944	
Madison Gas & Electric, Blount	Madison	7,945	
Madison Gas & Electric, Fitchburg	Fitchburg	0	
Madison Gas & Electric, Nine Springs	Madison	0	
Madison Gas & Electric, Sycamore	Madison	0	
WEPCO, Germantown	Germantown	0	
WEPCO, Oak Creek	Oak Creek	13,570	
WEPCO, Point Beach	Two Rivers	0	
WEPCO, Port Washington	Port Washington	7,059	
WEPCO, Valley	Milwaukee	6,542	
WPSC, Eagle River	Eagle River	0	
WPSC, Pulliam Plant	Green Bay	6,854	
WPSC, Weston 1&2	Weston	4,000	
	Subtotal	**104,357**	**39.6%**
NSPS			
Alliant (WP&L), Columbia 2	Pardeeville	14,606	
Alliant (WP&L), Edgewater 5	Sheboygan	10,342	
Dairyland Power, J.P. Madgett	Alma	4,687	
WEPCO, Pleasant Prairie	Kenosha	30,979	
WPSC, Peshtigo	Peshtigo	0	
WPSC, Weston 3	Weston	8,908	
	Subtotal	**69,522**	**26.4%**
	Total	**173,879**	**66.0%**
	Total for All Stationary Sources	**263,446**	

Table 2B: Wisconsin 2004 Large Source Sulfur Dioxide Emissions Arranged by Facility

Facility Name	Location	SO_2 Emissions (tons)	Percent of Total SO_2 Emissions
Minor Utilities			
Manitowoc Public Utilities	Manitowoc	3,142	
	Subtotal	**3,142**	**1.2%**
Pulp and Paper Mills			
Combined Locks Energy Center, LLC [1]	Combined Locks	1195	
Domtar A. W. Corporation-Nekoosa Mill [2]	Nekoosa	4496	
Domtar A. W. Corporation-Port Edward Mill [3]	Port Edwards	2385	
Stora Enso N. America-Biron Mill	Biron	5,837	
Stora Enso N. America-Kimberly Mill [4]	Kimberly	2,002	
Stora Enso N. America-Niagara Mill	Niagara	1,509	
Stora Enso N. America-Wis Rapids Pulp Mill	Wisc. Rapids	1,342	
Fort James Operating Company	Green Bay	12,725	
International Paper	Kaukauna	9,182	
Proctor & Gamble Paper Products Company	Green Bay	1,425	
Packaging Corporation of America [5]	Tomahawk	6,976	
Wausau-Mosinee Paper Corp.	Mosinee	1,290	
Wausau-Mosinee Paper Co.-Rhinelander	Rhinelander	2,502	
	Subtotal	**52,865**	**20.1%**
Other Large Sources			
Murphy Oil USA, Inc.	Superior	890	
University of Wisconsin - Charter St.	Madison	1,648	
	Subtotal	**2,538**	**1.0%**
	Total	**58,545**	**22.2%**
	Total for All Stationary Sources	**263,446**	

1. Previously Appleton Papers
2. Previously Nekoosa Papers, Inc.
3. Previously Nekoosa Papers, Inc.
4. Previously Inter Lake Papers
5. Previously Tenneco Packaging, Inc.

Table 3: Wisconsin Stationary Source Nitrogen Oxides Emissions Arranged by Category from 1980-2004

Values listed in tons of nitrogen oxides emitted

Year	Major Utilities			Large Sources	Area Sources	Small Sources	Total Emissions
	Pre-NSPS	NSPS	Total				
1980	94,354	14,252	108,606	24,715	30,000	23,462	186,783
1981	85,038	18,955	103,993	-	30,000	-	-
1982	83,041	18,110	101,151	-	30,000	-	-
1983	87,661	22,651	110,312	-	30,000	-	-
1984	93,530	23,921	117,451	-	30,000	-	-
1985	80,996	27,305	108,301	20,236	30,000	21,786	180,323
1986	73,815	30,588	104,403	18,286	30,000	22,466	175,155
1987	70,696	34,049	104,745	18,579	30,000	21,480	174,804
1988	77,175	32,640	109,815	18,763	30,000	22,788	181,366
1989	74,852	35,706	110,558	18,984	30,000	22,857	182,399
1990	70,978	37,653	108,631	19,029	30,000	23,300	180,960
1991	69,629	38,345	107,974	17,822	30,000	23,079	178,875
1992	64,943	32,873	97,816	31,731	30,000	21,595	181,142
1993	72,641	34,848	107,489	20,202	30,000	21,299	178,990
1994	75,524	36,450	111,974	22,507	30,000	21,182	185,663
1995	71,279	36,178	107,457	22,531	30,000	22,811	182,799
1996	78,723	36,995	115,718	18,627	30,000	27,671	192,016
1997	77,805	39,113	116,918	22,744	30,000	28,131	197,793
1998	77,948	38,590	116,538	24,764	30,000	22,493	193,795
1999	71,768	39,990	111,758	22,457	30,000	22,350	186,565
2000	77,666	42,652	120,319	21,348	30,000	23,023	194,690
2001	76,406	38,148	114,554	20,714	30,000	24,603	189,871
2002	70,437	35,144	105,581	21,110	30,000	20,126	176,817
2003	45,962	35,541	81,503	20,199	30,000	24,484	156,186
2004	44,714	29,884	74,598	19,577	30,000	25,132	149,307
% Change from 1980 Levels			**-31%**	**-21%**		**7%**	**-20%**

- Emissions were not totaled for this source category in that year.

Table 4A: Wisconsin 2004 Major Utility Nitrogen Oxides Emissions Arranged by Facility

Facility Name	Location	NO_x Emissions (tons)	Percent of Total NO_x Emissions
Pre-NSPS			
Alliant (WP&L), Blackhawk	Beloit	18	
Alliant (WP&L), Columbia 1	Pardeeville	3,028	
Alliant (WP&L), Edgewater 3&4	Sheboygan	5,321	
Alliant (WP&L), Nelson Dewey	Cassville	4,583	
Alliant (WP&L), Rock River	Beloit	462	
Alliant (WP&L), Sheepskin	Edgerton	2	
Dairyland Power, Alma 1-5	Alma	4,418	
Dairyland Power, Genoa	Genoa	3,383	
Madison Gas & Electric, Blount	Madison	1,636	
Madison Gas & Electric, Fitchburg	Fitchburg	22	
Madison Gas & Electric, Nine Springs	Madison	1	
Madison Gas & Electric, Sycamore	Madison	13	
WEPCO, Germantown	Germantown	85	
WEPCO, Oak Creek	Oak Creek	5,472	
WEPCO, Point Beach	Two Rivers	3	
WEPCO, Port Washington	Port Washington	1,247	
WEPCO, Valley	Milwaukee	3,246	
WEPCO, Watertown	Watertown	67	
WPSC, Eagle River	Eagle River	2	
WPSC, Pulliam Plant	Green Bay	8,033	
WPSC, Weston 1&2	Weston	3,671	
	Subtotal	**44,714**	**29.9%**
NSPS			
Alliant (WP&L), Columbia 2	Pardeeville	7,301	
Alliant (WP&L), Edgewater 5	Sheboygan	2,852	
Dairyland Power, J.P. Madgett	Alma	3,750	
WEPCO, Paris	Paris	87	
WEPCO, Pleasant Prairie	Kenosha	12,161	
WPSC	Peshtigo	73	
WPSC, Weston 3	Weston	3,659	
	Subtotal	**29,884**	**20.0%**
	Total	**74,598**	**50.0%**
Total for All Stationary Sources		**149,307**	

Table 4B: Wisconsin 2004 Large Source Nitrogen Oxides Emissions Arranged by Facility

Facility Name	Location	NO_x Emissions (tons)	Percent of Total NO_x Emissions
Cardinal FG	Menomonie	1,455	
Cardinal FG	Portage	1,471	
Domtar A.W. Corporation-Nekoosa Mill [1]	Nekoosa	1,351	
Fort James Operating Co.	Green Bay	4,076	
Packaging Corporation of America [2]	Tomahawk	1,632	
Stora Enso North America-Biron Mill	Biron	2,265	
Stora Enso NA-WI Rapids Pulp Mill	Wisconsin Rapids	2,141	
Thilmany [4]	Kaukauna	2,165	
Wausau-Mosinee Paper Co.-Rhinelander	Rhinelander	1,631	
Xcel Energy Bay Front Generating Station [3]	Ashland	1,389	
	Total	**19,577**	**13.1%**
Total for All Stationary Sources		**149,307**	

1. Previously Nekoosa Papers, Inc.
2. Previously Tenneco Packaging, Inc.
3. Previously Northern States Power Co.
4. Previously International Paper

Table 5: 2004 Corporate Average Annual Sulfur Dioxide Emission Rates

Major Utilities	Average SO_2 Rates (LB/MMBTU)
Alliant Energy Co. (WP&L)	0.92
Dairyland Power Cooperative	0.89
Madison Gas & Electric	1.10
Wisconsin Electric Power Co.	0.65
Wisconsin Public Service Co.	0.58
Large Sources, State-Owned	
University of Wisconsin-Madison - Charter St.	0.76

Appendix A: Historical Listing of Sulfur Dioxide Emissions Arranged by Facility for 2000-2004

Facility Name	Location	SO_2 Emissions (tons) Year 2000	2001	2002	2003	2004	Five Year Average (2000-2004)
Pre-NSPS Major Utilities							
Alliant (WP&L), Blackhawk	Beloit	0	0	0	0	0	0
Alliant (WP&L), Columbia 1	Pardeeville	15,056	13,769	14,013	15,666	14,845	14,670
Alliant (WP&L), Edgewater 3&4	Sheboygan	8,962	8,656	7,790	8,511	7,721	8,328
Alliant (WP&L), Nelson Dewey	Cassville	14,275	11,323	15,709	14,554	17,194	14,611
Alliant (WP&L), Rock River	Beloit	24	12	9	11	8	13
Alliant (WP&L), Sheepskin	Edgerton	0	0	0	0	0	0
Dairyland Power Alma 1-5	Alma	3,445	4,350	7,284	9,386	7,675	6,428
Dairyland Power Genoa	Genoa	8,165	12,118	15,046	16,844	10,944	12,623
Madison Gas & Electric, Blount St.	Madison	6,923	6,795	7,181	6,494	7,945	7,068
MG&E, Fitchburg	Fitchburg	0	0	0	0	0	0
MG&E, Nine Springs	Madison	0	0	0	0	0	0
MG&E, Sycamore	Madison	0	0	0	0	0	0
WEPCO Germantown	Germantown	9	5	0	3	0	3
WEPCO Oak Creek	Oak Creek	22,832	17,882	10,569	13,294	13,570	15,629
WEPCO Point Beach	Two Rivers	0	0	0	0	0	0
WEPCO Port Washington	Port Wash.	15,573	12,778	9,820	9,062	7,059	10,858
WEPCO Valley	Milwaukee	15,835	15,060	16,218	11,537	6,542	13,038
WPSC Eagle River	Eagle River	0	0	0	1	0	0
WPSC Pulliam Plant	Green Bay	6,314	6,475	6,901	7,081	6,854	6,725
WPSC Weston 1&2	Weston	3,340	3,615	3,231	4,149	4,000	3,667
Subtotal - Pre-NSPS Major Utilities		**120,754**	**112,838**	**113,771**	**116,593**	**104,357**	**113,663**
NSPS Major Utilities							
Alliant (WP&L), Columbia 2	Pardeeville	13,270	14,535	13,489	14,554	14,606	14,091
Alliant (WP&L), Edgewater 5	Sheboygan	8,744	9,235	9,203	10,039	10,342	9,513
Dairyland Power J.P. Madgett	Alma	5,376	4,980	7,489	5,777	4,687	5,662
WEPCO Pleasant Prairie	Kenosha	28,725	28,411	27,972	30,334	30,979	29,284
WPSC	Peshtigo	0	2	1	1	0	1
WPSC Weston 3	Weston	8,358	8,806	8,562	8,948	8,908	8,716
Subtotal - NSPS Major Utilities		**64,473**	**65,969**	**66,715**	**69,653**	**69,522**	**67,267**
Total - Major Utilities		**185,227**	**178,807**	**180,486**	**186,246**	**173,879**	**180,929**

... (con'd) Appendix A : Historical Listing of Sulfur Dioxide Emissions Arranged by Facility for 2000-2004

Facility Name	Location	SO2 Emissions (tons) Year 2000	2001	2002	2003	2004	Five Year Average (2000-2004)
Minor Utilities							
Manitowoc Public Utilities	Manitowoc	3,282	3,052	3,750	3,304	3,142	2,017
Subtotal - Minor Utilities		**3,282**	**3,052**	**3,750**	**3,304**	**3,142**	**2,017**
Paper Mills							
Combined Locks Energy Center, LLC [1]	Combined Locks	1,079	1,081	825	1,130	1,195	1,062
Domtar A. W. Corporation-Nekoosa Mill [2]	Nekoosa	3,121	3,196	4,351	4,238	4,496	3,880
Domtar A. W. Corporation-Port Edwards Mill [3]	Port Edwards	3,931	4,008	2,816	2,392	2,385	3,106
Stora Enso N. America-Biron Mill	Biron	5,681	5,353	5,781	5,519	5,837	5,634
Stora Enso N. America-Kimberly Mill [4]	Kimberly	1,656	1,748	1,866	2,020	2,002	1,858
Stora Enso N. America-Niagara Mill	Niagara	2,081	1,822	2,040	1,964	1,509	1,883
Stora Enso N. Am.-WI Rapids Pulp Mill	Wisc. Rapids	1,259	1,245	1,248	1,520	1,342	1,323
Fort James Operating Company	Green Bay	16,782	12,380	13,470	14,124	12,725	13,896
International Paper	Kaukauna	8,237	8,266	8,253	8,740	9,182	8,536
Proctor & Gamble Paper Products Company	Green Bay	536	1,868	2,011	1,733	1,425	1,515
Packaging Corporation of America [5]	Tomahawk	6,250	6,922	7,381	6,596	6,976	6,825
Wausau-Mosinee Paper Corp.	Mosinee	1,268	1,198	1,422	1,567	1,290	1,349
Wausau-Mosinee Paper Co.-Rhinelander	Rhinelander	2,915	2,410	2,295	2,254	2,502	2,475
Subtotal - Paper Mills		**54,796**	**51,497**	**53,759**	**53,797**	**52,865**	**53,343**
Other Large Sources							
Murphy Oil USA, Inc.	Superior	1,809	2,140	1,659	1,021	890	1,504
University of Wisconsin - Charter	Madison	1,911	1,688	1,347	1,849	1,648	1,689
Subtotal - Other Large Source Facilities		**3,720**	**3,828**	**3,006**	**2,870**	**2,539**	**3,193**
Total - Large Sources		**61,798**	**58,377**	**60,515**	**59,971**	**58,546**	**59,841**

1. Previously Appleton Papers
2. Previously Nekoosa Papers, Inc.
3. Previously Nekoosa Papers, Inc.
4. Previously Inter Lake Papers
5. Previously Tenneco Packaging, Inc.

Appendix B: Historical Listing of Nitrogen Oxides Emissions Arranged by Facility for 2000-2004

Facility Name	Location	NO_x Emissions (tons) YEAR				
		2000	2001	2002	2003	2004
Pre-NSPS Major Utilities						
Alliant (WP&L), Blackhawk	Beloit	36	38	59	50	18
Alliant (WP&L), Columbia 1	Pardeeville	7,981	7,808	4,062	2,996	3,028
Alliant (WP&L), Edgewater 3&4	Sheboygan	12,817	9,994	5,727	5,421	5,321
Alliant (WP&L), Nelson Dewey	Cassville	5,413	4,787	5,167	4,281	4,583
Alliant (WP&L), Rock River	Beloit	419	415	560	741	462
Alliant (WP&L), Sheepskin	Edgerton	2	4	11	4	2
Dairyland Power, Alma	Alma	2,774	7,619	7,249	3,747	4,418
Dairyland Power, Genoa	Genoa	3,611	4,127	4,402	4,429	3,383
Madison Gas & Electric, Blount	Madison	1,480	1,379	1,401	1,460	1,636
Madison Gas & Electric, Fitchburg	Fitchburg	44	35	30	28	22
Madison Gas & Electric, Nine Springs	Madison	18	1	1	1	1
Madison Gas & Electric, Sycamore	Madison	1	13	15	17	13
WEPCO, Germantown	Germantown	264	174	133	108	85
WEPCO, Oak Creek	Oak Creek	19,786	17,967	16,583	5,016	5,472
WEPCO, Point Beach	Two Rivers	3	5	4	2	3
WEPCO, Port Washington	Port Washington	4,090	3,226	2,554	2,292	1,247
WEPCO, Valley	Milwaukee	7,259	7,410	7,668	3,093	3,246
WEPCO, Watertown	Watertown	359	141	128	93	67
WPSC, Eagle River	Eagle River	2	4	12	13	2
WPSC, Pulliam Plant	Green Bay	8,045	7,850	8,226	8,424	8,033
WPSC, Weston 1&2	Weston	3,262	3,412	6,444	3,746	3,671
Subtotal - Pre-NSPS Major Utilities		**77,666**	**76,409**	**70,436**	**45,962**	**44,714**
NSPS Major Utilities						
Alliant (WP&L), Columbia 2	Pardeeville	6,774	8,115	6,904	7,198	7,301
Alliant (WP&L), Edgewater 5	Sheboygan	8,743	3,097	3,122	3,145	2,852
Dairyland Power, J.P. Madgett	Alma	4,845	5,081	4,304	4,484	3,750
WEPCO, Paris	Union Grove	447	230	252	185	87
WEPCO, Pleasant Prairie	Pleasant Prairie	18,452	18,430	17,311	16,950	12,161
WPSC	Peshtigo	164	150	135	168	73
WPSC, Weston 3	Weston	3,228	3,045	3,116	3,411	3,659
Subtotal - NSPS Major Utilities		**42,652**	**38,148**	**35,144**	**35,541**	**29,884**
Total - Major Utilities		**120,319**	**114,557**	**105,580**	**81,503**	**74,598**
Large Sources						
Cardinal FG	Menomonie	1,485	1,546	1,577	1,284	1,455
Cardinal FG	Portage	1,290	1,457	1,420	1,421	1,471
Domtar A.W. Corporation-Nekoosa Mill [1]	Nekoosa	1,263	1,307	1,448	1,386	1,351
Fort James Operating Co.	Green Bay	4,738	4,187	4,400	4,012	4,076
Packaging Corporation of America [2]	Tomahawk	1,615	1,834	1,849	1,591	1,632
Stora Enso North America-Biron Mill	Biron	2,328	2,122	2,202	2,142	2,265
Stora Enso NA-WI Rapids Pulp Mill	Wisconsin Rapids	2,002	1,894	1,851	1,875	2,141
Thilmany [4]	Kaukauna	2,043	2,110	2,132	2,146	2,165
Wausau-Mosinee Paper Co.-Rhinelander	Rhinelander	1,497	1,518	1,519	1,586	1,631
Xcel Energy Bay Front Generating Station [3]	Ashland	1,288	1,392	1,038	1,346	1,389
Total - Large Sources		**19,548**	**19,367**	**19,436**	**18,789**	**19,577**

1. Previously Nekoosa Papers, Inc.
2. Previously Tenneco Packaging, Inc.
3. Previously Northern States Power Co.
4. Previously International Paper

Appendix C: 2004 Sulfur Dioxide Emissions Rates for Major Utilities and One Large, State-Owned Source

Dairyland Power Cooperative

Unit Name	Heat Input (MMBtu)	Tons of SO_2
Alma 1	1,262,411	901
Alma 2	1,205,413	860
Alma 3	1,333,910	952
Alma 4	2,806,368	2,000
Alma 5	4,156,252	2,962
J.P. Madgett	23,449,781	4,687
Genoa 3	18,293,128	10,944
Dairyland Totals	52,507,263	23,306
	lbs SO_2/MMBtu	**0.89**

Alliant Energy Company (WP&L)

Unit Name	Heat Input (MMBtu)	Tons of SO_2
Blackhawk 3	33,829	0
Blackhawk 4	95,620	0
Columbia 1	20,280,398	6,938
Columbia 2	18,856,404	6,668
Edgewater 3	5,132,990	1,606
Edgewater 4	13,211,204	4,028
Edgewater 5	21,638,895	8,471
Nelson Dewey 1	7,858,126	8,467
Nelson Dewey 2	8,035,036	8,727
Rock River 1	1,313,670	4
Rock River 2	1,205,297	4
WP & L Totals	97,661,469	44,913
	lbs SO_2/MMBtu	**0.92**

Wisconsin Public Service Corporation

Unit Name	Heat Input (MMBtu)	Tons of SO_2
Pulliam 8	11,131,346	2,385
Pulliam 7	6,988,116	1,526
Pulliam 5 & 6	8,811,267	1,952
Pulliam 3 & 4	4,300,101	991
Weston 3	29,461,706	8,908
Weston 2	8,502,327	2,489
Weston 1	5,266,178	1,511
Columbia 2	13,472,123	4,766
Columbia 1	13,469,519	4,607
Edgewater 4	6,813,690	2,087
WPSC Totals	108,216,373	31,222
	lbs SO_2/MMBtu	**0.58**

Madison Gas & Electric Company

Unit Name	Heat Input (MMBtu)	Tons of SO_2
Columbia 1	9,645,540	3,300
Columbia 2	8,969,438	3,172
Blount 1-6 and 11	328,738	0
Blount 7	1,515,628	1,809
Blount 8	2,212,477	2,281
Blount 9	3,526,768	3,855
MG & E Totals	26,198,589	14,417
	lbs SO_2/MMBtu	**1.10**

Wisconsin Electric Power Company

Unit Name	Heat Input (MMBtu)	Tons of SO_2	
Edgewater 5	5,775,444	1,871	
Milwaukee County	1,301,531	602	
Oak Creek 5	13,353,916	2,776	
Oak Creek 6	14,212,033	2,954	
Oak Creek 7	18,695,928	3,886	
Oak Creek 8	19,020,285	3,954	
Pleasant Prairie 1	44,943,510	15,710	
Pleasant Prairie 2	43,686,172	15,269	
Port Washington 1	2,607,833	2,144	*
Port Washington 2	2,029,465	2,140	
Port Washington 3	2,635,049	2,775	
Port Washington 4	0	0	**
Port Washington 5	0	0	
Valley 1	8,120,640	3,065	
Valley 2	9,245,361	3,477	
WEPCO Totals	185,627,168	60,622	
	lbs SO_2/MMBtu	**0.65**	

University of Wisconsin-Madison (Charter Street)

Unit Name***	Heat Input (MMBtu)	Tons of SO_2
B21	583,238	303
B22	562,151	287
B23	686,197	356
B24	1,349,969	701
B25	1,179,210	0
UW-Charter Street Totals	4,360,765	1,648
	lbs SO_2/MMBtu	**0.76**

Legend

* Includes an additional 22% SO2 removal per Permit 90-POY-037
** Includes an additional 13% SO2 removal per Permit 90-POY-037
*** These unit names are specified in the Air Emissions Inventory File

NOTE: This appendix does not include emissions from WEPCO Germantown & Point Beach, and WPSC Eagle River & Peshtigo.