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Sulphur in Liquid Fuels

2000

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Environment Canada

Sulphur in Liquid Fuels

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Notice

The information contained in this report is compiled from data submitted by the producers and importers of liquid fuels in Canada pursuant to the requirements of the Federal *Fuels Information Regulations, No. 1*. Submissions have been verified for reasonableness but are subject to potential errors made at the source.

Any comments concerning the content of this report should be directed to:

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1.0 Summary

This report summarizes data concerning the sulphur content in liquid fuels for the year 2000, provided to Environment Canada pursuant to the *Fuels Information Regulations, No.1* of the *Canadian Environmental Protection Act*.

Analysis of the results reveals that the sulphur content varies widely between the different types of liquid fuels as well as between the regions. Gasoline constitutes 46.4% of the reported volume of liquid fuels produced or imported in Canada, and accounts for 5.5% of the sulphur mass in liquid fuels. Heavy fuel oil constitutes only 7.9% by volume of liquid fuels, but contains 68.5% of the total sulphur mass in Canada. The Atlantic provinces, Quebec and Ontario account for 87.1% of the total mass of sulphur present in fuels.

The following table represents a national summary of data compiled from Form 1, "Report on Sulphur Content", of the *Fuel Information Regulations, No. 1*, which petroleum refineries and importing companies are required to submit to Environment Canada.

TABLE 1.1					
Fuel Production / Imports and Sulphur Content					
National Summary for 2000					
Type of Fuel	Fuel Production / Imports		Sulphur Mass (tonnes)	Average Sulphur Content (% wt)	Distribution of Sulphur in Products (%)
	(m³)	(in %)			
Aviation Turbo Fuel	6,519,307	7.9	3,067	0.058	1.9
Motor/Aviation Gasoline	38,473,812	46.4	8,807	0.031	5.5
Kerosene/Stove Oil	1,495,553	1.8	436	0.037	0.3
Low-Sulphur Diesel Fuel	20,179,241	24.3	5,590	0.033	3.5
Diesel Fuel	4,207,731	5.1	7,774	0.217	4.8
Light Fuel Oil	4,704,209	5.7	8,218	0.203	5.1
Heavy Fuel Oil	6,561,430	7.9	110,695	1.747	68.7
Plant Consumption	797,580	1.0	16,575	2.115	10.3
TOTAL	82,938,862	100.0	161,163	0.209	100.0

2.0 Introduction

2.1 Fuels Information Regulations, No.1

The *Fuels Information Regulations, No.1* (see Appendix 1) were adopted in 1977 to provide Environment Canada with information regarding liquid fuel composition, particularly concerning sulphur dioxide (SO₂) emissions from combustion. These Regulations require annual reporting on sulphur levels in fuels and one-time reporting of non-lead fuel additive content (additional reporting is required when there are changes). They apply to all fuels¹ in liquid form that originate from crude oils, coal or bituminous sands.

The Regulations require all producers and importers handling more than 400 cubic meters (m³) of fuels intended for consumption in Canada within a calendar year to report the volume of fuels produced or imported, the fuel density and the fuel sulphur content for each quarter of the calendar year (see Appendix 2). Environment Canada uses the reported values to estimate the mass of sulphur in Canadian fuels. The definition of each type of liquid fuel can be found on the last page of Form 1 in Appendix 2. The Regulations also require all producers and importers who supply more than 400 m³ of a fuel to report all the additives other than lead or lead compounds in fuels.

A new category was added to the reporting form in 1995 to account for the production of low sulphur diesel fuel. This addition was a follow-up to the non-regulatory program agreed upon by the petroleum marketing industry to make available only diesel fuel with a sulphur content not exceeding 0.05% by weight at all service stations, truck stops and on-road cardlocks and keylocks in Canada. This program commenced on October 1, 1994. Information on low sulphur diesel is included in this report. Effective January 1, 1998, low sulphur diesel has been mandated for on-road vehicles by the federal *Diesel Fuel Regulations* (see section 2.2).

¹ Throughout this document, the word “fuel(s)” applies only to those fuels which are in liquid form and petroleum-based.

2.2 Regulations Controlling Sulphur Levels in Fuels

On January 1, 1998, the federal *Diesel Fuel Regulations* came into effect. The regulations require all on-road diesel to have a sulphur level not exceeding 0.05% (500 ppm) by weight. On June 23, 1999, the *Sulphur in Gasoline Regulations* were published in Part 2 of the *Canada Gazette*. These regulations will limit the sulphur content in gasoline to an average of 30 ppm with a maximum of 80 ppm. The requirements will be phased in. The first stage begins on July 1, 2002 limiting the average sulphur content of gasoline to 150 ppm over a 2 ½ year period. On January 1, 2005, the sulphur content will be further limited to a 30 ppm average with a maximum of 80 ppm.

In the *Notice of Intent on Cleaner Vehicles, Engines and Fuels*, published in the *Canada Gazette* in February 2001, the Government of Canada committed to align Canadian requirements for sulphur content in on-road diesel fuel with those in the United States' *Final Rule on Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements*, published January 18, 2001. Under this rule, sulphur requirements for on-road diesel fuel will be 15 ppm starting mid-2006. The Canadian regulatory process was initiated through a discussion paper that solicited views from stakeholders on the design of the regulations. It was distributed on May 1, 2001 with comments requested by June 15.

The *Notice of Intent* also commits Environment Canada to developing measures to reduce the level of sulphur in both light and heavy fuel oils used in stationary facilities. Studies of Canadian health and environmental benefits, as well as costs, will commence later in 2001, with the view to matching requirements set by the European Union. These requirements are 1% wt. for heavy fuel oil starting in 2003, and 0.1% wt. for light fuel oil by 2008.

The Canadian General Standards Board (CGSB) has standards for fuels which have been adopted by provinces in their regulations. Depending on the type of fuel, these standards establish a range of 0.04 % to 3.50% (400 ppm to 35 000 ppm) of sulphur by weight (see Appendix 4). CGSB standards are revised periodically to reflect developments in product, usage and manufacturing technology.

2.3 Period covered

This report covers the period from January 1 to December 31, 2000. Petroleum refineries and importing companies are required to submit information for each calendar quarter to the regional office of Environment Canada before January 31 of the following year. Failure to submit the data on time, incomplete data or unsigned forms are offenses under the *Canadian Environmental Protection Act* and are punishable by fines and imprisonment.

2.4 Access to Information Act

Appendix 3 presents data on the annual volume weighted sulphur content (in parts per million by weight) for gasoline, diesel and fuel oil during the period of 1995 to 2000 for each Canadian refinery and importer. This information was released to the public through a number of requests under the *Access to Information Act* that took place during 1997 to 2001. Data for importers and blenders prior to 1998 were not included in the ATI requests.

2.5 Reporting Petroleum Refineries and Importing Companies

The following petroleum refineries, blenders, and upgrading plants reported, under the regulation, information pertaining to volume, production, and fuel sulphur content for 2000:

Chevron Canada Limited (Burnaby Refinery, Burnaby, BC)
Consumers' Co-operative Refineries Limited (Regina, SK)
Husky Oil Operations Limited (Prince George Refinery, Prince George, BC)
Imperial Oil Limited (Dartmouth Refinery, Dartmouth, NS)
Imperial Oil Limited (Sarnia Refinery, Sarnia, ON)
Imperial Oil Limited (Nanticoke Refinery, Nanticoke, ON)
Imperial Oil Limited (Strathcona Refinery, Edmonton, AB)
Irving Oil Limited (Irving Oil Refinery, Saint John, NB)
North Atlantic Refining Limited (North Atlantic Refinery, Come-By-Chance, NF)
NOVA Chemicals Canada Limited (Corunna Plant, Sarnia, ON)
Parkland Refining Limited (Bowden Refinery, Bowden, AB)
Petro-Canada Lubricants (Lubricants Centre, Mississauga, ON)
Petro-Canada Products Limited (Montréal Refinery, Montréal, QC)
Petro-Canada Products Limited (Edmonton Refinery, Edmonton, AB)
Petro-Canada Products Limited (Lake Ontario Refinery, Oakville, ON)
Robbins Feed and Fuel Limited (Thorold, ON) (Blender)
Shell Canada Limited (Montréal-East Refinery, Montréal-Est, QC)
Shell Canada Products Limited (Sarnia Manufacturing Centre, Corunna, ON)
Shell Canada Products Limited (Scotford Refinery, Fort Saskatchewan, AB)
Suncor Energy Inc. (Oil Sands, Fort McMurray, AB)
Sunoco Inc. (Sarnia Refinery, Sarnia, ON)
Syncrude Canada Inc. (Mildred Lake Facility, Fort McMurray, AB)
Ultramar Canada Inc. (St-Romuald Refinery, St-Romuald, QC)

The following petroleum importers reported, under the regulation, information pertaining to volume, production, and fuel sulphur content for 2000:

BP Cherry Point (Blaine, Washington, USA)
Canadian Pacific Railway (Calgary, AB)
Daigle Oil Limited (Edmundston, NB)
Delta Western Fuel Canada Inc. (Totem Oil, Whitehorse, YT)
Ford Motor Company of Canada (Essex, St. Thomas & Windsor, ON)
Imperial Oil Limited (Burrard Terminal, Burnaby, BC)
Fraser Papers Inc. (Edmundston, NB)
Kildair Services Limited (Tracy, QC)
Mackenzie Petroleum Limited (Dawson City, YT)
Marine Petrobulk Limited (North Vancouver, BC)
Murphy Oil USA Inc. (Superior, Wisconsin, USA)
New Brunswick Power Corporation (Fredericton, NB)
Newfoundland and Labrador Hydro (St. John's, NF)
Noco Energy Canada (Nobleton, ON)
Northern Transportation Company Limited (Iqaluit, NU)
North 60 Petro Limited (Whitehorse, YT)
Nova Scotia Power Inc. (Halifax, NS)
Olco Petroleum Group Inc. (Hamilton, ON)
Olco Petroleum Group Inc. (Beauport & Montréal-Est, QC)
PaceSetter Enterprises (Whitehorse, YT)
Parkland Refining Limited (Bowden Refinery, Bowden, AB)
Petro-Canada Products (Burrard Products Terminal, Port Moody, BC)
Petro-Canada Products Limited (Lake Ontario Refinery, Oakville, ON)
Pétroles Norcan Inc. (Montréal, QC)
Pope and Talbot Limited (Harmac Pulp Operations, Nanaimo, BC)
TransCanada Energy Limited (Northridge Petroleum, Calgary, AB)
Ultramar Canada Inc. (St-Romuald Refinery, St-Romuald, QC)
Vancouver General Hospital (North Vancouver, BC)
Western Pulp Inc. (Port Alice, BC)

3.0 Volumes of Liquid Fuels Produced / Imported

In order to verify the accuracy of the sulphur content in the fuel reports submitted to Environment Canada, the reported volumes of produced fuels were compared to Statistics Canada figures for 2000 (see Table 3.1). The “plant consumption” volumes of oil sand processing plants are included in the Environment Canada numbers but are not included in the Statistics Canada numbers. There appears to be reasonable agreement between the two sets of data, given the differences in approaches noted below.

TABLE 3.1 : Volumes of Liquid Fuels Produced / Imported for Sale in Canada		
Statistics Canada ¹ and Environment Canada Reportings for 2000		
Type of Fuel	Statistics Canada (m³)	Environment Canada (m³)
Aviation Turbo Fuel	6,400,229	6,519,307
Motor/Aviation Gasoline	38,572,792	38,473,812
Kerosene/Stove Oil ²	502,427	1,495,553
Low-Sulphur Diesel Fuel	-	20,179,241
Diesel Fuel ³	23,035,910	4,207,731
Light Fuel Oil	4,708,061	4,704,209
Heavy Fuel Oil	6,737,667	6,561,430
Plant Consumption ⁴	1,015,935	797,580
TOTAL ⁵	80,973,021	82,938,862

Notes:

1 Statistics Canada data were compiled for the period June 1999 - May 2000, Source: Statistics Canada, Catalogue 45-004 Monthly, May 2000

2 According to Statistics Canada, approximately 75-80% of refinery-produced kerosene and stove oil are later transferred to diesel and light fuel oils.

3 Statistics Canada does not distinguish between low-sulphur and regular diesel grades.

4 Plant consumption fuel is almost all heavy fuel oil.

5 Volumes reported to Environment Canada mostly reflect production at the various refineries while Statistics Canada considers opening and closing inventories and inter-product transfers.

4.0 Volumes of Liquid Fuels Produced / Imported and Fuel Sulphur Content

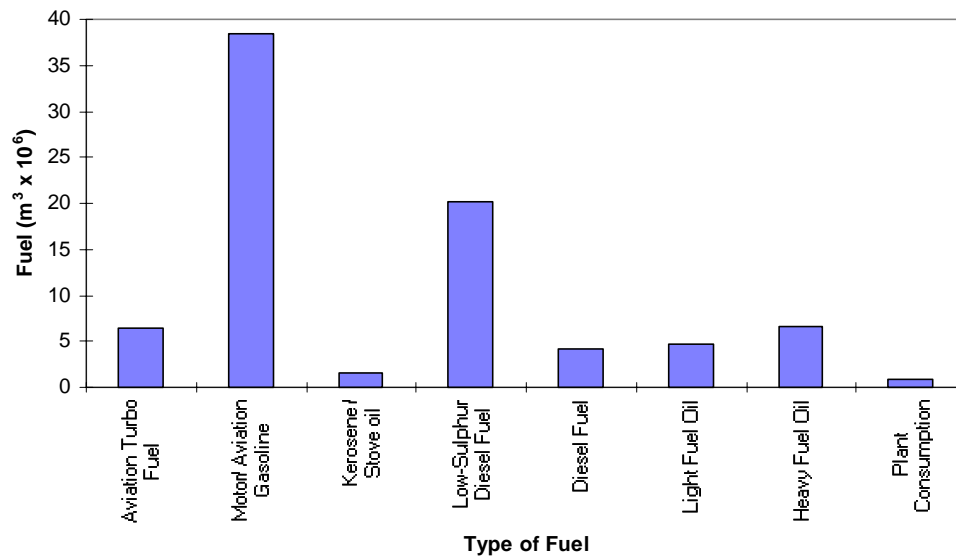
4.1 National and Regional Summaries

The following graphs and tables summarize the data compiled from reports submitted pursuant to the regulations for 2000:

- National Data for Liquid Fuels: Table 4.1, Graphs 4.1 and 4.2
- Regional Data for Liquid Fuels: Tables 4.2A-E, Graphs 4.3, 4.4, 4.5
- Refinery Data for Gasoline: Graph 4.6
- Regional Data for Gasoline: Graph 4.7
- Refinery Data for Diesel Fuel: Graph 4.8
- Historical Trends (National): Graphs 4.9 to 4.14

TABLE 4.1					
Fuel Production / Imports and Sulphur Content					
National Summary for 2000					
Type of Fuel	Fuel Production / Imports		Sulphur Mass (tonnes)	Average Sulphur Content (% wt)	Distribution of Sulphur in Products (%)
	(m³)	(in %)			
Aviation Turbo Fuel	6,519,307	7.9	3,067	0.058	1.9
Motor/Aviation Gasoline	38,473,812	46.4	8,807	0.031	5.5
Kerosene/Stove Oil	1,495,553	1.8	436	0.037	0.3
Low-Sulphur Diesel Fuel	20,179,241	24.3	5,590	0.033	3.5
Diesel Fuel	4,207,731	5.1	7,774	0.217	4.8
Light Fuel Oil	4,704,209	5.7	8,218	0.203	5.1
Heavy Fuel Oil	6,561,430	7.9	110,695	1.747	68.7
Plant Consumption	797,580	1.0	16,575	2.115	10.3
TOTAL	82,938,862	100.0	161,163	0.209	100.0

Graph 4.1: National Liquid Fuel Production / Imports



Graph 4.2: Tonnage of Sulphur in Liquid Fuels in 2000

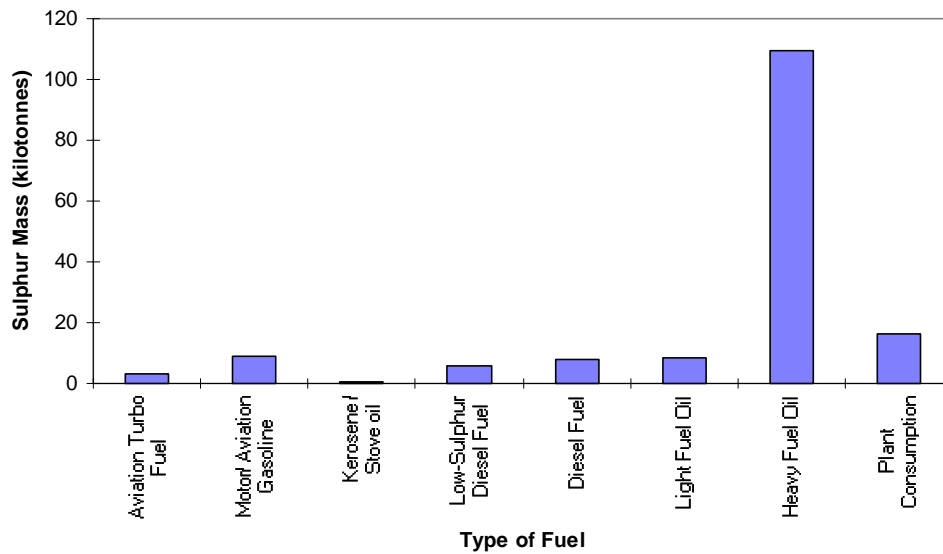


Table 4.2A : Fuel Production/Imports and Sulphur Content for 2000

Atlantic Region				
Type of Fuel	Fuel Production/Imports (m ³)	Sulphur Mass (tonnes)	Average Sulphur Content (%wt.)	Distribution of Sulphur in Products (%)
Aviation Turbo Fuel	561,731	619	0.139	0.9
Motor/Aviation Gasoline	2,732,561	539	0.027	0.8
Kerosene/Stove oil	95,403	19	0.024	0.0
Low-Sulphur Diesel Fuel	1,897,984	649	0.041	1.0
Diesel Fuel	677,886	714	0.124	1.1
Light Fuel Oil	1,411,328	1,726	0.143	2.6
Heavy Fuel Oil	2,555,795	50,609	2.155	76.9
Plant Consumption	398,654	10,954	2.701	16.6
TOTAL	10,331,342	65,828	0.687	100.0

Table 4.2B : Fuel Production/Imports and Sulphur Content for 2000

Quebec Region				
Type of Fuel	Fuel Production/Imports (m ³)	Sulphur Mass (tonnes)	Average Sulphur Content (%wt.)	Distribution of Sulphur in Products (%)
Aviation Turbo Fuel	1,200,394	495	0.051	1.3
Motor/Aviation Gasoline	9,688,322	1,917	0.027	5.2
Kerosene/Stove oil	1,276,676	388	0.038	1.1
Low-Sulphur Diesel Fuel	4,489,240	1,542	0.041	4.2
Diesel Fuel	217,547	457	0.248	1.2
Light Fuel Oil	1,870,666	3,943	0.245	10.7
Heavy Fuel Oil	1,844,582	24,791	1.329	67.2
Plant Consumption	238,715	3,381	1.598	9.2
TOTAL	20,826,143	36,916	0.187	100.0

Table 4.2C : Fuel Production/Imports and Sulphur Content for 2000

Ontario Region				
Type of Fuel	Fuel Production/Imports (m ³)	Sulphur Mass (tonnes)	Average Sulphur Content (%wt.)	Distribution of Sulphur in Products (%)
Aviation Turbo Fuel	2,173,323	958	0.054	2.5
Motor/Aviation Gasoline	12,665,287	4,170	0.045	11.1
Kerosene/Stove oil	81,973	22	0.032	0.1
Low-Sulphur Diesel Fuel	4,364,886	1,283	0.035	3.4
Diesel Fuel	1,125,219	2,831	0.297	7.5
Light Fuel Oil	1,409,062	2,543	0.208	6.7
Heavy Fuel Oil	1,386,425	23,668	1.718	62.8
Plant Consumption	159,081	2,229	1.433	5.9
TOTAL	23,365,256	37,705	0.175	100.0

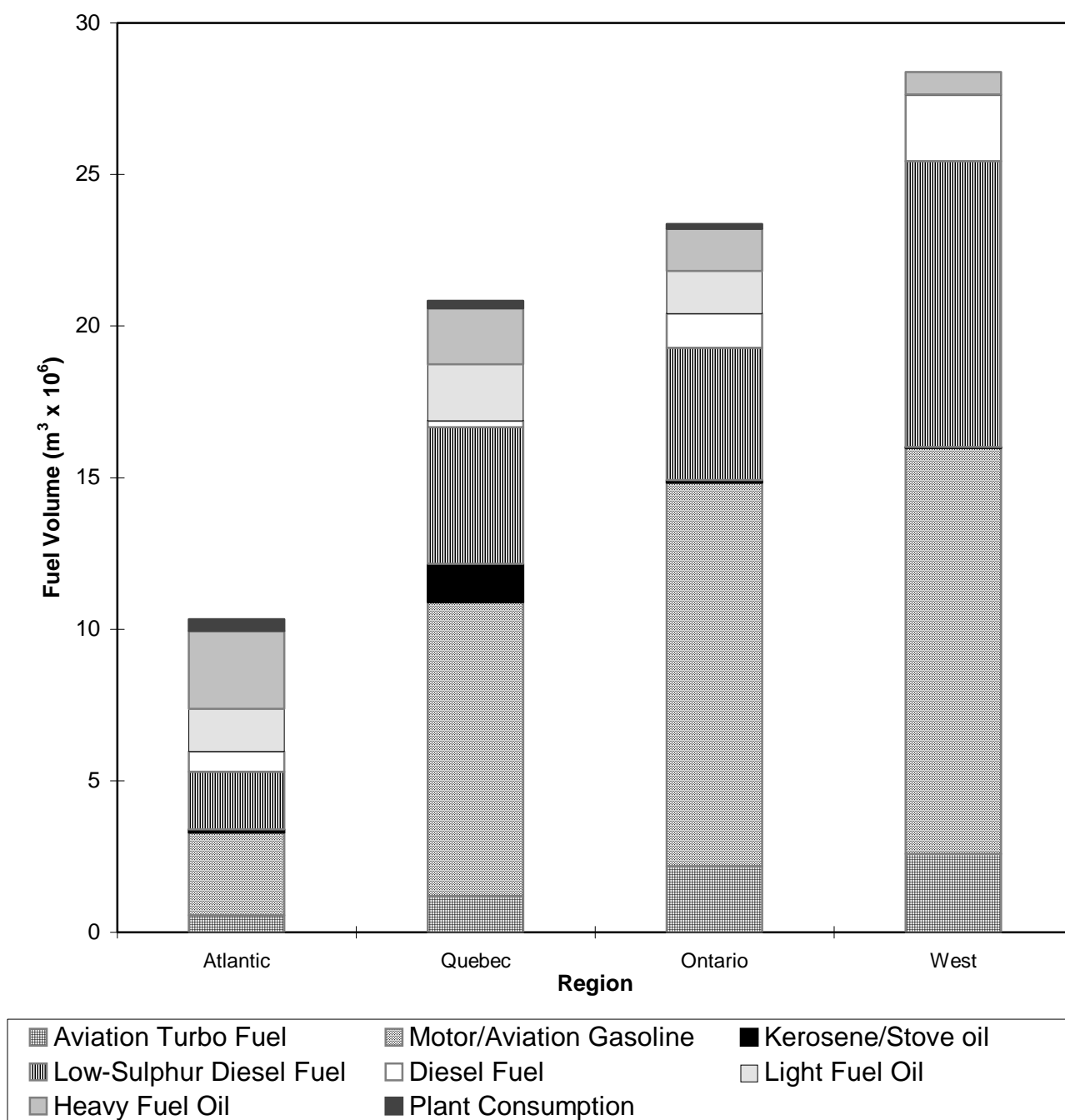
Table 4.2D : Fuel Production/Imports and Sulphur Content for 2000

West Region				
Type of Fuel	Fuel Production/Imports (m ³)	Sulphur Mass (tonnes)	Average Sulphur Content (%wt.)	Distribution of Sulphur in Products (%)
Aviation Turbo Fuel	2,583,859	994	0.047	5.1
Motor/Aviation Gasoline	13,387,642	2,181	0.022	11.1
Kerosene/Stove oil	41,501	8	0.024	0.0
Low-Sulphur Diesel Fuel	9,427,131	2,115	0.027	10.8
Diesel Fuel	2,187,079	3,772	0.201	19.3
Light Fuel Oil	13,153	7	0.062	0.0
Heavy Fuel Oil	735,626	10,492	1.370	53.6
Plant Consumption	1,130	11	1.060	0.1
TOTAL	28,377,120	19,581	0.075	100.0

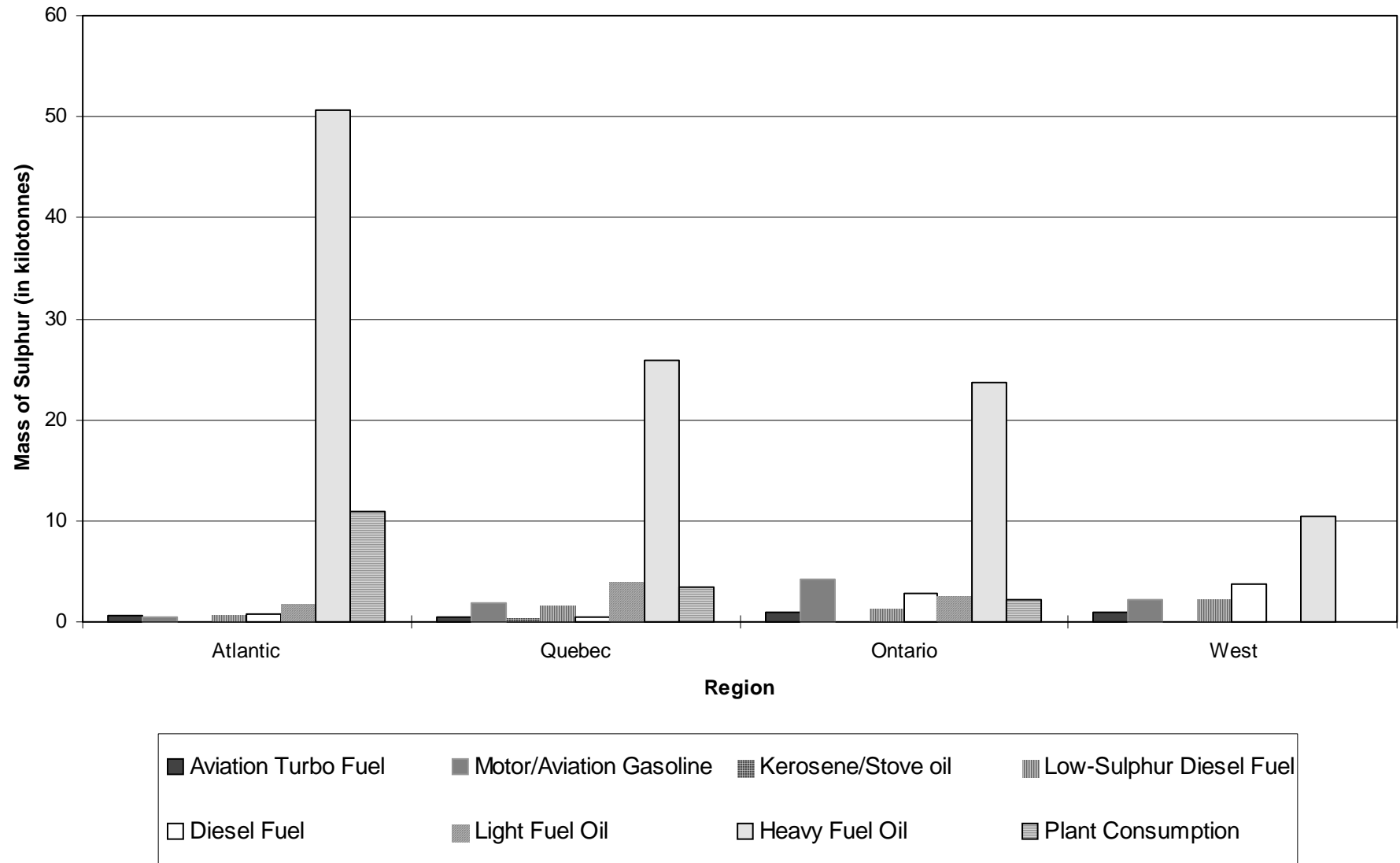
Table 4.2E : Regional and National Volume Weighted Averages of the Density of Fuels
Produced/Imported in 2000 (in kg/m³)

	Atlantic	Quebec	Ontario	West	Canada
Aviation Turbo Fuel	796.8	813.7	813.5	812.6	811.7
Motor & Aviation Gasoline	738.3	732.6	735.4	725.6	731.5
Kerosene/Stove Oil	824.9	782.3	857.9	815.9	790.1
Low-Sulphur Diesel Fuel	840.5	840.5	844.3	844.9	843.4
Diesel Fuel	851.5	849.2	846.8	859.1	854.1
Light Fuel Oil	855.0	863.6	865.4	848.3	861.5
Heavy Fuel Oil	915.3	1013.9	992.2	1037.3	973.3
Plant Consumption	1007.5	891.7	975.4	935.7	966.3

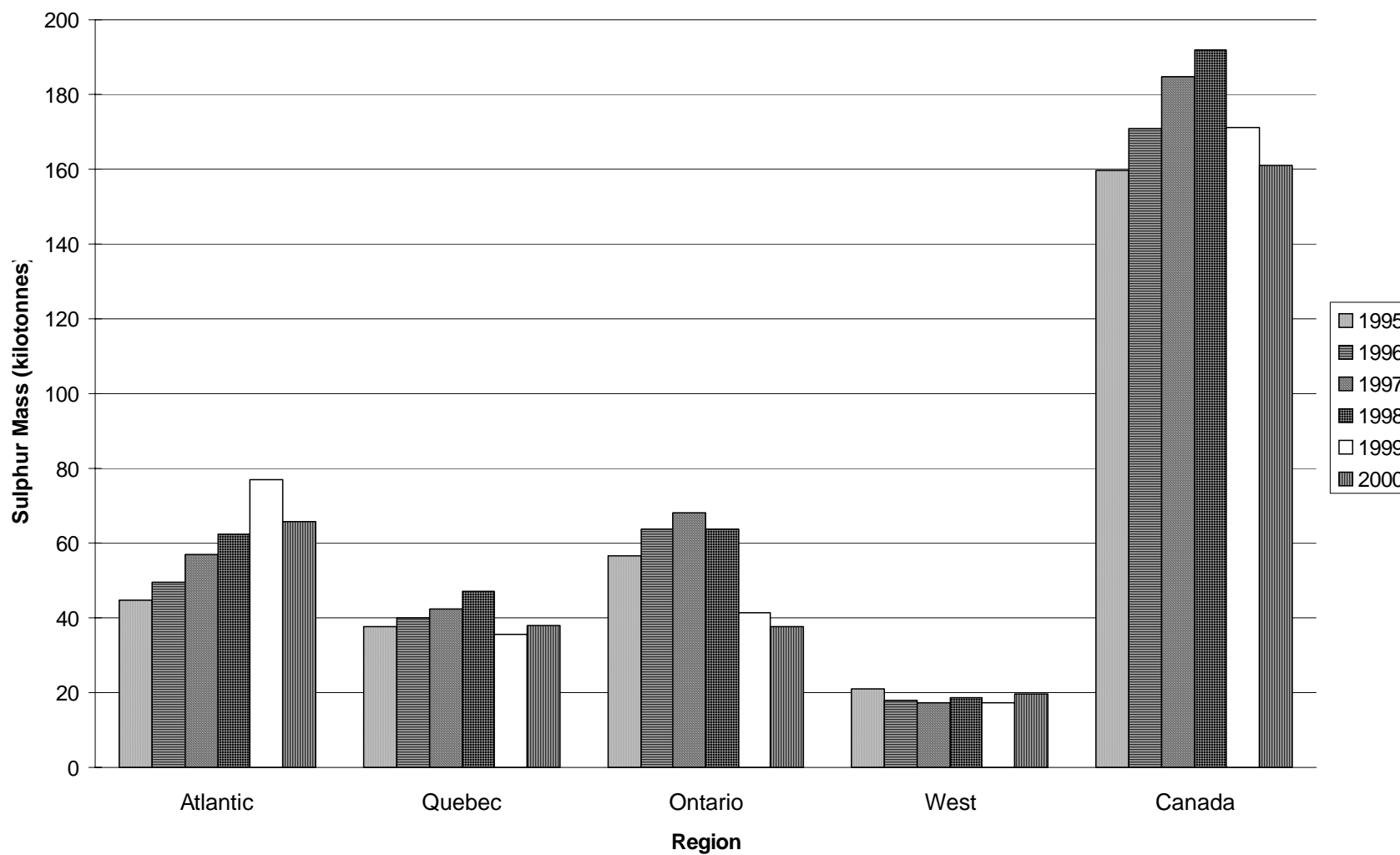
Graph 4.3 : Volumes of Liquid Fuels Produced / Imported in 2000



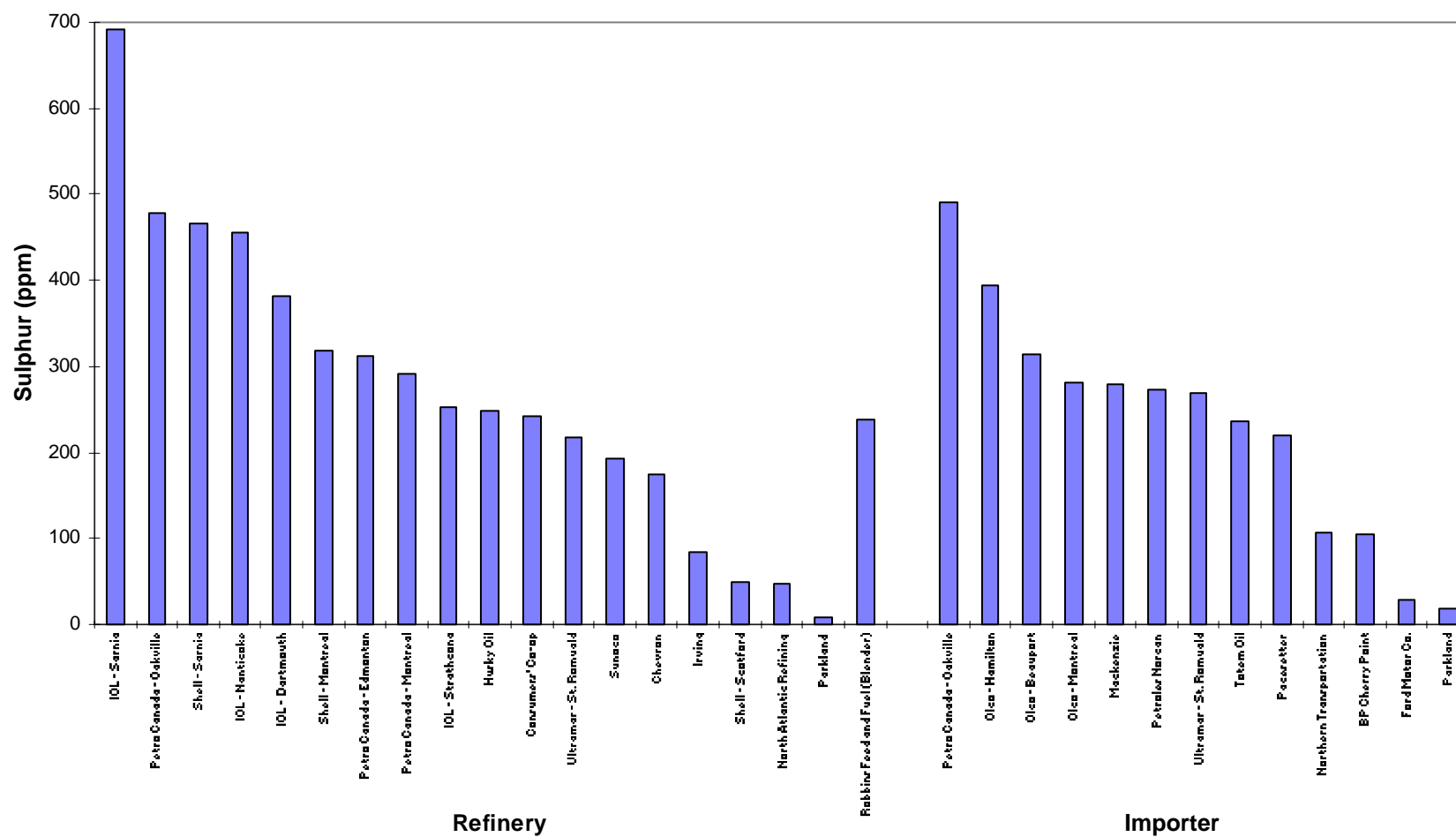
Graph 4.4 : Mass of Sulphur in Liquid Fuels Produced or Imported in 2000



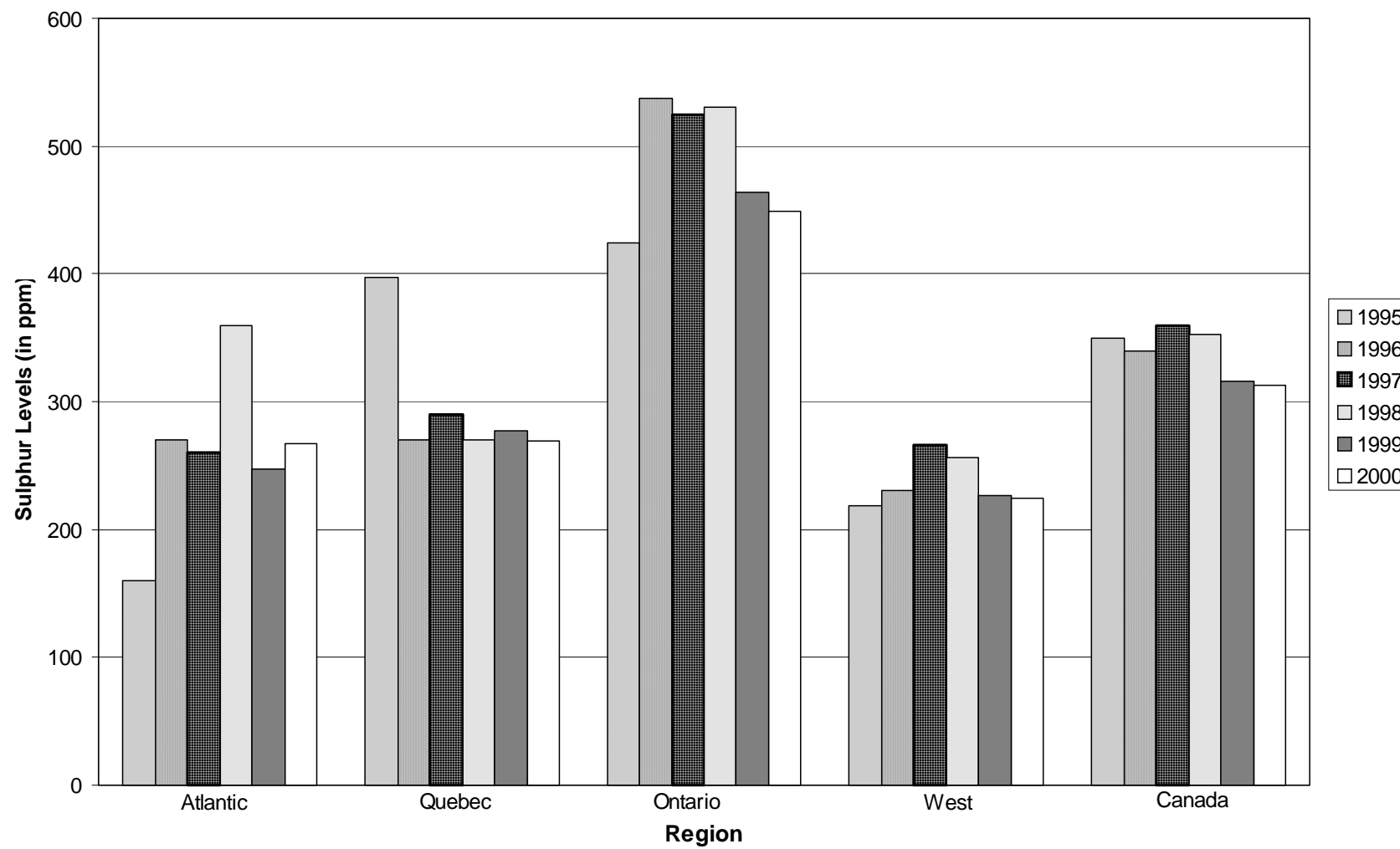
Graph 4.5 : Sulphur Mass in Liquid Fuels by Region, 1995 - 2000



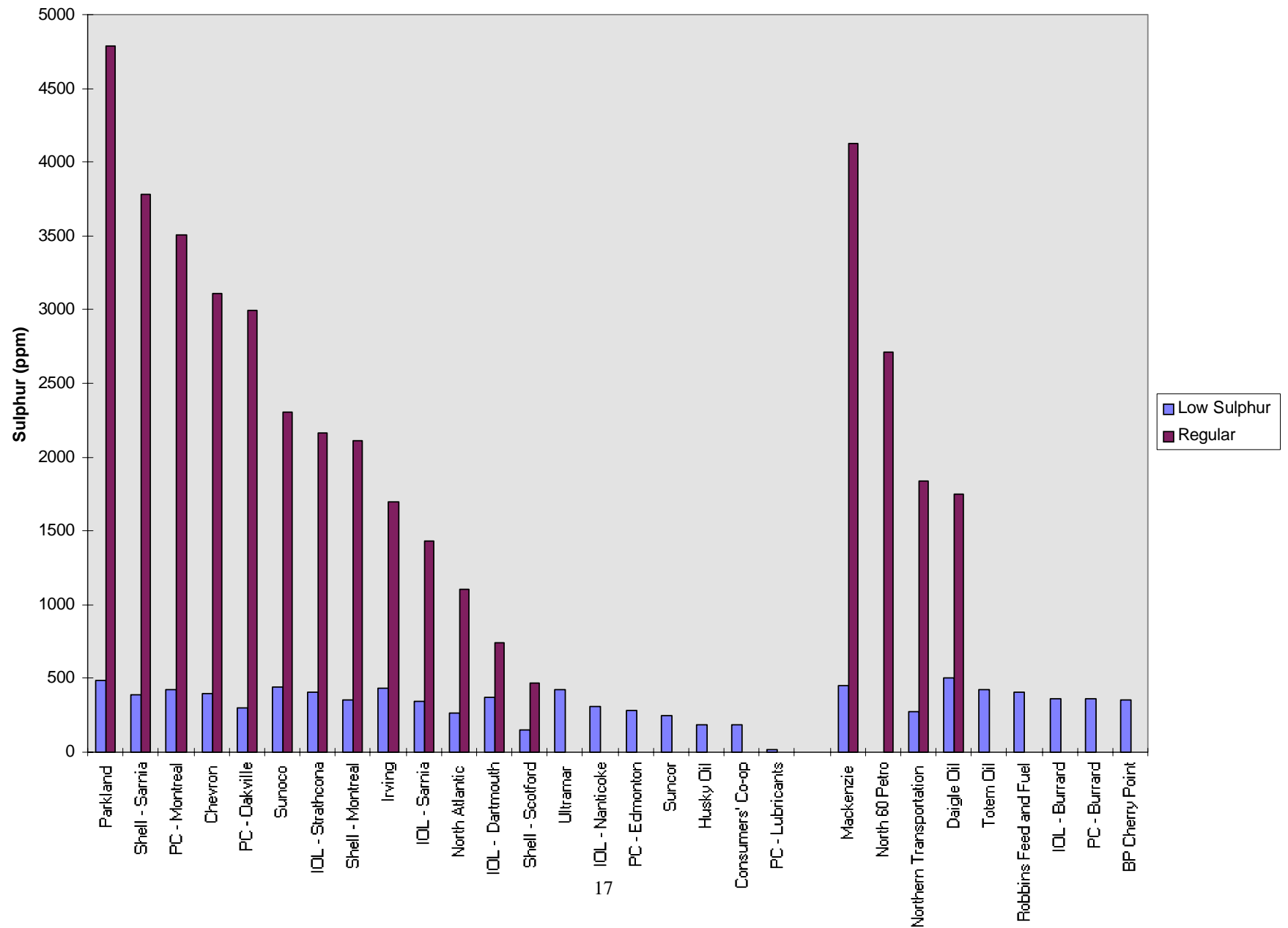
Graph 4.6: Sulphur Levels in Gasoline by Refinery / Importer in 2000



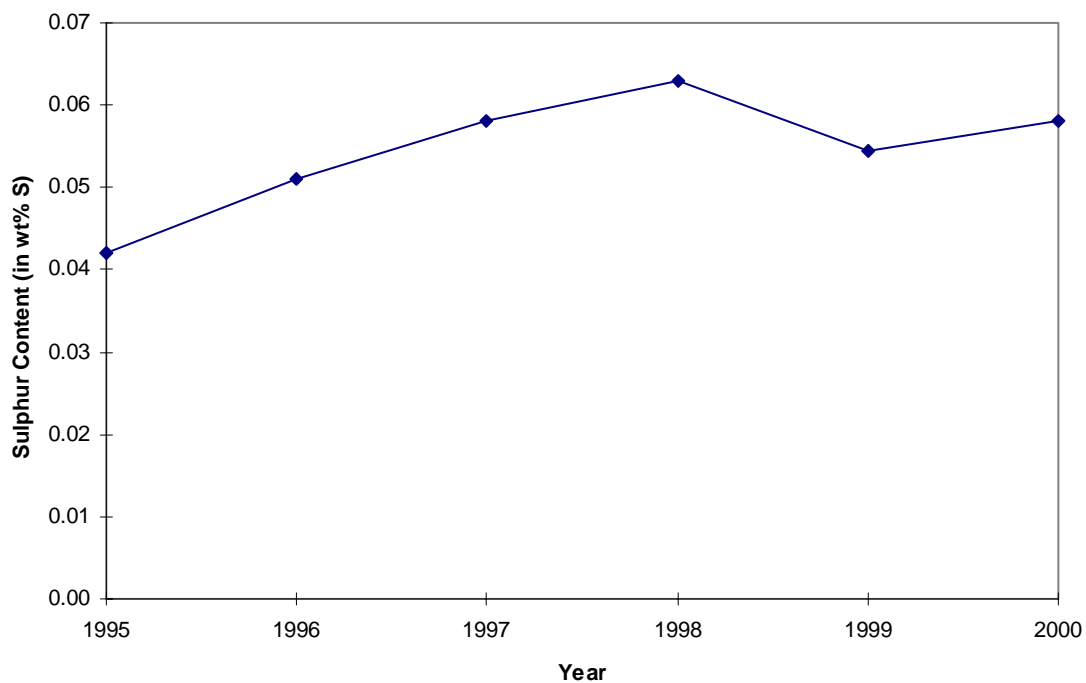
Graph 4.7 : Sulphur Levels in Gasoline by Region, 1995 - 2000



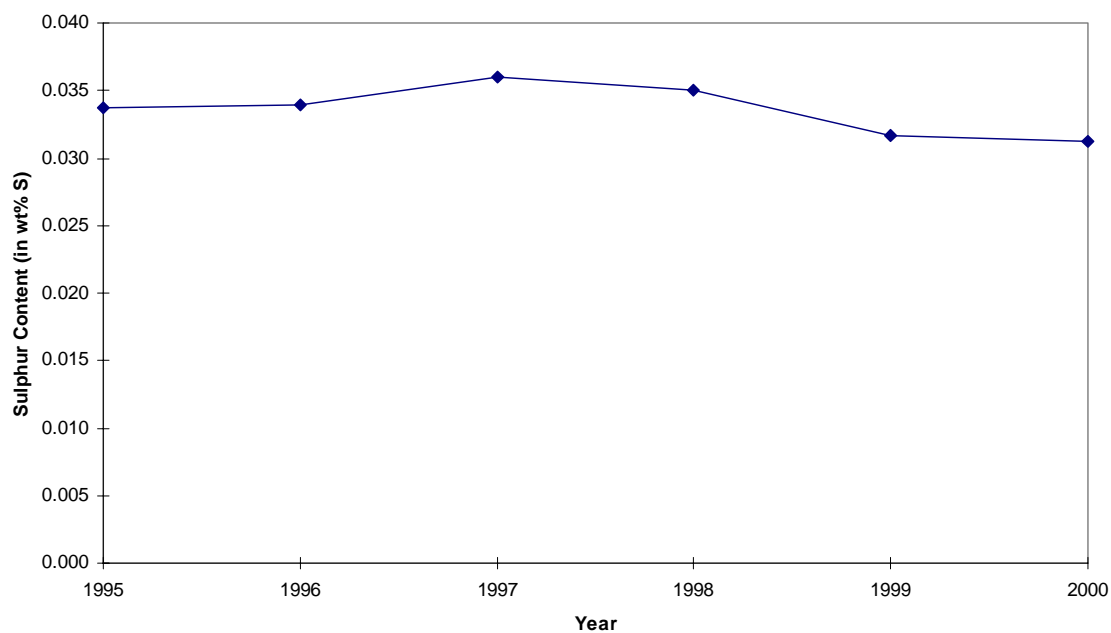
Graph 4.8: Sulphur Levels in Diesel Fuel by Refinery / Importer in 2000



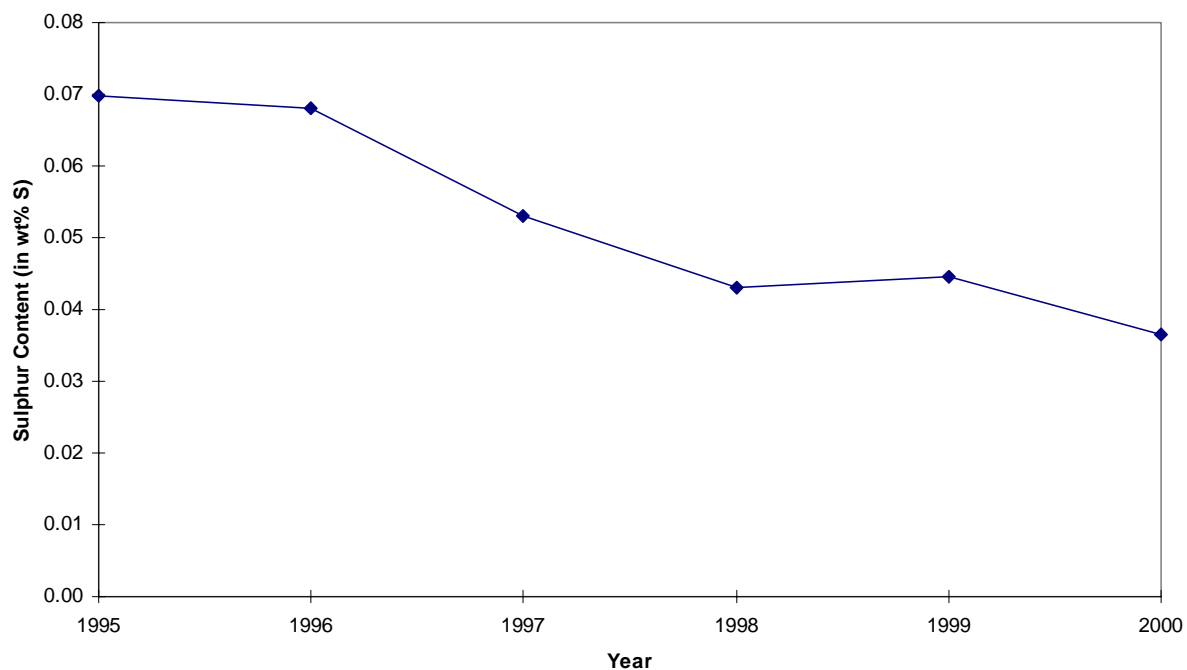
Graph 4.9 : National Trend of Sulphur Content in Aviation Turbo Fuel



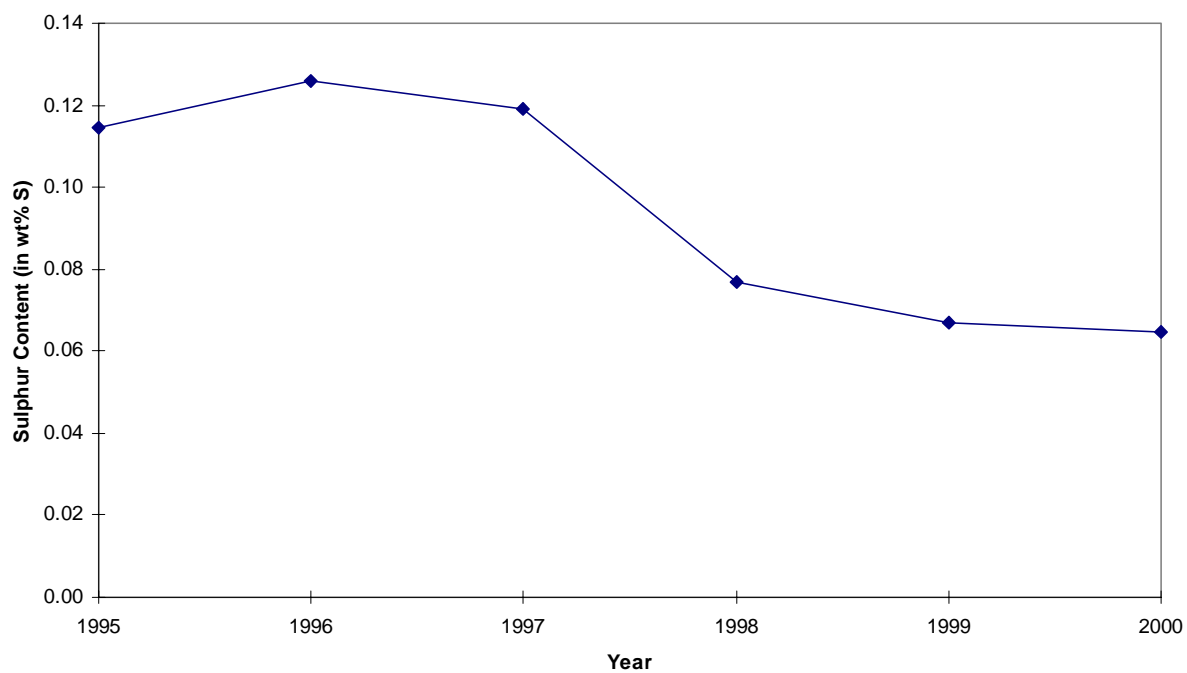
Graph 4.10: National Trend of Sulphur Content in Motor/Aviation Gasoline



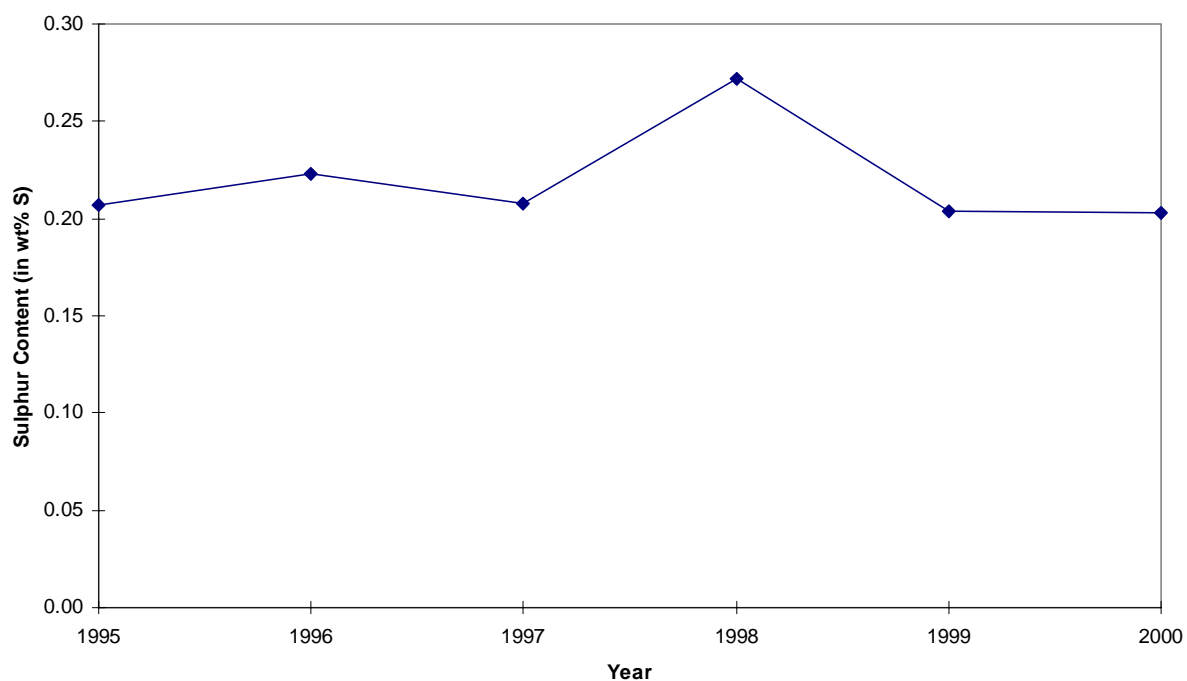
Graph 4.11 : National Trend of Sulphur Content in Kerosene/Stove Oil



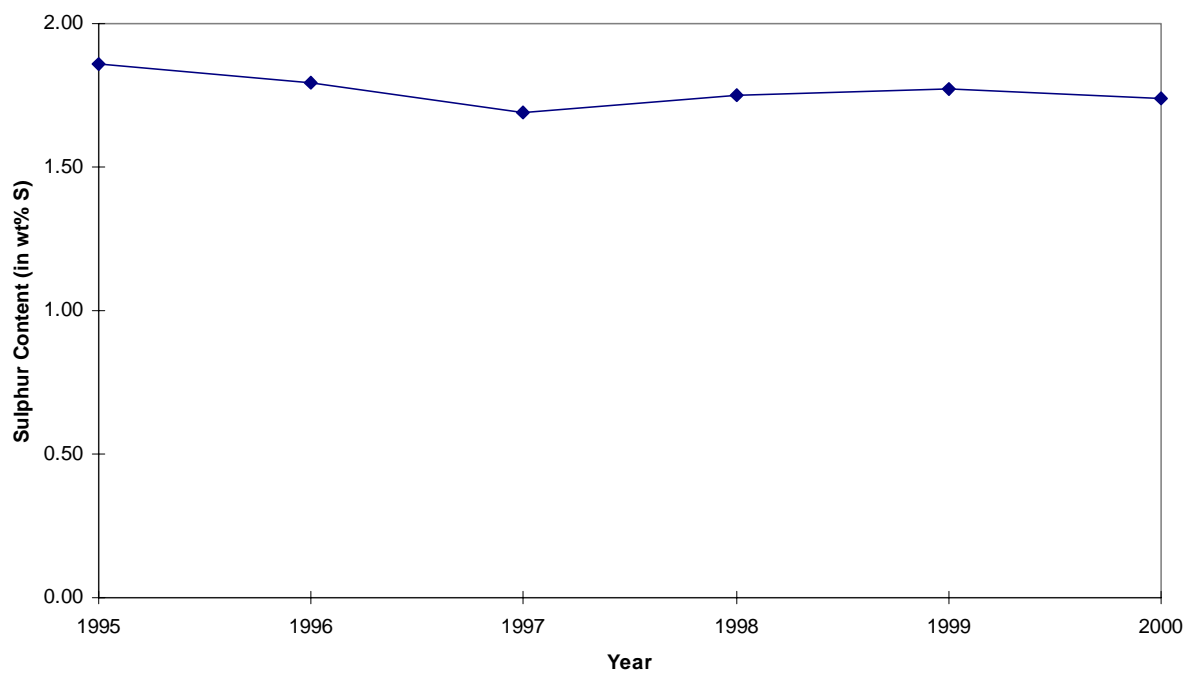
Graph 4.12 : National Trend of Sulphur Content in Diesel Fuel (Total Pool)



Graph 4.13 : National Trend of Sulphur Content in Light Fuel Oil



Graph 4.14 : National Trend of Sulphur Content in Heavy Fuel Oil



Appendix 1

Fuels Information Regulations, No. 1

Fuels Information Regulations, No. 1

1. **Short Title.** These Regulations may be cited as the *Fuels Information Regulations, No. 1*.
2. **Interpretation.** In these Regulations, “**Minister**” means the Minister of the Environment.
3. **Application.** These Regulations apply to fuels in liquid form that originate from crude oils, coal or bituminous sands.

Information. (1) Every person who produces in Canada or imports into Canada more than 400 cubic meters of a fuel named in an item of Form 1 of the schedule shall submit to the Minister, for each quarter of the calendar year during which the fuel was produced or imported, the information required by that Form.

(2) Information submitted pursuant to subsection (1) shall be submitted on or before January 31 following the end of the calendar year during which the fuel was produced or imported.

5. (1) Every person who produces in Canada or imports into Canada a fuel that contains any additive other than lead or lead compounds shall submit to the Minister, in respect of each additive not previously reported to the Minister under these Regulations, the information required by Form 2 of the schedule within sixty days of selling a cumulative total of 400 cubic meters of the fuel containing that additive within a calendar year.

(2) Where any change occurs in the information submitted by a person required by section 1, 2 or 4 of Form 2 of the schedule, that person shall, within sixty days of the change, report the change to the Minister.

SCHEDULE

Form 1 - Report on Sulphur Content

Reporting Period _____
 Company Name _____
 Facility Name _____ Telephone _____
 Facility Address _____

Fuels Produced or Imported for use or Sale in Canada

Name of Fuel	Quantity Refined, Produced or Imported (cubic meters)	API Gravity	Sulphur Content (Weight %)		
			Highest	Lowest	Weighted Average
1. Aviation Turbo Fuel					
2. Motor Gasoline					
a) lead free					
b) regular					
c) premium					
3. Kerosene and Stove Oil					
4. Diesel Oil (by type)					

5. No. 2 Light Fuel Oil
6. Heavy Fuel Oil
 - a) No. 4
 - b) No. 5
 - c) No. 6
7. Synthetic Crude (sold as fuel)
8. A fuel other than the fuels
named in items 1 to 5

_____(Signature of Authorized Company Official)
 _____(Title)
 _____(Date signed)

Form 2 - Liquid Fuel Additive Report

(To be submitted once for each fuel additive)

Fuel Manufacturer / Importer _____
 Telephone _____
 Address _____
 Additive Manufacturer _____
 Telephone _____
 Address _____

1. Type of Fuel _____
 Brand Name of Additive _____
 Purpose of Additive _____
 Quantity Used Annually _____

2. Fuel Additive Concentration (mg/L)

Highest	Lowest	Weighted Average
_____	_____	_____

3. Composition of Fuel Additive

Complete either paragraph (a) or (b) or attach a copy of a letter from the fuel additive manufacturer attesting to the fact that the information required by paragraph (a) or (b) has been forwarded to Environment Canada.

(a) Chemical name of each Approx. % by weight Constituent

(b) Element Approx. % by weight

Carbon
 Hydrogen
 Oxygen

(list other elements that individually account for more than 0.1% of the additive weight)

Appendix 2

Sample of Form 1,
“Report on Sulphur Content in Liquid Fuels”



Environment
Canada

Environnement
Canada

REPORT ON SULPHUR CONTENT OF LIQUID FUELS

QUARTER: _____ YEAR: _____

This report should be submitted:

- by January 31st for each quarter separately of the preceding calendar year, **unless** per notice below.
- by every person who during the calendar year has produced or imported over 400 cubic meters of petroleum fuels for use in Canada.
(No minimum for diesel fuel)
- for the purpose of informing the Minister of Environment Canada.
- to:

Notice: 30 days after the last day of each quarter if this form includes information scheduled under section 4(1) of the Diesel Fuel Regulations.

This form is provided for your convenience. Please refer to the Canadian Environmental Protection Act, Fuels Information Regulation No.1, Diesel Fuel Regulations for information on compliance with the requirements for reporting on sulphur content of liquid fuels.

FUELS PRODUCED OR IMPORTED FOR USE OR SALE IN CANADA

Company						
Facility Name:						
Facility Address:						
Type of Liquid Fuel	Volume (m ³)		Density (Kg/m ³) or API Gravity	Sulphur Content (weight %)		
	Produced	Imported		Min.	Max.	Volume Weighted Avg.
1 Aviation Turbo Fuel						
1.1 Jet A						
1.2 Jet B						
2 Gasoline						
2.1 Regular						
2.2 Mid-Grade						
2.3 Premium						
2.4 Aviation						
3 Kerosene and Stove Oil						
4 Diesel Fuel	Produced	Sold	Imported	Sold		
4.1 S < 0.05 wt%						
4.2 S > 0.05 wt%						
5 Light Fuel Oil						
6 Heavy Fuel Oil						
6.1 Number 4						
6.2 Number 5						
6.3 Number 6						
7 Other: specify (including Plant Consumption and Synthetic Crude used as a fuel)						
Authorized Company Official: (Please Print)	Title:		Signature:			
Telephone Number:	Fax Number:		Date:			

Revised : March 2000

REPORT ON SULPHUR CONTENT OF LIQUID FUELS

INSTRUCTIONS

1. Please use this form only and do not create or substitute another. If additional space is required for fuel information, make extra copies of the form.
2. For the column headings: "Volume (m³) - Produced, Imported", enter the number for the gross production of the liquid fuel. Do not include inter-product transfers of the liquid fuel.

LIQUID FUEL DEFINITIONS

Aviation Turbo Fuel

All kerosene-type (Jet A) and naphtha/wide-cut type (Jet B) fuels for turbo-jet or straight-jet type aircraft engines.

Gasoline

All gasoline-type fuels for internal combustion engines including aviation gasoline.

Kerosene and Stove Oil

Kerosene, mineral lamp oil, stove oil, type 1 fuel oil including all fuels intended for atomizing burners.

Diesel Fuel

All grades of distillate fuel suitable for diesel engines.

No. 2 Light Fuel Oil

Distillate fuel intended for use in most atomizing-type burner applications.

Heavy Fuel Oil

Fuel oils are heating fuel oil - type 4,5,and 6 containing residual components and include bunker C.

Other:

- plant consumption: liquid fuels used onsite or in company operations and not accounted for in items 1 to 6. Data should be provided for each fuel type using the definitions listed above.
- synthetic crude used as a fuel
- does not include gases

Appendix 3

Volume Weighted Annual Sulphur
Levels by Refiner for 1995 to 2000

Table A3.1 : Volume Weighted Annual Sulphur Level in Gasoline

	Name	City	Sulphur Levels (parts per million by weight)					
			1995	1996	1997	1998	1999	2000
Refiners	Chevron	Burnaby	215	273	294	246	199	174
	Consumer's Co-op	Regina	97	179	103	148	187	242
	Husky Oil	Prince George	183	261	225	282	170	248
	Imperial Oil	Dartmouth	365	419	374	491	329	382
	Imperial Oil	Sarnia	728	787	712	792	694	693
	Imperial Oil	Nanticoke	340	506	530	529	450	456
	Imperial Oil	Strathcona	239	243	346	297	272	252
	Irving Oil Limited	Saint-John	71	35	43	129	96	85
	North Atlantic Refining Ltd.	Come-by-Chance	38	75	118	76	55	47
	Nova	Sarnia	-	-	-	-	-	-
	Parkland	Bowden	0	1	1	4	4	8
	Petro-Canada	Montreal	472	356	387	316	367	292
	Petro-Canada	Oakville	528	489	519	514	523	479
	Petro-Canada	Edmonton	360	380	394	377	311	311
	Petro-Canada Lubricants	Mississauga	-	-	-	-	-	-
	Shell	Montreal	392	319	333	312	269	318
	Shell	Sarnia	553	579	582	567	453	466
	Shell	Scotford	50	50	50	50	50	50
	Suncor	Fort McMurray	-	-	-	-	-	-
	Sunoco	Sarnia	368	276	298	301	209	192
	Syncrude	Fort McMurray	-	-	-	-	-	-
Importers	Ultramar	St-Romuald	219	174	186	171	173	218
	Robbins Feed & Fuel (Blender)	Thorold	#	#	#	137	271	239
	BP Cherry Point	Blaine	#	#	#	70	103	105
	Delta Western Fuel (Totem Oil)	Whitehorse	#	#	#	610	73	236
	Ford Motor Company	Ontario	#	#	#	-	-	28
	Husky Oil	Prince George	#	#	#	80	-	-
	Imperial Oil	Burnaby	#	#	#	210	-	-
	Imperial Oil	Montreal	#	#	#	-	340	-
	Mackenzie Petroleum	Dawson City	#	#	#	170	301	280
	Murphy Oil USA	Superior	#	#	#	540	430	-
	Northern Transportation	Iqaluit	#	#	#	100	310	107
	Olco Petroleum Group	Quebec	#	#	#	457	511	299
	Olco Petroleum Group	Hamilton	#	#	#	410	540	394
	PaceSetter Enterprises	Whitehorse	#	#	#	-	246	220
	Parkland	Bowden	#	#	#	110	18	18
	Petro-Canada	Montreal	#	#	#	340	360	-
	Petro-Canada	Oakville	#	#	#	610	520	490
	Petro-Canada	Port Moody	#	#	#	210	321	-
	Petroles Norcan	Montreal	#	#	#	470	560	273
	Robbins Feed & Fuel	Thorold	#	#	#	140	270	-
	TransCanada Energy	Calgary	#	#	#	100	500	-
	Ultramar	St-Romuald	#	#	#	120	300	270
National Average			345	340	360	354	320	310

Not part of ATI requests.

Table A3.2 : Volume Weighted Annual Sulphur Level in Low-Sulphur Diesel

	Name	City	Sulphur Levels (parts per million by weight)					
			1995	1996	1997	1998	1999	2000
	Chevron	Burnaby	350	390	380	400	400	400
	Consumer's Co-op	Regina	200	270	250	230	220	190
	Husky Oil	Prince George	140	200	200	210	190	190
	Imperial Oil	Dartmouth	340	360	390	400	330	370
	Imperial Oil	Sarnia	-	-	420	290	410	350
	Imperial Oil	Nanticoke	-	-	160	290	280	310
	Imperial Oil	Strathcona	290	400	410	380	430	400
	Irving Oil Limited	Saint-John	400	400	440	450	440	430
	North Atlantic Refining Ltd.	Come-by-Chance	-	-	490	130	330	260
	Nova	Sarnia	-	-	-	-	-	-
Refiners	Parkland	Bowden	-	-	-	-	-	-
	Petro-Canada	Montreal	340	420	330	400	400	430
	Petro-Canada	Oakville	-	-	170	320	300	300
	Petro-Canada	Edmonton	190	220	210	230	240	280
	Petro-Canada Lubricants	Mississauga	10	20	20	20	20	20
	Shell	Montreal	390	370	210	280	360	350
	Shell	Sarnia	330	340	360	360	370	390
	Shell	Scotford	50	80	100	210	140	150
	Suncor	Fort McMurray	70	90	140	160	200	250
	Sunoco	Sarnia	340	300	370	460	450	440
	Syncrude	Fort McMurray	-	-	-	-	-	-
	Ultramar	St-Romuald	450	380	400	410	430	420
	Robbins Feed & Fuel (Blender)	Thorold	#	#	#	-	-	410
	BP Cherry Point	Blaine	#	#	#	380	380	360
	Daigle Oil	Edmundston	#	#	#	-	-	500
	Delta Western Fuel (Totem Oil)	Whitehorse	#	#	#	160	400	430
	Husky Oil	Prince George	#	#	#	380	-	-
	Imperial Oil	Burnaby	#	#	#	230	-	360
	Mackenzie Petroleum	Dawson City	#	#	#	300	400	450
	Murphy Oil USA	Superior	#	#	#	270	270	-
Importers	Northern Transportation	Iqaluit	#	#	#	20	210	270
	Olco Petroleum Group	Beauport	#	#	#	400	310	-
	Olco Petroleum Group	Montreal	#	#	#	-	310	-
	Parkland	Bowden	#	#	#	400	500	480
	Petro-Canada	Montreal	#	#	#	390	400	400
	Petro-Canada	Oakville	#	#	#	310	-	-
	Petro-Canada	Port Moody	#	#	#	-	-	360
	Petroles Norcan	Montreal	#	#	#	450	450	-
	Ultramar	St-Romuald	#	#	#	410	430	410
	National Average		210	260	270	310	320	330

*Report Plant Consumption only

Not part of ATI requests.

Table A3.3 : Volume Weighted Annual Sulphur Level in Regular Diesel

	Name	City	Sulphur Levels (parts per million by weight)					
			1995	1996	1997	1998	1999	2000
	Imperial Oil	Dartmouth	2,010	1,460	1,840	890	510	740
	Chevron	Burnaby	1,680	2,670	4,140	3,750	4,050	3,110
	Consumer's Co-op	Regina	-	-	-	-	-	-
	Husky Oil	Prince George	570	580	-	-	-	-
	Imperial Oil	Sarnia	660	690	-	-	-	1,430
	Imperial Oil	Nanticoke	3,480	3,880	4,300	-	-	-
	Imperial Oil	Strathcona	1,820	2,100	1,980	2,100	2,140	2,170
	Irving Oil Limited	Saint-John	1,820	1,840	1,750	2,150	1,700	1,690
	North Atlantic Refining Ltd.	Come-by-Chance	2,320	1,270	1,100	4,220	-	1,100
	Nova	Sarnia	-	-	-	-	-	-
Refiners	Parkland	Bowden	5,650	5,680	4,620	4,730	3,880	4,820
	Petro-Canada	Montreal	2,910	3,720	3,540	2,430	5,330	3,510
	Petro-Canada	Oakville	3,570	3,500	3,810	3,720	3,160	2,990
	Petro-Canada	Edmonton	-	-	-	-	-	-
	Petro-Canada Lubricants	Mississauga	-	-	-	-	-	-
	Shell	Montreal	2,060	2,230	1,900	3,020	2,470	2,110
	Shell	Sarnia	4,050	4,040	4,200	4,090	3,720	3,780
	Shell	Scotford	-	-	270	-	480	470
	Suncor	Fort McMurray	-	-	-	-	-	-
	Sunoco	Sarnia	1,290	1,620	2,370	2,650	2,010	2,300
	Syncrude	Fort McMurray	-	-	-	-	-	-
	Ultramar	St-Romuald	800	760	860	-	-	-
	Daigle Oil	Edmundston	#	#	#	-	-	1,750
	Mackenzie Petroleum	Dawson City	#	#	#	4,730	3,730	4,130
	Murphy Oil USA	Superior	#	#	#	2,900	820	-
Importers	North 60 Petro	Whitehorse	#	#	#	-	-	2,710
	Northern Transportation	Iqaluit	#	#	#	800	-	1,840
	Parkland	Bowden	#	#	#	4,730	3,500	4,780
	Petro-Canada	Oakville	#	#	#	3,700	2,510	3,030
	Petro-Canada	Port Moody	#	#	#	-	490	-
	National Average		2,150	2,360	2,580	2,990	2,300	2,170

Not part of ATI requests.

Table A3.4 : Volume Weighted Annual Sulphur Level in Light Fuel Oil

	Name	City	Sulphur Levels (parts per million by weight)					
			1995	1996	1997	1998	1999	2000
	Imperial Oil	Dartmouth	2,125	2,004	1,928	1,360	940	1,230
	Chevron	Burnaby	-	-	-	-	-	-
	Consumer's Co-op	Regina	-	-	-	-	-	-
	Husky Oil	Prince George	-	-	514	599	590	600
	Imperial Oil	Sarnia	1,668	1,803	1,417	2,260	1,830	1,690
	Imperial Oil	Nanticoke	2,950	3,189	3,327	1,791	2,000	1,950
	Imperial Oil	Strathcona	-	-	-	-	-	-
	Irving Oil Limited	Saint-John	-	-	1,731	2,080	1,770	1,660
	North Atlantic Refining Ltd.	Come-by-Chance	-	-	-	-	-	-
	Nova	Sarnia	1,520	1,450	1,550	1,850	1,770	1,450
Refiners	Parkland	Bowden	-	-	-	-	-	-
	Petro-Canada	Montreal	2,577	3,591	2,753	3,336	3,360	3,470
	Petro-Canada	Oakville	3,642	4,069	3,663	4,253	4,120	3,650
	Petro-Canada	Edmonton	-	-	-	-	-	-
	Petro-Canada Lubricants	Mississauga	-	-	-	-	-	-
	Shell	Montreal	2,357	2,256	2,784	2,837	2,720	2,770
	Shell	Sarnia	3,000	-	-	-	-	-
	Shell	Scotford	-	-	-	-	-	-
	Suncor	Fort McMurray	-	-	-	-	-	-
	Sunoco	Sarnia	1,591	1,758	2,144	2,578	2,190	2,960
	Syncrude	Fort McMurray	-	-	-	-	-	-
	Ultramar	St-Romuald	1,120	1,281	1,355	2,231	1,810	1,630
	Daigle Oil	Edmundston	#	#	#	-	-	3,000
	Olco Petroleum Group	Montreal	#	#	#	-	2,300	-
Importers	Olco Petroleum Group	Beauport	#	#	#	-	2,300	-
	Petro-Canada	Oakville	#	#	#	3,880	3,880	-
	North 60 Petro	Whitehorse	#	#	#	1,000	1,000	1,000
	National Average		1,980	2,150	2,000	2,270	2,030	2,030

Not part of ATI requests.

Table A3.5 : Volume Weighted Annual Sulphur Level in Heavy Fuel Oil

	Name	City	Sulphur Levels (parts per million by weight)					2000
			1995	1996	1997	1998	1999	
	Chevron	Burnaby	14,663	17,832	15,153	15,107	17,880	-
	Consumer's Co-op	Regina	8,313	12,315	11,207	8,986	8,870	10,640
	Husky Oil	Prince George	26,300	16,636	13,800	19,549	20,340	17,200
	Imperial Oil	Dartmouth	14,698	13,590	12,664	15,820	13,540	14,130
	Imperial Oil	Sarnia	21,970	20,153	21,840	22,530	19,900	17,980
	Imperial Oil	Nanticoke	23,022	23,325	25,815	27,319	22,780	17,030
	Imperial Oil	Strathcona	15,302	15,080	15,493	13,697	12,660	12,930
	Irving Oil Limited	Saint-John	20,850	18,612	18,396	18,409	17,800	16,270
	North Atlantic Refining Ltd.	Come-by-Chance	17,876	22,302	28,323	26,460	28,070	28,410
	Nova	Sarnia	11,840	11,990	13,520	14,690	13,870	11,750
Refiners	Parkland	Bowden	-	-	-	-	-	-
	Petro-Canada	Montreal	20,644	22,130	21,072	19,730	15,450	18,810
	Petro-Canada	Oakville	14,702	15,029	15,848	16,099	14,270	14,240
	Petro-Canada	Edmonton	23,009	26,568	25,890	23,736	22,160	24,500
	Petro-Canada Lubricants	Mississauga	-	-	-	-	-	-
	Shell	Montreal	17,723	19,447	18,230	17,679	15,960	14,210
	Shell	Sarnia	25,835	27,398	28,326	26,485	25,130	25,540
	Shell	Scotford	-	-	-	-	-	-
	Suncor	Fort McMurray	-	-	-	-	-	-
	Sunoco	Sarnia	17,317	18,351	20,169	20,539	17,220	20,240
	Syncrude	Fort McMurray	-	-	-	-	-	-
	Ultramar	St-Romuald	8,324	10,070	11,361	11,440	11,100	10,990
	Fraser Papers	Edmundston	#	#	#	-	4,280	3,980
	Kildair Services	Tracy	#	#	#	4,150	8,290	18,080
	Marine Petrobulk	North Vancouver	#	#	#	-	-	17,920
	Murphy Oil USA	Superior	#	#	#	45,710	18,230	-
Importers	New Brunswick Power	Fredericton	#	#	#	27,360	27,820	27,800
	Newfoundland & Labrador Hydro	St. John's	#	#	#	19,960	19,940	20,970
	North 60 Petro	Whitehorse	#	#	#	6,530	3,440	2,430
	Nova Scotia Power	Halifax	#	#	#	27,030	25,990	26,810
	Pope and Talbot	Nanaimo	#	#	#	-	-	10,600
	Vancouver General Hospital	North Vancouver	#	#	#	-	-	10,600
	Western Pulp	Port Alice	#	#	#	-	-	14,510
	National Average		16,761	17,300	17,250	17,220	17,710	17,400

Not part of ATI requests.

Appendix 4

Canadian General Standards Board Standards for
Sulphur Content in Fuels

**Appendix 4: Canadian General Standards Board
Standards for Sulphur Content in Fuels**

<u>Specification Number</u>	<u>Fuel Category</u>	<u>Maximum Sulphur Content</u> <u>(% mass)</u>
CAN/CGSB-3.5-99 CAN/CGSB-3.25-94	Gasoline Unleaded, Automotive Aviation	0.10 0.05
CAN/CGSB-3.23-97 CAN/CGSB-3.22-97	Aviation Turbo Fuel Kerosene Type (Jet A, A-1, F-34) Wide Cut Type (Jet b, F-40)	0.30 0.40
CAN/CGSB-3.3-99	Kerosene Type No. 1-K Type No. 2-K	0.04 0.30
CAN/CGSB-3.6-M90 CAN/CGSB-3.517-2000	Diesel Fuel Regular Sulphur - Type A Regular Sulphur - Type B Automotive Low Sulphur	0.30 0.50 0.05
CAN/CGSB-3.16-99	Mining Diesel Fuel Special Special - Low Sulphur	0.25 0.05
CAN/CGSB-3.2-99	Fuel Oil, Heating Type Type 0 Type 1 Type 2 Type 4 Type 5 Type 6	0.30 0.50 0.50 no limit no limit no limit
3-GP-11c (1996) 3-GP-15Mb (1989)	Fuel, Naval Distillate -6° C Pour Point -18° C Pour Point	0.50 1.00
3-GP-12Ma	Fuel Oil, Marine Boiler	3.50
CAN/CGSB-3.27-M89	Naphtha Fuel Type 1 Type 2	5 mg/kg 500 mg/kg
3-GP-24c (1989)	Aviation Fuel High Flash Type	0.40
CAN/CGSB-3.18-2000	Diesel Fuel for Locomotive Type Medium Speed Diesel Engines	0.50

Appendix 5

Maximum Sulphur Content in Fuel Oils Provincial Regulations and By-Laws

Appendix 5: Maximum Sulphur Content in Fuel Oils Provincial Regulations and By-Laws

Province	Regulation/By-Law	Regulation Adoption	Maximum Sulphur Content (% mass)
Canada	<i>Canadian Environmental Protection Act 1999,</i> Diesel Fuel Regulations Sulphur in Gasoline Regulation	1998, amended 2000 1999	0.05 0.015 avg/0.03cap(2002-04) ¹ 0.003 avg/0.008cap(2005) ¹
New Brunswick	<i>Clean Air Act,</i> Air Quality Regulation	1983, amended 1990 & 1998	#1 - 0.5 #2 - 0.5 #4 - 1.5 #5 - 2.0 #6b - 3.0 #6c - 3.0
Quebec	<i>Petroleum Products and Equipment Act,</i> Petroleum Products Regulation	1991 amended 1996, 1998 & 1999	Gasoline: Grades 1,2,3,4 - 0.15 Diesel: Type AA - 0.2 Types A,B,C,D,E - 0.5 Heating Oil: Type 00 - 0.2 Types 0,1,2 - 0.5
	By-Law 90, Montreal Urban Community	1987	1.0-1.5
Ontario	<i>Environmental Protection Act,</i> Regulation 361, Sulphur Content of Fuels	1970 amended 1980, 1990 & 1999 (effective in Metro Toronto only)	#1 - 0.5 #2 - 0.5 #4 - 1.5 #5 - 1.5 #6b - 1.5 #6c - 1.5
	<i>Environmental Protection Act,</i> Boilers Regulation	1986 amended 1999	1.0
British Columbia	<i>Waste Management Act,</i> Sulphur Content of Fuel Regulation	1989	1.1
	<i>Waste Management Act,</i> Diesel Fuel Regulation	1994 (effective for on-road diesel only)	0.05
	<i>Waste Management Act,</i> Cleaner Gasoline Regulation	1995 -effective 1999 in Southwest B.C., -effective 2000 for the rest of B.C.	0.015 ² 0.020 ²

¹ Has various options - see regulation for details.

² Annual limit, also can use the U.S. Complex Model to provide equivalent emission levels.

Appendix 6

Comparison of Average Sulphur Content from the 2000 Liquid Fuels Report
with the Limits Set Forth by the Canadian General Standards Board and
the Provincial Regulations

Appendix 6: Comparison of 2000 Liquid Fuel Average Sulphur Levels and Standards Set Forth by the Canadian General Standards Board and the Provincial Regulations

1) Average Sulphur Content (%) in the Liquid Fuels Report Versus the Standards Set Forth by the CGSB

Type of Fuel	Sulphur Content (%) in Liquid Fuels Report (2000)	CGSB (%)
Aviation Turbo Fuel	0.058	0.3 - Jet A 0.4 - Jet B
Motor And Aviation Gasoline	0.031	0.10 - Leaded/Unleaded 0.05 - Aviation
Kerosene/Stove Oil	0.037	0.04 - Type No. 1-K 0.30 - Type No. 2-K
Low Sulphur Diesel Fuel	0.033	0.05
Diesel Fuel	0.217	0.30 - Type A 0.50 - Type B
Light Fuel Oil	0.203	0.50
Heavy Fuel Oil	1.740	No Limits

2) Average Sulphur Content (%) in the Liquid Fuels Report for Heavy Fuel Oil Versus the Limits Set Forth by Provincial Regulations

Region	Sulphur Content (%) in Heavy Fuel Oil (2000)	Provincial Regulations	
		Province	Sulphur Content Limit (%)
Atlantic	2.155	New Brunswick	1.5 - Type 4 2.0 - Type 5 3.0 - Type 6
Quebec	1.329	Quebec	2.0 1.0/1.5 - Montreal
Ontario	1.718	Ontario	1.0 - Boilers 1.5 - All Types - Toronto
West	1.370	B.C.	1.1 - All Types