

**2000 British Columbia Emissions Inventory of  
Criteria Air Contaminants:  
Result Highlights**

British Columbia Ministry of Water, Land and Air Protection  
Water, Air and Climate Change Branch  
Victoria, B.C.

February 2005  
Revised June 2005

**Library and Archives Canada Cataloguing in Publication Data**

Wakelin, Tony.

2000 British Columbia emissions inventory of criteria air  
contaminants [electronic resource] : result highlights

Available on the Internet.

"February 2005"

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ISBN 0-7726-5285-6

1. Air - Pollution - British Columbia - Measurement.
  2. Pollutants - Reporting - British Columbia.
  3. Environmental monitoring - British Columbia.
- I. Goddard, Kathy. II. British Columbia. Water, Air and Climate  
Change Branch. III. British Columbia. Ministry of Water, Land  
and Air Protection. II. Title.

TD883.148.C3W34 2005 363.739'263'09711 C2005-960028-4

## **INTRODUCTION**

Air emission inventories are an accounting of air contaminants released to the environment, their sources and locations. They are an important tool used to plan air protection programs and policies at the provincial level, and at the local level for the development and implementation of local airshed management plans.

In October, 2004, the provincial Ministry of Water, Land and Air Protection (the ministry) released the technical report titled “2000 British Columbia Emissions Inventory of Criteria Air Contaminants: Methods and Calculations.” The report is a technical document which focuses on the methodologies used to prepare the year 2000 emission inventory estimates.<sup>1</sup> The Greater Vancouver Regional District (GVRD) similarly prepares a report for emissions in the Canadian Portion of the Lower Fraser Valley.<sup>2</sup>

This report provides an overview of the methods used in preparing the 2000 provincial air emission inventory, and presents highlights of the results.

## **HOW THE YEAR 2000 INVENTORY WAS PREPARED**

The year 2000 emission inventory was compiled as a collaborative effort involving the ministry the Greater Vancouver Regional District (GVRD), and Environment Canada. The GVRD inventoried all sources within the Canadian Portion of the Lower Fraser Valley (CLFV), which includes the GVRD and the Fraser Valley Regional District (FVRD). For the province outside the CLFV, the ministry produced emission estimates for sources that operate under ministry authorization, as well as sources that are large contributors or are best understood at a provincial level. The remaining estimates were prepared by Environment Canada. Data from the GVRD and Environment Canada were merged with ministry estimates to present a complete picture of provincial emission estimates.

Results of the emission inventory are presented in three different geographical breakdowns as clarified in Figure 1:

- 1) Within the Canadian Portion of the Lower Fraser Valley (CLFV);
- 2) Outside the CLFV; and
- 3) The province as a whole.

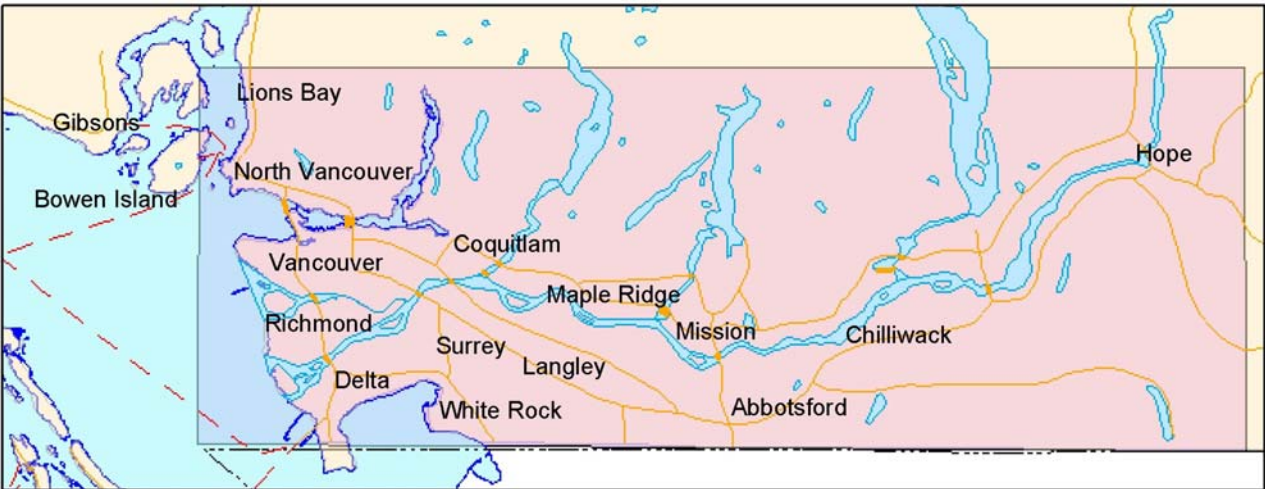


Figure 1 The Canadian Portion of the Lower Fraser Valley: For the purposes of the year 2000 emissions inventory, the CLFV is defined as bounded on the north by latitude 49° 30', on the east by longitude 121° 15', on the west by longitude 123° 20', and on the south by the Canada/U.S. border.<sup>3</sup>

## **CONTAMINANTS INCLUDED IN THE INVENTORY**

The following criteria air contaminants (CAC's) were included in the emission inventory:

- **particulate<sup>4</sup>** - airborne liquid and solid particles, and subsets:
  - **PM<sub>10</sub>** (particles < 10 µm in diameter, also called inhalable particulate), and
  - **PM<sub>2.5</sub>** (particles < 2.5 µm in diameter, also referred to as the fine fraction of **PM<sub>10</sub>**, or respirable particulate matter)
- sulphur oxides (**SO<sub>x</sub>**)
- nitrogen oxides (**NO<sub>x</sub>**)
- volatile organic compounds (**VOC**), and
- carbon monoxide (**CO**)

When compiling the inventory emphasis was placed on estimating **particulate** matter emissions, with greater focus placed on the fine fraction (**PM<sub>2.5</sub>**). Fine particles penetrate deeply into the lungs, where they can contribute to a range of cardiorespiratory illnesses, cancer and even premature death. A number of source types have been linked to health effects, but those of greatest concern involve fossil fuel and biomass combustion.

Data on greenhouse gas emissions (GHG) are not presented in this report due to the difficulty in obtaining this data from large industrial sources. Data on GHG releases within BC can be obtained from other sources.<sup>5</sup>

## **CATEGORIES OF EMISSION SOURCES**

The year 2000 inventory is divided into four emission source categories:

1. Point sources;
2. Area sources;
3. Mobile sources; and
4. Natural sources.

Only primary emissions of  $PM_{10}$  and  $PM_{2.5}$  are quantified in the year 2000 inventory. Primary emissions are those that are emitted directly into the atmosphere from a source. Secondary fine particulates are not included. Secondary fine particulate matter forms in the atmosphere from a complex series of interactions involving primary emissions of particles and gases.

### **1. Point sources**

Point sources are industrial facilities that operate under ministry authorization (i.e. under a permit, approval or regulation), or under an air discharge permit issued by the GVRD.

Estimation of emissions from point sources in the CLFV were determined by the GVRD. Emissions from point sources outside the CLFV were made based on either source specific data supplied by industry, or ministry Permit Fee Database (WASTE) data adjusted using published industry production quantities.

### **2. Area sources**

Area sources are stationary sources which are not normally required to obtain an air discharge permit from the ministry, and include prescribed burning<sup>6</sup>, residential fuel wood use, light industrial, and other residential, commercial and institutional sources. Emissions from most of these area sources individually are small compared to the point sources but can be significant when considered collectively.

### **3. Mobile sources**

Mobile sources include on-road motor vehicles primarily involved in the transportation of people and goods, including passenger cars, trucks and motorcycles, and off-road sources including aircraft, marine vessels and railways, off-road vehicles and small off-road engines such as agricultural, lawn and garden, construction, or recreational equipment.

### **4. Natural sources**

Natural sources of emissions occur in nature without the influence of human beings and include categories such as wildfires, biogenics (plants), wildlife and marine aerosol. Half of wildfires are caused by lightning and half are caused by humans.<sup>7</sup> These human-caused fires are treated as natural sources for analysis of inventory results.

## **HIGHLIGHTS OF RESULTS**

Year 2000 emission estimates are presented in Tables 1 to 3 and illustrated in the accompanying pie charts.<sup>8</sup>

### **Items of Note**

- Particulate emissions are presented as **particulate** and as the separate fractions **PM<sub>10</sub>** and **PM<sub>2.5</sub>**.
- The pie charts illustrate that combustion sources such as fossil fuel use and wood burning dominate **PM<sub>2.5</sub>**. Conversely, marine cargo handling and agriculture sources have relatively high coarse fraction **particulate** (in the **particulate** to **PM<sub>10</sub>** size range).
- Emissions from “Natural Sources” are not included in the pie chart representations because they are not man made and can therefore not be managed as part of local airshed planning.<sup>9</sup>
- “Road Dust” is also not included in the pie charts due to uncertainties in developing the estimates. However, it should be noted that this is a significant contributor to **particulate**, **PM<sub>10</sub>** and **PM<sub>2.5</sub>** emissions.

### **Key Findings**

#### ***A. Within the Canadian Portion of the Lower Fraser Valley (CLFV):***

##### **Particulates**

- Point sources collectively account for over half (51%) of the **particulate** emissions with significant amounts from the wood industry (13%) and marine cargo handling sector (17%).
- Area sources contribute 29% with agriculture being the most dominant amount (16%).
- Mobile sources account for the remaining 20%, of this, off-road use of diesel is most dominant (7%).

##### **PM<sub>10</sub>**

- **PM<sub>10</sub>** from point sources is about 40% of the total, with marine cargo sources being the most dominant (14%).
- Area sources contribute 30% with significant amounts from agriculture (10%) and residential fuel wood combustion (5%).
- Mobile sources account for approximately one third with contributions from off road use of diesel (11%), and marine transportation (9%).

##### **PM<sub>2.5</sub>**

- Point sources account for 24% of the **PM<sub>2.5</sub>** with no one industry sector dominating.

- Area sources account for 32% of the **PM<sub>2.5</sub>** with contributions from prescribed burning (8%), and residential fuel wood combustion (7%).
- Mobile sources contribute approximately 44% of **PM<sub>2.5</sub>** with significant contributions from off-road use of diesel (16%), and marine transportation (14%).

### SO<sub>x</sub>

- Mobile sources are responsible for the vast majority (79%) of **SO<sub>x</sub>** emissions, with marine transportation accounting for 59% of total **SO<sub>x</sub>**.
- Petroleum refining contributes 14% of **SO<sub>x</sub>**

### NO<sub>x</sub>

- Mobile sources account for a significant portion (88%) of **NO<sub>x</sub>** emissions. Marine transportation represents 23%.
- Off-road use of diesel accounts for 16%, heavy-duty diesel vehicles account for 15% and light-duty gasoline vehicles and trucks together account for 24% of total **NO<sub>x</sub>**.

### VOC

- Mobile sources are responsible for 56% of **VOC's**, with light-duty gasoline vehicles and trucks together contributing 38% of total **VOC's**.
- Area sources account for 36% of **VOC's**, with 12% resulting from general solvent use.

### CO

- Mobile sources contribute virtually all (96%) **CO** in the CLFV; 68% from light-duty gasoline vehicles and trucks, and 21% from off-road use of gasoline.

## *B. Province Outside the CLFV:*

### Particulates

- Point sources contribute more than half (51%) of **particulate** emissions in BC outside the CLFV; the wood industry is responsible for 27% and the pulp and paper industry for 12%.
- Area sources are collectively responsible for 44% of **particulate** emissions outside the CLFV; 21% from prescribed burning and 14% from agricultural practices.

### PM<sub>10</sub>

- Point sources contribute 44% of **PM<sub>10</sub>** emissions outside the CLFV, with 22% from the wood industry.
- Area sources are collectively responsible for 48% of **PM<sub>10</sub>** emissions outside the CLFV; 25% from prescribed burning, 10% from agricultural practices and 12% from residential fuel wood combustion.

### PM<sub>2.5</sub>

- Area sources account for just over half (51%) of **PM<sub>2.5</sub>** emissions outside the CLFV, with significant contributions from prescribed burning (32%) and residential fuel wood combustion (16%).
- Point sources contribute 38% of **PM<sub>2.5</sub>** emissions with 20% from wood industry, and 11% from pulp and paper.

### SO<sub>x</sub>

- The majority of **SO<sub>x</sub>** emissions (90%) are from point sources, with upstream oil and gas accounting for 66%, and pulp and paper 13%.

### NO<sub>x</sub>

- Mobile sources collectively account for 63% of **NO<sub>x</sub>** emissions outside the CLFV. Marine transportation is responsible for 18% and heavy-duty diesel vehicles 13%.
- Point sources contribute 34% of **NO<sub>x</sub>** with 19% from oil and gas.

### VOC

- Point sources account for 42 % of **VOC's** outside the CLFV, mainly made up of emissions from upstream oil and gas (24%) and the wood industry (13%).
- Mobile sources are collectively responsible for 31% of **VOC's** with 14% from off-road use of gasoline.
- Area sources are responsible for 27% of **VOC's** with no one source type dominating.

### CO

- Almost half (48%) of **CO** emissions outside the CLFV can be attributed to mobile sources; 25% from light-duty gasoline trucks and vehicles combined, and 20% from off-road use of gasoline.
- Point sources are responsible for 30% of **CO** with the wood industry contributing 23%.

## *C. Provincial Total*

### Particulates

- Point sources contribute more than half (51%) of **particulate** emissions in BC; the wood industry is responsible for 25% and the pulp and paper industry for 11%. Other point sources collectively contribute 14%.
- Area sources are collectively responsible for 43% of **particulate** emissions in the province; prescribed burning accounts for 19%, while 15% is from agriculture.

### PM<sub>10</sub>

- Point sources account for 43% of **PM<sub>10</sub>** emissions, including 21% from the wood industry and 10% from the pulp and paper industry.
- Area sources are collectively responsible for 46% of **PM<sub>10</sub>** emissions in the province; 23% from prescribed burning, 10% from agricultural practices, and 11% from residential fuel wood combustion.

### PM<sub>2.5</sub>

- Almost half (49%) of **PM<sub>2.5</sub>** emissions are from area sources; prescribed burning contributes 30% and residential fuel wood combustion 15%.
- Point sources account for 37% of **PM<sub>2.5</sub>**, with 18% attributable to the wood industry and 10% to the pulp and paper industry.

### SO<sub>x</sub>

- The vast majority of **SO<sub>x</sub>** emissions are attributable to point sources (86%), with the most significant contribution from upstream oil and gas (62%).
- Mobile sources collectively contribute 13% of provincial **SO<sub>x</sub>** emissions, with 11% attributable to marine transportation.

### NO<sub>x</sub>

- Mobile sources are responsible for 70% of all provincial **NO<sub>x</sub>** emissions; 18% from marine transportation. The balance of mobile source emissions includes heavy-duty diesel vehicles (14%), off-road use of diesel (13%) and other mobile sources (16%).
- Point sources contribute 26% of provincial **NO<sub>x</sub>**, with 13% from the upstream oil and gas industry.

### VOC

- **VOC** emissions are roughly evenly attributable to mobile sources (37%), point sources (34%) and area sources (29%).
- Of the point sources, upstream oil and gas sector contributes 18%, and the wood industry 10%.

- Of the mobile sources, light-duty gasoline vehicles contribute 11%, and 13% is from off-road use of gasoline.

## CO

- Mobile sources collectively contribute 60% of provincial **CO** emissions; off-road use of gasoline is responsible for 19%, with light-duty gasoline trucks and vehicles together accounting for 36%.
- Point sources make up 23% of **CO** emissions, with 17% from the wood industry.
- Area sources make up the remaining 17% of **CO** emissions; prescribed burning accounts for 13%.

## END NOTES

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<sup>1</sup> To date, inventories have been prepared by the province for the years 1985, 1990 and 1995. Over the years, improvements have been made to emission estimation methods, and new source categories have been added. As a result, direct comparisons of inventories from one year to the next can be misleading, as it is difficult to decipher whether a change in the data reflects an actual change in emission levels or a change in the estimation methodology applied. The reader is therefore advised not to draw conclusions based on comparing the separate inventory reports.

<sup>2</sup> “2000 Emission Inventory for the Canadian Portion of the Lower Fraser Valley Airshed – Detailed Listing of Results and Methodology,” November, 2003. Available from the Greater Vancouver Regional District web site at [http://www.gvrd.bc.ca/air/inventory\\_reports.htm](http://www.gvrd.bc.ca/air/inventory_reports.htm)

<sup>3</sup> “2000 British Columbia Emissions Inventory of Criteria Air Contaminants: Methods and Calculations.” October 2004; Revised June 2005. Available from the Ministry of Water, Land and Air Protection website at <http://wlapwww.gov.bc.ca/air/airquality/index.html#inventory>

<sup>4</sup> The term "particulate" used in this report is synonymous to the terms "particulate matter" (PM) and "total suspended particulates" (TSP) used in other air quality reports. The term PM is consistent with the nomenclature used for PM<sub>10</sub> and PM<sub>2.5</sub> and is therefore preferred by some authors. TSP refers to measurement of "particulate" with a high-volume sampler that typically includes particulates up to about 40 micrometers in diameter.

<sup>5</sup> Canada's greenhouse gas inventory produced by Environment Canada, available at [http://www.ec.gc.ca/pdb/ghg/inventories\\_e.cfm](http://www.ec.gc.ca/pdb/ghg/inventories_e.cfm) or Canada's Climate Change Voluntary Challenge and Registry Inc, <http://www.vcr-mvr.ca/>

<sup>6</sup> For the purposes of developing the 2000 emission inventory, the term “prescribed burn” refers to the deliberate application of fire to a specific area of land for the purposes of forest management or other land use objectives.

<sup>7</sup> “Number and percentage of people- and lightning- caused fires for each of the past 10 years (2002 to 1993).” Available from Ministry of Forests Protection Branch web site at: <http://www.for.gov.bc.ca/protect/average.htm>

<sup>8</sup> There are some minor differences between the Environment Canada emission summaries for the CLFV (presented in this report) and the reports produced by the GVRD (available on the web). Environment Canada elected to move area source emissions the GVRD had listed for the asphalt paving industry, bakeries, the coal mining industry and other industries into point source categories. Also, the GVRD solvent evaporation category was split by Environment Canada into general solvent use, and surface coatings categories. These changes may result in slight differences in percentages shown in pie charts presented in this report and those contained in the GVRD report (See End Note 2).

<sup>9</sup> However, it should be noted that natural sources in some cases can have a profound impact on local air quality (for example natural VOCs can contribute substantially to ground level ozone formation). Therefore, the exclusion of natural sources should be taken with caution when applying the pie charts in a local airshed management context.

## 2000 Emission Inventory for the Canadian Portion of the Lower Fraser Valley (tonnes)<sup>1</sup>

CATEGORY / SECTOR	Part	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>x</sub>	NO <sub>x</sub>	VOC	CO
<b>POINT SOURCES</b>							
Abrasives Manufacture	0	0	0	0	0	0	0
Aluminum Industry	0	0	0	0	1	0	0
Asphalt Paving Industry	118	37	15	21	52	227	128
Bakeries	0	0	0	0	0	58	0
Cement and Concrete Industry	1,059	657	282	205	3,672	58	1,200
Chemicals Industry	5	4	4	9	135	11	42
Clay Products Industry	65	39	10	0	13	1	11
Coal Mining Industry	85	43	17	0	0	0	0
Ferrous Foundries	95	38	28	0	12	25	7
Grain Industries	600	204	25	0	0	0	0
Iron and Steel Industries	71	13	13	1	32	212	21
Mining and Rock Quarrying	0	0	0	0	0	0	0
Non-Ferrous Mining and Smelting Industry	3	3	2	2	1	0	1
Paint & Varnish Manufacturing	3	2	1	0	0	203	0
Petroleum Refining	138	98	59	1,238	312	451	80
Plastics & Synthetic Resins Fabrication	1	1	1	1	5	3	4
Pulp and Paper Industry	371	65	56	9	159	50	183
Upstream Oil and Gas Industry	3	3	3	0	201	5	39
Wood Industry	2,103	869	443	15	236	1,349	1,857
Other Industries	755	207	109	28	317	1,888	213
Electric Power Generation (Utilities)	99	99	99	26	235	72	123
Incineration	6	3	1	96	453	4	28
Marine Cargo Handling Industry	2,843	1,364	414	0	0	1	0
<b>SUB-TOTAL POINT</b>	<b>8,423</b>	<b>3,749</b>	<b>1,582</b>	<b>1,651</b>	<b>5,836</b>	<b>4,618</b>	<b>3,937</b>
<b>% OF TOTAL EMISSIONS</b>	<b>51</b>	<b>38</b>	<b>25</b>	<b>19</b>	<b>7</b>	<b>8</b>	<b>1</b>
<b>AREA SOURCES</b>							
Prescribed Burning	525	523	523	11	129	615	2,791
Residential Fuel Combustion	177	176	174	46	2,178	127	923
Residential Fuel Wood Combustion	533	505	503	8	51	841	4,625
Commercial Fuel Combustion	140	137	136	129	1,784	96	1,470
Agriculture (Animals)	474	303	47	0	0	2,200	0
Agriculture Tilling and Wind Erosion	2,103	721	155	0	0	0	0
Construction Operations	172	36	7	0	0	0	0
Cigarette Smoking	167	167	167	0	4	0	128
Dry Cleaning	0	0	0	0	0	137	0
Fuel Marketing	0	0	0	0	0	3,045	0
General Solvent Use	0	0	0	0	0	7,011	0
Meat Cooking	261	261	261	0	0	0	0
Pesticides and Fertilizer Application	118	58	17	0	0	0	0
Printing	9	2	2	0	11	799	8
Structural Fires	12	12	12	0	1	11	57
Surface Coatings	0	0	0	0	0	5,060	0
Landfills Sites	131	47	12	0	0	305	0
<b>SUB-TOTAL AREA</b>	<b>4,822</b>	<b>2,948</b>	<b>2,016</b>	<b>194</b>	<b>4,158</b>	<b>20,247</b>	<b>10,002</b>
<b>% OF TOTAL EMISSIONS</b>	<b>29</b>	<b>30</b>	<b>32</b>	<b>2</b>	<b>5</b>	<b>36</b>	<b>3</b>

<sup>1</sup> There are some minor differences between the Environment Canada emission summaries for the CLFV (presented in this report) and the reports produced by the GVRD (available on the web) see end note 8 on page 9.

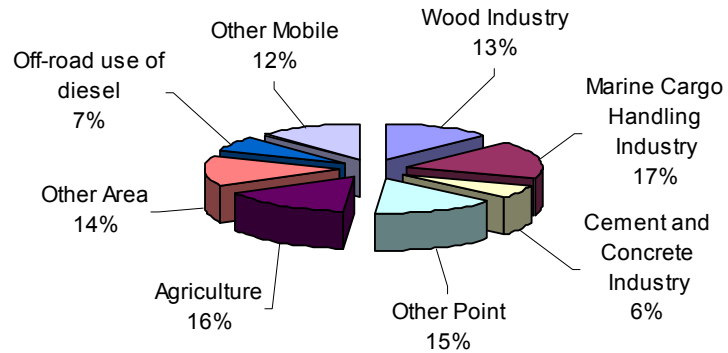
## 2000 Emission Inventory for the Canadian Portion of the Lower Fraser Valley (tonnes)

CATEGORY / SECTOR	Part	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>x</sub>	NO <sub>x</sub>	VOC	CO
<b>MOBILE SOURCES</b>							
Air Transportation	165	161	160	52	1,040	862	7,832
Heavy-duty diesel vehicles	279	279	258	259	12,253	423	2,556
Heavy-duty gasoline trucks	13	13	10	21	753	208	2,864
Light-duty diesel trucks	16	16	15	10	108	45	75
Light-duty diesel vehicles	27	27	25	5	100	29	62
Light-duty gasoline trucks	62	62	54	318	7,841	8,243	110,429
Light-duty gasoline vehicles	61	61	57	332	11,742	13,176	140,440
Marine Transportation	906	906	906	5,143	18,197	1,651	4,807
Motor cycles	1	1	1	1	101	265	1,054
Off-road use of diesel	1,113	1,113	1,024	616	13,464	1,838	7,025
Off-road use of gasoline	127	127	118	57	2,030	5,054	75,478
Rail Transportation	67	66	65	50	4,342	105	701
Tire wear & Brake lining	304	301	104	0	0	0	0
<b>SUB-TOTAL MOBILE</b>	<b>3,141</b>	<b>3,133</b>	<b>2,797</b>	<b>6,864</b>	<b>71,971</b>	<b>31,899</b>	<b>353,323</b>
<b>% OF TOTAL EMISSIONS</b>	<b>19</b>	<b>32</b>	<b>44</b>	<b>79</b>	<b>88</b>	<b>56</b>	<b>96</b>
<b>TOTAL</b>	<b>16,386</b>	<b>9,830</b>	<b>6,395</b>	<b>8,709</b>	<b>81,965</b>	<b>56,764</b>	<b>367,262</b>
<b>% OF TOTAL EMISSIONS</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

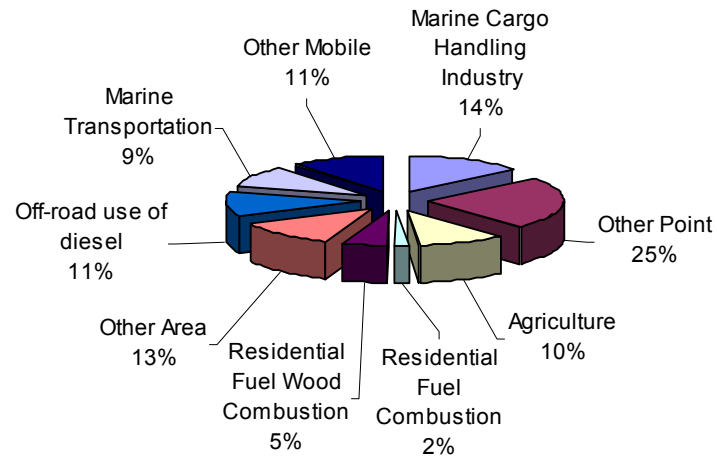
<b>NATURAL SOURCES</b>							
Forest Fires	3	2	2	0	0	1	17
Biogenics	0	0	0	0	534	14,141	0
Marine Aerosols	332	289	50	0	0	0	0
Wildlife	0	0	0	0	0	4	0
<b>SUB-TOTAL NATURAL</b>	<b>335</b>	<b>291</b>	<b>52</b>	<b>0</b>	<b>534</b>	<b>14,146</b>	<b>17</b>
<b>ROAD DUST SOURCES</b>							
Dust from Paved Roads	31,300	6,000	1,500	0	0	0	0
Dust from Unpaved Roads	0	0	0	0	0	0	0
<b>SUB-TOTAL ROAD DUST</b>	<b>31,300</b>	<b>6,000</b>	<b>1,500</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## 2000 Emission Inventory for the Canadian Portion of the Lower Fraser Valley (tonnes)

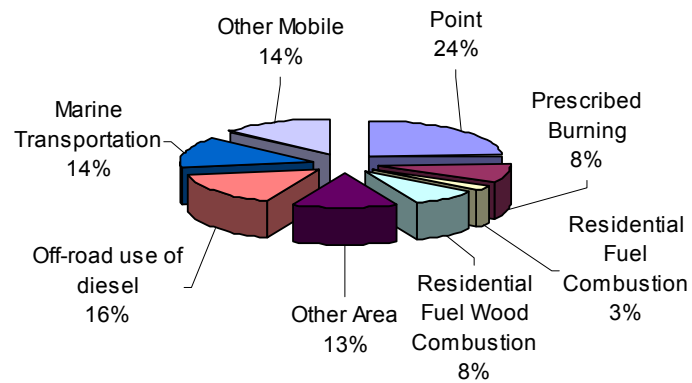
### Particulate



### PM<sub>10</sub>

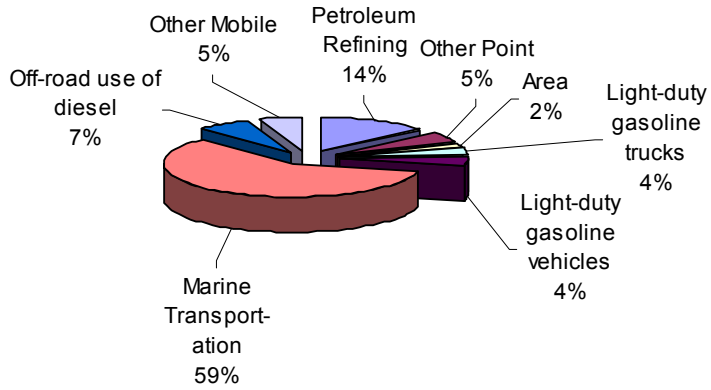


### PM<sub>2.5</sub>

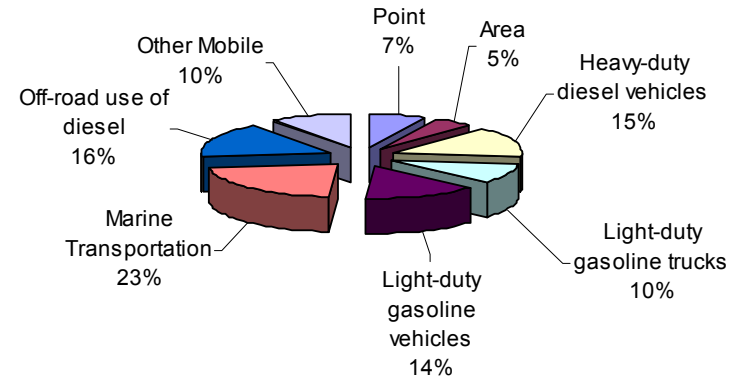


## 2000 Emission Inventory for the Canadian Portion of the Lower Fraser Valley (tonnes)

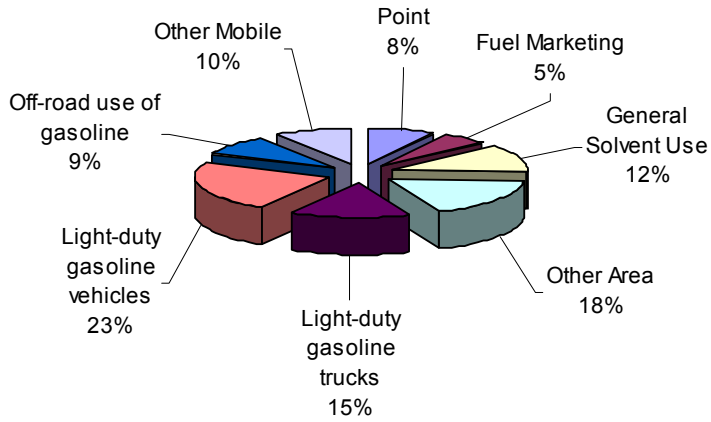
### SO<sub>x</sub>



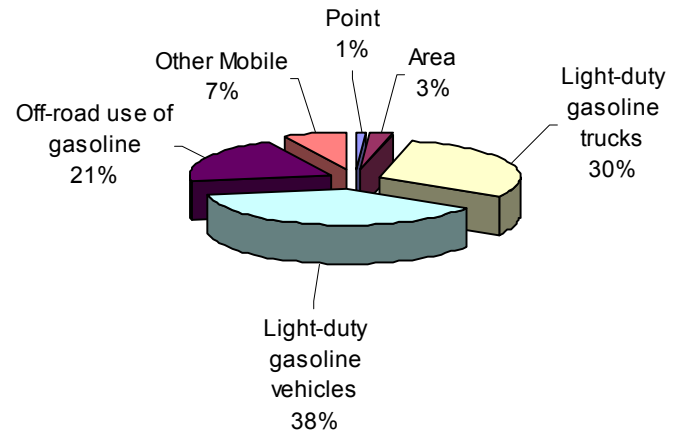
### NO<sub>x</sub>



### VOC



### CO



## 2000 Emission Inventory for British Columbia Excluding CLFV (tonnes)

CATEGORY / SECTOR	Part	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>x</sub>	NO <sub>x</sub>	VOC	CO
<b>POINT SOURCES</b>							
Abrasives Manufacture	131	0	0	0	0	0	0
Aluminum Industry	1,778	1,149	546	5,450	11	1	75
Asphalt Paving Industry	75	0	0	4	30	566	86
Bakeries	0	0	0	0	0	46	0
Cement and Concrete Industry	190	140	49	66	344	5	20
Chemicals Industry	92	72	49	289	3,019	31	124
Clay Products Industry	0	0	0	0	0	0	0
Coal Mining Industry	5,794	3,984	1,494	1,884	1,319	806	42
Ferrous Foundries	127	107	38	1	45	1	43
Grain Industries	1	0	0	0	0	0	0
Iron and Steel Industries	0	0	0	0	0	0	0
Mining and Rock Quarrying	1,514	1,013	366	683	1,093	80	265
Non-Ferrous Mining and Smelting Industry	247	186	123	3,086	0	0	0
Paint & Varnish Manufacturing	0	0	0	0	0	0	0
Petroleum Refining	46	33	20	2,457	71	121	2,307
Plastics & Synthetic Resins Fabrication	0	0	0	3	13	1	14
Pulp and Paper Industry	17,424	9,326	7,032	16,069	18,767	6,023	69,596
Upstream Oil and Gas Industry	661	523	517	85,851	38,021	41,548	6,551
Wood Industry	36,762	19,582	12,226	436	5,998	22,515	260,782
Other Industries	5,304	1,528	862	338	1,108	328	840
Electric Power Generation (Utilities)	261	242	237	109	2,469	541	2,429
Incineration	486	338	290	65	178	177	3,051
Marine Cargo Handling Industry	59	31	9	0	0	0	0
<b>SUB-TOTAL POINT</b>	<b>70,952</b>	<b>38,254</b>	<b>23,858</b>	<b>116,791</b>	<b>72,486</b>	<b>72,790</b>	<b>346,225</b>
<b>% OF TOTAL EMISSIONS</b>	<b>51</b>	<b>44</b>	<b>38</b>	<b>90</b>	<b>34</b>	<b>42</b>	<b>30</b>
<b>AREA SOURCES</b>							
Prescribed Burning	29,841	21,853	19,830	133	3,709	9,960	195,218
Residential Fuel Combustion	122	112	101	114	1,518	80	578
Residential Fuel Wood Combustion	10,720	10,127	10,120	153	1,069	14,019	60,954
Commercial Fuel Combustion	114	97	80	510	1,132	53	717
Agriculture (Animals)	7,219	4,596	718	0	0	5,951	0
Agriculture Tilling and Wind Erosion	12,949	4,369	377	0	0	0	0
Construction Operations	116	24	5	0	0	0	0
Cigarette Smoking	88	88	88	0	2	0	68
Dry Cleaning	0	0	0	0	0	104	0
Fuel Marketing	0	0	0	2	0	4,556	0
General Solvent Use	0	0	0	0	0	5,534	0
Meat Cooking	203	203	203	0	0	0	0
Pesticides and Fertilizer Application	369	181	51	0	0	0	0
Printing	0	0	0	0	0	1,101	0
Structural Fires	6	6	5	0	1	4	21
Surface Coatings	0	0	0	0	0	3,865	0
Landfills Sites	372	134	38	0	0	2,233	0
<b>SUB-TOTAL AREA</b>	<b>62,119</b>	<b>41,790</b>	<b>31,616</b>	<b>912</b>	<b>7,431</b>	<b>47,460</b>	<b>257,556</b>
<b>% OF TOTAL EMISSIONS</b>	<b>44</b>	<b>48</b>	<b>51</b>	<b>1</b>	<b>3</b>	<b>27</b>	<b>22</b>

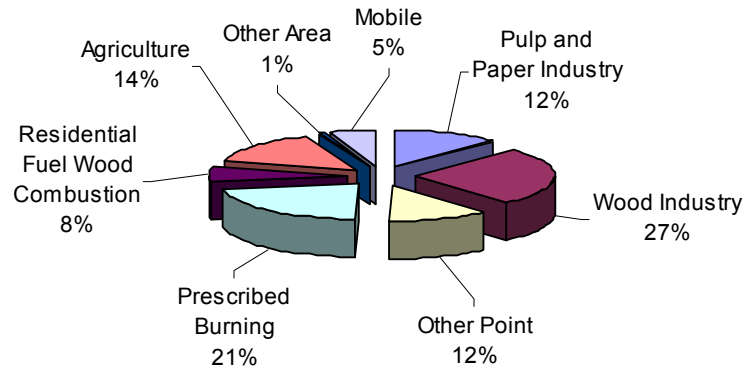
## 2000 Emission Inventory for British Columbia Excluding CLFV (tonnes)

CATEGORY / SECTOR	Part	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>x</sub>	NO <sub>x</sub>	VOC	CO
<b>MOBILE SOURCES</b>							
Air Transportation	139	137	133	24	234	443	5,889
Heavy-duty diesel vehicles	978	978	902	517	28,145	1,369	6,382
Heavy-duty gasoline trucks	9	9	8	14	599	247	3,491
Light-duty diesel trucks	123	123	113	68	999	455	815
Light-duty diesel vehicles	16	16	15	3	105	48	104
Light-duty gasoline trucks	77	75	61	263	7,515	10,229	154,747
Light-duty gasoline vehicles	35	34	31	212	8,235	11,159	144,044
Marine Transportation	1,591	1,591	1,591	9,486	38,333	1,331	4,139
Motor cycles	2	2	1	2	83	114	830
Off-road use of diesel	2,895	2,895	2,664	760	24,419	2,711	14,753
Off-road use of gasoline	664	664	611	39	4,634	23,722	222,582
Rail Transportation	499	496	455	256	20,845	1,046	3,972
Tire wear & Brake lining	264	260	91	0	0	0	0
<b>SUB-TOTAL MOBILE</b>	<b>7,292</b>	<b>7,280</b>	<b>6,676</b>	<b>11,644</b>	<b>134,146</b>	<b>52,874</b>	<b>561,748</b>
<b>% OF TOTAL EMISSIONS</b>	<b>5</b>	<b>8</b>	<b>11</b>	<b>9</b>	<b>63</b>	<b>31</b>	<b>48</b>
<b>TOTAL</b>	<b>140,363</b>	<b>87,324</b>	<b>62,150</b>	<b>129,347</b>	<b>214,063</b>	<b>173,124</b>	<b>1,165,529</b>
<b>% OF TOTAL EMISSIONS</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

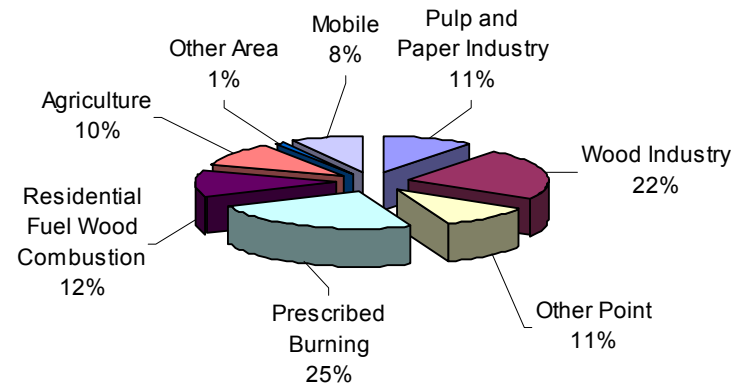
<b>NATURAL SOURCES</b>							
Forest Fires	18,384	14,063	12,656	47	1,875	4,004	95,625
Biogenics	0	0	0	0	40,195	4,113,366	0
Marine Aerosols	0	0	0	0	0	0	0
Wildlife	0	0	0	0	0	887	0
<b>SUB-TOTAL NATURAL</b>	<b>18,384</b>	<b>14,063</b>	<b>12,656</b>	<b>47</b>	<b>42,070</b>	<b>4,118,257</b>	<b>95,625</b>
<b>ROAD DUST SOURCES</b>							
Dust from Paved Roads	419,786	80,459	19,240	0	0	0	0
Dust from Unpaved Roads	249,007	86,839	12,977	0	0	0	0
<b>SUB-TOTAL ROAD DUST</b>	<b>668,793</b>	<b>167,298</b>	<b>32,217</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# 2000 Emission Inventory for British Columbia Excluding CLFV

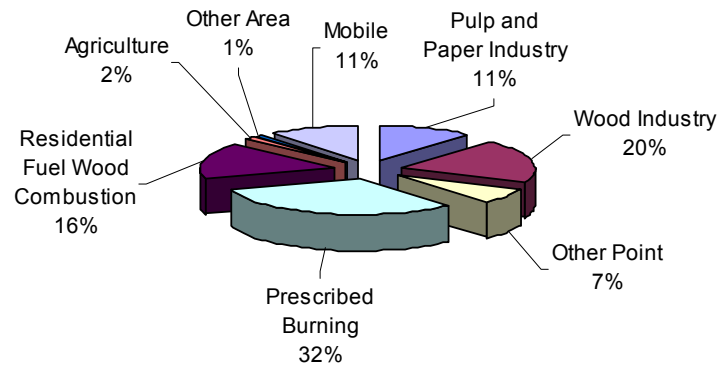
## Particulate



## PM<sub>10</sub>

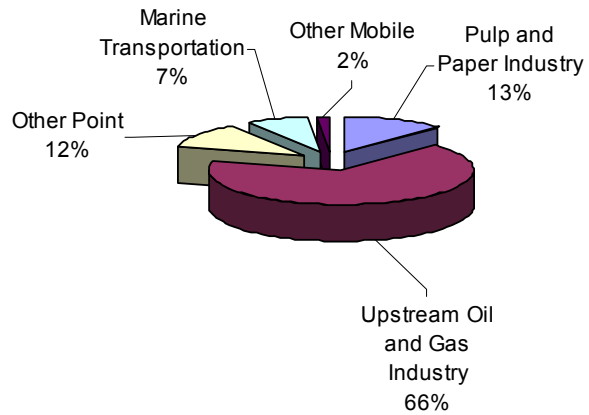


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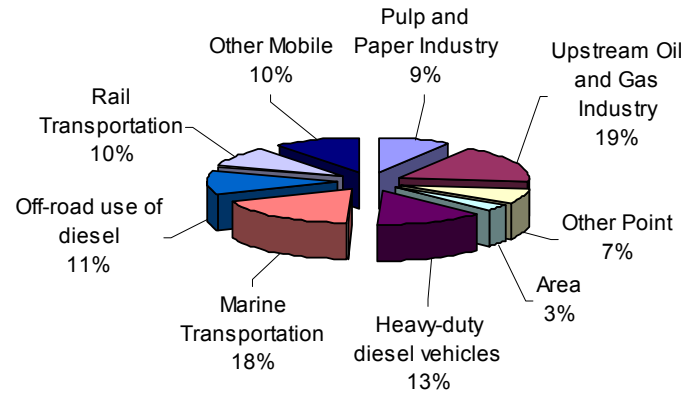


## 2000 Emission Inventory for British Columbia Excluding CLFV

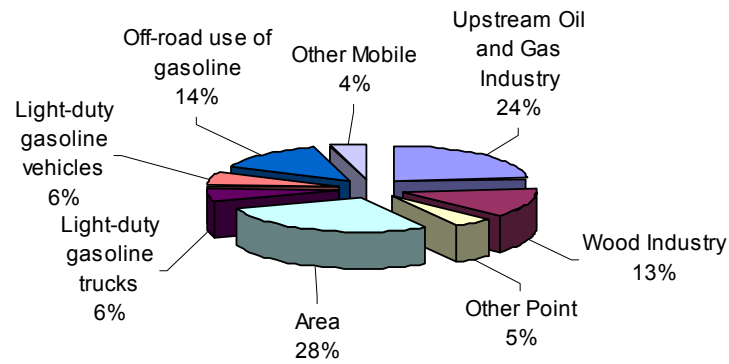
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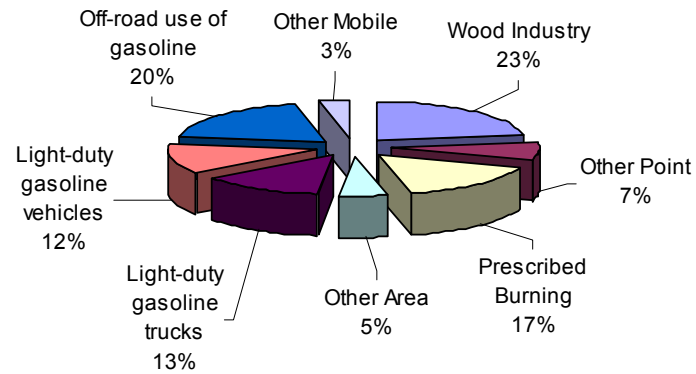
### NO<sub>x</sub>



### VOC



### CO



## 2000 Emission Inventory for British Columbia (tonnes)

CATEGORY / SECTOR	Part	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>x</sub>	NO <sub>x</sub>	VOC	CO
<b>POINT SOURCES</b>							
Abrasives Manufacture	131	0	0	0	0	0	0
Aluminum Industry	1,778	1,149	546	5,450	12	1	75
Asphalt Paving Industry	193	37	15	25	82	793	214
Bakeries	0	0	0	0	0	104	0
Cement and Concrete Industry	1,249	797	331	271	4,016	63	1,220
Chemicals Industry	97	76	53	298	3,154	42	166
Clay Products Industry	65	39	10	0	13	1	11
Coal Mining Industry	5,879	4,027	1,511	1,884	1,319	806	42
Ferrous Foundries	222	145	66	1	57	26	50
Grain Industries	601	204	25	0	0	0	0
Iron and Steel Industries	71	13	13	1	32	212	21
Mining and Rock Quarrying	1,514	1,013	366	683	1,093	80	265
Non-Ferrous Mining and Smelting Industry	250	189	125	3,088	1	0	1
Paint & Varnish Manufacturing	3	2	1	0	0	203	0
Petroleum Refining	184	131	79	3,695	383	572	2,387
Plastics & Synthetic Resins Fabrication	1	1	1	4	18	4	18
Pulp and Paper Industry	17,795	9,391	7,088	16,078	18,926	6,073	69,779
Upstream Oil and Gas Industry	664	526	520	85,851	38,222	41,553	6,590
Wood Industry	38,865	20,451	12,669	451	6,234	23,864	262,639
Other Industries	6,059	1,735	971	366	1,425	2,216	1,053
Electric Power Generation (Utilities)	360	341	336	135	2,704	613	2,552
Incineration	492	341	291	161	631	181	3,079
Marine Cargo Handling Industry	2,902	1,395	423	0	0	1	0
<b>SUB-TOTAL POINT</b>	<b>79,375</b>	<b>42,003</b>	<b>25,440</b>	<b>118,442</b>	<b>78,322</b>	<b>77,408</b>	<b>350,162</b>
(%)	<b>51</b>	<b>43</b>	<b>37</b>	<b>86</b>	<b>26</b>	<b>34</b>	<b>23</b>
<b>AREA SOURCES</b>							
Prescribed Burning	30,366	22,376	20,353	144	3,838	10,575	198,009
Residential Fuel Combustion	299	288	275	160	3,696	207	1,501
Residential Fuel Wood Combustion	11,253	10,632	10,623	161	1,120	14,860	65,579
Commercial Fuel Combustion	254	234	216	639	2,916	149	2,187
Agriculture (Animals)	7,693	4,899	765	0	0	8,151	0
Agriculture Tilling and Wind Erosion	15,052	5,090	532	0	0	0	0
Construction Operations	288	60	12	0	0	0	0
Cigarette Smoking	255	255	255	0	6	0	196
Dry Cleaning	0	0	0	0	0	241	0
Fuel Marketing	0	0	0	2	0	7,601	0
General Solvent Use	0	0	0	0	0	12,545	0
Meat Cooking	464	464	464	0	0	0	0
Pesticides and Fertilizer Application	487	239	68	0	0	0	0
Printing	9	2	2	0	11	1,900	8
Structural Fires	18	18	17	0	2	15	78
Surface Coatings	0	0	0	0	0	8,925	0
Landfills Sites	503	181	50	0	0	2,538	0
<b>SUB-TOTAL AREA</b>	<b>66,941</b>	<b>44,738</b>	<b>33,632</b>	<b>1,106</b>	<b>11,589</b>	<b>67,707</b>	<b>267,558</b>
(%)	<b>43</b>	<b>46</b>	<b>49</b>	<b>1</b>	<b>4</b>	<b>29</b>	<b>17</b>

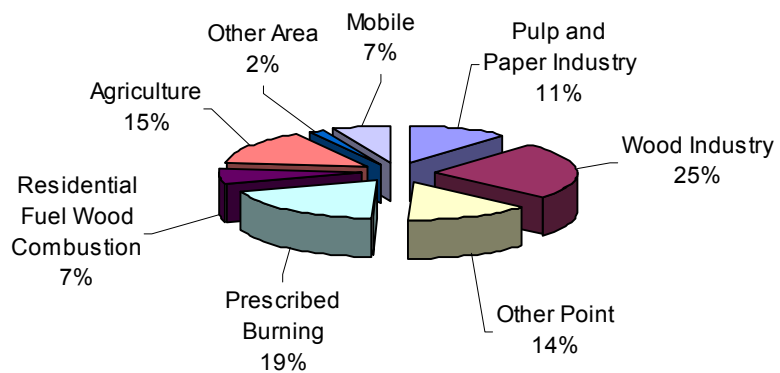
## 2000 Emission Inventory for British Columbia (tonnes)

CATEGORY / SECTOR	Part	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>x</sub>	NO <sub>x</sub>	VOC	CO
<b>MOBILE SOURCES</b>							
Air Transportation	304	298	293	76	1,274	1,305	13,721
Heavy-duty diesel vehicles	1,257	1,257	1,160	776	40,398	1,792	8,938
Heavy-duty gasoline trucks	22	22	18	35	1,352	455	6,355
Light-duty diesel trucks	139	139	128	78	1,107	500	890
Light-duty diesel vehicles	43	43	40	8	205	77	166
Light-duty gasoline trucks	139	137	115	581	15,356	18,472	265,176
Light-duty gasoline vehicles	96	95	88	544	19,977	24,335	284,484
Marine Transportation	2,497	2,497	2,497	14,629	56,530	2,982	8,946
Motor cycles	3	3	2	3	184	379	1,884
Off-road use of diesel	4,008	4,008	3,688	1,376	37,883	4,549	21,778
Off-road use of gasoline	791	791	729	96	6,664	28,776	298,060
Rail Transportation	566	562	520	306	25,187	1,151	4,673
Tire wear & Brake lining	568	561	195	0	0	0	0
<b>SUB-TOTAL MOBILE</b>	<b>10,433</b>	<b>10,413</b>	<b>9,473</b>	<b>18,508</b>	<b>206,117</b>	<b>84,773</b>	<b>915,071</b>
(%)	7	11	14	13	70	37	60
<b>TOTAL</b>	<b>156,749</b>	<b>97,154</b>	<b>68,545</b>	<b>138,056</b>	<b>296,028</b>	<b>229,888</b>	<b>1,532,791</b>
<b>% OF TOTAL EMISSIONS</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

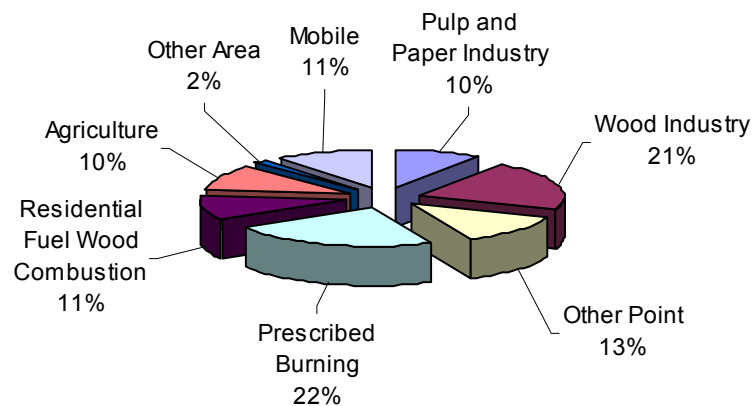
<b>NATURAL SOURCES</b>							
Forest Fires	18,387	14,065	12,658	47	1,875	4,005	95,642
Biogenics	0	0	0	0	40,729	4,127,507	0
Marine Aerosols	332	289	50	0	0	0	0
Wildlife	0	0	0	0	0	891	0
<b>SUB-TOTAL NATURAL</b>	<b>18,719</b>	<b>14,354</b>	<b>12,708</b>	<b>47</b>	<b>42,604</b>	<b>4,132,403</b>	<b>95,642</b>
<b>ROAD DUST SOURCES</b>							
Dust from Paved Roads	451,086	86,459	20,740	0	0	0	0
Dust from Unpaved Roads	249,007	86,839	12,977	0	0	0	0
<b>SUB-TOTAL ROAD DUST</b>	<b>700,093</b>	<b>173,298</b>	<b>33,717</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# 2000 Emission Inventory for British Columbia

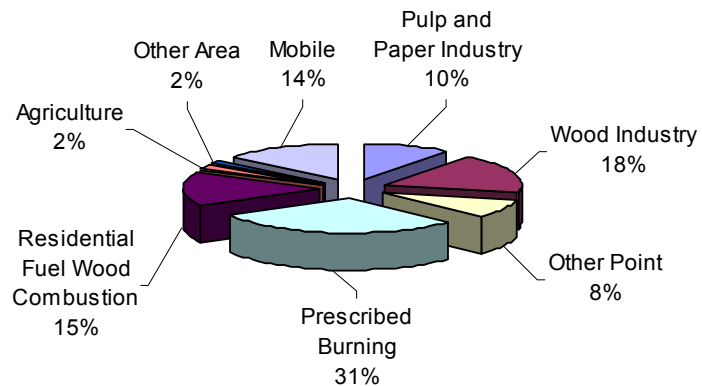
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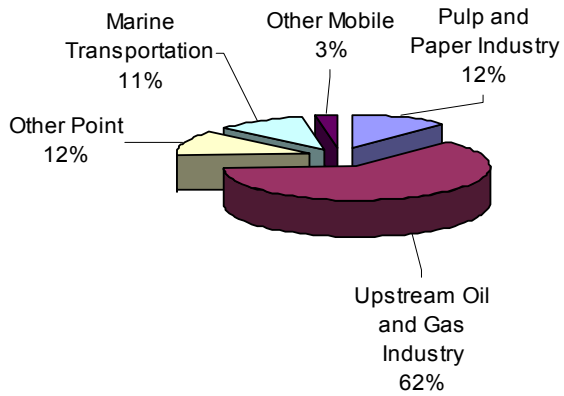


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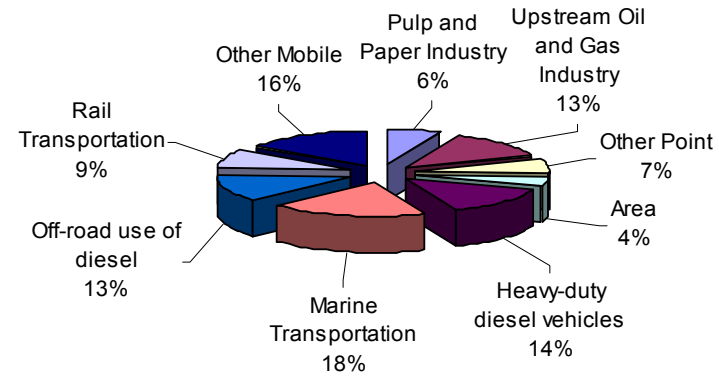


# 2000 Emission Inventory for British Columbia

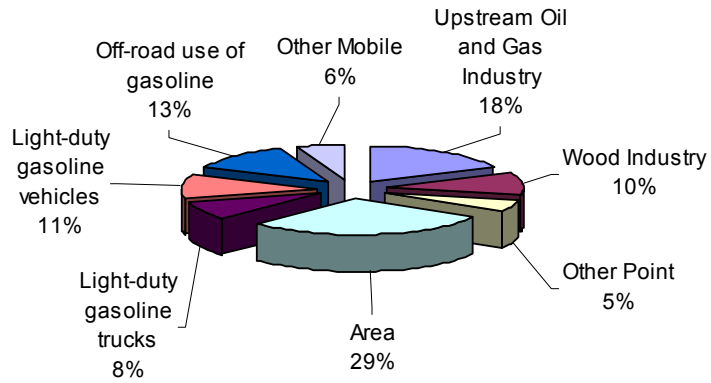
## SO<sub>x</sub>



## NO<sub>x</sub>



## VOC



## CO

