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BENZENE AND LEAD IN CANADIAN GASOLINE

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Canada

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Notice

The information contained in this report is compiled from data as of March 1, 2019, submitted by the producers, importers, and blenders of gasoline in Canada pursuant to the requirements of the Benzene in Gasoline Regulations and the Gasoline Regulations under the Canadian Environmental Protection Act, 1999. Information submitted to Environment and Climate Change Canada has been reviewed for reasonableness, but may be subject to potential errors made at the source.

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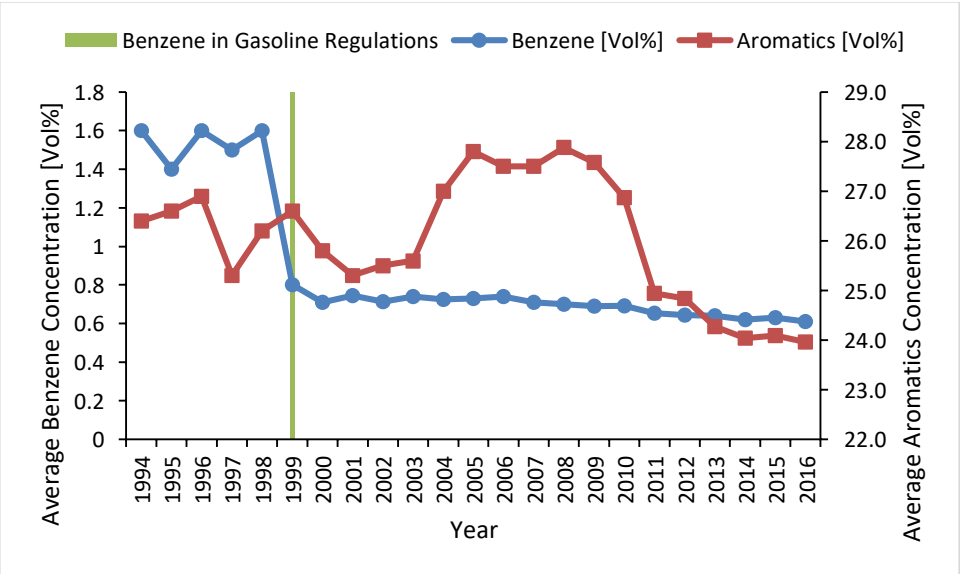
ABSTRACT

This report reviews how primary suppliers have reported to Environment and Climate Change Canada under the *Benzene in Gasoline Regulations* of the *Canadian Environmental Protection Act, 1999* (CEPA 1999). The *Benzene in Gasoline Regulations* (the 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 published the final *Benzene in Gasoline Regulations* on November 26, 1997 in the Canada Gazette, Part II.

The *Benzene in Gasoline Regulations* have been successful in achieving both recommendations of the Task Force: reported benzene and aromatic levels have been significantly reduced compared to what they were in 1994. Figure 0.1 shows the reported benzene and aromatics levels since the coming into force of the Regulations.

Figure 0.1 Average Benzene and Aromatics Content of Canadian Gasoline (1994-2016)



The Regulations define a primary supplier as a person who owns, leases, operates, controls, supervises, or manages a refinery or blending facility; who owns the gasoline in the blending facility; or the importer of gasoline. All primary suppliers must submit reports annually to Environment and Climate Change Canada reporting on the composition of the gasoline they supplied in that year (quarterly reports were required until the end of 2002).

For the 2013 reporting year, one primary supplier reported exceeding the allowable limit for benzene concentration. For the 2014, 2015, and 2016 reporting years, all primary suppliers reported that their gasoline met

the regulated requirements with respect to both benzene concentration and the benzene emission number (BEN, as calculated in Schedule 1 of the Regulations). Details on the compliance and reported exceedances are found in Section 3.3. As part of Environment and Climate Change Canada's enforcement activities, enforcement officers conduct inspections and investigations into alleged exceedances under the *Benzene in Gasoline Regulations* and take action consistent with the Compliance and Enforcement Policy for CEPA (1999).

Independent audits are required for those primary suppliers that have elected to be on a yearly pool average, which must be submitted to Environment and Climate Change Canada by May 31st of the year following the reporting period. This report includes a summary, found in Section 3.4, of the independent audits conducted for the 2013 to 2016 reporting periods.

This report contains data as reported by regulated parties up to March 1, 2019. Any updated information received after March 1, 2019, has not been included in this report.

The *Gasoline Regulations* limit the concentration of lead in gasoline that is produced, imported, sold or offered for sale in Canada. The *Gasoline Regulations* also limit the concentration of phosphorus in unleaded gasoline. Gasoline for use in aircraft is exempt from the regulations and leaded gasoline for use in competition vehicles is not subject to the lead concentration restrictions. This report contains information regarding companies that engage in the business of producing and/or importing leaded gasoline for use in competition vehicles in Canada.

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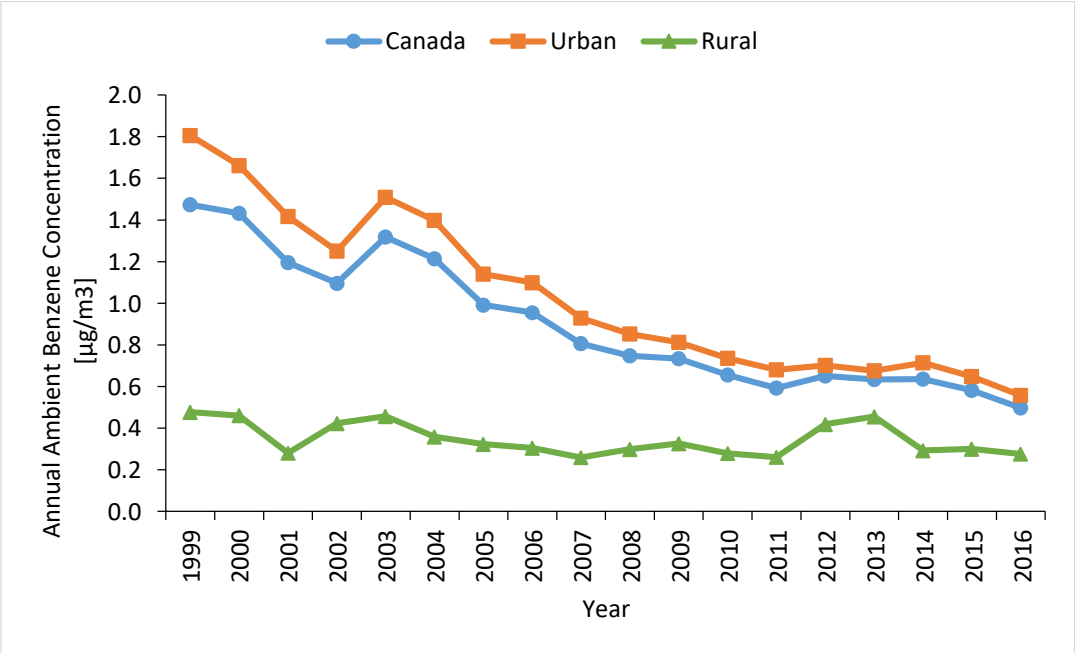
1 AMBIENT BENZENE IN CANADA

Figure 1.1 has been produced from Canada's "National Air Pollution Surveillance" (NAPS) program between the federal government and the provinces and territories.

Figure 2.1 Average Ambient Benzene Concentrations in Urban and Rural Canada (1999-2016)



Benzene is one of many volatile organic compounds (VOCs) measured in samples collected at 75 air-monitoring sites across Canada using Summa™ canister samples. Collected samples are analyzed by Environment and Climate Change Canada.

Urban and rural trend sites were selected covering the period 1999-2016, if they had over 40 samples each year. An annual and seasonal (summer and winter) data completeness criterion of 75% was applied over the 1999-2016 time period (i.e. a site was only included if sufficient data was collected for at least 14 of the 18 years). In addition, sufficient data must have been collected for at least two of the first three years (i.e. 1999, 2000, 2001) and for at least two of the last three years (i.e. 2014, 2015, 2016). From this criteria, 28 sites qualified for the urban context and 6 sites qualified for the rural context.

Annual means were calculated for the urban and rural trend sites based on samples collected year round. All selected sites were weighted equally. Outliers were not removed

from the dataset. There was no interpolation of missing data. No special statistical or analysis techniques were used.

2 OVERVIEW OF BENZENE IN GASOLINE REGULATIONS

This report reviews the compliance of primary suppliers' (manufacturers, importers and blenders) gasoline with the *Benzene in Gasoline Regulations*[1], and summarizes levels of various parameters in Canadian gasoline. Primary suppliers, as required under the Regulations, provided the information used for this report.

2.1 BENZENE IN GASOLINE REGULATIONS

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

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).

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

- more than 100 m³ of gasoline at any one time;
- any amount of gasoline-like blendstock; or
- into a province, more than 1000 m³ of gasoline within any one day.

[1] SOR/97-493, as amended by SOR/99-204, SOR/2000-102, SOR/2003-318, SOR/2004-252 and SOR/2018-11; a copy of the Regulations can be found at http://laws-lois.justice.gc.ca/eng/regulations/SOR-97-493/.

The *Benzene in Gasoline Regulations*, when originally published, 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 is selected separately for each refinery, blending facility and import pool, and provides regulatees considerable flexibility in meeting the requirements of the Regulations. The Regulations mainly focus on primary suppliers (manufacturers, blenders and importers). 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 BEN of gasoline, a number that relates gasoline composition to estimated emissions of benzene from vehicles.

The regulated benzene and seasonal BEN 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. Primary suppliers who elected a yearly pool average must submit independent audits to Environment and Climate Change Canada.

Since July 1st, 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.

Table 2.1 Regulated Limits for Benzene and the BEN

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

2.2 AMENDMENTS TO THE REGULATIONS

Since the initial publication of the Regulations in 1997, various amendments have been made. The most recent amendments were made in 2018 as part of the *Regulations Amending Certain Regulations Made Under Sections 140, 209 and 286.1 of the Canadian Environmental Protection Act, 1999* omnibus package. These amendments made changes that pertain to aligning certain definitions with other regulations, fixing obsolete references, updating test methods, removing obsolete paragraphs, enabling electronic reporting, aligning deadlines, updating to reflect new auditor definition, and correcting French text. A list of the amendments can be found at: http://www.gazette.gc.ca/rp-pr/p2/2018/2018-02-21/html/sor-dors11-eng.html.

3 COMPLIANCE WITH THE REGULATIONS

3.1 PRIMARY SUPPLIERS

Primary suppliers are required to register with Environment and Climate Change Canada by providing the information specified in Schedule 2 of the Regulations. Tables 3.1 to 3.4 list the primary suppliers who were registered with Environment and Climate Change Canada under the Regulations and reported supplying gasoline in 2013, 2014, 2015, and 2016, respectively. The jurisdiction noted in Tables 3.1 to 3.4 was determined using the facility location or the jurisdiction of import. The primary supplier type noted in Tables 3.1 to 3.4 was determined based on what was indicated in the Annual Reports, Schedule 3 of the Regulations, *Report on Composition of Gasoline* that were submitted.

Table 3.1 Primary Suppliers Having Supplied Gasoline (2013)

Facility Name	Province	Facility Type
Chevron Burnaby Refinery	BC	Manufacturer and Importer and Blender
CCRL - Regina	SK	Manufacturer
Husky Oil - Prince George	BC	Manufacturer
IOL - Burrard	BC	Importer
IOL - Dartmouth	NS	Manufacturer and Importer and Blender
IOL - Strathcona	AB	Manufacturer
IOL - Nanticoke	ON	Manufacturer and Importer
IOL - Sarnia	ON	Manufacturer and Importer
IOL - Shell Montreal	QC	Importer
MSCG - Canterm	QC	Importer
SCL - QC Imports	QC	Importer
SCL - BC Imports	BC	Importer
SCL - Sarnia	ON	Manufacturer and Importer and Blender
SCL - Scotford	AB	Manufacturer and Importer and Blender
Energie Valero - Montreal	QC	Importer and Blender
Energie Valero - Jean-Gaulin	QC	Manufacturer and Importer and Blender
Irving Oil - Saint John	NB	Manufacturer and Importer
North Atlantic	NL	Manufacturer and Importer
Les Produits Petroliers Norcan	QC	Importer and Blender
SEPP - Montreal	QC	Manufacturer and Importer
SEPP - Burrard	BC	Importer
SEPP - Edmonton	AB	Manufacturer
SEPP - Sarnia	ON	Manufacturer and Importer and Blender
WPC - MB Imports	MB	Importer
WPC - ON Imports	ON	Importer
Greenergy - Ontario Imports	ON	Importer

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership; WPC = Western Petroleum Company.

Table 3.2 Primary Suppliers Having Supplied Gasoline (2014)

Facility Name	Province	Facility Type
Chevron Burnaby Refinery	BC	Manufacturer and Importer and Blender
CCRL - Regina	SK	Manufacturer
Husky Oil - Prince George	BC	Manufacturer
IOL - Burrard	BC	Importer
IOL - Dartmouth	NS	Importer and Blender
IOL - Strathcona	AB	Manufacturer
IOL - Nanticoke	ON	Manufacturer and Importer
IOL - Sarnia	ON	Manufacturer and Importer
IOL - Shell Montreal	QC	Importer
MSCG - Canterm	QC	Importer
SCL - QC Imports	QC	Importer
SCL - BC Imports	BC	Importer
SCL - Sarnia	ON	Manufacturer and Importer and Blender
SCL - Scotford	AB	Manufacturer and Importer and Blender
Energie Valero - Montreal	QC	Importer and Blender
Energie Valero - Jean-Gaulin	QC	Manufacturer and Importer and Blender
Irving Oil - Saint John	NB	Manufacturer and Importer
North Atlantic	NL	Manufacturer and Importer
Les Produits Petroliers Norcan	QC	Importer and Blender
SEPP - Montreal	QC	Manufacturer and Importer
SEPP - Burrard	BC	Importer
SEPP - Edmonton	AB	Manufacturer
SEPP - Sarnia	ON	Manufacturer and Importer and Blender
WPC - MB Imports	MB	Importer
WPC - ON Imports	ON	Importer
Greenergy - Vopak Imports	ON	Importer

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership; WPC = Western Petroleum Company.

Table 3.3 Primary Suppliers Having Supplied Gasoline (2015)

Facility Name	Province	Facility Type
Chevron Burnaby Refinery	BC	Manufacturer and Importer and Blender
CCRL - Regina	SK	Manufacturer
Husky Oil - Prince George	BC	Manufacturer
IOL - Burrard	BC	Importer
IOL - Dartmouth	NS	Importer and Blender
IOL - Strathcona	AB	Manufacturer
IOL - Nanticoke	ON	Manufacturer and Importer
IOL - Valero Montreal	QC	Importer
IOL - Sarnia	ON	Manufacturer and Importer
MSCG - Canterm	QC	Importer
SCL - QC Imports	QC	Importer
SCL - AB Imports	AB	Importer
SCL - BC Imports	BC	Importer
SCL - Sarnia	ON	Manufacturer and Importer and Blender
SCL - NS Imports	NS	Importer
SCL - Scotford	AB	Manufacturer and Importer and Blender
Energie Valero - Montreal	QC	Importer and Blender
Energie Valero - Jean-Gaulin	QC	Manufacturer and Importer
Irving Oil - Saint John	NB	Manufacturer and Importer
North Atlantic	NL	Manufacturer
Les Produits Petroliers Norcan	QC	Importer and Blender
SEPP - Montreal	QC	Manufacturer and Importer
SEPP - Burrard	BC	Importer
SEPP - Edmonton	AB	Manufacturer
SEPP - Sarnia	ON	Manufacturer and Importer and Blender
Greenergy - Vopak Imports	ON	Importer
Rolympus Commodities	BC	Importer
World Fuel Services Canada - Saskatchewan	SK	Importer

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership.

Table 3.4 Primary Suppliers Having Supplied Gasoline (2016)

Facility Name	Province	Facility Type
Chevron Burnaby Refinery	BC	Manufacturer and Importer and Blender
CCRL - Regina	SK	Manufacturer
Husky Oil - Prince George	BC	Manufacturer
IOL - Burrard	BC	Importer
IOL - Dartmouth	NS	Importer and Blender
IOL - Strathcona	AB	Manufacturer
IOL - Nanticoke	ON	Manufacturer and Importer
IOL - Valero Montreal	QC	Importer
IOL - Sarnia	ON	Manufacturer and Importer
SCL - BC Imports	BC	Importer
SCL - Sarnia	ON	Manufacturer and Importer and Blender
SCL - ON Imports	ON	Importer
STC - QC Imports	QC	Importer
SCL - Scotford	AB	Manufacturer and Importer and Blender
Energie Valero - Montreal	QC	Importer
Energie Valero - Jean-Gaulin	QC	Manufacturer and Importer
Irving Oil - Saint John	NB	Manufacturer and Importer
Irving Oil Commercial, G.P.	NS	Importer
North Atlantic	NL	Manufacturer
Les Produits Petroliers Norcan	QC	Importer
SEPP - Montreal	QC	Manufacturer and Importer
SEPP - Burrard	BC	Importer
SEPP - Edmonton	AB	Manufacturer
SEPP - Sarnia	ON	Manufacturer and Importer and Blender
Greenergy - Escoumins	ON	Importer
Greenergy - Ontario Imports	ON	Importer
Rolympus Commodities	BC	Importer
World Fuel Services Canada - Saskatchewan	SK	Importer
North 60 Petro LTD	YT	Importer

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; SCL = Shell Canada Limited;

SEPP = Suncor Energy Products Partnership; STC = Shell Trading Canada.

3.2 INFORMATION REPORTED

Under Section 8 of the Regulations, primary suppliers must provide the information set out in Schedule 3 of the Regulations entitled *Report on the Composition of Gasoline* before February 15 of the following year.

In addition to the volume of gasoline supplied (m^3), the number of batches supplied, and the names of any oxygenates added, the Regulations require that primary suppliers also report the maximum and annual volume-weighted average values for the following parameters:

- concentration of benzene (% by volume);
- value of BEN (Benzene Emission Number);
- concentration of aromatics (% by volume);
- concentration of olefins (% by volume);
- concentration of sulphur (mg/kg);
- concentration of oxygenate (% by weight);
- vapour pressure at 37.8°C (100°F) (kPa);
- evaporation fraction at 93.3°C (200°F) – E200 (% by volume); and
- evaporation fraction at 148.9°C (300°F) – E300 (% by volume)

3.3 REPORTED EXCEEDANCES OF REGULATED LIMITS

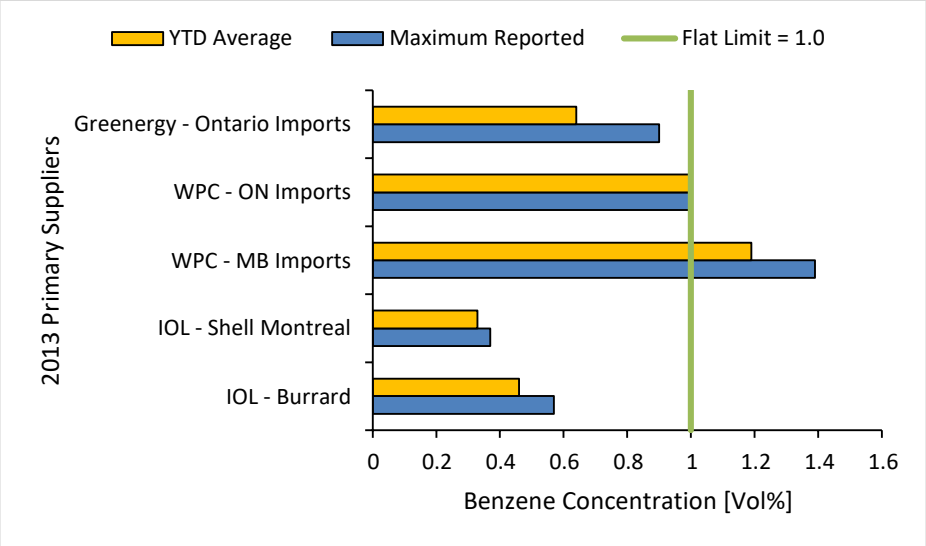
Environment and Climate Change Canada's Enforcement Branch is responsible for the enforcement of regulations created under CEPA 1999, including the *Benzene in Gasoline Regulations.* As part of its enforcement activities, enforcement officers conduct inspections and investigations into alleged exceedances under the *Benzene in Gasoline Regulations.* All CEPA 1999 regulations are enforced in accordance with the Compliance and Enforcement Policy for the *Canadian Environmental Protection Act, 1999*, available on Environment and Climate Change Canada's website at: https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry.html. Additional details on inspections numbers and enforcement measures taken for CEPA,1999 regulations are available at: https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/general-information.html

For reported benzene levels, Figures 3.1 to 3.4 show the reported maximum and volume weighted-average benzene level from 2013 to 2016, respectively, for primary suppliers using flat limits. Similarly, Figures 3.5 to 3.8 show the reported maximum and volume-weighted average benzene level from 2013 to 2016, respectively, for primary suppliers who elected to use the yearly pool average limit.

Figures 3.9 to 3.12 show the reported maximum and average BEN from 2013 to 2016, respectively, for primary suppliers using flat limits Figures 3.13 to 3.16 show the reported maximum and average BEN from 2013 to 2016, respectively, for primary suppliers who elected to use the yearly pool average limit.

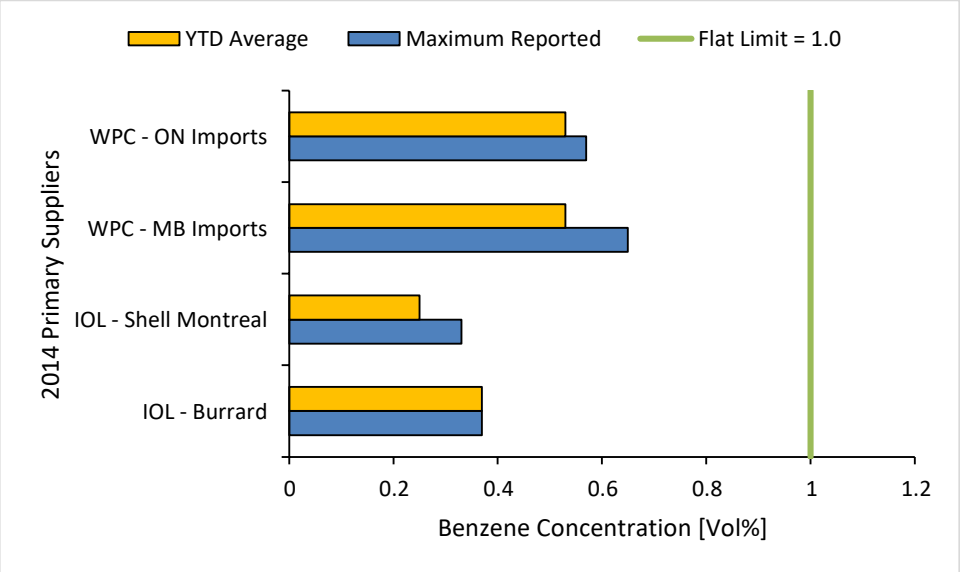
Western Petroleum Company Manitoba Imports were reported to exceed the flat limit in 2013 (average of 1.19%Vol and max of 1.39%Vol).

Figure 3.1 Reported Benzene Levels for Primary Suppliers on a Flat Limit (2013)



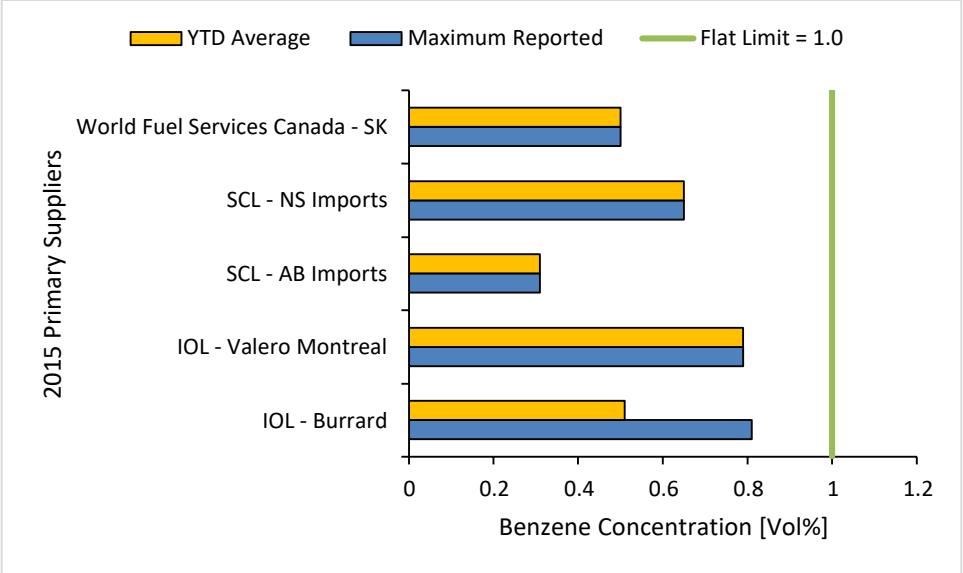
IOL = Imperial Oil Limited; WPC = Western Petroleum Company.

Figure 3.2 Reported Benzene Levels for Primary Suppliers on a Flat Limit (2014)



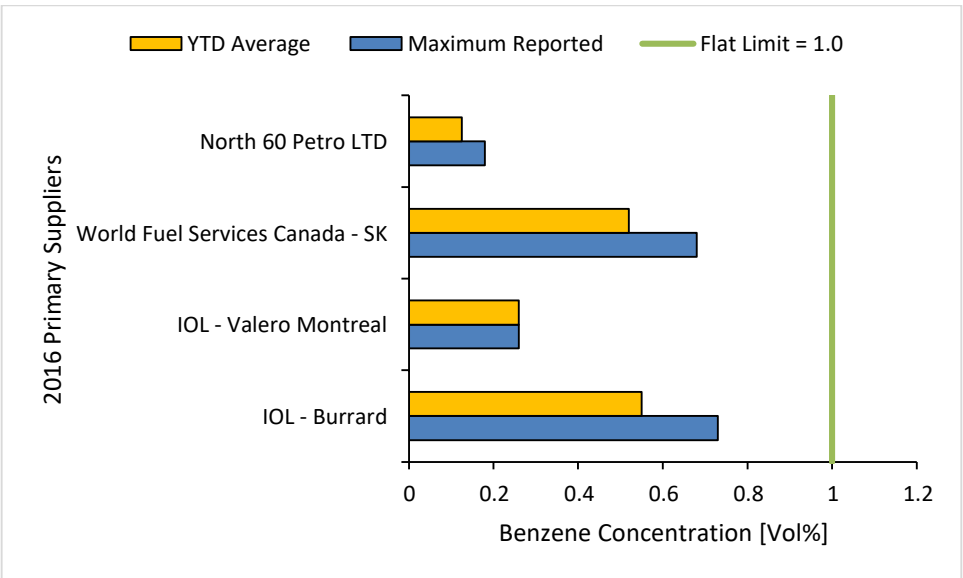
IOL = Imperial Oil Limited; WPC = Western Petroleum Company.

Figure 3.3 Reported Benzene Levels for Primary Suppliers on a Flat Limit (2015)



IOL = Imperial Oil Limited; SCL = Shell Canada Limited.

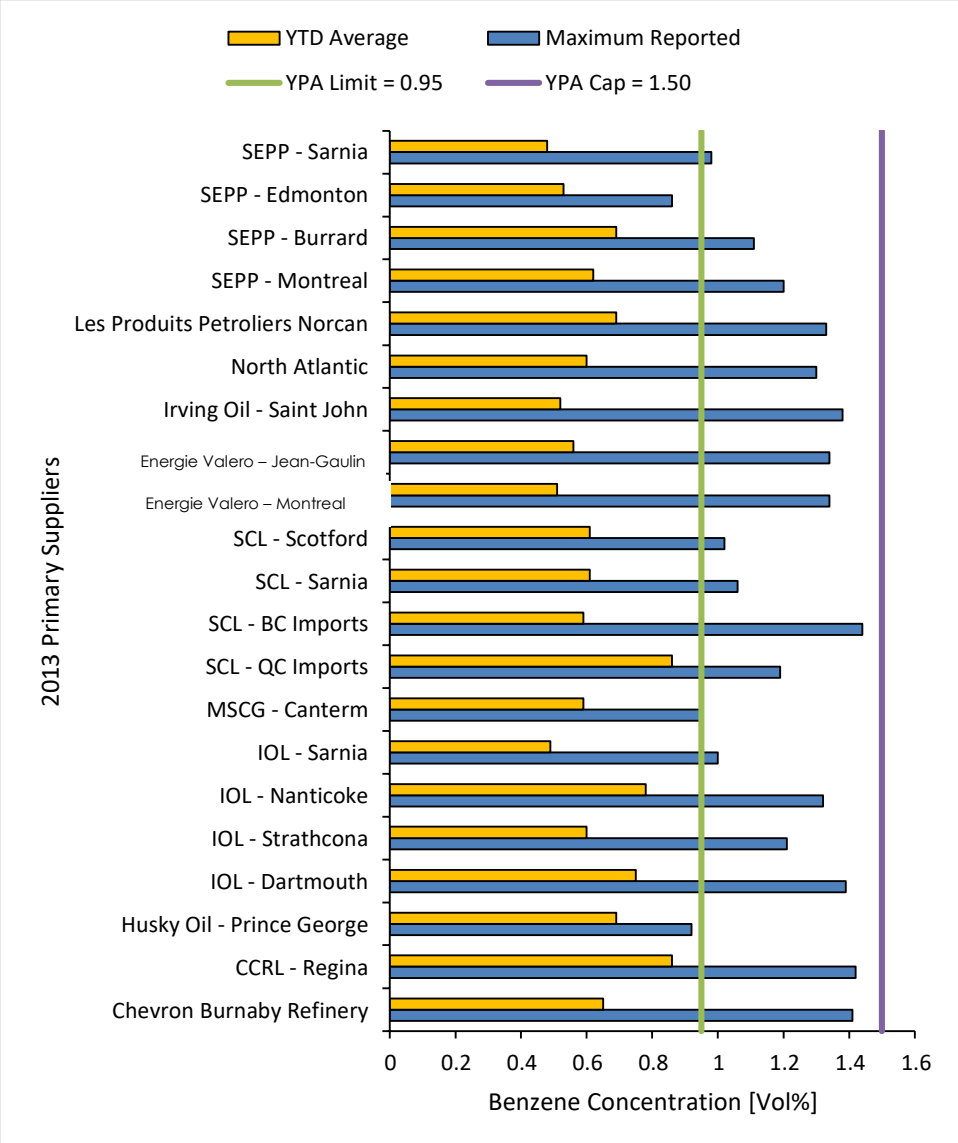
Figure 3.4 Reported Benzene Levels for Primary Suppliers on a Flat Limit (2016)



IOL = Imperial Oil Limited.

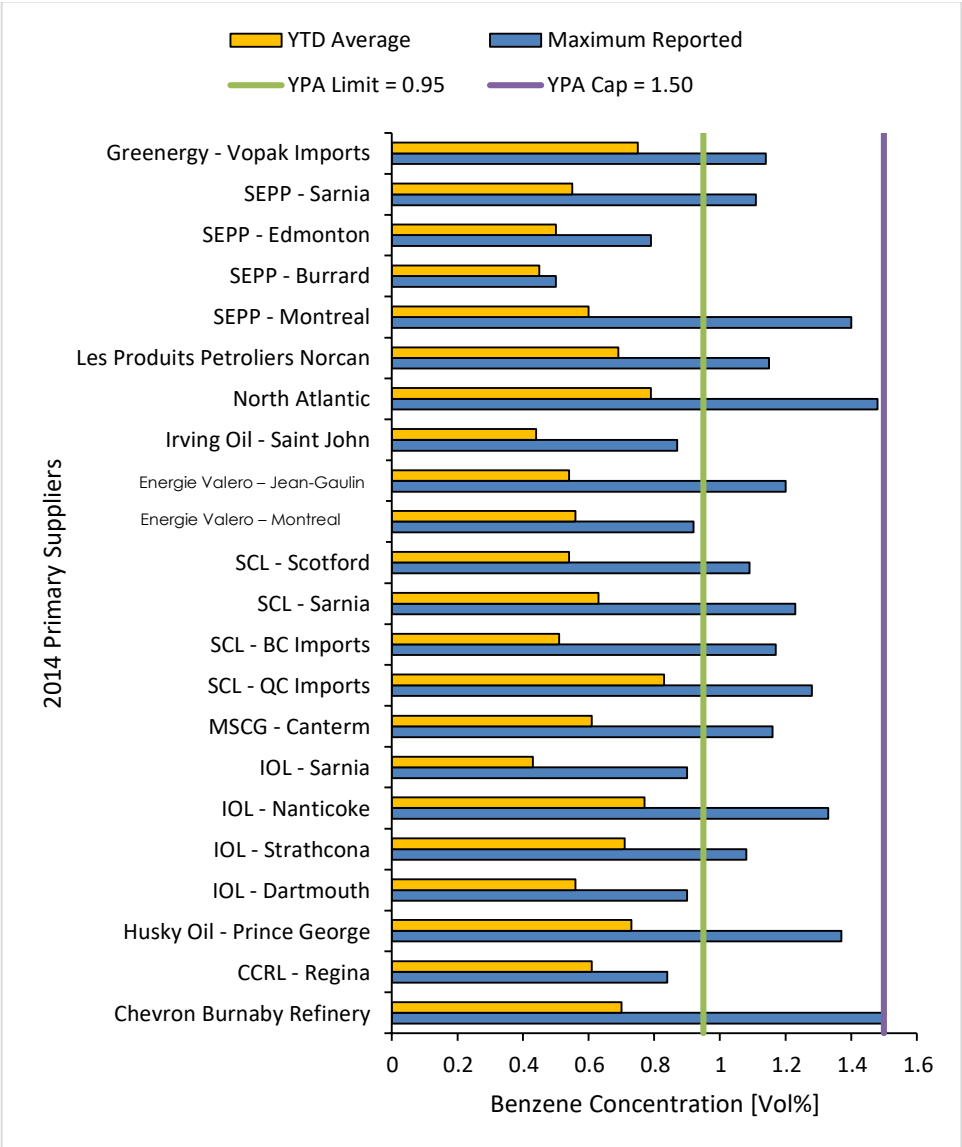
As indicated in Figures 3.5 through 3.8, no primary suppliers on the yearly pool average reported exceeding the yearly pool average limit for benzene concentration (0.95%Vol).

Figure 3.5 Reported Benzene Levels for Primary Suppliers on a Yearly Pool Average Limit (2013)



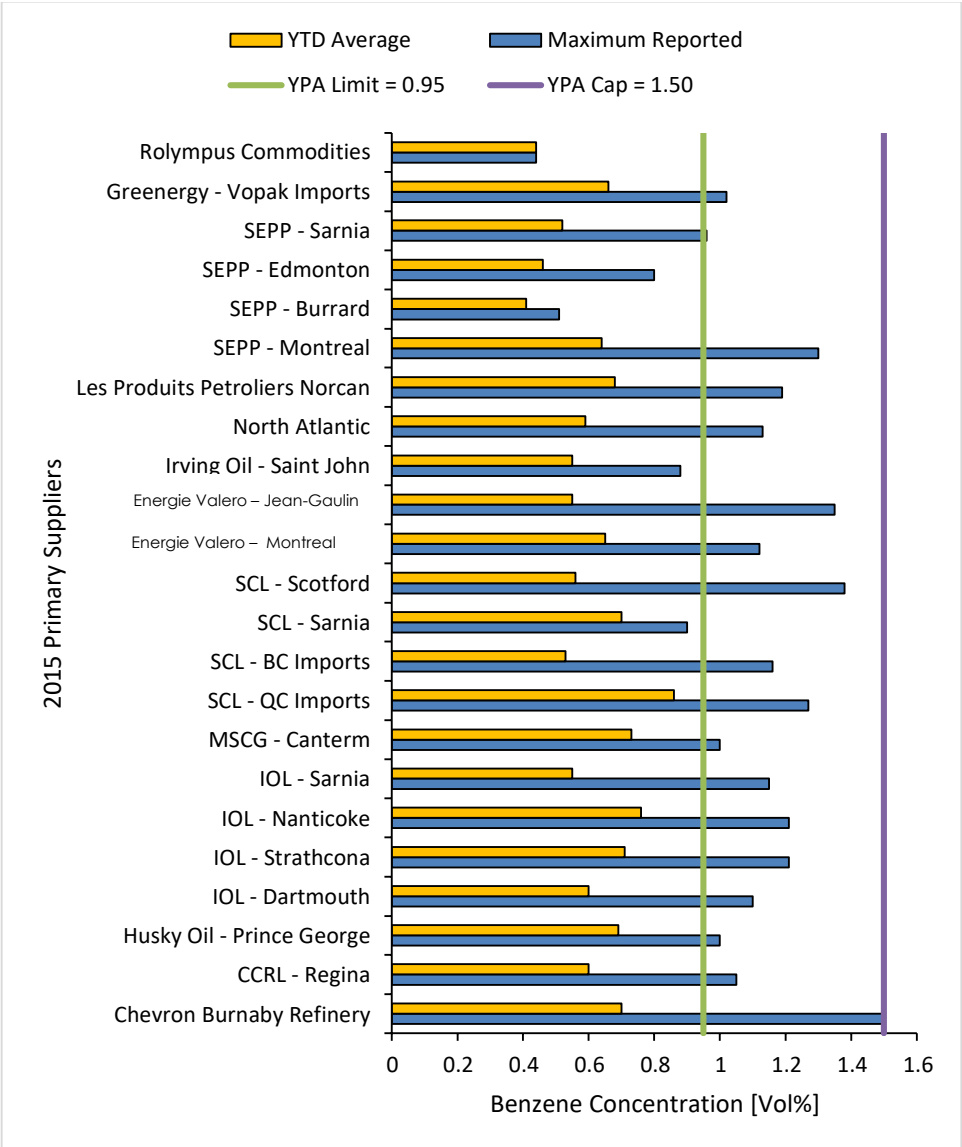
CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership.

Figure 3.6 Reported Benzene Levels for Primary Suppliers on a Yearly Pool Average Limit (2014)



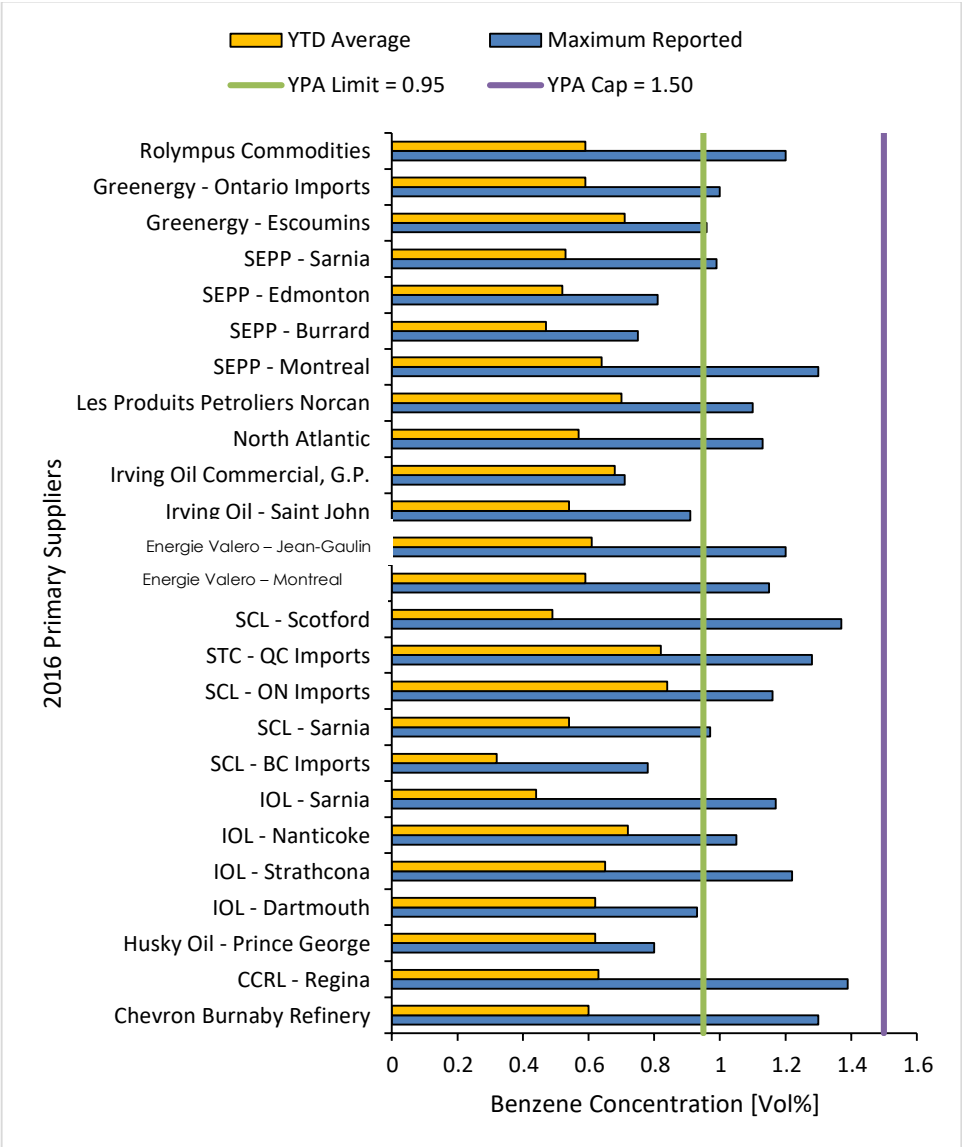
CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership.

Figure 3.7 Reported Benzene Levels for Primary Suppliers on a Yearly Pool Average Limit (2015)



CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership.

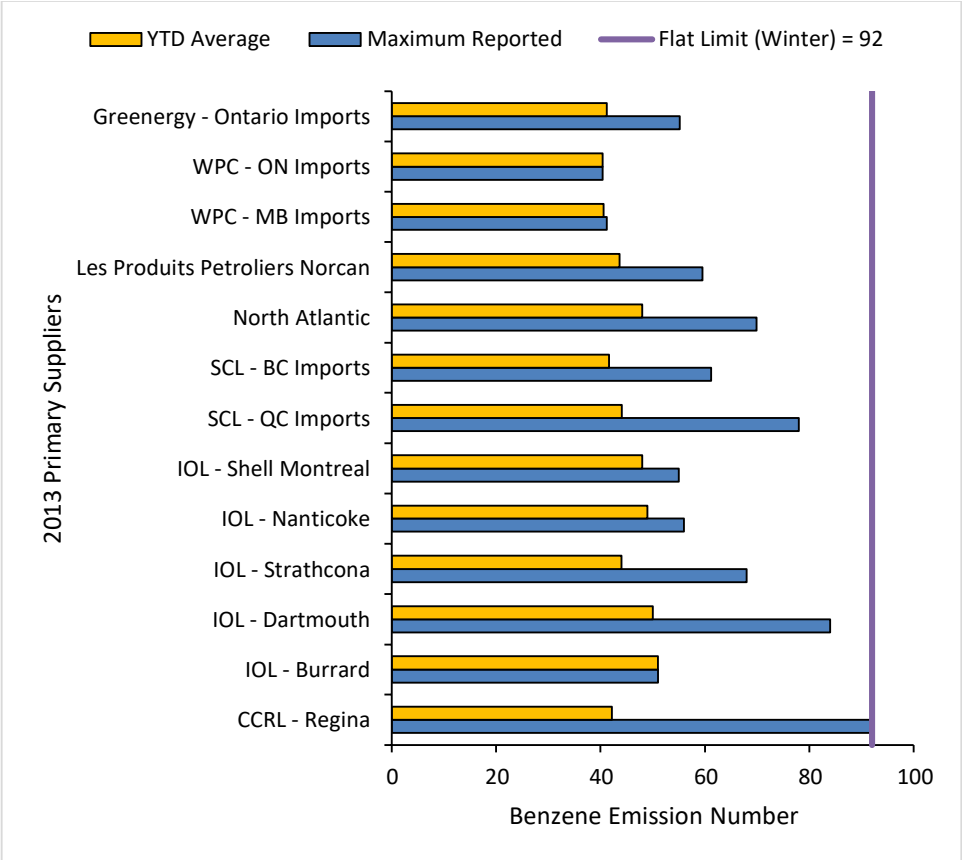
Figure 3.8 Reported Benzene Levels for Primary Suppliers on a Yearly Pool Average Limit (2016)



CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership; STC = Shell Trading Canada.

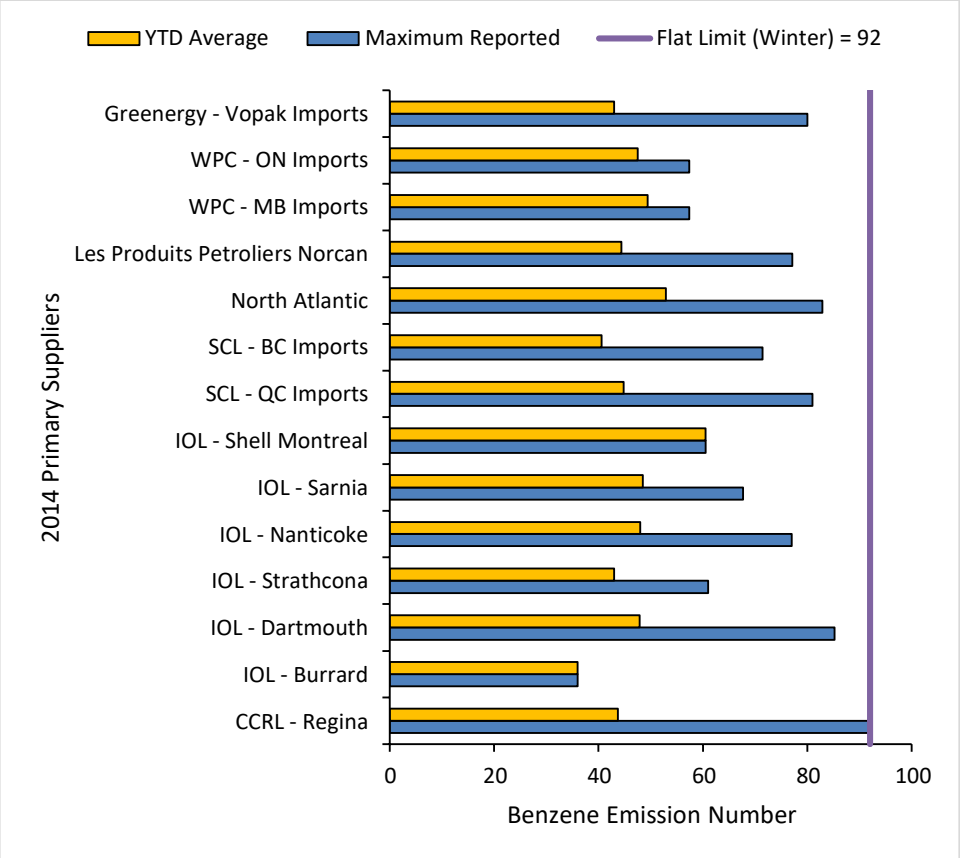
As indicated in Figures 3.9 through 3.12, no primary suppliers exceeded the maximum BEN winter limit (92). BEN generally is reported as a yearly maximum and yearly average. It is unknown if the summer maximum BEN limit (71) has been exceeded.

Figure 3.9 Reported BEN Levels for Primary Suppliers on a Flat Limit (2013)



CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; SCL = Shell Canada Limited; WPC = Western Petroleum Company.

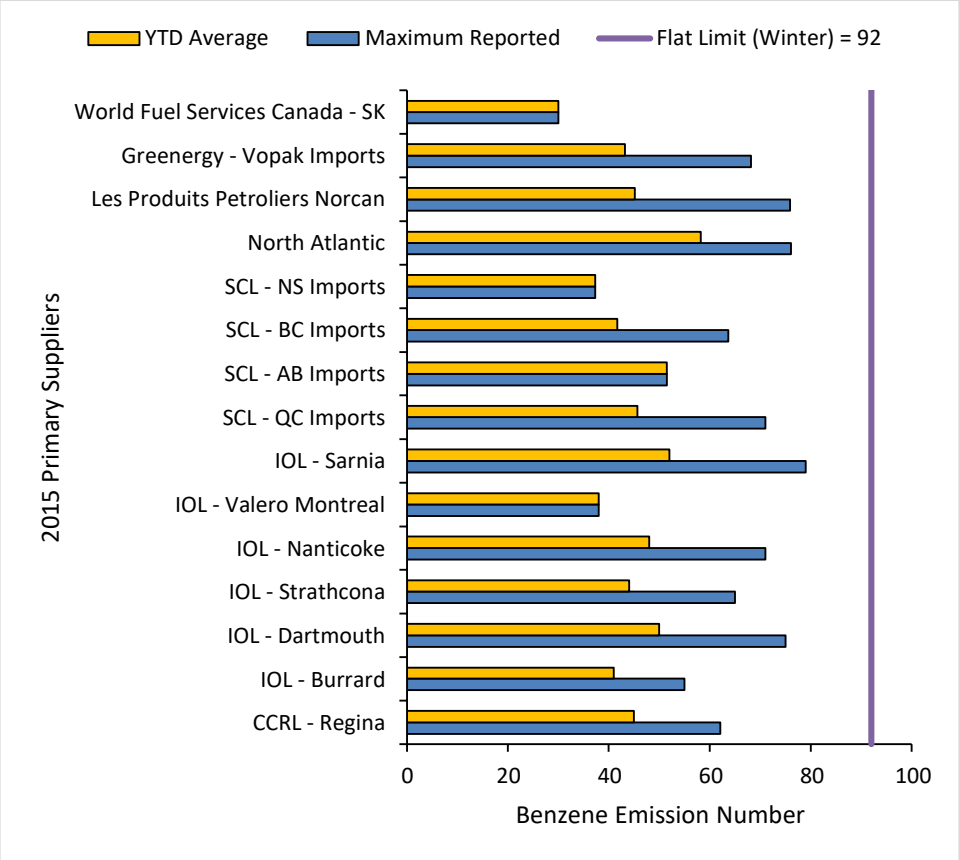
Figure 3.10 Reported BEN Levels for Primary Suppliers on a Flat Limit (2014)



CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited;

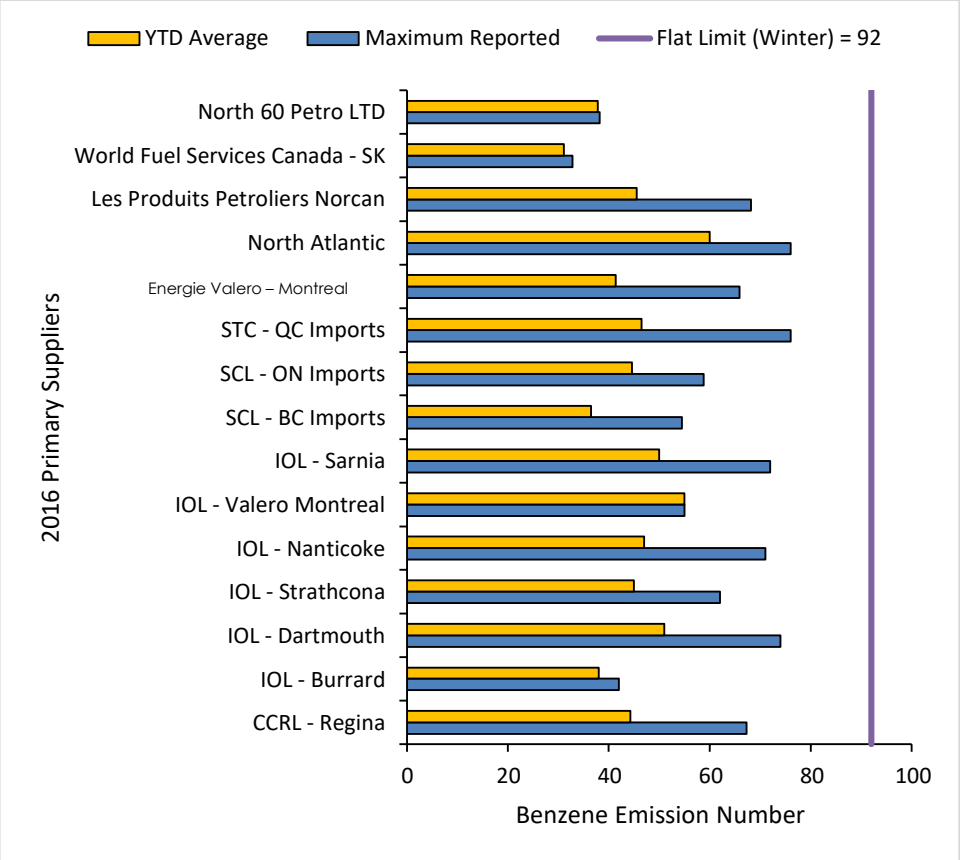
SCL = Shell Canada Limited; WPC = Western Petroleum Company.

Figure 3.11 Reported BEN Levels for Primary Suppliers on a Flat Limit (2015)



CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; SCL = Shell Canada Limited.

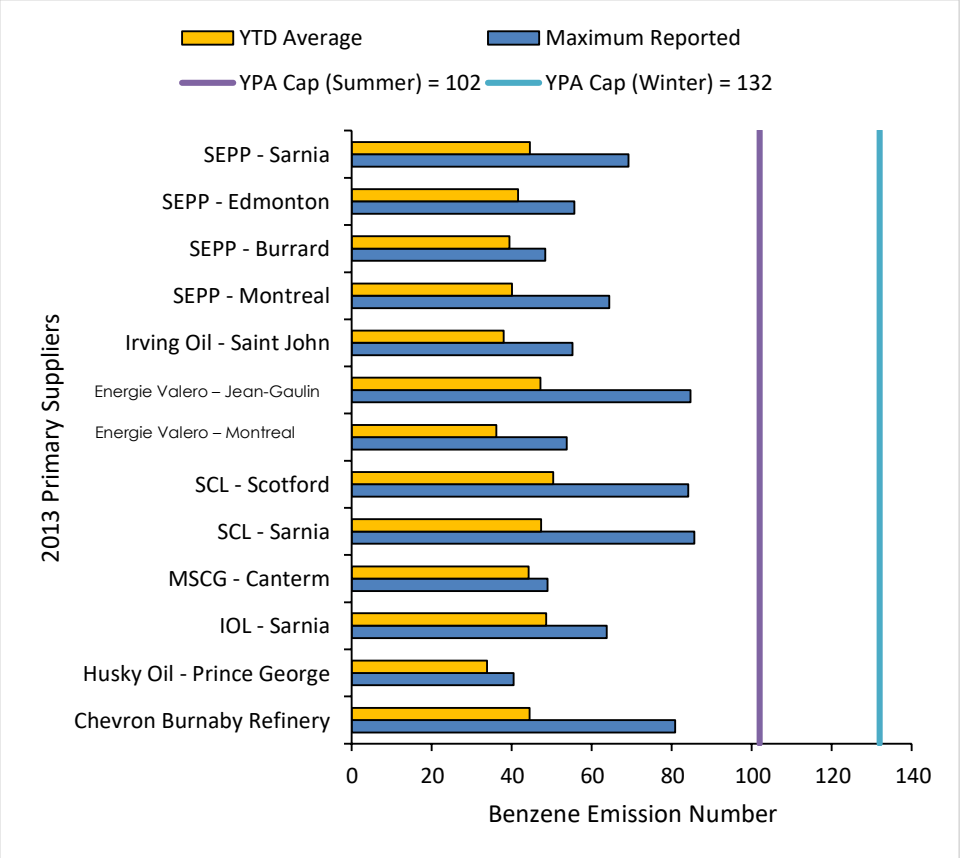
Figure 3.12 Reported BEN Levels for Primary Suppliers on a Flat Limit (2016)



CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; SCL = Shell Canada Limited; STC = Shell Trading Canada.

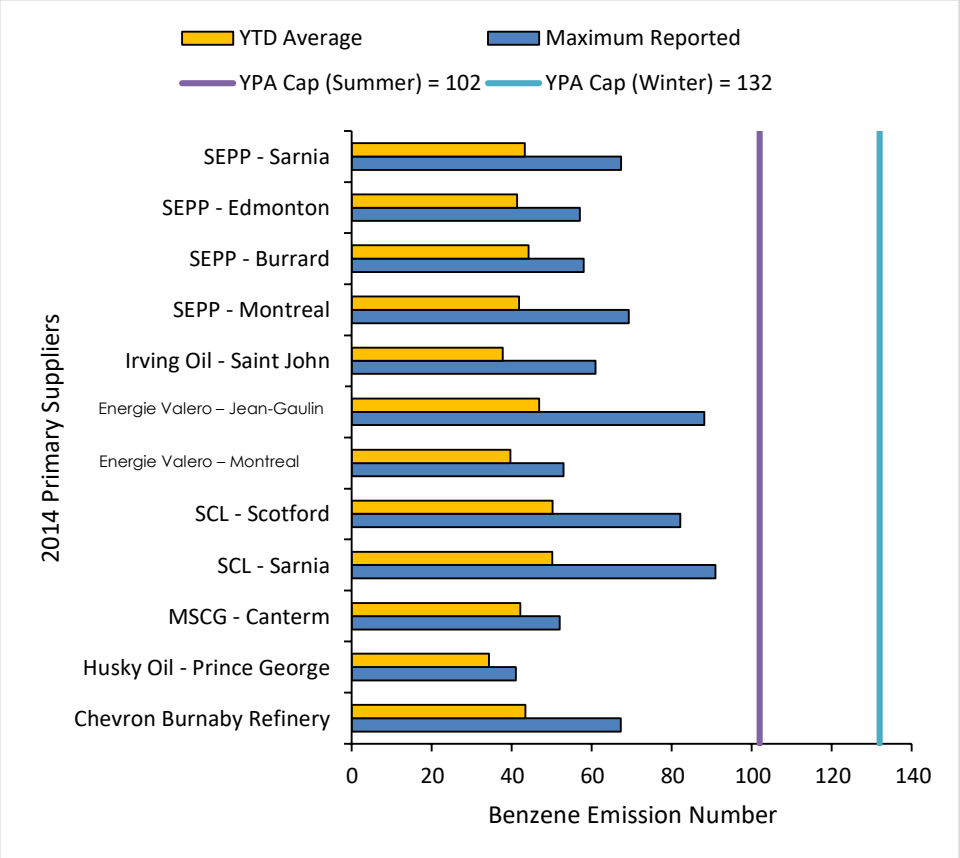
As indicated in Figures 3.13 through 3.16, no primary suppliers on the yearly pool average surpassed the yearly pool average limit (59.5), summer yearly pool average cap (102), or the winter yearly pool average cap (132) for BEN.

Figure 3.13 Reported BEN Levels for Primary Suppliers on a Yearly Pool Average Limit (2013)



IOL – Imperial Oil, MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership.

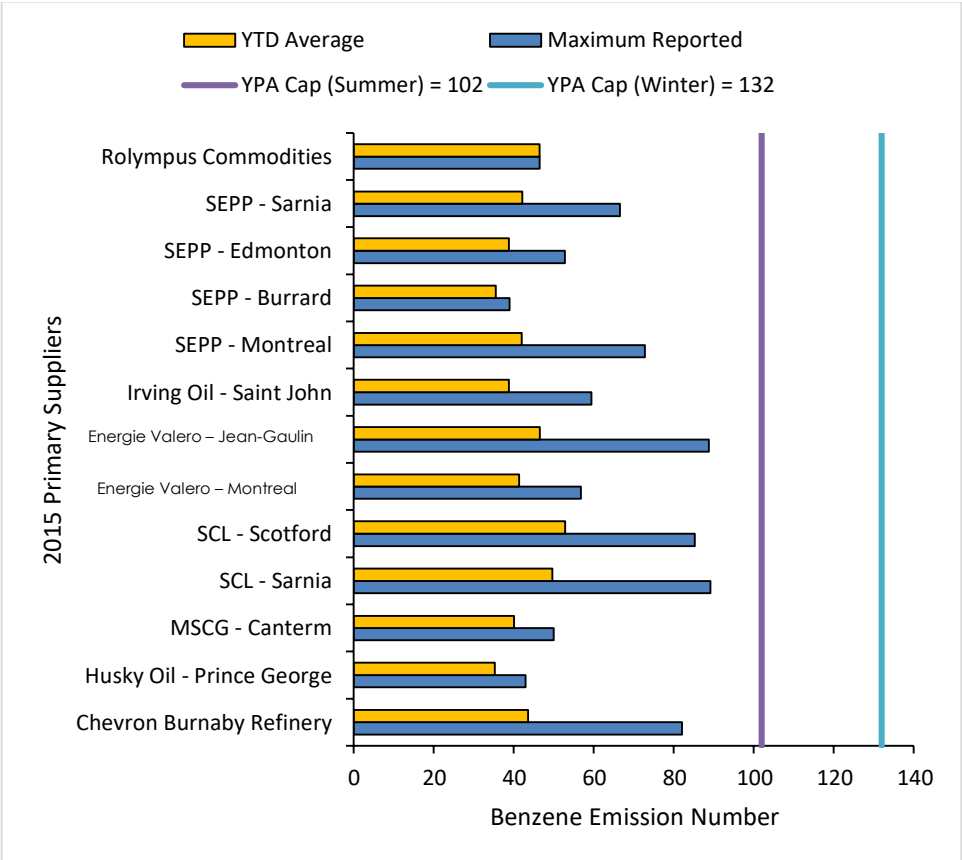
Figure 3.14 Reported BEN Levels for Primary Suppliers on a Yearly Pool Average Limit (2014)



MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited;

SEPP = Suncor Energy Products Partnership.

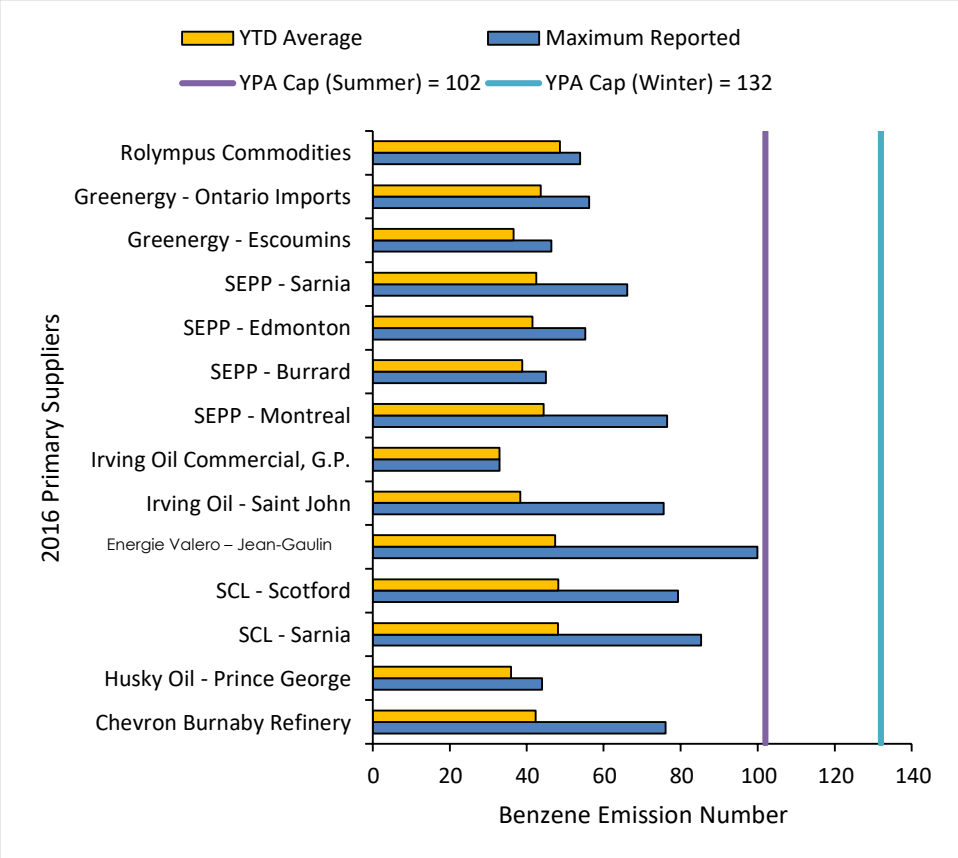
Figure 3.15 Reported BEN Levels for Primary Suppliers on a Yearly Pool Average Limit (2015)



MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited;

SEPP = Suncor Energy Products Partnership.

Figure 3.16 Reported BEN Levels for Primary Suppliers on a Yearly Pool Average Limit (2016)



SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership.

3.4 SUMMARY OF INDEPENDENT AUDITS

Under Section 22 of the Regulations, a primary supplier that has elected to use a yearly pool average for benzene, BEN, or both 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 and Climate Change Canada by May 31 of the year following the reporting period. Environment and Climate Change 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 and Climate Change Canada assurance that the yearly pool averages are being correctly reported.

Table 3.5 outlines the number of audit reports received, the corresponding facility type, the number of audit reports that contained details of inaccuracies and compliance issues, and the number of different independent auditors for the 2013, 2014, 2015, and 2016 reporting periods.

Table 3.5 Summary of Audits (2013-2016)

	2013	2014	2015	2016
Total Audit Reports Received	13	18	19	24
Reports for: Manufacturer	3	3	4	4
Reports for: Manufacturer and Importer	3	4	4	5
Reports for: Importer	1	4	5	11
Reports for: Importer and Blender	2	3	3	1
Reports for: Manufacturer and Importer and Blender	4	4	3	3
Audit Reports Identifying Inaccuracies	6	10	5	7
Different Auditor Companies	4	7	7	6

The increase in number of independent audits can be attributed to the creation of the trading system for gasoline and distillate compliance units as required under the *Sulphur in Gasoline* Regulations.

Auditors in their evaluation reports made several recommendations for improvements.

These recommendations relate to:

- remaining consistent with the methodology of testing;
- creating a succession plan to ensure information and processes are not lost;
- procedures for updating compliance plans;
- documentation and procedures for sampling;
- procedures for updating and clarifying test methods; and
- procedures for clarifying and ensuring consistency in reporting.

4 CANADIAN GASOLINE COMPOSITION

This section reviews the composition of gasoline in Canada in 2013, 2014, 2015, and 2016, based on data reported by primary suppliers pursuant to the Regulations.

4.1 VOLUME OF GASOLINE

The number of batches and volume of gasoline (excluding exports) reported for the 2013, 2014, 2015, and 2016 reporting periods are summarized in Table 4.1.

Table 4.1 Regional Volumetric Data of Gasoline in Canada (2013-2016)

		West/North	Ontario	Quebec	Atlantic	Canada
2013	**Volume [m³]**	14,021,618	9,908,428	12,771,695	2,970,823	39,672,564
	Batches	2455	1077	832	350	4714
2014	**Volume [m³]**	14,096,148	10,016,260	13,134,002	2,667,083	39,913,493
	Batches	2605	1093	892	213	4803
2015	**Volume [m³]**	14,438,569	10,122,016	13,416,764	2,803,821	40,781,169
	Batches	2696	1136	922	213	4967
2016	**Volume [m³]**	14,584,434	12,241,312	11,756,506	2,827,524	41,409,777
	Batches	2473	1306	937	214	4930

West/North = British Columbia, Yukon, North West Territories, Alberta, Saskatchewan, Nunavut, Manitoba;

Atlantic = Newfoundland and Labrador, New Brunswick, Prince Edward Island, Nova Scotia

4.2 BENZENE CONCENTRATION AND BENZENE EMISSION NUMBER (BEN)

Data reported on benzene levels for the 2013, 2014, 2015, and 2016 reporting periods are summarized in Table 4.2.

Table 4.2 Benzene Concentration in Canadian Gasoline (2013-2016)

	Benzene Concentration [Vol%]			
Year	**2013**	**2014**	**2015**	**2016**
Volume-weighted average	0.64	0.62	0.63	0.61
Maximum reported average	1.19	0.83	0.86	0.84
Minimum reported average	0.33	0.25	0.31	0.13
Maximum value reported	1.44	1.50	1.50	1.39

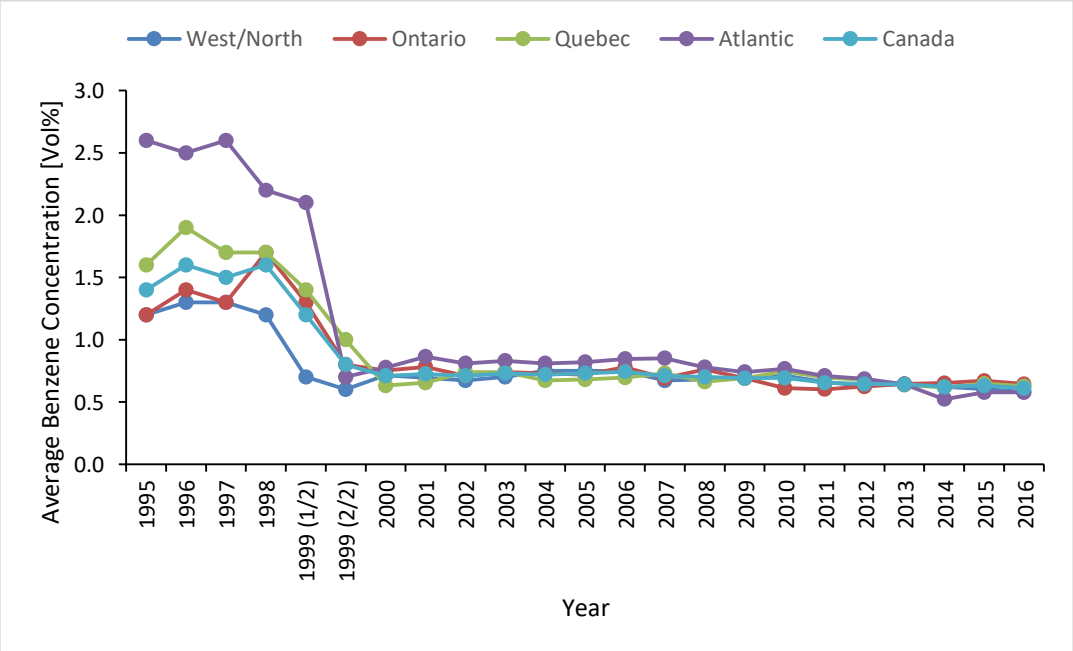
Data reported on BEN levels for the 2013, 2014, 2015, and 2016 reporting periods are summarized in Table 4.3.

Table 4.3 BEN in Canadian Gasoline (2013-2016)

	Benzene Emission Number			
Year	**2013**	**2014**	**2015**	**2016**
Volume-weighted average	44.6	44.7	44.9	45.0
Maximum reported average	51.0	60.5	58.2	60.0
Minimum reported average	33.9	34.4	30.0	31.1
Maximum value reported	92.0	92.0	89.2	99.9

Figure 4.1 shows the graphical trend in average benzene concentration between 1995 and 2016 for Canada, both nationally and by region.[2] As the Regulations took effect mid-1999, the data for the year 1999 is presented separately for the first and second half of the year. Nationally, benzene levels between 2013 and 2016 were less than half of those between 1995 and 1998.

Figure 4.1 Volume-Weighted Average Benzene Content of Canadian Gasoline by Region (1995-2016)



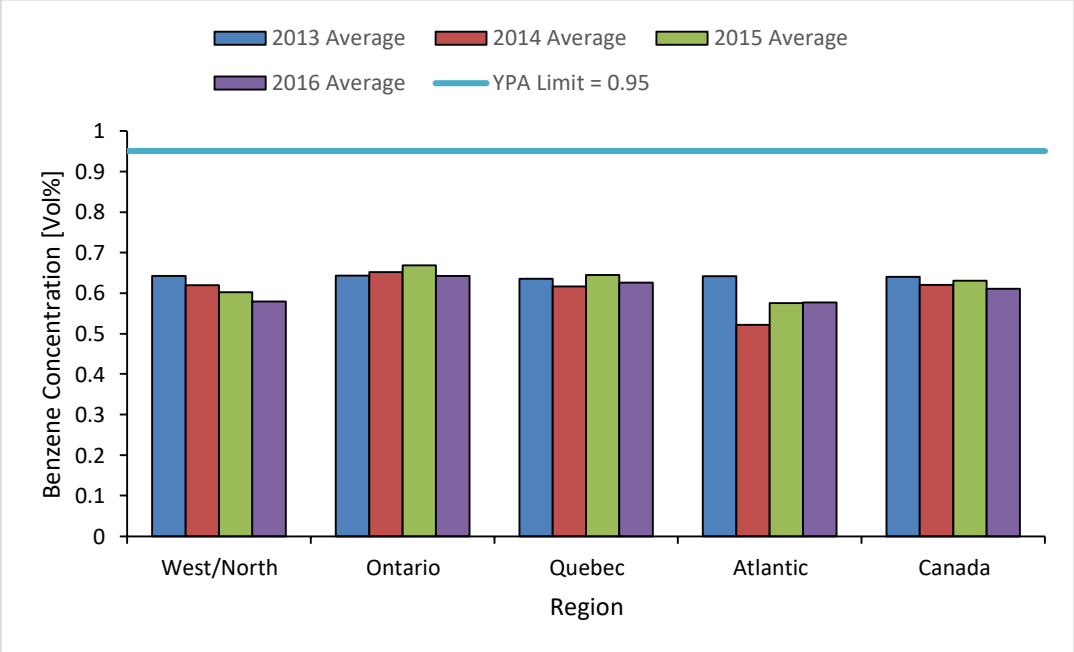
West/North = British Columbia, Yukon, North West Territories, Alberta, Saskatchewan, Nunavut, Manitoba;

Atlantic = Newfoundland and Labrador, New Brunswick, Prince Edward Island, Nova Scotia

Figures 4.2 and Figures 4.3 show the regional and national average values for benzene concentrations and BEN, respectively, for the 2013, 2014, 2015, and 2016 reporting periods. These figures cover all primary suppliers, i.e. primary suppliers reporting on a yearly pool average as well as those on a flat limit.

[2] 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 and Climate Change Canada.

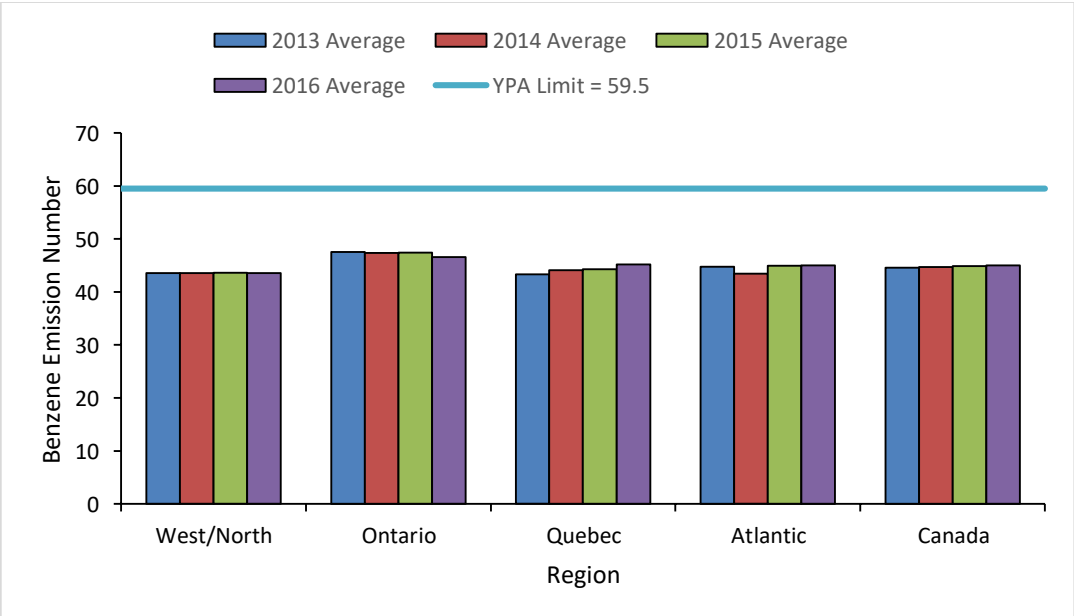
Figure 4.2 Volume-Weighted Average Benzene Concentration of Canadian Gasoline by Region (2013-2016)



West/North = British Columbia, Yukon, North West Territories, Alberta, Saskatchewan, Nunavut, Manitoba;

Atlantic = Newfoundland and Labrador, New Brunswick, Prince Edward Island, Nova Scotia, YPA = Yearly Pool Average.

Figure 4.3 Volume-Weighted Average BEN of Canadian Gasoline by Region (2013-2016)



West/North = British Columbia, Yukon, North West Territories, Alberta, Saskatchewan, Nunavut, Manitoba;

Atlantic = Newfoundland and Labrador, New Brunswick, Prince Edward Island, Nova Scotia, YPA = Yearly Pool Average.

4.3 AROMATICS AND OLEFIN CONCENTRATION IN GASOLINE

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. Both benzene and 1,3-butadiene are classified as carcinogenic to humans (Group 1) and both are listed on the Toxic Substance List (Schedule 1) of the *Canadian Environmental Protection Act, 1999*. From 1995 to 1998, data on the benzene, aromatic and olefin concentrations in gasoline were collected by Environment and Climate Change Canada under a voluntary survey. Olefin concentrations were added to this survey in 1997. Recent trends for aromatics and olefins content are shown in Table 4.4 and Table 4.5, respectively.

Table 4.4 Average Aromatics Content of Canadian Gasoline (2013-2016)

Region	2013	2014	2015	2016
West/North	22.9	22.6	22.4	22.4
Ontario	28.8	28.0	27.1	26.0
Quebec	22.2	22.5	23.2	23.6
Atlantic	24.4	24.4	25.8	24.8
Canada	24.3	24.0	24.1	24.0

West/North = British Columbia, Yukon, North West Territories, Alberta, Saskatchewan, Nunavut, Manitoba;

Atlantic = Newfoundland and Labrador, New Brunswick, Prince Edward Island, Nova Scotia.

Table 4.5 Average Olefins Content of Canadian Gasoline (2013-2016)

Region	2013	2014	2015	2016
West/North	9.7	9.0	9.8	9.9
Ontario	7.1	8.0	7.7	7.4
Quebec	12.9	12.8	12.1	11.4
Atlantic	12.3	9.7	7.8	10.8
Canada	10.2	10.1	9.9	9.6

West/North = British Columbia, Yukon, North West Territories, Alberta, Saskatchewan, Nunavut, Manitoba;

Atlantic = Newfoundland and Labrador, New Brunswick, Prince Edward Island, Nova Scotia.

5 REPORTED DATA FOR ALL PRIMARY SUPPLIERS

This section of the report (Tables 5.1 to 5.12) presents the reported data for all parameters for each primary supplier for the 2013, 2014, 2015, and 2016 reporting periods.

Table 5.1 Primary Suppliers in 2013 (Part 1 of 3)

Facility Name	Province	Facility Type	Benzene Limit	BEN Limit
Chevron Burnaby Refinery	BC	Manufacturer and Importer and Blender	YPA	YPA
CCRL - Regina	SK	Manufacturer	YPA	Flat
Husky Oil - Prince George	BC	Manufacturer	YPA	YPA
IOL - Burrard	BC	Importer	Flat	Flat
IOL - Dartmouth	NS	Manufacturer and Importer and Blender	YPA	Flat
IOL - Strathcona	AB	Manufacturer	YPA	Flat
IOL - Nanticoke	ON	Manufacturer and Importer	YPA	Flat
IOL - Sarnia	ON	Manufacturer and Importer	YPA	YPA
IOL - Shell Montreal	QC	Importer	Flat	Flat
MSCG - Canterm	QC	Importer	YPA	YPA
SCL - QC Imports	QC	Importer	YPA	Flat
SCL - BC Imports	BC	Importer	YPA	Flat
SCL - Sarnia	ON	Manufacturer and Importer and Blender	YPA	YPA
SCL - Scotford	AB	Manufacturer and Importer and Blender	YPA	YPA
Energie Valero - Montreal	QC	Importer and Blender	YPA	YPA
Energie Valero - Jean-Gaulin	QC	Manufacturer and Importer and Blender	YPA	YPA
Irving Oil - Saint John	NB	Manufacturer and Importer	YPA	YPA
North Atlantic	NL	Manufacturer and Importer	YPA	Flat
Les Produits Petroliers Norcan	QC	Importer and Blender	YPA	Flat
SEPP - Montreal	QC	Manufacturer and Importer	YPA	YPA
SEPP - Burrard	BC	Importer	YPA	YPA
SEPP - Edmonton	AB	Manufacturer	YPA	YPA
SEPP - Sarnia	ON	Manufacturer and Importer and Blender	YPA	YPA
WPC - MB Imports	MB	Importer	Flat	Flat
WPC - ON Imports	ON	Importer	Flat	Flat
Greenergy - Ontario Imports	ON	Importer	Flat	Flat

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership; WPC = Western Petroleum Company; YPA = Yearly Pool Average

Table 5.2 Primary Suppliers in 2013 (Part 2 of 3)

	[Benzene] [Vol%]		BEN		[Aromatics] [Vol%]		[Olefin] [Vol%]	
Facility Name	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**
Chevron Burnaby Refinery	0.65	1.41	44.5	80.9	22.8	48.9	10.3	32.6
CCRL - Regina	0.86	1.42	42.2	92.0	24.6	36.0	11.1	15.9
Husky Oil - Prince George	0.69	0.92	33.9	40.5	16.3	20.7	15.4	19.7
IOL - Burrard	0.46	0.57	51.0	51.0	29.4	34.4	5.9	12.6
IOL - Dartmouth	0.75	1.39	50.0	84.0	27.3	49.1	14.9	24.4
IOL - Strathcona	0.60	1.21	44.0	68.0	22.2	27.7	10.5	17.2
IOL - Nanticoke	0.78	1.32	49.0	56.0	28.1	39.4	9.3	16.4
IOL - Sarnia	0.49	1.00	48.7	63.8	29.9	41.4	1.1	5.7
IOL - Shell Montreal	0.33	0.37	48.0	55.0	28.9	32.7	8.3	11.4
MSCG - Canterm	0.59	0.95	44.3	49.0	20.8	32.1	11.7	15.9
SCL - QC Imports	0.86	1.19	44.1	78.0	19.4	42.1	12.6	26.1
SCL - BC Imports	0.59	1.44	41.6	61.2	19.7	31.4	11.4	26.1
SCL - Sarnia	0.61	1.06	47.4	85.7	32.1	60.4	9.6	15.6
SCL - Scotford	0.61	1.02	50.4	84.2	32.6	50.2	1.0	2.2
Energie Valero - Montreal	0.51	1.34	36.2	53.8	19.4	35.1	13.6	21.6
Energie Valero - Jean-Gaulin	0.56	1.34	47.2	84.7	24.6	52.6	14.7	27.6
Irving Oil - Saint John	0.52	1.38	38.0	55.2	20.0	35.0	10.0	17.0
North Atlantic	0.60	1.30	48.0	69.9	29.3	44.1	7.7	15.4
Les Produits Petroliers Norcan	0.69	1.33	43.7	59.5	22.1	34.6	10.8	17.9
SEPP - Montreal	0.62	1.20	40.1	64.4	21.7	44.8	11.9	19.8
SEPP - Burrard	0.69	1.11	39.5	48.4	30.1	44.0	6.4	13.8
SEPP - Edmonton	0.53	0.86	41.6	55.7	18.3	30.9	10.9	17.4
SEPP - Sarnia	0.48	0.98	44.6	69.2	27.1	50.6	3.7	6.3
WPC - MB Imports	1.19	1.39	40.6	41.2	29.7	31.5	9.8	10.3
WPC - ON Imports	1.00	1.00	40.4	40.4	27.6	27.6	8.4	8.4
Greenergy - Ontario Imports	0.64	0.90	41.2	55.2	18.4	35.3	6.5	16.6

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership; WPC = Western Petroleum Company.

Table 5.3 Primary Suppliers in 2013 (Part 3 of 3)

	[Oxygen] [wt%]		[Sulphur] [mg/kg]		Vapour Pressure [kPa]		E200 [Vol%]		E300 [Vol%]	
Facility Name	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**
Chevron Burnaby Refinery	0.0	0.0	23.9	79.6	76.5	106.9	69.0	46.4	84.9	95.0
CCRL - Regina	1.9	3.8	13.8	25.9	79.2	104.2	68.4	47.7	80.5	90.9
Husky Oil - Prince George	3.7	3.8	10.2	19.9	79.3	94.5	65.0	60.0	91.0	94.0
IOL - Burrard	0.0	0.0	17.0	36.0	45.3	97.3	51.7	41.7	89.5	92.9
IOL - Dartmouth	0.0	0.0	27.7	57.3	84.1	106.6	59.0	46.9	86.3	92.2
IOL - Strathcona	0.0	0.0	17.0	30.0	82.7	106.7	59.7	43.3	84.7	93.9
IOL - Nanticoke	0.0	0.0	25.0	63.0	78.1	106.9	67.6	48.9	81.8	93.6
IOL - Sarnia	0.0	0.0	2.4	21.6	77.0	104.0	66.0	56.0	95.0	98.0
IOL - Shell Montreal	3.7	3.8	13.0	14.0	58.9	59.3	55.1	52.8	84.7	87.0
MSCG - Canterm	0.0	0.0	28.0	68.0	73.5	87.2	54.6	50.5	87.6	94.0
SCL - QC Imports	0.1	0.5	14.0	40.0	73.7	103.0	68.4	55.6	92.1	100.0
SCL - BC Imports	0.0	0.0	24.0	40.0	73.0	103.0	60.2	47.0	86.1	93.3
SCL - Sarnia	0.0	0.0	28.0	47.0	81.5	107.3	58.2	46.9	80.2	94.3
SCL - Scotford	0.0	0.0	9.0	16.0	77.8	106.0	57.9	44.7	80.6	89.1
Energie Valero - Montreal	0.0	0.0	17.1	50.0	57.9	91.0	58.5	47.5	87.3	91.4
Energie Valero - Jean-Gaulin	0.0	0.0	17.0	61.0	87.0	107.0	73.5	54.3	91.7	97.5
Irving Oil - Saint John	2.1	4.1	24.0	48.0	82.4	106.4	67.0	53.0	88.0	94.0
North Atlantic	0.0	0.0	19.0	32.0	87.0	105.9	56.0	48.5	84.3	87.3
Les Produits Petroliers Norcan	0.0	0.0	23.2	41.0	70.1	100.0	60.4	51.7	86.6	95.2
SEPP - Montreal	0.9	3.7	27.9	53.0	75.3	105.5	64.9	51.1	85.4	98.2
SEPP - Burrard	0.0	0.0	7.1	34.0	53.4	62.1	51.3	42.3	83.5	91.2
SEPP - Edmonton	0.0	0.0	19.0	58.0	79.8	106.0	58.4	47.0	87.0	93.4
SEPP - Sarnia	0.0	0.0	21.9	50.0	76.8	105.5	54.0	43.5	81.2	91.0
WPC - MB Imports	2.1	3.7	9.8	21.9	62.3	95.7	46.2	46.0	81.6	82.4
WPC - ON Imports	0.0	0.0	7.4	7.4	59.7	59.7	45.9	45.9	80.3	80.3
Greenergy - Ontario Imports	0.0	0.0	9.5	53.0	76.3	101.5	63.9	56.4	90.8	97.5

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership; WPC = Western Petroleum Company.

E200 means the evaporative fraction of the gasoline at 93.3°C (200°F), as a percentage of the gasoline by volume,

E300 means the evaporative fraction of the gasoline at 148.9°C (300°F), as a percentage of the gasoline by volume, or the modified value specified in subsection 3(2).

Table 5.4 Primary Suppliers in 2014 (Part 1 of 3)

Facility Name	Province	Facility Type	Benzene Limit	BEN Limit
Chevron Burnaby Refinery	BC	Manufacturer and Importer and Blender	YPA	YPA
CCRL - Regina	SK	Manufacturer	YPA	Flat
Husky Oil - Prince George	BC	Manufacturer	YPA	YPA
IOL - Burrard	BC	Importer	Flat	Flat
IOL - Dartmouth	NS	Importer and Blender	YPA	Flat
IOL - Strathcona	AB	Manufacturer	YPA	Flat
IOL - Nanticoke	ON	Manufacturer and Importer	YPA	Flat
IOL - Sarnia	ON	Manufacturer and Importer	YPA	Flat
IOL - Shell Montreal	QC	Importer	Flat	Flat
MSCG - Canterm	QC	Importer	YPA	YPA
SCL - QC Imports	QC	Importer	YPA	Flat
SCL - BC Imports	BC	Importer	YPA	Flat
SCL - Sarnia	ON	Manufacturer and Importer and Blender	YPA	YPA
SCL - Scotford	AB	Manufacturer and Importer and Blender	YPA	YPA
Energie Valero - Montreal	QC	Importer and Blender	YPA	YPA
Energie Valero - Jean-Gaulin	QC	Manufacturer and Importer and Blender	YPA	YPA
Irving Oil - Saint John	NB	Manufacturer and Importer	YPA	YPA
North Atlantic	NL	Manufacturer and Importer	YPA	Flat
Les Produits Petroliers Norcan	QC	Importer and Blender	YPA	Flat
SEPP - Montreal	QC	Manufacturer and Importer	YPA	YPA
SEPP - Burrard	BC	Importer	YPA	YPA
SEPP - Edmonton	AB	Manufacturer	YPA	YPA
SEPP - Sarnia	ON	Manufacturer and Importer and Blender	YPA	YPA
WPC - MB Imports	MB	Importer	Flat	Flat
WPC - ON Imports	ON	Importer	Flat	Flat
Greenergy - Vopak Imports	ON	Importer	YPA	Flat

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership; WPC = Western Petroleum Company; YPA = Yearly Pool Average.

Table 5.5 Primary Suppliers in 2014 (Part 2 of 3)

	[Benzene] [Vol%]		BEN		[Aromatics] [Vol%]		[Olefin] [Vol%]	
Facility Name	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**
Chevron Burnaby Refinery	0.70	1.50	43.5	67.3	21.8	36.5	9.0	33.3
CCRL - Regina	0.61	0.84	43.7	92.0	24.3	32.7	11.9	18.9
Husky Oil - Prince George	0.73	1.37	34.4	41.1	15.0	40.9	18.2	20.2
IOL - Burrard	0.37	0.37	36.0	36.0	29.0	29.0	0.1	0.1
IOL - Dartmouth	0.56	0.90	47.9	85.2	28.3	47.8	10.9	18.2
IOL - Strathcona	0.71	1.08	43.0	61.0	20.3	32.4	10.0	15.8
IOL - Nanticoke	0.77	1.33	48.0	77.0	27.7	43.5	10.7	19.1
IOL - Sarnia	0.43	0.90	48.5	67.7	30.1	40.5	1.7	7.9
IOL - Shell Montreal	0.25	0.33	60.5	60.5	26.3	34.8	7.3	9.0
MSCG - Canterm	0.61	1.16	42.2	52.0	19.6	30.4	9.0	16.9
SCL - QC Imports	0.83	1.28	44.8	81.0	19.2	42.8	11.6	28.2
SCL - BC Imports	0.51	1.17	40.6	71.4	19.9	30.8	10.9	34.4
SCL - Sarnia	0.63	1.23	50.2	91.0	31.1	54.4	9.7	16.0
SCL - Scotford	0.54	1.09	50.3	82.2	33.4	49.1	1.0	2.2
Energie Valero - Montreal	0.56	0.92	39.7	53.0	19.9	44.4	8.8	20.7
Energie Valero - Jean-Gaulin	0.54	1.20	46.9	88.2	24.1	54.3	15.4	28.2
Irving Oil - Saint John	0.44	0.87	37.8	61.0	20.0	31.0	9.0	25.0
North Atlantic	0.79	1.48	52.9	82.9	30.0	42.4	8.1	23.7
Les Produits Petroliers Norcan	0.69	1.15	44.4	77.1	21.4	43.9	14.3	24.4
SEPP - Montreal	0.60	1.40	41.9	69.3	23.6	52.0	11.5	19.3
SEPP - Burrard	0.45	0.50	44.3	58.0	27.2	31.5	5.1	10.2
SEPP - Edmonton	0.50	0.79	41.4	57.1	19.2	38.6	9.6	15.9
SEPP - Sarnia	0.55	1.11	43.3	67.4	24.9	45.9	4.3	9.2
WPC - MB Imports	0.53	0.65	49.4	57.4	52.8	55.0	28.6	30.0
WPC - ON Imports	0.53	0.57	47.5	57.4	41.1	55.0	21.2	30.0
Greenergy - Vopak Imports	0.75	1.14	43.0	80.0	21.8	43.2	10.2	25.5

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership; WPC = Western Petroleum Company.

Table 5.6 Primary Suppliers in 2014 (Part 3 of 3)

	[Oxygen] [wt%]		[Sulphur] [mg/kg]		Vapour Pressure [kPa]		E200 [Vol%]		E300 [Vol%]	
Facility Name	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**
Chevron Burnaby Refinery	0.0	0.0	15.5	46.2	78.3	106.9	89.6	48.1	85.2	95.0
CCRL - Regina	2.3	3.8	13.8	25.0	76.5	106.0	58.3	44.4	81.4	90.7
Husky Oil - Prince George	3.7	3.8	7.1	11.7	77.3	95.2	65.0	59.5	91.1	94.0
IOL - Burrard	0.0	0.1	1.4	1.4	49.5	49.5	55.5	55.5	93.6	93.6
IOL - Dartmouth	0.1	0.1	21.6	51.0	77.9	104.0	66.5	51.7	87.2	94.6
IOL - Strathcona	0.1	0.1	16.0	55.0	81.1	107.0	66.2	46.3	86.6	94.4
IOL - Nanticoke	0.1	0.1	28.0	57.0	77.0	107.0	66.1	50.6	81.6	93.8
IOL - Sarnia	0.1	0.1	1.2	7.0	76.0	107.0	66.0	58.0	95.0	98.0
IOL - Shell Montreal	0.1	0.1	16.6	18.0	63.7	104.7	47.4	46.7	89.3	92.5
MSCG - Canterm	0.0	0.0	15.0	23.0	77.8	96.1	63.4	52.2	88.1	96.7
SCL - QC Imports	0.0	0.0	16.0	47.0	75.2	104.6	68.6	56.6	91.2	98.9
SCL - BC Imports	0.0	0.0	25.0	38.0	75.5	106.0	83.5	47.4	84.0	94.1
SCL - Sarnia	0.0	0.0	28.0	46.0	80.4	106.8	56.2	46.9	81.0	92.1
SCL - Scotford	0.0	0.0	8.0	16.0	80.3	105.0	53.2	44.0	77.9	89.0
Energie Valero - Montreal	0.0	0.0	13.1	38.0	64.9	99.0	62.5	51.8	90.9	98.0
Energie Valero - Jean-Gaulin	0.0	0.0	15.0	38.0	86.5	107.0	71.7	53.4	92.5	97.3
Irving Oil - Saint John	2.0	4.6	17.0	36.0	82.5	106.9	68.0	55.0	91.0	96.0
North Atlantic	0.0	0.0	13.0	30.0	88.3	106.4	57.4	49.3	86.0	91.3
Les Produits Petroliers Norcan	0.0	0.0	23.1	62.0	77.3	102.1	66.7	52.7	87.8	97.6
SEPP - Montreal	0.9	3.7	21.9	47.0	76.5	107.0	65.2	50.1	85.6	97.5
SEPP - Burrard	0.0	0.0	18.7	36.0	56.1	60.4	51.4	46.7	85.8	87.7
SEPP - Edmonton	0.0	0.0	14.0	32.0	80.3	106.0	62.5	46.7	87.3	93.7
SEPP - Sarnia	0.0	0.0	17.5	43.4	77.0	105.2	58.0	44.7	80.9	99.7
WPC - MB Imports	3.3	3.7	17.7	25.0	64.8	100.9	45.4	39.3	80.0	84.1
WPC - ON Imports	0.0	0.0	15.4	25.0	79.1	100.9	45.4	40.9	79.6	84.1
Greenergy - Vopak Imports	0.0	0.0	17.6	45.0	68.3	100.5	70.2	60.3	92.2	95.7

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership; WPC = Western Petroleum Company.

E200 means the evaporative fraction of the gasoline at 93.3°C (200°F), as a percentage of the gasoline by volume,

E300 means the evaporative fraction of the gasoline at 148.9°C (300°F), as a percentage of the gasoline by volume, or the modified value specified in subsection 3(2).

Table 5.7 Primary Suppliers in 2015 (Part 1 of 3)

Facility Name	Province	Facility Type	Benzene Limit	BEN Limit
Chevron Burnaby Refinery	BC	Manufacturer and Importer and Blender	YPA	YPA
CCRL - Regina	SK	Manufacturer	YPA	Flat
Husky Oil - Prince George	BC	Manufacturer	YPA	YPA
IOL - Burrard	BC	Importer	Flat	Flat
IOL - Dartmouth	NS	Importer and Blender	YPA	Flat
IOL - Strathcona	AB	Manufacturer	YPA	Flat
IOL - Nanticoke	ON	Manufacturer and Importer	YPA	Flat
IOL - Valero Montreal	QC	Importer	Flat	Flat
IOL - Sarnia	ON	Manufacturer and Importer	YPA	Flat
MSCG - Canterm	QC	Importer	YPA	YPA
SCL - QC Imports	QC	Importer	YPA	Flat
SCL - AB Imports	AB	Importer	Flat	Flat
SCL - BC Imports	BC	Importer	YPA	Flat
SCL - Sarnia	ON	Manufacturer and Importer and Blender	YPA	YPA
SCL - NS Imports	NS	Importer	Flat	Flat
SCL - Scotford	AB	Manufacturer and Importer and Blender	YPA	YPA
Energie Valero - Montreal	QC	Importer and Blender	YPA	YPA
Energie Valero - Jean-Gaulin	QC	Manufacturer and Importer	YPA	YPA
Irving Oil - Saint John	NB	Manufacturer and Importer	YPA	YPA
North Atlantic	NL	Manufacturer	YPA	Flat
Les Produits Petroliers Norcan	QC	Importer and Blender	YPA	Flat
SEPP - Montreal	QC	Manufacturer and Importer	YPA	YPA
SEPP - Burrard	BC	Importer	YPA	YPA
SEPP - Edmonton	AB	Manufacturer	YPA	YPA
SEPP - Sarnia	ON	Manufacturer and Importer and Blender	YPA	YPA
Greenergy - Vopak Imports	ON	Importer	YPA	Flat
Rolympus Commodities	BC	Importer	YPA	YPA
World Fuel Services Canada - Saskatchewan	SK	Importer	Flat	Flat

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership; YPA = Yearly Pool Average.

Table 5.8 Primary Suppliers in 2015 (Part 2 of 3)

	[Benzene] [Vol%]		BEN		[Aromatics] [Vol%]		[Olefin] [Vol%]	
Facility Name	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**
Chevron Burnaby Refinery	0.70	1.50	43.6	82.1	21.3	47.6	10.7	25.1
CCRL - Regina	0.60	1.05	45.0	62.1	24.4	34.1	11.5	18.8
Husky Oil - Prince George	0.69	1.00	35.3	43.0	14.8	35.7	18.2	21.0
IOL - Burrard	0.51	0.81	41.0	55.0	26.1	32.9	9.6	17.6
IOL - Dartmouth	0.60	1.10	50.0	75.0	29.6	49.8	10.1	17.5
IOL - Strathcona	0.71	1.21	44.0	65.0	22.0	33.6	10.4	19.6
IOL - Nanticoke	0.76	1.21	48.0	71.0	27.2	43.8	9.2	17.6
IOL - Valero Montreal	0.79	0.79	38.0	38.0	21.8	21.8	6.2	6.2
IOL - Sarnia	0.55	1.15	52.0	79.0	30.9	44.1	1.8	8.3
MSCG - Canterm	0.73	1.00	40.1	50.0	19.5	25.9	13.2	17.6
SCL - QC Imports	0.86	1.27	45.7	71.0	20.8	43.0	10.8	25.9
SCL - AB Imports	0.31	0.31	51.5	51.5	50.1	50.1	4.6	4.6
SCL - BC Imports	0.53	1.16	41.7	63.7	19.0	30.2	9.1	28.8
SCL - Sarnia	0.70	0.90	49.7	89.2	29.6	54.8	10.3	15.9
SCL - NS Imports	0.65	0.65	37.3	37.3	16.2	16.2	10.5	10.5
SCL - Scotford	0.56	1.38	52.9	85.3	33.8	51.1	1.1	4.0
Energie Valero - Montreal	0.65	1.12	41.4	56.8	21.8	49.3	10.3	22.4
Energie Valero - Jean-Gaulin	0.55	1.35	46.6	88.8	23.7	47.0	14.8	28.8
Irving Oil - Saint John	0.55	0.88	38.8	59.5	21.0	32.0	7.0	16.0
North Atlantic	0.59	1.13	58.2	76.1	37.6	43.0	0.7	2.8
Les Produits Petroliers Norcan	0.68	1.19	45.2	75.9	22.7	43.9	11.6	32.7
SEPP - Montreal	0.64	1.30	42.0	72.8	24.7	51.3	10.3	17.6
SEPP - Burrard	0.41	0.51	35.5	39.0	27.6	31.8	6.7	9.8
SEPP - Edmonton	0.46	0.80	38.8	52.8	17.4	27.1	10.7	16.9
SEPP - Sarnia	0.52	0.96	42.2	66.6	23.2	45.0	5.1	11.5
Greenergy - Vopak Imports	0.66	1.02	43.2	68.2	22.7	44.6	13.4	25.6
Rolympus Commodities	0.44	0.44	46.5	46.5	19.3	19.3	7.6	7.6
World Fuel Services Canada - Saskatchewan	0.50	0.50	30.0	30.0	15.8	15.8	5.1	5.1

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership.

Table 5.9 Primary Suppliers in 2015 (Part 3 of 3)

	[Oxygen] [wt%]		[Sulphur] [mg/kg]		Vapour Pressure [kPa]		E200 [Vol%]		E300 [Vol%]	
Facility Name	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**
Chevron Burnaby Refinery	0.0	0.0	16.8	58.0	79.8	106.9	68.0	48.2	86.4	95.0
CCRL - Regina	0.0	0.0	18.7	37.0	76.1	103.6	57.0	43.9	79.3	88.7
Husky Oil - Prince George	3.7	3.8	8.2	17.2	85.0	99.3	65.0	61.0	92.0	94.0
IOL - Burrard	0.0	0.0	13.2	24.0	60.4	80.4	52.5	45.9	87.7	93.3
IOL - Dartmouth	0.0	0.0	20.8	35.3	80.8	103.6	62.8	51.0	87.5	95.1
IOL - Strathcona	0.1	0.1	24.0	82.0	80.4	116.0	64.9	44.4	86.7	95.0
IOL - Nanticoke	0.0	0.0	25.8	69.3	77.9	107.0	69.7	49.7	81.7	95.6
IOL - Valero Montreal	0.0	0.0	8.0	8.0	73.9	73.9	53.7	53.7	87.8	87.8
IOL - Sarnia	0.0	0.0	2.5	25.1	81.7	109.7	68.0	58.0	94.9	99.0
MSCG - Canterm	0.0	0.0	17.8	27.0	69.6	95.1	65.3	53.8	88.7	95.5
SCL - QC Imports	0.0	0.0	12.0	36.0	70.1	103.8	69.8	55.3	92.8	99.0
SCL - AB Imports	0.0	0.0	8.0	8.0	69.2	69.2	48.5	48.5	88.5	88.5
SCL - BC Imports	0.0	0.0	26.0	52.0	72.8	107.0	62.1	46.7	86.7	93.4
SCL - Sarnia	0.0	0.0	29.0	50.0	71.3	107.0	59.0	48.3	83.3	93.1
SCL - NS Imports	0.0	0.0	34.0	34.0	95.8	95.8	59.4	59.4	87.2	87.2
SCL - Scotford	0.0	0.0	8.0	22.0	79.5	106.0	55.6	43.6	79.3	90.8
Energie Valero - Montreal	0.0	0.0	18.0	58.0	68.4	104.0	64.4	52.1	88.8	96.0
Energie Valero - Jean-Gaulin	0.0	0.0	13.0	46.0	85.7	107.0	69.0	53.5	91.9	96.2
Irving Oil - Saint John	1.8	3.8	12.0	38.0	82.9	106.7	70.0	53.0	90.0	95.0
North Atlantic	0.0	0.0	4.0	7.4	87.6	106.7	48.8	39.9	88.1	90.9
Les Produits Petroliers Norcan	0.0	0.0	17.8	57.0	76.4	102.9	64.8	52.7	88.0	95.5
SEPP - Montreal	0.9	3.7	18.0	36.0	77.4	105.5	67.7	50.5	84.6	97.9
SEPP - Burrard	0.0	0.0	19.3	27.0	66.1	76.7	43.7	39.3	84.3	101.3
SEPP - Edmonton	0.0	0.0	13.0	59.0	80.3	108.0	57.5	44.2	85.2	93.4
SEPP - Sarnia	0.0	0.0	12.0	29.0	76.4	104.6	58.6	47.2	82.8	96.0
Greenergy - Vopak Imports	0.0	0.0	13.0	28.0	66.2	96.3	58.1	51.0	89.6	93.6
Rolympus Commodities	0.0	0.0	13.0	13.0	96.1	96.1	58.2	58.2	88.9	88.9
World Fuel Services Canada - Saskatchewan	0.0	0.0	11.2	11.2	59.2	59.2	37.3	37.3	86.3	86.3

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; MSCG = Morgan Stanley Capital Group; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership.

E200 means the evaporative fraction of the gasoline at 93.3°C (200°F), as a percentage of the gasoline by volume,

E300 means the evaporative fraction of the gasoline at 148.9°C (300°F), as a percentage of the gasoline by volume, or the modified value specified in subsection 3(2).

Table 5.10 Primary Suppliers in 2016 (Part 1 of 3)

Facility Name	Province	Facility Type	Benzene Limit	BEN Limit
Chevron Burnaby Refinery	BC	Manufacturer and Importer and Blender	YPA	YPA
CCRL - Regina	SK	Manufacturer	YPA	Flat
Husky Oil - Prince George	BC	Manufacturer	YPA	YPA
IOL - Burrard	BC	Importer	Flat	Flat
IOL - Dartmouth	NS	Importer and Blender	YPA	Flat
IOL - Strathcona	AB	Manufacturer	YPA	Flat
IOL - Nanticoke	ON	Manufacturer and Importer	YPA	Flat
IOL - Valero Montreal	QC	Importer	Flat	Flat
IOL - Sarnia	ON	Manufacturer and Importer	YPA	Flat
SCL - BC Imports	BC	Importer	YPA	Flat
SCL - Sarnia	ON	Manufacturer and Importer and Blender	YPA	YPA
SCL - ON Imports	ON	Importer	YPA	Flat
STC - QC Imports	QC	Importer	YPA	Flat
SCL - Scotford	AB	Manufacturer and Importer and Blender	YPA	YPA
Energie Valero - Montreal	QC	Importer	YPA	Flat
Energie Valero - Jean-Gaulin	QC	Manufacturer and Importer	YPA	YPA
Irving Oil - Saint John	NB	Manufacturer and Importer	YPA	YPA
Irving Oil Commercial, G.P.	NS	Importer	YPA	YPA
North Atlantic	NL	Manufacturer	YPA	Flat
Les Produits Petroliers Norcan	QC	Importer	YPA	Flat
SEPP - Montreal	QC	Manufacturer and Importer	YPA	YPA
SEPP - Burrard	BC	Importer	YPA	YPA
SEPP - Edmonton	AB	Manufacturer	YPA	YPA
SEPP - Sarnia	ON	Manufacturer and Importer and Blender	YPA	YPA
Greenergy - Escoumins	ON	Importer	YPA	YPA
Greenergy - Ontario Imports	ON	Importer	YPA	YPA
Rolympus Commodities	BC	Importer	YPA	YPA
World Fuel Services Canada - Saskatchewan	SK	Importer	Flat	Flat
North 60 Petro LTD	YT	Importer	Flat	Flat

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership; STC = Shell Trading Canada; YPA = Yearly Pool Average.

Table 5.11 Primary Suppliers in 2016 (Part 2 of 3)

	[Benzene] [Vol%]		BEN		[Aromatics] [Vol%]		[Olefin] [Vol%]	
Facility Name	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**
Chevron Burnaby Refinery	0.60	1.30	42.4	76.1	19.7	44.4	12.5	33.1
CCRL - Regina	0.63	1.39	44.3	67.3	24.2	36.7	11.7	21.9
Husky Oil - Prince George	0.62	0.80	36.0	44.0	20.2	29.7	14.7	19.3
IOL - Burrard	0.55	0.73	38.0	42.0	30.2	34.1	0.9	5.6
IOL - Dartmouth	0.62	0.93	51.0	74.0	28.2	48.4	13.2	37.6
IOL - Strathcona	0.65	1.22	45.0	62.0	21.3	37.7	10.7	18.6
IOL - Nanticoke	0.72	1.05	47.0	71.0	26.6	40.2	8.6	18.0
IOL - Valero Montreal	0.26	0.26	55.0	55.0	32.5	32.5	2.2	2.2
IOL - Sarnia	0.44	1.17	50.0	72.0	32.3	45.0	1.0	6.0
SCL - BC Imports	0.32	0.78	36.5	54.5	15.1	28.3	15.5	51.4
SCL - Sarnia	0.54	0.97	48.2	85.3	29.9	55.4	9.1	16.9
SCL - ON Imports	0.84	1.16	44.6	58.8	25.6	41.1	9.2	15.9
STC - QC Imports	0.82	1.28	46.5	76.0	20.5	44.3	10.4	24.3
SCL - Scotford	0.49	1.37	48.3	79.3	34.1	48.7	1.2	6.1
Energie Valero - Montreal	0.59	1.15	41.4	65.9	19.9	47.3	10.4	18.8
Energie Valero - Jean-Gaulin	0.61	1.20	47.4	99.9	24.6	50.5	13.4	25.8
Irving Oil - Saint John	0.54	0.91	38.4	75.6	20.0	39.0	10.0	24.0
Irving Oil Commercial, G.P.	0.68	0.71	33.0	33.0	13.0	14.0	23.0	25.0
North Atlantic	0.57	1.13	60.0	76.0	41.1	44.7	0.8	1.2
Les Produits Petroliers Norcan	0.70	1.10	45.5	68.2	22.9	48.0	10.8	25.9
SEPP - Montreal	0.64	1.30	44.4	76.5	24.7	60.6	9.7	17.3
SEPP - Burrard	0.47	0.75	38.9	45.0	33.4	43.8	4.8	11.5
SEPP - Edmonton	0.52	0.81	41.5	55.2	18.8	33.7	9.3	14.6
SEPP - Sarnia	0.53	0.99	42.5	66.1	23.2	41.6	4.7	19.0
Greenergy - Escoumins	0.71	0.96	36.7	46.4	16.9	30.3	13.1	22.1
Greenergy - Ontario Imports	0.59	1.00	43.7	56.2	25.1	43.2	8.6	12.8
Rolympus Commodities	0.59	1.20	48.7	53.9	20.0	20.7	8.6	12.8
World Fuel Services Canada - Saskatchewan	0.52	0.68	31.1	32.8	17.2	18.9	3.5	4.8
North 60 Petro LTD	0.13	0.18	37.8	38.2	10.0	8.9	1.7	1.9

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership; STC = Shell Trading Canada.

Table 5.12 Primary Suppliers in 2016 (Part 3 of 3)

	[Oxygen] [wt%]		[Sulphur] [mg/kg]		Vapour Pressure [kPa]		E200 [Vol%]		E300 [Vol%]	
Facility Name	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**	**Ave**	**Max**
Chevron Burnaby Refinery	1.0	3.9	25.5	79.4	81.2	109.6	71.0	51.0	86.4	95.0
CCRL - Regina	0.0	0.0	20.0	42.0	80.1	114.4	55.8	44.5	80.0	89.7
Husky Oil - Prince George	3.8	3.9	9.1	12.5	80.1	100.7	66.0	60.0	91.0	96.0
IOL - Burrard	0.0	0.0	6.4	24.0	47.4	54.4	50.0	43.9	88.6	91.9
IOL - Dartmouth	0.0	0.0	22.5	66.8	80.0	105.1	65.4	54.6	88.3	95.2
IOL - Strathcona	0.0	0.0	22.0	59.0	85.2	109.9	60.3	46.9	88.2	93.6
IOL - Nanticoke	0.0	0.0	22.6	70.0	78.3	108.7	69.4	50.3	82.1	95.7
IOL - Valero Montreal	0.0	0.0	13.0	13.0	45.5	45.5	42.0	42.0	83.3	83.3
IOL - Sarnia	0.0	0.0	1.6	6.3	77.6	107.9	71.2	57.4	93.5	97.6
SCL - BC Imports	0.0	0.0	21.0	39.0	79.8	108.0	65.8	47.9	85.6	91.2
SCL - Sarnia	0.0	0.0	27.0	54.0	77.9	109.6	66.0	47.9	82.7	96.3
SCL - ON Imports	0.0	0.5	19.0	48.0	63.0	90.3	56.0	46.3	88.0	96.0
STC - QC Imports	0.0	0.5	18.0	50.0	74.9	105.0	70.8	56.4	93.8	98.0
SCL - Scotford	0.0	0.0	9.8	25.8	78.8	110.0	58.4	44.5	77.3	91.3
Energie Valero - Montreal	0.0	0.0	13.4	39.0	71.6	106.6	70.0	51.1	88.7	96.3
Energie Valero - Jean-Gaulin	0.0	0.0	10.0	29.0	86.6	110.0	73.1	53.8	91.2	97.7
Irving Oil - Saint John	1.8	3.9	15.0	45.0	85.0	105.8	77.0	53.0	89.0	96.0
Irving Oil Commercial, G.P.	0.0	0.0	10.0	11.0	99.7	100.7	65.0	65.0	93.0	93.0
North Atlantic	0.0	0.0	3.0	6.6	87.7	106.7	43.3	36.1	83.8	88.8
Les Produits Petroliers Norcan	0.0	0.0	13.5	47.0	73.6	105.4	68.7	53.5	89.4	93.4
SEPP - Montreal	0.0	0.0	17.0	36.0	76.9	109.9	66.6	50.5	85.0	98.0
SEPP - Burrard	0.0	0.0	6.0	28.0	47.6	57.4	48.1	39.1	84.5	91.3
SEPP - Edmonton	0.0	0.0	8.0	20.0	85.1	110.0	57.6	45.5	86.9	93.1
SEPP - Sarnia	0.0	0.0	13.0	29.0	78.5	108.1	57.4	46.8	82.3	97.1
Greenergy - Escoumins	0.0	0.0	14.6	23.0	66.7	108.3	70.1	54.7	90.8	97.8
Greenergy - Ontario Imports	0.0	0.0	12.4	28.0	73.3	96.7	54.1	48.5	85.1	91.4
Rolympus Commodities	0.0	0.0	12.2	13.0	94.5	96.8	61.7	53.5	88.9	98.0
World Fuel Services Canada - Saskatchewan	0.0	0.0	9.6	14.0	61.5	64.3	43.0	40.0	87.0	88.0
North 60 Petro LTD	0.0	0.0	4.1	6.4	99.2	102.0	54.8	49.4	91.4	91.7

CCRL = Consumer's Co-operative Refineries Limited; IOL = Imperial Oil Limited; SCL = Shell Canada Limited; SEPP = Suncor Energy Products Partnership; STC = Shell Trading Canada.

E200 means the evaporative fraction of the gasoline at 93.3°C (200°F), as a percentage of the gasoline by volume,

E300 means the evaporative fraction of the gasoline at 148.9°C (300°F), as a percentage of the gasoline by volume, or the modified value specified in subsection 3(2).

6 REGIONAL AND NATIONAL DATA FOR ALL PARTNERS

Tables 6.1 to 6.4 compare the reported average and maxima data by region and nationally for 2013, 2014, 2015 and 2016, respectively.

Table 6.1 Averages (Volume-weighted, Maximum and Minimum) and Maximum Values of Reported Gasoline Parameters by Region (2013)

	Region	West/North	Ontario	Quebec	Atlantic	Canada
	Number of Primary Suppliers	10	6	7	3	26
	Volume [m³]	14,021,618	9,908,428	12,771,695	2,970,823	39,672,564
	Batches	2455	1077	832	350	4714
[Benzene] [Vol%]	**Volume-weighted average**	0.64	0.64	0.64	0.64	0.64
	Maximum reported average	1.19	1.00	0.86	0.75	1.19
	Minimum reported average	0.46	0.48	0.33	0.52	0.33
	Maximum value reported	1.44	1.32	1.34	1.39	1.44
BEN	**Volume-weighted average**	43.6	47.6	43.3	44.8	44.6
	Maximum reported average	51.0	49.0	48.0	50.0	51.0
	Minimum reported average	33.9	40.4	36.2	38.0	33.9
	Maximum value reported	92.0	85.7	84.7	84.0	92.0
[Aromatics] [Vol%]	**Volume-weighted average**	22.9	28.8	22.2	24.4	24.3
	Maximum reported average	32.6	32.1	28.9	29.3	32.6
	Minimum reported average	16.3	18.4	19.4	20.0	16.3
	Maximum value reported	50.2	60.4	52.6	49.1	60.4
[Olefin] [Vol%]	**Volume-weighted average**	9.7	7.1	12.9	12.3	10.2
	Maximum reported average	15.4	9.6	14.7	14.9	15.4
	Minimum reported average	1.0	1.1	8.3	7.7	1.0
	Maximum value reported	32.6	16.6	27.6	24.4	32.6
[Oxygen] [wt%]	**Volume-weighted average**	0.4	0.0	0.3	0.9	0.3
	Maximum reported average	3.7	0.0	3.7	2.1	3.7
	Minimum reported average	0.0	0.0	0.0	0.0	0.0
	Maximum value reported	3.8	0.0	3.8	4.1	4.1
[Sulphur] [mg/kg]	**Volume-weighted average**	16.5	22.0	21.0	25.4	20.0
	Maximum reported average	24.0	28.0	28.0	27.7	28.0
	Minimum reported average	7.1	2.4	13.0	19.0	2.4
	Maximum value reported	79.6	63.0	68.0	57.3	79.6
Vapour Pressure [kPa]	**Volume-weighted average**	79.3	78.3	77.2	83.6	78.7
	Maximum reported average	82.7	81.5	87.0	87.0	87.0
	Minimum reported average	45.3	59.7	57.9	82.4	45.3
	Maximum value reported	106.9	107.3	107.0	106.6	107.3
E200 [Vol%]	**Volume-weighted average**	45.8	48.3	52.7	49.6	48.9
	Maximum reported average	60.0	56.4	55.6	53.0	60.0
	Minimum reported average	41.7	43.5	47.5	46.9	41.7
	Maximum value reported	69.0	67.6	73.5	67.0	73.5
E300 [Vol%]	**Volume-weighted average**	84.1	83.1	88.8	86.9	85.6
	Maximum reported average	91.0	95.0	92.1	88.0	95.0
	Minimum reported average	80.5	80.2	84.7	84.3	80.2
	Maximum value reported	95.0	98.0	100.0	94.0	100.0

Table 6.2 Averages (Volume-weighted, Maximum and Minimum) and Maximum Values of Reported Gasoline Parameters by Region (2014)

	Region	West/North	Ontario	Quebec	Atlantic	Canada
	Number of Primary Suppliers	10	6	7	3	26
	Volume [m^3]	14,096,148	10,016,260	13,134,002	2,667,083	39,913,493
	Batches	2605	1093	892	213	4803
[Benzene] [Vol%]	**Volume-weighted average**	0.62	0.65	0.62	0.52	0.62
	Maximum reported average	0.73	0.77	0.83	0.79	0.83
	Minimum reported average	0.37	0.43	0.25	0.44	0.25
	Maximum value reported	1.50	1.33	1.40	1.48	1.50
BEN	**Volume-weighted average**	43.6	47.4	44.1	43.4	44.7
	Maximum reported average	50.3	50.2	60.5	52.9	60.5
	Minimum reported average	34.4	43.0	39.7	37.8	34.4
	Maximum value reported	92.0	91.0	88.2	85.2	92.0
[Aromatics] [Vol%]	**Volume-weighted average**	22.6	28.0	22.5	24.4	24.0
	Maximum reported average	52.8	41.1	26.3	30.0	52.8
	Minimum reported average	15.0	21.8	19.2	20.0	15.0
	Maximum value reported	55.0	55.0	54.3	47.8	55.0
[Olefin] [Vol%]	**Volume-weighted average**	9.0	8.0	12.8	9.7	10.1
	Maximum reported average	28.6	21.2	15.4	10.9	28.6
	Minimum reported average	0.1	1.7	7.3	8.1	0.1
	Maximum value reported	34.4	30.0	28.2	25.0	34.4
[Oxygen] [wt%]	**Volume-weighted average**	0.5	0.1	0.3	1.0	0.3
	Maximum reported average	3.7	0.1	0.9	2.0	3.7
	Minimum reported average	0.0	0.0	0.0	0.0	0.0
	Maximum value reported	3.8	0.1	3.7	4.6	4.6
[Sulphur] [mg/kg]	**Volume-weighted average**	14.1	22.2	18.1	18.6	17.7
	Maximum reported average	25.0	28.0	23.1	21.6	28.0
	Minimum reported average	1.4	1.2	13.1	13.0	1.2
	Maximum value reported	55.0	57.0	62.0	51.0	62.0
Vapour Pressure [kPa]	**Volume-weighted average**	79.5	77.4	78.7	81.0	78.8
	Maximum reported average	81.1	80.4	86.5	88.3	88.3
	Minimum reported average	49.5	68.3	63.7	77.9	49.5
	Maximum value reported	107.0	107.0	107.0	106.9	107.0
E200 [Vol%]	**Volume-weighted average**	46.2	49.6	52.5	53.1	49.6
	Maximum reported average	59.5	60.3	56.6	55.0	60.3
	Minimum reported average	39.3	40.9	46.7	49.3	39.3
	Maximum value reported	89.6	70.2	71.7	68.0	89.6
E300 [Vol%]	**Volume-weighted average**	84.6	83.1	89.4	88.9	86.1
	Maximum reported average	93.6	95.0	92.5	91.0	95.0
	Minimum reported average	77.9	79.6	85.6	86.0	77.9
	Maximum value reported	95.0	99.7	98.9	96.0	99.7

Table 6.3 Averages (Volume-weighted, Maximum and Minimum) and Maximum Values of Reported Gasoline Parameters by Region (2015)

	Region	West/North	Ontario	Quebec	Atlantic	Canada
	Number of Primary Suppliers	11	5	8	4	28
	Volume [m^3]	14,438,569	10,122,016	13,416,764	2,803,821	40,781,169
	Batches	2696	1136	922	213	4967
[Benzene] [Vol%]	Volume-weighted average	0.60	0.67	0.64	0.58	0.63
	Maximum reported average	0.71	0.76	0.86	0.65	0.86
	Minimum reported average	0.31	0.52	0.44	0.55	0.31
	Maximum value reported	1.50	1.21	1.35	1.13	1.50
BEN	Volume-weighted average	43.6	47.4	44.3	45.0	44.9
	Maximum reported average	52.9	52.0	46.6	58.2	58.2
	Minimum reported average	30.0	42.2	38.0	37.3	30.0
	Maximum value reported	85.3	89.2	88.8	76.1	89.2
[Aromatics] [Vol%]	Volume-weighted average	22.4	27.1	23.2	25.8	24.1
	Maximum reported average	50.1	30.9	24.7	37.6	50.1
	Minimum reported average	14.8	22.7	19.3	16.2	14.8
	Maximum value reported	51.1	54.8	51.3	49.8	54.8
[Olefin] [Vol%]	Volume-weighted average	9.8	7.7	12.1	7.8	9.9
	Maximum reported average	18.2	13.4	14.8	10.5	18.2
	Minimum reported average	1.1	1.8	6.2	0.7	0.7
	Maximum value reported	28.8	25.6	32.7	17.5	32.7
[Oxygen] [wt%]	Volume-weighted average	0.1	0.0	0.3	0.9	0.2
	Maximum reported average	3.7	0.0	0.9	1.8	3.7
	Minimum reported average	0.0	0.0	0.0	0.0	0.0
	Maximum value reported	3.8	0.0	3.7	3.8	3.8
[Sulphur] [mg/kg]	Volume-weighted average	17.6	20.4	15.4	15.3	17.4
	Maximum reported average	26.0	29.0	18.0	34.0	34.0
	Minimum reported average	8.0	2.5	8.0	4.0	2.5
	Maximum value reported	82.0	69.3	58.0	38.0	82.0
Vapour Pressure [kPa]	Volume-weighted average	78.8	76.5	78.0	82.6	78.2
	Maximum reported average	85.0	81.7	96.1	95.8	96.1
	Minimum reported average	59.2	66.2	68.4	80.8	59.2
	Maximum value reported	116.0	109.7	107.0	106.7	116.0
E200 [Vol%]	Volume-weighted average	44.9	49.9	52.6	51.2	49.1
	Maximum reported average	61.0	58.0	58.2	59.4	61.0
	Minimum reported average	37.3	47.2	50.5	39.9	37.3
	Maximum value reported	68.0	69.7	69.8	70.0	70.0
E300 [Vol%]	Volume-weighted average	84.2	84.0	89.1	88.8	86.1
	Maximum reported average	92.0	94.9	92.8	90.0	94.9
	Minimum reported average	79.3	81.7	84.6	87.2	79.3
	Maximum value reported	101.3	99.0	99.0	95.1	101.3

Table 6.4 Averages (Volume-weighted, Maximum and Minimum) and Maximum Values of Reported Gasoline Parameters by Region (2016)

	Region	West/North	Ontario	Quebec	Atlantic	Canada
	Number of Primary Suppliers	11	7	7	4	29
	Volume [m³]	14,584,434	12,241,312	11,756,506	2,827,524	41,409,777
	Batches	2473	1306	937	214	4930
[Benzene] [Vol%]	Volume-weighted average	0.58	0.64	0.63	0.58	0.61
	Maximum reported average	0.65	0.84	0.71	0.68	0.84
	Minimum reported average	0.13	0.44	0.26	0.54	0.13
	Maximum value reported	1.39	1.28	1.30	1.13	1.39
BEN	Volume-weighted average	43.6	46.6	45.2	45.0	45.0
	Maximum reported average	48.3	50.0	55.0	60.0	60.0
	Minimum reported average	31.1	42.5	36.7	33.0	31.1
	Maximum value reported	79.3	85.3	99.9	76.0	99.9
[Aromatics] [Vol%]	Volume-weighted average	22.4	26.0	23.6	24.8	24.0
	Maximum reported average	34.1	32.3	32.5	41.1	41.1
	Minimum reported average	10.0	20.5	16.9	13.0	10.0
	Maximum value reported	48.7	55.4	60.6	48.4	60.6
[Olefin] [Vol%]	Volume-weighted average	9.9	7.4	11.4	10.8	9.6
	Maximum reported average	15.5	10.4	13.4	23.0	23.0
	Minimum reported average	0.9	1.0	2.2	0.8	0.8
	Maximum value reported	51.4	24.3	25.9	37.6	51.4
[Oxygen] [wt%]	Volume-weighted average	0.1	0.0	0.0	0.9	0.1
	Maximum reported average	3.8	0.0	0.0	1.8	3.8
	Minimum reported average	0.0	0.0	0.0	0.0	0.0
	Maximum value reported	3.9	0.5	0.0	3.9	3.9
[Sulphur] [mg/kg]	Volume-weighted average	16.8	18.1	13.2	16.9	16.2
	Maximum reported average	25.5	27.0	17.0	22.5	27.0
	Minimum reported average	4.1	1.6	10.0	3.0	1.6
	Maximum value reported	79.4	70.0	47.0	66.8	79.4
Vapour Pressure [kPa]	Volume-weighted average	82.3	77.4	79.2	83.5	80.1
	Maximum reported average	99.2	78.5	94.5	99.7	99.7
	Minimum reported average	47.4	63.0	45.5	80.0	45.5
	Maximum value reported	114.4	109.6	110.0	106.7	114.4
E200 [Vol%]	Volume-weighted average	46.3	51.2	52.3	52.5	49.9
	Maximum reported average	60.0	57.4	54.7	65.0	65.0
	Minimum reported average	39.1	46.3	42.0	36.1	36.1
	Maximum value reported	71.0	71.2	73.1	77.0	77.0
E300 [Vol%]	Volume-weighted average	84.9	85.7	88.6	88.4	86.4
	Maximum reported average	91.4	93.8	91.2	93.0	93.8
	Minimum reported average	77.3	82.1	83.3	83.8	77.3
	Maximum value reported	96.0	98.0	98.0	96.0	98.0

7 *GASOLINE REGULATIONS* AND LEADED GASOLINE

The *Gasoline Regulations*[3] limit the concentration of lead and phosphorous in gasoline that is produced, imported, sold, or offered for sale in Canada. The maximum concentration of lead in gasoline produced, imported, sold or offered for sale in Canada is 5 mg/L and the concentration limit of phosphorus is 1.3 mg/L. Gasoline for use in aircraft is exempt from the Regulations and gasoline for use in competition vehicles is not subject to the lead concentration restrictions.

Since 1990, the *Gasoline Regulations* have significantly reduced lead emissions from gasoline, with 99.8% of gasoline now lead-free. These 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.

The original regulations and subsequent amendments provided exemptions for specific, limited uses of leaded gasoline, when a transition to non-leaded fuels was not technically and economically feasible. An exemption of indeterminate length was provided for aircraft, and temporary exemptions were provided for competition vehicles since 1994.

The *Regulations Amending the Gasoline Regulations*[4], published in July 2010, provide an exemption for the production, import and sale of leaded gasoline in Canada for use in competition vehicles for an indeterminate period. Record-keeping and reporting requirements for producers, importers and sellers of leaded gasoline remain in effect.

Under the *Gasoline Regulations*, every person who produces, imports, sells, or offers for sale leaded gasoline in Canada for use in competition vehicles is required to make and maintain records, which must be submitted annually to the Minister of Environment and Climate Change, on or before March 31 of the year following the year the activity occurred. These

[3] SOR/90-247, as amended by SOR/92-587, SOR/94-355, SOR/97-147, SOR/98-217, SOR/2000-104, SOR/2003-106, SOR/2008-126, and SOR/2010-134. A copy of the Regulations and amendments can be found at http://laws-lois.justice.gc.ca/eng/regulations/SOR-90-247/index.html.
[4] https://pollution-waste.canada.ca/environmental-protection-registry/regulations/view?Id=102.

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.

Table 7.1 indicates the names of the companies who submitted records of imports and/or sales of leaded gasoline for use in competition vehicles from 2013 through 2016.

Table 7.1 Companies who Submitted Records of Imports and/or Sales of Leaded Gasoline for Use in Competition Vehicles (2013-2016)

Year	2013	2014	2015	2016
Number of Companies	8	9	10	10
Importers	6	7	9	7
Sellers	8	7	9	7
Total Volume Imported [L]	1,170,823	1,081,523	1,040,100	1,270,456
Total Volume Sold [L]	1,013,073	869,191	823,788	776,565
Min Average Lead Concentration [mg/L]	0	0	0	0
Max Average Lead Concentration [mg/L]	2113	1587	4230	4230
Companies	AFD Petroleum CT Performance Duval et Lafrance JMS Motorsports Specialty Engineering Speedway Int. T.A. Lubes V.P. Racing Fuels	AFD Petroleum Al Blancher CT Performance Duval et Lafrance JMS Motorsports Larry Penner Specialty Engineering Speedway Int. V.P. Racing Fuels	AFD Petroleum Al Blancher Corrigan Oil CT Performance Duval et Lafrance JMS Motorsports Specialty Engineering Speedway Int. T.A. Lubes V.P. Racing Fuels	AFD Petroleum Al Blancher Corrigan Oil CT Performance Duval et Lafrance JMS Motorsports Specialty Engineering Speedway Int. T.A. Lubes V.P. Racing Fuels

8 CONCLUSION

The *Benzene in Gasoline Regulations* have been successful in achieving both recommendations of the federal-provincial Task Force on Cleaner Vehicles and Fuels. Air monitoring data has confirmed that reported benzene levels have significantly reduced and reported aromatic levels are about the same as they were in 1994. For the 2013 reporting year, one facility exceeded the allowable limit for benzene concentration. For the 2014, 2015, and 2016 reporting years, all primary suppliers reported that their gasoline met the regulated requirements with respect to benzene concentration and BEN. As part of its enforcement activities, enforcement officers conduct inspections and investigations into alleged exceedances under the *Benzene in Gasoline Regulations* and take action consistent with the Compliance and Enforcement Policy for CEPA (1999).

The total number of companies reporting under the *Gasoline Regulations* has been relatively consistent for the 2013 -2016 reporting years. The total volume of imported leaded race gas for use in competition vehicles has also been relatively consistent for the 2013 – 2016 reporting years. As part of its enforcement activities, enforcement officers conduct inspections and investigations into alleged exceedances under the Gasoline Regulations and take action consistent with the Compliance and Enforcement Policy for CEPA (1999).