

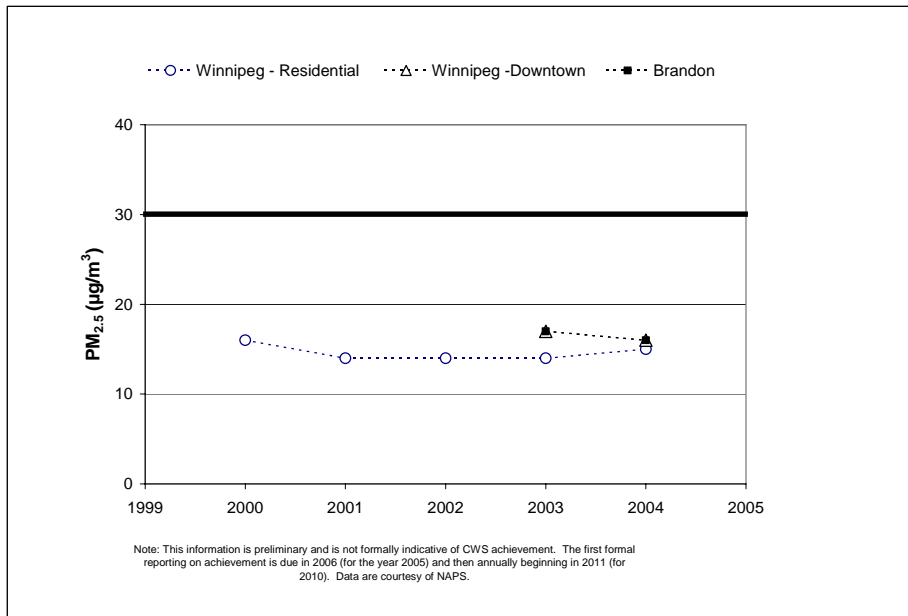
**CANADA-WIDE STANDARDS FOR PM & OZONE**  
**STATUS OF JURISDICTIONAL IMPLEMENTATION ACTIVITIES**  
**“MANITOBA”**  
**UPDATE FOR 2004**

**I. INTRODUCTION**

- Manitoba has only one Census Metropolitan Area (CMA) (*i.e.*, Winnipeg with a population of 671,000 or about 60% of Manitoba’s population). The next largest community is Brandon with a CMA population of about 41,000 (3.6% of the total population). (Data for Brandon in this report are included for information only.)
- The provincial monitoring network has been expanded in recent years, but the available ambient data for PM<sub>2.5</sub> are still limited to a few locations and a relatively limited time period; for ozone, data are available for Winnipeg since 1976.
- PM<sub>2.5</sub>: Limited continuous monitoring data in Winnipeg at two sites (located in a downtown area since November 2000 and in a residential area since September 1997) and long-term non-continuous sampling at the downtown site indicate that Winnipeg is currently in compliance with the future CWS. Monitoring has been undertaken in an industrial area of Brandon since 2001. PM<sub>2.5</sub> monitoring began in April 2002 in the Flin Flon area and in September 2004 in Thompson. Information from these sites will be provided in future reports once sufficient data are available.

<b>Value of the PM<sub>2.5</sub> CWS metric (<math>\mu\text{g}/\text{m}^3</math>) in Manitoba from 2000 to 2004.</b>					
<i>Indicated values are the required 3-year averages.</i>					
<b>Year</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
<b>Winnipeg - Residential</b>	16	14	14	14	15
<b>Winnipeg -Downtown</b>				17	16
<b>Brandon</b>				17	16

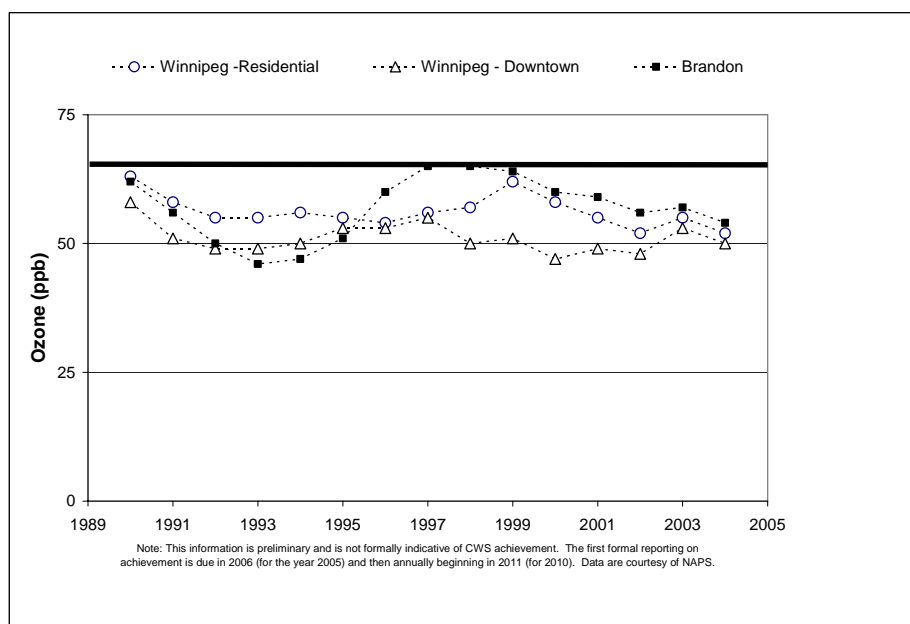
PM<sub>2.5</sub> CWS: 30  $\mu\text{g}/\text{m}^3$  as 24-hour average; 98<sup>th</sup> percentile ambient measurement annually, averaged over three consecutive years



- **Ozone:** Based on long-term continuous monitoring at two urban sites in Winnipeg, the future CWS is currently being achieved. The CWS is also being achieved at the monitoring location in a smaller community (*i.e.*, Brandon).

Value of the ozone CWS metric (ppb) in Manitoba.															
<i>Indicated values are the required 3-year averages.</i>															
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
<b>Winnipeg - Residential</b>	63	58	55	55	56	55	54	56	57	62	58	55	52	55	52
<b>Winnipeg - Downtown</b>	58	51	49	49	50	53	53	55	50	51	47	49	48	53	50
<b>Brandon</b>	62	56	50	46	47	51	60	65	65	64	60	59	56	57	54

Ozone CWS: 65 ppb as 8-hour average; 4<sup>th</sup> highest measurement annually, averaged over three consecutive years



- Transboundary pollution and urban smog issues have historically not been of concern in Manitoba.
- Using the Guidance Document on Achievement Determination, jurisdictions are in the process of implementing and designating their monitoring stations and reporting areas for CWS achievement determination. The information presented above is strictly preliminary and should not be construed as achievement of the CWS. The CWS for particulate matter and ozone is to be achieved by 2010. A comprehensive report will be completed for the year 2005 and for every fifth year thereafter assessing progress on all provisions of the CWSs including assessment of ambient levels and trends and identification of communities where ambient levels are exceeding or approaching the CWS levels. Annual reporting on achievement of the CWSs begins in 2011.

## II. AIR QUALITY OVERVIEW

- The most recent information on the jurisdictional emissions of PM<sub>2.5</sub>, SO<sub>x</sub>, NO<sub>x</sub> and VOC's is part of the preliminary 2002 national criteria air contaminant (CAC) inventory which is expected to be published in early 2006. The most recent published inventory is for the year 2000. These inventories, however, only provide information on the total provincial emissions rather than on emissions specifically within or in the vicinity of the Winnipeg CMA.
- The complete 2000 and 2002 criteria air contaminant inventories for Manitoba are included in Appendix B.
- At this time, it is not possible to compare the 2000 and 2002 CAC inventories for Manitoba because the methodology for estimating emissions were different for the two years for some of the sectors (*e.g.*, transportation).
- In the "Open Source" category, forest fires can be a significant contributor to PM<sub>2.5</sub>, NO<sub>x</sub>, and VOC emissions. This sector, however, is highly variable from year to year. In the 20-year period from 1985 to 2004, the area of forest burned in Manitoba has varied from a low of 10,342 hectares in 1986 to a high of 3,567,947 hectares in 1989. Over this time period, the average annual forest fire area was 457,515 ha. However, forest fire smoke only infrequently affects air quality in the Winnipeg CMA.

### Manitoba Emissions of PM<sub>2.5</sub> and Precursors of PM<sub>2.5</sub> and Ozone

Pollutant	Sectoral Contribution to Total Provincial Emissions (tonnes)	Year 2000	Year 2002 (Preliminary)
PM <sub>2.5</sub>	Pulp and Paper Industry	1,868	455
	Other Industries	2,388	2,856
	Residential Fuelwood Combustion	2,461	2,265
	Transportation	4,788	4,222
	Other	1,441	1,439
	Open Sources	42,148	44,680
	<b>Total (without Open Sources)</b>	<b>12,916</b>	<b>11,237</b>
	<b>Total (with Open Sources)</b>	<b>55,064</b>	<b>55,917</b>
SO <sub>x</sub>	Non-ferrous Mining and Smelting	353,000	374,306
	Transportation	2,305	2,056
	Other Industries	3,653	3,568
	Electricity	2,563	1,102
	Other	414	72
	Open Sources	10	14
	<b>Total (without Open Sources)</b>	<b>391,936</b>	<b>381,104</b>
	<b>Total (with Open Sources)</b>	<b>361,945</b>	<b>381,118</b>
NO <sub>x</sub>	Transportation	82,191	70,754
	Upstream Oil and Gas	8,329	1,735
	Commercial and Residential Fuel Combustion	2,868	2,425
	Electric Power Generation (Utilities)	2,136	1,287
	Other Industries	3,432	4,527
	Other	1	1
	Open Sources	4,305	3,195
	<b>Total (without Open Sources)</b>	<b>98,956</b>	<b>80,729</b>
	<b>Total (with Open Sources)</b>	<b>103,262</b>	<b>83,924</b>
VOCs	General Solvent Use	11,540	7,282

Pollutant	Sectoral Contribution to Total Provincial Emissions (tonnes)	Year 2000	Year 2002 (Preliminary)
	Residential Fuelwood Combustion	3,580	3,295
	Transportation	43,947	38,500
	Other Industries	501	8,097
	Other	4,851	4,407
	Upstream Oil and Gas	7,367	4,644
	Fuel Marketing	3,663	3,654
	Open Sources	38,827	39,746
	<b>Total (without Open Sources)</b>	<b>75,449</b>	<b>69,879</b>
	<b>Total (with Open Sources)</b>	<b>114,276</b>	<b>109,625</b>

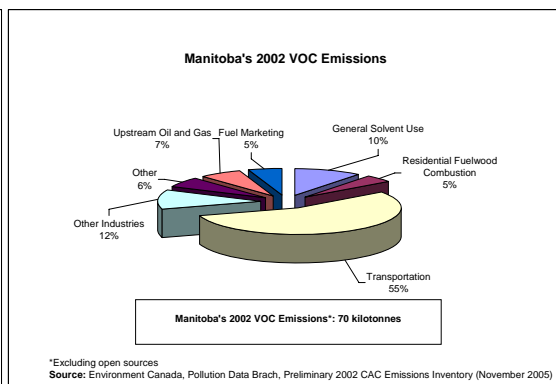
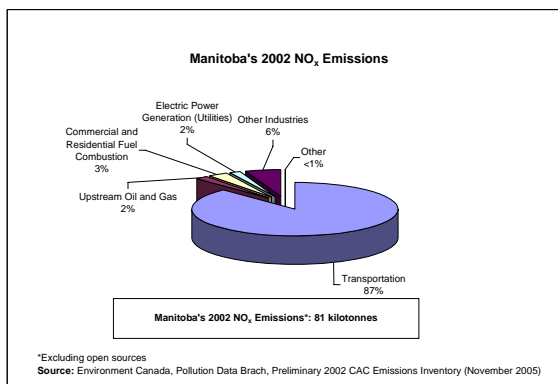
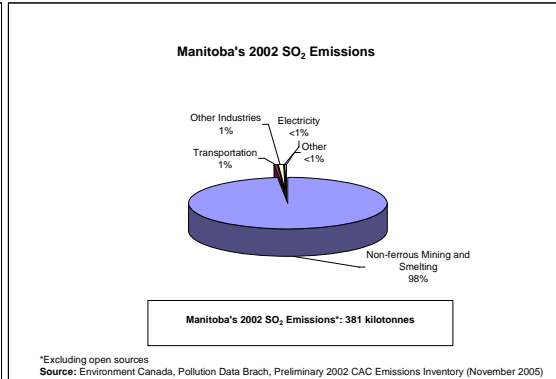
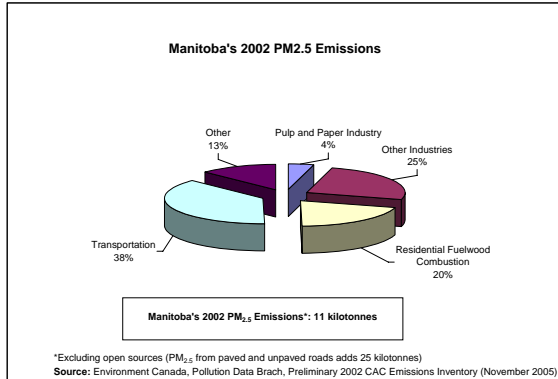
Open Sources: sources which emit air contaminants over large geographical areas, primarily in a stationary non-point source manner, and are diffuse in nature (e.g., forest fires, road dust, etc.).

PM<sub>2.5</sub>: particulate matter less than 2.5 µm in diameter

SO<sub>x</sub>: sulphur oxides

NO<sub>x</sub>: nitrogen oxides

VOC: volatile organic compounds



### **III. STATUS OF ACTIVITIES RELATED TO PM & OZONE IMPLEMENTATION**

- Given the continuing compliance with both the PM<sub>2.5</sub> and ozone CWS, the focus of Manitoba's implementation plan remains on "Keeping Clean Areas Clean".
- Since the last update in September 2004, examples of actions taken by Manitoba Conservation which are likely to expand our knowledge or reduce ambient PM<sub>2.5</sub> and ozone concentrations include:
  - ◆ continuing to undertake shorter-term, special air quality monitoring projects in select urban areas in Winnipeg to better define the spatial and temporal distribution of ambient PM<sub>2.5</sub> levels;
  - ◆ working towards reducing in emissions of particulate matter at Northern Manitoba smelters; and
  - ◆ as part of the environmental licensing process, working with and encouraging provincial sources to reduce emissions of all pollutants.
- Manitoba is implementing a mandate requiring that 85% of the gasoline sold in Manitoba is blended with 10% ethanol. This mandate will have the effect of reducing particulate emissions from individual vehicles by between 25% and 32%, depending on the vehicle. Manitoba has also announced an action plan to promote the development of biodiesel. Compared with petroleum diesel, emissions of hydrocarbons and particulate matter are reduced when using biodiesel.
- Many of the current and proposed programs in Manitoba's Climate Change Action Plan<sup>1</sup> have the potential to reduce particulate matter and VOC emissions from various sectors, in most cases by reducing the need for the combustion of fossil fuel. Examples of just a few of the programs include: the Wuskwatim Hydro Generation Project in Northern Manitoba; and Manitoba Hydro's Power Smart energy conservation programs.

### **IV. NEXT STEPS (Path Forward)**

Manitoba is currently in compliance with the future CWS for both PM<sub>2.5</sub> and ozone. Consequently, Manitoba Conservation is focussing on "Keeping Clean Areas Clean" through:

- continuation of the initiatives and activities noted in Section III of this current update and all previous updates; and
- continued cooperation with other provincial and federal Departments in addressing PM<sub>2.5</sub> and ozone issues.

**Manitoba Conservation**  
**January 16, 2006**

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<sup>1</sup> Province of Manitoba, "Kyoto and Beyond: A plan of action to meet and exceed Manitoba's Kyoto targets", October 2002.

## Appendix A - The Canada-wide Standards Numeric Targets and Statistical Forms

The Canada-wide Standards (CWS) provisions include numeric targets for PM<sub>2.5</sub> and ozone, and their associated statistical forms. The numeric targets are:

**PM<sub>2.5</sub>:** 30 µg/m<sup>3</sup>, 24-hour (midnight to midnight) averaging time

**Ozone:** 65 ppb, 8-hour averaging time

The statistical forms of the numeric targets are:

**PM<sub>2.5</sub>:** 98th percentile ambient measurement annually,  
averaged over three consecutive years

**Ozone:** 4th highest measurement annually,  
averaged over 3 consecutive years

To facilitate the communication and data presentation in relation to the statistical forms, the above statistical forms are referred to as the *PM<sub>2.5</sub> CWS metric* and the *ozone CWS metric* respectively. Table A-1 below provides an outline of the computation procedure of the CWS metrics for a single site.

Jurisdictions are in the process of implementing and designating their monitoring stations for CWS achievement determination using the Guidance Document on Achievement Determination. As such, it should be noted that the ambient data presented in this Update is strictly preliminary and should not be construed as achievement of the CWS numeric level. Achievement reporting will require three years of data and is not required until 2010.

**Table A-1:** Sample calculations for the CWS metric.

Annual 98 <sup>th</sup> percentile of the daily PM <sub>2.5</sub> levels (µg/m <sup>3</sup> )			Value of the PM <sub>2.5</sub> CWS metric for the year 2000 (µg/m <sup>3</sup> )
1998	1999	2000	
35	25	40	33

Annual 4 <sup>th</sup> highest of the daily maximum 8-hour ozone levels (ppb)			Value of the ozone CWS metric for the year 2000 (ppb)
1998	1999	2000	
65	70	50	62

## Appendix B – Criteria Air Contaminant Inventories for Manitoba

**Table B.1 2000 Criteria Air Contaminant Emissions Inventory (tonnes)**

SECTOR	PM2.5	SO <sub>x</sub>	NO <sub>x</sub>	VOC
<b>INDUSTRIAL SOURCES</b>	<b>4,256</b>	<b>356,654</b>	<b>11,761</b>	<b>7,868</b>
Abrasives Manufacture	0	0	0	0
Aluminum Industry	0	0	0	0
Asbestos Industry	0	0	0	0
Asphalt Paving Industry	183	10	24	14
Bakeries	0	0	0	172
Cement and Concrete Industry	43	2	2	0
Chemicals Industry	28	223	454	8
Clay Products Industry	0	0	0	0
Coal Mining Industry	13	0	0	0
Ferrous Foundries	214	7	16	8
Grain Industries	174	0	0	0
Iron and Steel Industries	18	51	126	78
Iron Ore Mining Industry	0	0	0	0
Mining and Rock Quarrying	49	7	374	1
Non-Ferrous Mining and Smelting Industry	798	353,000	1	0
Oil Sands	0	0	0	0
Other Petroleum and Coal Products Industry	0	0	0	0
Paint & Varnish Manufacturing	0	0	0	0
Petrochemical Industry	0	0	0	0
Petroleum Refining	0	0	0	0
Plastics & Synthetic Resins Fabrication	0	0	0	0
Pulp and Paper Industry	1,868	3,141	793	8
Upstream Oil and Gas Industry	0	0	8,329	7,367
Wood Industry	336	106	43	181
Other Industries	532	106	1,599	30
<b>NON INDUSTRIAL FUEL COMBUSTION</b>	<b>3,054</b>	<b>2,977</b>	<b>5,003</b>	<b>3,794</b>
Commercial Fuel Combustion	157	358	1,525	73
Electric Power Generation (Utilities)	309	2,563	2,136	58
Residential Fuel Combustion	127	23	1,115	83
Residential Fuel Wood Combustion	2,461	33	228	3,580
<b>TRANSPORTATION</b>	<b>4,788</b>	<b>2,305</b>	<b>82,191</b>	<b>43,947</b>
Air Transportation	23	103	1,641	560
Heavy-duty diesel vehicles	807	334	24,784	1,406
Heavy-duty gasoline trucks	14	23	1,177	858
Light-duty diesel trucks	41	21	356	182
Light-duty diesel vehicles	10	2	65	30
Light-duty gasoline trucks	50	207	6,720	10,330
Light-duty gasoline vehicles	32	214	9,118	12,887

SECTOR	PM <sub>2.5</sub>	SO <sub>x</sub>	NO <sub>x</sub>	VOC
Marine Transportation	2	13	45	6
Motor cycles	0	0	16	22
Off-road use of diesel	3,248	982	28,456	3,786
Off-road use of gasoline	317	40	1,926	13,481
Rail Transportation	173	364	7,885	397
Tire wear & Brake lining	72	0	0	0
<b>INCINERATION</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>
Crematorium	0	0	1	0
Industrial & Commercial Incineration	0	0	0	0
Municipal Incineration	0	0	0	0
Other Incineration & Utilities	0	0	0	0
<b>MISCELLANEOUS</b>	<b>818</b>	<b>0</b>	<b>0</b>	<b>19,840</b>
Cigarette Smoking	26	0	0	0
Dry Cleaning	0	0	0	30
Fuel Marketing	0	0	0	3,663
General Solvent Use	0	0	0	11,540
Marine Cargo Handling Industry	0	0	0	0
Meat Cooking	46	0	0	0
Pesticides and Fertilizer Application	286	0	0	0
Printing	0	0	0	1,190
Structural Fires	460	0	0	496
Surface Coatings	0	0	0	2,920
<b>OPEN SOURCES</b>	<b>42,148</b>	<b>10</b>	<b>4,305</b>	<b>38,827</b>
Agriculture (Animals)	2,294	0	0	20,103
Agriculture Tilling and Wind Erosion	3,235	0	0	0
Construction Operations	419	0	0	0
Dust from Paved Roads	7,943	0	0	0
Dust from Unpaved Roads	16,664	0	0	0
Forest Fires	11,488	10	4,305	18,535
Landfills Sites	4	0	0	190
Mine Tailings	101	0	0	0
Prescribed Burning	0	0	0	0
<b>TOTAL WITH OPEN SOURCES</b>	<b>55,064</b>	<b>361,945</b>	<b>103,262</b>	<b>114,276</b>
<b>TOTAL WITHOUT OPEN SOURCES</b>	<b>12,916</b>	<b>361,936</b>	<b>98,956</b>	<b>75,449</b>

PM<sub>2.5</sub>: particulate matter less than 2.5 µm in diameter

SO<sub>x</sub>: sulphur oxides

NO<sub>x</sub>: nitrogen oxides

VOC: volatile organic compounds

Open Sources: sources which emit air contaminants over large geographical areas, primarily in a stationary non-point source manner, and are diffuse in nature (*e.g.*, forest fires, road dust, *etc.*).

Source: Environment Canada, Pollution Data Branch, 2000 CAC Emissions Inventory (December 2004)

([http://www.ec.gc.ca/pdb/cac/cac\\_ESummaries\\_e.cfm](http://www.ec.gc.ca/pdb/cac/cac_ESummaries_e.cfm))

**Table B.2 Preliminary 2002 Criteria Air Contaminant Emissions Inventory (tonnes)**

<b>SECTOR</b>	<b>PM<sub>2.5</sub></b>	<b>SO<sub>x</sub></b>	<b>NO<sub>x</sub></b>	<b>VOC</b>
<b>INDUSTRIAL SOURCES</b>	<b>3,311</b>	<b>377,874</b>	<b>6,262</b>	<b>12,741</b>
Abrasive Industry	0	0	0	0
Aluminum Industry	0	0	0	0
Asbestos Industry	0	0	0	0
Asphalt Paving Industry	134	0	0	0
Bakeries	0	0	0	226
Cement and Concrete Industry	93	0	0	0
Chemical Industry	13	967	1,123	18
Clay Products Industry	0	0	0	0
Coal Industry	9	0	0	0
Ferrous Foundries	272	7	17	23
Grain Industries	225	0	0	0
Iron and Steel Production	34	54	252	51
Iron Ore Mining and Beneficiation	0	0	0	0
Mining and Rock Quarrying	22	0	0	1
Non-Ferrous Mining and Smelting	1,320	374,306	0	0
Oil Sands	0	0	0	0
Other Petroleum and Coal Products	0	0	0	0
Paint & Varnish Manufacturing	0	0	0	39
Petrochemical Industry	0	0	0	0
Petroleum Refining	0	0	0	0
Plastics & Synthetic Resins Industry	0	0	0	0
Pulp and Paper Industry	455	709	643	514
Upstream Oil and Gas Industry	54	306	1,735	4,644
Wood Industry	284	420	270	1,367
Other Industries	394	1,105	2,222	5,858
<b>NON INDUSTRIAL FUEL COMBUSTION</b>	<b>2,701</b>	<b>1,173</b>	<b>3,712</b>	<b>3,452</b>
Commercial Fuel Combustion	124	15	1,100	56
Electric Power Generation	186	1,102	1,287	18
Residential Fuel Combustion	127	26	1,115	83
Residential Fuelwood Combustion	2,265	30	210	3,295
<b>TRANSPORTATION</b>	<b>4,222</b>	<b>2,056</b>	<b>70,754</b>	<b>38,500</b>
Air Transportation	18	83	1,311	501
Heavy-duty diesel vehicles	441	200	16,398	635
Heavy-duty gasoline trucks	14	26	1,368	621
Light-duty diesel trucks	32	15	298	127
Light-duty diesel vehicles	4	1	41	13
Light-duty gasoline trucks	51	192	6,844	9,784
Light-duty gasoline vehicles	24	160	6,935	9,059
Marine Transportation	1	6	20	3
Motorcycles	1	1	46	90
Off-road use of diesel	3,021	939	26,308	3,167
Off-road use of gasoline	381	36	1,976	14,068
Rail Transportation	174	397	9,208	433

SECTOR	PM <sub>2.5</sub>	SO <sub>x</sub>	NO <sub>x</sub>	VOC
Tire wear	60	0	0	0
<b>INCINERATION</b>	<b>11</b>	<b>0</b>	<b>1</b>	<b>1</b>
Cremation	0	0	1	0
Industrial & Commercial Incineration	0	0	0	0
Municipal Incineration	0	0	0	0
Other Utilities	11	0	0	1
<b>MISCELLANEOUS</b>	<b>992</b>	<b>0</b>	<b>0</b>	<b>15,184</b>
Cigarette Smoking	20	0	0	0
Dry Cleaning	0	0	0	10
Fuel Marketing	0	0	0	3,654
General Solvent Use	0	0	0	7,282
Marine Cargo Handling Industry	0	0	0	0
Meat Cooking	320	0	0	0
Pesticides and Fertilizer Application	268	0	0	0
Printing	0	0	0	2,028
Structural Fires	383	0	0	413
Surface Coatings	0	0	0	1,796
Human	0	0	0	0
<b>OPEN SOURCES</b>	<b>44,680</b>	<b>14</b>	<b>3,195</b>	<b>39,746</b>
Agriculture	3,172	0	0	25,771
Agricultural Operations	3,322	0	0	0
Construction	4,212	0	0	0
Dust from Paved Roads	8,198	0	0	0
Dust from Unpaved Roads	17,198	0	0	0
Forest Fires	8,407	7	3,151	13,564
Landfills Sites	4	0	0	190
Mine Tailings	50	0	0	0
Prescribed Burning	118	7	44	222
<b>TOTAL WITH OPEN SOURCES</b>	<b>55,917</b>	<b>381,118</b>	<b>83,924</b>	<b>109,625</b>
<b>TOTAL WITHOUT OPEN SOURCES</b>	<b>11,237</b>	<b>381,104</b>	<b>80,729</b>	<b>69,879</b>

PM<sub>2.5</sub>: particulate matter less than 2.5 µm in diameter

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Open Sources: sources which emit air contaminants over large geographical areas, primarily in a stationary non-point source manner, and are diffuse in nature (e.g., forest fires, road dust, etc.).

Source: Environment Canada, Pollution Data Branch, 2002 CAC Emissions Inventory (November 2005, Draft)