

**Fleet Average NOx Emission**  
**Performance of 2004 Model Year**  
**Light-Duty Vehicles, Light-Duty Trucks**  
**and Medium-Duty Passenger Vehicles**

In relation to the  
*On-Road Vehicle and Engine Emission Regulations*  
under the  
*Canadian Environmental Protection Act, 1999*

Transportation Division  
Environment Canada

May 2006

### **Disclaimer**

This document provides a summary report only. It does not in anyway supersede or modify the requirements of the *Canadian Environmental Protection Act, 1999* or the *On-Road Vehicle and Engine Emission Regulations*, made under that Act. In the event of an inconsistency between this document and the Act and/or the Regulations, the Act and the Regulations prevail.

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## **1 Purpose**

The purpose of this report is to:

1. summarize the regulatory requirements related to NOx fleet averaging for light-duty vehicles, light-duty trucks and medium-duty passenger vehicles under the *On-Road Vehicle and Engine Emission Regulations*;
2. summarize the fleet average NOx emission performance of individual companies and the overall Canadian fleet of the 2004 model year based on data submitted by companies in their end of model year reports; and,
3. evaluate the effectiveness of the Canadian fleet average NOx emission program at achieving the environmental performance objectives.

## **2 Introduction**

On January 1, 2004, the *On-Road Vehicle and Engine Emission Regulations* came into effect under the *Canadian Environmental Protection Act, 1999* (CEPA 1999). These Regulations introduced more stringent national emission standards for on-road vehicles and engines. The Regulations align Canada's emission standards for light-duty vehicles, light-duty trucks, medium-duty passenger vehicles, heavy-duty vehicles, heavy-duty engines and motorcycles with those of the U.S. Environmental Protection Agency (EPA).

The Regulations require that new light-duty vehicles (LDV)<sup>1</sup>, light light-duty trucks (LLDT)<sup>2</sup>, heavy light-duty trucks (HLDT)<sup>3</sup> and medium-duty passenger vehicles (MDPV)<sup>4</sup> manufactured or imported for sale in Canada conform to the emission standards associated with one of eleven available “bins” that are generally known as “Tier 2” Bins (1 to 11). Each “bin” is defined by a specific set of maximum limits for exhaust emissions of oxides of nitrogen (NOx), non-methane organic gases (NMOG), carbon monoxide (CO), formaldehyde (HCHO) and particulate matter (PM), when measured in accordance with the applicable test procedures. A company’s choice of “bin” to which individual vehicle models are certified in a given model year is limited by the obligation to comply with the fleet average NOx emission standards associated with that model year. The emission “bins”, fleet average NOx emission standards, timing of phase-ins and methods of calculating fleet average NOx values are aligned with the U.S. Tier 2 emission program. There are, however, differences in the structure of the NOx averaging program in Canada designed to recognize vehicles that are sold concurrently in Canada and the U.S. The structure of the regulatory requirements are designed to deliver fleet average emissions

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<sup>1</sup> Light-duty vehicles generally consist of passenger cars.

<sup>2</sup> Light light-duty trucks generally consist of vans, sport utility vehicles and pick-up trucks having a GVWR of 2,722 kg (6,000 pounds) or less.

<sup>3</sup> Heavy light-duty trucks generally comprise vans, sport utility vehicles and pick-up trucks having a GVWR of more than 2,722 kg (6,000 pounds) and up to 3,856 kg (8,500 pounds).

<sup>4</sup> Medium-duty passenger vehicles generally consist of heavier passenger-type vehicles, such as vans and sport utility vehicles having a GVWR greater than 3,856 kg (8,500 pounds) and less than 4,536 kg (10,000 pounds).

comparable to the U.S. while minimizing the regulatory burden on companies and enabling the marketing of vehicles in Canada independently from the U.S.

The Regulations require that companies submit a report to the Minister of the Environment at the end of each model year containing specific information concerning the company’s fleets and fleet average NOx emission performance for the model year.

### **3 Summary of Key Regulatory Elements for Fleet Average NOx Emissions**

#### **3.1 Exhaust Emission “Bin”**

The Regulations include, amongst other requirements, technical standards establishing maximum limits on vehicle exhaust emissions. These technical standards correspond to those of the U.S. EPA through incorporation by reference to the U.S. Code of Federal Regulations (CFR) to ensure that the specified standards are identical in both countries.

Vehicles are required to comply with emission standards specified for a defined “full useful life”. The full useful life is specified in years and as accumulated mileage, whichever comes first, and varies depending on the class or subclass of vehicles. The full useful life for light-duty vehicles (LDV) and light light-duty trucks (LLDT) is 10 years or 192 000 km (120,000 miles). The full useful life for heavy light-duty trucks (HLDT) and for the new class of medium-duty passenger vehicles (MDPV) is established to be 11 years or 192 000 km (120,000 miles).

Companies certify every vehicle to one of eleven “bins”, each of which contains standards for oxides of nitrogen (NOx), non-methane organic gases (NMOG), carbon monoxide (CO), formaldehyde (HCHO) and particulate matter (PM) as presented in Table 1.

**Table 1: LDV, LLDT, HLDT and MDPV Full Useful Life Exhaust Emission Standards**  
(grams/mile)

<b>“Bin” Number</b>	<b>NOx</b>	<b>NMOG</b>	<b>CO</b>	<b>Formaldehyde</b>	<b>PM</b>
<b>11</b>	0.9	0.28	7.3	0.032	0.12
<b>10</b>	0.6	0.156/0.230	4.2/6.4	0.018/0.027	0.08
<b>9</b>	0.3	0.090/0.180	4.2	0.018	0.06
<b>8</b>	0.20	0.125/0.156	4.2	0.018	0.02
<b>7</b>	0.15	0.09	4.2	0.018	0.02
<b>6</b>	0.10	0.09	4.2	0.018	0.01
<b>5</b>	0.07	0.09	4.2	0.018	0.01
<b>4</b>	0.04	0.07	2.1	0.011	0.01
<b>3</b>	0.03	0.055	2.1	0.011	0.01
<b>2</b>	0.02	0.01	2.1	0.004	0.01
<b>1</b>	0.00	0.00	0.0	0.000	0.00

*Note - The equivalent limits in units of grams/km are obtained by multiplying the grams/mile value by 0.621.*

“Bins” 9 and 10 are only available for the 2004 to 2006 model years for light-duty vehicles and light light-duty trucks and up to and including the 2008 model year for heavy light-duty trucks and medium-duty passenger vehicles. “Bins” 8 through 10 contain additional temporary, less stringent standards for certain pollutants and for certain vehicles. “Bin” 11 is only for medium-duty passenger vehicles and is available up to and including the 2008 model year. Beginning in the 2009 model year, applicable standards are limited to “bins” 1 to 8 for all light-duty vehicles, light-duty trucks and medium-duty passenger vehicles.

### 3.2 Fleet Average NOx Emission Standards

The Regulations establish fleet average NOx emission standards for the 2004 and later model years. Each new light-duty vehicle, light-duty truck and medium-duty passenger vehicle is required to be certified to one of the above “bins” for which there are specific emission standards for NOx and other pollutants. Based on the number of vehicles in each “bin”, a company calculates a “fleet average NOx value” for each model year.

Table 2 presents the fleet average NOx standards for a company’s fleet<sup>5</sup> of light-duty vehicles and light light-duty trucks and its fleet of heavy light-duty trucks and medium-duty passenger vehicles.

**Table 2: Fleet Average NOx Standards**

(grams/mile)

<b>Model Year</b>	<b>LDV/LLDT</b>	<b>HLDT/MDPV</b>
<b>2004</b>	0.25	0.53
<b>2005</b>	0.19	0.43
<b>2006</b>	0.13	0.33
<b>2007</b>	0.07	0.20
<b>2008</b>	0.07	0.14
<b>2009</b>	0.07	

The Canadian fleet average NOx standards for the phase-in period represent an approach that is equivalent to the corresponding U.S. Tier 2 program. For example, in the 2004 model year, the U.S. rules require that a minimum of 25% of a company’s fleet of light-duty vehicles and light light-duty trucks meet a fleet average NOx standard of 0.07 grams/mile, and the remaining 75% is subject to a fleet average NOx standard of 0.3 grams/mile. The corresponding Canadian fleet average NOx standard of 0.25 grams/mile applies to a company’s entire fleet of light-duty vehicles and light light-duty trucks of the 2004 model year (i.e. effectively represent the weighted average of the U.S. phase-in).

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<sup>5</sup> Fleet refers only to vehicles of a specific model year that a company manufactures in Canada, or imports into Canada, for the purpose of sale of those vehicles to the first retail purchaser.

From 2009, when the fleet average NOx emission standards are fully phased in, a company's combined fleet of light-duty vehicles, light-duty trucks and medium-duty passenger vehicles will be subject to a single fleet average NOx standard of 0.07 grams/mile, corresponding to the NOx emission standard in “bin” 5.

The fleet average NOx standards also serve as the reference point against which NOx emission credits and deficits are generated. The Regulations provide flexibility for a company to exclude, from mandatory compliance with the Canadian fleet average NOx standards, its group of U.S. EPA certified vehicles that are sold in both Canada and the U.S. Available elections and credits/deficits are discussed in more details in Sections 3.4 and 3.5 respectively.

### 3.3 Calculation of Fleet Average NOx Values

The fleet average NOx value is calculated in accordance with the following equation:

$$\sum(A \times B) / C \quad [1]$$

Where:

*A* represents the NOx emission standard for each full useful life emission “bin”;

*B* represents the number of vehicles in the fleet that conform to that NOx emission standard; and,

*C* represents the total number of vehicles in the fleet.

Fleet average NOx values are required to be rounded to the same number of significant figures that are contained in the total number of vehicles in the fleet in the denominator of equation [1], but to at least three decimal places.

Since fleet average NOx standards are different for the various regulated classes of vehicle for the 2004-2008 model years, for these years, a company must calculate separate fleet average NOx values for:

- its fleet of light-duty vehicles and light light-duty trucks; and,
- its fleet of heavy light-duty trucks and medium-duty passenger vehicles.

Starting with the 2009 model year, a company is required to calculate only a single fleet average NOx value for its combined fleet of light-duty vehicles, light-duty trucks and medium-duty passenger vehicles.



### 3.4 Election for Vehicles Covered by a U.S. EPA Certificate

The objective of the fleet averaging provisions is to create a regulatory framework that achieves a Canadian vehicle fleet emission performance that is comparable with the U.S. The vast majority of vehicles sold in Canada are vehicles designed for and marketed in the U.S. as well as Canada. In developing the fleet averaging provisions, Environment Canada believes that a U.S. fleet designed to meet the U.S. fleet average standard (i.e., 0.07 grams/mile in 2009) will, when sold concurrently in Canada, yield a similar but not necessarily identical result in Canada. An analysis conducted by Environment Canada<sup>6</sup> indicated that, even under extreme scenarios, the variations between Canadian and U.S. fleet averages are expected to be small. Nonetheless, given the large numbers of on-road vehicles in Canada and that vehicles are important contributors to air pollution, Environment Canada believes that an appropriate regulatory framework is necessary to remove the opportunity for individual companies to systematically sell a significant number of higher emitting vehicles in Canada than would be allowed in the U.S. This was judged to be important to provide assurance that the long-term environmental performance of the Canadian fleet will be comparable with that of the U.S. Environment Canada recognized, however, that the Canadian market is not identical to the U.S. Therefore, the *On-Road Vehicle and Engine Emission Regulations* under CEPA 1999 allow company to elect to exclude the group of vehicles that are sold concurrently in Canada and in the U.S. from the mandatory fleet average standard. A company that chooses to make the election in a model year is subject to the following restrictions:

1. The company cannot include vehicles in the group that is subject to the election if the total number of vehicles sold in Canada exceeds the total number of vehicles sold in the U.S. under the same certificate of conformity in that model year. This restriction does not apply to vehicles that conform to a full useful life emission “bin” having a NOx standard that is equal to or less than the applicable fleet average NOx standard for that model year (i.e. achieve below “average” emissions).
2. The company must include all eligible vehicles in that group. Thus, a company could not choose to exempt only a portion of its eligible vehicles while allowing others to remain in the portion of their fleet subject to the averaging requirements.
3. The company cannot generate any emission credits or transfer any emission credits to another company in the model year that it chooses to exclude vehicles that are subject to the election, and forfeits any emission credits that it may have obtained in previous model years.

Environment Canada believes that the various provisions are structured in a manner that will deliver fleet average emissions comparable to the U.S., minimize the regulatory burden on companies and allow companies to market vehicles in Canada independently from the U.S.

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<sup>6</sup> Scenario Analysis: Fleet Average NOx Emissions in Canada, Transportation Systems Branch, Environment Canada, November, 2002.

### 3.5 Emission Credits/Deficits

NOx emission credits/deficits are calculated in accordance with the following equation:

$$(A - B) \times C \quad [2]$$

Where:

*A* is the fleet average NOx standard;

*B* is the average NOx value in respect of the fleet; and,

*C* is the total number of vehicles in the fleet.

NOx emission credits/deficits are expressed in units of vehicle-grams per mile and must be rounded to the nearest whole number. NOx emission credits are obtained when the average NOx value in respect of a fleet of a specific model year is lower than the fleet average NOx standard for that model year. NOx emission deficits are obtained in a specific model year when the average NOx value in respect of a fleet of a specific model year is higher than the fleet average NOx standard for that model year.

NOx emission credits for a specific model year are credited on the last day of that model year and may be used to offset any outstanding NOx emission deficit, be carried forward to offset a future deficit or be transferred to another company. A deficit must be offset no later than the third model year following the year in which it is incurred. If any part of a NOx emission deficit for a specific model year is outstanding following the second model year after the model year in which the deficit was incurred, the number of NOx emission credits required to offset that outstanding deficit in the next model year is 120% of the deficit.

### 3.6 End of Model Year Reports

The Regulations require that all companies submit a report to the Minister of the Environment no later than May 1<sup>st</sup> after the end of the model year. The end of model year report must contain detailed information concerning the company's fleets and/or groups of vehicles, including information related to:

- statements of allowable elections made by the company in complying with the fleet average NOx requirements of the Regulations
- average NOx value(s) achieved
- values used in calculating the fleet average NOx values
- calculation of NOx emission credits and/or NOx emission deficits
- balance of credits or deficits
- credit transfers to, or from, the company.

## 4 Summary of Company Fleet Average NOx Emission Performance

### 4.1 Scope of Company Reports

Table 3 presents a summary of the companies that submitted a fleet average NOx report for the 2004 model year in accordance with the requirements of the Regulations, including the vehicle divisions and the number of tests groups<sup>7</sup> covered by the company reports.

**Table 3: Scope of Company Reports**

<b>Company</b>	<b>Divisions</b>	<b>Number of Test Groups</b>
BMW Canada Inc.	BMW, Mini, Rolls-Royce	15
Daimler-Chrysler Canada Inc.	Chrysler, Dodge, Jeep	26
Ferrari North America, Inc.	Ferrari	2
Ford Motor Company of Canada, Limited	Ford, Lincoln, Mercury	48
General Motors of Canada Limited	Buick, Cadillac, Chevrolet, Chevy Trucks, GMC, Hummer, Oldsmobile, Pontiac, Saab, Saturn	46
Honda Canada Inc.	Acura, Honda	18
Hyundai Auto Canada	Hyundai	10
Jaguar Canada	Jaguar	6
Kia Motors Canada Inc.	Kia	8
Land Rover Canada	Land Rover	2
Maserati North America, Inc.	Maserati	1
Mazda Canada Inc.	Mazda	18
Mercedes-Benz Canada Inc.	Mercedes	12
Mitsubishi Motor Sales of Canada Inc.	Mitsubishi	11
Nissan Canada Inc.	Infiniti, Nissan	17
Porsche Cars Canada Ltd.	Porsche	8
Subaru Canada, Inc.	Subaru	8
Suzuki Canada Inc.	Suzuki	5
Toyota Canada Inc.	Lexus, Toyota	21
Volkswagen Canada Inc.	Audi, Bentley, Lamborghini, Volkswagen	21
Volvo Cars of Canada Ltd.	Volvo	7
<b>Total</b>		<b>310</b>

A total of twenty-one companies submitted reports covering 2004 model year vehicles in 310 test groups.

<sup>7</sup> A test group is the basic classification unit for the purpose of demonstrating compliance with exhaust emission standards and comprises light-duty vehicles, light-duty trucks or medium-duty passenger vehicles having similar exhaust emission performance and that share all of the features described in section 1827, subchapter C, part 86 of the CFR.

#### 4.2 Company Fleet Average NOx Values for the 2004 Model Year

Tables 4 and 5 summarize the total number of vehicles and average NOx values for each company's fleets of LDV/LLDT and HLDT/MDPV, respectively.

**Table 4: Summary of Company Average NOx Values for LDV/LLDT Fleet**  
**Fleet Average NOx Standard = 0.25 grams/mile**  
**Maximum NOx = 0.6 grams/mile (i.e. "Bin" 10)**

<b>Company</b>	<b>Total Number of Vehicles</b>	<b>Average NOx Value (grams/mile)</b>
BMW Canada Inc.	17,423	0.20068
Daimler-Chrysler Canada Inc.	145,116	0.186912
Ferrari North America, Inc.	95	0.30
Ford Motor Company of Canada, Limited	96,611	0.21258
General Motors of Canada Limited	304,495	0.186855
Honda Canada Inc.	129,063	0.199389
Hyundai Auto Canada	58,716	0.23606
Jaguar Canada	2,028	0.2383
Kia Motors Canada Inc.	24,342	0.23589
Land Rover Canada	540	0.200
Maserati North America, Inc.	52	0.30
Mazda Canada Inc.	70,509	0.15989
Mercedes-Benz Canada Inc.	8,080	0.1686
Mitsubishi Motor Sales of Canada Inc.	9,839	0.2498
Nissan Canada Inc.	64,426	0.15932
Porsche Cars Canada Ltd.	799	0.229
Subaru Canada, Inc.	17,896	0.23787
Suzuki Canada Inc.	12,342	0.18103
Toyota Canada Inc.	163,171	0.226898
Volkswagen Canada Inc.	36,707	0.32947
Volvo Cars of Canada Ltd.	14,872	0.14703

**Table 5: Summary of Company Average NOx Values for HLDT/MDPV Fleet**

**Fleet Average NOx Standard = 0.53 grams/mile**

**Maximum NOx = 0.9 grams/mile (i.e. "Bin" 11)**

<b>Company</b>	<b>Total Number of Vehicles</b>	<b>Average NOx Value (grams/mile)</b>
BMW Canada Inc.	2,809	0.3959
Daimler-Chrysler Canada Inc.	41,527	0.20230
Ford Motor Company of Canada, Limited	53,776	0.37012
General Motors of Canada Limited	67,549	0.35377
Mercedes-Benz Canada Inc.	1,220	0.6000
Nissan Canada Inc.	3,044	0.2180
Porsche Cars Canada Ltd.	1,357	0.3447
Volkswagen Canada Inc.	2,315	0.3097

Although the Regulations came in effect on January 1, 2004, the Regulations give companies the option of including all of their 2004 model year vehicles, including those manufactured before January 1, 2004, in the fleet average calculations or only those manufactured after January 1, 2004. All companies elected to report on the basis of all of their 2004 model year vehicles. In addition, Land Rover Canada, Toyota Canada Inc. and Volkswagen Canada Inc. reported vehicles for a limited number of heavy light-duty trucks (HLDT) test groups certified to Tier 1 standards. This is consistent with U.S. EPA Tier 2 provisions for heavy light-duty trucks of the 2004 model year whose model year commenced before December 21, 2003. These vehicles are not included in the fleet average value calculations for the 2004 model year.

The company average NOx values ranged from 0.14703 grams/mile to 0.32947 grams/mile for LDV/LLDT and 0.20230 grams/mile to 0.6000 grams/mile for HLDT/MDPV. The calculated average NOx values for three of the twenty-one companies LDV/LLDT fleet are above the average NOx standard of 0.25 grams/mile. One company also reported an average NOx value for HLDT/MDPV fleet above the average NOx standard of 0.53 grams/mile. Average NOx values above the applicable average NOx standard for a given fleet are generally attributed to one or more of the following reasons:

1. Fleet contains a very limited number of vehicles. The U.S. EPA exempts "small-volume" manufacturers from the requirements of the fleet average NOx program during the phase-in period. For example, a "small-volume" manufacturer's fleet of light-duty vehicles and light light-duty trucks is subject to a fleet average NOx standard of 0.3 grams/mile for 2004-2006, and then subject to a fleet average NOx standard of 0.07 grams/mile in 2007. In Canada, there is no such provision. A company can, however, elect to exclude U.S. certified vehicles that are sold concurrently in both countries from the mandatory fleet average standard in Canada.
2. Fleet includes a substantial number of diesel-fuelled vehicles. It is recognized that achieving low NOx levels, particularly pending the availability of low sulphur diesel in 2006 that will enable the use of sophisticated emission control technologies,

represents a greater technical challenge for diesel-fuelled vehicles. Diesel engines, however, typically produce lower emissions of volatile organic compounds (VOCs), carbon monoxide (CO) and carbon dioxide (CO<sub>2</sub>) relative to comparable gasoline-fuelled vehicles.

3. Average NOx value of only one of the fleet is above the average NOx standard. A company can average values from the LDV/LLDT and HLDT/MDPV fleets to satisfy the requirements of the average NOx emission program in Canada.

Ferrari North America Inc., Land Rover Canada, Mitsubishi Motor Sales of Canada Inc., Maserati North America Inc. and Volkswagen Canada Inc. elected to exclude their group of vehicles that were sold concurrently in Canada and the U.S. from compliance with the fleet average NOx standard, which effectively applies to their entire fleets of the 2004 model year vehicles. As all of their group of vehicles satisfy the applicable restrictions, fleet average NOx values from those companies were reported in this section for information purposes only, but do not generate any emission credits/deficits in Section 4.3.

#### 4.3 Emission Credits/Deficits for the 2004 Model Year

Table 6 summarizes the emission credits earned by each company for the 2004 model year. Companies that elected to exclude their group of vehicles from compliance with the fleet average NOx standard or that did not report vehicles for a particular fleet are assigned “0” credits/deficits.

**Table 6: Emission Credits/Deficits for the 2004 Model Year**  
(vehicle-grams/mile)

<b>Company</b>	<b>LDV/LLDT</b>	<b>HLDT/MDPV</b>	<b>Total 2004 MY Credits</b>
BMW Canada Inc.	859	377	1,236
Daimler-Chrysler Canada Inc.	9,155	13,608	22,763
Ferrari North America, Inc.	0 <sup>1</sup>	0 <sup>2</sup>	0 <sup>1</sup>
Ford Motor Company of Canada, Limited	3,615	8,598	12,213
General Motors of Canada Limited	19,227	11,904	31,131
Honda Canada Inc.	6,532	0 <sup>2</sup>	6,532
Hyundai Auto Canada	818	0 <sup>2</sup>	818
Jaguar Canada	24	0 <sup>2</sup>	24
Kia Motors Canada Inc.	343	0 <sup>2</sup>	343
Land Rover Canada	0 <sup>1</sup>	0 <sup>2</sup>	0 <sup>1</sup>
Maserati North America, Inc.	0 <sup>1</sup>	0 <sup>2</sup>	0 <sup>1</sup>
Mazda Canada Inc.	6,354	0 <sup>2</sup>	6,354
Mercedes-Benz Canada Inc.	658	-85	573
Mitsubishi Motor Sales of Canada Inc.	0 <sup>1</sup>	0 <sup>2</sup>	0 <sup>1</sup>
Nissan Canada Inc.	5,842	950	6,792
Porsche Cars Canada Ltd.	17	251	268
Subaru Canada, Inc.	217	0 <sup>2</sup>	217
Suzuki Canada Inc.	851	0 <sup>2</sup>	851
Toyota Canada Inc.	3,770	0 <sup>2</sup>	3,770
Volkswagen Canada Inc.	0 <sup>1</sup>	0 <sup>1</sup>	0 <sup>1</sup>
Volvo Cars of Canada Ltd.	1,531	0 <sup>2</sup>	1,531
<b>Total</b>	<b>59,813</b>	<b>35,603</b>	<b>95,416</b>

*Notes:*

- A negative “-“ sign indicates a deficit.
- <sup>1</sup> The company elected to exclude their group of vehicles from compliance with the fleet average NOx standard.
- <sup>2</sup> The company’s fleet did not have any vehicles for the applicable class.

A total of 95,416 credits were earned for the 2004 model year. None of the companies reported an overall deficit for the 2004 model year, although one company used credits from one of its fleet to offset a NOx emission deficit from the other fleet.

#### 4.4 End of Model Year Balance of Emission Credits/Deficits

Table 7 shows all activity relating to credits for the 2004 model year.

**Table 7: End of Model Year Emission Credits/Deficits Balance**

(vehicle-grams/mile)

<b>Company</b>	<b>Initial Balance</b>	<b>Total 2004 MY Credits</b>	<b>New Balance</b>	<b>Credits Transferred</b>	<b>End of Model Year Balance</b>
BMW Canada Inc.	0	1,236	1,236	0	1,236
Daimler-Chrysler Canada Inc.	0	22,763	22,763	0	22,763
Ferrari North America, Inc.	0	0 <sup>1</sup>	0	0	0
Ford Motor Company of Canada, Limited	0	12,213	12,213	0	12,213
General Motors of Canada Limited	0	31,131	31,131	0	31,131
Honda Canada Inc.	0	6,532	6,532	0	6,532
Hyundai Auto Canada	0	818	818	0	818
Jaguar Canada	0	24	24	0	24
Kia Motors Canada Inc.	0	343	343	0	343
Land Rover Canada	0	0 <sup>1</sup>	0	0	0
Maserati North America, Inc.	0	0 <sup>1</sup>	0	0	0
Mazda Canada Inc.	0	6,354	6,354	0	6,354
Mercedes-Benz Canada Inc.	0	573	573	0	573
Mitsubishi Motor Sales of Canada Inc.	0	0 <sup>1</sup>	0	0	0
Nissan Canada Inc.	0	6,792	6,792	0	6,792
Porsche Cars Canada Ltd.	0	268	268	0	268
Subaru Canada, Inc.	0	217	217	0	217
Suzuki Canada Inc.	0	851	851	0	851
Toyota Canada Inc.	0	3,770	3,770	0	3,770
Volkswagen Canada Inc.	0	0 <sup>1</sup>	0	0	0
Volvo Cars of Canada Ltd.	0	1,531	1,531	0	1,531
<b>Total</b>	<b>0</b>	<b>95,416</b>	<b>95,416</b>	<b>0</b>	<b>95,416</b>

*Note:*

- <sup>1</sup> The company elected to exclude their group of vehicles from compliance with the fleet average NOx standard.

As this is the first year that the fleet averaging provisions are in effect, no credits were available from previous years to be applied to this model year. While trading of emission credits between companies was permitted, no trading was reported for the 2004 model year. Credits generated in the 2004 model year may be used to offset deficits in future years.



## 5 NOx Emission Performance of the Canadian Fleet

### 5.1 Distribution of LDV, LLDT, HLDT and MDPV

Table 8 summarizes the LDV, LLDT, HLDT and MDPV distribution of the Canadian fleet for the 2004 model year.

**Table 8: Distribution of Canadian Fleet**

Vehicle Class	Total Number of Vehicles	Percentage of Total Fleet
LDV	798,251	59%
LLDT	378,871	28%
HLDT	123,129	9%
MDPV	50,468	4%
<b>Total</b>	<b>1,350,719</b>	<b>100%</b>

The overall Canadian fleet for the 2004 model year was comprised of 59% light-duty vehicles, 28% light light-duty trucks, 9% heavy light-duty trucks and 4% medium-duty passenger vehicles.

### 5.2 Distribution of “Bins” and NOx Fleet Average Values

Table 9 summarizes the distribution of vehicles by NOx standard (i.e. “Bin”) for each of the LDV/LLDT and HLDT/MDPV fleet.

**Table 9: Distribution of Vehicles by NOx Standard (Bin)**

“Bin” Number	NOx Standard (grams/mile)	LDV/LLDT		HLDT/MDPV	
		Total Number of	Percentage of	Total Number of	Percentage of
		Vehicles in “Bin”	Vehicles in “Bin”	Vehicles in “Bin”	Vehicles in “Bin”
11	0.9	N/A	N/A	1,004	0.58%
10	0.6	28,532	2.42%	51,365	29.59%
9	0.3	472,002	40.10%	931	0.54%
8	0.20	243,322	20.67%	119,005	68.55%
7	0.15	1,867	0.16%	0	0.00%
6	0.10	0	0.00%	24	0.01%
5	0.07	415,293	35.28%	1,268	0.73%
4	0.04	14,440	1.23%	0	0.00%
3	0.03	1,666	0.14%	0	0.00%
2	0.02	0	0.00%	0	0.00%
1	0.00	0	0.00%	0	0.00%
<b>Total</b>		<b>1,177,122</b>	<b>100%</b>	<b>173,597</b>	<b>100%</b>
<b>Canada NOx Fleet Average (grams/mile)</b>		<b>0.2016463</b>		<b>0.321976</b>	
<b>Fleet Average NOx Standard (grams/mile)</b>		<b>0.25</b>		<b>0.53</b>	

A total of 1,177,122 LDV/LLDT and 173,597 HLDT/MDPV were reported for the 2004 model year for a total of 1,350,719 vehicles. The average NO<sub>x</sub> values were 0.2016463 grams/mile and 0.321976 grams/mile for the LDV/LLDT and HLDT/MDPV fleets, respectively. These NO<sub>x</sub> values are approximately 19% and 39% better than their corresponding fleet average NO<sub>x</sub> standards of 0.25 grams/mile and 0.53 grams/mile.

## **6 Conclusions**

In the first year that companies were subject to fleet average NO<sub>x</sub> requirement under the *On-Road Vehicle and Engine Emission Regulations*, a total of twenty-one companies submitted reports for 310 test groups comprising 1,350,719 vehicles of the 2004 model year manufactured or imported for the purpose of sale in Canada. The average NO<sub>x</sub> value for the entire Canadian LDV/LLDT fleet is 0.2016463 grams/mile compared to a fleet average NO<sub>x</sub> standard of 0.25 grams/mile. The average NO<sub>x</sub> value for the entire Canadian HLDT/MDPV fleet is 0.321976 grams/mile compared to a fleet average NO<sub>x</sub> standard of 0.53 grams/mile. The NO<sub>x</sub> values for both overall fleets are better than the corresponding fleet average NO<sub>x</sub> standards, consistent with the environmental performance objectives of the Regulations for the 2004 model year.