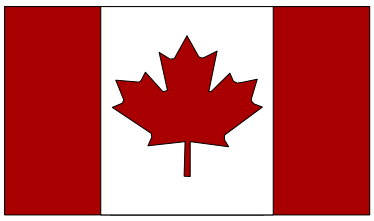

Environment Canada
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Environmental Stewardship Branch
Direction générale de l'intendance environnementale

Benzene in Canadian Gasoline:

Report on the Effect of the *Benzene in Gasoline Regulations*

2005

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Environment Canada

Benzene in Canadian Gasoline

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Notice

The information contained in this report is compiled from data submitted by the producers and importers of gasoline in Canada pursuant to the requirements of the *Benzene in Gasoline Regulations* under the *Canadian Environmental Protection Act, 1999*. Submissions have been verified for reasonableness but are subject to potential errors made at the source.

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1.0 Summary

This report reviews how primary suppliers have responded to the *Benzene in Gasoline Regulations* of the *Canadian Environmental Protection Act* and summarizes the information on composition of gasoline reported under the regulations for 2005. All of the information summarized in this report was provided to Environment Canada by producers, importers and blenders of gasoline, pursuant to the requirements of the regulations.

The *Benzene in Gasoline Regulations* came into effect on July 1, 1999, fulfilling a recommendation of the federal-provincial Task Force on Cleaner Vehicles and Fuels. In 1995, the Task Force recommended to the Canadian Council of Ministers of the Environment (CCME) that benzene in gasoline be reduced through a federal regulation to 1% by volume and that aromatics (or equivalent benzene tailpipe emissions) be frozen at 1994 levels. The CCME endorsed this recommendation. Consequently, the federal government passed the federal *Benzene in Gasoline Regulations* on November 26, 1997.

The regulations have been successful in achieving both of the recommendations of the Task Force: reported benzene levels have been significantly reduced and reported aromatic levels are about the same as they were in 1994. Figures 1.1 and 1.2 show how benzene and aromatics levels have changed since the coming into force of the regulations. Figure 1.3 shows that average urban ambient benzene concentrations, measured at Environment Canada monitoring stations across Canada, have fallen by 68% between 1991 and 2005. Since 1998, the year prior to the regulation coming into effect, average urban and rural ambient benzene concentrations have fallen by approximately 50%.

All primary suppliers must submit reports annually to Environment Canada reporting on the composition of the gasoline they supplied in that year (quarterly reports were required until the end of 2002). With two exceptions, for the 2005 reporting year, primary suppliers reported that all gasoline supplied in Canada met the regulated requirements with respect to benzene concentration. Details on the two exceptions can be found in Section 3.2, Exceedances of Regulated Limits. All gasoline supplied in Canada was reported to have met the regulated requirements for the benzene emissions number (BEN).

Independent audits are required for those primary suppliers that elected to be on a yearly pool average and must be submitted to Environment Canada by May 31 of the year following the reporting period. This report includes analysis of the independent audits conducted for the 2005 reporting period. Those audits found thirteen instances of non-compliance with administrative requirements involving sampling, testing, record keeping and reporting requirements. Most primary suppliers outlined corrective actions taken to address these issues. Environment Canada views the audits as a crucial component of the enforcement provisions of the regulations.

Figure 1.1: Average Benzene Content of Canadian Gasoline 1994-2005

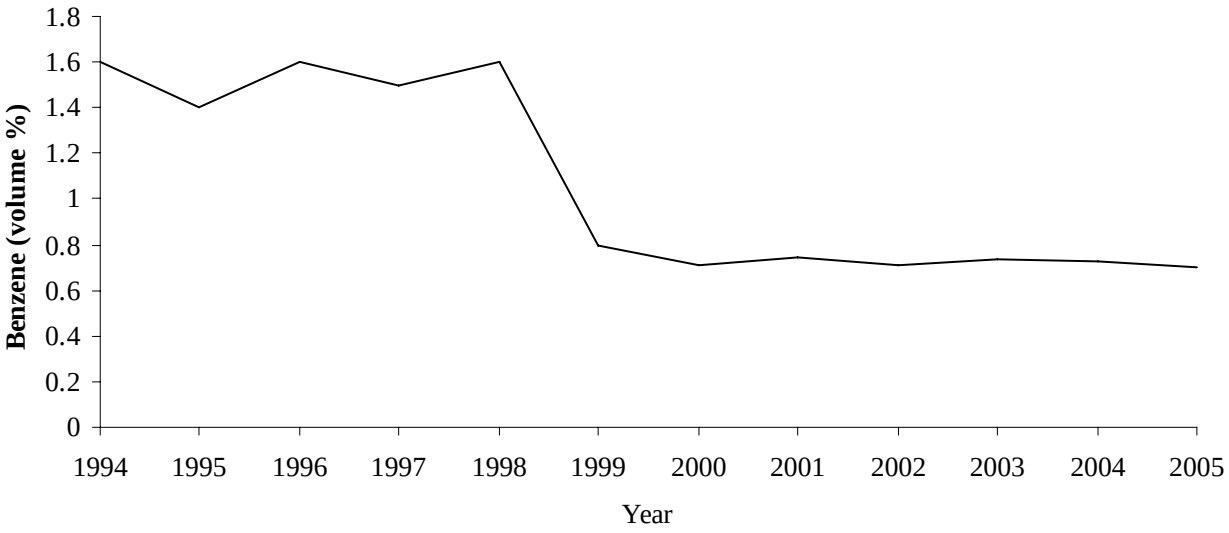


Figure 1.2: Average Aromatics Content of Canadian Gasoline 1994-2005

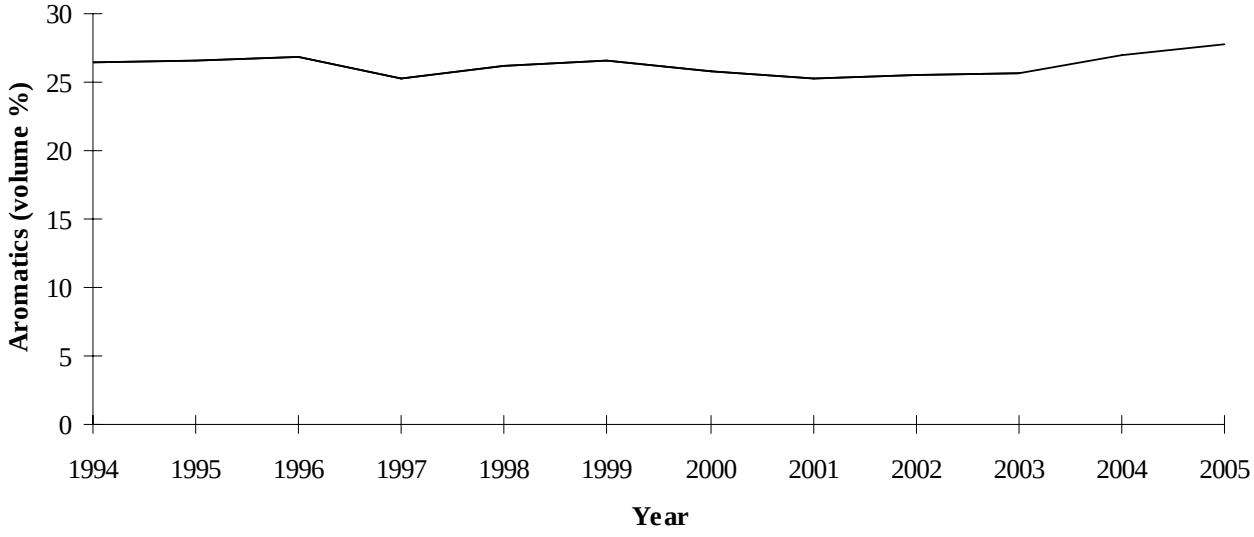
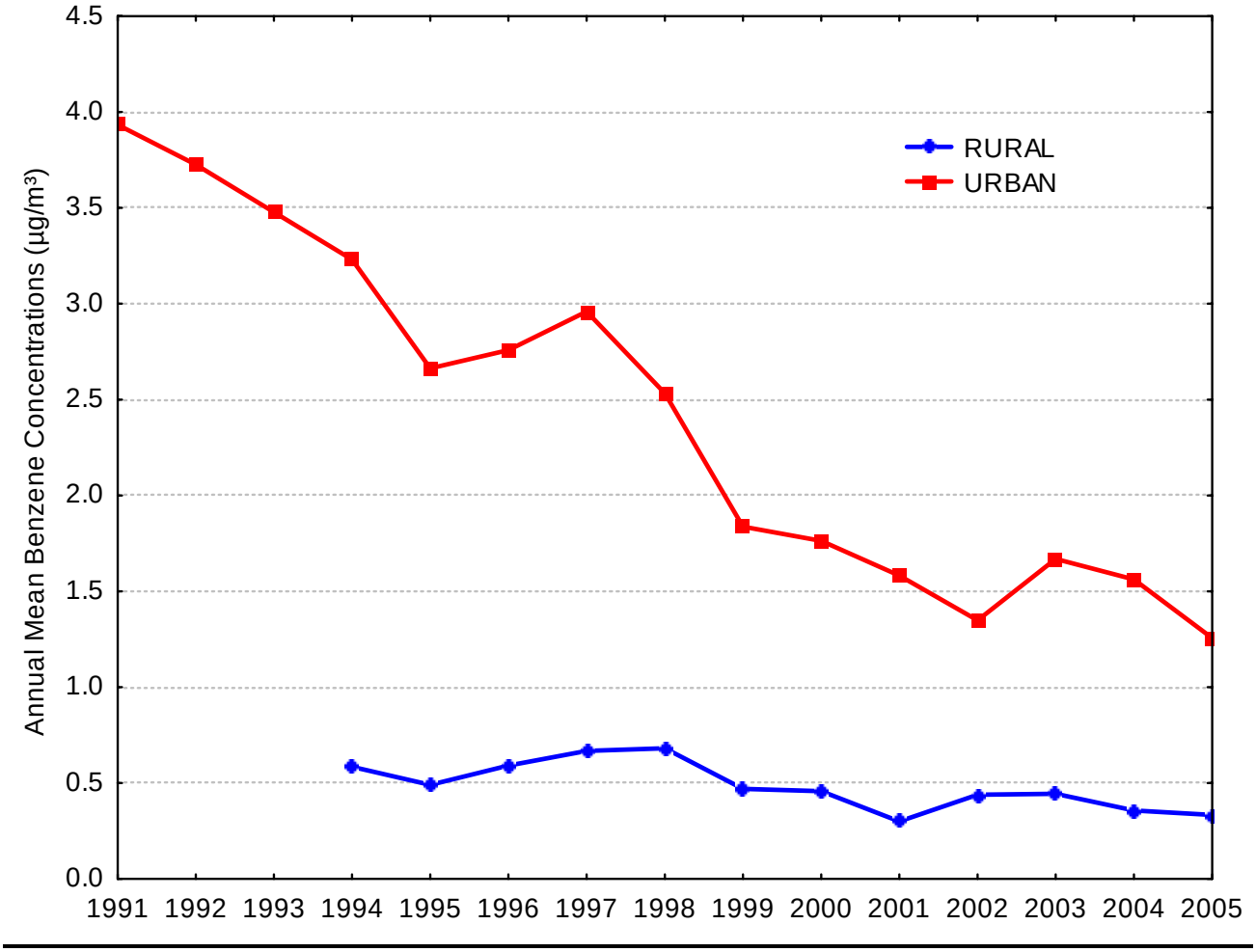


Figure 1.3: Average Ambient Benzene Concentration in Canada 1990-2005



Source: Tom Dann (Environment Canada), personal communication, 2005

2.0 Introduction

This report reviews the compliance of primary suppliers' (refiners, importers and blenders) gasoline with the *Benzene in Gasoline Regulations*[1] of the *Canadian Environmental Protection Act, 1999*, and summarizes levels of various parameters in Canadian gasoline for 2005. The information used for this report was provided by primary suppliers, as required under the regulations.

2.1 Benzene in Gasoline Regulations

The *Benzene in Gasoline Regulations* were passed in November 1997 in order to reduce emissions of benzene from gasoline-powered vehicles. The regulations limit the level of benzene and the benzene emission number (BEN)[2] of Canadian gasoline and require reporting on the composition of gasoline that is produced, imported or blended[3]. The regulations apply to all types of gasoline for sale or use in Canada, except gasoline for use in aircraft, competition vehicles or scientific research.

The *Benzene in Gasoline Regulations* introduced a new approach to controlling fuel composition by allowing regulatees the option to elect to use a yearly pool average as the basis for compliance. This option provides regulatees considerable flexibility in meeting the requirements of the regulations. The regulations are chiefly focused on primary suppliers (refiners, blenders and importers) who can affect the composition of gasoline. There is also a per-litre limit for benzene at the point of sale. In addition to setting a limit for gasoline benzene content, the regulations also set a limit for the benzene emission number (BEN) of gasoline, a number that relates gasoline composition to estimated emissions of benzene from vehicles.

The regulated limits apply to individual refineries, blending facilities, and imports into a province from outside Canada. Primary suppliers are subject to flat limits for each of their refineries, blending facilities or import pools unless they have elected for yearly pool average limits. The yearly pool average is the volume-weighted average of benzene or BEN of the gasoline supplied by the primary supplier during a year and may be selected for either benzene, BEN, or both. Independent audits must be submitted to Environment Canada by primary suppliers that elect to be on a yearly pool average.

Since July 1, 1999, primary suppliers have been subject to limits on the level of benzene and the BEN in the gasoline they produce, blend or import. Table 2.1 summarizes the regulated limits for benzene and the BEN.

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[1] SOR/97-493, as amended by SOR/99-204, SOR/2000-102, SOR/2003-318 and SOR/2004-252; a copy of the regulations can be found at www.ec.gc.ca/CEPARegistry/regulations

[2] BEN - The Benzene Emission Number relates gasoline composition to the estimated emissions of benzene from vehicles. It is a number calculated using various gasoline parameters and relates gasoline composition to emissions of benzene from a "typical" 1990 vehicle. (see Schedule 1 of the Regulations)

[3] The definition of "blend" in the regulations excludes the mixing of complying gasoline or the adding of only additives, commercially-pure butane or oxygenate to complying gasoline.

Table 2.1: Regulated Limits for Benzene and the BEN

	Type of Limit	Benzene % by volume	BEN (*)	
			Summer	Winter
Production, Blending and Imports	Flat Limit	1.0	71	92
	Options of Yearly Pool Average YPA Limits	0.95	59.5 (annual average)	
	Not-to-be-exceeded cap	1.5	102	132
Sales	Flat Limit	1.5	N/A	N/A

*Four refineries use alternative (higher) limits for BEN (under subsection 17(2) of the regulations) (see Appendix 2)

All primary suppliers must submit reports annually on the levels of various parameters of gasoline to Environment Canada (quarterly reports were required until the end of 2002). Importers must notify Environment Canada at least 12 hours in advance of their intention to import:

- more than 100 m^3 of gasoline at any one time;
- any amount of gasoline-like blendstock; or
- into a province, more than 1000 m^3 of gasoline within any one day.

Minor amendments to the *Benzene in Gasoline Regulations* were published on December 1, 2004[4]. These amendments were made to address concerns raised by the Standing Joint Committee for the Scrutiny of Regulations. The amendments comprise of corrections to inconsistencies between the French and English versions of the regulations.

2.2 Alternative Limits for the BEN

Under subsection 17(2) of the regulations, a primary supplier could elect before December 1, 1998 to use alternative (higher) limits for the BEN. These alternative limits are based on the historical composition of the primary supplier's gasoline, thereby reflecting its historical BEN number. There is no expiry date for alternative BEN limits, although a primary supplier may rescind the alternative limit at any time. A supplier rescinding its alternative limit would then be subject to the normal limits for BEN.

Petro-Canada and Shell elected to use alternative (higher) limits for the BEN at their Ontario and Quebec refineries. Their alternative limits were set out in a Notice published by the Minister of the Environment in the *Canada Gazette* on September 4, 1999 (see Appendix 2).

[4] SOR/2004-252; a copy of the regulations can be found at www.ec.gc.ca/CEPARegistry/regulations

2.3 Options for Meeting the Requirements of the Regulations

As discussed in section 2.1, primary suppliers can select either flat or yearly pool average limits for benzene and BEN as the basis for compliance. The options are selected separately for each refining, blending facility and import pool. Table 2.2 shows the number of gasoline pools subject to each type of limit for benzene and the BEN for primary suppliers reporting in 2005.

Table 2.2: Number of Gasoline Pools Subject to Flat and Yearly Pool Average Limits

		Flat Limits	YPA Limits
Benzene	Refineries	1	16
	Blending Facilities	1	1
	Import Pools	5	2
BEN	Refineries	6	11
	Blending Facilities	2	0
	Import Pools	6	1

2.4 Reporting Refineries and Importing Companies

Primary suppliers are required to register with Environment Canada using the R*egistration Form for a Manufacturer, Blender or Importer of Gasoline* (Appendix 1). Table 2.3 shows the primary suppliers who were registered with Environment Canada and reported supplying gasoline during 2005. The table also shows the type of limit the supplier is subject to for benzene and BEN: "YPA" if the primary supplier has selected a yearly pool average as its basis for compliance, and "Flat" (flat per-litre limits) otherwise.

Table 2.3: Primary Suppliers Reporting on Gasoline Composition

	Name	Location of Production or Import Facilities	Benzene Limit	BEN Limit
Refiners	Chevron Canada Ltd.	Burnaby, BC	YPA	YPA
	Consumers' Co-operative Refineries Ltd.	Regina, SK	YPA	Flat
	Husky Oil Operations Ltd.	Prince George, BC	YPA	YPA
	Imperial Oil Ltd.	Dartmouth, NS	YPA	Flat
	Imperial Oil Ltd.	Nanticoke, ON	YPA	Flat
	Imperial Oil Ltd.	Sarnia, ON	YPA	Flat
	Imperial Oil Ltd.	Strathcona, AB	YPA	Flat
	Irving Oil Ltd.	Saint John, NB	YPA	YPA
	North Atlantic Refining Ltd.	Come-by-Chance, NL	Flat	Flat
	Petro-Canada Products	Edmonton, AB	YPA	YPA
	Petro-Canada Products	Montreal, QC	YPA	YPA
	Petro-Canada Products	Oakville, ON	YPA	YPA
	Shell Canada Products	Montreal, QC	YPA	YPA
	Shell Canada Products	Sarnia, ON	YPA	YPA
	Shell Canada Products	Scotford, AB	YPA	YPA
	Suncor Energy Products Inc.	Sarnia, ON	YPA	YPA
	Ultramar Ltée.	St-Romuald, QC	YPA	YPA
Blenders	Robbins Feed and Fuel Ltd.	Thorold, ON	Flat	Flat
	Ultramar Ltée.	Montreal, QC	YPA	Flat
Importers	Olco Petroleum Group Inc.	Montreal, QC	Flat	Flat
	General Motors of Canada Limited	Oshawa, ON	Flat	Flat
	Imperial Oil Ltd.	Point Tupper, NS	Flat	Flat
	Imperial Oil Ltd.	Burrard, BC	Flat	Flat
	Petro-Canada Products	Burrard, BC	YPA	YPA
	Petroles Norcan Inc.	Montreal, QC	Flat	Flat
	Ultramar Ltée.	Holyrood, NL	YPA	Flat

* Locations submitting “Nil” reports were excluded from this table

3.0 Compliance with the Regulations

This section reviews the compliance of primary suppliers with reporting requirements of the regulations and reported exceedances of the benzene and BEN limits.

3.1 Information Reported

Under section 8 of the regulations, primary suppliers must provide the information set out on the form entitled *Report on the Composition of Gasoline* (refer to Appendix 1). The information includes the maximum and year-to-date average values for a number of composition parameters. Primary suppliers must also report the volume of gasoline, the number of batches supplied, and the name of any oxygenates used. Starting in 2003, the report must be submitted once per year before February 15 of the following year. Prior to 2003, the reports were submitted quarterly.

3.2 Exceedances of Regulated Limits

There were no reported exceedances of the BEN limit. Two annual reports received by Environment Canada contained reported maximum benzene levels that exceed the Benzene limit of 1.5% (never-to-be-exceeded-cap). Explanations of these reported exceedances were included in the independent audit reports submitted by the primary suppliers. These audit reports documented three instances where batches of gasoline used in the yearly pool average calculation had benzene concentrations above 1.5% (by volume). The following extracts are the auditor's description of these instances:

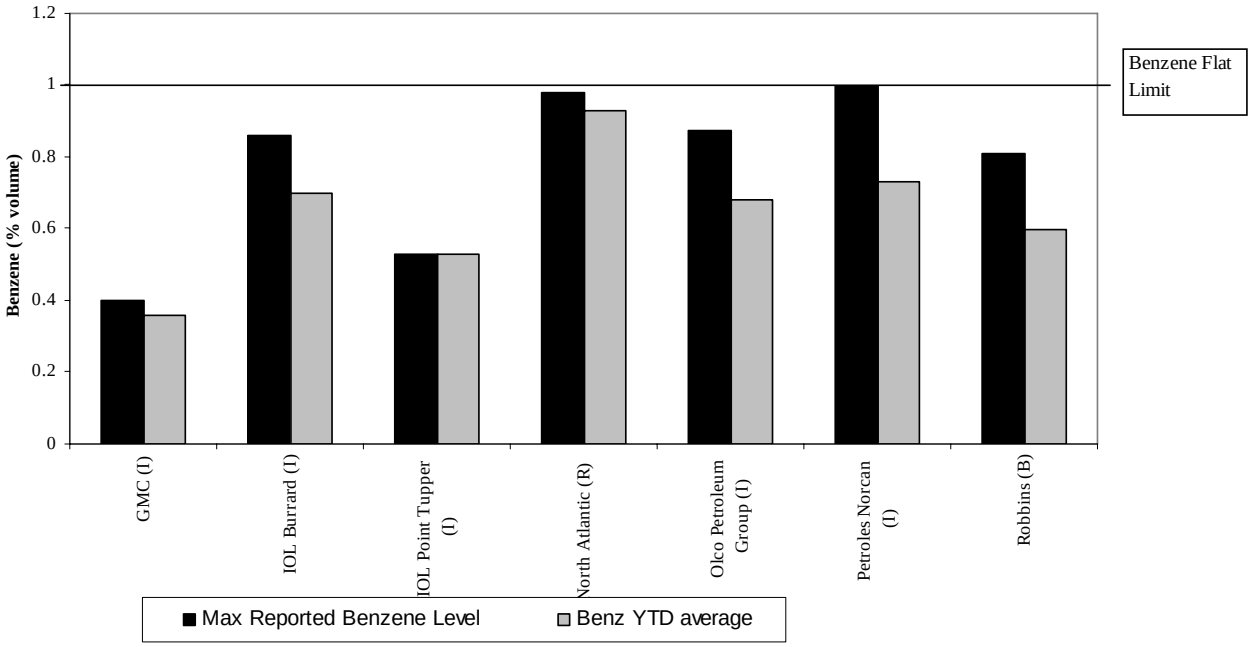
Shell Montreal – *"It was confirmed from the analytical data that Shell [Montreal] has not exceeded these limits except for one incident in the complying year. A batch of gasoline used in YPA calculation was over 1.5% based on batch sample results … however the receiving tank sample check was below 1.23 vol%. The gasoline was not sold to the market at a concentration that exceed 1.5 vol%. A quality incident report has been documented … and the Minister was notified."*

Imperial Oil Nanticoke – *"Two batches of gasoline used in YPA calculation were over 1.5% based on batch volume (i.e. 1.54 vol% for batch RUL-28 and 1.58 vol% for batch 29); the actual dispatched quality for these batches were confirmed in compliance as 1.44 vol% and 1.48 vol% respectively."*

For primary suppliers using flat limits, Figure 3.1 shows the reported maximum and average benzene level and Figure 3.2 shows the reported maximum and average BEN .

For primary suppliers using YPA limits, Figure 3.3 shows the reported average and maximum benzene levels and Figure 3.4 shows the reported average and maximum BEN levels, as a percentage of the regulated limits. The yearly pool average data from Figures 3.3 and 3.4 represent the volume weighted average for all gasoline from a given primary supplier during the year. For Figure 3.4, the y-axis is in units of percent of the regulated limit, as some primary suppliers were on alternative limits.

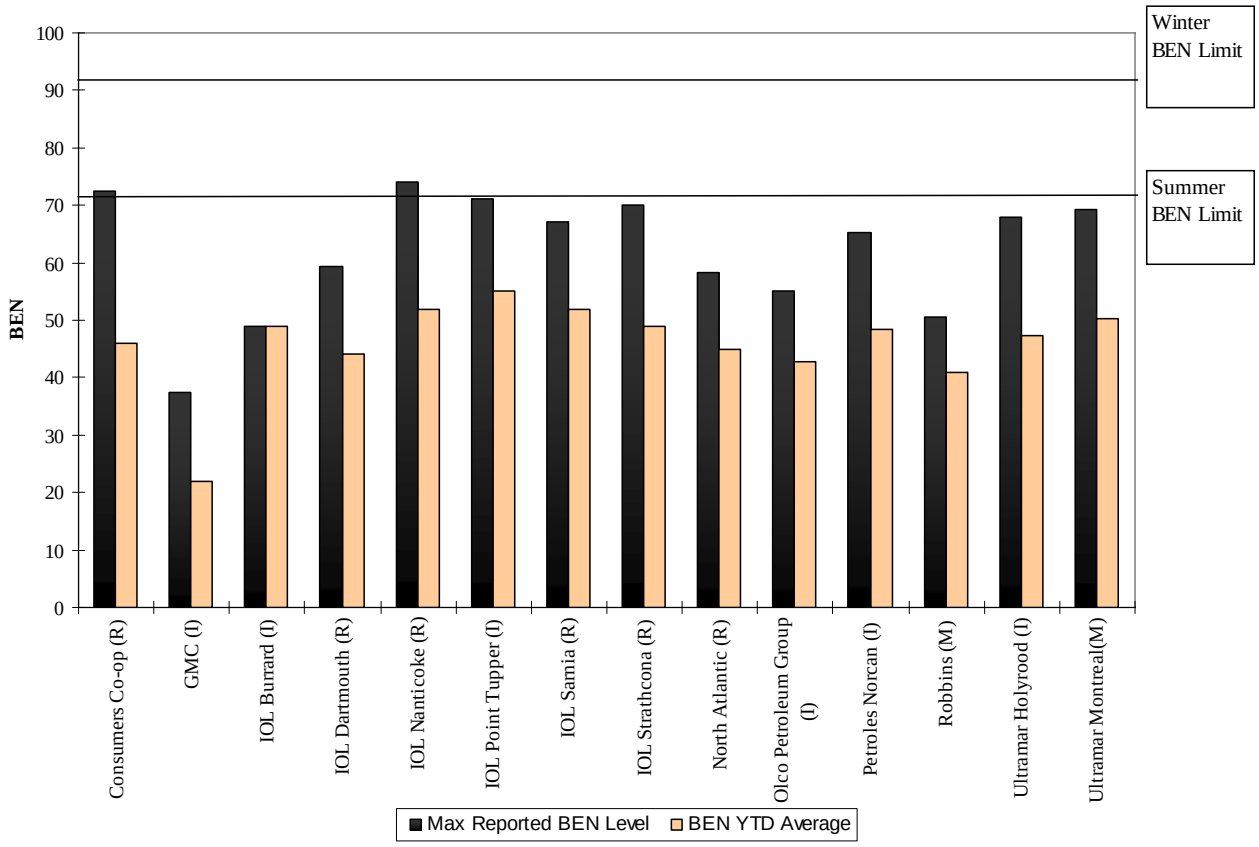
Figure 3.1: Reported Benzene Levels (Maximum and Average) for Suppliers on a Flat Limit, 2005



Notes:

- 1.0% volume = Benzene Flat Limit
- R = Refiner, B = Blender and I = Importer

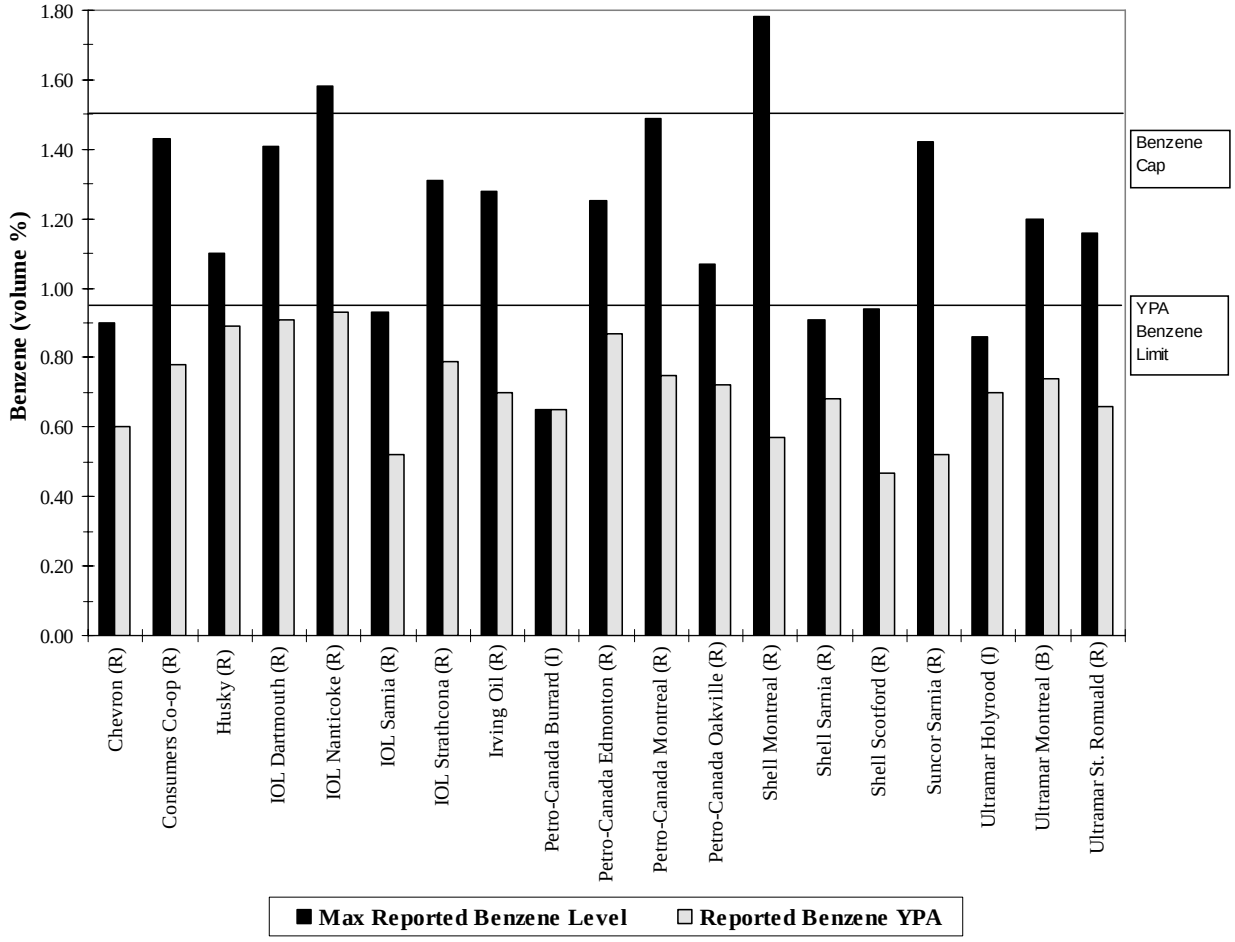
Figure 3.2: Reported BEN (Maximum and Average) for Suppliers on a Flat Limit, 2005



Notes:

- 92 = Flat BEN Winter Limit
- 71 = Flat BEN Summer Limit
- R = Refiner, B = Blender and I = Importer

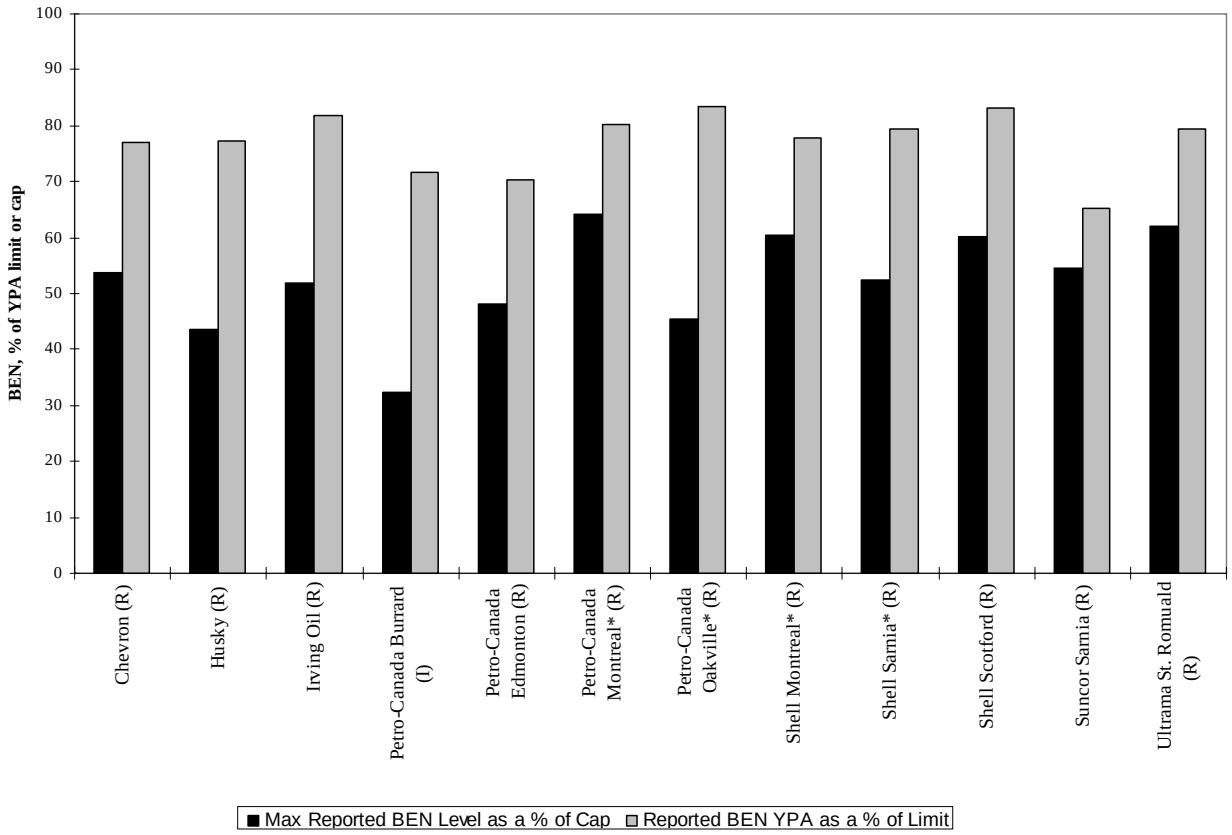
Figure 3.3: Reported Benzene Levels (Maximum and Average) for Suppliers on a Yearly Pool Average Limit, 2005



Notes:

- 0.95% vol. = YPA Benzene Limit
- 1.5% vol. = YPA Benzene Cap
- R = Refiner, B = Blender and I = Importer

Figure 3.4: Reported BEN (Maximum and Average) Levels for Suppliers on a Yearly Pool Average Limit, 2005 (% of limit)



Notes:

- 59.5 = YPA limit, unless a supplier used alternative limits (marked with an *).
- 132 = YPA winter cap, unless a supplier used alternative limits (marked with an *).
- 102 = YPA summer cap, unless a supplier used alternative limits (marked with an *).
- R = Refiner, B = Blender and I = Importer

3.3 Results of Independent Audits

Under section 22 of the regulations, a primary supplier that has elected to use a yearly pool average as its basis for compliance must have an independent auditor perform an audit of the primary supplier's systems, practices and procedures and its compliance with the regulations. The auditor's report must be submitted to Environment Canada by May 31 of the year following the reporting period. This section contains the analysis of the Independent Audits submitted for the 2005 reporting period.

3.4 Summary of 2005 Independent Audits

For the 2005 reporting year, nineteen audits were submitted by nine companies in regard to sixteen refineries, one import pools and two blending facilities. Seventeen of these audits were combined audits capturing the audit requirements for both the *Benzene in Gasoline Regulations* and the *Sulphur in Gasoline Regulations*. The audits were conducted by four audit companies.

Paragraph 22(3)(e) of the Regulations requires that the audit contain: "*an assessment by the auditor of the extent to which the primary supplier has complied with these Regulations throughout the year of the audit.*" The audits state that all primary suppliers subject to audits met the regulated limits for the benzene limit and BEN. However, with respect to the regulated limits for benzene concentration, two audit reports documented three instances where batches of gasoline used in the yearly pool average calculation had benzene concentrations above 1.5% (by volume). The auditor's findings regarding these instances were described previously in Section 3.2, Exceedances of Regulated Limits.

Regarding the administrative requirements of the regulations, seven audit reports identified one or more instance of minor non-compliance for a total of 13 instances of non-compliance. These involved sampling, testing, record keeping and reporting requirements. A list of corrective actions taken by the primary supplier accompanied the audit reports from four companies, covering 11 of the 13 instances of non-compliance.

With respect to testing, instances of non-compliance included:

- effective quality control program for analyses that could not be demonstrated;
- corrective actions that were not fully documented on control charts when out of control data was observed; and
- product testing procedures that were deviated from which lead to the dispatch of complying gasoline without full analysis.

With respect to the annual reports required by the regulations, instances of non-compliance included:

- incorrect reporting of gasoline volume, gasoline-like blendstock volume, maximum benzene value, maximum E200 value; and
- failure to submit an annex to the annual report documenting batches of gasoline-like blendstock dispatched.

With respect to sampling, instances of non-compliance included:

- inconsistent recording of required information on sample labels;
- improper procedures during sample withdrawal, including
    - incorrect placement of sample delivery tube in sample container (was not always maintained below liquid level); and
    - sample containers were not filled and drained with product three times prior to sample withdrawal;
- inconsistency in performing weekly QC samples; and
- inability to fully demonstrate sample retention practice.

With respect to record keeping required by the regulations, one instance of non-compliance was reported in relation to missing information on a record for a batch of gasoline-like blendstock received at the facility.

Several recommendations for improvements were made by auditors in their evaluation reports. These recommendations were made relating to:

- reducing the potential for human caused error and the duplication of effort;
- sampling and equipment storage procedures;
- lab procedures for remaining current on reference methods and standards for sampling and analysis,
- better equipment calibration /verification practices; and
- establishing clear, documented quality control program for the lab, incorporating current sampling, testing and analytical procedures.

Environment Canada views the audits as a crucial component of the enforcement provisions of the regulations and, to be effective, the auditing process must be independent and thorough. The concept of a yearly pool average relies on the maintenance of complete records and reports. The audits are intended to provide Environment Canada assurance that the yearly pool averages are being correctly reported.

4.0 Canadian Gasoline Composition

This section reviews the composition of gasoline in Canada during 2005, based on data reported by primary suppliers pursuant to the regulations. The regulations require that the following parameters are reported:

- the concentration of benzene,
- the value of BEN,
- the concentration of aromatics,
- the concentration of olefins,
- the concentration of sulphur,
- the concentration of oxygen,
- the vapour pressure,
- the evaporation fraction at 93.3 ^{o}C (200 ^{0}F - E200),
- the evaporation fraction at 148.9 ^{o}C (300 ^{0}F - E300).

Appendix 3 shows the regional and national concentrations for all parameters. Appendix 4 shows the parameters reported by individual companies.

4.1 Volume of Gasoline

The number of batches and volume of gasoline (excluding exports) reported are summarized in Table 4.1.

Table 4.1: Regional Volumetric Data for 2005

Region	Total Volume (m^3)	Number of Batches
Atlantic	2,860,790	350
Quebec	13,701,089	1,095
Ontario	10,970,568	1,055
West*	13,358,248	2,117
National	40,890,695	4,617

*Includes all western provinces and northern territories.

4.2 Regulated Parameters: Benzene and BEN

Data reported on benzene and BEN levels for 2005 are summarized in Table 4.2. The national trend for benzene is shown graphically in Figure 4.1.

Table 4.2: Benzene Concentration and BEN for 2005

Year	Reported Volume Weighted Averages*					
	Benzene (% Volume)			BEN		
	Minimum	Maximum	Canadian Volume Weighted Average	Minimum	Maximum	Canadian Volume Weighted Average
2005	0.36	0.93	0.73	22.0	56.6	48.4

* Includes primary suppliers on alternative limits

Table 4.3 shows the trend in benzene levels between 1995 and 2005[5]. Nationally, benzene levels in 2005 were half of those between 1995 and 1998. These trends are shown graphically for each region and for Canada in Figures 4.1 to 4.5. As the Regulations took effect mid-1999, the data for that year are presented separately for the first and second half of the year. Figures 4.6 and 4.7 show the regional and national average values for benzene and BEN.

Table 4.3: Average Benzene Content of Canadian Gasoline 1995-2005

Region	Average Benzene (volume %)											
	1995	1996	1997	1998	1999		2000	2001	2002	2003	2004	2005
					1st half	2nd half						
Atlantic	2.6	2.5	2.6	2.2	2.1	0.7	0.78	0.86	0.81	0.83	0.81	0.82
Quebec	1.6	1.9	1.7	1.7	1.4	1.0	0.63	0.65	0.74	0.74	0.67	0.68
Ontario	1.2	1.4	1.3	1.7	1.3	0.8	0.75	0.78	0.71	0.74	0.73	0.72
West	1.2	1.3	1.3	1.2	0.7	0.6	0.71	0.69	0.67	0.70	0.75	0.75
Canada	1.4	1.6	1.5	1.6	1.2	0.8	0.71	0.72	0.71	0.73	0.72	0.73

[5] The data for 1995 to 1998 were collected from primary suppliers under a voluntary survey of benzene, aromatics and olefins in gasoline. All refiners and a number of importers participated in the survey. Annual reports on the survey were published by Environment Canada.

Figure 4.1: Average Benzene Content of Gasoline – Canada 1995-2005

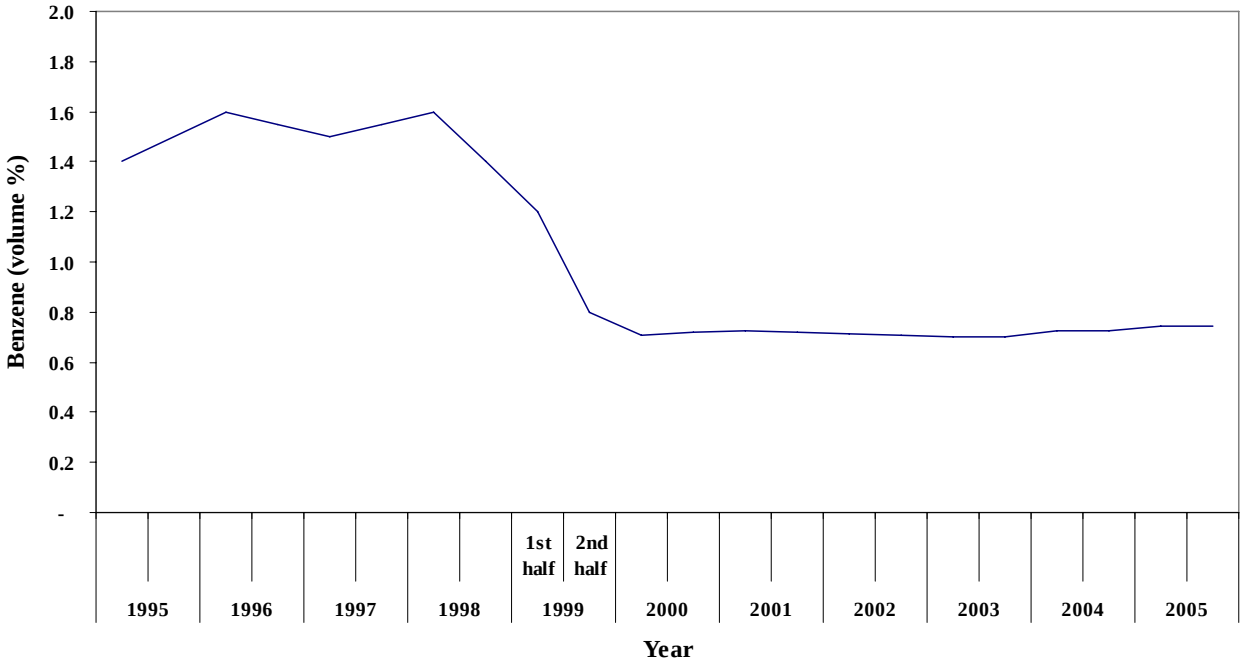


Figure 4.2: Average Benzene Content of Gasoline – Atlantic 1995-2005

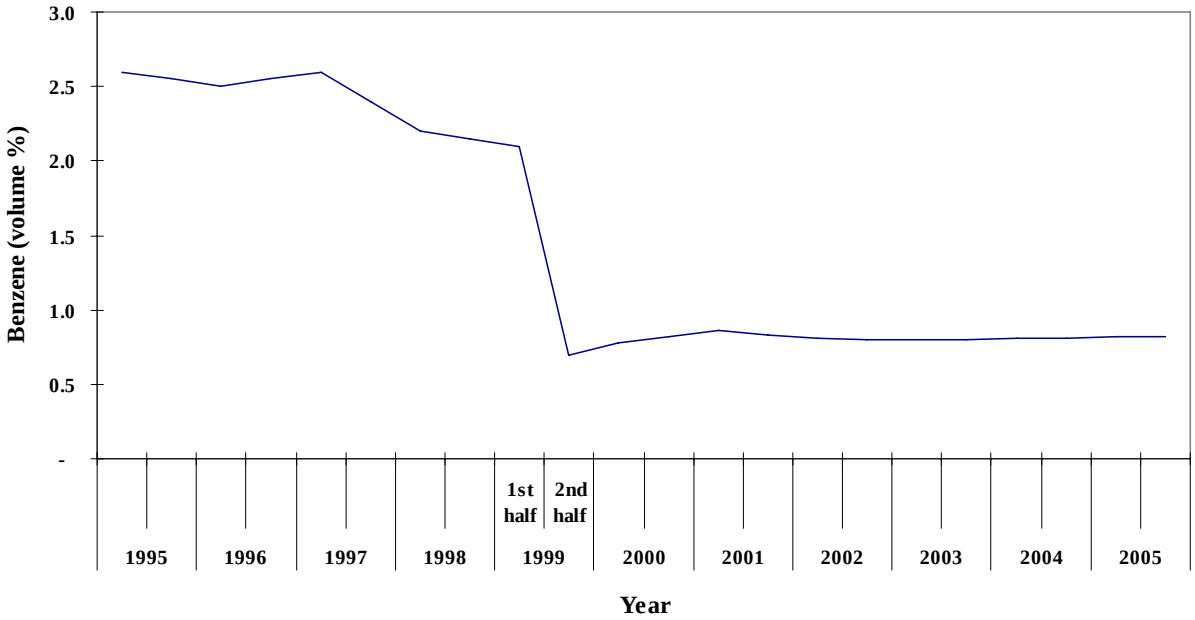


Figure 4.3: Average Benzene Content of Gasoline – Quebec 1995-2005

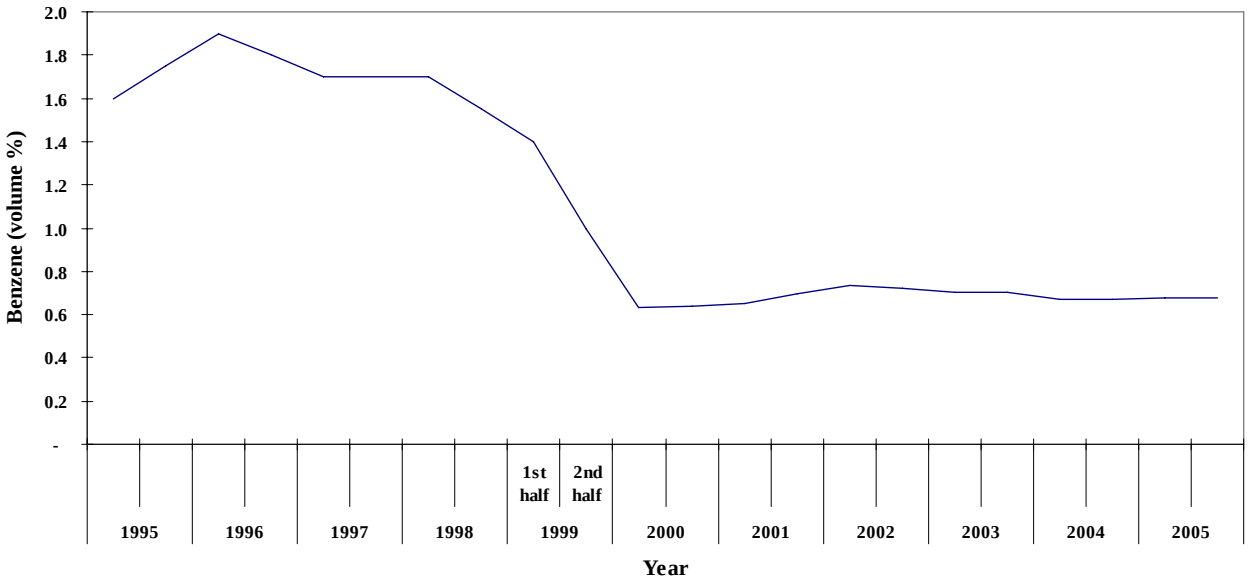


Figure 4.4: Average Benzene Content of Gasoline – Ontario 1995-2005

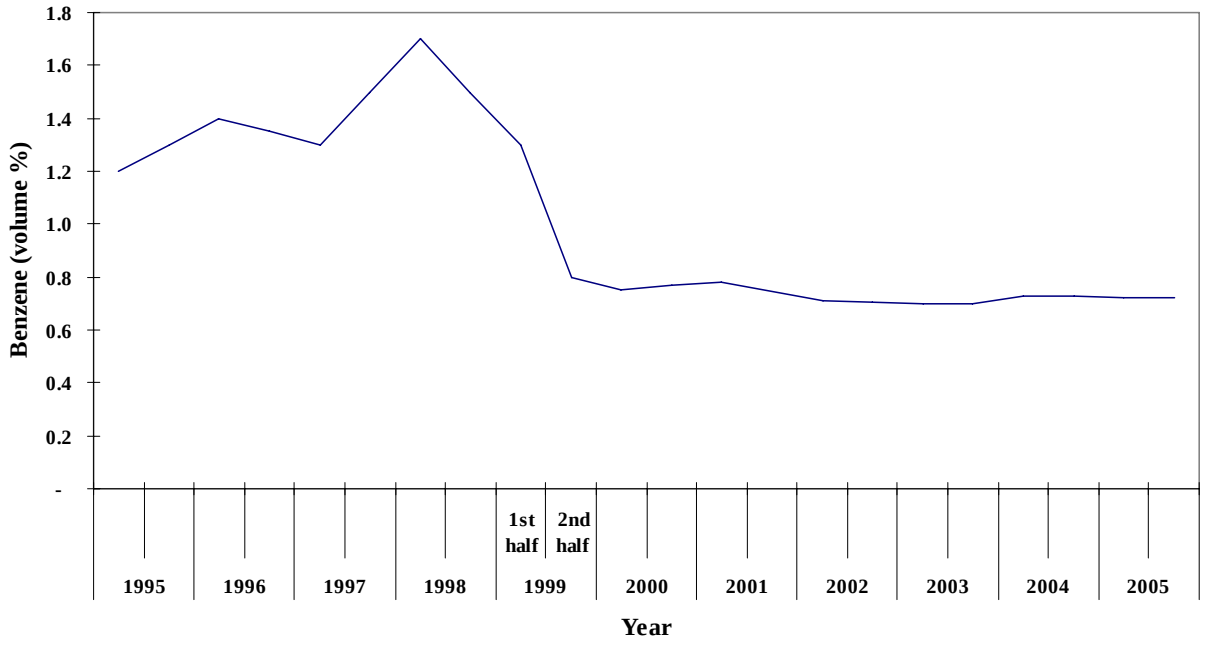


Figure 4.5: Average Benzene Content of Gasoline – West 1995-2005

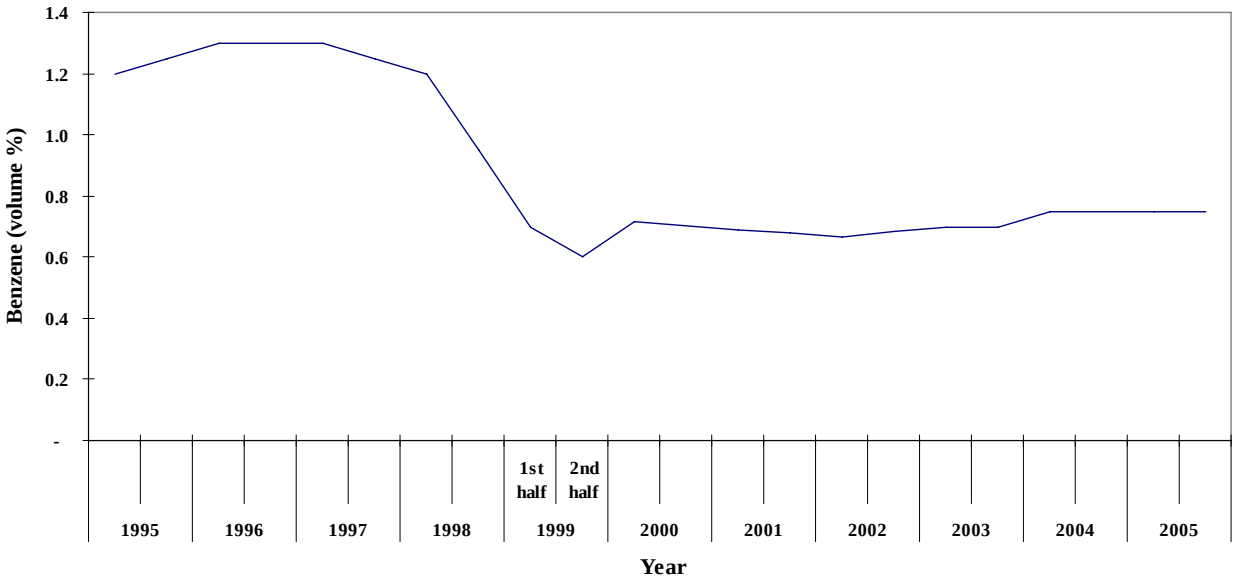
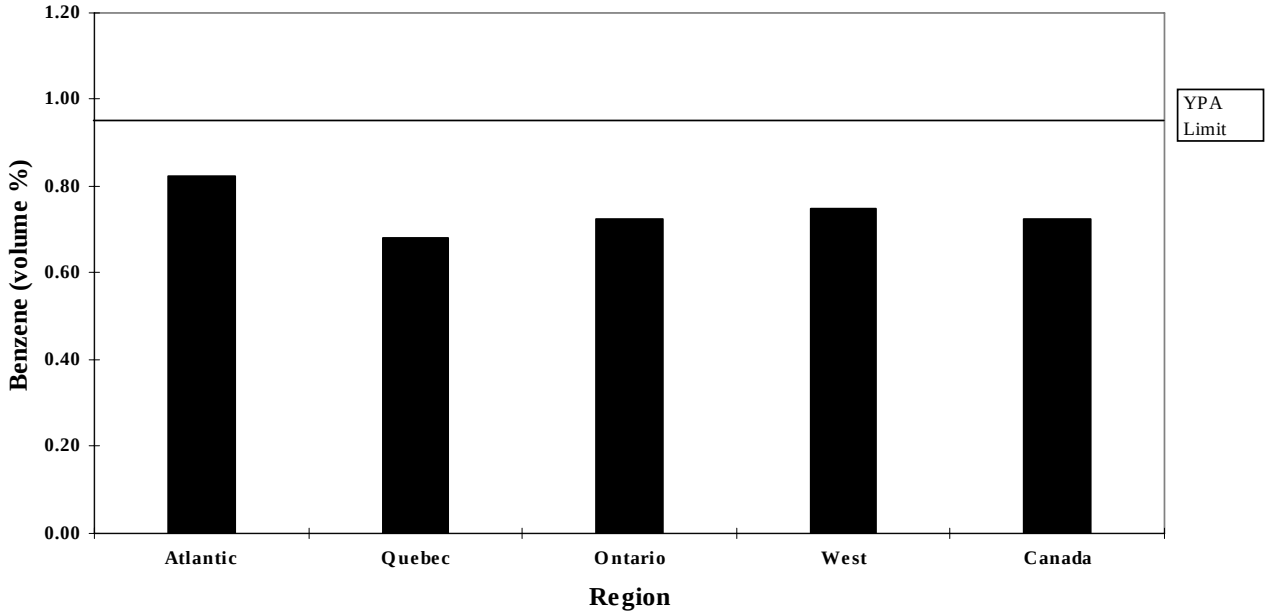


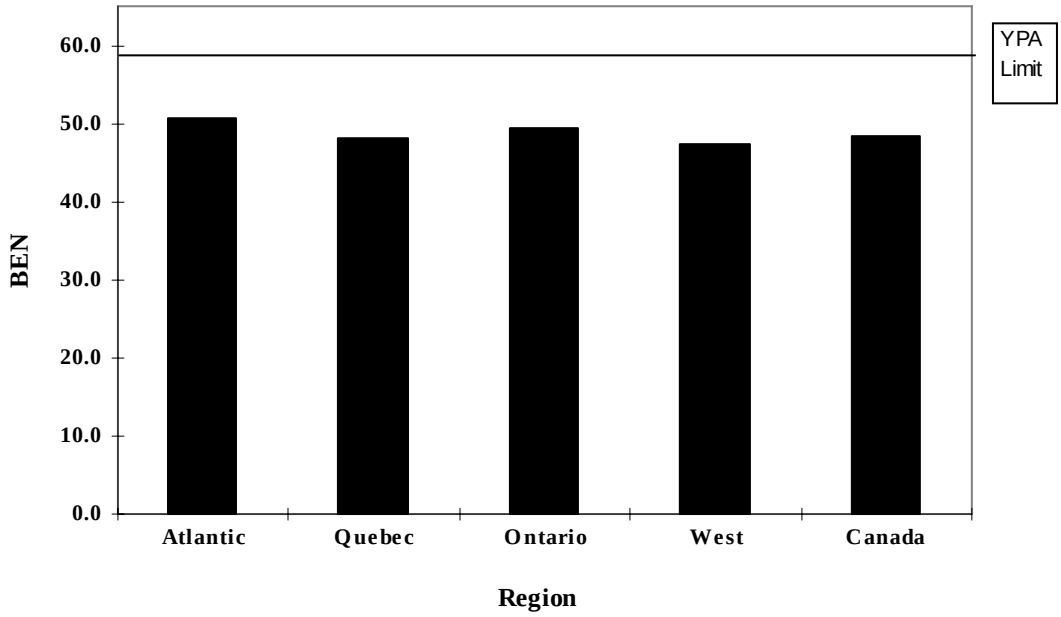
Figure 4.6: Average Benzene Concentration of Canadian Gasoline 2005



Note:

- The annual average Benzene limit for primary suppliers on a YPA is 0.95% vol.

Figure 4.7: Average BEN of Canadian Gasoline 2005



Note:

- The annual average BEN limit for primary suppliers on a YPA is 59.5.

4.3 Reported Oxygen Concentration

Primary suppliers are required to report the type of oxygenate that they use and the oxygen concentration of the gasoline produced or imported. Tables 4.4 and 4.5 summarize the concentrations of MTBE and ethanol, respectively, based on the reported oxygen concentrations and type of oxygenate. Since 2000, the average level of MTBE reported in gasoline produced and imported has decreased by 79% and the average ethanol concentration has increased by 24%. The average concentration of ethanol in gasoline that was reported for 2005 showed an 18% decrease from 2004 levels. The data presented here does not include oxygenates that are blended downstream of the refinery or point of import. As a result, these values are likely to be underestimates of the usage of oxygenates in Canadian gasoline.

Table 4.4: Average Concentration of MTBE Reported

Region	Average Concentration of MTBE based on all volumes of gasoline reported (% by volume)						Maximum Concentration of MTBE based on volumes of gasoline containing MTBE (% by volume)					
	2000	2001	2002	2003	2004	2005	2000	2001	2002	2003	2004	2005
Atlantic	0.85	1.13	0.14	0.08	0.06	0.11	14.89	15.39	14.83	14.67	14.72	14.39
Quebec	0.02	0.08	0.04	0.06	0.22	0.07	3.00	7.11	2.22	9.44	9.27	7.90
Ontario	0.00	0.00	0.00	0.00	0.00	0.00	11.44	12.22	0.28	11.06	2.78	6.11
West	0.21	0.01	0.01	0.01	0.00	0.00	15.56	0.00	3.33	8.33	1.11	0.00
Canada	0.14	0.11	0.02	0.02	0.06	0.03	15.56	15.39	14.83	14.67	14.72	14.39

Notes:
1. The regulations do not require reporting of oxygenate blended downstream of the refinery (except for a few special incidences described in the regulations). These values are therefore likely to be underestimates of oxygenate usage.
2. 15 % MTBE by volume = approximately 2.7 wt % oxygen.

Table 4.5: Average Concentration of Ethanol Reported

Region	Average Concentration of Ethanol based on all volumes of gasoline reported (% by volume)						Maximum Concentration of Ethanol based on volumes of gasoline containing Ethanol (% by volume)					
	2000	2001	2002	2003	2004	2005	2000	2001	2002	2003	2004	2005
Atlantic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Quebec	0.04	0.00	0.01	0.19	0.29	0.10	10.00	10.00	10.00	10.00	10.00	10.00
Ontario	1.43	1.69	1.81	2.02	1.80	1.98	10.00	10.00	10.00	9.73	10.00	75.95
West	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	10.00	10.00	10.81	10.00
Canada	0.46	0.60	0.61	0.60	0.67	0.57	10.00	10.00	10.00	10.00	10.81	75.95

Notes:
1. The regulations do not require reporting of oxygenate blended downstream of the refinery (except for a few special incidences described in the regulations). These values are therefore likely to be underestimates of oxygenate usage.
2. 10 % ethanol by volume = approximately 3.7 wt % oxygen.

4.4 Trends of Aromatics and Olefins

From 1994 to 1998, data on the benzene, aromatic and olefin concentrations in gasoline were collected by Environment Canada under a voluntary survey. When gasoline is combusted in the vehicle's engine, aromatics in the gasoline can form benzene (a known human carcinogen), while olefins can form 1,3-butadiene (a probable human carcinogen).

Trends for aromatics and olefins content are shown in tables 4.6 and 4.7, respectively[6]. These data show that 2005 national reported levels of aromatics have increased slightly since 2004 and are the highest since 1995 while levels of olefins are the lowest since 1998.

Table 4.6: Average Aromatics Content of Canadian Gasoline 1995-2005

Region	Average Aromatics (volume %)											
	1995	1996	1997	1998	1999		2000	2001	2002	2003	2004	2005
					1st half	2nd half						
Atlantic	31.6	29.4	30.3	31.5	30.8	28.3	28.0	25.9	26.4	26.4	27.8	27.2
Quebec	28.5	27.3	24.8	22.0	26.1	27.4	25.4	25.4	26.0	25.5	26.8	28.8
Ontario	26.3	28.5	28.1	30.2	27.9	29.0	28.3	27.6	27.0	25.9	29.6	29.8
West	24.6	24.5	23.1	24.1	23.9	23.4	23.6	23.5	23.3	24.5	24.6	25.3
Canada	26.6	26.9	25.3	26.2	26.2	26.6	25.8	25.5	25.5	25.3	27.0	27.8

Table 4.7: Average Olefins Content of Canadian Gasoline 1995-2005

Region	Average Olefins (volume %)											
	1995	1996	1997	1998	1999		2000	2001	2002	2003	2004	2005
					1st half	2nd half						
Atlantic	-	-	8.7	13.6	11.7	14.1	15.1	17.4	17.7	16.2	14.7	13.8
Quebec	-	-	14.1	12.5	13.3	14.2	13.6	14.1	13.4	13.4	11.8	11.5
Ontario	-	-	10.2	9.4	10.8	9.7	10.3	10.4	9.5	8.7	8.4	7.5
West	-	-	10.9	9.8	9.4	10.2	10.1	10.9	10.7	11.1	10.1	9.5
Canada	-	-	11.2	10.6	11.0	11.4	11.4	12.1	11.5	11.4	10.3	10.0

(-) = not available, olefins were not part of the survey until 1997.

[6] The data for 1995 to 1998 were collected from primary suppliers under a voluntary survey of benzene, aromatics and olefins in gasoline. All refiners and a number of importers participated in the survey. Annual reports on the survey were published by Environment Canada.

4.5 Comparison of Imported vs. Domestic Gasoline

Table 4.8 compares the data provided by refiners and importers. As was shown in Table 2.3, flat limits were selected by the majority of importers while the YPA option was selected by the majority of refiners. As shown in Table 4.8, importers reported lower maximum values for all parameters except for oxygen, where an importer reported a maximum oxygen content of 28.1% for gasoline containing ethanol (approximately 76% ethanol). Importers also reported lower average values for oxygen, sulphur, vapour pressure, olefins, benzene and BEN.

Table 4.8: Comparison of Importers and Refiners Reported Maximum and Average Values (for All Reported Parameters)

Parameter	Reported Maxima		Calculated Volume Weighted Average	
	Importers	Refiners	Importers	Refiners
Oxygen (wt %)	28.10	3.70	0.20	0.23
Sulphur (mg/kg)	80	77	24	20
Vapour Pressure (kPa)	104.1	114.8	69.9	84.3
E200 (vol %)	69.8	74.3	50.6	48.9
E300 (vol %)	93.8	97.0	86.5	84.5
Aromatics (vol %)	40.6	53.0	29.4	27.8
Olefins (vol %)	17.8	26.2	9.6	9.8
Benzene (vol %)	1.00	1.78	0.71	0.72
BEN	69.2	87.5	46.9	48.4

5.0 Other Gasoline Quality Information

5.1 The Gasoline Regulations

The Regulations respecting concentrations of lead and phosphorus in gasoline (The *Gasoline Regulations*)[7] limit the concentration of lead in gasoline that is produced, imported, sold or offered for sale in Canada to 5 mg/L and limit the concentration of phosphorus in unleaded gasoline to 1.3 mg/L. The limit for lead in gasoline for use in specialized equipment such as farming, boats and large trucks is 30 mg/L. Gasoline for use in aircraft is exempt from the Regulations and, until January 1, 2008, gasoline for use in competition vehicles is not subject to the lead concentration restrictions.

The *Gasoline Regulations* were passed in 1990, virtually eliminating the use of lead additives in gasoline. The Regulations were passed in response to the 1986 Royal Society of Canada Commission on Lead in the Environment, which recommended to the Government of Canada that "Public health and environmental policy should be to reduce blood lead to its lowest possible level". Of particular concern were emissions of lead particles to the atmosphere, of which the largest source was gasoline lead particulates from the combustion of tetraethyl lead and tetramethyl lead, antiknock additives that were commonly used in gasoline.

Under the *Gasoline Regulations*, producers, importers or sellers of leaded gasoline must submit reports to the Minister of the Environment as follows:

- Every person who produces or imports leaded gasoline for use or sale in Canada (excluding gasoline used for competition vehicles) is required to submit quarterly reports, within 15 days of the last day of each quarter, indicating the:
    - quantity of leaded gasoline produced/imported by grade;
    - quantity of lead added by grade; and
    - average lead concentration.

- Every person who produces, imports or sells (or offers for sale) in Canada leaded gasoline for use in competition vehicles is required to make and maintain records, which must be submitted annually to the Minister of the Environment, on or before March 31 of the year following the year the activity occurred. These records must include:
    - the brand name of the gasoline;
    - the octane rating and the method used for determining the octane rating of the gasoline;
    - the average yearly lead concentration in milligrams per litre (mg/L) of the gasoline for each brand name;
    - if the gasoline was sold for resale or distribution, the name and address of the re-seller or distributor;
    - if the gasoline was sold at a track or event location, the name and address of the track or event location where the gasoline was used; and
    - quantities of leaded gasoline produced, imported, sold or offered for sale.

[7] SOR/90-247, as amended by SOR/92-587, SOR/94-355, SOR/97-147, SOR/98-217, SOR/2000-104, and SOR/2003-106; a copy of the regulations can be found at http://www.ec.gc.ca/CEPARegistry/regulations

For the 2005 reporting period, 9 companies submitted records of imports of leaded gasoline for use in competition vehicles totalling 1,160,301 Litres. Nine companies submitted records of leaded gasoline sales. The reported average lead concentrations of that gasoline ranged from 0.2 to 2.1 g/L. Table 5.1 summarizes the number of companies reporting imports of leaded gasoline for use in competition vehicles for each region in 2005. There were no quarterly reports received for 2005 from producers or importers of leaded gasoline for uses other than in competition vehicles.

Table 5.1 Number of Companies Reporting Imports of Gasoline for Use in Competition Vehicles for 2005

Region	Number of Companies
Atlantic	0
Ontario	2
Quebec	1
West*	5
National	9[8]

*Includes all western provinces and northern territories.

[8] One company reported imports into more than one region (Atlantic, Quebec, Ontario and Alberta).

Appendix 1

Annual Compliance Package with Sample Reporting Forms for the *Benzene in Gasoline Regulations*; & *Gasoline Regulations*

Benzene in Gasoline Regulations

NOTE: Information contained in this page is for compliance promotional purposes and has NO legal status. For requirements under the regulations, refer to the actual regulations.

These regulations apply to importers, manufacturers and blenders of gasoline. They also apply to anyone that sells gasoline or offers it for sale.

The regulations prohibit the production or import of gasoline with a benzene content exceeding 1.0% by volume. They also restrict the Benzene Emissions Number (BEN), a calculated parameter that relates gasoline composition to predicted emissions of benzene from vehicle tailpipes to a maximum of 71 in the summer and 92 in the winter. Companies may elect to meet annual pooled averages for benzene and BEN, in place of the above limits.

The regulations also prohibit the sale of gasoline with more than 1.5% by volume of benzene.

Various reporting and record-keeping requirements are specified in different sections of the Regulations. For instance:

- Section 6 requires that information on alternative sampling or analysis methods be submitted **60 days prior to use**.
- Section 7 specifies that **registration as per Schedule 2** is required with Environment Canada **15 days prior** to commencing operations for new refiners, importers or blenders (a copy of Schedule 2 is attached for your convenience).
- Section 8 requires every primary supplier to submit gasoline composition reports due annually on February 15. A copy of Schedule 3 is attached for your convenience.
- Section 12 specifies additional reporting requirements for importers. A page summarizing the reporting requirements is attached for your convenience.
- Subsection 21(2) requires that a compliance plan be signed by an authorized official of the primary supplier and sent to the Minister by registered mail or courier at least 150 days before the beginning of the first year (i.e. by August 4) for which the primary supplier has elected to meet a requirement on the basis of a yearly pool average. Any changes to the compliance plan require at least 45 days notice to the Minister as per subsection 21(3).
- Subsection 22(3) requires that auditor's reports for those on a yearly pool average be submitted each year by May 31.

Further details on the above are contained in an Environment Canada guidance document entitled "Questions and Answers on the Federal *Benzene in Gasoline Regulations* (May 27, 1998)". For a copy of this document, please refer to following website:

http://www.ec.gc.ca/CEPARegistry/regulations/

Environment Canada Environnement Canada

SCHEDULE 2
(Section 7)
REGISTRATION FORM FOR A MANUFACTURER, BLENDER OR IMPORTER OF GASOLINE

This form is provided for your convenience. Please refer to the *Canadian Environmental Protection Act* and the *Benzene in Gasoline Regulations* for information on requirements.

Mail To: Environment Canada
REGIONAL ADDRESS

1. Company Name: _____

   Company Address: _____

   Type of primary supplier (check one or more): [ ] Manufacturer [ ] Blender [ ] Importer

2. Name and location of each refinery and typical annual volume, in m^3, of each type of gasoline manufactured at each refinery:

   _____

   _____

   _____

3. Name and location of each blending facility, typical blending material(s) and typical annual volume, in m^3, of each type of gasoline blended at each facility: (For cargo tankers, railway cars, boats, marine vessels or other mobile blending facilities, indicate only the type and number of mobile facilities and the province of operation.)

   _____

   _____

   _____

4. Each usual point and mode of importation and typical annual volume, in m^3, of each type of gasoline imported:

   _____

   _____

5. Authorized official: _____ Telephone no. (_____) _____-_____

   Title: _____ Fax no. (_____) _____-_____

   Signature: _____ Date: _____

Environment Canada Environnement Canada

BENZENE IN GASOLINE REGULATIONS - REPORT ON COMPOSITION OF GASOLINE

NOTE: This form is provided for your convenience in reporting. For reporting details, refer to the Regulations.

This report, in respect of section 8 and schedule 3 of the federal *Benzene in Gasoline Regulations* should be submitted:
a) by every primary supplier as defined in the Regulations
b) on or before February 15 of each year (annual reporting)
c) to the appropriate regional office of Environment Canada (see back page)

Registration Number	Year
Company name	
Company address	

Type of primary supplier (check one or more) : [ ] Manufacturer [ ] Blender [ ] Importer

Has a yearly pool average been elected for this year? [ ] Yes [ ] No
If yes, for which parameters? [ ] Benzene [ ] Benzene Emissions Number (BEN)
If yes, has your compliance plan been updated during the reporting period? [ ] Yes [ ] No
Note: Updated compliance plans must be submitted to the Minister pursuant to subsection 21(3) of the *Benzene in Gasoline Regulations*.

Name and location of the refinery, blending facility or points of importation in the province, covered by this report :
(Refer to Notes A) and B) on the next page)

Composition of gasoline supplied during this reporting period.

Volume of gasoline supplied, in m^3	Number of batches supplied	Name of any oxygenates added

Item	Column 1 Parameter	Column 2 Maximum Value	Column 3 Year-to-date volume-weighted average value
1.	Oxygen Concentration (% by weight)		
2.	Sulphur Concentration (mg/kg)		
3.	Vapor pressure at 37.8ºC (100ºF)(kPa)		
4.	Evaporative fraction at 93.3ºC (200ºF) (% by volume)		
5.	Evaporative fraction at 148.9ºC (300ºF) (% by volume)		
6.	Aromatics concentration (% by volume)		
7.	Olefins concentration (% by volume)		
8.	Benzene concentration (% by volume)		
9.	Benzene Emissions Number (Refer to note C)		

Authorized Official (*)	Telephone No. ( ) -
Title	Fax No. ( ) -
Signature	Date

(*) Refer to note (F) on next page

Environment Canada Environnement Canada

NOTES -- BENZENE IN GASOLINE REGULATIONS

A. This Report on Composition of Gasoline must be submitted separately for each refinery, blending facility and province of importation, or any combination of them described under section 18 of the *Benzene in Gasoline Regulations*.
B. For Note A, the name and location for cargo tankers, railway cars, boats, marine vessels or other mobile blending facilities are replaced by the type of mobile facilities, their number and the province of operation, or the name and location of the non-mobile facility with which they are grouped.
C. The average benzene emissions number is the volume-weighted average of the benzene emissions numbers for each batch; it is not calculated from the average model parameters.
D. Under subsection 13(2) of *the Benzene in Gasoline Regulations*, for each batch of gasoline-like blendstock dispatched or imported by the primary supplier during the period covered by this Report, the primary supplier must report to the Minister, in an annex to this Report, the name and address of the purchaser or receiver, the date of dispatch or importation and the volume.
E. Under subsection 2(2) of Schedule 1 to the *Benzene in Gasoline Regulations*, the primary supplier must report to the Minister, in an annex to this Report, each occurrence of a model parameter that is outside the acceptable range, the reason for each occurrence, and the volume of gasoline affected.
F. Authorized official is a defined term (refer to subsection 1(1) of the Benzene in Gasoline Regulations).

Additional Requirements for Importers as per Section 12 of the *Benzene in Gasoline Regulations*

NOTE: Information contained in this page is for compliance promotional purposes and has no legal status. For requirements under the regulations, refer to the actual regulations.

Subsection 12(1) Every importer must notify the Minister, at least 12 hours before the time of importation, of the importer's intention to import:

a) at any one time more than 100 m^3 of gasoline identified under subsection 9(1) or (2) as complying gasoline, U.S. reformulated gasoline, California gasoline or northern winter complying gasoline; or

b) at any one time, any amount of gasoline identified under subsection 9(1) as gasoline-like blendstock; or

c) **into a province and within any one day, more than 1,000 m^3 of gasoline identified under subsection 9(1) or (2) as complying gasoline, U.S. reformulated gasoline, California gasoline or northern winter complying gasoline (amended 2003)**

Subsection 12(2) The notice required by subsection (1) must include:

a) the name and registration number of the importer;
b) the type of gasoline identified under subsection 9(1), unless it is complying gasoline;
c) the volume of the gasoline that is scheduled to be imported;
d) the point of entry of the gasoline into Canada and the estimated date and time* that it will enter Canada;
e) the address of the first storage facility or refueling facility to which the gasoline is to be delivered and the estimated date and time of its delivery there; and
f) the name and telephone number of a representative of the importer through whom sampling arrangements can be made.

* Provide the best estimated date and time with your notice; revise when more accurate date and time become available.
(A form containing above noted requirements is attached for your convenience)

Subsection 12(3) No importer shall import gasoline by cargo tanker, railway car, boat, marine vessel or aircraft unless the gasoline is accompanied at the point of entry into Canada and at the point of delivery, and everywhere between those points, by a record that shows:

a) the name, address and registration number of the importer;
b) the name and address of the person to whom the gasoline is to be sold or ownership transferred;
c) the address of the first storage facility or refueling facility to which the gasoline is to be delivered;
d) the volume of the gasoline; and
e) the type of gasoline identified under subsection 9(1), unless it is complying gasoline.

Environment Canada Environnement Canada

This form is provided for your convenience. Please refer to the *Benzene in Gasoline Regulations* for information on requirements.

Additional Requirements under section 12 of the *Benzene in Gasoline Regulations* **for Importers** intending to import at any one time more than 100 m^3 of gasoline or more than 1000 m^3 into a province in one day. Note **no** minimum for gasoline-like blendstock.

Notification: via fax at least 12 hours before the time of importation

REGIONAL ADDRESS
Regional Enforcement Fax#

a) Importer Name: _____

Importer Registration Number: _____

Batch Number (Optional): _____

b) Type of gasoline identified under Section 9, check or mark "x" below:

Complying gasoline	[ ]	California gasoline	[ ]
Gasoline-like blendstock	[ ]	Northern winter complying gasoline	[ ]
US reformulated gasoline	[ ]		

c) Scheduled volume of gasoline (m^3): _____

d) Point of entry into Canada: _____

Estimated date _____ and time of entry _____

e) Address of first storage facility or refueling facility to whom gasoline is to be delivered:

_____

Estimated date of delivery _____ and time of delivery _____

f) Importer's representative through whom sampling may be arranged:

Name (Print): _____, Telephone: _____

Following To Be Completed by Environment Canada (PLEASE PRINT):
Environment Canada Official receiving or reviewing information:

Name: _____ Signature: _____

Date: _____ Telephone: (_____) _____ -- _____

Environment Canada Environnement Canada

Gasoline Regulations

NOTE: Information contained in this page is for compliance promotional purposes and has no legal status. For requirements under the regulations, refer to the actual regulations.

These Regulations specify the allowable lead and phosphorus content in leaded and unleaded gasoline that is produced, imported, sold or offered for sale in Canada. Gasoline for use in aircraft is exempted. The regulations do not apply to gasoline for use in competition vehicles, as defined by the regulations, except for the record and reporting requirements of section 11.

Leaded Gasoline reporting

Producers and importers of leaded gasoline for use or sale in Canada must submit quarterly reports to the Minister of the Environment detailing quantities produced and imported, as well as lead concentrations. These reports must be submitted within 15 days after the last day of each calendar quarter in which the activity occurred. Records of the sales of this gasoline must be retained in Canada for a period of two years after the date the record is made. Note that this requirement does not pertain to leaded gasoline for use in competition vehicles.

Leaded Gasoline used in Competition Vehicles reporting

For leaded gasoline used in competition vehicles, annual detailed reports indicating, among other things, quantities imported, produced and distributed, as well as the lead concentrations, must be submitted to the Minister of the Environment by March 31 of the year following the year in which the activity occurred. Records detailing these activities must be kept in Canada for a period of five years after the date the record is made. Example templates in paper form for company identification and record keeping (for leaded gasoline import, production, sales, re-sales and distribution information) are attached for your convenience. Electronic versions of the templates (in Excel) are also available. The required information is to be mailed to the address below.

Environment Canada
REGIONAL ADDRESS

Environment Canada Environnement Canada

Leaded Gasoline For Competition Vehicles

Annual Reporting for *Gasoline Regulations*

Canadian Environmental Protection Act, 1999

Company Identification and Declaration

Company Information

Company Name:_____

_____

Address:_____

City: _____ Prov.: _____

Postal Code:_____

Ph: (_____) _____-_____

Fax: (_____) _____-_____

Contact Information

Name:_____

Title:_____

Address:_____

City:_____ Prov.:_____

Postal Code:_____

Ph: (_____) _____-_____

Fax: (_____) _____-_____

(to be completed if contact address differs from company address)

Calendar year: 2005

Non Involvement

☐ In the above indicated calendar year, I did not produce, import, distribute, re-sell, sell or offer for sale leaded gasoline for use in competition vehicles. In this case, please complete this form and return it to the address listed below.

Involvement

☐ In the above indicated calendar year, I produced, imported, distributed, re-sold, sold or offered for sale leaded gasoline for use in competition vehicles. The reports for these activities are attached.

Confidential

☐ Pursuant to subsection 313(1) of the *Canadian Environmental Protection Act, 1999*, I request that the following information for the above calendar year be treated as confidential (please specify your reasons).

Not Confidential

☐ I do not request the following information be treated as confidential and I consent to it being released without restriction.

_____ _____

Signature Name *(please print)*

_____ _____

Title Place and date

Please complete, include your records and return to:

Environment Canada
REGIONAL ADDRESS

Environment Canada Environnement Canada

Leaded Gasoline For Competition Vehicles

Record Keeping for *Gasoline Regulations*

Canadian Environmental Protection Act, 1999

Leaded Gasoline Import/Production Information

Date	Brand Name	Octane Rating/ Analysis Method[1]	Average Lead Concentration (mg/L)	Quantity Imported (L)	Quantity Produced (L)

1. Please indicate for Octane Rating and Analysis Method: R - Research Octane Number; M - Motor Octane Number; or, A - Anti-Knock Index

Environment Canada Environnement Canada

Leaded Gasoline For Competition Vehicles

Record Keeping for *Gasoline Regulations*

Canadian Environmental Protection Act, 1999

Leaded Gasoline Sales, Re-Sales and Distribution Information

Date	Activity[1]	Brand Name	Octane Rating/ Analysis Method[2]	Average Lead Concentration (mg/L)	Name and Address of Re-Seller or Track/Event (if applicable)	Quantity (L)

1. Please indicate for Activity: Sales to Resellers/Distributors (SRD); Sales to Tracks/Events (STE); or, Sales to Individual Users (SIU) [other than at tracks/events]
2. Please indicate for Octane Rating and Analysis Method: R - Research Octane Number; M - Motor Octane Number; or, A - Anti-Knock Index

Appendix 2

Alternative Limits under *the Benzene in Gasoline Regulations*

http://www.ec.gc.ca/RegistreLCPE/documents/notices/g1-13336_n1.pdf

GOVERNMENT NOTICES

DEPARTMENT OF THE ENVIRONMENT

Alternative Limits under the Benzene in Gasoline Regulations

This notice provides information on alternative limits that have been approved by the Minister of the Environment under the federal *Benzene in Gasoline Regulations.*

The federal *Benzene in Gasoline Regulations* set limits for the level of benzene in gasoline and for a parameter called the benzene emissions number (BEN). The BEN relates gasoline composition to the estimated emissions of benzene from vehicles. The limits under the Regulations came into effect on July 1, 1999.

Under subsection 17(2) of the *Benzene in Gasoline Regulations*, primary suppliers of gasoline (refiners, blenders and importers) could elect to be subject to alternative limits for the BEN, based on their historical gasoline composition. Under subsection 16(2), primary suppliers unable to meet the July 1, 1999, implementation date could also apply to be subject to temporary (higher) limits for both benzene and the BEN for up to six months.

Temporary Limits under Subsection 16(2)

Under subsection 16(2) of the Regulations, primary suppliers may apply for temporary alternative limits for benzene and the BEN if, for reasons beyond their control, they cannot meet the implementation date of July 1, 1999. Primary suppliers may only use the temporary limits until December 31, 1999. Under subsection 16(4) of the Regulations, the Minister of the Environment approves these applications only if:

— the primary supplier has made all reasonable efforts to meet the implementation date of July 1, 1999; and

— that non-authorization of the temporary limits would

— have a significant effect on the supply of gasoline or other petroleum products in the region,

— require the primary supplier to significantly curtail operations or cease operating for a period of time and thereby result in financial hardship, or

— result in the primary supplier going out of business.

In the Regulatory Impact Analysis Statement that accompanied amendments to the *Benzene in Gasoline Regulations*, published in the *Canada Gazette*, Part II, on May 26, 1999, the Minister of the Environment announced her intention to "publish a notice in *Canada Gazette* Part I identifying the company, its alternative limits, and the period that the limits apply". Pursuant to that intention, the following tables show the temporary alternative limits for benzene and the BEN that have been applied for and approved. It should be noted that under the Regulations, companies can elect to meet the requirements on the basis of yearly pool average limits with associated never-to-be-exceeded caps, rather than meeting "flat" never-to-be-exceeded limits.

Temporary Limits for Primary Suppliers having Elected to use Yearly Pool Averages

Company	Refinery or province of importation	Temporary yearly pool average limits (all expire on December 31, 1999)	Temporary never-to-be-exceeded caps	Expiry date for temporary never-to-be-exceeded caps
		Benzene (% vol.) BEN	*Benzene (% vol.) BEN*	
Petro-Canada	Montréal refinery	1.28% 76.4	4.61% 156.8/198.1	November 15, 1999
Shell	Montréal refinery	2.0% 86.8	4.7% 117.8/220.0	November 15, 1999
Ultramar	Québec refinery and Montréal terminal	1.2% —	3.55% —/134.8	November 15, 1999
Pétroles Norcan	Imports into Quebec	1.54% 66.68	3.0% —	November 15, 1999
Petro-Canada	Oakville refinery	1.75% 80.4	4.29% 140.6/—	September 15, 1999
Standard limits under subsections 16(1) and 17(1)				
Standard limits	Benzene BEN	0.95% 59.5	1.5% 102/132	

Temporary Limits for Primary Suppliers Subject to "Flat" Limits

Company	Refinery or province of importation	Temporary flat (per-litre) limit		Expiry date for temporary flat limit
		Benzene (% vol.)	*BEN*	
Olco/Neste	Imports into Quebec and Ontario	3.0%	—	November 15, 1999
Spur/Murphy	Imports into Ontario	2.06%	—	September 15, 1999
Parkland	Bowden refinery	1.5%	—	December 31, 1999
Standard limits under subsection 3(1) and section 4				
Standard limits		1.0%	71/92	

Notes:

1. There are different seasonal per-litre limits for the BEN — summer (1st number) and winter (2nd number).

2. Temporary average limits, which expire on December 31, 1999, take into account gasoline produced/imported before and after the expiry date for the temporary per-litre limits. After the expiry dates, regular limits apply.

3. "—" indicates that no temporary limit was applied for by the primary supplier.

Under paragraph 3(2)(*b*) of the Regulations, the areas where gasoline sold is subject to temporary alternative limits are:

— Quebec, except that portion of the province that is in the northern supply area (as defined by the Regulations);

— all of Ontario; and

— southern Alberta and southeastern British Columbia (roughly the towns of Provost, Leduc, Drayton Valley and Revelstoke, and all other locations in Alberta and British Columbia south and east of those towns).

In the above areas, the prohibition on selling (as opposed to manufacturing, blending or importing) gasoline containing benzene at a concentration that exceeds 1.5 percent by volume is deferred from October 1, 1999, to April 1, 2000.

Alternative Limits for BEN under Subsection 17(2)

Under subsection 17(2) of the Regulations, primary suppliers may elect for alternative limits for the BEN based on the historical composition of their gasoline. There is no expiry date for alternative BEN limits.

In the Regulatory Impact Analysis Statement that accompanied the *Benzene in Gasoline Regulations*, published in the *Canada Gazette*, Part II, on November 26, 1997, the Minister of the Environment announced her intention that the alternative limits "will be publicly available and will be published by Environment Canada". Pursuant to that intention, the following alternative limits for the BEN have been applied for and approved:

Alternative Limits for BEN

		Benzene Emissions Number	
Company	Refinery	Alternative yearly pool average limit	Alternative never-to-be-exceeded cap (summer/winter)
Petro-Canada	Montréal	67.9	115.0/151.0
Shell	Montréal	65.3	110.5/144.7
Petro-Canada	Oakville	65.3	117.1/141.4
Shell	Sarnia	65.0	106.0/147.8
Standard limits under subsection 17(1)			
Standard limits		59.5	102/132

Contact

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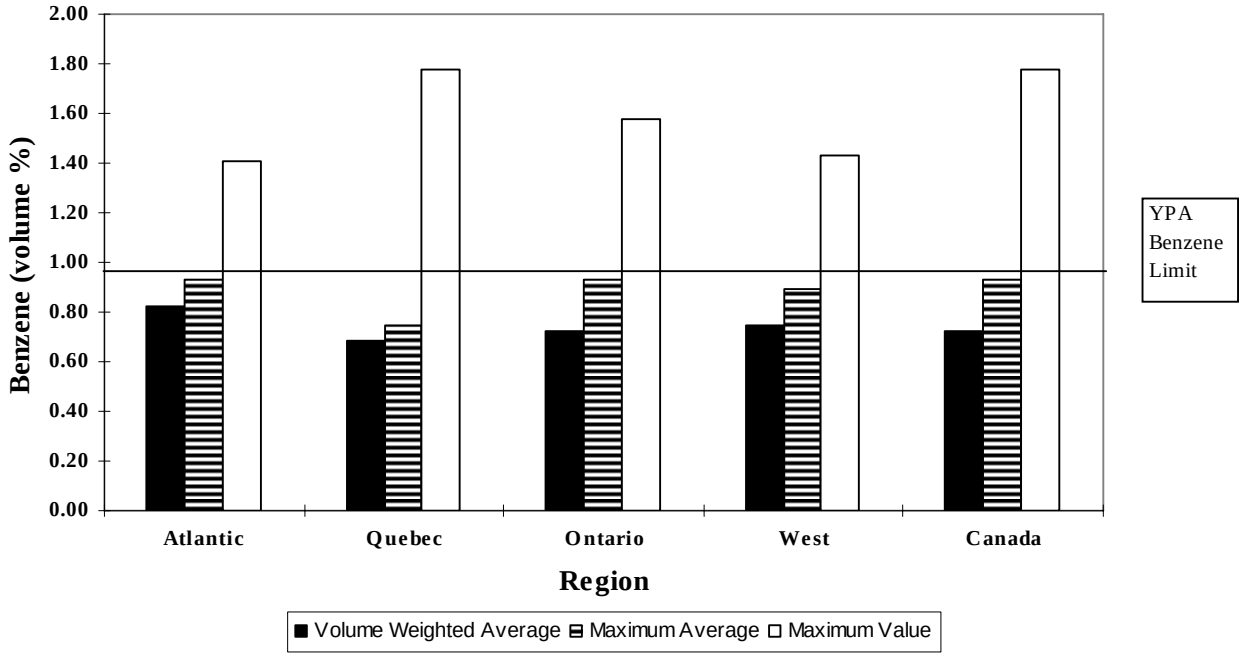
[36-1-o]

Appendix 3

Regional and National Data for all Parameters

Figure A3.1: Average, Maximum Average and Maximum Value for Benzene Concentration of Canadian Gasoline 2005

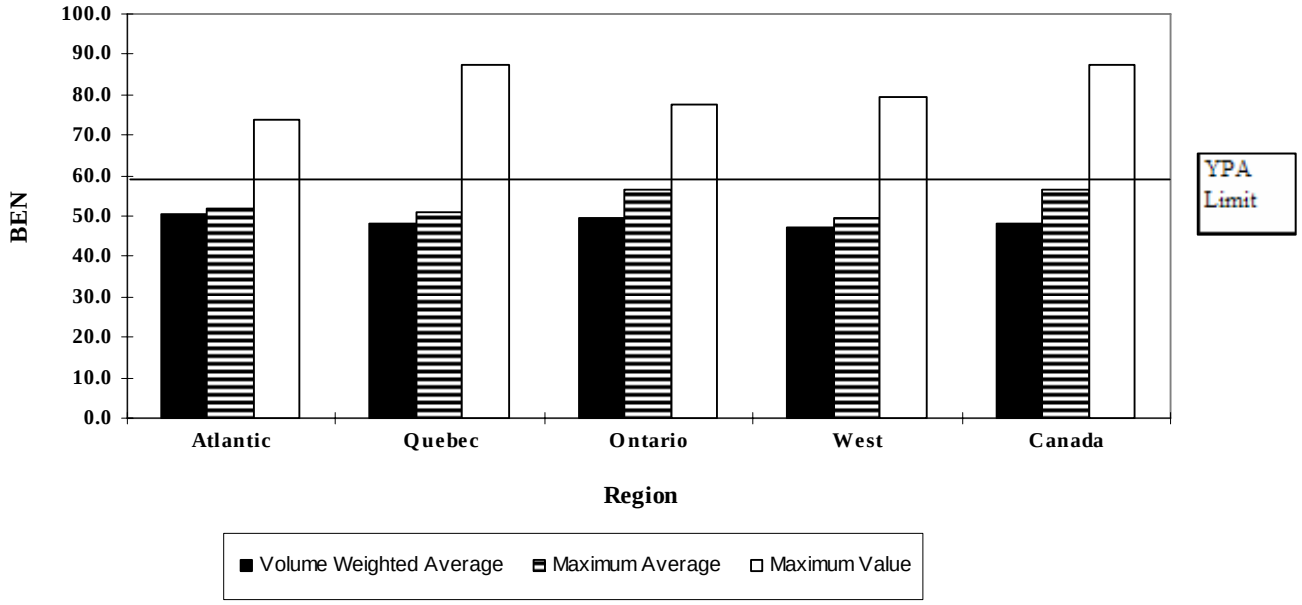


- The Benzene limit for primary suppliers is 1.0% vol. or 0.95% vol. for those on a YPA.

Table A3.1: 2005 Average, Maximum Average, Maximum Value and Minimum Value for Benzene Concentration (% by volume)

Region	Volume (m^3)	Volume Weighted Average	Maximum Average	Maximum Value	Minimum Value
Atlantic	2,860,790	0.82	0.93	1.41	0.53
Quebec	13,701,089	0.68	0.75	1.78	0.88
Ontario	10,970,568	0.72	0.93	1.58	0.40
West	13,358,248	0.75	0.89	1.43	0.65
Canada	40,890,695	0.73	0.93	1.78	0.40

Figure A3.2: Average, Maximum Average and Maximum Value for BEN of Canadian Gasoline 2005



- The annual average BEN limit for primary suppliers on a YPA is 59.5.

Table A3.2: 2005 Average, Maximum Average, Maximum Value and Minimum Value for BEN

Region	Volume (m^3)	Volume Weighted Average	Maximum Average	Maximum Value	Minimum Value
Atlantic	2,860,790	50.6	52.0	74.0	49.0
Quebec	13,701,089	48.2	50.8	87.5	55.1
Ontario	10,970,568	49.3	56.6	77.6	37.3
West	13,358,248	47.3	49.4	79.4	42.7
Canada	40,890,695	48.4	56.6	87.5	37.3

Figure A3.3: Average, Maximum Average and Maximum Value for Sulphur Concentration of Canadian Gasoline 2005

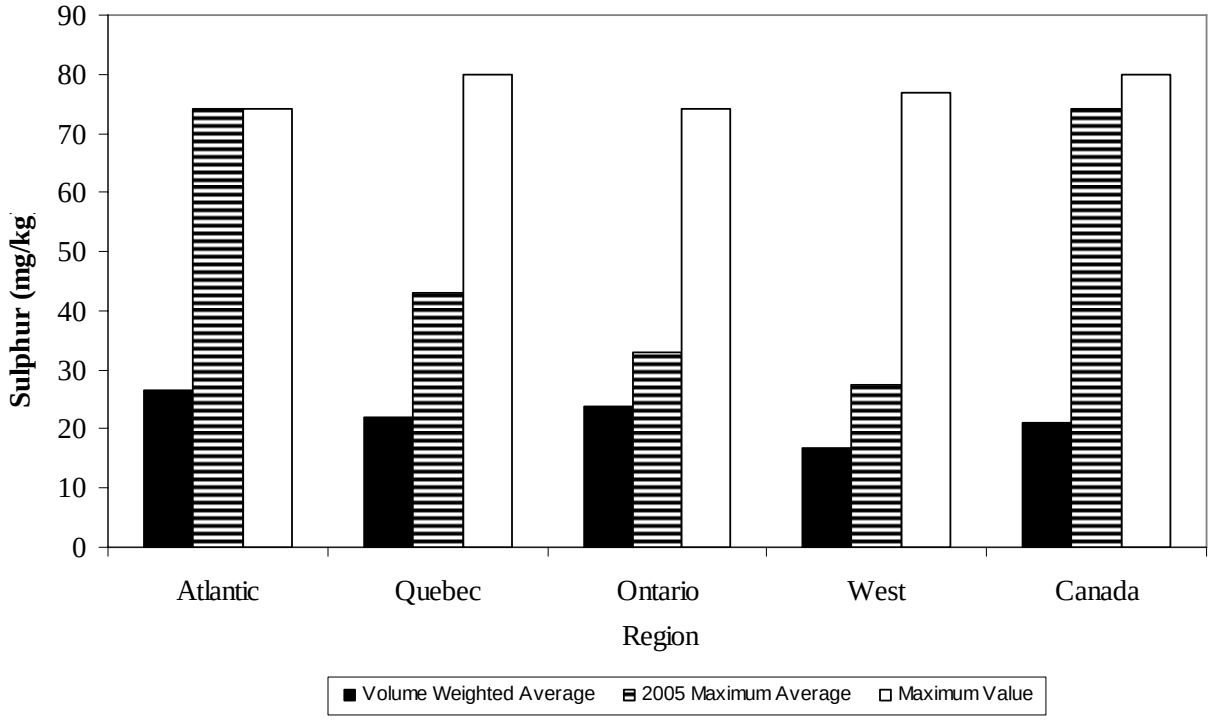


Table A3.3: 2005 Average, Maximum Average, Maximum Value and Minimum Value for Sulphur Concentration (mg/kg)

Region	Volume (m^3)	Volume Weighted Average	Maximum Average	Maximum Value	Minimum Value
Atlantic	2,860,790	27	74	74	32
Quebec	13,701,089	22	43	80	39
Ontario	10,970,568	24	33	74	14
West	13,358,248	17	28	77	2
Canada	40,890,695	21	74	80	2

Figure A3.4: Average, Maximum Average and Maximum Value for Olefin Concentration of Canadian Gasoline 2005

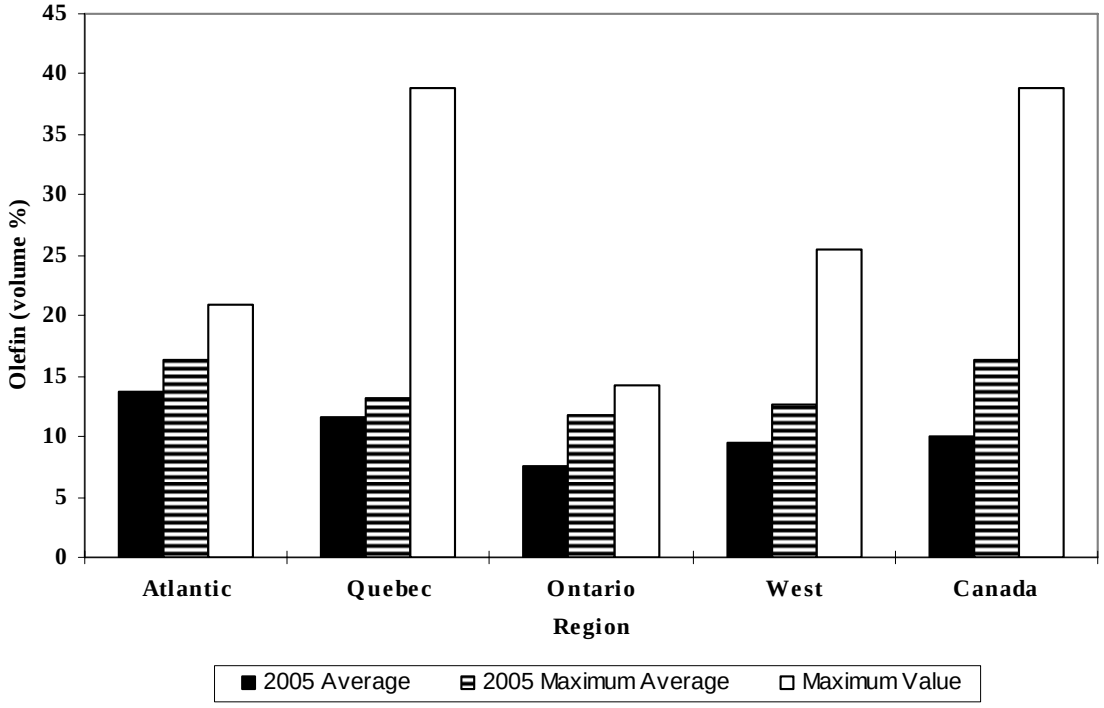


Table A3.4: 2005 Average, Maximum Average, Maximum Value and Minimum Value for Olefin Concentration (% by volume)

Region	Volume (m^3)	Volume Weighted Average	Maximum Average	Maximum Value	Minimum Value
Atlantic	2,860,790	13.8	16.3	21.0	10.1
Quebec	13,701,089	11.5	13.1	38.9	17.8
Ontario	10,970,568	7.5	11.8	14.3	5.3
West	13,358,248	9.5	12.6	25.5	1.2
Canada	40,890,695	10.0	16.3	38.9	1.2

Figure A3.5: Average, Maximum Average and Maximum Value for Aromatics Concentration of Canadian Gasoline 2005

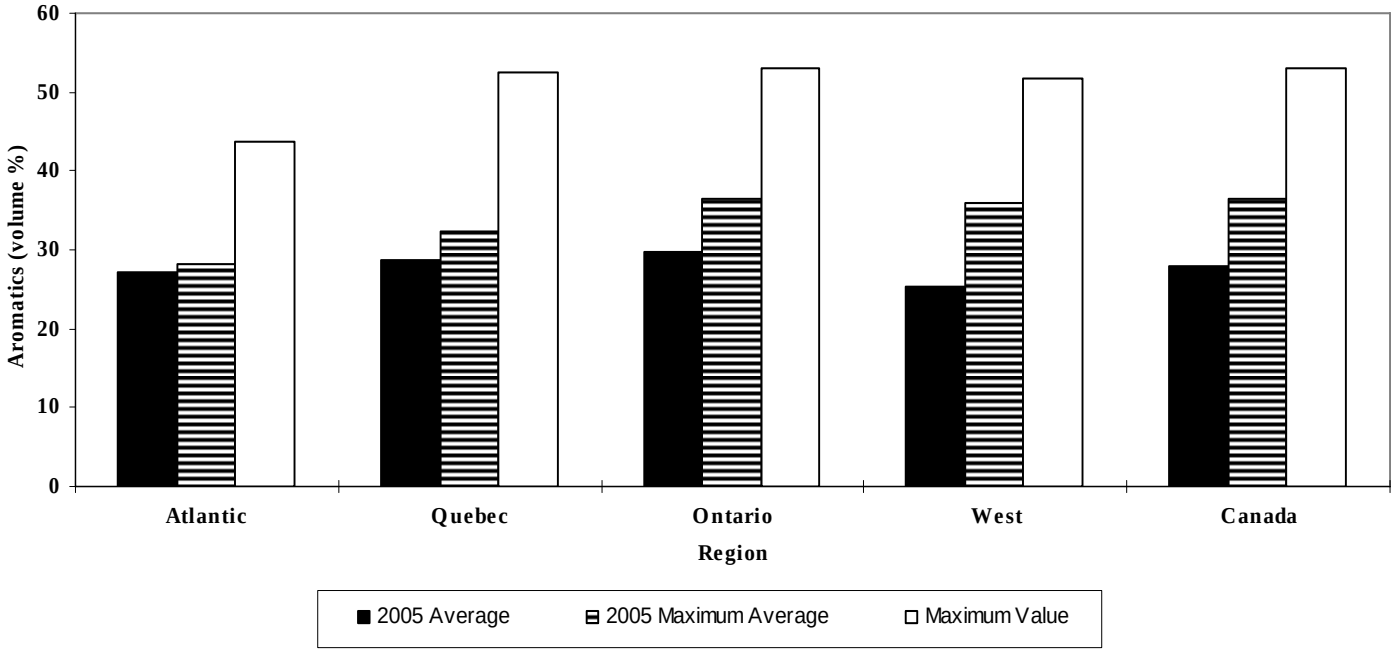


Table A3.5: 2005 Average, Maximum Average, Maximum Value and Minimum Value for Aromatics Concentration (% by volume)

Region	Volume (m^3)	Volume Weighted Average	Maximum Average	Maximum Value	Minimum Value
Atlantic	2,860,790	27.2	28.2	43.8	21.3
Quebec	13,701,089	28.8	32.4	52.4	30.2
Ontario	10,970,568	29.8	36.4	53.0	33.4
West	13,358,248	25.3	35.9	51.6	31.2
Canada	40,890,695	27.8	36.4	53.0	21.3

Figure A3.6: Average, Maximum Average and Maximum Value for Average E200 of Canadian Gasoline 2005

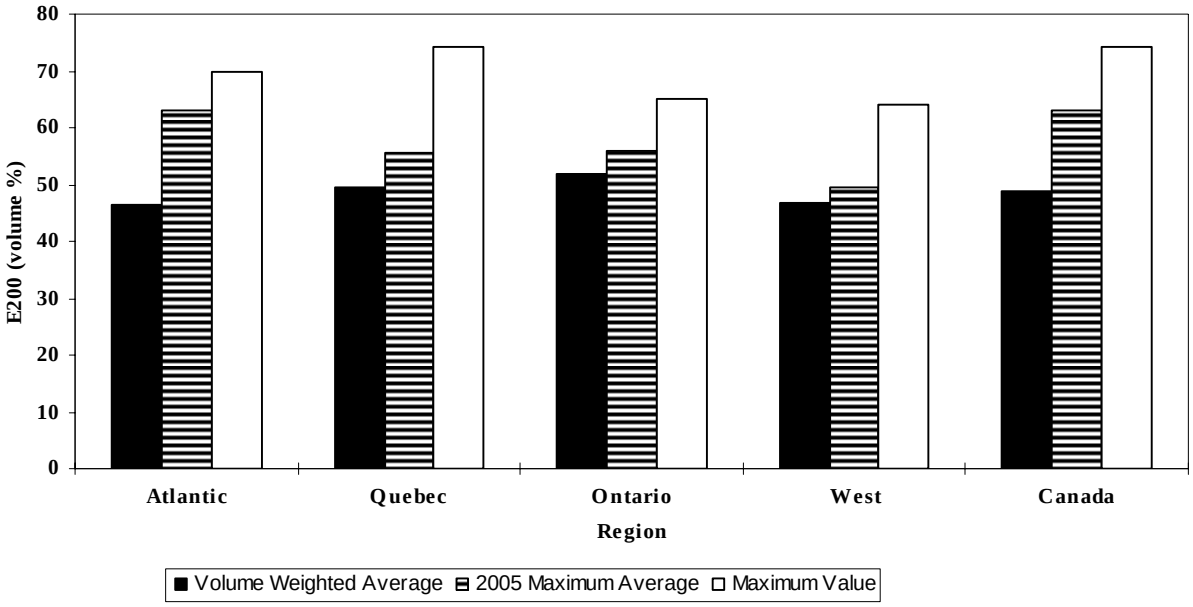


Table A3.6: 2005 Average, Maximum Average, Maximum Value and Minimum Value for E200 (% by volume)

Region	Volume (m^3)	Volume Weighted Average	Maximum Average	Maximum Value	Minimum Value
Atlantic	2,860,790	46.3	63.0	69.8	56.3
Quebec	13,701,089	49.4	55.7	74.3	60.0
Ontario	10,970,568	51.7	55.9	65.2	40.0
West	13,358,248	46.9	49.6	64.0	41.0
Canada	40,890,695	49.0	63.0	74.3	40.0

Figure A3.7: Average, Maximum Average and Maximum Value for E300 of Canadian Gasoline 2005

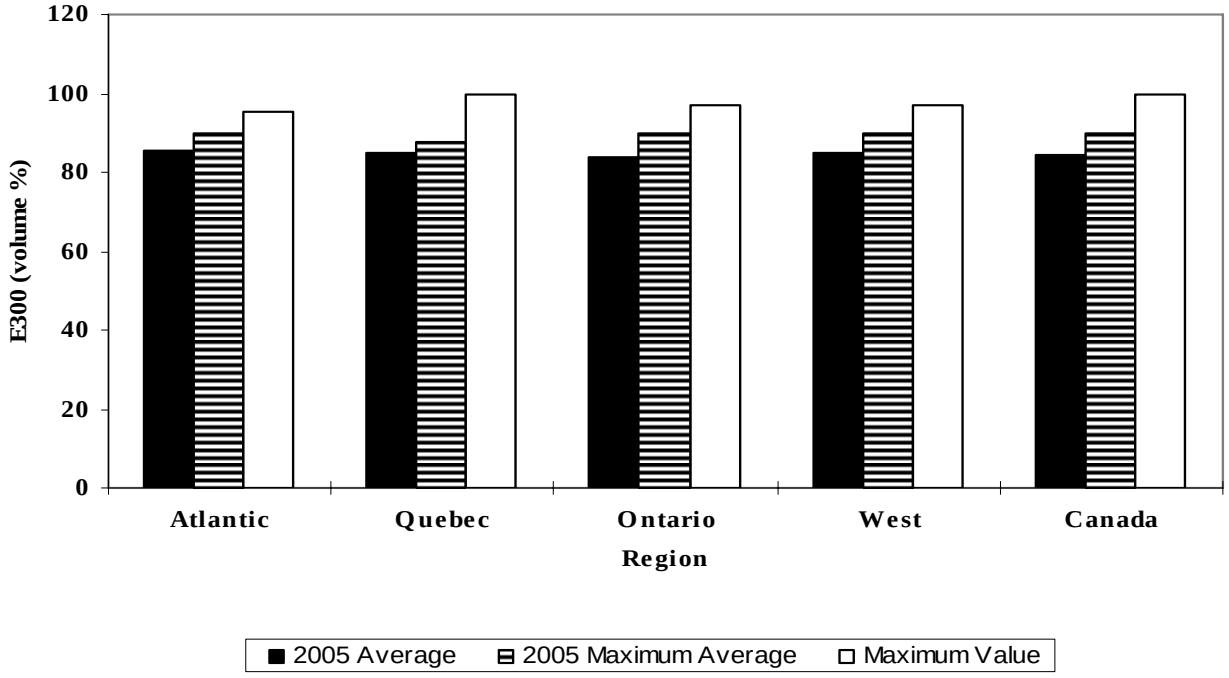
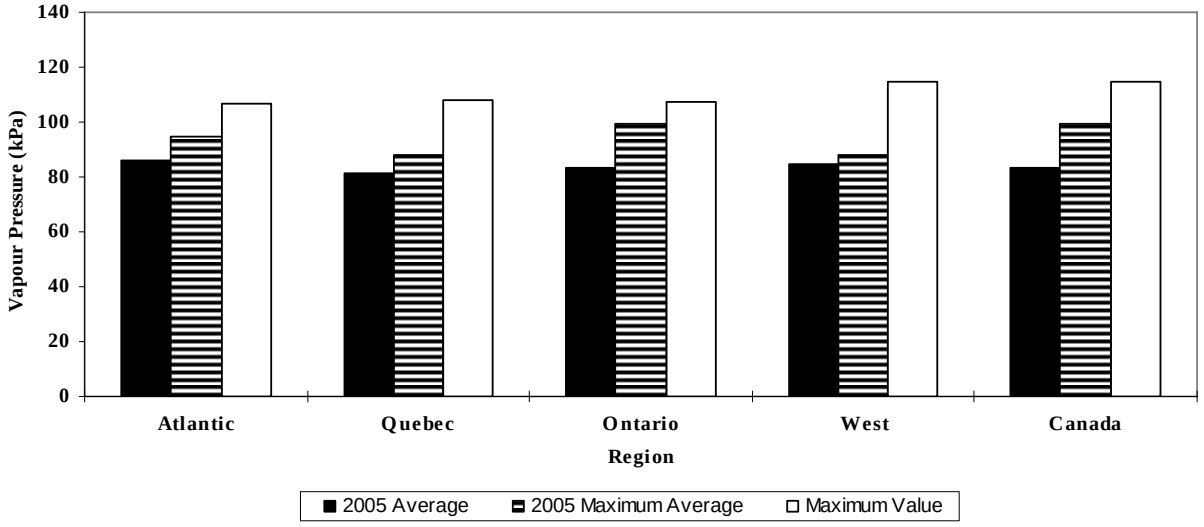


Table A3.7: 2005 Average, Maximum Average, Maximum Value and Minimum Value for E300 (% by volume)

Region	Volume (m^3)	Volume Weighted Average	Maximum Average	Maximum Value	Minimum Value
Atlantic	2,860,790	85.7	89.7	95.1	87.6
Quebec	13,701,089	84.8	87.8	99.7	89.8
Ontario	10,970,568	83.9	89.8	97.0	87.4
West	13,358,248	84.7	90.0	97.0	84.4
Canada	40,890,695	84.6	90.0	99.7	84.4

Figure A3.8: Average, Maximum Average and Maximum Value for Vapour Pressure of Canadian Gasoline 2005



1 psi = 6.894757 kPa

Table A3.8: 2005 Average, Maximum Average, Maximum Value and Minimum Value for Vapour Pressure (kPa)

Region	Volume (m^3)	Volume Weighted Average	Maximum Average	Maximum Value	Minimum Value
Atlantic	2,860,790	85.7	94.9	106.9	69.8
Quebec	13,701,089	81.4	88.1	107.9	98.2
Ontario	10,970,568	83.6	99.1	107.2	82.0
West	13,358,248	84.5	87.7	114.8	53.8
Canada	40,890,695	83.3	99.1	114.8	53.8

Figure A3.9: Average, Maximum Average and Maximum Value for Oxygen Concentration of Canadian Gasoline Based on All Volumes of Gasoline 2005

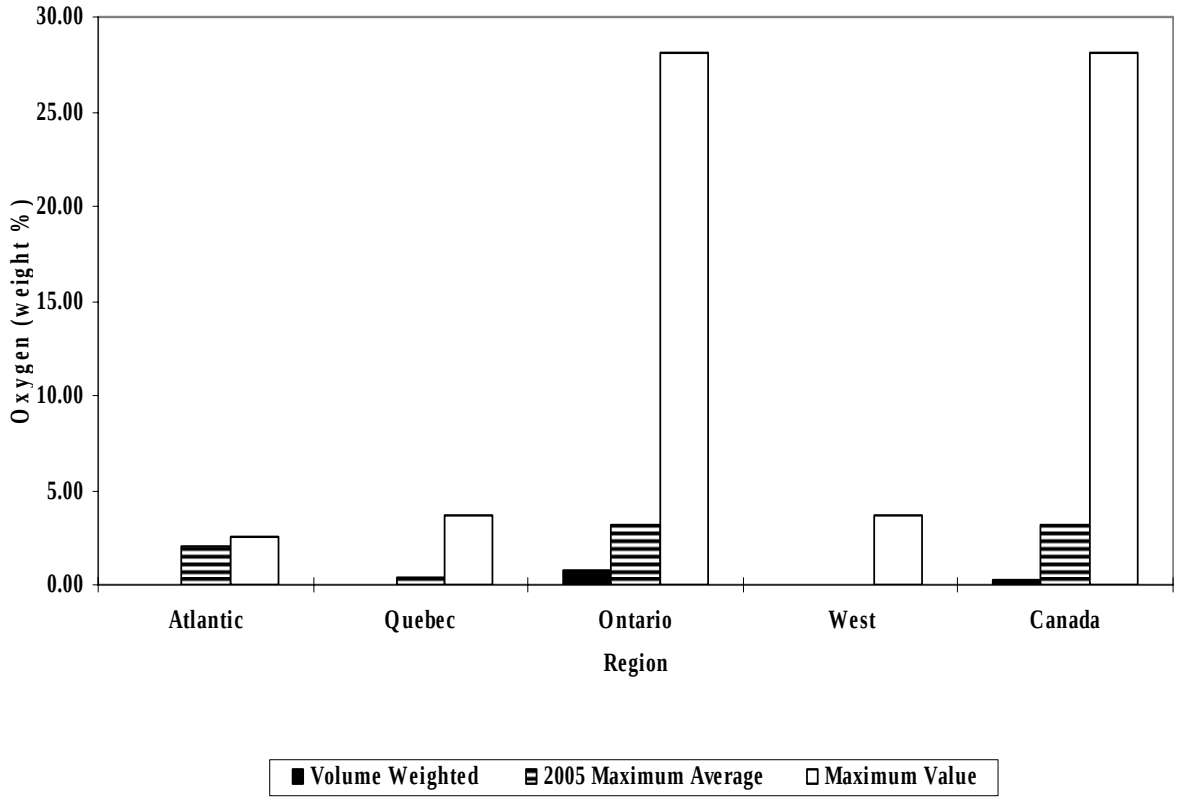


Table A3.9: 2005 Average, Maximum Average and Maximum Value for Oxygen Concentration Based on All Volumes of Gasoline (% by weight)

Region	Volume (m^3)	Volume Weighted Average	Maximum Average	Maximum Value	Minimum Value
Atlantic	2,860,790	0.02	2.00	2.59	0.00
Quebec	13,701,089	0.05	0.35	3.70	0.00
Ontario	10,970,568	0.73	3.17	28.10	0.00
West	13,358,248	0.00	0.03	3.70	0.00
Canada	40,890,695	0.22	3.17	28.10	0.00

Note:

The regulations do not require reporting of oxygenate blended downstream of the refinery (except for a few special incidences described in the regulations). These values are therefore likely to be underestimates of oxygenate usage.

Appendix 4

Company Reported Data

Table A4.1: 2005 Averages and Maxima Reported for Benzene (% by volume)

	Name	Location of Facilities	Average	Maximum
Refiners	Chevron Canada Ltd.	Burnaby, BC	0.60	1.30
	Consumers' Co-operative Refineries Ltd.	Regina, SK	0.78	1.43
	Husky Oil Operations Ltd.	Prince George, BC	0.89	1.10
	Imperial Oil Ltd.	Dartmouth, NS	0.91	1.41
	Imperial Oil Ltd.	Nanticoke, ON	0.93	1.58
	Imperial Oil Ltd.	Sarnia, ON	0.52	0.93
	Imperial Oil Ltd.	Strathcona, AB	0.79	1.31
	Irving Oil Ltd.	Saint John, NB	0.70	1.28
	North Atlantic Refining Ltd.	Come-by-Chance, NL	0.93	0.98
	Petro-Canada Products	Edmonton, AB	0.87	1.25
	Petro-Canada Products	Montreal, QC	0.75	1.49
	Petro-Canada Products	Oakville, ON	0.72	1.07
	Shell Canada Products	Montreal, QC	0.57	1.78
	Shell Canada Products	Sarnia, ON	0.68	0.91
	Shell Canada Products	Scotford, AB	0.47	0.94
	Suncor Energy Products Inc.	Sarnia, ON	0.52	1.42
	Ultramar Ltée.	St-Romuald, QC	0.66	1.16
Blenders	Robbins Feed and Fuel Ltd.	Thorold, ON	0.60	0.81
	Ultramar Ltée.	Montreal, QC	0.74	1.20
Importers	Olco Petroleum Group Inc.	Montreal, QC	0.68	0.88
	General Motors of Canada Limited	Oshawa, ON	0.36	0.40
	Imperial Oil Ltd.	Point Tupper, NS	0.53	0.53
	Imperial Oil Ltd.	Burrard, BC	0.70	0.86
	Petro-Canada Products	Burrard, BC	0.65	0.65
	Petroles Norcan Inc.	Montreal, QC	0.73	1.00
	Ultramar Ltée.	Holyrood, NL	0.70	0.86

Table A4.2: 2005 Averages and Maxima Reported for BEN

	Name	Location of Facilities	Average	Maximum
Refiners	Chevron Canada Ltd.	Burnaby, BC	45.8	70.8
	Consumers' Co-operative Refineries Ltd.	Regina, SK	45.9	72.4
	Husky Oil Operations Ltd.	Prince George, BC	46.0	57.7
	Imperial Oil Ltd.	Dartmouth, NS	52.0	74.0
	Imperial Oil Ltd.	Nanticoke, ON	52.0	67.0
	Imperial Oil Ltd.	Sarnia, ON	55.0	71.0
	Imperial Oil Ltd.	Strathcona, AB	49.0	70.0
	Irving Oil Ltd.	Saint John, NB	48.7	68.6
	North Atlantic Refining Ltd.	Come-by-Chance, NL	44.8	58.2
	Petro-Canada Products	Edmonton, AB	46.0	68.2
	Petro-Canada Products*	Montreal, QC	47.7	84.7
	Petro-Canada Products*	Oakville, ON	56.6	68.6
	Shell Canada Products*	Montreal, QC	50.8	87.5
	Shell Canada Products*	Sarnia, ON	51.7	77.6
	Shell Canada Products	Scotford, AB	49.4	79.4
	Suncor Energy Products Inc.	Sarnia, ON	38.8	72.0
	Ultramar Ltée.	St-Romuald, QC	47.3	82.0
Blenders	Robbins Feed and Fuel Ltd.	Thorold, ON	40.9	50.6
	Ultramar Ltée.	Montreal, QC	47.4	67.8
Importers	Olco Petroleum Group Inc.	Montreal, QC	42.7	55.1
	General Motors of Canada Limited	Oshawa, ON	22.0	37.3
	Imperial Oil Ltd.	Point Tupper, NS	49.0	49.0
	Imperial Oil Ltd.	Burrard, BC	44.0	59.3
	Petro-Canada Products	Burrard, BC	42.7	42.7
	Petroles Norcan Inc.	Montreal, QC	48.4	65.2
	Ultramar Ltée.	Holyrood, NL	50.2	69.2

* Primary suppliers that are shaded and marked with an asterisk have an alternative limit for the BEN. See Appendix 2 for details.

Table A4.3: 2005 Averages and Maxima Reported for Aromatics (% by volume)

	Name	Location of Facilities	Average	Maximum
Refiners	Chevron Canada Ltd.	Burnaby, BC	25.2	45.5
	Consumers' Co-operative Refineries Ltd.	Regina, SK	24.4	33.3
	Husky Oil Operations Ltd.	Prince George, BC	18.8	36.5
	Imperial Oil Ltd.	Dartmouth, NS	26.6	42.0
	Imperial Oil Ltd.	Nanticoke, ON	29.5	44.4
	Imperial Oil Ltd.	Sarnia, ON	36.4	44.3
	Imperial Oil Ltd.	Strathcona, AB	25.4	37.9
	Irving Oil Ltd.	Saint John, NB	28.2	43.8
	North Atlantic Refining Ltd.	Come-by-Chance, NL	26.0	32.5
	Petro-Canada Products	Edmonton, AB	21.3	31.2
	Petro-Canada Products	Montreal, QC	29.9	52.4
	Petro-Canada Products	Oakville, ON	27.3	38.8
	Shell Canada Products	Montreal, QC	32.4	46.7
	Shell Canada Products	Sarnia, ON	31.6	45.1
	Shell Canada Products	Scotford, AB	34.4	51.6
	Suncor Energy Products Inc.	Sarnia, ON	26.0	53.0
	Ultramar Ltée.	St-Romuald, QC	26.0	45.4
Blenders	Robbins Feed and Fuel Ltd.	Thorold, ON	25.0	33.4
	Ultramar Ltée.	Montreal, QC	28.3	43.9
Importers	Olco Petroleum Group Inc.	Montreal, QC	26.5	30.2
	General Motors of Canada Limited	Oshawa, ON	30.0	37.5
	Imperial Oil Ltd.	Point Tupper, NS	21.3	21.3
	Imperial Oil Ltd.	Burrard, BC	34.8	38.7
	Petro-Canada Products	Burrard, BC	35.9	35.9
	Petroles Norcan Inc.	Montreal, QC	27.4	40.6
	Ultramar Ltée.	Holyrood, NL	24.5	35.1

Table A4.4: 2005 Averages and Maxima Reported for Olefins (% by volume)

	Name	Location of Facilities	Average	Maximum
Refiners	Chevron Canada Ltd.	Burnaby, BC	11.0	19.5
	Consumers' Co-operative Refineries Ltd.	Regina, SK	12.6	16.0
	Husky Oil Operations Ltd.	Prince George, BC	10.0	20.2
	Imperial Oil Ltd.	Dartmouth, NS	16.3	21.0
	Imperial Oil Ltd.	Nanticoke, ON	10.2	14.3
	Imperial Oil Ltd.	Sarnia, ON	1.2	5.3
	Imperial Oil Ltd.	Strathcona, AB	10.6	16.2
	Irving Oil Ltd.	Saint John, NB	10.7	19.5
	North Atlantic Refining Ltd.	Come-by-Chance, NL	1.3	11.1
	Petro-Canada Products	Edmonton, AB	10.3	25.5
	Petro-Canada Products	Montreal, QC	11.1	26.2
	Petro-Canada Products	Oakville, ON	7.4	11.7
	Shell Canada Products	Montreal, QC	8.8	23.4
	Shell Canada Products	Sarnia, ON	11.8	13.5
	Shell Canada Products	Scotford, AB	1.3	2.4
	Suncor Energy Products Inc.	Sarnia, ON	3.6	11.1
	Ultramar Ltée.	St-Romuald, QC	12.9	21.3
Blenders	Robbins Feed and Fuel Ltd.	Thorold, ON	8.1	10.1
	Ultramar Ltée.	Montreal, QC	13.1	38.9
Importers	Olco Petroleum Group Inc.	Montreal, QC	13.1	17.8
	General Motors of Canada Limited	Oshawa, ON	3.0	5.5
	Imperial Oil Ltd.	Point Tupper, NS	10.1	10.1
	Imperial Oil Ltd.	Burrard, BC	6.3	16.2
	Petro-Canada Products	Burrard, BC	1.2	1.2
	Petroles Norcan Inc.	Montreal, QC	11.7	17.8
	Ultramar Ltée.	Holyrood, NL	7.7	12.8

Table A4.5: 2005 Averages and Maxima Reported for Sulphur (mg/kg)

	Name	Location of Facilities	Average	Maximum
Refiners	Chevron Canada Ltd.	Burnaby, BC	18	77
	Consumers' Co-operative Refineries Ltd.	Regina, SK	20	36
	Husky Oil Operations Ltd.	Prince George, BC	28	56
	Imperial Oil Ltd.	Dartmouth, NS	25	59
	Imperial Oil Ltd.	Nanticoke, ON	29	71
	Imperial Oil Ltd.	Sarnia, ON	4	14
	Imperial Oil Ltd.	Strathcona, AB	21	52
	Irving Oil Ltd.	Saint John, NB	29	65
	North Atlantic Refining Ltd.	Come-by-Chance, NL	30	36
	Petro-Canada Products	Edmonton, AB	12	44
	Petro-Canada Products	Montreal, QC	20	53
	Petro-Canada Products	Oakville, ON	24	40
	Shell Canada Products	Montreal, QC	19	39
	Shell Canada Products	Sarnia, ON	28	52
	Shell Canada Products	Scotford, AB	12	23
	Suncor Energy Products Inc.	Sarnia, ON	23	74
	Ultramar Ltée.	St-Romuald, QC	19	77
Blenders	Robbins Feed and Fuel Ltd.	Thorold, ON	33	38
	Ultramar Ltée.	Montreal, QC	29	57
Importers	Olco Petroleum Group Inc.	Montreal, QC	43	66
	General Motors of Canada Limited	Oshawa, ON	21	41
	Imperial Oil Ltd.	Point Tupper, NS	74	74
	Imperial Oil Ltd.	Burrard, BC	11	25
	Petro-Canada Products	Burrard, BC	2	2
	Petroles Norcan Inc.	Montreal, QC	30	80
	Ultramar Ltée.	Holyrood, NL	22	32

Table A4.6: 2005 Averages and Maxima Reported for Oxygen (% by weight)

	Name	Location of Facilities	Oxygenate	Average	Maximum
Refiners	Chevron Canada Ltd.	Burnaby, BC	N/A	0.00	0.00
	Consumers' Co-operative Refineries Ltd.	Regina, SK	N/A	0.00	0.00
	Husky Oil Operations Ltd.	Prince George, BC	Ethanol	0.03	3.70
	Imperial Oil Ltd.	Dartmouth, NS	N/A	0.00	0.00
	Imperial Oil Ltd.	Nanticoke, ON	MTBE, TAME	0.00	1.10
	Imperial Oil Ltd.	Sarnia, ON	N/A	0.00	0.00
	Imperial Oil Ltd.	Strathcona, AB	N/A	0.00	0.00
	Irving Oil Ltd.	Saint John, NB	MTBE	0.02	0.16
	North Atlantic Refining Ltd.	Come-by-Chance, NL	MTBE	2.00	2.59
	Petro-Canada Products	Edmonton, AB	N/A	0.00	0.00
	Petro-Canada Products	Montreal, QC	Ethanol	0.13	3.70
	Petro-Canada Products	Oakville, ON	N/A	0.00	0.00
	Shell Canada Products	Montreal, QC	N/A	0.00	0.00
	Shell Canada Products	Sarnia, ON	N/A	0.00	0.00
	Shell Canada Products	Scotford, AB	N/A	0.00	0.00
	Suncor Energy Products Inc.	Sarnia, ON	Ethanol	3.00	3.60
	Ultramar Ltée.	St-Romuald, QC	N/A	0.00	0.00
Blenders	Robbins Feed and Fuel Ltd.	Thorold, ON	Ethanol	3.17	3.50
	Ultramar Ltée.	Montreal, QC	N/A	0.00	0.00
Importers	Olco Petroleum Group Inc.	Montreal, QC	N/A	0.00	0.00
	General Motors of Canada Limited	Oshawa, ON	Ethanol	0.01	28.10
	Imperial Oil Ltd.	Point Tupper, NS	N/A	0.00	0.00
	Imperial Oil Ltd.	Burrard, BC	N/A	0.00	0.00
	Petro-Canada Products	Burrard, BC	MTBE	0.00	0.00
	Petroles Norcan Inc.	Montreal, QC	MTBE	0.35	1.42
	Ultramar Ltée.	Holyrood, NL	N/A	0.00	0.00

Table A4.7: 2005 Averages and Maxima Reported for Vapour Pressure (kPa)

	Name	Location of Facilities	Average	Maximum
Refiners	Chevron Canada Ltd.	Burnaby, BC	79.3	105.5
	Consumers' Co-operative Refineries Ltd.	Regina, SK	87.4	106.6
	Husky Oil Operations Ltd.	Prince George, BC	80.0	107.0
	Imperial Oil Ltd.	Dartmouth, NS	88.5	106.9
	Imperial Oil Ltd.	Nanticoke, ON	84.0	106.7
	Imperial Oil Ltd.	Sarnia, ON	84.0	107.0
	Imperial Oil Ltd.	Strathcona, AB	87.7	114.8
	Irving Oil Ltd.	Saint John, NB	82.3	105.4
	North Atlantic Refining Ltd.	Come-by-Chance, NL	94.9	102.8
	Petro-Canada Products	Edmonton, AB	83.5	106.0
	Petro-Canada Products	Montreal, QC	80.6	106.8
	Petro-Canada Products	Oakville, ON	99.1	107.2
	Shell Canada Products	Montreal, QC	80.9	107.9
	Shell Canada Products	Sarnia, ON	85.1	106.8
	Shell Canada Products	Scotford, AB	86.2	107.1
	Suncor Energy Products Inc.	Sarnia, ON	79.0	106.0
	Ultramar Ltée.	St-Romuald, QC	88.1	106.9
Blenders	Robbins Feed and Fuel Ltd.	Thorold, ON	93.1	106.2
	Ultramar Ltée.	Montreal, QC	69.2	98.2
Importers	Olco Petroleum Group Inc.	Montreal, QC	82.3	104.1
	General Motors of Canada Limited	Oshawa, ON	58.0	82.0
	Imperial Oil Ltd.	Point Tupper, NS	69.8	69.8
	Imperial Oil Ltd.	Burrard, BC	57.0	94.2
	Petro-Canada Products	Burrard, BC	53.8	53.8
	Petroles Norcan Inc.	Montreal, QC	75.5	104.1
	Ultramar Ltée.	Holyrood, NL	75.2	81.4

Table A4.8: 2005 Averages and Maxima Reported for E200 (% by volume)

	Name	Location of Facilities	Average	Maximum
Refiners	Chevron Canada Ltd.	Burnaby, BC	47.3	62.7
	Consumers' Co-operative Refineries Ltd.	Regina, SK	49.6	57.2
	Husky Oil Operations Ltd.	Prince George, BC	47.0	64.0
	Imperial Oil Ltd.	Dartmouth, NS	48.4	59.3
	Imperial Oil Ltd.	Nanticoke, ON	51.5	65.2
	Imperial Oil Ltd.	Sarnia, ON	52.2	61.5
	Imperial Oil Ltd.	Strathcona, AB	44.8	54.9
	Irving Oil Ltd.	Saint John, NB	41.8	56.3
	North Atlantic Refining Ltd.	Come-by-Chance, NL	60.2	63.8
	Petro-Canada Products	Edmonton, AB	47.4	55.8
	Petro-Canada Products	Montreal, QC	48.9	74.3
	Petro-Canada Products	Oakville, ON	54.9	59.3
	Shell Canada Products	Montreal, QC	47.5	69.5
	Shell Canada Products	Sarnia, ON	49.2	56.6
	Shell Canada Products	Scotford, AB	48.3	57.9
	Suncor Energy Products Inc.	Sarnia, ON	53.0	63.0
	Ultramar Ltée.	St-Romuald, QC	50.3	70.0
Blenders	Robbins Feed and Fuel Ltd.	Thorold, ON	55.9	59.9
	Ultramar Ltée.	Montreal, QC	49.9	69.6
Importers	Olco Petroleum Group Inc.	Montreal, QC	55.7	60.0
	General Motors of Canada Limited	Oshawa, ON	39.0	40.0
	Imperial Oil Ltd.	Point Tupper, NS	63.0	63.0
	Imperial Oil Ltd.	Burrard, BC	44.2	52.6
	Petro-Canada Products	Burrard, BC	41.0	41.0
	Petroles Norcan Inc.	Montreal, QC	52.0	62.0
	Ultramar Ltée.	Holyrood, NL	61.7	69.8

Table A4.9: 2005 Averages and Maxima Reported for E300 (% by volume)

	Name	Location of Facilities	Average	Maximum
Refiners	Chevron Canada Ltd.	Burnaby, BC	86.3	95.0
	Consumers' Co-operative Refineries Ltd.	Regina, SK	81.8	84.4
	Husky Oil Operations Ltd.	Prince George, BC	90.0	97.0
	Imperial Oil Ltd.	Dartmouth, NS	86.5	91.9
	Imperial Oil Ltd.	Nanticoke, ON	80.9	88.0
	Imperial Oil Ltd.	Sarnia, ON	89.8	96.0
	Imperial Oil Ltd.	Strathcona, AB	83.0	92.4
	Irving Oil Ltd.	Saint John, NB	84.1	95.1
	North Atlantic Refining Ltd.	Come-by-Chance, NL	87.0	90.5
	Petro-Canada Products	Edmonton, AB	88.2	93.3
	Petro-Canada Products	Montreal, QC	84.1	95.7
	Petro-Canada Products	Oakville, ON	88.9	90.5
	Shell Canada Products	Montreal, QC	84.2	92.8
	Shell Canada Products	Sarnia, ON	83.8	88.8
	Shell Canada Products	Scotford, AB	81.6	90.8
	Suncor Energy Products Inc.	Sarnia, ON	85.0	97.0
	Ultramar Ltée.	St-Romuald, QC	85.2	93.9
Blenders	Robbins Feed and Fuel Ltd.	Thorold, ON	84.7	87.4
	Ultramar Ltée.	Montreal, QC	85.3	99.7
Importers	Olco Petroleum Group Inc.	Montreal, QC	86.3	89.8
	General Motors of Canada Limited	Oshawa, ON	77.0	88.0
	Imperial Oil Ltd.	Point Tupper, NS	87.6	87.6
	Imperial Oil Ltd.	Burrard, BC	83.2	89.7
	Petro-Canada Products	Burrard, BC	84.4	84.4
	Petroles Norcan Inc.	Montreal, QC	87.8	93.8
	Ultramar Ltée.	Holyrood, NL	89.7	92.0