

Gasoline and Diesel Fuel Survey

*Driveability Index (DI) and Oxygenates in
Gasoline; Cetane Index, Cetane Number,
Aromatics and Polyaromatic Hydrocarbons
(PAH) in Diesel*

Final Report

**by Jeffrey Guthrie
Fuels Division
Oil, Gas & Energy Branch
Environment Canada**

**and Patrick Fowler
Co-op Student
University of Ottawa**

**and René Sabourin
Co-op Student
Carleton University**

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NOTICE

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

Jeffrey Guthrie
Oil, Gas & Energy Branch
Environment Canada
351 St. Joseph Blvd., 10th floor
Gatineau, PQ
K1A 0H3
Tel: (819) 956-9279
Fax: (819) 953-8903

The information contained in this report is compiled from data submitted by the producers and importers of gasoline and diesel fuel in Canada through a voluntary survey on Gasoline Driveability Index and Diesel Cetane, Aromatics and Polyaromatic Hydrocarbons as requested by Environment Canada, May 29, 2001. Submissions have been verified for reasonableness but are subject to potential errors made at the source.

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1.0 Introduction

On February 17, 2001, the federal Minister of the Environment published a *Notice of Intent on Cleaner Vehicles, Engines and Fuels* in the *Canada Gazette*, setting out the federal agenda to address clean air issues in the transportation sector. The Notice included action by Environment Canada to initiate a voluntary program with industry to provide information on fuel parameters for both gasoline and diesel fuel (on-road and off-road).

By a letter dated May 29, 2001, Environment Canada requested that Canadian refineries and importers provide quarterly data over an 18 month period (July 2001 to December 2002) on the following fuel parameters:

Gasoline:

- distillation temperatures
- oxygenates
- driveability index (DI)

Diesel Fuel (on-road and off-road)

- cetane index
- cetane number
- aromatics
- polyaromatic hydrocarbons (PAH)

This report summarizes the information gathered during the survey.

2.0 Survey Request by Environment Canada

By a letter dated May 29, 2001 (see Appendix A), Environment Canada requested that Canadian refineries and importers report quarterly on distillation characteristics of gasoline and on cetane, aromatics and PAH in diesel fuel beginning July 1, 2001. Attached to the letter were guidelines for reporting diesel cetane index, cetane number, aromatics and PAH levels and gasoline “DI” parameters. The guidelines addressed sampling location, sampling procedures, sampling frequency and analytical procedures. Also included in the guidelines were templates of forms to use in recording the parameters and volumes. The letter indicated that information with respect to company production and import volumes would be treated in a confidential manner.

Specifically, Environment Canada requested that companies producing or importing more than 1000 m³ of either gasoline or diesel fuel in a quarter for use in Canada provide the following information:

Gasoline

- The volume of each batch of gasoline be reported by grade in m³.
- DI and distillation values (T10, T50, T90), oxygen content and type of oxygenate be provided by batch.

- The volume of each batch of diesel fuel be reported by type (i.e. <500 ppm or >500 ppm), in m³.
- Cetane index and whether cetane improver was added be provided for each batch and by diesel type.

Diesel Fuel

- Diesel aromatics and PAH be measured at least once per month for low-sulphur (<500 ppm) diesel and regular (>500 ppm) diesel from representative batches.
- Diesel cetane number be measured at least once per year for low-sulphur (<500 ppm) diesel and regular (>500 ppm) diesel fuel from representative batches.

The data was requested to be reported on a quarterly basis and provided within 45 days after the end of the quarter.

3.0 Gasoline

3.1 Distillation Temperatures and Driveability (Distillation) Index

Driveability (or Distillation) Index (DI) is a function of distillation temperatures of gasoline and the oxygen content contributed by alcohols (e.g. ethanol). It is expressed by the formula:

$$DI = (1.5 * T_{10}) + (3.0 * T_{50}) + (T_{90}) + (11 * O_{xyA})$$

where T₁₀, T₅₀ and T₉₀ (in degrees Celsius) are the distillation temperatures where 10%, 50% and 90% of the gasoline is evaporated. OxyA equals the weight percent of oxygen in the fuel contributed by alcohol (ethanol). A factor for MTBE-based oxygen has not been identified, and for the present a factor of 0 is being applied to OxyA for MTBE. 10 volume-percent MTBE equates to 1.8 weight-percent oxygen. 10 volume-percent ethanol equates to 3.7 weight-percent oxygen. It is expected that a factor between 0 and 11 will be developed for the oxygenate MTBE in the future.

1. *Canadian Standards for DI / Distillation Temperatures*

In Canada, there are no federal regulated requirements for DI or for distillation temperatures. However, the Canadian General Standards Board (CGSB) commercial standard for unleaded gasoline containing less than 0.5% by weight alcohol (e.g., ethanol) does include specifications for DI, however the CGSB formula for DI does not include the oxygenate factor in the formula presented above. It should be noted that the current CGSB commercial standard for automotive gasoline containing ethanol (*Oxygenated Unleaded Automotive Gasoline Containing Ethanol*) does not include any specifications for DI, although CGSB is in the process of revising this standard to include a specification for DI.

The CGSB unleaded gasoline (*Unleaded Automobile Gasoline*) standard includes a maximum specification for DI of 550 during the winter and 590 in the summer. The standard specifies a higher DI limit of 600 in the summer in areas with a low-vapour pressure requirement (less than 62 kPa: i.e., southern Ontario, southwestern Quebec and southwestern British Columbia). The standard also includes the specifications for minimum and maximum T₁₀ and T₅₀ along with a maximum T₉₀ that are summarized in Table 3.1¹.

¹ CAN/CGSB-3.5-99, Unleaded Automotive Gasoline.

Table 3.1: CGSB Standards for T10, T50 and T90 in Unleaded Gasoline

Volatility Class	Vapour Pressure kPa		Distillation Temperature °C				
	Min.	Max.	T10		T50		T90
			Min.	Max.	Min.	Max.	Min.
A1	41	72	35	70	70	120	190
A2	41	62	35	70	70	120	190
A3	38	55	35	70	70	120	190
B	48	86	-	60	70	117	190
C	59	97	-	55	70	113	185
D	69	107	-	50	70	110	185

The CGSB commercial standard for automotive gasoline containing ethanol includes the specifications for minimum and maximum T10 and T50 and a maximum T90 that are summarized in Table 3.2².

Table 3.2: CGSB Volatility Class Standard for Unleaded Automotive Gasoline Containing Ethanol

Volatility Class (Note 1)	Vapour Pressure kPa		Distillation Temperature °C				
	Min.	Max.	T10		T50		T90
			Min.	Max.	Min. (Note 3)	Max.	Max.
A1 (Note 2)	-	72	35	65	70	120	190
A	-	79	35	65	70	120	190
B	-	86	-	60	70	117	190
C	-	97	-	55	70	113	185
D	69	107	-	50	70 (Note 4)	110	185

Notes from CGSB standard:

Note 1: Classes A1, A, B and C represent a progressively cooler seasonal and geographical schedule with Class D being winter gasoline.

Note 2: Classes A, B, C, and D apply at point of sale. Class A1 applies at the refinery gate or at point of entry into Canada, or at point of blending if oxygenate is added downstream of a refinery or at a point of entry. The intent of Class A1 is to limit gasoline Vapour Pressure to 72 kPa maximum in order to minimize evaporative losses.

Note 3: Gasoline with a 50% distillation point below 75 °C may need an additive(s) to avoid carburetor icing.

Note 4: Gasoline with a 50% distillation point greater than 65 °C but less than 70 °C may be provided if the Vapour Pressure is below 97 kPa to avoid warm engine driveability problems.

- British Columbia³ and Ontario⁴ regulations require that gasoline meet CGSB standards.
- Alberta sets T10, T50, and T90 standards⁵. These are maxima of 57 °C, 118 °C and 185 °C for T10, T50 and T90 respectively for summer gasoline and maxima of 52 °C, 113 °C and 185 °C for T10, T50 and T90 respectively for winter gasoline.
- Quebec sets minima and maxima for T10, T50 and T90⁶. The details can be found in the table 3.3 below.

² CAN/CGSB-3.511-93, Oxygenated Unleaded Automotive Gasoline Containing Ethanol

³ British Columbia Regulation 498/95, Cleaner Gasoline Regulation requires that gasoline for sale in BC meet the CGSB standard CAN/CGSB-3.5-94, Standard for Unleaded Automotive Gasoline or CAN/CGSB-3.511-M93, Standard for Oxygenated Gasoline Containing Ethanol

⁴ Ontario Regulation R.S.O 1990 c. G.4, Gasoline Handling Act, Gasoline Handling Code, as amended by Gasoline Branch Standard No. 1/95; No 1/97; No. 2/97; Regulatory Bulletin, January 1996 under *Section 3 - Product Standards* requires gasoline to conform to the CGSB standards CAN/CGSB-3.1, CAN/CGSB-3.5, CAN/CGSB-3.511, CAN/CGSB-3.515 and CAN/CGSB-3.517 (Gasoline Branch Standard No. 1/95, s.5)

⁵ Regulation 248/71, Standard Specifications for Fuel Oil Regulations,

⁶ Regulation O.C. 753-91, Petroleum Products Regulation, (as amended by O.C. 108-96; 505-98; and 156-99)

Table 3.3: Quebec Regulations for DI T10, T50 and T90

Distillation Temperature in °C		Gasoline Type*				
		V	W	X	Y	Z
T10	Minimum	35	35	-	-	-
	Maximum	65	65	60	55	50
T50	Minimum	70	70	70	70	70**
	Maximum	120	120	117	113	110
T90	Maximum	190	190	190	185	185

* where the gasoline types are:

“Type V gasoline” means gasoline used in the summertime in the Outaouais-Montreal corridor defined in Schedule 12;

“Type W gasoline” means gasoline used in the summertime in zones 1, 2 and 3, except in the Outaouais-Montreal corridor defined in Schedule 12;

“Type X gasoline” means gasoline used during transition between 2 seasons and whose Reid vapour pressure does not exceed 86 kPa;

“Type Y gasoline” means gasoline used during the transition between 2 seasons and whose Reid vapour pressure ranges in situated between 62 kPa and 97 kPa;

“Type Z gasoline” means gasoline used in the wintertime.

** A 50% evaporative rate for gasoline at a temperature greater than 65 °C but less than 70 °C may be acceptable if the vapour pressure is less than 97 kPa (O.C. 505-98, s.4)

2. Other Jurisdictions

In early 1999, U.S. auto manufacturers petitioned the U.S. EPA to “*limit by regulation the Distillation Index (DI) to [570 °C]*”⁷. They claimed that “*Excessive DI caused engines to misfire which increases emissions of hydrocarbons (HC) and carbon monoxide (CO). The magnitude of this effect is greater on advanced technology [vehicles], such as low emission vehicles (LEVs), than on Tier 1 and earlier vehicles.*” The EPA replied to the auto manufacturers’ petition within its proposed gasoline sulphur rule. It stated that “*the analysis presented in [the automakers’] petition have merit. However, we do not believe that they are sufficient to justify capping DI [at 570 °C] at this time, since there are a number of issues that it does not address. ... Therefore, we are not today proposing controls on gasoline distillation properties. However, we request comments on the automakers’ DI petition ...*”.

The current American Society for Testing and Materials (ASTM) limit for DI is 1250 °F⁸ at the refinery-level. In 2002 an ASTM subcommittee voted to not extend the 1250 °F DI limit to the retail-level⁹. The DI ballot received 62.5% affirmative votes and failed due to the change requires 66% affirmative votes.

California does not control DI *per se*, but does control distillation temperatures directly. California Reformulated Gasoline Phase 3 (CaRFG3) under the averaging compliance option allows for an average T50 of 95 °C with a cap of 104 °C, and an average T90 of 146 °C with a cap of 166 °C. Without the elected averaging compliance option, the limits default to flat maxima for T50 and T90 of 101 °C and 152 °C respectively. The CaRFG3 regulations came into effect on December 31, 2002¹⁰.

⁷ 1200 when T10, T50, and T90 are in degrees Fahrenheit.

⁸ ASTM D-4814-01, the standard specifications for gasoline

⁹ Octane Week, June 24, 2002, Reference to June 2002 ASTM International Meeting in Montreal, Quebec, Canada.

¹⁰ The California Reformulated Gasoline Phase 3 Amendments, Title 13, California Code of Regulations, date of Adoption: June 16, 2000

The World-Wide Fuel Charter (December 2002) has specifications for both DI and the respective T10, T50 and T90 For category 4 unleaded gasoline that is identified for markets with further advanced requirements for emission control. According to the charter, this is to enable sophisticated NOx after-treatment technologies. The distillation specifications are given in the table below (Table 3.4).

Table 3.4: World-Wide Fuel Charter Category 4 Distillation Specifications (Unleaded Gasoline)

Class	A	B	C	D	E
Ambient Temp. Range, °C	>+15	+5 to +15	-5 to +5	-5 to -15	<-15
T10, °C, max	65	60	55	50	45
T50, °C	77-100	77-100	77-100	77-100	77-100
T90, °C	130-175	130-175	130-175	130-175	130-175
DI, max	570	565	560	555	550

3.2 Notice of Intent

The Notice of Intent (NOI) published in *Canada Gazette Part 1*, February 17, 2001 indicated Environment Canada's intention to carry out a survey on DI. The NOI states "*In order to monitor Canadian gasoline quality in respect of the DI, Environment Canada intends to ask refiners and importers of gasoline to voluntarily provide information on the input parameters to DI, specifically the distillation values of gasoline (T10, T50, T90) and the concentration of oxygen (by type of oxygenate) starting in July 2001. If participation in this voluntary program is poor, Environment Canada will consider mandating the reporting of the information.*"

3.3 Industry's Response to Survey

14 companies representing 17 refineries and 12 importers responded to the gasoline portion of the survey. One refinery decided not to participate in the DI survey. Table 3.5 provides a summary of the companies contacted and how they responded.

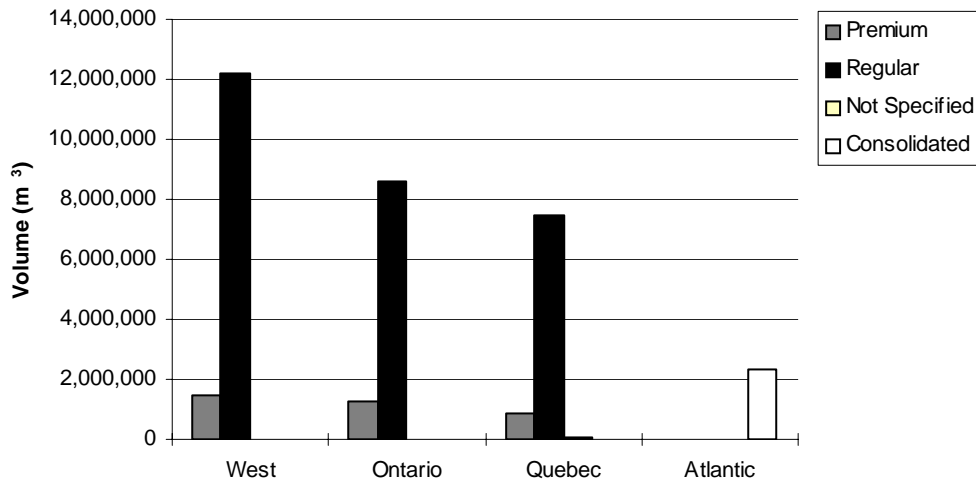
Table 3.5: Response to DI in Gasoline Survey

GASOLINE				
Region	Company	Location	Refinery/Importer	Information Frequency
Atlantic	Imperial Oil Ltd.	Dartmouth, NS	Refinery	Batch
	Irving	Saint John	Refinery	Quarterly
	North Atlantic	Come-by-Chance, NF	Refinery	Batch
	Ultramar	Holyrood Terminal	Importer	Batch
Ontario	Imperial Oil Ltd.	Nanticoke	Refinery	Batch
	Imperial Oil Ltd.	Sarnia Refinery	Refinery	Batch
	Olco Petroleum	Terminal Vopak, Hamilton	Importer	Batch
	Petro Canada	Oakville	Refinery	Batch
	Shell	Sarnia Refinery	Refinery	Batch
	Sunoco	Sarnia Refinery	Refinery	Batch
	Sunoco	Vopak, Hamilton, ON	Importer	Batch
Quebec	Neste Petroleum	Terminal Canterm - Quebec City	Importer	Batch
	Neste Petroleum	Terminal Canterm - Montreal	Importer	Batch
	Petro Canada	Montreal	Refinery	Batch
	Petroles Norcan	Terminal Norcan	Importer	Batch
	Shell	Montreal	Refinery	Batch
	Sunoco	Montrel	Importer	Batch
	Ultramar	Saint Romuald	Refinery	Batch
	Ultramar	Montreal	Importer	Batch
West	Chevron	Burnaby	Refinery	Batch
	Co-op	Regina, SK	Refinery	Batch
	Husky	Prince George, BC	Refinery	Not Participating
	Imperial Oil Ltd.	Strathcona	Refinery	Batch
	Imperial Oil Ltd.	Burrard Terminal	Importer	Batch
	Parkland	Bowden, AB	Refinery	Batch
	Parkland	Beaver Creek, YK	Importer	Batch
	Petro Canada	Edmonton Refinery	Refinery	Batch
	Petro Canada	Burrard Terminal	Importer	Batch
	Shell	Scotford Refinery	Refinery	Batch
	Williams AK Petroleum Inc.	Beaver Creek, YK	Importer	Batch

1. *Volume of Gasoline Reported*

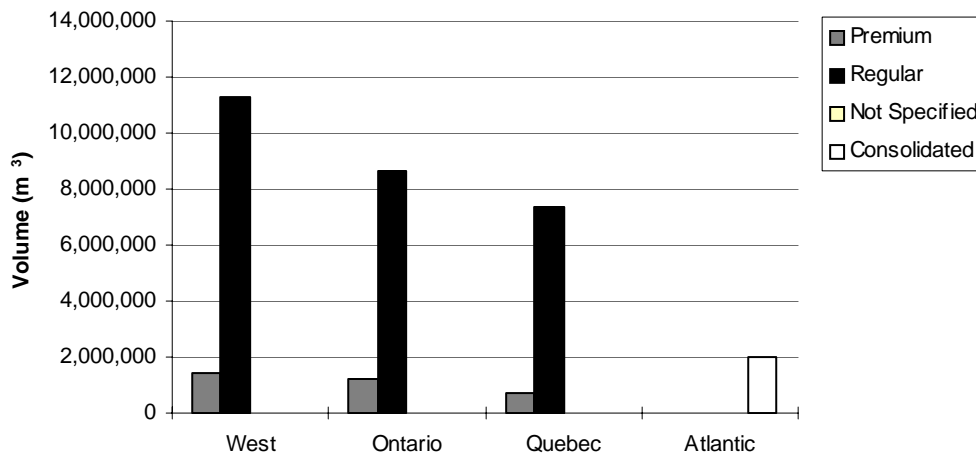
Figures 3.1 and 3.2 show the volumes of gasoline reported under the survey. While the first quarter of reporting included 15 % of volume with the grade not identified, this dropped to 3 % for the second reporting quarter and 0 % for the next four quarters of the survey. The volumes reported under the survey compared to Statistics Canada data for the period of the survey can be found in Figure 3.3.

Figure 3.1: Reported Gasoline Volume by Grade
- Summer -



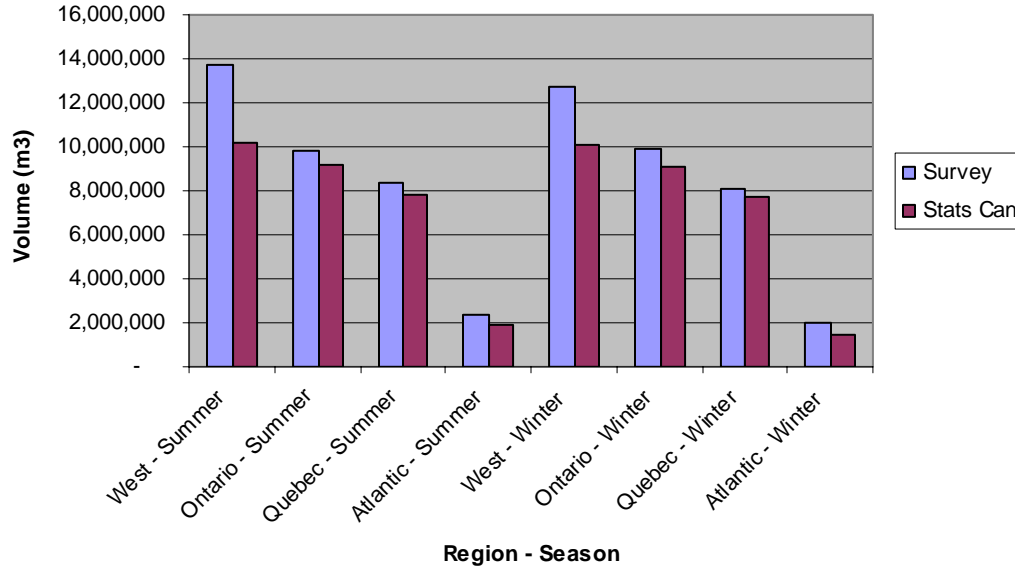
*Note: Atlantic volumes reported for Regular, Premium and Not Specified have been consolidated to protect company volume information.

Figure 3.2: Reported Gasoline Volume by Grade
- Winter -



*Note: Atlantic volumes reported for Regular, Premium and Not Specified have been consolidated to protect company volume information.

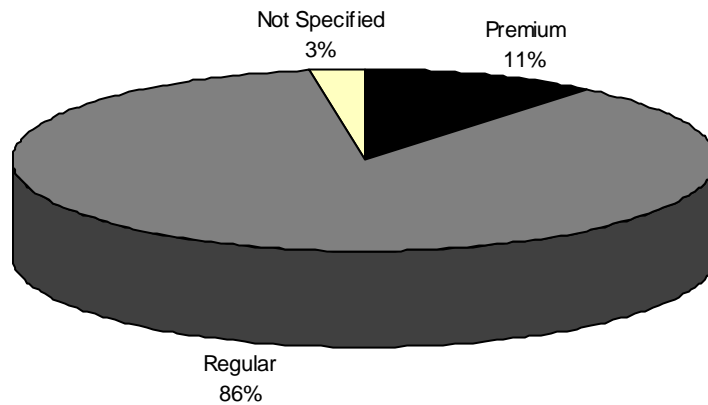
Figure 3.3: Gasoline Volume Reported on Survey Compared to Statistics Canada Data (production+imports-exports)



2. *Grades of Gasoline*

Figure 3.4 shows the percentage breakdown of reported gasoline volume by grade. Only one western refinery reported for mid-grade gasoline. The mid-grade gasoline is often blended at terminals using gasoline from regular and premium batches produced at the refinery. Mid-grade gasoline data are not addressed in this report.

Figure 3.4: Reported Gasoline Volume by Grade



3. Frequency of Sampling

Environment Canada requested details by batch for T10, T50, T90, DI and weight percent oxygen. Twenty-seven of 28 respondents provided this data by batch (Table 3.5); one provided quarterly summaries.

4. Analytical Procedures Used

The reference procedure ASTM D-86 for measuring the distillation properties (T10, T50 and T90) was reported used by all facilities/importers. CAN/CGSB-3.0 No. 14.3 was identified as the reference procedure for oxygen content (in % by weight) and was reported used by 22 facilities/importers. Five facilities/importers did not report a procedure for determining oxygen (wt %) since they did not add oxygenate to their gasoline. Table 3.6 summarizes the different procedures used.

Table 3.6: Analytical Procedures Used to Measure Gasoline Parameters.

Analytical Procedures		Respondents Using
T10 / T50 / T90	ASTM D-86*	29
Oxygen (wt%)	CAN/CGSB 3.0 No 14.3*	22
	ASTM D5599	1
	ASTM D4815	1
	Not Required	5

* Reference procedure

3.4 Assumptions and Simplifications

Due to the nature of different response formats and frequency of reporting by batch, by month or by quarter, the following assumptions were made in analyzing the data:

- T10, T50, T90, DI and weight percent oxygen were given by most facilities/importers by batch and in this case were volume-weighted. If the parameters were only given by month or by quarter, the volume for the month or quarter for the gasoline grade for the facility/importer was applied to the parameters (T10, T50, T90, DI, wt% Oxygen) to volume weight them in the analysis.
- If grade of gasoline was not indicated, the information was consolidated under the heading “not specified”. As noted above, the volume of gasoline without the grades identified decreased to zero as the survey progressed.
- All volumes reported were assumed to be sold in Canada unless identified otherwise. Volumes identified for U.S. sales were removed from the data and excluded from this analysis.

3.5 Results and Observations

Tables 3.7 (a, b, c, d, e, f) show the regional and national volume-weighted average DI, 95th¹¹ and 99th¹² DI percentiles, for all grades of gasoline split by quarter and oxygenate type (or without oxygenate). Gasoline grades with oxygenate (MTBE or ethanol) have the added information of volume-weighted average wt. % oxygen, along with the 95th and 99th percentiles weight % oxygen.

- For summer gasoline with less than 0.5% by weight alcohol oxygenate content, the CGSB specification for DI is 590 °C, or 600 °C in areas with a low-vapour pressure requirement such as southern Ontario and southwestern Quebec. Twelve batches of such gasoline produced during Q2 or Q3 were reported as having a DI greater than 590 °C but less than 600 °C and 4 batches were above 600 °C. In terms of volume, 0.41% of this Q2/Q3 gasoline was reported as having a DI exceeding 590 °C and 0.06% exceeded 600 °C.
- For winter gasoline with less than 0.5% by weight alcohol oxygenate content, the CGSB specification for DI is 550 °C. The survey results indicate that 35 batches of this gasoline produced during Q1 or Q4, representing about 1.03% of the total reported Canadian volume, exceeded 550 °C.

There is no CGSB specification for DI of gasoline containing ethanol.

- For summer gasoline containing ethanol, 15 batches were reported as having DI exceeding 600 °C and 7 batches had a DI value between 590 and 600 °C. In terms of volume, 12.01% of the ethanol blended Q2/Q3 gasoline was reported as having a DI exceeding 590 °C and 7.63% exceeded 600 °C.
- For winter gasoline containing ethanol, 5 batches were reported as having DI exceeding 550 °C. In terms of volume, 1.97% of the ethanol gasoline blended during Q1 or Q4 was reported as having a DI exceeding 550 °C.

It should be noted that the CGSB DI specifications apply at point of sale, whereas the survey data are from refinery production and imports.

Two oxygenates were reported used in gasoline, MTBE and ethanol.

- Ethanol was reported used by one refinery in Ontario, one refinery in Quebec and by one importer in the West (see tables 3.7 (e, f)). It should be noted that ethanol is often blended with gasoline at the rack or downstream of refineries and that such volumes may not be captured in the survey data.
- MTBE is largely used by two refineries in the Atlantic region. The reported data indicates that in 2001, 31 batches of gasoline containing MTBE were produced or imported in Ontario and Quebec. This dropped to 13 batches in 2002, with all but one batch containing MTBE identified as imported gasoline.

¹¹ Ninety-five percent of the reported observations are at or below this value. This is not volume weighted and is based on the number of observations reported.

¹² Ninety-nine of the reported observations are at or below this value. This is not volume weighted and is based on the number of observations reported.

Table 3.7 a: DI Reported for Gasoline without Oxygenate - Summer

Gasoline Without Oxygenate			Driveability Index (°C)		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		576	578	558
	Regular		567	575	527
Quebec	Premium		589	603	557
	Regular		567	590	527
Ontario	Premium		586	591	560
	Regular		574	582	531
West	Premium		573	590	542
	Regular		564	582	524
NATIONAL	Premium		584	591	551
	Regular		568	583	527
Total Volume Gasoline		31,006,722			

Table 3.7 b: DI Reported for Gasoline without Oxygenate - Winter

Gasoline Without Oxygenate			Driveability Index (°C)		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		541	547	518
	Regular		499	522	475
Quebec	Premium		544	561	514
	Regular		522	550	468
Ontario	Premium		548	563	519
	Regular		526	546	472
West	Premium		547	564	503
	Regular		515	545	477
NATIONAL	Premium		547	564	511
	Regular		519	545	473
Total Volume Gasoline		29,839,790			

Table 3.7 c: DI & Weight Percent Oxygen Reported for Gasoline with MTBE - Summer

Gasoline Containing MTBE			Oxygenate (wt%)			Driveability Index (°C)		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Vol Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		2.6	2.7	2.3	517	524	495
	Not Specified		0.1	0.1	0.1	565	567	550
Qubec	Regular		1.9	4.0	0.8	563	570	540
	Not Specified		0.0	0.0	0.0	532	535	472
Ontario	Regular		0.3	0.3	0.2	567	571	540
West	Regular		0.1	0.1	0.1	541	541	541
NATIONAL	Regular		2.6	3.5	0.7	558	572	538
	Not Specified		0.1	0.1	0.1	564	566	546
Total Volume Gasoline		1,271,053						

Note: Grade “not specified” reported by one company in Atlantic Canada , reported on a quarterly basis; hence shows the same values for the percentiles and the weighted average.

Table 3.7 d: DI & Weight Percent Oxygen Reported for Gasoline with MTBE - Winter

Gasoline Containing MTBE			Oxygenate (wt%)			Driveability Index (°C)		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Vol Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		2.6	2.7	2.0	504	505	473
	Not Specified		0.2	0.2	0.2	521	522	510
Quebec	Premium		0.3	0.4	0.1	536	539	507
	Regular		0.4	0.4	0.2	522	555	470
Ontario	Regular		0.2	0.2	0.1	521	522	500
NATIONAL	Premium		0.3	0.4	0.1	536	539	507
	Regular		2.2	2.6	0.2	521	544	472
	Not Specified		0.2	0.2	0.2	521	522	510
Total Volume Gasoline		917,667						

Note: Grade “not specified” reported by one company in Atlantic Canada , reported on a quarterly basis; hence shows the same values for the percentiles and the weighted average.

Table 3.7 e: DI & Weight Percent Oxygen Reported for Gasoline with Ethanol - Summer

Gasoline Containing Ethanol			Oxygen (wt%)			Driveability Index (°C)		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Vol Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Premium		3.5	3.5	3.4	609	620	569
	Eth BI Regular		3.5	3.6	3.5	605	621	551
West	Eth BI Premium		0.5	0.5	0.5	520	520	520
Quebec	Eth BI Premium		2.1	2.1	1.7	590	594	559
NATIONAL	Eth BI Premium		3.5	3.5	2.9	608	620	566
	Eth BI Regular		3.5	3.6	3.5	605	621	551
Total Volume Gasoline								

Note: Volume not shown as only one company reported ethanol blended gasolines. Note that ethanol blended gasoline is produced by more than one major company, however the gasoline is usually blended at the rack and therefore these oxygenate levels were not reported in most cases.

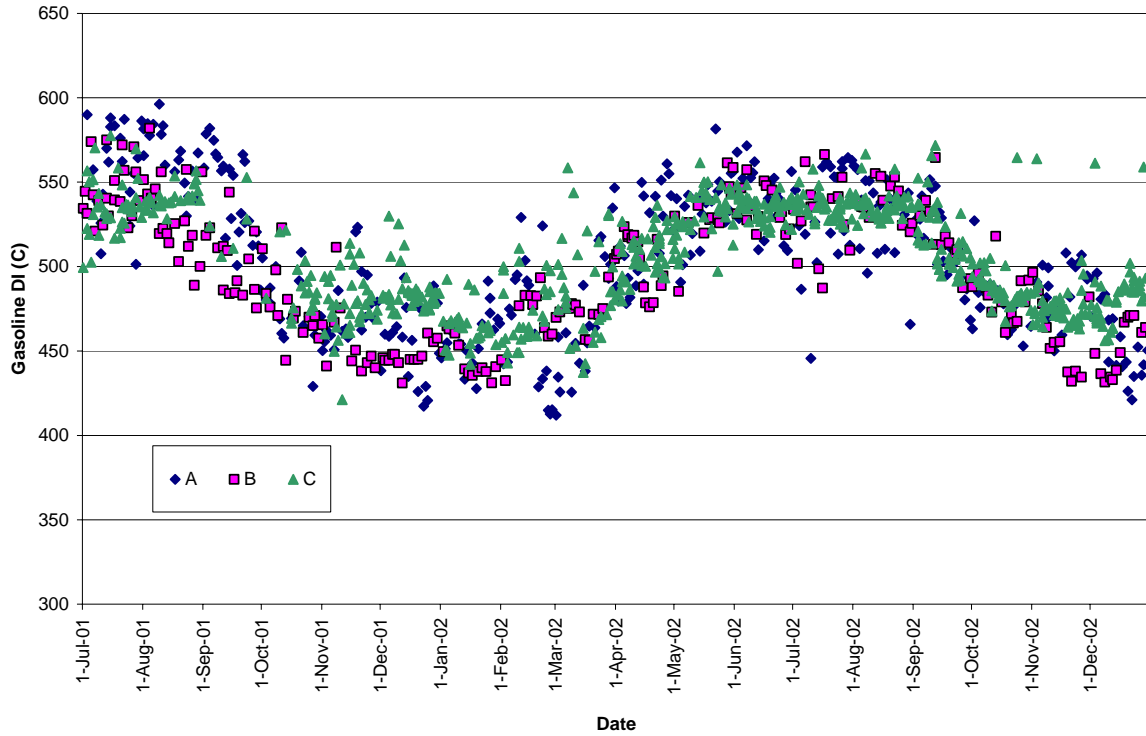
Table 3.7 f: DI & Weight Percent Oxygen Reported for Gasoline with Ethanol - Winter

Gasoline Containing Ethanol			Oxygen (wt%)			Driveability Index (°C)		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Vol Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		3.6	3.7	3.5	553	578	491
	Eth BI Reg		3.6	3.6	3.5	533	546	487
West	Eth BI Prem		0.3	0.3	0.3	543	543	543
NATIONAL	Eth BI Prem		3.6	3.7	3.5	546	553	491
	Eth BI Reg		3.6	3.6	3.5	533	546	487
Total Volume Gasoline								

Note: Volume not shown as only one company reported ethanol blended gasolines. Note that ethanol blended gasoline is produced by more than one major company, however the gasoline is usually blended at the rack and therefore these oxygenate levels were not reported in most cases.

Figure 3.5 indicates the variability of DI by batch for three large refineries. Note the general downward trend from from summer to winter.

Figure 3.5: DI Variability in Canadian Gasoline (Regular) at Selected Refineries



1. Driveability Index

DI has been calculated from the reported data using the equation presented earlier. The following graphs present the data separately for ethanol and non-ethanol gasolines. Figures 3.6 (a, b, c, d, e, f, g, h, i) show the volume distribution of gasoline DI by grade and season based on batch volumes. Note that the volume axis for ethanol blended (Figures 3.6 (c, d)) gasoline (regular and premium) is in percent of total regional volume. Detailed data on the distillation temperatures are presented in Appendix B.

Figure 3.6 a: Distribution of Calculated DI in Canadian Gasoline
(Regular Non-Ethanol Gasoline - Summer)

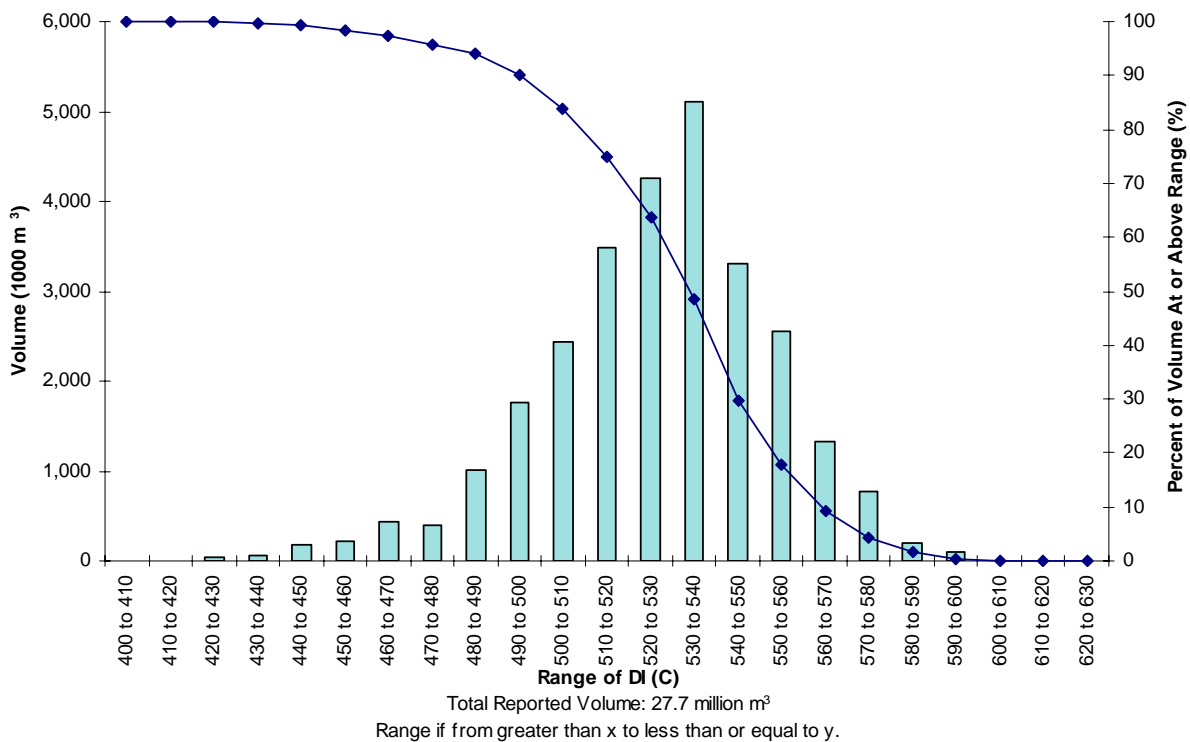


Figure 3.6 b: Distribution of Calculated DI in Canadian Gasoline
(Regular Non-Ethanol Gasoline - Winter)

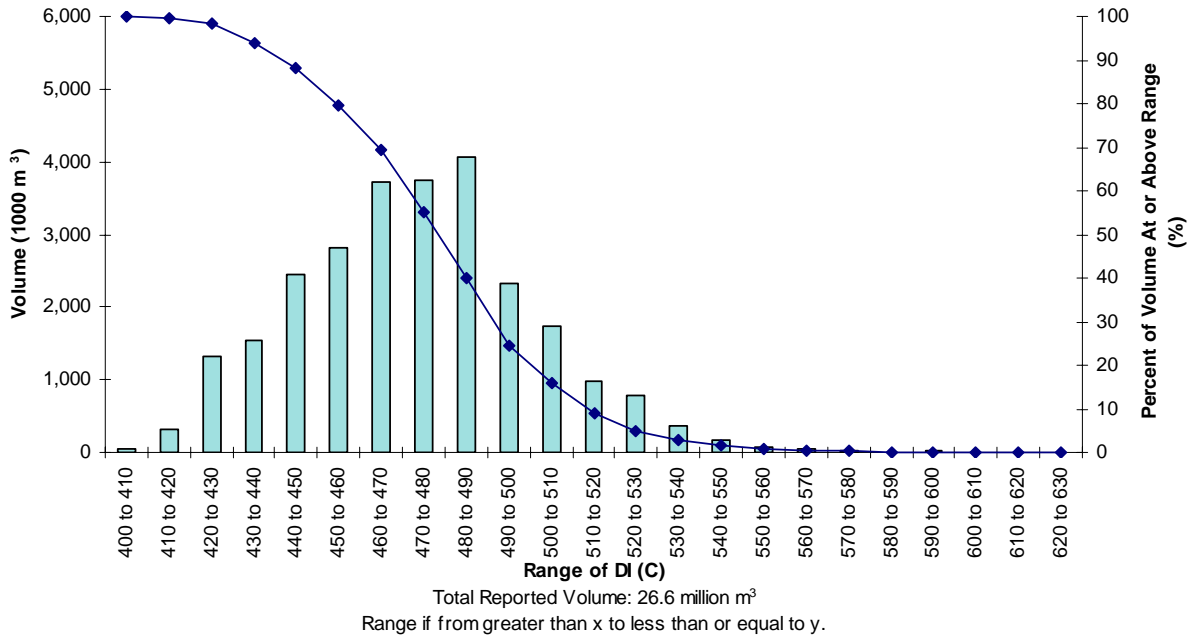


Figure 3.6 c: Distribution of Calculated DI in Canadian Gasoline
(Regular Ethanol Blend Gasoline - Summer)

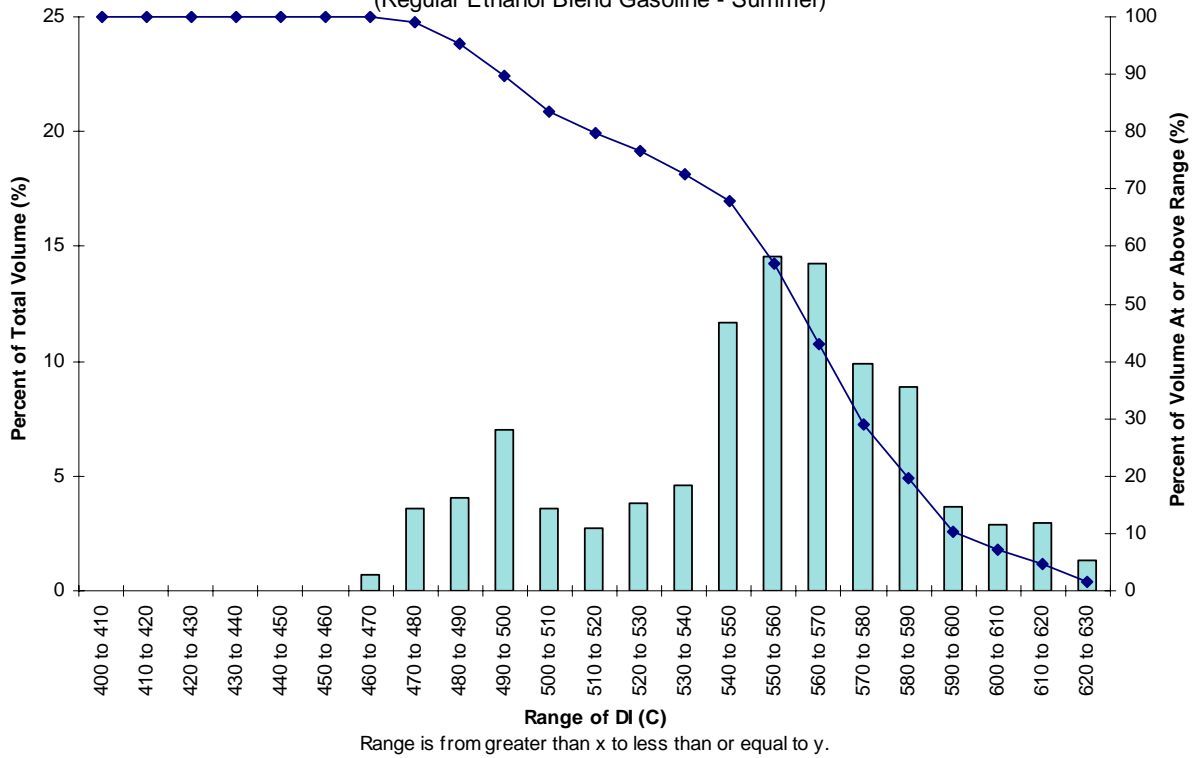


Figure 3.6 d: Distribution of Calculated DI in Canadian Gasoline
(Regular Ethanol Blend Gasoline - Winter)

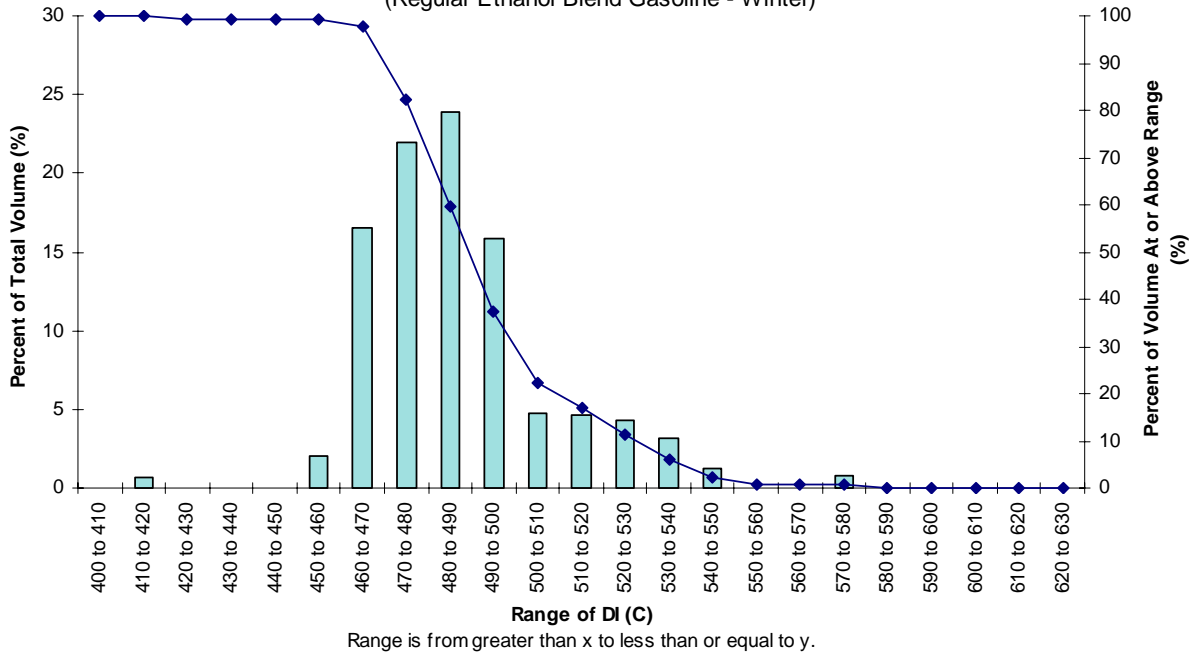


Figure 3.6 e: Distribution of Calculated DI in Canadian Gasoline
(Premium Non-Ethanol Gasoline - Summer)

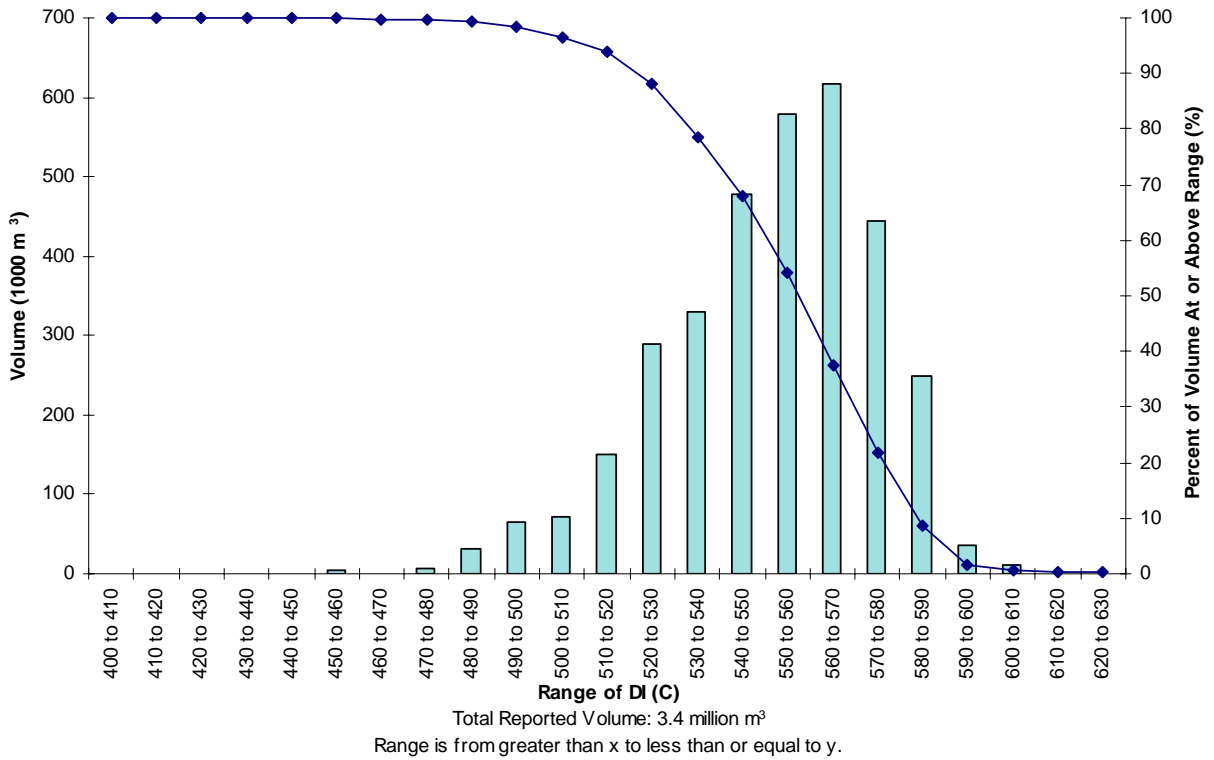


Figure 3.6 f: Distribution of Calculated DI in Canadian Gasoline
(Premium Non-Ethanol Gasoline - Winter)

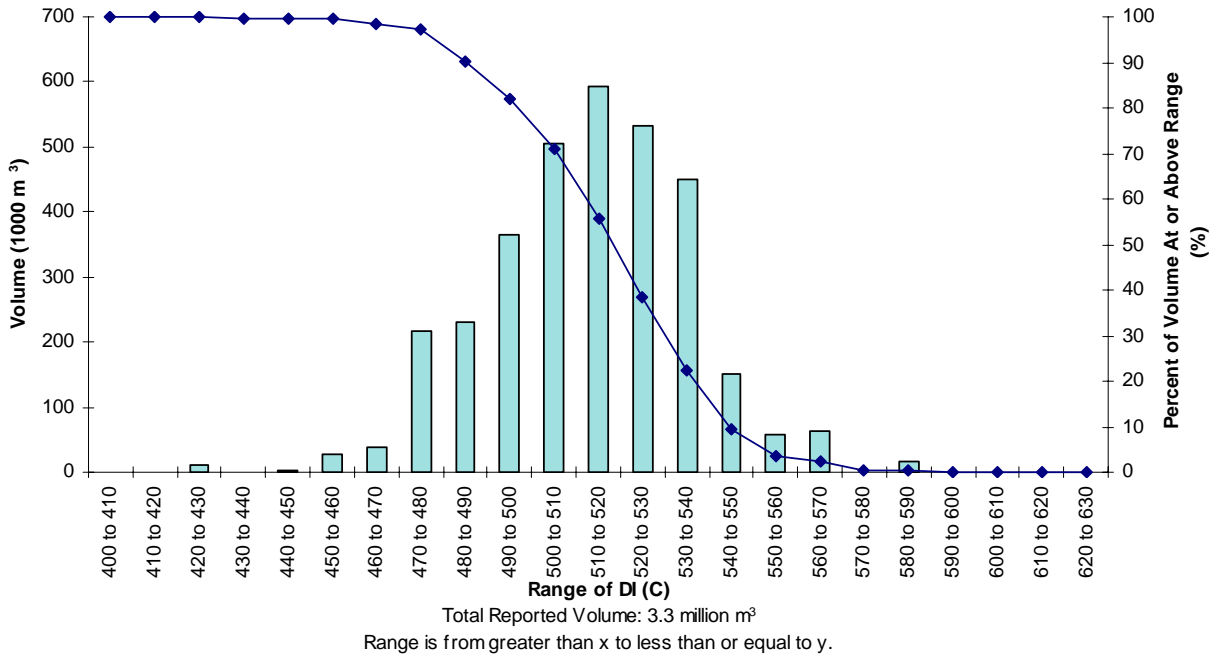


Figure 3.6 g: Distribution of Calculated DI in Canadian Gasoline
(Premium Ethanol Blend Gasoline - Summer)

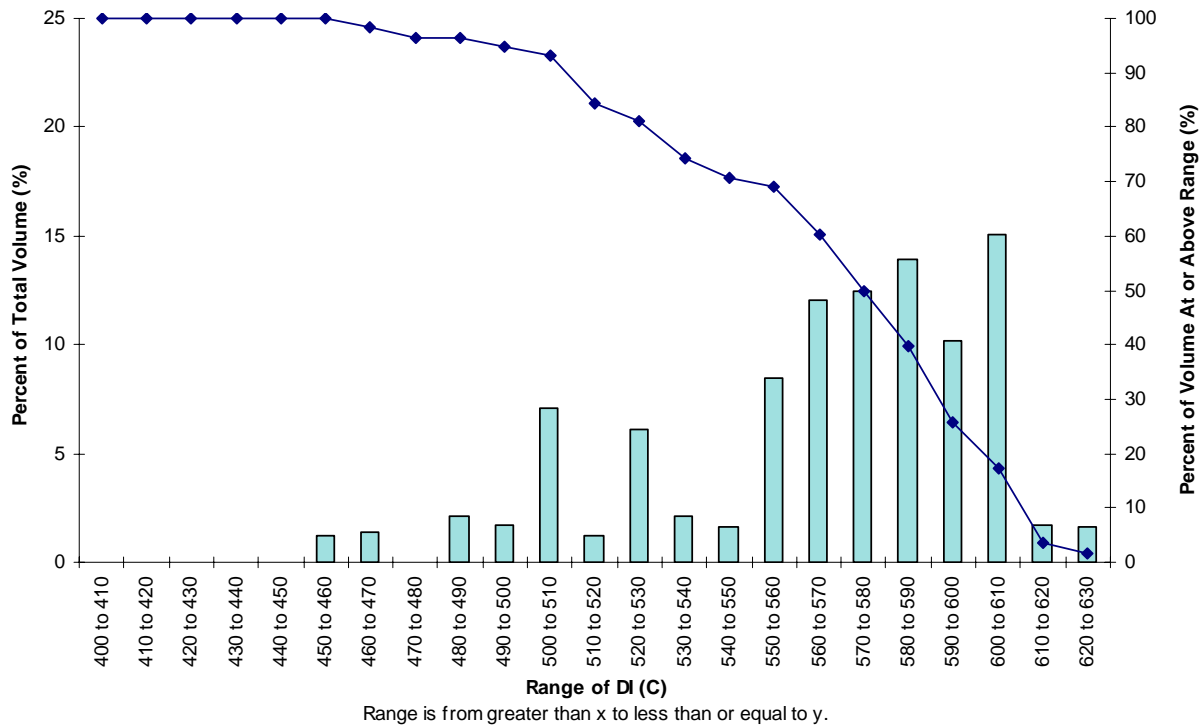
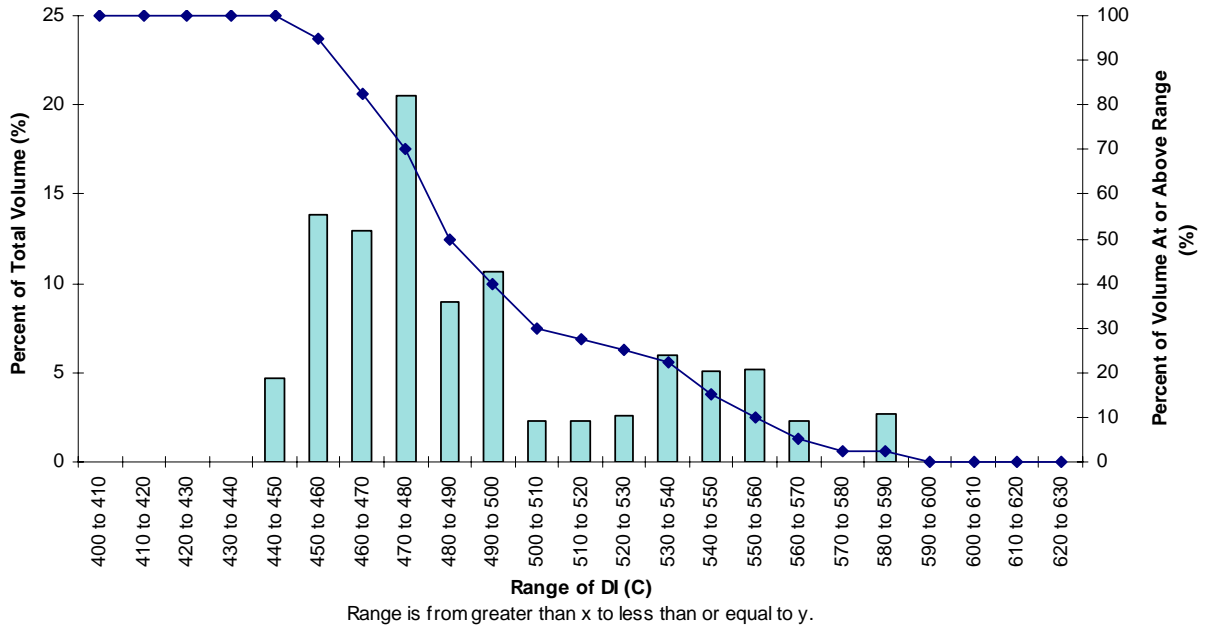


Figure 3.6 h: Distribution of Calculated DI in Canadian Gasoline
 (Premium Ethanol Blend Gasoline - Winter)



4.0 Diesel Fuel

4.1 Cetane

Cetane number is a measure of the ignition quality of diesel fuel and influences combustion characteristics. The cetane number requirements depend on engine design and size, nature of speed and load variations, and starting and atmospheric conditions. Higher cetane number fuels generally give better performance in aspects such as emissions, noise and cold white smoke generation¹³. Cetane index is a calculated number that can be used for approximating the cetane number of fuels that do not contain a cetane-improver additive (CAN/CGSB-3.517-2000). The cetane number takes into account cetane improver added, while the cetane index does not.

The cetane number of a fuel depends on its hydrocarbon composition. In general, normal paraffins (saturated unbranched hydrocarbons (alkanes)) have high cetane numbers, isoparaffins (saturated branched hydrocarbons) and aromatics have low cetane numbers, and olefins (unsaturated hydrocarbons (alkenes)) and cycloparaffins fall somewhere in between¹⁴. A Cetane number of 100 is represented by cetane (n-hexadecane), a straight chain saturated hydrocarbon and the cetane number of 0 is represented by α -methyl naphthalene, an aromatic hydrocarbon with two benzene rings.

In Canada, there are no federal regulated requirements for cetane number or cetane index. However, the CGSB specification for both regular and low-sulphur diesel fuel is a minimum of 40 for the cetane number¹⁵. The specification for diesel fuel used in locomotives can be lower.

Ontario¹⁶ through the adoption of CGSB standards requires both on-road and off-road diesel fuel to have a minimum cetane number of 40. Quebec also requires a minimum cetane index of 40 for all diesel types.¹⁷ British Columbia¹⁸ recently rescinded its regulations that adopted CGSB standards for on-road and off-road diesel.

Specifications in other jurisdictions include:

- The U.S. EPA regulations require either a minimum cetane index of 40 or a maximum aromatics content of 35 volume percent for any diesel fuel for use in on-road vehicles¹⁹. EPA has also proposed the same levels for diesel fuel for off-road use, including locomotive diesel.
- The ASTM standard specification for diesel fuel oils standard for grades No. 1-D (automotive) and No. 2-D (automotive) diesel is a minimum cetane number of 40 and for No. 4-D (non-automotive) diesel is a minimum cetane number of 30²⁰.

¹³ Automotive Low-Sulphur Diesel Fuel, CAN/CGSB-3.517-2000, Canadian General Standards Board, December 2000

¹⁴ Encyclopedia of Chemical Technology, 4th Edition, Volume 12, Kirk-Otmer, 1994

¹⁵ CAN/CGSB-3.6-2000, Regular Sulphur Diesel Fuel; CAN/CGSB-3.517-2000, Automotive Low-Sulphur Diesel Fuel

¹⁶ Ontario Regulation R.S.O 1990 c. G.4, Gasoline Handling Act, Gasoline Handling Code, as amended by Gasoline Branch Standard No. 1/95; No 1/97; No. 2/97; Regulatory Bulletin, January 1996 under *Section 3 - Product Standards*

¹⁷ Regulation O.C. 753-91, Petroleum Products Regulation, (as amended by O.C. 108-96; 505-98; and 156-99

¹⁸ . Regulation 259/94, Diesel Fuel Regulation

¹⁹ US Federal Register / Vol. 66, No 12 / Thursday, January 18, 2001 / Rules and Regulations. Part 80 - Regulation on Fuels and Fuel Additives, section 80.2 and 80.29 (pg 5135)

²⁰ ASTM D-975-98b, Standard Specifications for Diesel Fuel Oils.

- The California Air Resources Board (CARB) regulations require a minimum cetane number of 48 (47 for small refiners) for on-road diesel fuel.
- The European Union (EU) regulates a minimum cetane number of 51.

The California Air Resources Board (CARB) has recommended further evaluation of the effects of lowering aromatics and PAH. The Ozone Transport Commission in the U.S. northeast explored the feasibility of a summertime minimum cetane level of 50 in order to help reduce vehicle emissions²¹. However it decided not to pursue this strategy any further in 2000²².

A report published by the EPA²³ addresses the effects of cetane additives on cetane number and on NOx emissions. The report states *“There is a good reason to believe that additized cetane and natural cetane describe identical, or at least similar, combustion mechanisms, since both additized and natural cetane are measures of a fuel’s propensity to auto-ignite. Any differences in NOx impacts between additized and natural cetane may be related to the aromatics and specific gravity effects that are inherent with natural cetane. That is, natural cetane increases accompanied by typical reductions in aromatics and specific gravity might be expected to produce somewhat larger NOx benefits than additized cetane alone.*

As to ... the impacts of increased cetane number on combustion activity, we have determined that correlating additized cetane with NOx emissions is an appropriate means for providing inventory impact information on to anyone considering the use of higher cetane diesel fuel”.

A draft report by CARB²⁴ on the effects of their diesel fuel program, which includes a minimum cetane number of 48, indicates that *“reducing sulphur content, aromatic hydrocarbon content, and specific gravity and increasing cetane number reduces PM emissions. [The studies] also show that reducing aromatic hydrocarbon content and specific gravity and increasing cetane number reduces NOx emissions from diesel engines”.*

4.2 Aromatics and PAH

Aromatic compounds are compounds that contain a benzene ring and include mono, di and poly aromatic compounds. Polyaromatic hydrocarbons (PAH) are organic substances made up of carbon and hydrogen atoms grouped into at least two condensed aromatic ring (benzene) structures²⁵. Aromatics can form benzene when they are combusted in an engine. Combustion of diesel fuel was identified as a major source of atmospheric benzene release and diesel-powered vehicles were identified as a significant emissions source of PAH in urban areas. Benzene and PAH were placed on the first Priority Substances List (PSL) in February 1994 and were assessed as “toxic” under the Canadian Environmental Protection Act (CEPA).

²¹ Support Document to the Notice of Intent on Cleaner Vehicles, Engines and Fuels, Environment Canada, February 2001, pg. 33

²² Ozone Transport Commission meeting, December 2000.

²³ The Effect of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines. U.S. EPA, February 2003.

²⁴ Draft – Staff Review of the Emission Benefits of California’s Diesel Fuel Program. California Environmental Protection Agency, March 2003.

²⁵ Priority Substance List Assessment Report, Polycyclic Aromatic Hydrocarbons, Environment Canada and Health Canada, 1994

The PSL Report for Benzene noted that benzene has been demonstrated to cause cancer in experimental animals and in humans. Benzene, is therefore, considered to be a “non-threshold toxicant”, i.e., a substance for which there is believed to be some chance of adverse effects at any level of exposure²⁶. The PSL Report noted that the five PAH considered in the human health assessment have been classified as “Probably Carcinogenic to Humans” (i.e., substances for which there is believed to be some chance of adverse effects at any level of exposure)²⁷.

While there have been no standards for aromatics or PAH in diesel fuel set in Canada, there have been specifications for aromatics and PAH developed elsewhere:

- The European Union set a maximum limit for PAH in diesel fuel of 11% by weight in 2000. This was based largely on results from the European Programme on Emissions, Fuels and Engine Technology which found that changes to the content of PAH in diesel fuel consistently reduces emissions of nitrogen oxides and fine particulate matter. The EU limits are not expected to change with the introduction of “zero” sulphur diesel in 2005²⁸.
- The World-wide Fuel Charter developed by automakers and engine manufacturers, calls for PAH (di and higher) in diesel to not exceed 2% by weight for markets with advanced requirements for emissions controls.
- California Air Resources Board (CARB) regulates a maximum of 1.4% by weight (4% for small refiners) for PAH²⁹ in on-road diesel fuel.
- The world’s automakers and engine manufacturers, in their World-wide Fuel Charter for markets with advanced requirements for emissions controls, call for aromatics in diesel fuel to not exceed 15% by weight³⁰. CARB regulates a maximum of 10% by volume (20% for small refiners) for aromatics³¹.

In its advance notice of rulemaking on diesel fuel quality, the U.S. EPA concluded that “*Changes in fuel density and aromatics [in relation to changes in other non-sulphur parameters of diesel] were found to have the greatest beneficial effects on emissions*”³².

4.3 Notice of Intent

During the NOI process, the Canadian Vehicle Manufacturers’ Association (CVMA) recommended a minimum cetane level of 55 for on-road diesel fuel.

²⁶ Priority Substance List Assessment Report, Benzene, Environment Canada and Health Canada, 1994

²⁷ Priority Substance List Assessment Report, Polycyclic Aromatic Hydrocarbons, Environment Canada and Health Canada, 1994

²⁸ Proposal for a Directive of the European Parliament and the Council on the quality of petrol and diesel fuels and amending Directive 98/70/EC, Commission of the European Communities, Brussels, May 11, 2001

²⁹ The California Diesel Fuel Regulation, Title 13 California Code of Regulations, Sections 2281 and 2282 (As Last Amended June 4, 1997), California Air Resources Board, 1997

³⁰ World-wide Fuel Charter, ACEA, Alliance, EMA, JAMA, April 2000

³¹ The California Diesel Fuel Regulation, Title 13 California Code of Regulations, Sections 2281 and 2282 (As Last Amended June 4, 1997), California Air Resources Board, 1997

³² U.S. Environmental Protection Agency, 1999. *Diesel fuel quality: advance notice of proposed rulemaking*. EPA-420-F-99-011

Environment Canada's discussion document found *“that there is insufficient evidence at this time regarding the effects on emissions, engines and emission control equipment of parameters other than sulphur (e.g., cetane, aromatics, PAH, and density) to justify setting requirements for these parameters. Environment Canada will continue to closely monitor the results from fuel programs to understand the effects of such parameters on emissions and to analyze data from such programs. The Department will also continue to undertake its own tests on Canadian diesel”*³³.

Environment Canada therefore *“considers it prudent to gather more information on the composition of Canadian diesel fuel (both for on-road and off-road diesel), particularly on cetane, aromatics and PAH levels. This information is important in order to assess the effect of potential fuel controls that might be considered in the future. The successful voluntary Survey of Benzene, Aromatics and Olefins in gasoline, which was carried out by Environment Canada from 1994-1998 can serve as a model for the data collection process”*³⁴.

The February 17, 2001 NOI stated that Environment Canada intended *“to establish a comprehensive database on diesel fuel composition in order to monitor fuel qualities. Refiners and importers of diesel fuel will be requested to provide information on the level of cetane, aromatics and PAH in both on-road (<500 ppm sulphur) and off-road (>500 ppm sulphur) starting in January 2001. If participation in the survey is inadequate, Environment Canada will consider mandatory reporting requirements”*³⁵.

4.4 Industry Response to Survey

During the survey period, 11 companies representing 23 facilities/importers, consisting of 18 refineries³⁶ and 4 importers responded to the diesel portion of the survey. One refinery decided not to participate. Twenty-one facilities/importers gave the information by batch, 1 refinery by month and 1 refinery by quarter. Table 4.1 provides a summary of the responding companies.

Table 4.1: Response to Diesel Fuel Survey

³³ Support Document to the Notice Of Intent on Cleaner Vehicles, Engines and Fuels, Environment Canada. February 2001, pg 34

³⁴ Support Document to the Notice Of Intent on Cleaner Vehicles, Engines and Fuels, Environment Canada. February 2001, pg 34

³⁵ Federal Agenda on Cleaner Vehicles, Engines and Fuels, Canada Gazette Part I, February 17, 2001, pg. 455

³⁶ Suncor, included in the 18 responding refineries, provided 2 responses on volumes for its Fort McMurray Plant and its Edmonton terminal. These two responses we counted as one refinery

Gasoline and Diesel Fuel Survey

DIESEL							
Region	Company	Location	Refinery/Importer	Response			
				Information Frequency	Aromatic Samples*	PAH Samples*	Cetane Number*
Atlantic	Imperial Oil Ltd.	Dartmouth, NS	Refinery	Batch	18	18	5
	Irving	Saint John	Refinery	Quarterly	6	6	6
	North Atlantic	Come-by-Chance, NF	Refinery	Batch	15/0	15/0	15
	Ultramar	Holyrood Terminal	Importer	Batch	2	2	0
Ontario	Imperial Oil Ltd.	Nanticoke	Refinery	Batch	18/0	18/0	6/0
	Imperial Oil Ltd.	Sarnia Refinery	Refinery	Batch	18/7	18/7	1/1
	Petro Canada	Oakville	Refinery	Monthly	35/18	38/18	6/3
	Shell	Sarnia Refinery	Refinery	Batch	18	18	2
	Sunoco	Sarnia Refinery	Refinery	Batch	32/16	32/16	4/2
Quebec	Petro Canada	Montreal	Refinery	Batch	18/2	18/2	1/0
	Shell	Montreal	Refinery	Batch	23/18	23/18	23/18
	Ultramar	Saint Romuald	Refinery	Batch	36/0	36/0	11/0
	Ultramar	Montreal	Importer	Batch	2/0	2/0	0
West	Chevron	Burnaby	Refinery	Batch	7	7	1/1
	Co-op	Regina, SK	Refinery	Batch	30/0	30/0	415/0
	Husky	Prince George, BC	Refinery	Not Participating			
	Imperial Oil Ltd.	Burrard Terminal	Importer	Batch	3/0	3/0	1/0
	Imperial Oil Ltd.	Strathcona	Refinery	Batch	18	18	2
	Parkland	Bowden, AB	Refinery	Batch	0/3	0/3	0/3
	Parkland	Beaver Creek, YK	Importer	Batch	0/17	0/17	0/2
	Petro Canada	Edmonton Refinery	Refinery	Batch	20/0	20/0	39/0
	Shell	Scotford Refinery	Refinery	Batch	18/0	18/0	257/0
	Suncor	Edmonton Gibson's Terminal	Refinery	Batch	13/0	13/0	240/37
	Suncor	Fort McMurray Truck Loading	Refinery	Batch	3/0	3/0	37/0
	Williams	Alaska	Importer	Batch	0/14	0/14	0

*Aromatic Samples , PAH Samples and Centane Number column shows the number of aromatic , PAH and Cetane Number values reported respectively within the survey period by diesel type (low sulphur diesel and regular sulphur diesel). Since most reported the same number of low sulphur diesel and regular sulphur diesel aromatic , PAH and Centane Number values, one entry was used. Where there was a difference, two values were shown (e.g. 6/3 represents the reporting of 6 low sulphur values and 3 regular sulphur values)

Figures 4.1 and 4.2 show the volumes of diesel fuel reported for each quarter under the survey by region and grade. Figures 4.3 and 4.4 compare volumes reported under the survey to the volumes reported under *Fuels Information Regulation No. 1*. The figures show that generally there is good agreement between the reported volumes. Figure 4.5 shows the percentage of low sulphur diesel (<500 ppm S) and regular sulphur diesel (>500 ppm S) reported as per total pool of diesel reported.

Figure 4.1: Reported Diesel Volume by Type

- Summer -

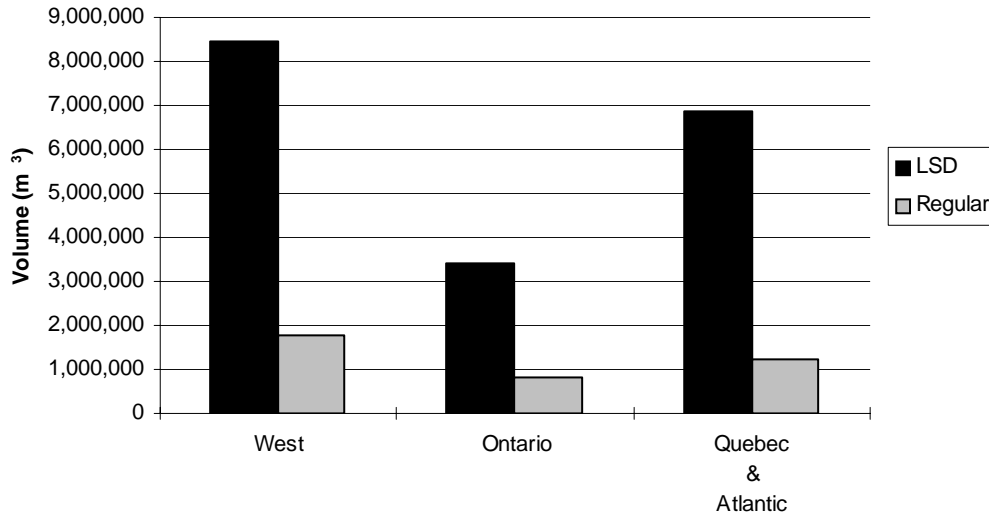


Figure 4.2: Reported Diesel Volume by Type

- Winter -

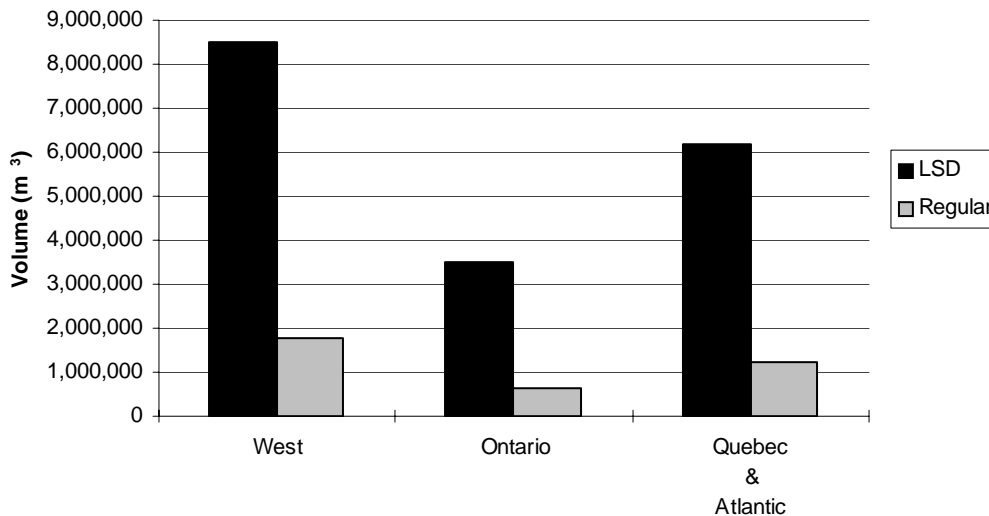


Figure 4.3: Low Sulphur Diesel Volume Reported Compared to Fuels Information Regulation No. 1 Volume Reported

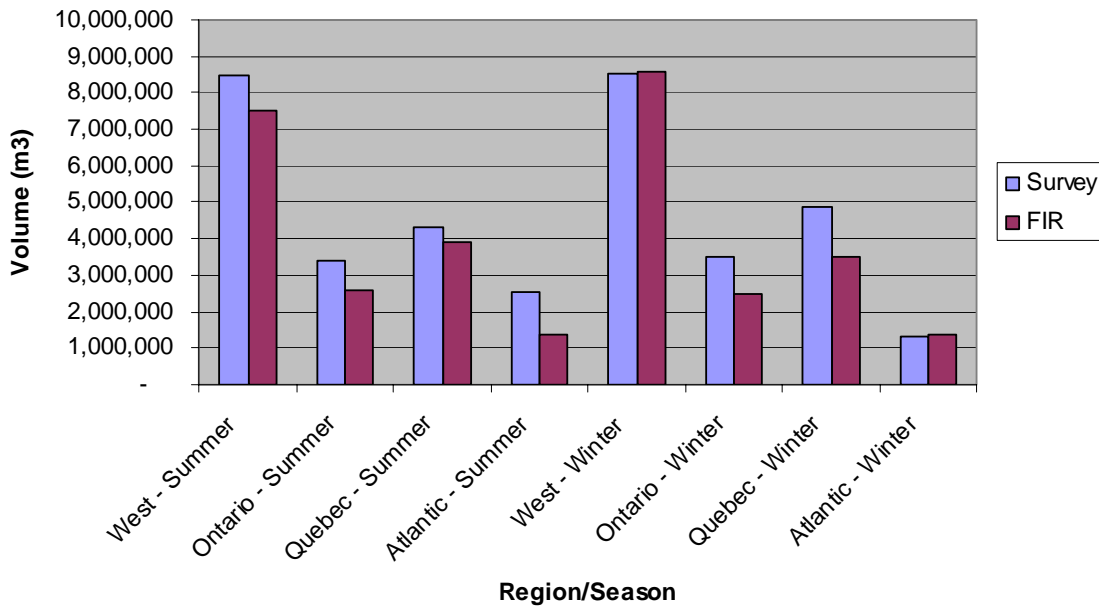


Figure 4.4: Regular Sulphur Diesel Volume Reported Compared to Fuels Information Regulations No. 1 Volume Reported

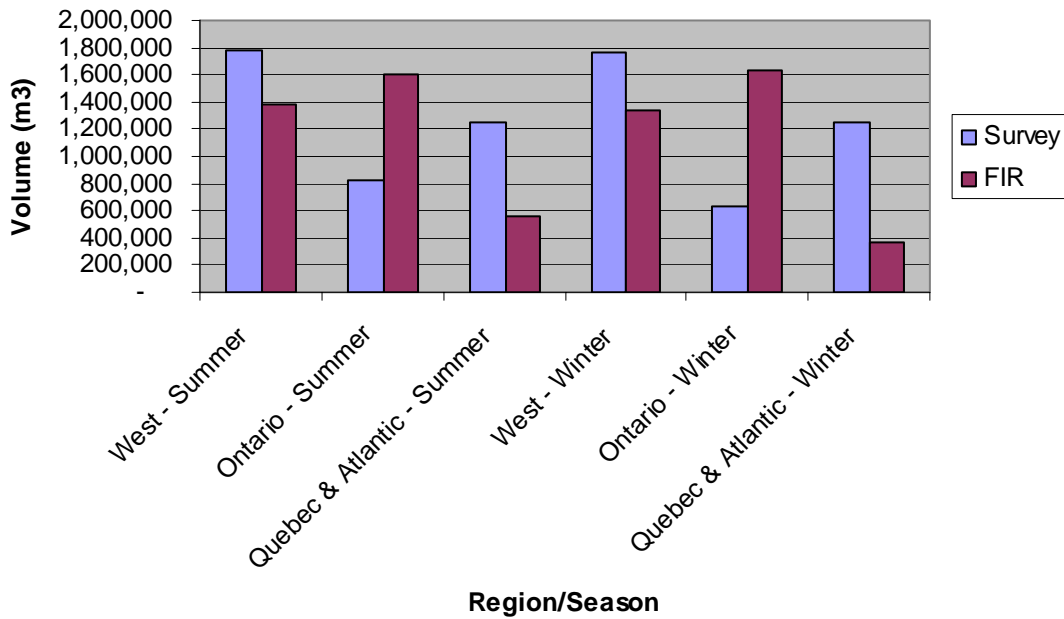
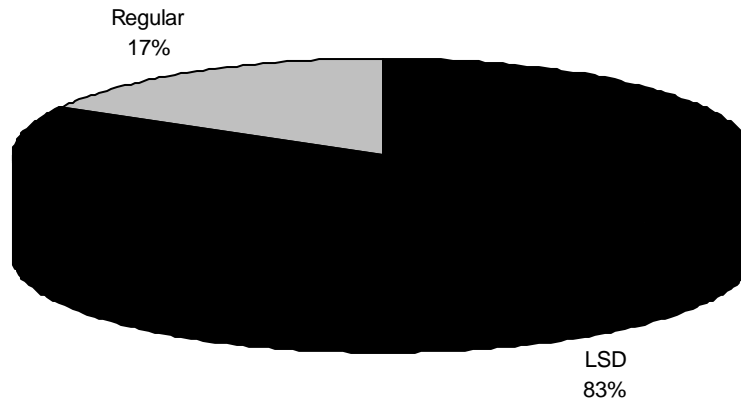


Figure 4.5: Reported Diesel Volume by Type

1. *Frequency of Sampling*

Cetane index, aromatic and PAH weight percentages were provided by all reporting facilities/importers. Cetane index was provided by batch by 22 of the 24 facilities/importers. Monthly data on aromatics and PAH were provided by 17 facilities/importers. Cetane Number was requested on an annual basis and was reported by 21 facilities/importers in the survey period. Table 4.1 summarizes the survey response.

Table 4.1 identifies the number of batches analyzed for aromatics and PAH over the survey period.

2. *Analytical Procedures Used*

Of the 24 reporting facilities/importers, 19 used the reference procedure for cetane index, 22 used the reference procedure for both aromatics and PAH, and 19 used the reference procedure for cetane number. Note that for the cetane number, 3 of the 5 facilities/importers that did not report their analytical procedure did not report a cetane number during the survey period. Table 4.2 lists the different procedures reported to be used and the number of facilities/importers using them.

Table 4.2: Analytical Procedures Used to Measure Diesel Fuel Parameters.

Analytical Procedures		Respondents Using
Cetane Index (wt%)	ASTM D-4737*	19
	ASTM D-976	3
	Not Specified	2
Cetane Number (wt%)	ASTM D-613*	19
	Not Specified	5
Aromatics/PAHs (wt%)	CAN/CGSB 3.0 No 15.0*	22
	Not Specified	2

*Reference procedure

4.5 Assumptions and Simplifications

Due to the nature of different response formats and frequency of reporting by batch, by month or by quarter, the following assumptions were made in analyzing the data:

- Where one cetane index value was provided per month or per quarter (rather than by batch), it was assumed to apply to the entire volume for the refinery/import for the month or quarter.
- The regional and national volume-weighted cetane numbers were calculated assuming that the reported cetane numbers (usually only one provided per quarter) apply to the total reported volume for the refinery or import point. (In the one case where cetane number was provided by batch it was volume-weighted by batch).
- Aromatics and PAH were volume-weighted based on the monthly volume reported by facilities/importers. Where more than one measurement per month for aromatics and/or PAH was provided, the multiple values were numerically averaged and then applied to the volume for the month for the specific facilities/importers. The monthly average was then used to calculate the volume-weighted quarterly and national averages. Where only quarterly measurements were provided, these were applied to the quarterly volume for the facilities/importers.
- If the facilities/importers did not specify whether or not a batch of diesel fuel had cetane improver, it was assumed that there was no cetane improver added.
- One facility/importer indicated that it added cetane improver if the cetane index is less than 42. Since the data was not provided by batch, the volume of diesel with cetane improver was not available, and hence was not included in the cetane improver analysis (Figures 4.6 (a, b), 4.7 (a, b), 4.8 (a, b), and 4.9 (a, b)).
- All volumes reported were assumed to be sold in Canada unless identified otherwise. Volumes identified for U.S. sales were removed from the data and excluded from this analysis.

4.6 Results and Observations

Tables 4.3 (a,b) show the reported volume-weighted average cetane index along with 1st³⁷ and 5th³⁸ percentiles by diesel grade (low sulphur diesel and regular sulphur diesel) and by region.

Table 4.3a: Reported Cetane Index of Diesel Fuel - Summer

Cetane Index - Summer			Cetane Index		
Region	Diesel Type	Applicable Volume (m3)	1st Percentile	5th Percentile	Vol Weighted Avg
Atlantic	LSD		42.8	43.0	45.6
	Regular		42.4	42.6	45.0
Quebec	LSD		41.9	42.7	45.8
	Regular		37.4	37.9	42.0
Ontario	LSD		40.2	41.1	45.3
	Regular		41.5	42.1	44.3
West	LSD		40.0	40.8	43.6
	Regular		38.3	39.0	43.9
NATIONAL	LSD	17,240,175	40.2	41.0	44.8
	Regular	3,846,972	37.9	39.2	44.1

Table 4.3b: Reported Cetane Index of Diesel Fuel- Winter

Cetane Index - Winter			Cetane Index		
Region	Diesel Type	Applicable Volume (m3)	1st Percentile	5th Percentile	Vol Weighted Avg
Atlantic	LSD		41.2	41.5	42.8
	Regular		41.3	42.3	42.5
Quebec	LSD		40.9	42.1	45.0
	Regular		38.3	39.1	41.4
Ontario	LSD		39.2	40.5	44.7
	Regular		42.1	43.2	44.5
West	LSD		39.8	40.4	42.6
	Regular		38.5	39.2	43.0
NATIONAL	LSD	16,365,648	39.9	40.6	43.8
	Regular	3,645,428	38.5	39.4	42.9

³⁷ One percent of the reported observations are at or below this value. This is not volume weighted and is based on the number of observations reported.

³⁸ Five percent of the reported observations are at or below this value. This is not volume weighted and is based on the number of observations reported.

Tables 4.4 (a,b) show the reported volume-weighted average cetane number along with 1st and 5th percentiles by diesel type and by region.

Table 4.4a: Reported Cetane Number of Diesel Fuel - Summer

Cetane Number - Summer			Cetane Number		
Region	Diesel Type	Applicable Volume (m ³)	Minimum	Maximum	Vol Weighted Avg
Atlantic	LSD		43.1	56.1	44.2
	Regular		41.5	46.3	44.2
Quebec	LSD		40.3	48.7	43.1
	Regular		40.2	42.5	41.8
Ontario	LSD		41.6	41.8	41.7
	Regular		51.2	51.2	51.2
West	LSD		40.0	52.9	42.7
	Regular		44.4	50.2	44.4
NATIONAL	LSD	12,551,050	40.0	56.1	43.0
	Regular	1,636,101	40.2	51.2	43.6

Table 4.4b: Reported Cetane Number of Diesel Fuel - Winter

Cetane Number - Winter			Cetane Number		
Region	Diesel Type	Applicable Volume (m ³)	Minimum	Maximum	Vol Weighted Avg
Atlantic	LSD		42.3	54.2	42.9
	Regular		39.5	44.0	41.7
Quebec	LSD		40.5	45.3	42.7
	Regular		40.8	42.8	41.7
Ontario	LSD		40.3	47.1	43.1
	Regular		41.4	45.7	43.9
West	LSD		36.3	52.0	42.2
	Regular		41.6	52.4	42.4
NATIONAL	LSD	11,063,997	36.3	54.2	42.6
	Regular	1,938,037	39.5	52.4	42.2

Tables 4.5 (a,b) and 4.6 (a,b) show the reported volume-weighted average weight percent of aromatics and PAH along with 95th and 99th percentiles by region and by diesel type.

Table 4.5a: Reported Weight Percent Aromatics in Diesel Fuel - Summer

Distribution of Aromatics - Summer			Aromatics (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	LSD		32.0	32.9	29.5
	Regular		39.3	41.0	34.5
Quebec	LSD		37.1	42.6	30.5
	Regular		42.5	42.7	40.8
Ontario	LSD		41.5	42.3	30.4
	Regular		39.3	39.4	34.7
West	LSD		38.1	38.4	31.2
	Regular		39.8	41.0	37.5
NATIONAL	LSD	17,969,866	39.6	42.3	30.7
	Regular	3,738,421	41.3	42.4	36.5

Table 4.5b: Reported Weight Percent Aromatics in Diesel Fuel - Winter

Distribution of Aromatics - Winter			Aromatics (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	LSD		28.3	29.6	26.1
	Regular		33.8	33.9	29.7
Quebec	LSD		34.5	35.7	28.5
	Regular		40.2	40.4	38.1
Ontario	LSD		38.5	40.4	29.7
	Regular		36.9	48.2	28.7
West	LSD		36.9	63.3	30.2
	Regular		36.7	38.2	37.2
NATIONAL	LSD	17,286,251	36.9	40.4	29.3
	Regular	4,312,145	39.0	43.6	34.9

Table 4.6a: Reported Weight Percent Polyaromatic Hydrocarbons (PAH) in Diesel Fuel - Summer

Distribution of PAH - Summer			PAH (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	LSD		9.2	9.6	6.0
	Regular		15.1	15.7	7.9
Quebec	LSD		11.6	13.0	8.5
	Regular		15.6	17.5	18.6
Ontario	LSD		14.8	15.1	7.7
	Regular		19.7	19.9	5.0
West	LSD		8.9	10.1	4.8
	Regular		17.9	18.9	12.1
NATIONAL	LSD	17,969,866	13.5	14.9	6.3
	Regular	3,738,421	19.2	19.5	10.2

Table 4.6b: Reported Weight Percent Polyaromatic Hydrocarbons (PAH) in Diesel Fuel - Winter

Distribution of PAH - Winter			PAH (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	LSD		7.9	7.9	2.7
	Regular		11.1	11.2	2.7
Quebec	LSD		12.4	12.5	7.4
	Regular		17.4	17.5	15.3
Ontario	LSD		11.8	13.1	5.9
	Regular		13.6	24.1	4.7
West	LSD		9.4	12.7	5.5
	Regular		15.1	15.2	12.5
NATIONAL	LSD	17,286,251	11.5	13.1	5.9
	Regular	4,312,145	16.1	20.3	10.2

Figures 4.6 (a, b) show the volume of diesel fuel reported by region with and without cetane improver for low sulphur diesel (<500 ppm) by region and by quarter. Of the total volume of low sulphur diesel fuel reported to have cetane improver added, 86% and 90% respectively for summer and winter was in the West and 14% and 10% respectively for summer and winter was in Ontario. One refinery in the Atlantic indicated it only added cetane improver when the cetane index was less than 42, and therefore was excluded from Figures 4.6 and 4.7.

Figure 4.6a: Volume of Canadian Diesel for which Cetane Improver was Reported Used (<500ppm - Summer)

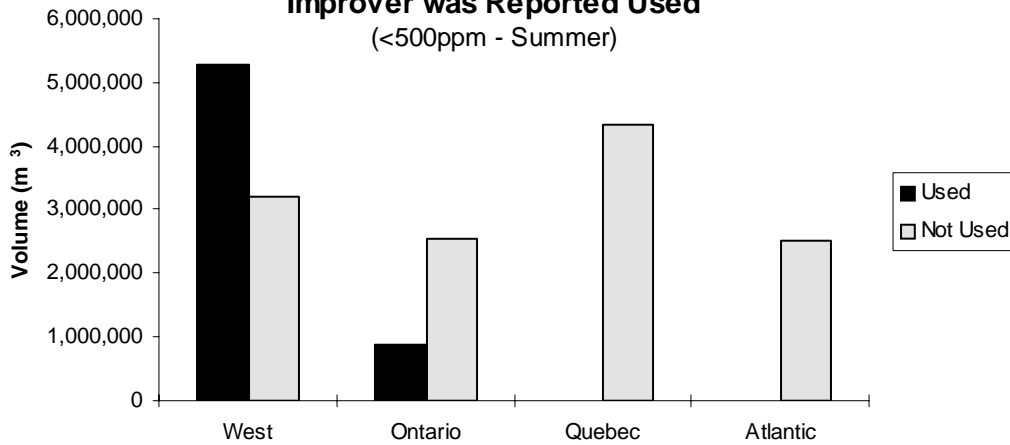
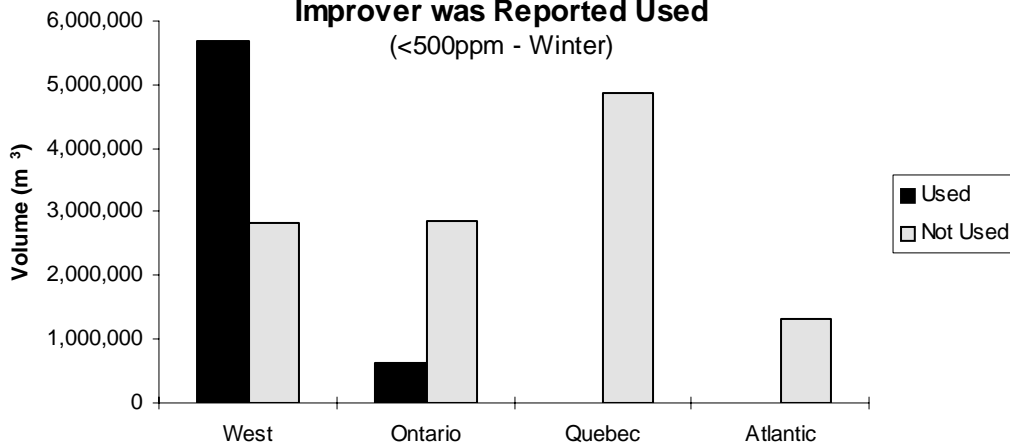


Figure 4.6b: Volume of Canadian Diesel for which Cetane Improver was Reported Used (<500ppm - Winter)



Figures 4.7 (a, b) show the percentage of the total volume reported of low sulphur diesel fuel with and without cetane improver added for summer and winter.

Figure 4.7a: Volume of Canadian Diesel for which Cetane Improver was Reported Used (<500ppm - Summer)

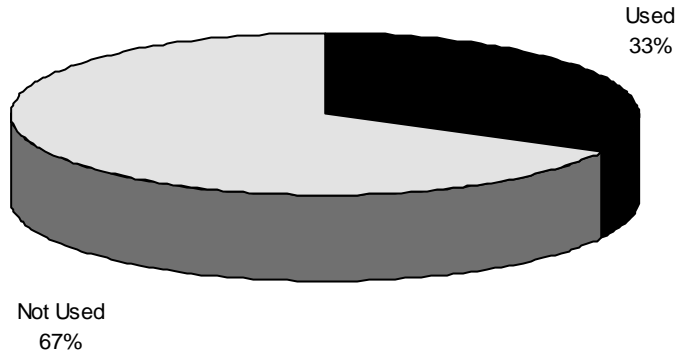
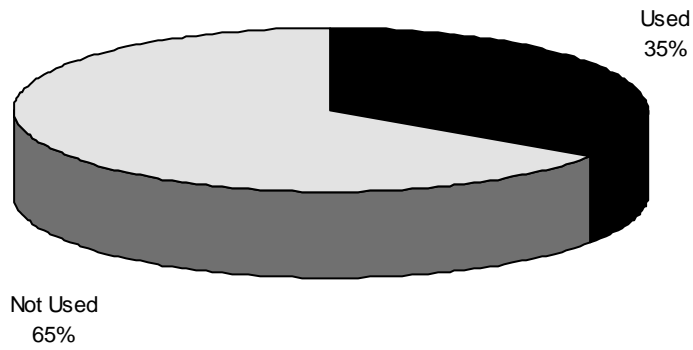


Figure 4.7b: Volume of Canadian Diesel for which Cetane Improver was Reported Used (<500ppm - Winter)



Figures 4.8 (a, b) show the volume of diesel fuel reported by region with or without cetane improver added for regular sulphur diesel fuel (>500 ppm) by region and season. With regular sulphur diesel fuel, cetane improver was only reported added in the West. One refinery in the Atlantic indicated the addition of cetane improver when the cetane index was less than 42; however it did not report by batch and therefore was excluded from Figures 4.8 and 4.9.

Figure 4.8a: Volume of Canadian Diesel for which Cetane Improver was Reported Used (>500ppm - Summer)

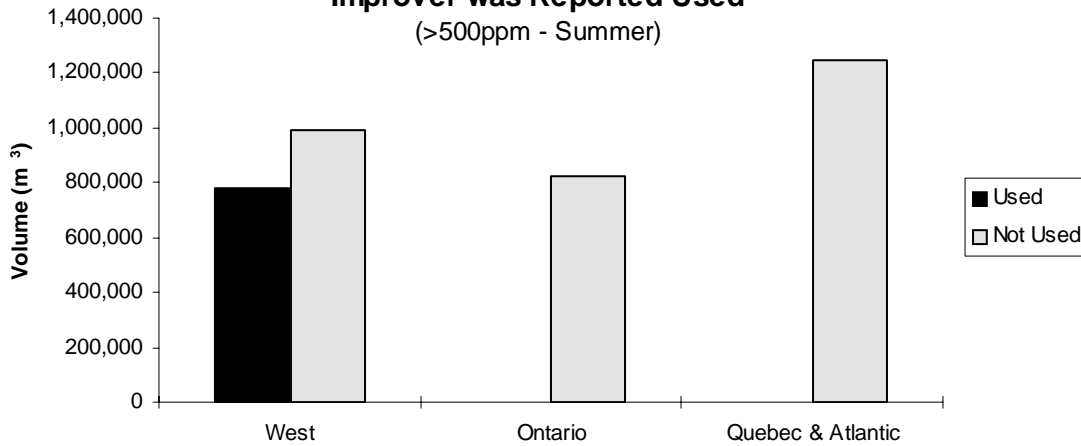
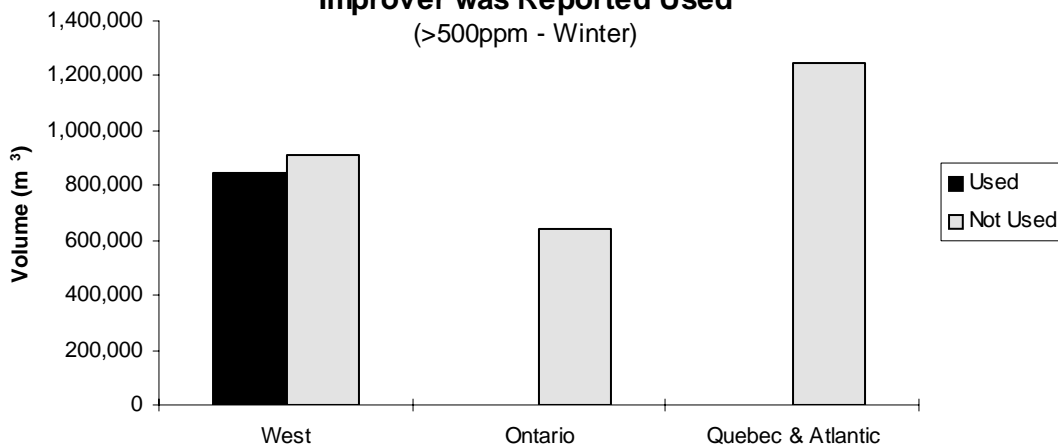


Figure 4.8b: Volume of Canadian Diesel for which Cetane Improver was Reported Used (>500ppm - Winter)



Figures 4.9 (a, b) show the percentage of the total volume of reported regular sulphur diesel fuel with and without cetane improver added for summer and winter.

Figure 4.9a: Volume of Canadian Diesel for which Cetane Improver was Reported Used (>500ppm - Summer)

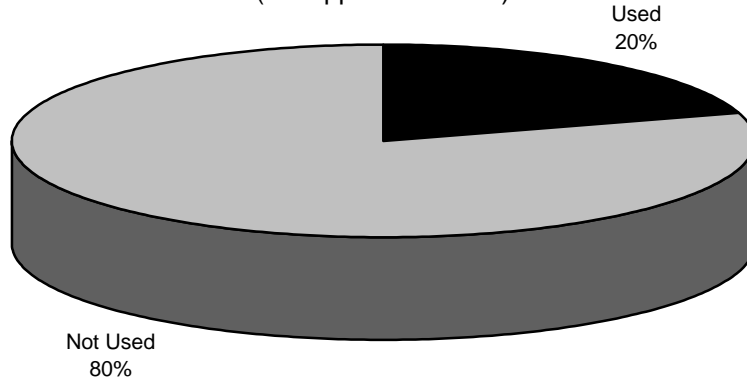


Figure 4.9b: Volume of Canadian Diesel for which Cetane Improver was Reported Used (>500ppm - Winter)

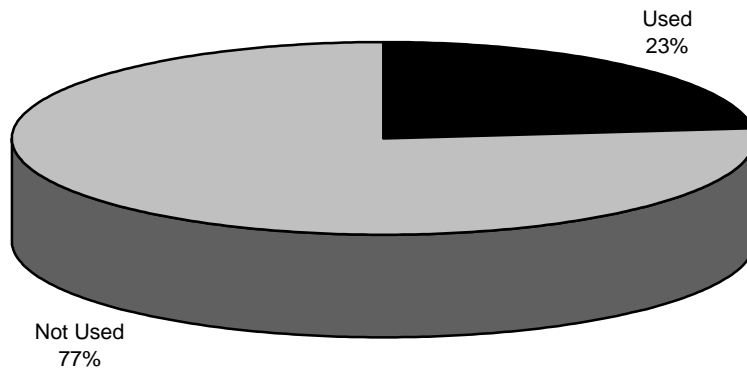
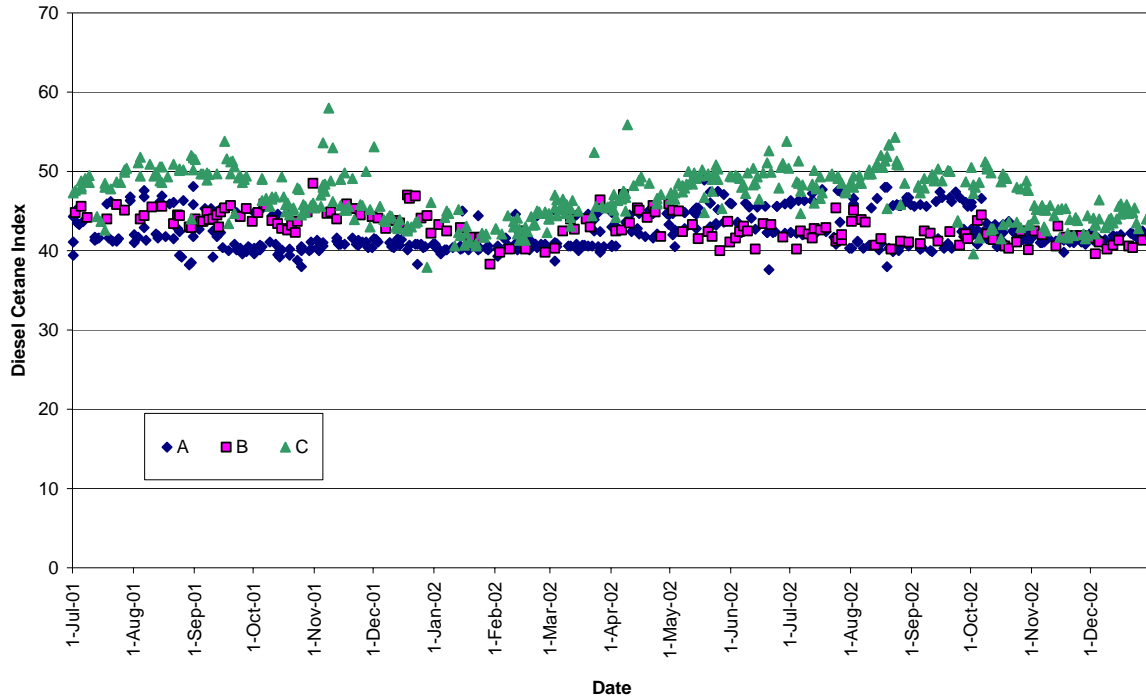


Figure 4.10 shows the variability of low sulphur diesel fuel cetane index by batch for three facilities/importers.

Figure 4.10: Cetane Index Variability in Canadian Diesel (<500 ppm) at Selected Refineries



Figures 4.11 (a, b) show the volume distribution of diesel fuel cetane index by batch for low sulphur diesel for summer and winter.

Figure 4.11a: Distribution of Cetane Index in Canadian Diesel
(<500ppm - Summer)

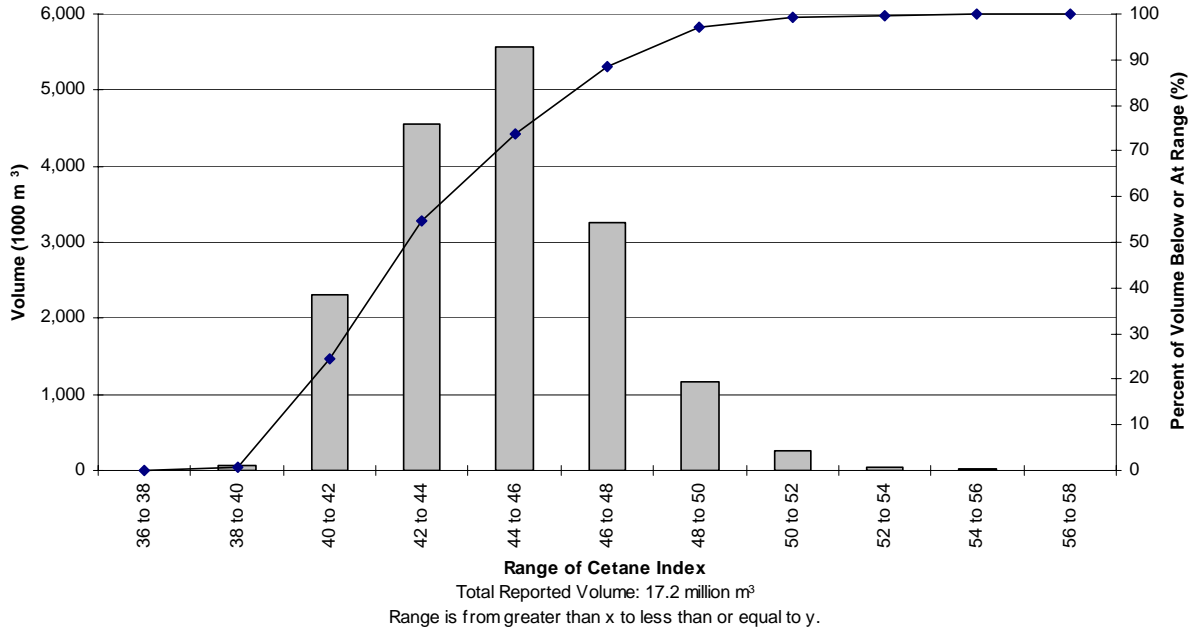
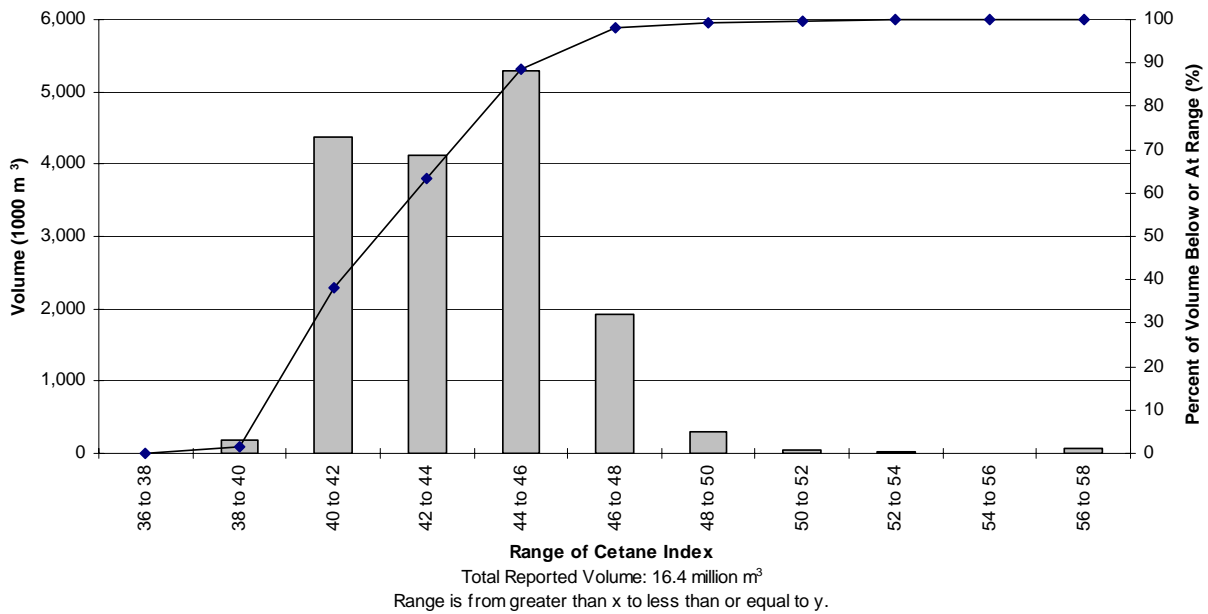


Figure 4.11b: Distribution of Cetane Index in Canadian Diesel
(<500ppm - Winter)



Figures 4.12 (a, b) show the volume distribution of diesel fuel cetane index by batch for regular sulphur diesel for summer and winter.

Figure 4.12a: Distribution of Cetane Index in Canadian Diesel
(>500ppm - Summer)

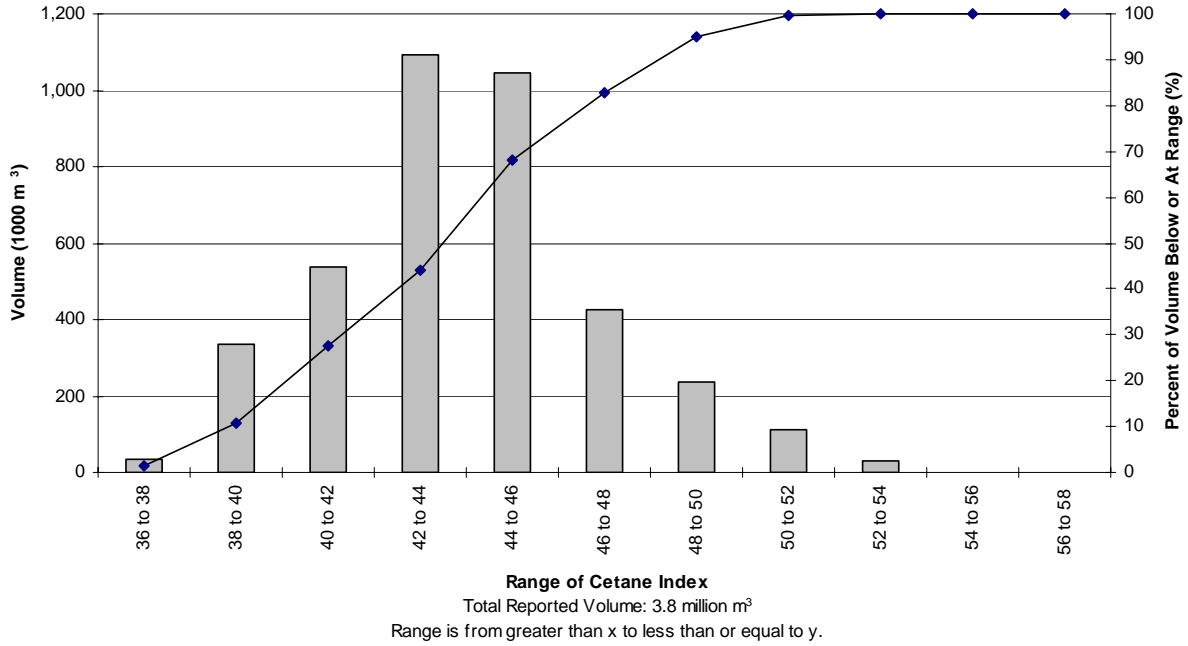
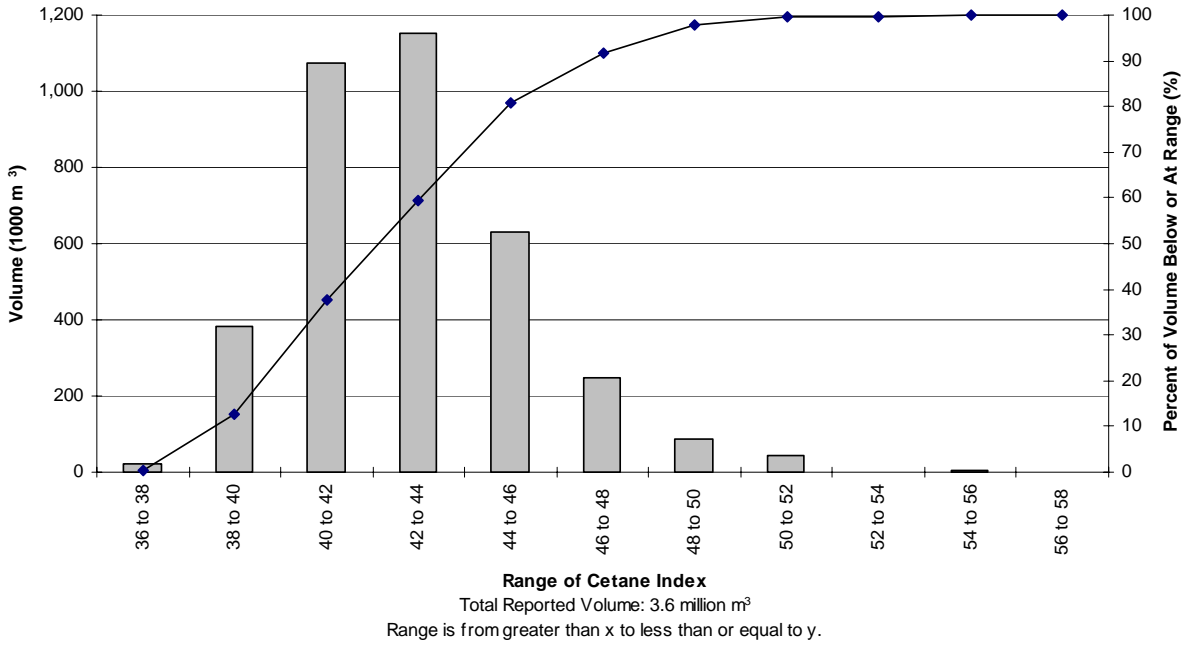


Figure 4.12b: Distribution of Cetane Index in Canadian Diesel
(>500ppm - Winter)



Figures 4.13 (a, b) show the volume distribution of reported weight percent aromatics by season for low sulphur diesel fuel.

Figure 4.13a: Distribution of Reported Aromatics in Canadian Diesel
(<500ppm - Summer)

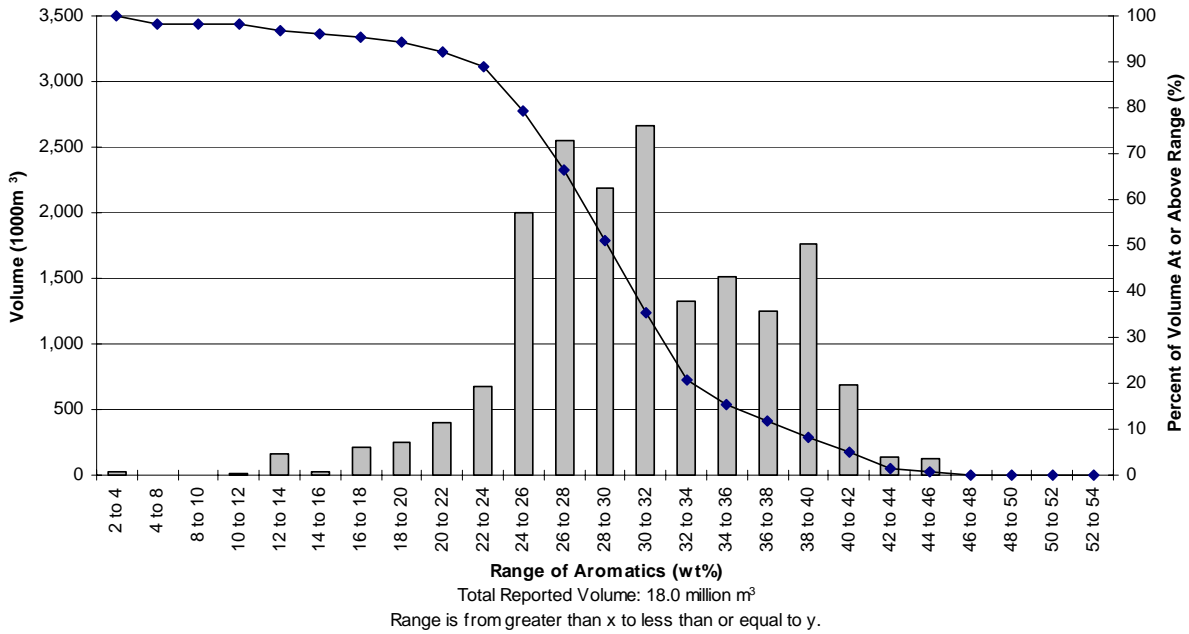
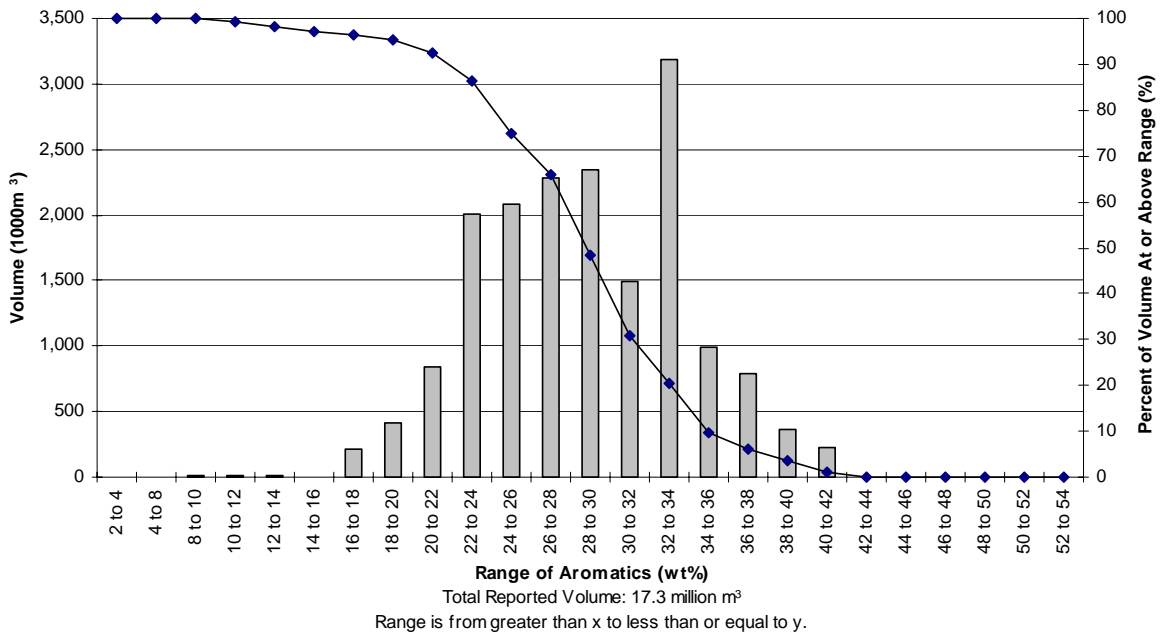


Figure 4.13b: Distribution of Reported Aromatics in Canadian Diesel
(<500ppm - Winter)



Figures 4.14 (a, b) show the volume distribution of reported weight percent aromatics by season for regular sulphur diesel fuel.

Figure 4.14a: Distribution of Reported Aromatics in Canadian Diesel (>500ppm - Summer)

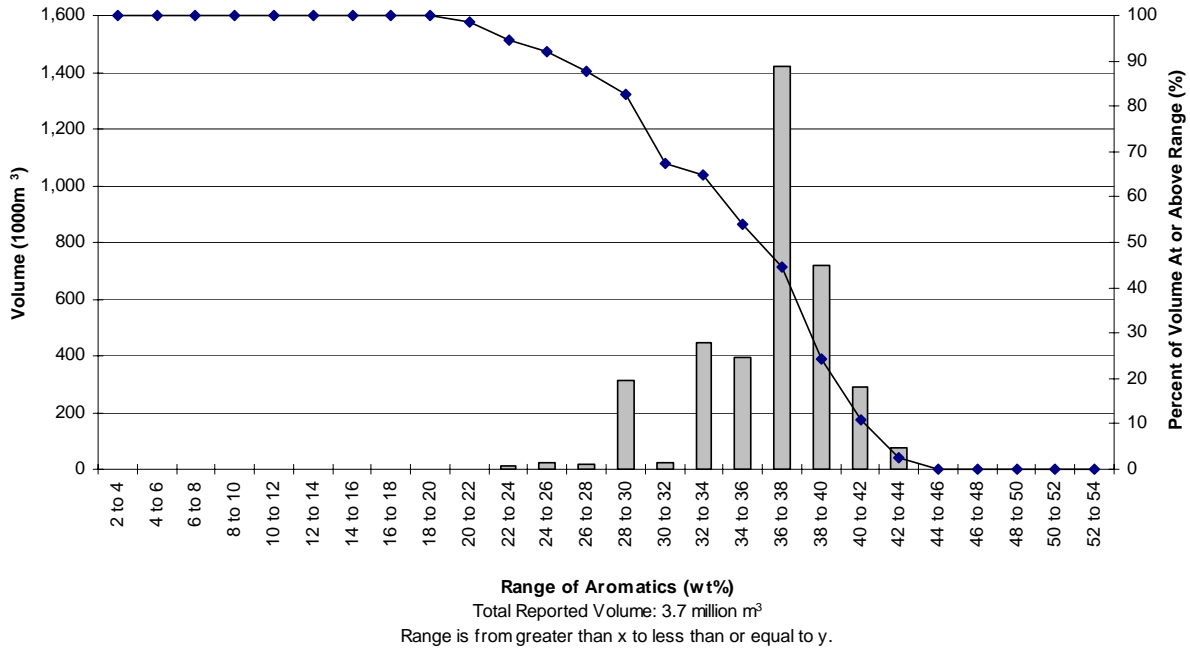
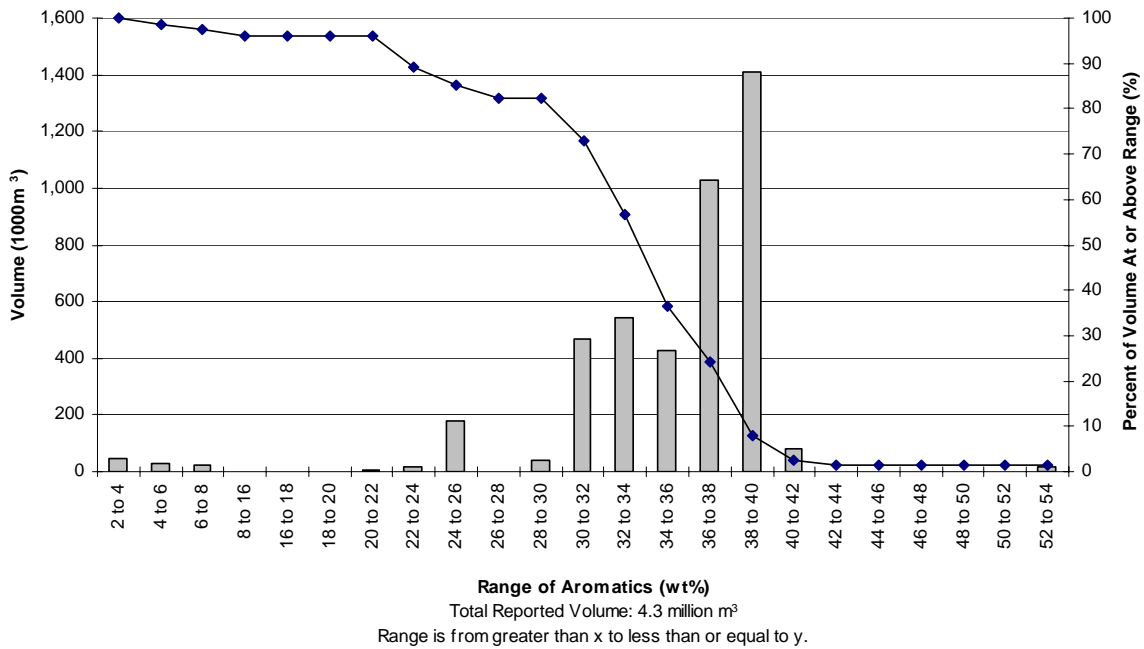


Figure 4.14b: Distribution of Reported Aromatics in Canadian Diesel (>500ppm - Winter)



Figures 4.15 (a, b) show the volume distribution of reported weight percent polyaromatic hydrocarbons (PAH) by season for low sulphur diesel fuel.

Figure 4.15a: Distribution of Reported PAH in Canadian Diesel
(<500ppm - Summer)

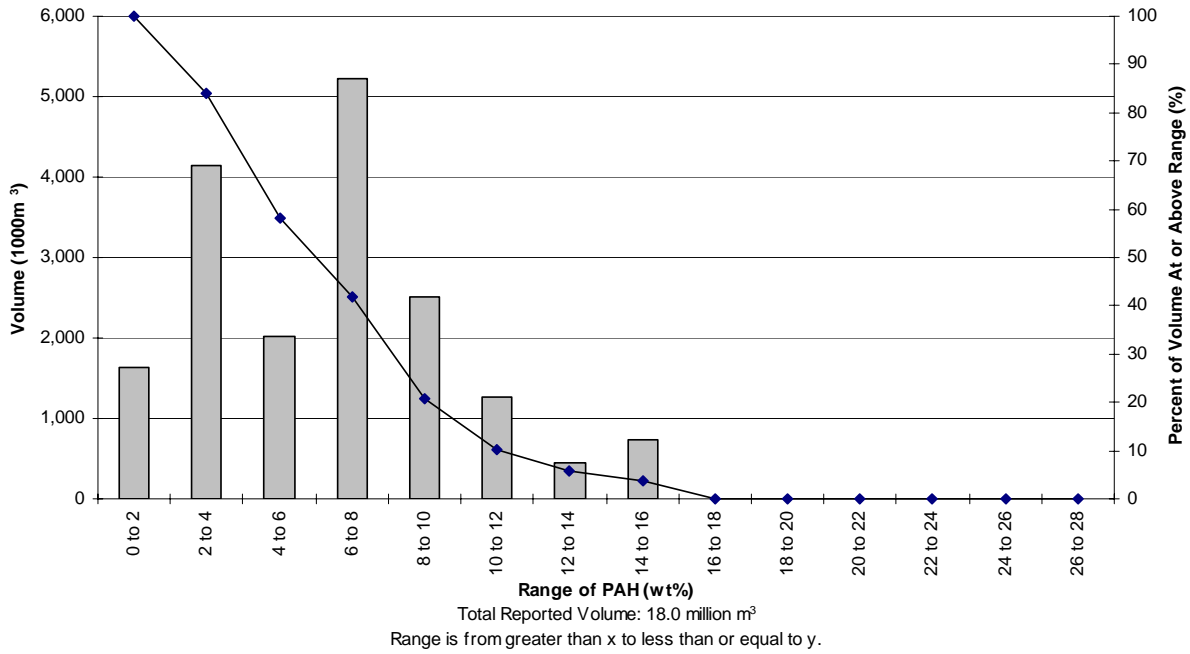
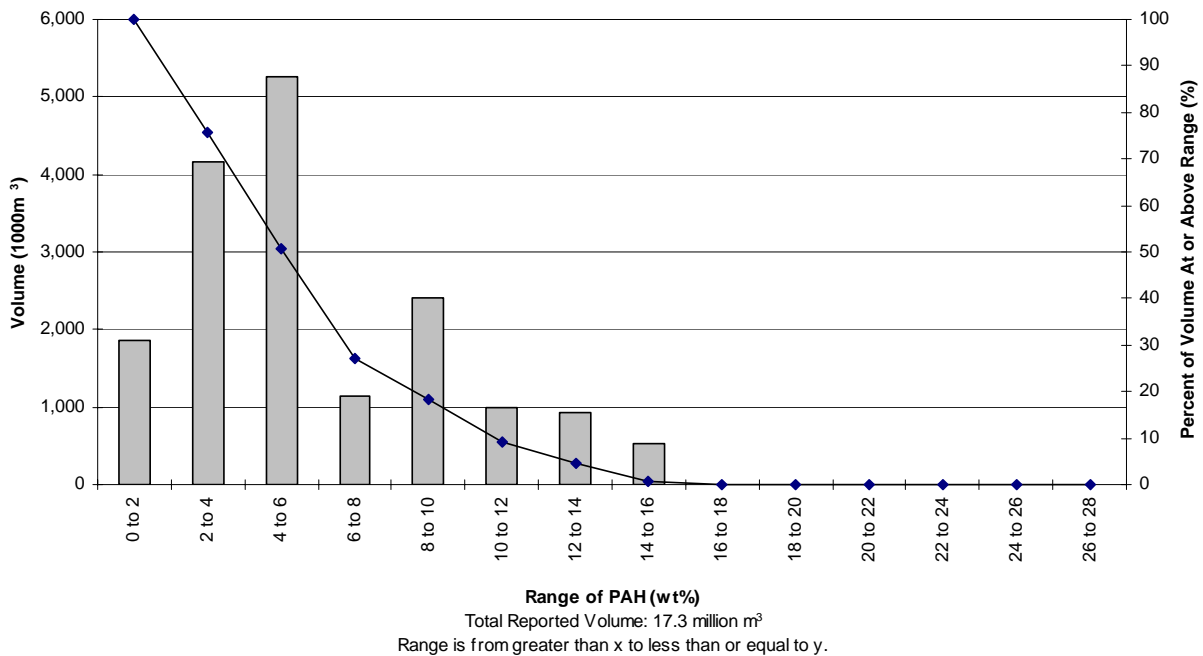


Figure 4.15b: Distribution of Reported PAH in Canadian Diesel
(<500ppm - Winter)



Figures 4.16 (a, b) show the volume distribution of reported weight percent polyaromatic hydrocarbons (PAH) by season for regular sulphur diesel fuel.

Figure 4.16a: Distribution of Reported PAH in Canadian Diesel (>500ppm - Summer)

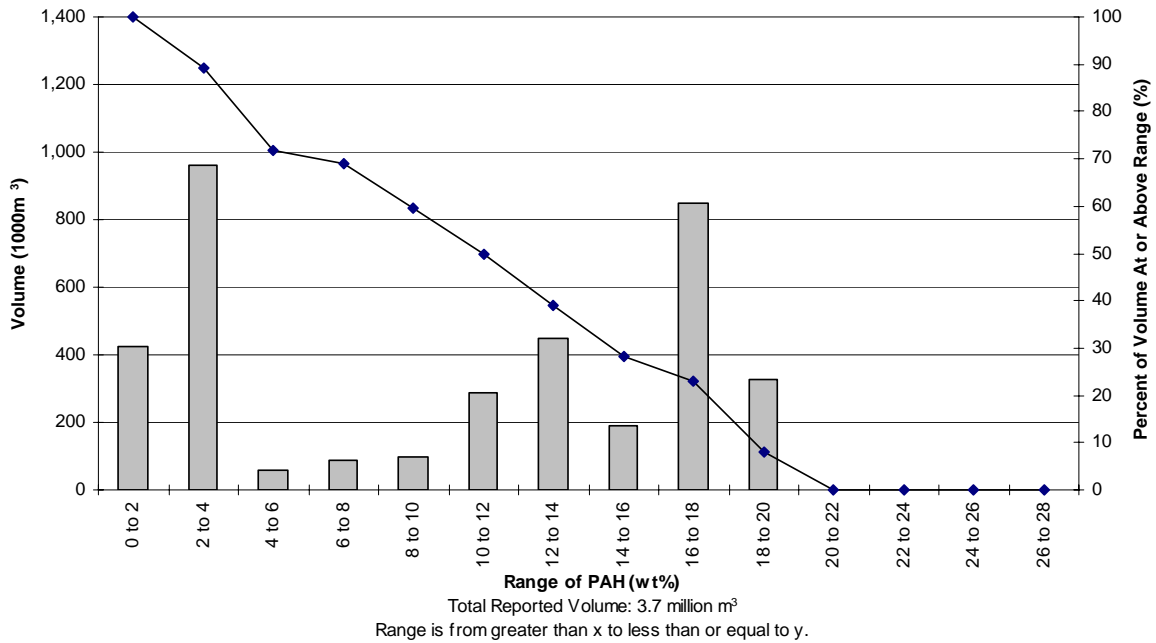
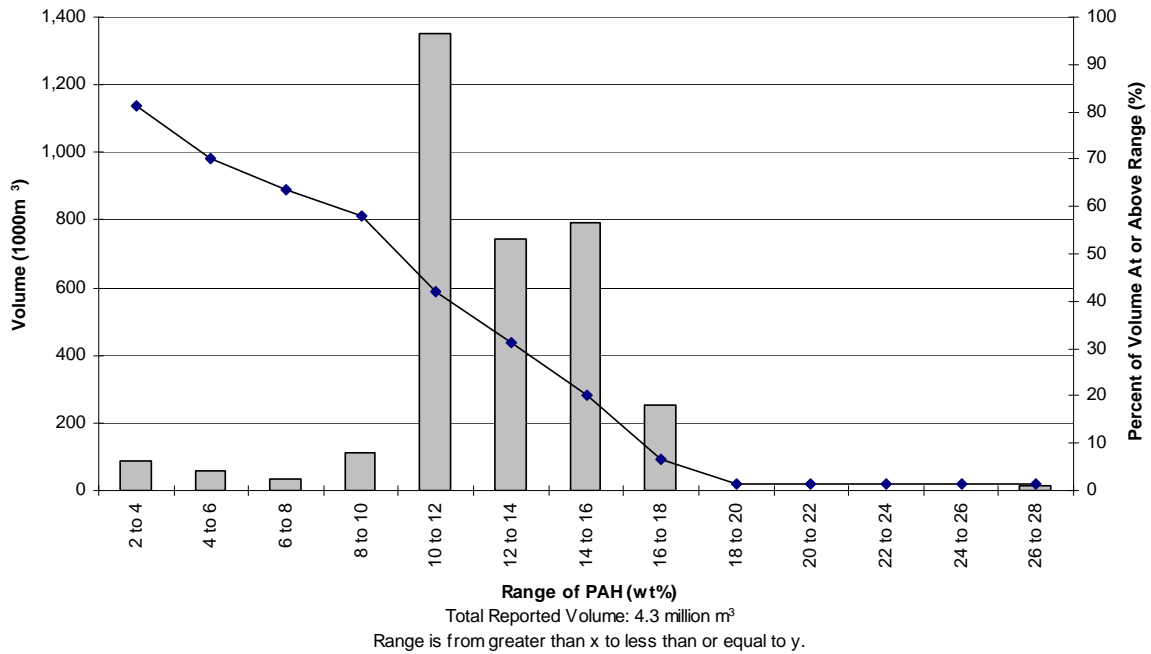


Figure 4.16b: Distribution of Reported PAH in Canadian Diesel (>500ppm - Winter)



Appendix A

Environment Canada request to companies producing and/or importing diesel fuel and/or motor gasoline into Canada.

May 29, 2001

To: Companies producing and /or importing diesel fuel and/or motor gasoline into Canada (see distribution list)

I am requesting that your company provide information beginning on July 1, 2001 regarding certain properties of diesel fuel and gasoline produced or imported for use or sale in Canada. Although certain provisions of the *Canadian Environmental Protection Act* (CEPA) provide for the collection of data, Environment Canada's preferred approach is to request this information on a voluntary basis. Based on Environment Canada's experience under the voluntary survey of Benzene, Aromatics and Olefins in Gasoline, we intend this survey to continue for a period of 18 months (i.e. until December 31, 2002).

Companies producing or importing more than 1000 m³ of either gasoline or diesel fuel in a quarter for use in Canada are requested by Environment Canada to provide the following information.

- For diesel fuel, information regarding the cetane, and concentrations of aromatics and polyaromatic hydrocarbons (PAHs) are requested separately for low-sulphur (<500 ppm) diesel and regular (> 500 ppm) diesel. While analyses for each batch of fuel would be desirable, it is recognized that there could be significant additional costs to measure diesel aromatic content and diesel PAH for all volumes. Therefore, I am requesting that in respect of these parameters, representative batches be analyzed and reported at a minimum frequency of once a month.
- The specific information requested for gasoline is the driveability index (DI), calculated as indicated in the attached guidelines, distillation values (T10, T50, and T90) and the oxygen content.

We are requesting that the information outlined in the attachment be provided to Environment Canada on a quarterly basis with each submission 45 days after the end of the quarter (the first submission is due November 14, 2001). This information is necessary to allow Environment Canada to monitor fuel quality and evaluate whether control measures similar to those introduced in other jurisdictions are required in Canada.

- 2 -

Information with respect to company production and import volumes will be treated in a confidential manner.

If you have any questions regarding this request, please contact Joanna Bellamy or Mark Tushingam in our Oil, Gas and Energy Branch at (819) 994-2901 or 994-0510.

Your co-operation in this matter is greatly appreciated.

Yours sincerely,

Barry Stemshorn
Assistant Deputy Minister
Environmental Protection Service

cc: Refinery Managers
Importers
CPPI
Chair, CGSB Gasoline and Alternative Automotive Fuels Committee
Chair, CGSB Middle Distillates Committee
Environment Canada Regional Offices

GUIDELINES FOR REPORTING DIESEL CETANE, AROMATICS AND PAH LEVELS AND GASOLINE “DI” PARAMETERS

Companies producing or importing more than 1000 m³ of diesel fuel in a quarter for use in Canada are requested by Environment Canada to provide information on the cetane number and index and the concentration of aromatics and polyaromatic hydrocarbons (PAHs) in the diesel separately for low-sulphur (<500 ppm) diesel and regular (> 500 ppm) diesel.

Companies producing or importing more than 1000 m³ of motor gasoline in a quarter for use in Canada are also requested to provide information on the distillation parameters T10, T50 and T90, driveability index (DI), and oxygen content.

1. SAMPLE LOCATION

Sample locations should cover all of the gasoline and diesel produced or imported by a company for sale in Canada. Appropriate sampling locations are:

Domestic production: refinery tanks, distribution terminal tanks, or pipelines.
Imports: Vessels, barges, tank truck compartments, or receipt tanks.

2. SAMPLING PROCEDURES

Samples taken shall be representative of the total of each quantity of gasoline or diesel fuel produced or imported. It is recognized that different hardware configurations exist and that sampling details may differ between locations. However, as a general guideline, for gasoline or diesel in refinery and terminal tanks or vessel/barge/tank truck compartments, samples shall be taken as “all level samples” or “top/middle/bottom composites”, as described in ASTM D-4057.

For pipeline shipments, samples can be either continuous composites or a composite of spot samples taken throughout the pipeline shipment, in accordance with the principles in ASTM D-4177.

3. SAMPLE FREQUENCY

Analyses should be reported for every quantity of gasoline and diesel which is imported into Canada or produced at Canadian refineries, with the exceptions stated below.

Reduced sampling frequency is allowed as long as data which is reported gives a statistical representation of the averages and variability at each reporting refinery or import area. For measurement of diesel aromatic content and diesel PAH content, analyses should be reported a minimum of once a month. Diesel cetane index should be reported for every batch. Cetane number should be provided as a reference, in addition to cetane index, as frequently as possible, but at least once per calendar year. (The addition of cetane-improving additives should be noted when cetane index is reported.)

4. ANALYTICAL PROCEDURES

The following are the reference procedures:

- for gasoline distillation properties T10, T50 and T90 (in °C) – ASTM D-86; and
- for gasoline oxygen content (in % by weight) – CAN/CGSB-3.0 14.3.

- for diesel cetane index –ASTM D-4737;
- for diesel cetane number – ASTM D-613-95;
- for diesel total aromatic content and diesel PAH content (di and higher ringed aromatics) (in % by weight) – CAN/CGSB-3.0 15.0-94.

Other appropriate analytical procedures are allowable provided that the results are equivalent to those obtained with appropriate reference methods listed above. The method should be identified and, if documentation is not publicly available, a copy of the method should be provided to Environment Canada.

No single standard test method has emerged for the measurement of PAH and aromatics in diesel. Because of this, it is expected that other methods will be used without a clear understanding as to their producing equivalent results to the reference method. For the purposes of this survey, Environment Canada will assume that they all give equivalent results.

5. FUEL VOLUMES

The volume of each quantity of gasoline or diesel fuel that is produced in Canada or imported shall be reported by grade in cubic meters, along with the corresponding parameters. If sampling frequency is reduced, the volumes applicable to quantities not analyzed still have to be reported but without any corresponding analytical results.

6. CALCULATION OF DRIVEABILITY INDEX

DI is to be calculated using the following equation:

$$DI = (1.5 \times T10) + (3 \times T50) + T90 + (11^1 \times \% OXY)$$

where T10 is the temperature (in °C) at which 10% of the gasoline distills, T50 the temperature (in °C) at which 50% of the gasoline distills, and T90 the temperature (in °C) at which 90% of the gasoline distills, and where % OXY is the percent oxygen content by weight. Note that 10% ethanol by volume is equivalent to approximately 3.7 wt % oxygen and 15% MTBE by volume is equivalent to approximately 2.7 wt % oxygen.

It is recognized that the oxygenate constant has some uncertainty associated with it and is dependent on the type of oxygenate added. Because the survey includes all the input to the DI equation, Environment Canada can recalculate the DI if new information emerges with respect to the constant.

7. REPORTING FORMAT AND FREQUENCY

The information to be reported is detailed in the attached form. Information shall be reported on a quarterly basis within forty-five days of the end of each quarter. Please send the completed form to:

Head, Oil and Gas Section
c/o Joanna Bellamy
Oil, Gas and Energy Branch
Environment Canada
351 St. Joseph Blvd., 10th Floor
Hull, Quebec K1A 0H3

If you have any questions regarding the sampling and analytical procedures or forms please contact Mark Tushingham at 819-994-0510 or Joanna Bellamy at 819-994-2901.

¹ The original letter had the factor of 20, which was for the DI equation using degrees Fahrenheit. The correct factor revised in this letter is 11, for the DI equation using degrees Celsius.

Appendix B

Details on T10, T50 and T90

Figures 3.7 (a, b, c, d, e, f, g, h, i) show the reported volume distribution of T10 in °C, Figures 3.8 (a, b, c, d, e, f, g, h, i) show the reported volume distribution of T50 in °C, and Figures 3.9 (a, b, c, d, e, f, g, h, i) show the reported volume distribution of T90 in °C. In Canada, there is a CGSB standard for T10, T50 and T90. Only Quebec, Ontario, Alberta and British Columbia regulate T10, T50 and T90.

In general the CGSB specification for summer gasoline T10 is a minimum of 35 °C and a maximum of 70 °C, except for cooler regions of Canada. In Q2 and Q3 there were 6 batches reported with T 10 below the 35 °C, all in the West. One batch was reported above was reported above 70 °C for T10 in Q2 and Q3.

The CGSB standard includes a transition period (September/October) between summer and winter gasolines during which the maximum T10 is 55 °C. The CGSB specification for winter gasoline has no minimum T10 and a maximum T10 of 50 °C. In Q1 and Q4, 51 batches were reported having T10 above 50 °C. 6 of these batches were produced in October, with 3 of them exceeding the transitional maximum of 55 °C.

In general, the CGSB specifications for summer gasoline T50 are a minimum of 70 °C and a maximum of 120 °C, except for cooler regions of Canada. In Q2 and Q3, 3 batches reported were below the minimum of 70 °C and 1 batch was above the maximum of 120 °C for T50.

The CGSB standard includes a transition period (September/October) between summer and winter gasolines during which the maximum T50 is 113 °C. The CGSB specifications for winter gasoline T50 are a minimum of 70 °C and a maximum of 110 °C. In Q1 and Q4, 45 batches were reported having T50 below 70 °C and 15 batches were reported having T50 above 110 °C. 5 of the exceeding batches were produced in October, with 3 of them exceeding the transitional maximum of 113 °C.

In general the specifications for summer gasoline T90 are no minimum and a maximum of 190 °C, except for cooler regions of Canada. In Q2 and Q3, 1 batch reported was above the maximum of 190 °C.

The CGSB specifications for winter gasoline T90 is no minimum and a maximum of 185 °C. In Q1 and Q4, 1 batch was above 185 °C.

Figure 3.7 a: Distribution of Reported T10(C) for Canadian Gasoline
(Regular Non-Ethanol Gasoline - Summer)

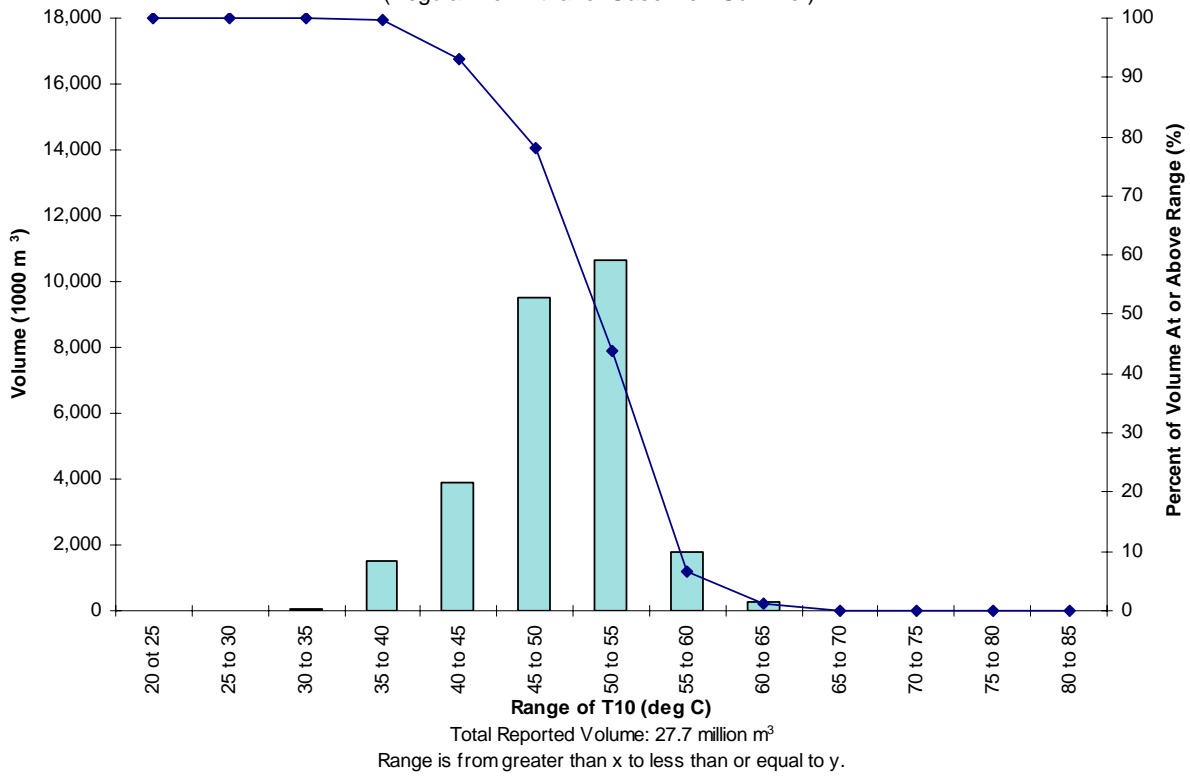


Figure 3.7 b: Distribution of Reported T10(C) for Canadian Gasoline
(Regular Non-Ethanol Gasoline - Winter)

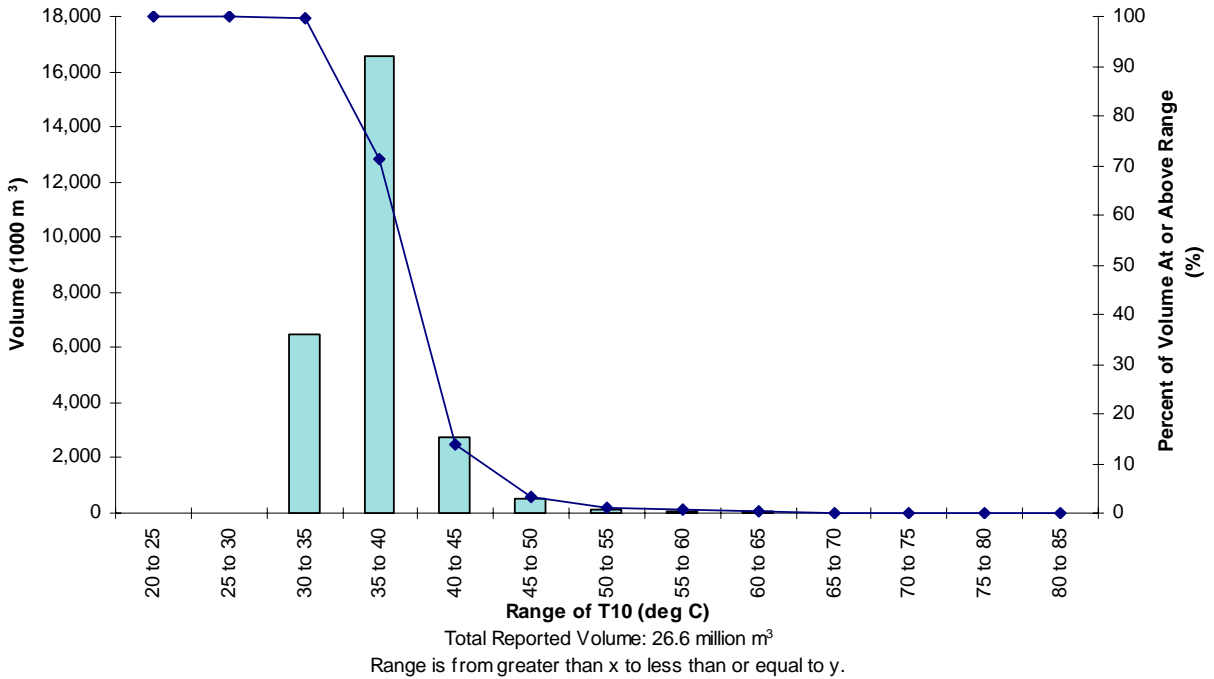


Figure 3.7 c: Distribution of Reported T10(C) for Canadian Gasoline
(Regular Ethanol Blend Gasoline - Summer)

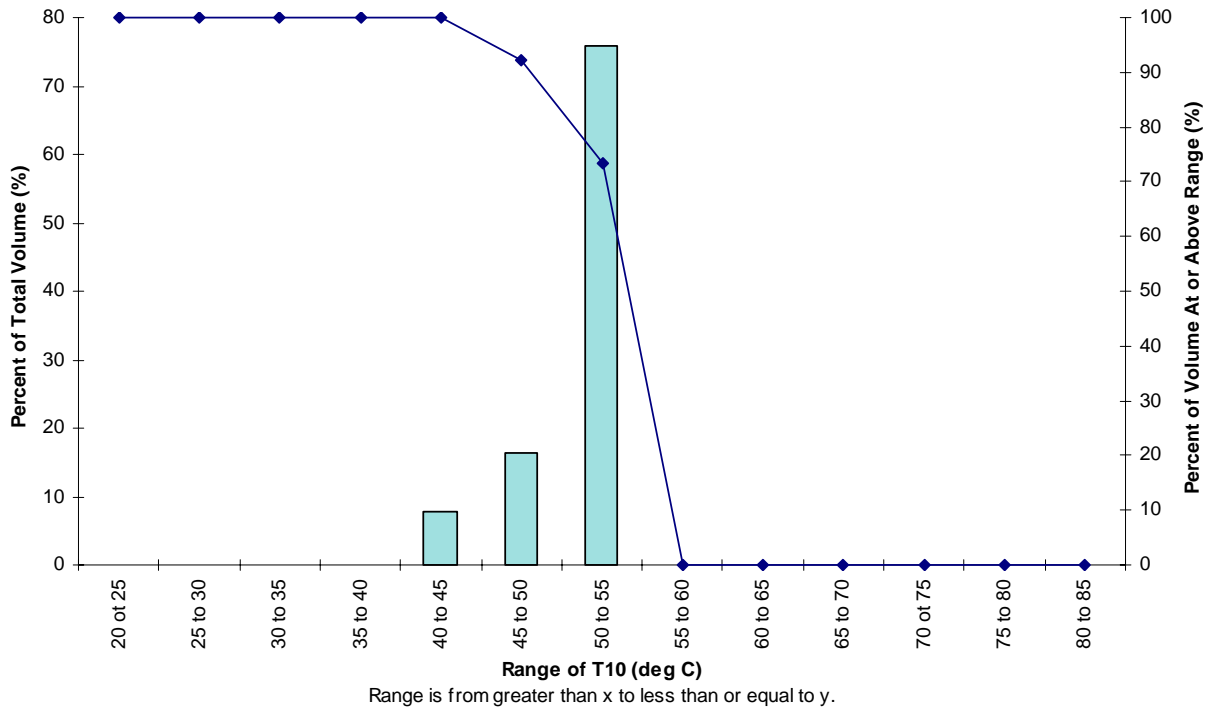


Figure 3.7 d: Distribution of Reported T10(C) for Canadian Gasoline
(Regular Ethanol Blend Gasoline - Winter)

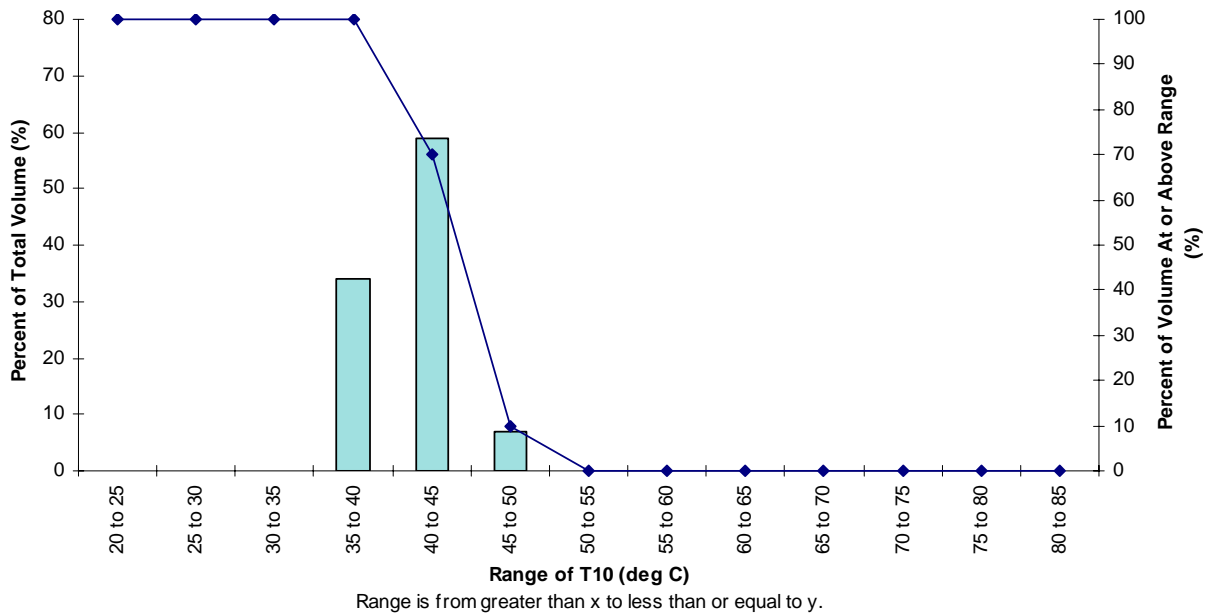


Figure 3.7 e: Distribution of Reported T10(C) for Canadian Gasoline
(Premium Non-Ethanol Gasoline - Summer)

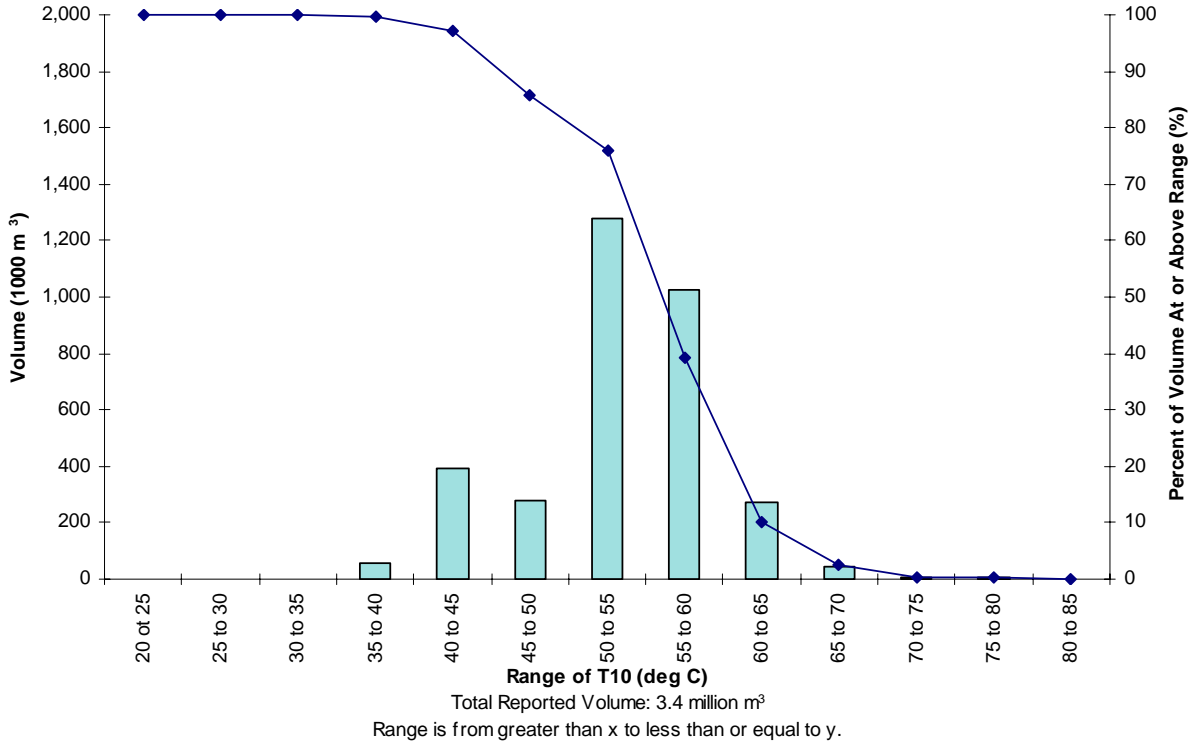


Figure 3.7 f: Distribution of Reported T10(C) for Canadian Gasoline
(Premium Non-Ethanol Gasoline - Winter)

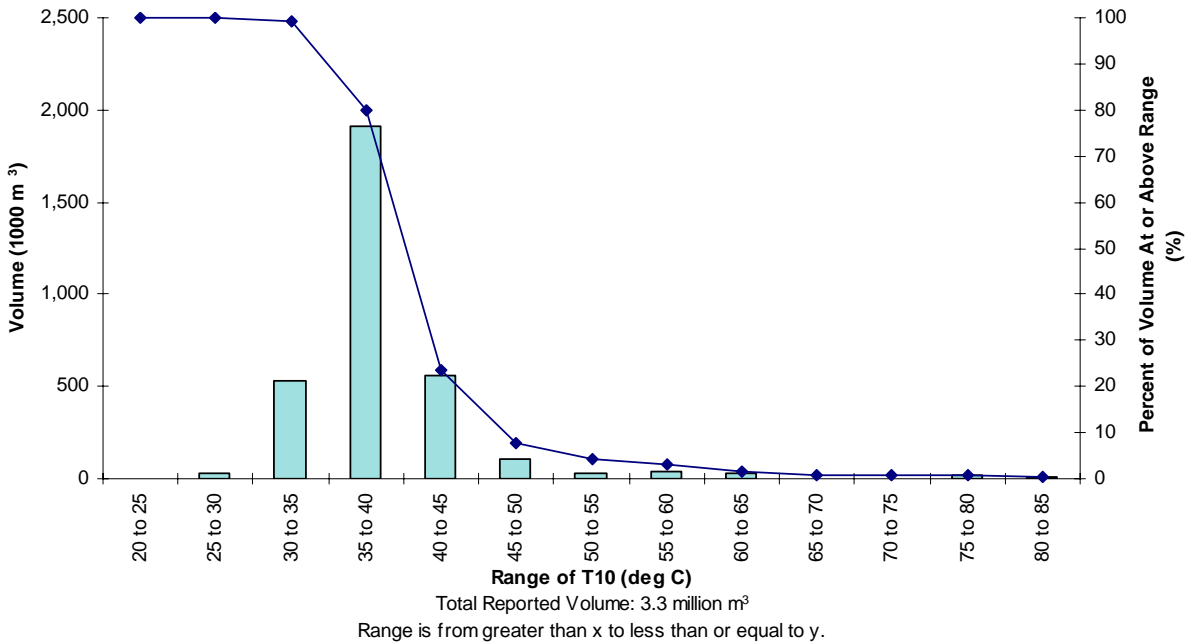


Figure 3.7 g: Distribution of Reported T10(C) for Canadian Gasoline
(Premium Ethanol Blend Gasoline - Summer)

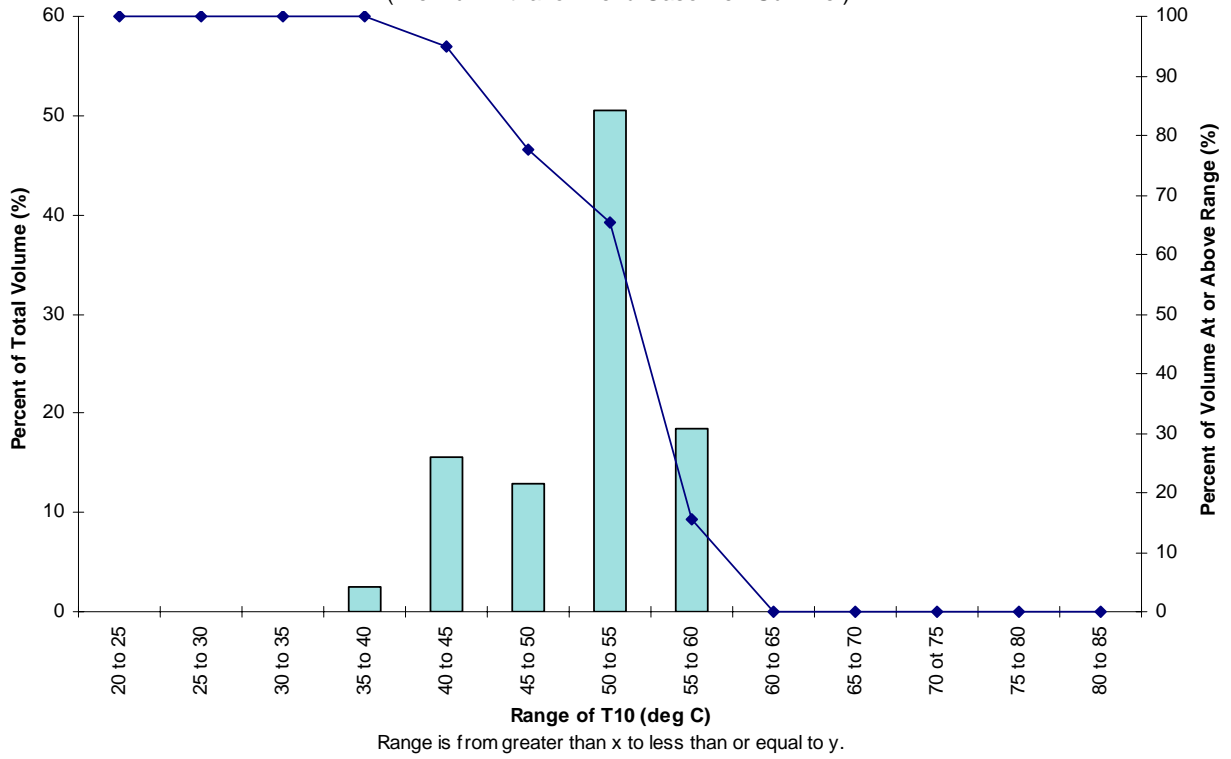


Figure 3.7 h: Distribution of Reported T10(C) for Canadian Gasoline
(Premium Ethanol Blend Gasoline - Winter)

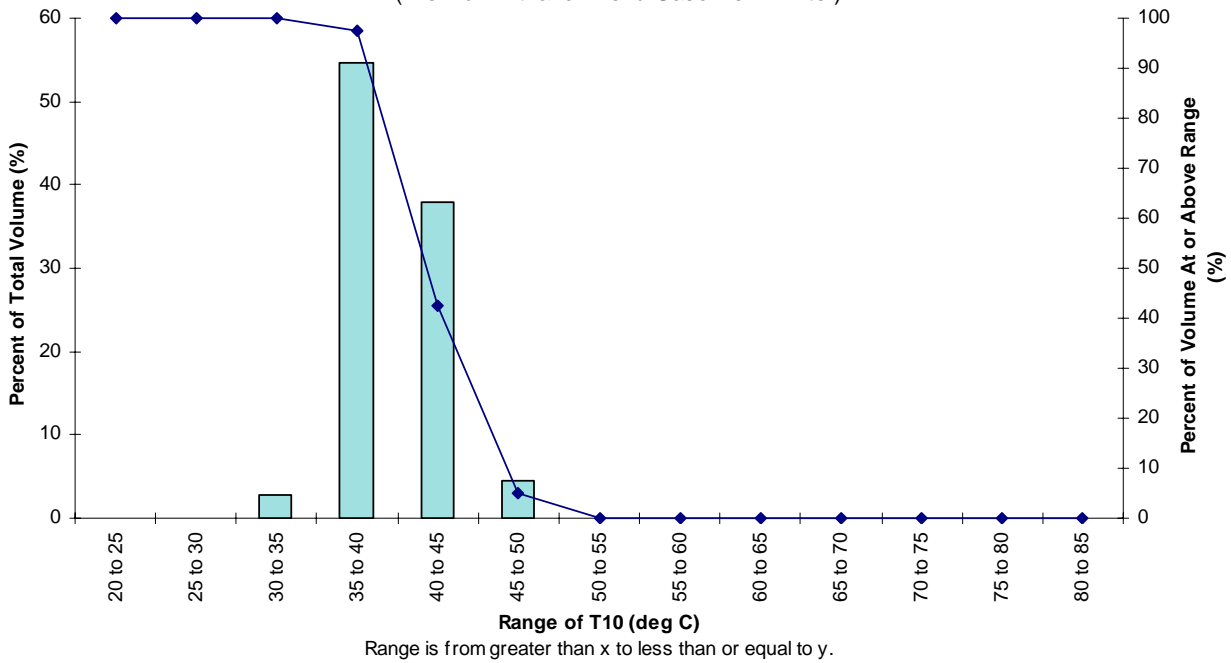


Figure 3.8 a: Distribution of Reported T50(C) for Canadian Gasoline
(Regular Non-Ethanol Gasoline - Summer)

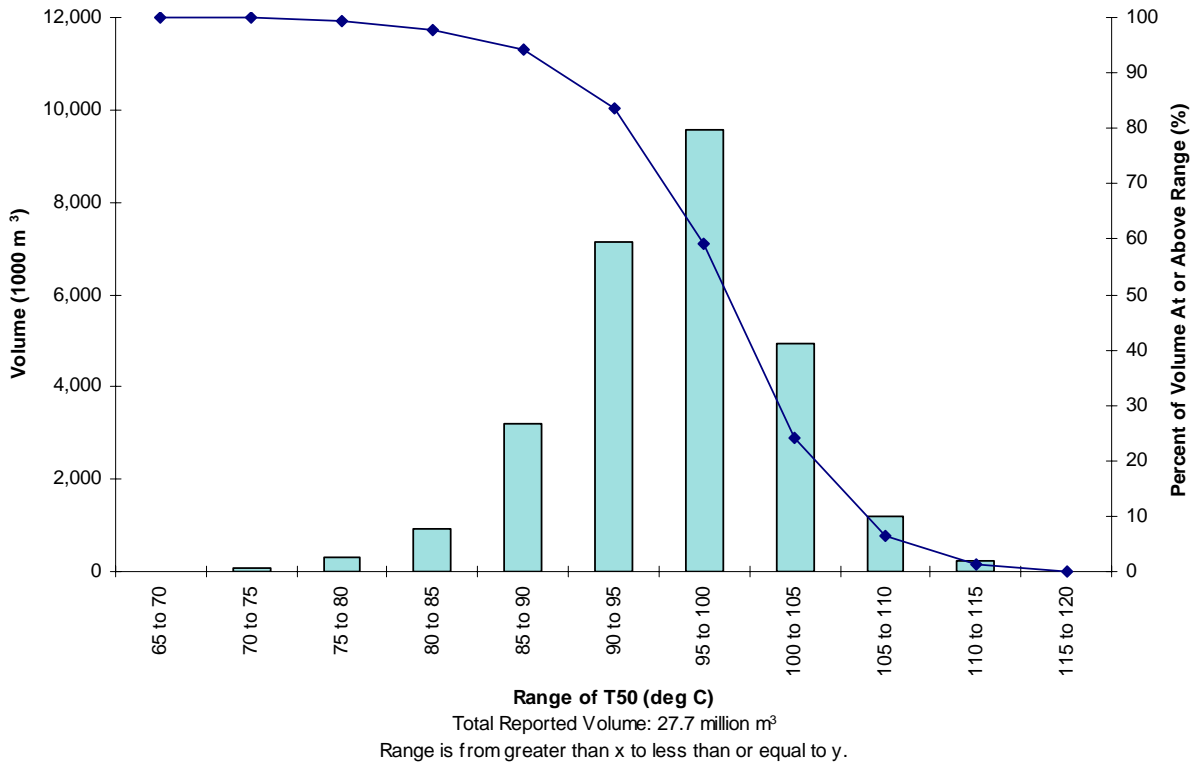


Figure 3.8 b: Distribution of Reported T50(C) for Canadian Gasoline
(Regular Non-Ethanol Gasoline - Winter)

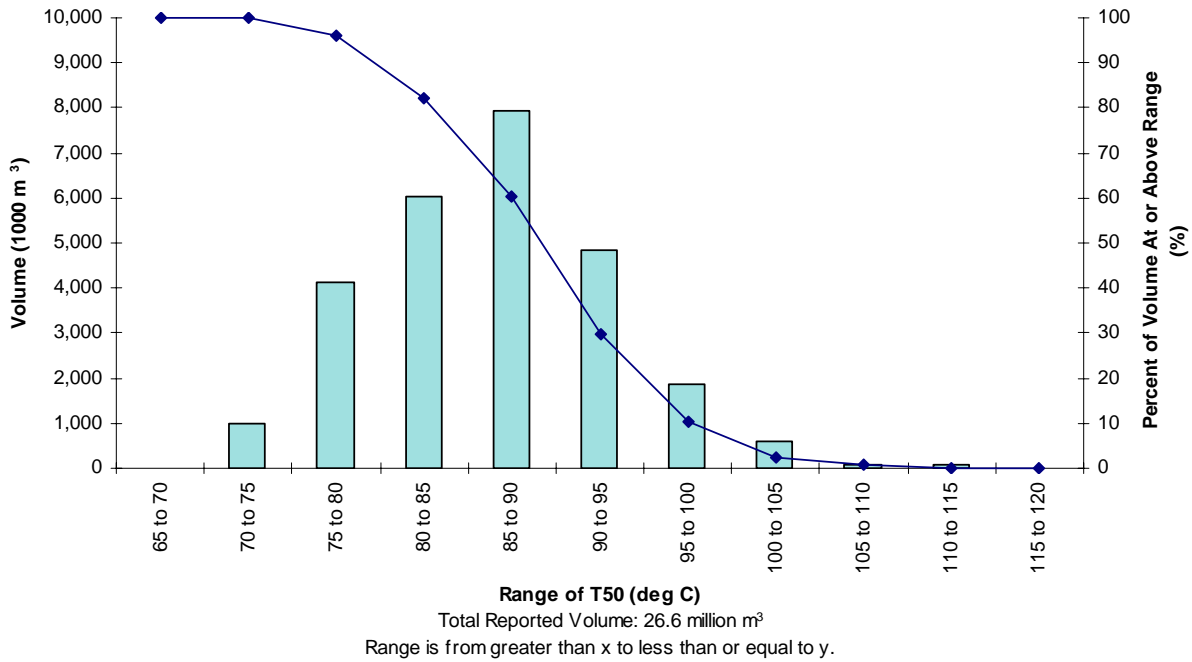


Figure 3.8 c: Distribution of Reported T50(C) for Canadian Gasoline
(Regular Ethanol Blend Gasoline - Summer)

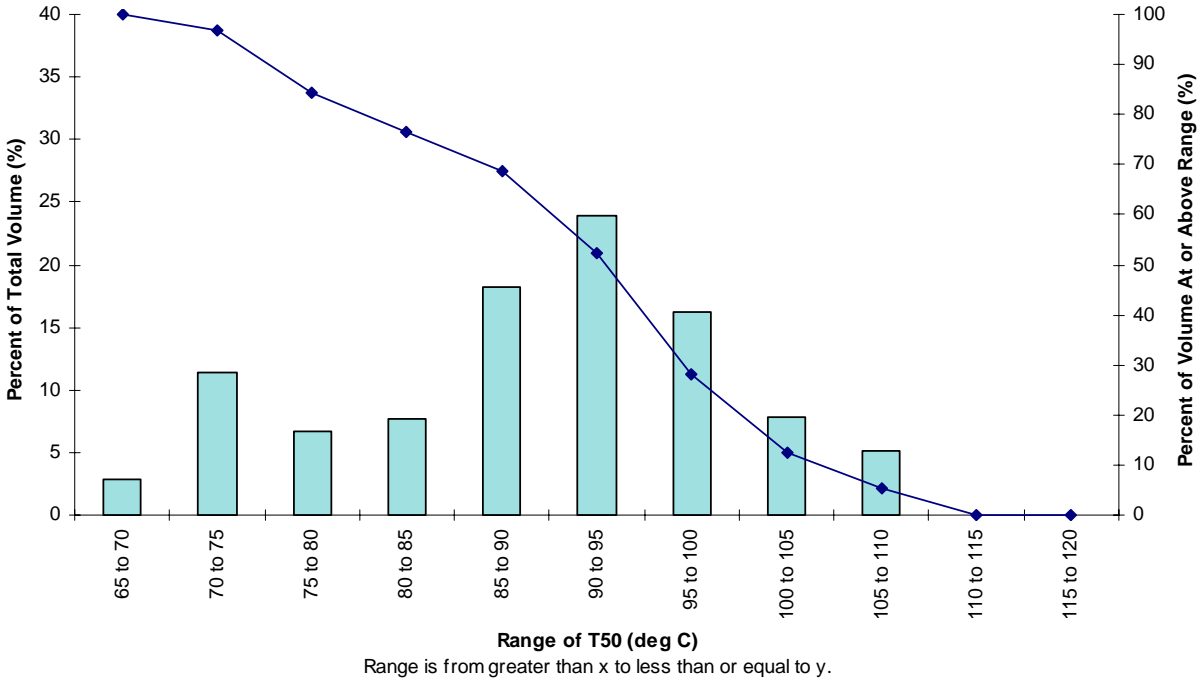


Figure 3.8 d: Distribution of Reported T50(C) for Canadian Gasoline
(Regular Ethanol Blend Gasoline - Winter)

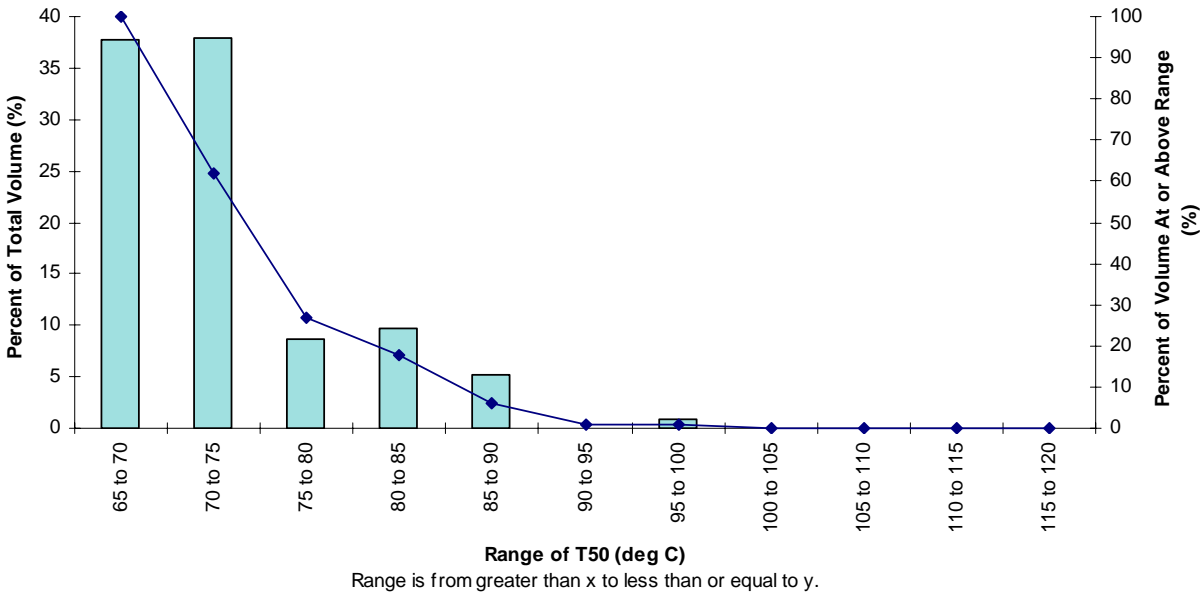


Figure 3.8 e: Distribution of Reported T50(C) for Canadian Gasoline
(Premium Non-Ethanol Gasoline - Summer)

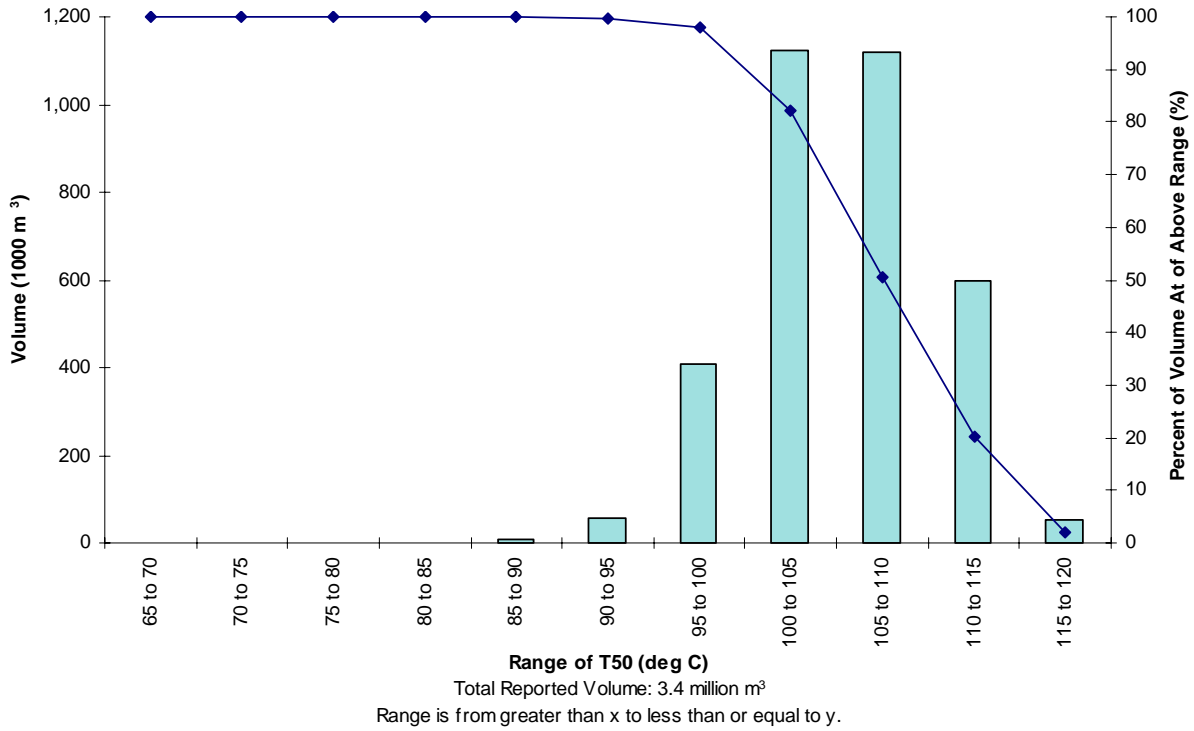


Figure 3.8 f: Distribution of Reported T50(C) for Canadian Gasoline
(Premium Non-Ethanol Gasoline - Winter)

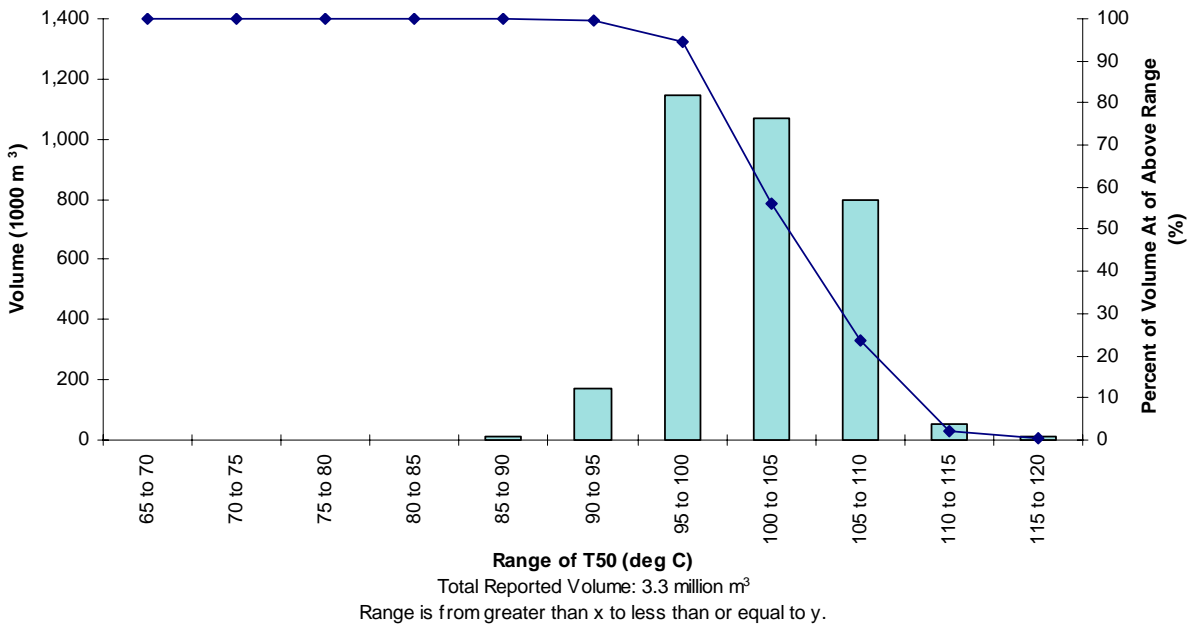


Figure 3.8 g: Distribution of Reported T50(C) for Canadian Gasoline
(Premium Ethanol Blend Gasoline - Summer)

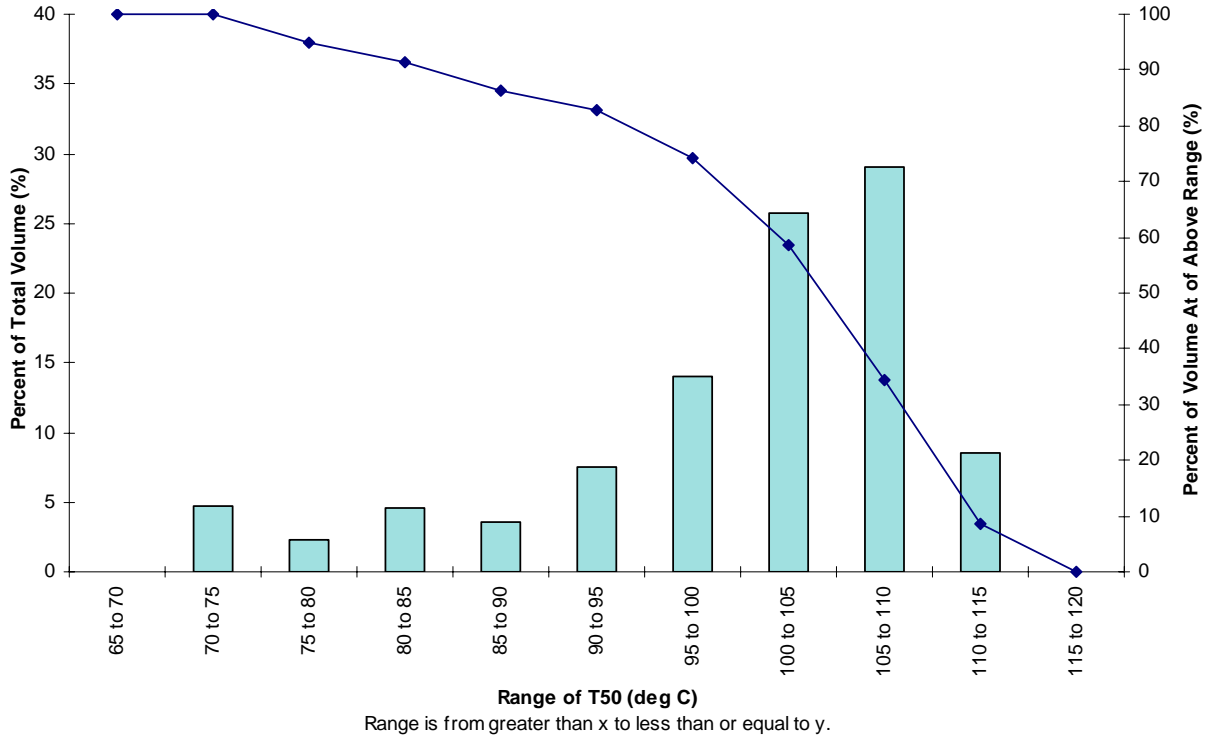


Figure 3.8 h: Distribution of Reported T50(C) for Canadian Gasoline
(Premium Ethanol Blend Gasoline - Winter)

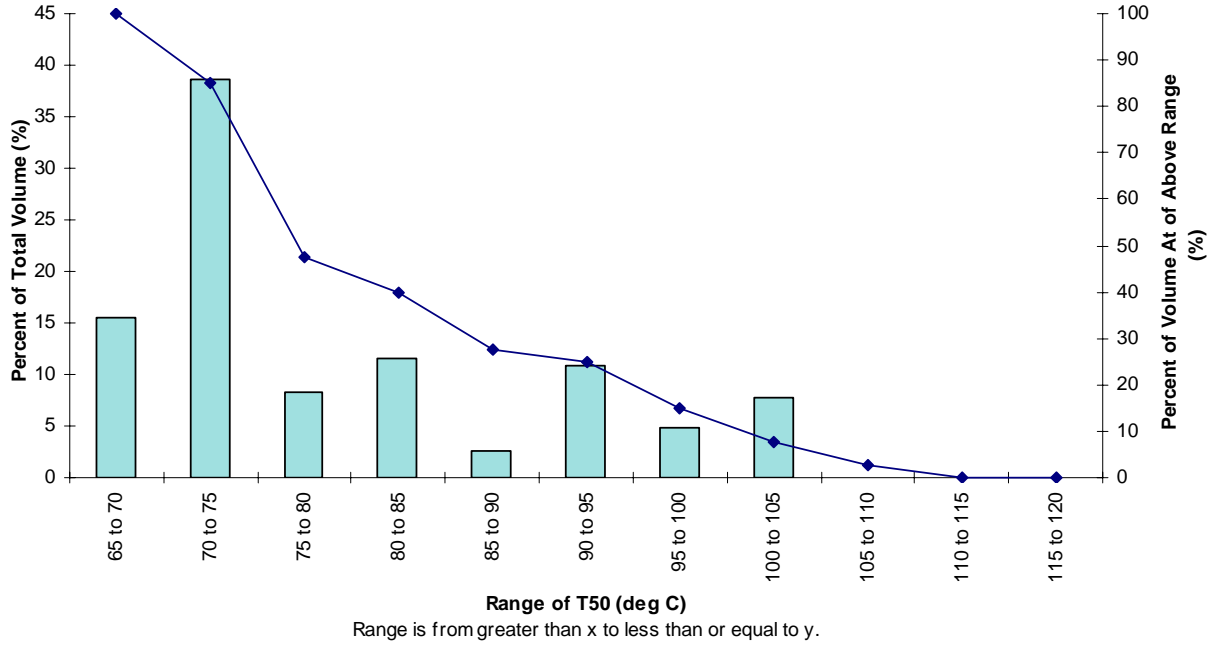


Figure 3.9 a: Distribution of Reported T90(C) for Canadian Gasoline
(Regular Non-Ethanol Gasoline - Summer)

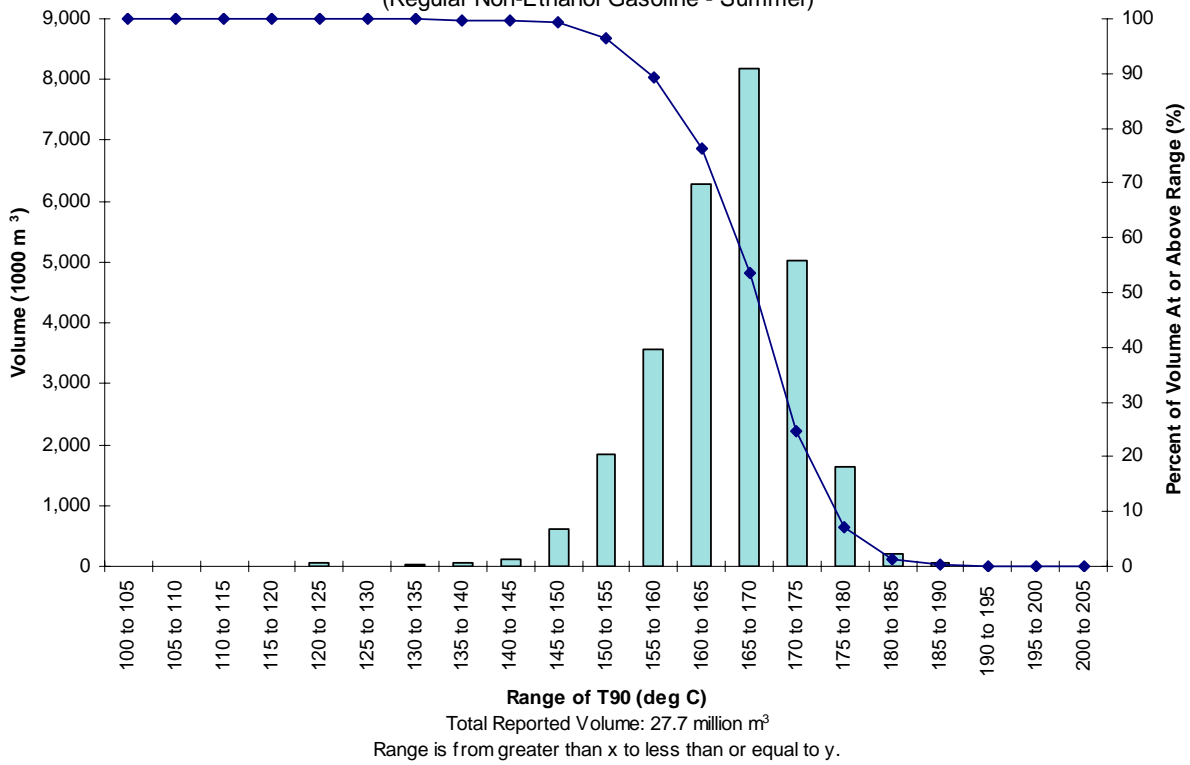
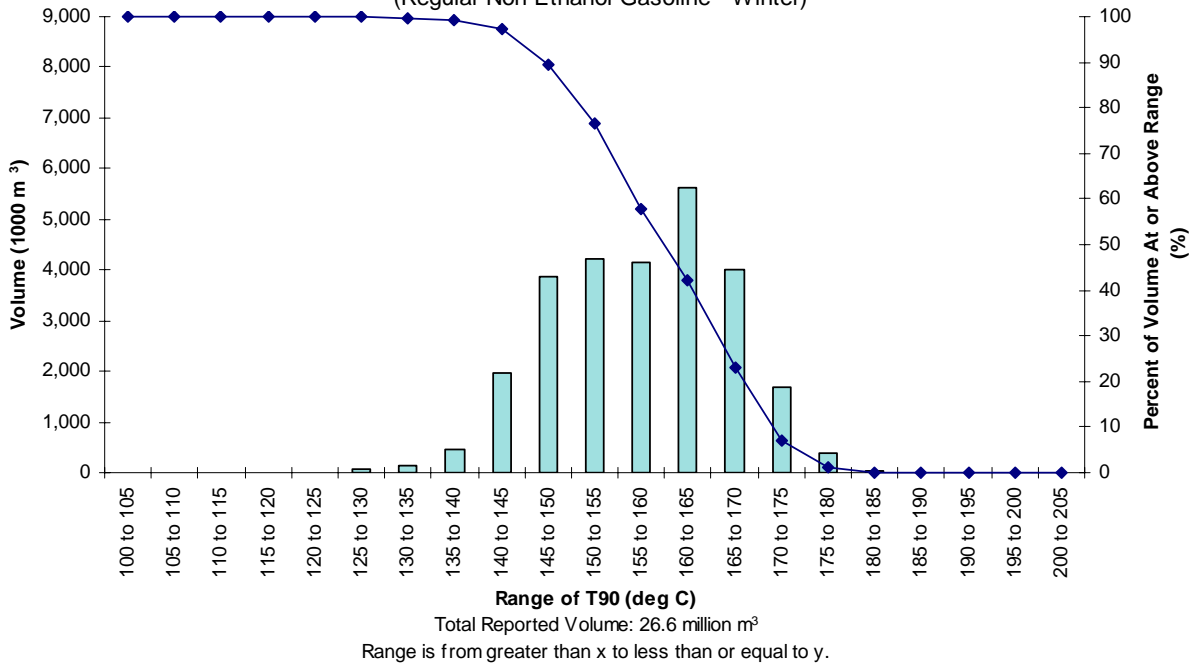
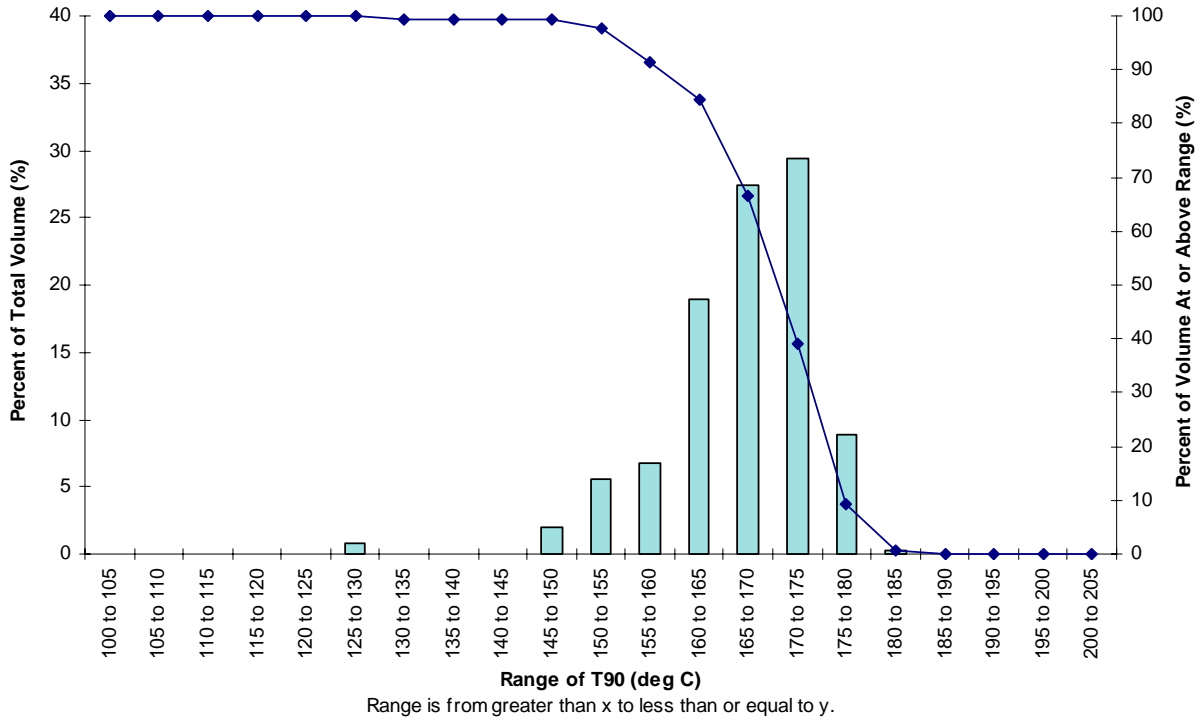


Figure 3.9 b: Distribution of Reported T90(C) for Canadian Gasoline
(Regular Non-Ethanol Gasoline - Winter)



**Figure 3.9 c: Distribution of Reported T90(C) for Canadian Gasoline
(Regular Ethanol Blend Gasoline - Summer)**



**Figure 3.9 d: Distribution of Reported T90(C) for Canadian Gasoline
(Regular Ethanol Blend Gasoline - Winter)**

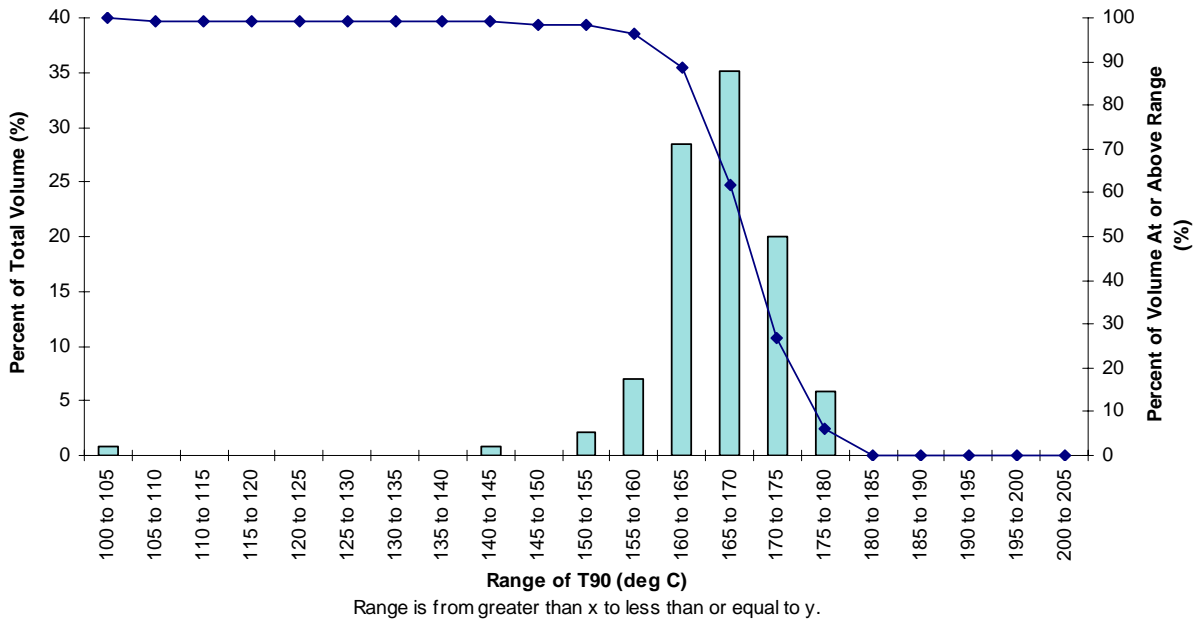


Figure 3.9 e: Distribution of Reported T90(C) for Canadian Gasoline
(Premium Non-Ethanol Gasoline - Summer)

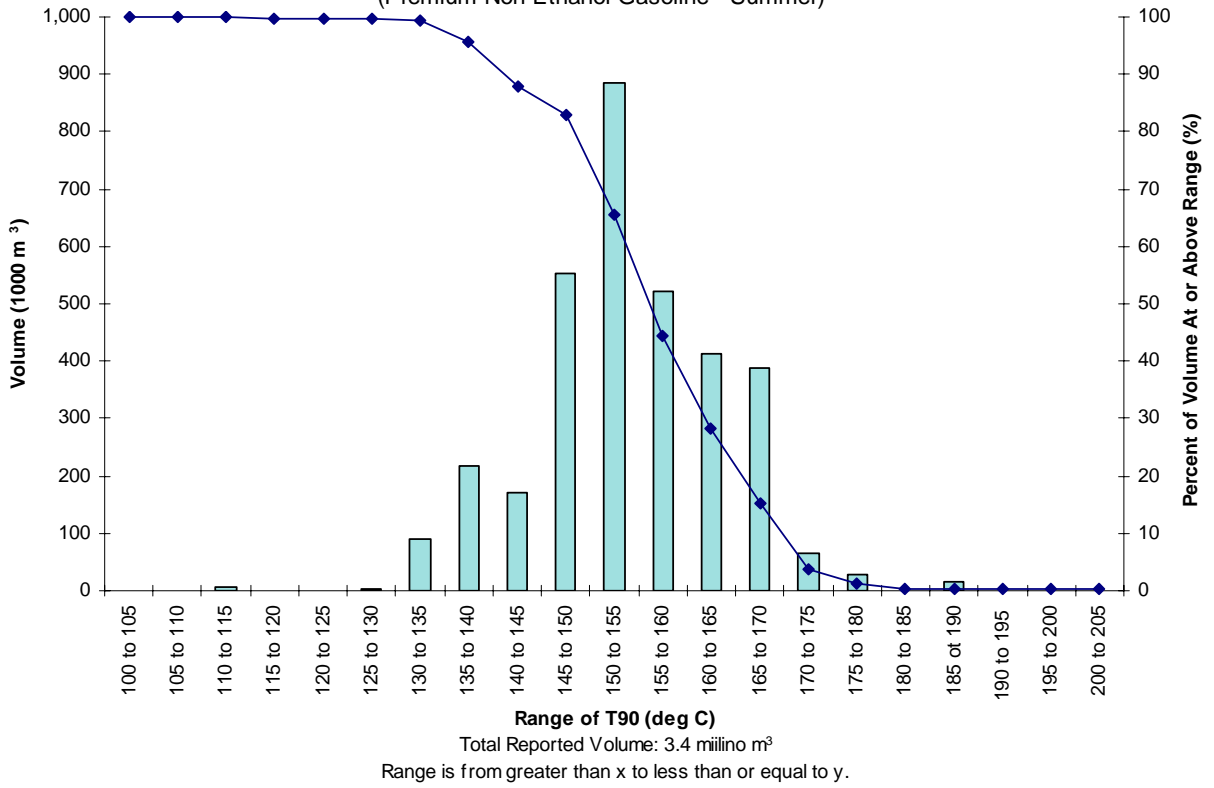


Figure 3.9 f: Distribution of Reported T90(C) for Canadian Gasoline
(Premium Non-Ethanol Gasoline - Winter)

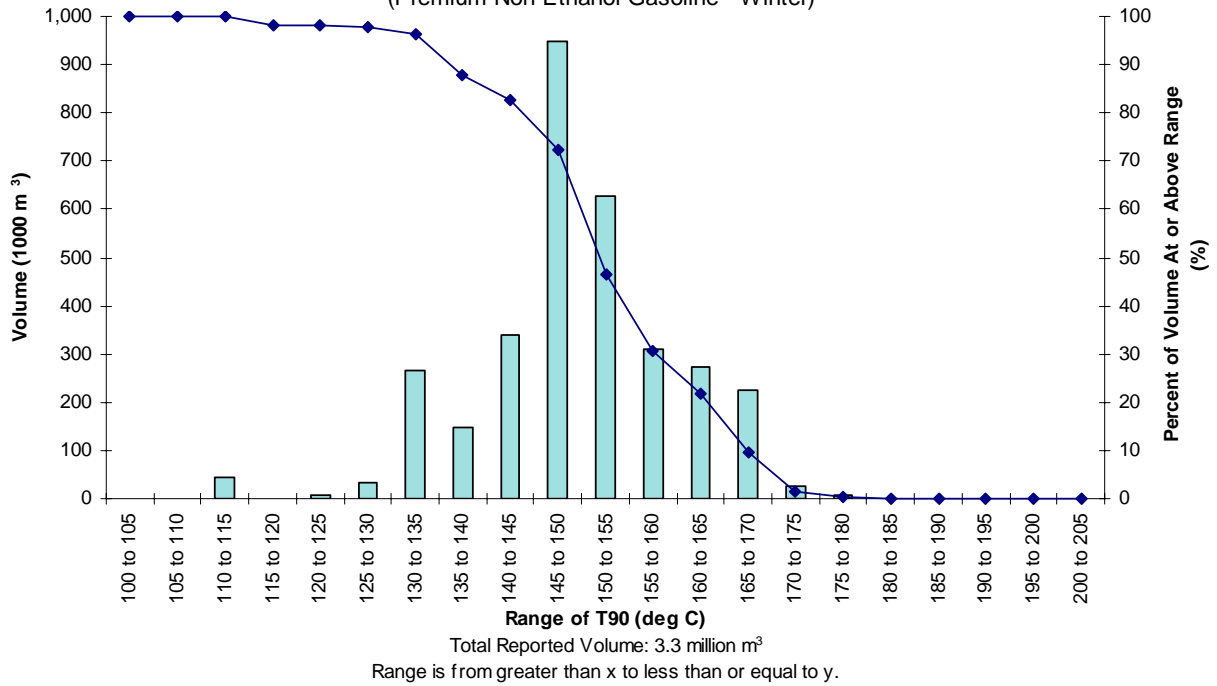


Figure 3.9 g: Distribution of Reported T90(C) in Canadian Gasoline
(Premium Ethanol Blend Gasoline - Summer)

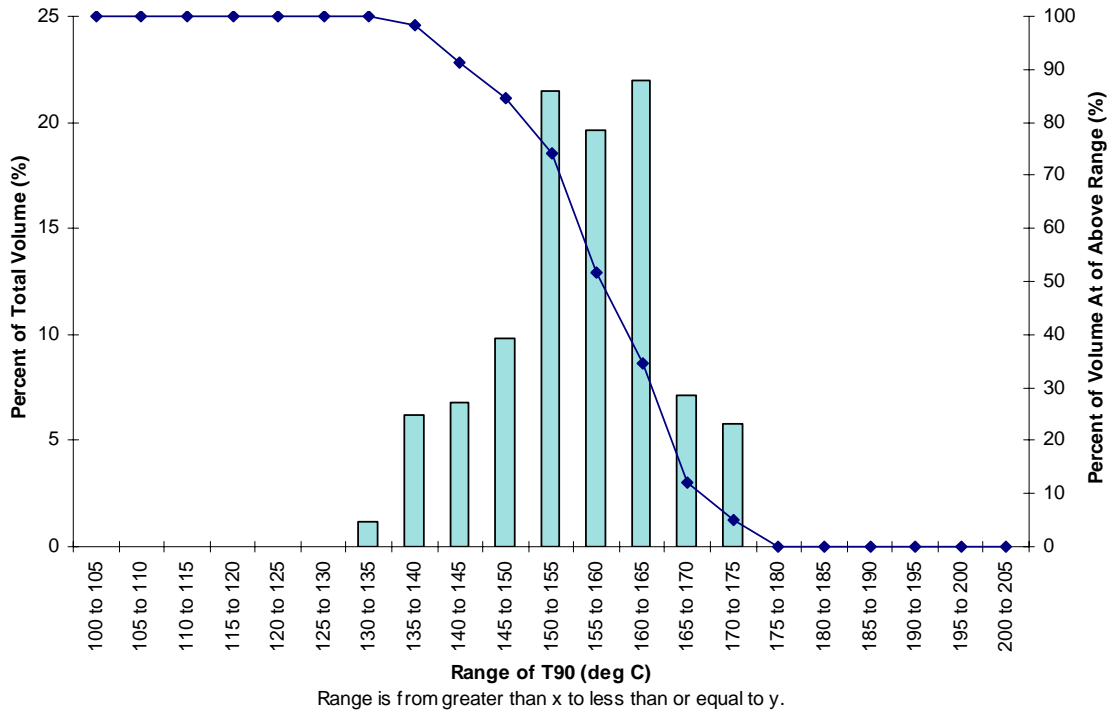
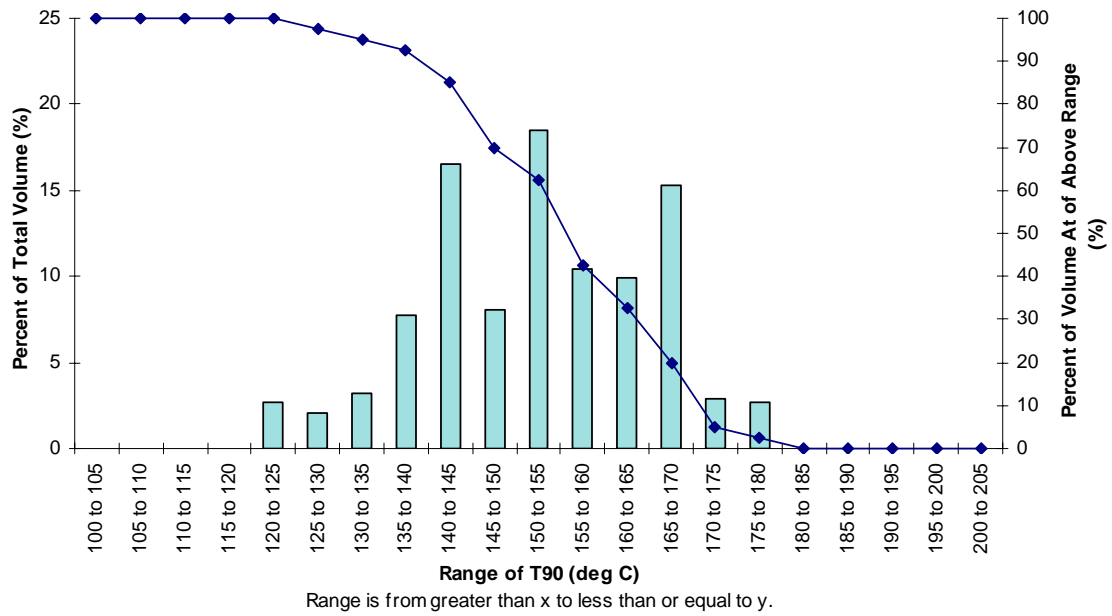


Figure 3.9 h: Distribution of Reported T90(C) in Canadian Gasoline
(Premium Ethanol Blend Gasoline - Winter)



Appendix C

2001 - Q3

Gasoline Without Oxygenate			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		516.0	516.0	516.0
	Regular		572.5	572.5	572.5
	Not Specified		572.6	578.2	525.6
Quebec	Premium		584.6	598.2	562.3
	Regular		566.4	587.9	529.8
Ontario	Premium		588.6	591.3	571.8
	Regular		581.9	586.4	547.3
	Not Specified		567.7	577.5	516.9
West	Premium		565.7	573.3	404.7
	Regular		570.2	586.4	516.3
	Not Specified		570.4	570.5	538.3
NATIONAL	Premium		583.7	590.8	516.1
	Regular		577.0	587.1	528.3
	Not Specified		572.0	580.4	521.7

2001 - Q4

Gasoline Without Oxygenate			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		536.4	546.5	518.0
	Regular		510.6	518.5	459.6
Quebec	Premium		541.1	559.0	514.9
	Regular		519.4	547.5	473.1
Ontario	Premium		538.4	559.6	515.5
	Regular		535.8	554.0	476.5
West	Premium		539.9	549.2	494.6
	Regular		510.1	525.8	476.6
NATIONAL	Premium		540.2	553.5	509.5
	Regular		520.6	544.5	474.8

2002 - Q1

Gasoline Without Oxygenate			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		526.6	528.2	512.8
	Regular		493.5	500.7	463.1
Quebec	Premium		557.0	560.9	516.1
	Regular		526.3	563.1	467.3
Ontario	Premium		550.4	563.4	528.3
	Regular		517.5	545.5	470.6
West	Premium		546.8	582.3	508.3
	Regular		534.3	559.1	478.2
NATIONAL	Premium		552.0	568.5	517.6
	Regular		529.0	558.5	472.0

2002 - Q2

Gasoline Without Oxygenate			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		568.6	573.1	544.8
	Regular		556.7	560.3	522.4
Quebec	Premium		575.2	580.0	548.6
	Regular		569.0	597.7	526.3
Ontario	Premium		582.8	584.8	556.9
	Regular		568.5	577.5	531.3
West	Premium		570.4	582.8	536.9
	Regular		558.8	567.3	521.2
NATIONAL	Premium		577.8	584.6	548.0
	Regular		563.9	577.5	525.7

2002 - Q3

Gasoline Without Oxygenate			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		577.0	578.0	568.7
	Regular		562.1	565.7	528.9
Quebec	Premium		590.2	601.2	556.9
	Regular		563.2	578.1	520.7
Ontario	Premium		587.0	590.4	553.1
	Regular		556.3	568.0	522.7
West	Premium		583.1	591.2	546.7
	Regular		564.9	576.2	526.8
NATIONAL	Premium		589.3	591.4	550.8
	Regular		562.8	575.6	524.7

2002 - Q4

Gasoline Without Oxygenate			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		541.6	541.9	522.7
	Regular		497.6	521.9	490.4
Quebec	Premium		541.7	543.1	509.7
	Regular		511.0	529.9	463.4
Ontario	Premium		515.6	534.5	513.2
	Regular		547.8	551.8	470.0
West	Premium		556.7	564.1	511.7
	Regular		506.9	514.0	476.1
NATIONAL	Premium		547.0	561.8	512.1
	Regular		509.3	527.3	472.7

2001 - Q3

Gasoline Containing Ethanol			Oxygen (wt%)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Premium		3.5	3.5	3.4	568	569	521
	Eth BI Regular		3.5	3.6	3.5	549	576	505
West	Eth BI Premium		0.5	0.5	0.5	514	514	514
NATIONAL	Eth BI Premium		3.5	3.5	3.4	568	569	521
	Eth BI Regular		3.5	3.6	3.5	549	576	505

2001 - Q4

Gasoline Containing Ethanol			Oxygen (wt%)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		3.6	3.7	3.5	533	547	480
	Eth BI Reg		3.6	3.6	3.5	504	521	459
West	Eth BI Prem		0.3	0.3	0.3	539	539	539
NATIONAL	Eth BI Prem		3.6	3.7	3.5	543	548	480
	Eth BI Reg		3.6	3.6	3.5	504	521	459

2002 - Q1

Gasoline Containing Ethanol			Oxygen (wt%)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		3.5	3.5	3.5	489	490	471
	Eth BI Reg		3.6	3.6	3.5	517	527	480
NATIONAL	Eth BI Prem		3.5	3.5	3.5	489	490	471
	Eth BI Reg		3.6	3.6	3.5	517	527	480

2002 - Q2

Gasoline Containing Ethanol			Oxygen (wt%)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		3.5	3.5	3.4	620	621	574
	Eth BI Reg		3.5	3.6	3.5	613	618	549
West	Eth BI Prem		2.1	2.1	1.8	592	594	561
NATIONAL	Eth BI Prem		3.5	3.5	2.6	617	621	567
	Eth BI Reg		3.5	3.6	3.5	613	618	549

2002 - Q3

Gasoline Containing Ethanol			Oxygen (wt%)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		3.4	3.5	3.4	608	609	573
	Eth BI Reg		3.5	3.6	3.5	593	619	559
Quebec	Eth BI Prem		1.7	1.7	1.4	574	577	554
NATIONAL	Eth BI Prem		3.4	3.5	2.8	608	609	568
	Eth BI Reg		3.5	3.6	3.5	593	619	559

2002 - Q4

Gasoline Containing Ethanol			Oxygen (wt%)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		3.6	3.6	3.5	541	545	484
	Eth BI Reg		3.6	3.7	3.5	508	524	485
NATIONAL	Eth BI Prem		3.6	3.6	3.5	541	545	484
	Eth BI Reg		3.6	3.7	3.5	508	524	485

2001 - Q3

Gasoline Containing MTBE			Oxygenate (wt%)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		2.3	2.3	2.1	521	526	497
	Not Specified		0.7	0.7	0.7	531	531	531
Qubec	Regular		0.4	0.4	0.2	557	558	540
Ontario	Regular		0.3	0.3	0.3	547	548	528
NATIONAL	Regular		2.3	2.3	0.2	554	558	538
	Not Specified		0.7	0.7	0.7	531	531	531

2001 - Q4

Gasoline Containing MTBE			Oxygenate (wt%)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		2.4	2.5	2.0	496	503	476
	Not Specified		0.2	0.2	0.2	498	498	498
Quebec	Premium		0.0	0.0	0.0	536	539	508
	Regular		0.4	0.4	0.2	522	556	468
Ontario	Regular		0.1	0.1	0.1	522	522	510
NATIONAL	Premium		0.0	0.0	0.0	536	539	508
	Regular		2.1	2.4	0.2	523	551	470
	Not Specified		0.2	0.2	0.2	498	498	498

2002 - Q1

Gasoline Containing MTBE			Oxygenate (wt%)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Not Specified		0.1	0.4	0.1	522	522	522
Quebec	Premium		0.4	0.1	0.4	505	505	505
NATIONAL	Premium		0.4	0.4	0.4	505	505	505
	Not Specified		0.1	0.1	0.1	522	522	522

2002 - Q2

Gasoline Containing MTBE			Oxygenate (wt%)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		2.53	2.55	2.12	516	517	490
	Not Specified		0.10	0.10	0.10	551	551	551
Quebec	Regular		0.14	0.15	0.06	569	572	551
	Not Specified		0.05	0.05	0.04	532	535	472
Ontario	Regular		0.14	0.15	0.06	569	572	551
NATIONAL	Regular		0.10	0.10	0.24	550	551	546
	Not Specified		2.52	2.55	0.09	572	572	541

2002 - Q3

Gasoline Containing MTBE			Oxygenate (wt%)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		2.67	2.67	2.50	517	518	497
	Not Specified		0.08	0.08	0.08	567	567	567
Quebec	Regular		3.86	4.37	1.77	556	558	538
West	Regular		0.10	0.10	0.10	541	541	541
NATIONAL	Regular		3.04	4.21	1.47	546	556	537
	Not Specified		0.08	0.08	0.08	567	567	567

2002 - Q4

Gasoline Containing MTBE			Oxygenate (wt%)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (wt%)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		2.48	2.63	2.09	500	504	471
Quebec	Regular		0.29	0.30	0.28	519	520	518
Ontario	Regular		0.20	0.20	0.20	482	482	482
NATIONAL	Regular		2.43	2.62	0.43	509	518	499

2001 - Q3

Gasoline Without Oxygenate - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		52.0	52.0	52.0	516	516	516
	Regular		59.0	59.0	59.0	573	573	573
	Not Specified		53.3	56.0	52.2	573	578	526
Quebec	Premium		60.9	64.0	53.9	585	598	562
	Regular		56.4	59.2	50.4	566	588	530
Ontario	Premium		56.0	56.7	52.2	589	591	572
	Regular		55.4	56.1	50.8	582	586	547
	Not Specified		56.1	56.8	49.8	568	578	517
West	Premium		65.7	68.9	54.1	566	573	405
	Regular		57.8	60.7	48.0	570	586	516
	Not Specified		67.1	67.8	56.5	570	570	538
NATIONAL	Premium		63.9	68.2	53.3	584	591	516
	Regular		56.8	60.2	49.5	577	587	528
	Not Specified		62.8	65.6	51.2	572	580	522

2001 - Q4

Gasoline Without Oxygenate - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		42.4	45.3	38.1	536.4	546.5	518.0
	Regular		42.1	43.0	36.5	510.6	518.5	459.6
Quebec	Premium		46.8	55.5	38.4	541.1	559.0	514.9
	Regular		42.0	46.8	37.4	519.4	547.5	473.1
Ontario	Premium		40.5	51.6	37.9	538.4	559.6	515.5
	Regular		42.0	46.3	36.6	535.8	554.0	476.5
West	Premium		41.8	56.9	38.0	539.9	549.2	494.6
	Regular		42.2	49.7	36.8	510.1	525.8	476.6
NATIONAL	Premium		42.3	58.7	38.1	540.2	553.5	509.5
	Regular		42.0	48.3	36.9	520.6	544.5	474.8

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2002 - Q1

Gasoline Without Oxygenate - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		42.0	42.1	38.4	526.6	528.2	512.8
	Regular		42.0	42.8	38.6	493.5	500.7	463.1
Quebec	Premium		49.0	53.0	39.4	557.0	560.9	516.1
	Regular		45.5	55.7	37.6	526.3	563.1	467.3
Ontario	Premium		46.7	47.2	39.0	550.4	563.4	528.3
	Regular		41.1	44.4	36.6	517.5	545.5	470.6
West	Premium		58.5	62.9	43.4	546.8	582.3	508.3
	Regular		49.9	64.2	38.5	534.3	559.1	478.2
NATIONAL	Premium		53.5	61.2	40.5	552.0	568.5	517.6
	Regular		46.9	61.5	37.7	529.0	558.5	472.0

2002 - Q2

Gasoline Without Oxygenate - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		52.6	52.8	48.9	568.6	573.1	544.8
	Regular		51.3	51.8	46.5	556.7	560.3	522.4
Quebec	Premium		60.4	62.7	53.0	575.2	580.0	548.6
	Regular		55.4	58.4	48.9	569.0	597.7	526.3
Ontario	Premium		57.4	58.5	53.9	582.8	584.8	556.9
	Regular		55.3	56.2	49.6	568.5	577.5	531.3
West	Premium		65.5	68.0	55.3	570.4	582.8	536.9
	Regular		54.5	61.2	48.2	558.8	567.3	521.2
NATIONAL	Premium		61.9	67.6	53.8	577.8	584.6	548.0
	Regular		55.0	60.1	48.7	563.9	577.5	525.7

Gasoline and Diesel Fuel Survey

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Gasoline Without Oxygenate - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		54.0	54.2	51.0	577.0	578.0	568.7
	Regular		53.8	54.5	48.9	562.1	565.7	528.9
Quebec	Premium		60.5	63.8	52.3	590.2	601.2	556.9
	Regular		54.0	55.8	48.9	563.2	578.1	520.7
Ontario	Premium		56.4	57.9	53.3	587.0	590.4	553.1
	Regular		54.6	57.0	50.4	556.3	568.0	522.7
West	Premium		64.0	68.4	54.4	583.1	591.2	546.7
	Regular		56.1	59.7	48.8	564.9	576.2	526.8
NATIONAL	Premium		62.8	66.5	53.6	589.3	591.4	550.8
	Regular		55.3	58.4	49.2	562.8	575.6	524.7

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Gasoline Without Oxygenate - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		42.0	42.0	38.9	541.6	541.9	522.7
	Regular		42.0	44.4	39.2	497.6	521.9	490.4
Quebec	Premium		39.6	43.7	36.6	541.7	543.1	509.7
	Regular		42.0	46.0	36.9	511.0	529.9	463.4
Ontario	Premium		41.0	43.4	37.5	515.6	534.5	513.2
	Regular		41.4	42.6	36.9	547.8	551.8	470.0
West	Premium		52.3	80.3	38.8	556.7	564.1	511.7
	Regular		40.7	44.8	37.2	506.9	514.0	476.1
NATIONAL	Premium		42.5	78.0	38.2	547.0	561.8	512.1
	Regular		41.1	45.2	37.2	509.3	527.3	472.7

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Gasoline Containing Ethanol - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Premium		56.4	56.9	52.1	568	569	521
	Eth BI Regular		53.9	54.0	51.2	549	576	505
West	Eth BI Premium		36.8	36.8	36.8	514	514	514
NATIONAL	Eth BI Premium		56.4	56.9	52.1	568	569	521
	Eth BI Regular		53.9	54.0	51.2	549	576	505

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Gasoline Containing Ethanol - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		46.4	46.9	42.9	533	547	480
	Eth BI Reg		47.0	48.5	44.5	504	521	459
West	Eth BI Prem		37.5	37.5	37.5	539	539	539
NATIONAL	Eth BI Prem		46.4	46.9	42.9	543	548	480
	Eth BI Reg		47.0	48.5	44.5	504	521	459

2002 - Q1

Gasoline Containing Ethanol - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		42.0	42.0	38.9	489	490	471
	Eth BI Reg		43.0	43.6	40.8	517	527	480
NATIONAL	Eth BI Prem		42.0	42.0	38.9	489	490	471
	Eth BI Reg		43.0	43.6	40.8	517	527	480

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Gasoline Containing Ethanol - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		56.4	56.9	51.3	620	621	574
	Eth BI Reg		54.1	55.0	50.5	613	618	549
West	Eth BI Prem		58.3	59.7	51.6	592	594	561
NATIONAL	Eth BI Prem		56.9	59.3	51.4	617	621	567
	Eth BI Reg		54.1	55.0	50.5	613	618	549

2002 - Q3

Gasoline Containing Ethanol - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		55.4	55.9	51.3	608	609	573
	Eth BI Reg		53.0	54.0	50.9	593	619	559
Quebec	Eth BI Prem		54.0	54.2	50.2	574	577	554
NATIONAL	Eth BI Prem		55.0	55.8	51.0	608	609	568
	Eth BI Reg		53.0	54.0	50.9	593	619	559

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Gasoline Containing Ethanol - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		40.8	41.8	38.9	541	545	484
	Eth BI Reg		42.0	43.0	40.3	508	524	485
NATIONAL	Eth BI Prem		40.8	41.8	38.9	541	545	484
	Eth BI Reg		42.0	43.0	40.3	508	524	485

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Gasoline Containing MTBE - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		63.5	63.8	55.6	521	526	497
	Not Specified		52.4	52.4	52.4	531	531	531
Quebec	Regular		56.2	56.4	53.4	557	558	540
Ontario	Regular		51.3	51.5	50.1	547	548	528
NATIONAL	Regular		63.0	63.7	53.2	554	558	538
	Not Specified		52.4	52.4	52.4	531	531	531

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Gasoline Containing MTBE - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		52.2	53.6	48.1	496	503	476
	Not Specified		42.6	42.6	42.6	498	498	498
Quebec	Premium		40.0	40.0	37.7	536	539	508
	Regular		42.6	51.5	38.9	522	556	468
Ontario	Regular		42.6	42.6	40.9	522	522	510
NATIONAL	Premium		40.0	40.0	37.7	536	539	508
	Regular		50.2	54.0	39.1	523	551	470
	Not Specified		42.6	42.6	42.6	498	498	498

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Gasoline Containing MTBE - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Not Specified		41.6	41.6	41.6	522	522	522
Quebec	Premium		39.3	39.3	39.3	505	505	505
NATIONAL	Premium		39.3	39.3	39.3	505	505	505
	Regular		41.6	41.6	41.6	522	522	522

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Gasoline Containing MTBE - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		61.28	61.62	52.51	516	517	490
	Not Specified		49.80	49.80	49.80	551	551	551
Quebec	Regular		55.78	55.96	54.12	569	572	551
	Not Specified		50.50	50.50	39.72	532	535	472
Ontario	Regular		55.78	55.96	54.21	569	572	551
NATIONAL	Regular		50.50	50.50	54.01	550	551	546
	Not Specified		61.10	61.58	48.49	572	572	541

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Gasoline Containing MTBE - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		61.37	61.63	59.70	517	518	497
	Not Specified		52.20	52.20	52.20	567	567	567
Quebec	Regular		54.04	54.09	53.11	556	558	538
West	Regular		51.20	51.20	51.20	541	541	541
NATIONAL	Regular		61.22	61.60	52.96	546	556	537
	Not Specified		52.20	52.20	52.20	567	567	567

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Gasoline Containing MTBE - T10			T10 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		49.40	49.40	44.96	500	504	471
Quebec	Regular		39.99	40.16	36.33	519	520	518
West	Regular		37.00	37.00	37.00	482	482	482
NATIONAL	Regular		49.40	49.40	37.46	509	518	499

2001 - Q3

Gasoline Without Oxygenate - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		93.0	93.0	93.0	516	516	516
	Regular		107.0	107.0	107.0	573	573	573
	Not Specified		113.0	113.9	97.2	573	578	526
Quebec	Premium		113.6	115.7	109.5	585	598	562
	Regular		106.4	108.9	97.2	566	588	530
Ontario	Premium		112.9	114.1	108.6	589	591	572
	Regular		107.8	112.0	99.9	582	586	547
	Not Specified		110.1	111.6	92.6	568	578	517
West	Premium		108.8	110.9	101.2	566	573	405
	Regular		106.6	109.4	95.0	570	586	516
	Not Specified		102.0	102.0	98.6	570	570	538
NATIONAL	Premium		112.2	114.4	106.5	584	591	516
	Regular		107.0	110.0	96.9	577	587	528
	Not Specified		113.0	113.4	94.8	572	580	522

2001 - Q4

Gasoline Without Oxygenate - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		106.4	106.9	103.6	536.4	546.5	518.0
	Regular		93.1	99.3	85.4	510.6	518.5	459.6
Quebec	Premium		110.0	110.0	103.2	541.1	559.0	514.9
	Regular		96.4	108.6	86.2	519.4	547.5	473.1
Ontario	Premium		107.6	113.9	100.7	538.4	559.6	515.5
	Regular		100.0	105.5	86.4	535.8	554.0	476.5
West	Premium		108.0	110.4	99.3	539.9	549.2	494.6
	Regular		97.4	100.1	88.7	510.1	525.8	476.6
NATIONAL	Premium		109.3	112.0	101.1	540.2	553.5	509.5
	Regular		98.0	103.2	87.2	520.6	544.5	474.8

Gasoline and Diesel Fuel Survey

2002 - Q1

Gasoline Without Oxygenate - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Vol Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		105.3	105.8	102.9	526.6	528.2	512.8
	Regular		94.1	95.5	86.5	493.5	500.7	463.1
Quebec	Premium		110.0	110.0	103.1	557.0	560.9	516.1
	Regular		98.8	107.1	85.0	526.3	563.1	467.3
Ontario	Premium		109.9	110.7	103.4	550.4	563.4	528.3
	Regular		98.5	105.0	84.1	517.5	545.5	470.6
West	Premium		107.8	116.6	100.3	546.8	582.3	508.3
	Regular		99.2	104.8	87.7	534.3	559.1	478.2
NATIONAL	Premium		110.0	112.2	102.3	552.0	568.5	517.6
	Regular		99.0	105.7	85.7	529.0	558.5	472.0

2002 - Q2

Gasoline Without Oxygenate - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		111.7	112.7	107.1	568.6	573.1	544.8
	Regular		104.3	104.6	97.3	556.7	560.3	522.4
Quebec	Premium		111.7	112.8	106.7	575.2	580.0	548.6
	Regular		106.8	112.9	95.6	569.0	597.7	526.3
Ontario	Premium		111.5	112.5	104.7	582.8	584.8	556.9
	Regular		105.0	108.0	96.4	568.5	577.5	531.3
West	Premium		110.5	112.3	101.7	570.4	582.8	536.9
	Regular		104.4	107.9	95.4	558.8	567.3	521.2
NATIONAL	Premium		111.3	113.0	104.4	577.8	584.6	548.0
	Regular		105.0	109.0	95.8	563.9	577.5	525.7

Gasoline and Diesel Fuel Survey

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Gasoline Without Oxygenate - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		113.5	113.8	111.9	577.0	578.0	568.7
	Regular		105.0	105.8	97.9	562.1	565.7	528.9
Quebec	Premium		115.1	116.1	108.1	590.2	601.2	556.9
	Regular		104.3	112.5	93.9	563.2	578.1	520.7
Ontario	Premium		113.0	113.4	104.4	587.0	590.4	553.1
	Regular		102.2	107.8	94.8	556.3	568.0	522.7
West	Premium		116.1	119.1	105.1	583.1	591.2	546.7
	Regular		108.3	112.1	96.3	564.9	576.2	526.8
NATIONAL	Premium		115.0	118.4	105.7	589.3	591.4	550.8
	Regular		105.9	111.2	95.5	562.8	575.6	524.7

2002 - Q4

Gasoline Without Oxygenate - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		108.0	108.0	104.2	541.6	541.9	522.7
	Regular		94.1	98.2	92.2	497.6	521.9	490.4
Quebec	Premium		110.0	110.0	101.4	541.7	543.1	509.7
	Regular		93.9	104.9	84.2	511.0	529.9	463.4
Ontario	Premium		97.2	101.6	100.3	515.6	534.5	513.2
	Regular		108.3	110.9	85.3	547.8	551.8	470.0
West	Premium		108.9	110.4	102.3	556.7	564.1	511.7
	Regular		95.4	97.9	87.7	506.9	514.0	476.1
NATIONAL	Premium		109.0	110.4	101.8	547.0	561.8	512.1
	Regular		95.8	100.6	86.6	509.3	527.3	472.7

2001 - Q3

Gasoline Containing Ethanol - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Premium		106.4	106.9	97.1	568	569	521
	Eth BI Regular		101.0	107.3	87.9	549	576	505
West	Eth BI Premium		101.6	101.6	101.6	514	514	514
NATIONAL	Eth BI Premium		106.4	106.9	97.1	568	569	521
	Eth BI Regular		101.0	107.3	87.9	549	576	505

2001 - Q4

Gasoline Containing Ethanol - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		100.2	101.6	88.5	533	547	480
	Eth BI Reg		88.9	93.9	75.3	504	521	459
West	Eth BI Prem		106.3	106.3	106.3	539	539	539
NATIONAL	Eth BI Prem		103.5	105.7	88.5	543	548	480
	Eth BI Reg		88.9	93.9	75.3	504	521	459

2002 - Q1

Gasoline Containing Ethanol - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		74.8	75.8	70.9	489	490	471
	Eth BI Reg		81.6	85.9	71.4	517	527	480
NATIONAL	Eth BI Prem		74.8	75.8	70.9	489	490	471
	Eth BI Reg		81.6	85.9	71.4	517	527	480

2002 - Q2

Gasoline Containing Ethanol - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		115.0	115.0	101.7	620	621	574
	Eth BI Reg		108.0	109.2	90.1	613	618	549
West	Eth BI Prem		108.3	108.5	101.4	592	594	561
NATIONAL	Eth BI Prem		114.7	115.0	101.6	617	621	567
	Eth BI Reg		108.0	109.2	90.1	613	618	549

2002 - Q3

Gasoline Containing Ethanol - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		109.4	109.9	101.1	608	609	573
	Eth BI Reg		101.6	108.2	91.2	593	619	559
Quebec	Eth BI Prem		104.2	105.2	99.3	574	577	554
NATIONAL	Eth BI Prem		109.0	109.8	100.6	608	609	568
	Eth BI Reg		101.6	108.2	91.2	593	619	559

2002 - Q4

Gasoline Containing Ethanol - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		99.2	103.0	79.8	541	545	484
	Eth BI Reg		82.0	84.4	73.0	508	524	485
NATIONAL	Eth BI Prem		99.2	103.0	79.8	541	545	484
	Eth BI Reg		82.0	84.4	73.0	508	524	485

2001 - Q3

Gasoline Containing MTBE - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		89.8	90.8	86.4	521	526	497
	Not Specified		97.3	97.3	97.3	531	531	531
Quebec	Regular		105.1	105.2	99.6	557	558	540
Ontario	Regular		104.4	104.9	97.5	547	548	528
NATIONAL	Regular		105.0	105.2	99.1	554	558	538
	Not Specified		97.3	97.3	97.3	531	531	531

2001 - Q4

Gasoline Containing MTBE - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		88.5	89.7	84.1	496	503	476
	Not Specified		93.3	93.3	93.3	498	498	498
Quebec	Premium		109.4	110.7	101.6	536	539	508
	Regular		102.4	104.1	85.3	522	556	468
Ontario	Regular		102.4	103.2	95.7	522	522	510
NATIONAL	Premium		109.4	110.7	101.6	536	539	508
	Regular		103.4	104.0	85.8	523	551	470
	Not Specified		93.3	93.3	93.3	498	498	498

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Gasoline Containing MTBE - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Not Specified		99.5	99.5	99.5	522	522	522
Quebec	Premium		99.6	99.6	99.6	505	505	505
NATIONAL	Premium		99.6	99.6	99.6	505	505	505
	Regular		99.5	99.5	99.5	522	522	522

2002 - Q2

Gasoline Containing MTBE - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		89.4	89.4	85.2	516	517	490
	Not Specified		103.0	103.0	103.0	551	551	551
Quebec	Regular		107.7	108.3	102.7	569	572	551
	Not Specified		100.1	100.8	64.9	532	535	472
Ontario	Regular		107.7	108.3	102.8	569	572	551
NATIONAL	Regular		102.8	103.0	101.2	550	551	546
	Not Specified		108.5	108.5	98.0	572	572	541

2002 - Q3

Gasoline Containing MTBE - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		92.20	92.68	84.83	517	518	497
	Not Specified		106.80	106.80	106.80	567	567	567
Quebec	Regular		103.40	103.64	99.00	556	558	538
West	Regular		97.90	97.90	97.90	541	541	541
NATIONAL	Regular		102.10	103.38	98.32	546	556	537
	Not Specified		106.80	106.80	106.80	567	567	567

2002 - Q4

Gasoline Containing MTBE - T50			T50 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		91.59	92.56	84.32	500	504	471
Quebec	Regular		100.73	100.95	100.58	519	520	518
West	Regular		87.00	87.00	87.00	482	482	482
NATIONAL	Regular		97.22	100.24	93.63	509	518	499

2001 - Q3

Gasoline Without Oxygenate - T90			T90 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		159.0	159.0	159.0	516	516	516
	Regular		163.0	163.0	163.0	573	573	573
	Not Specified		172.0	172.9	162.2	573	578	526
Quebec	Premium		158.6	161.8	152.8	585	598	562
	Regular		175.5	180.6	166.1	566	588	530
Ontario	Premium		175.7	177.1	167.6	589	591	572
	Regular		180.0	181.0	171.5	582	586	547
	Not Specified		169.1	169.8	164.5	568	578	517
West	Premium		164.4	167.5	145.0	566	573	405
	Regular		176.3	182.4	164.9	570	586	516
	Not Specified		167.0	167.0	157.7	570	570	538
NATIONAL	Premium		172.0	176.1	155.8	584	591	516
	Regular		178.8	182.1	166.9	577	587	528
	Not Specified		171.0	172.4	163.2	572	580	522

2001 - Q4

Gasoline Without Oxygenate - T90			T90 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		156.0	160.8	150.2	536.4	546.5	518.0
	Regular		162.0	166.9	148.6	510.6	518.5	459.6
Quebec	Premium		159.8	162.5	147.8	541.1	559.0	514.9
	Regular		173.0	176.1	158.3	519.4	547.5	473.1
Ontario	Premium		168.8	171.7	156.5	538.4	559.6	515.5
	Regular		177.5	179.7	162.5	535.8	554.0	476.5
West	Premium		162.3	164.5	139.7	539.9	549.2	494.6
	Regular		170.1	171.9	155.2	510.1	525.8	476.6
NATIONAL	Premium		165.6	169.5	149.1	540.2	553.5	509.5
	Regular		172.2	178.5	157.9	520.6	544.5	474.8

2002 - Q1**Gasoline Without Oxygenate - T90**

Region	Grade	Applicable Volume (m3)	T90 (deg C)			Driveability Index		
			95th Percentile	99th Percentile	Vol Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		147.9	148.0	146.6	526.6	528.2	512.8
	Regular		150.8	153.7	145.8	493.5	500.7	463.1
Quebec	Premium		158.6	172.8	147.8	557.0	560.9	516.1
	Regular		172.0	174.0	155.9	526.3	563.1	467.3
Ontario	Premium		168.2	168.9	159.6	550.4	563.4	528.3
	Regular		173.5	175.4	163.4	517.5	545.5	470.6
West	Premium		163.1	163.9	142.3	546.8	582.3	508.3
	Regular		170.0	171.5	157.3	534.3	559.1	478.2
NATIONAL	Premium		167.0	168.8	150.0	552.0	568.5	517.6
	Regular		170.4	174.0	158.2	529.0	558.5	472.0

2002 - Q2**Gasoline Without Oxygenate - T90**

Region	Grade	Applicable Volume (m3)	T90 (deg C)			Driveability Index		
			95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		154.9	155.8	150.1	568.6	573.1	544.8
	Regular		170.4	171.8	160.7	556.7	560.3	522.4
Quebec	Premium		153.4	169.6	148.8	575.2	580.0	548.6
	Regular		176.0	176.6	166.1	569.0	597.7	526.3
Ontario	Premium		169.8	170.0	162.0	582.8	584.8	556.9
	Regular		177.3	179.8	167.7	568.5	577.5	531.3
West	Premium		165.5	174.5	148.8	570.4	582.8	536.9
	Regular		174.5	181.2	162.8	558.8	567.3	521.2
NATIONAL	Premium		168.2	171.0	154.1	577.8	584.6	548.0
	Regular		176.2	179.7	165.2	563.9	577.5	525.7

2002 - Q3

Gasoline Without Oxygenate - T90

Region	Grade	Applicable Volume (m3)	T90 (deg C)			Driveability Index		
			95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		159.2	159.5	156.5	577.0	578.0	568.7
	Regular		168.4	171.0	161.6	562.1	565.7	528.9
Quebec	Premium		159.3	163.0	154.1	590.2	601.2	556.9
	Regular		174.6	180.5	165.7	563.2	578.1	520.7
Ontario	Premium		169.3	172.4	160.1	587.0	590.4	553.1
	Regular		173.4	177.1	162.8	556.3	568.0	522.7
West	Premium		165.5	169.2	149.9	583.1	591.2	546.7
	Regular		173.3	177.9	164.6	564.9	576.2	526.8
NATIONAL	Premium		167.7	171.8	153.2	589.3	591.4	550.8
	Regular		173.9	179.0	164.3	562.8	575.6	524.7

2002 - Q4

Gasoline Without Oxygenate - T90

Region	Grade	Applicable Volume (m3)	T90 (deg C)			Driveability Index		
			95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Premium		154.6	154.9	151.7	541.6	541.9	522.7
	Regular		163.0	164.0	155.1	497.6	521.9	490.4
Quebec	Premium		158.3	167.5	150.6	541.7	543.1	509.7
	Regular		171.0	177.0	155.2	511.0	529.9	463.4
Ontario	Premium		172.2	174.1	156.0	515.6	534.5	513.2
	Regular		171.1	172.9	158.7	547.8	551.8	470.0
West	Premium		164.0	165.4	146.4	556.7	564.1	511.7
	Regular		168.9	171.0	157.4	506.9	514.0	476.1
NATIONAL	Premium		169.0	171.4	149.4	547.0	561.8	512.1
	Regular		170.7	173.2	157.0	509.3	527.3	472.7

2001 - Q3**Gasoline Containing Ethanol - T90**

Region	Grade	Applicable Volume (m3)	T90 (deg C)			Driveability Index		
			95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Premium		164.4	169.7	151.1	568	569	521
	Eth BI Regular		173.0	175.2	164.6	549	576	505
West	Eth BI Premium		154.0	154.0	154.0	514	514	514
NATIONAL	Eth BI Premium		163.9	169.6	151.1	568	569	521
	Eth BI Regular		173.0	175.2	164.6	549	576	505

2001 - Q4**Gasoline Containing Ethanol - T90**

Region	Grade	Applicable Volume (m3)	T90 (deg C)			Driveability Index		
			95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		174.2	175.6	149.9	533	547	480
	Eth BI Reg		176.5	178.5	165.8	504	521	459
West	Eth BI Prem		163.8	163.8	163.8	539	539	539
NATIONAL	Eth BI Prem		174.1	175.6	150.0	543	548	480
	Eth BI Reg		176.5	178.5	165.8	504	521	459

2002 - Q1**Gasoline Containing Ethanol - T90**

Region	Grade	Applicable Volume (m3)	T90 (deg C)			Driveability Index		
			95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		170.0	170.0	161.5	489	490	471
	Eth BI Reg		173.2	175.3	166.3	517	527	480
NATIONAL	Eth BI Prem		170.0	170.0	161.5	489	490	471
	Eth BI Reg		173.2	175.3	166.3	517	527	480

2002 - Q2

Gasoline Containing Ethanol - T90

Region	Grade	Applicable Volume (m3)	T90 (deg C)			Driveability Index		
			95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		165.0	165.0	154.6	620	621	574
	Eth BI Reg		174.1	176.0	165.4	613	618	549
West	Eth BI Prem		171.1	173.3	159.0	592	594	561
NATIONAL	Eth BI Prem		167.7	172.5	156.9	617	621	567
	Eth BI Reg		174.1	176.0	165.4	613	618	549

2002 - Q3

Gasoline Containing Ethanol - T90

Region	Grade	Applicable Volume (m3)	T90 (deg C)			Driveability Index		
			95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Ontario	Eth BI Prem		164.4	164.9	155.5	608	609	573
	Eth BI Reg		177.0	180.2	171.3	593	619	559
Quebec	Eth BI Prem		169.7	170.1	165.4	574	577	554
NATIONAL	Eth BI Prem		168.6	169.9	158.3	608	609	568
	Eth BI Reg		177.0	180.2	171.3	593	619	559

2002 - Q4

Gasoline Containing Ethanol - T90			T90 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Weighted Avg
Ontario	Eth BI Prem		167.2	168.6	147.7	541	545	484
	Eth BI Reg		175.0	177.0	167.4	508	524	485
NATIONAL	Eth BI Prem		167.2	168.6	147.7	541	545	484
	Eth BI Reg		175.0	177.0	167.4	508	524	485

2001 - Q3

Gasoline Containing MTBE - T90			T90 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		157.2	158.1	154.3	521	526	497
	Not Specified		160.7	160.7	160.7	531	531	531
Quebec	Regular		164.2	164.2	160.7	557	558	540
Ontario	Regular		161.2	161.3	159.8	547	548	528
NATIONAL	Regular		164.1	164.2	160.5	554	558	538
	Not Specified		160.7	160.7	160.7	531	531	531

2001 - Q4

Gasoline Containing MTBE - T90			T90 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		153.1	153.3	151.6	496	503	476
	Not Specified		154.0	154.0	154.0	498	498	498
Quebec	Premium		152.5	152.9	146.3	536	539	508
	Regular		163.2	169.7	153.3	522	556	468
Ontario	Regular		163.2	163.2	161.9	522	522	510
NATIONAL	Premium		152.5	152.9	146.3	536	539	508
	Regular		163.2	168.7	153.7	523	551	470
	Not Specified		154.0	154.0	154.0	498	498	498

2002 - Q1

Gasoline Containing MTBE - T90			T90 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Not Specified		161.0	161.0	161.0	522	522	522
Quebec	Premium		147.2	147.2	147.2	505	505	505
NATIONAL	Premium		147.2	147.2	147.2	505	505	505
	Regular		161.0	161.0	161.0	522	522	522

2002 - Q2

Gasoline Containing MTBE - T90			T90 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		158.30	158.30	155.77	516	517	490
	Not Specified		167.40	167.40	167.40	551	551	551
Quebec	Regular		164.14	164.27	161.40	569	572	551
	Not Specified		156.20	157.24	103.42	532	535	472
Ontario	Regular		164.14	164.27	161.66	569	572	551
NATIONAL	Regular		166.41	167.20	161.00	550	551	546
	Not Specified		164.30	164.30	159.06	572	572	541

2002 - Q3

Gasoline Containing MTBE - T90			T90 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		159.72	162.18	153.35	517	518	497
	Not Specified		168.30	168.30	168.30	567	567	567
Quebec	Regular		166.00	166.32	161.36	556	558	538
West	Regular		170.10	170.10	170.10	541	541	541
NATIONAL	Regular		167.14	169.51	162.77	546	556	537
	Not Specified		168.30	168.30	168.30	567	567	567

2002 - Q4

Gasoline Containing MTBE - T90			T90 (deg C)			Driveability Index		
Region	Grade	Applicable Volume (m3)	95th Percentile	99th Percentile	Weighted Avg (deg C)	95th Percentile	99th Percentile	Vol Weighted Avg
Atlantic	Regular		151.93	152.15	150.64	500	504	471
Quebec	Regular		162.48	162.90	162.18	519	520	518
West	Regular		165.00	165.00	165.00	482	482	482
NATIONAL	Regular		163.60	164.72	162.11	509	518	499

Cetane Index - Q3 2001			Cetane Index		
Region	Diesel Type	Applicable Volume (m3)	1st Percentile	5th Percentile	Weighted Average (wt %)
Atlantic	LSD		44.8	45.2	46.3
	Regular		42.4	42.6	47.0
Quebec	LSD		42.1	42.5	45.2
	Regular		37.2	38.2	42.4
Ontario	LSD		41.2	42.5	45.5
	Regular		42.8	45.0	45.3
West	LSD		39.4	40.4	42.7
	Regular		37.9	38.5	41.2
NATIONAL	LSD		39.9	40.9	44.4
	Regular		37.7	38.9	43.9

Cetane Index - Q4 2001			Cetane Index		
Region	Diesel Type	Applicable Volume (m3)	1st Percentile	5th Percentile	Weighted Average (wt %)
Atlantic	LSD		48.8	49.5	43.5
	Regular		47.8	48.1	43.1
Quebec	LSD		49.1	53.6	45.7
	Regular		45.4	45.7	41.9
Ontario	LSD		47.0	48.6	45.2
	Regular		49.2	49.8	44.7
West	LSD		45.1	46.3	42.0
	Regular		49.5	52.0	41.7
NATIONAL	LSD		47.1	49.8	44.1
	Regular		49.1	51.2	42.7

Cetane Index - Q1 2002			Cetane Index		
Region	Diesel Type	Applicable Volume (m3)	1st Percentile	5th Percentile	Weighted Average (wt %)
Atlantic	LSD		41.3	41.4	42.3
	Regular		41.2	42.2	41.4
Quebec	LSD		40.7	41.6	44.7
	Regular		39.4	39.9	44.5
Ontario	LSD		38.6	40.2	44.1
	Regular		43.2	43.7	41.6
West	LSD		39.9	40.3	42.1
	Regular		38.8	39.5	42.3
NATIONAL	LSD		39.8	40.4	43.3
	Regular		39.2	39.7	42.4

Cetane Index - Q2 2002			Cetane Index		
Region	Diesel Type	Applicable Volume (m3)	1st Percentile	5th Percentile	Weighted Average (wt %)
Atlantic	LSD		41.9	43.1	45.6
	Regular		42.7	42.9	45.2
Quebec	LSD		41.0	42.6	45.5
	Regular		37.6	37.8	41.0
Ontario	LSD		40.2	41.1	45.1
	Regular		41.4	41.7	43.3
West	LSD		40.5	40.9	37.2
	Regular		40.9	41.6	44.9
NATIONAL	LSD		40.6	41.0	41.8
	Regular		37.9	40.0	44.0

Cetane Index - Q3 2002			Cetane Index		
Region	Diesel Type	Applicable Volume (m3)	1st Percentile	5th Percentile	Weighted Average (wt %)
Atlantic	LSD		42.2	43.0	45.4
	Regular		42.5	42.7	44.3
Quebec	LSD		43.1	43.5	46.4
	Regular		38.2	39.3	42.6
Ontario	LSD		40.4	41.1	45.1
	Regular		41.5	42.0	44.1
West	LSD		40.0	40.9	44.4
	Regular		39.7	40.0	44.9
NATIONAL	LSD		40.2	41.1	45.1
	Regular		39.3	40.2	44.5

Cetane Index - Q2 2002			Cetane Index		
Region	Diesel Type	Applicable Volume (m3)	1st Percentile	5th Percentile	Weighted Average (wt %)
Atlantic	LSD		41.8	41.2	42.5
	Regular		42.2	41.9	43.1
Quebec	LSD		42.2	41.5	45.1
	Regular		38.5	37.6	40.7
Ontario	LSD		40.6	40.2	44.3
	Regular		42.5	42.2	44.2
West	LSD		40.9	40.3	43.4
	Regular		40.0	39.6	43.9
NATIONAL	LSD		41.0	40.3	43.9
	Regular		40.0	38.5	43.4

Cetane Number - Q3 2001			Cetane Number		
Region	Diesel Type	Applicable Volume (m ³)	Minimum (wt%)	Maximum (wt%)	Weighted Average (wt %)
Atlantic	LSD		44.6	54.2	45.6
	Regular		41.5	45.1	43.8
Quebec	LSD		40.8	45.3	42.3
	Regular		41.8	42.5	42.0
Ontario	LSD		41.7	41.7	41.7
West	LSD		40.0	52.2	42.0
	Regular		44.4	50.2	44.4
NATIONAL	LSD		40.0	54.2	42.4
	Regular		41.5	50.2	43.7

Cetane Number - Q4 2001			Cetane Number		
Region	Diesel Type	Applicable Volume (m ³)	Minimum (wt%)	Maximum (wt%)	Weighted Average (wt %)
Atlantic	LSD		42.3	54.2	42.9
	Regular		39.5	42.3	39.6
Quebec	LSD		41.3	45.3	43.3
	Regular		41.3	42.6	42.1
Ontario	LSD		40.6	47.1	43.0
	Regular		42.0	45.7	44.2
West	LSD		36.3	46.7	41.9
	Regular		47.7	47.7	47.7
NATIONAL	LSD		36.3	54.2	42.7
	Regular		39.5	47.7	42.4

Cetane Number - Q1 2002			Cetane Number		
Region	Diesel Type	Applicable Volume (m ³)	Minimum (wt%)	Maximum (wt%)	Weighted Average (wt %)
Atlantic	LSD		42.3	43.8	42.8
	Regular		40.9	43.8	41.4
Quebec	LSD		40.5	43.8	42.1
	Regular		41.4	42.8	41.8
Ontario	LSD		41.1	47.0	44.7
West	LSD		40.0	52.0	42.7
	Regular		42.1	42.1	42.1
NATIONAL	LSD		40.0	43.8	42.9
	Regular		40.9	52.0	41.8

Cetane Number - Q2 2002			Cetane Number		
Region	Diesel Type	Applicable Volume (m ³)	Minimum (wt%)	Maximum (wt%)	Weighted Average (wt %)
Atlantic	LSD		43.1	55.3	44.9
	Regular		43.5	46.3	45.5
Quebec	LSD		41.1	48.7	43.5
	Regular		40.2	42.4	41.3
Ontario	LSD		41.6	41.6	41.6
West	LSD		40.3	52.9	43.4
NATIONAL	LSD		40.3	55.3	43.4
	Regular		40.2	46.3	43.7

Cetane Number - Q3 2002			Cetane Number		
Region	Diesel Type	Applicable Volume (m ³)	Minimum (wt%)	Maximum (wt%)	Weighted Average (wt %)
Atlantic	LSD		43.1	56.1	43.7
	Regular		43.5	45.1	43.8
Quebec	LSD		51.2	51.2	51.2
	Regular		40.3	45.8	44.0
Ontario	LSD		41.8	41.8	41.8
West	LSD		41.4	42.3	41.9
	Regular		40.0	48.8	42.9
NATIONAL	LSD		41.4	56.1	43.3
	Regular		40.0	48.8	43.2

Cetane Number – Q4 2002			Cetane Number		
Region	Diesel Type	Applicable Volume (m ³)	Minimum (wt%)	Maximum (wt%)	Weighted Average (wt %)
Atlantic	LSD		43.0	46.9	43.1
	Regular		44.0	44.0	44.0
Quebec	LSD		42.1	44.1	42.8
	Regular		40.8	41.4	41.3
Ontario	LSD		40.3	46.9	42.0
	Regular		41.4	44.4	43.2
West	LSD		40.0	49.9	41.8
	Regular		41.6	52.4	50.1
NATIONAL	LSD		40.0	49.9	42.2
	Regular		40.3	52.4	42.7

Distribution of Aromatics - Q3 2001			Aromatics (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Weighted Average (wt %)
Atlantic	LSD		30.5	31.2	26.1
	Regular		37.8	37.9	35.0
Quebec	LSD		33.4	33.4	30.1
	Regular		42.6	42.7	40.9
Ontario	LSD		41.2	40.3	31.6
	Regular		35.8	36.7	32.6
West	LSD		38.1	38.3	30.1
	Regular		40.9	41.2	39.8
NATIONAL	LSD		39.2	41.5	30.1
	Regular		41.3	42.4	36.8

Distribution of Aromatics - Q4 2001			Aromatics (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Weighted Average (wt %)
Atlantic	LSD		27.8	27.9	25.7
	Regular		33.7	33.8	31.9
Quebec	LSD		32.4	33.6	27.7
	Regular		39.9	40.0	38.4
Ontario	LSD		34.6	35.2	27.6
	Regular		36.6	37.2	33.5
West	LSD		34.6	37.5	28.8
	Regular		36.6	36.7	36.2
NATIONAL	LSD		33.9	36.5	28.0
	Regular		38.8	39.8	35.2

Distribution of Aromatics - Q1 2002			Aromatics (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Weighted Average (wt %)
Atlantic	LSD		27.8	28.0	26.4
	Regular		32.2	32.3	30.6
Quebec	LSD		35.1	35.8	28.9
	Regular		37.1	37.2	36.8
Ontario	LSD		38.5	40.0	29.3
	Regular		43.6	50.6	32.6
West	LSD		36.7	36.9	29.0
	Regular		36.3	36.6	35.1
NATIONAL	LSD		36.9	39.3	28.8
	Regular		37.1	48.6	34.0

Distribution of Aromatics - Q2 2002			Aromatics (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Weighted Average (wt %)
Atlantic	LSD		31.4	31.5	28.3
	Regular		40.9	41.3	32.1
Quebec	LSD		35.1	36.0	29.9
	Regular		41.7	41.8	40.9
Ontario	LSD		40.3	41.0	29.4
	Regular		39.0	39.1	36.9
West	LSD		35.5	37.9	25.7
	Regular		36.4	37.0	34.8
NATIONAL	LSD		36.8	40.7	27.8
	Regular		41.3	41.7	35.7

Distribution of Aromatics - Q3 2002			Aromatics (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Weighted Average (wt %)
Atlantic	LSD		32.8	33.0	30.7
	Regular		36.8	36.9	35.3
Quebec	LSD		40.9	43.9	31.2
	Regular		42.2	42.3	40.5
Ontario	LSD		42.1	42.6	30.3
	Regular		39.4	39.4	35.0
West	LSD		37.1	38.0	32.5
	Regular		38.4	38.5	37.8
NATIONAL	LSD		41.2	43.6	31.5
	Regular		40.8	42.0	36.8

Distribution of Aromatics - Q4 2002			Aromatics (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Weighted Average (wt %)
Atlantic	LSD		29.5	29.8	26.2
	Regular		33.8	33.9	26.8
Quebec	LSD		34.2	34.9	28.8
	Regular		40.3	40.4	39.1
Ontario	LSD		39.1	40.1	31.9
	Regular		35.4	36.2	20.3
West	LSD		42.5	82.7	32.2
	Regular		37.6	38.4	38.0
NATIONAL	LSD		38.4	63.4	30.8
	Regular		39.0	40.1	35.3

Distribution of PAH - Q3 2001			PAH (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Weighted Average (wt %)
Atlantic	LSD		7.2	7.2	3.1
	Regular		14.5	14.5	6.3
Quebec	LSD		10.6	11.3	8.6
	Regular		19.3	19.4	18.1
Ontario	LSD		14.9	14.9	8.2
	Regular		9.6	9.9	5.1
West	LSD		9.2	9.8	6.1
	Regular		18.9	19.1	18.0
NATIONAL	LSD		13.8	14.9	6.9
	Regular		18.9	19.4	11.8

Distribution of PAH - Q4 2001			PAH (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Weighted Average (wt %)
Atlantic	LSD		6.5	6.5	2.4
	Regular		11.2	11.2	3.2
Quebec	LSD		10.9	12.1	7.2
	Regular		17.1	17.2	15.8
Ontario	LSD		10.8	11.2	5.0
	Regular		7.9	8.2	2.4
West	LSD		9.0	9.2	4.8
	Regular		14.8	14.9	13.7
NATIONAL	LSD		10.2	11.8	5.4
	Regular		16.0	17.0	9.4

Distribution of PAH - Q1 2002			PAH (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Weighted Average (wt %)
Atlantic	LSD		5.9	6.0	2.3
	Regular		9.7	9.7	2.7
Quebec	LSD		12.5	12.6	7.7
	Regular		14.5	14.6	14.1
Ontario	LSD		10.9	11.7	5.8
	Regular		20.2	26.4	6.9
West	LSD		9.8	10.4	4.9
	Regular		15.2	15.2	13.4
NATIONAL	LSD		12.0	12.5	5.6
	Regular		15.2	24.7	10.1

Distribution of PAH - Q2 2002			PAH (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Weighted Average (wt %)
Atlantic	LSD		8.6	8.7	3.6
	Regular		15.5	15.8	4.6
Quebec	LSD		12.1	13.3	8.7
	Regular		19.8	19.9	19.0
Ontario	LSD		13.4	13.7	6.8
	Regular		15.9	17.3	5.4
West	LSD		9.2	9.9	5.0
	Regular		15.2	16.2	12.7
NATIONAL	LSD		11.5	13.7	6.2
	Regular		18.6	19.7	10.2

Distribution of PAH - Q3 2002			PAH (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Weighted Average (wt %)
Atlantic	LSD		9.6	9.7	7.5
	Regular		12.3	12.4	9.9
Quebec	LSD		10.7	11.5	8.2
	Regular		19.4	19.4	18.7
Ontario	LSD		14.9	15.2	7.9
	Regular		15.9	16.7	4.5
West	LSD		7.0	7.8	3.8
	Regular		17.4	17.7	9.2
NATIONAL	LSD		12.4	15.0	6.0
	Regular		19.2	19.4	9.2

Distribution of PAH - Q2 2002			PAH (wt%)		
Region	Diesel Type	Applicable Volume (m ³)	95th Percentile	99th Percentile	Weighted Average (wt %)
Atlantic	LSD		7.9	7.9	3.5
	Regular		10.6	10.7	2.4
Quebec	LSD		10.4	11.1	7.4
	Regular		17.4	17.5	16.2
Ontario	LSD		13.0	13.2	6.8
	Regular		12.9	14.1	5.2
West	LSD		9.9	14.1	6.4
	Regular		13.9	14.1	11.9
NATIONAL	LSD		12.4	14.1	6.6
	Regular		15.8	17.2	10.7