

Discussion Paper – Proposed Amendment’s to Canada’s *Sulphur in Diesel Fuel Regulations*

July 2011

Introduction

Canada’s *Sulphur in Diesel Fuel Regulations*, under the *Canadian Environmental Protection Act, 1999*, ensure that the level of sulphur in on-road, off-road, rail and marine diesel fuel does not impede the effective operation of advanced emission-control technologies being phased in across North America for such applications. The requirements, shown in Table 1, were originally aligned in level and timing with those of the U.S. Environmental Protection Agency (EPA).

As a result of the adoption by the International Maritime Organization (IMO) of the North American Emission Control Area (ECA) proposal, Environment Canada intends to amend its *Sulphur in Diesel Fuel Regulations*.

The U.S. EPA has revised its requirements for diesel fuel used in marine engines. In accordance with Environment Canada’s policy of alignment with the U.S. EPA on fuel quality requirements, we are proposing to amend the *Sulphur in Diesel Fuel Regulations* to align Canadian limits nationally for sulphur in these fuels with those of the U.S. Additional minor amendments are also proposed to improve administration of the Regulations.

Table 1: Current Limits and Effective Dates under *Sulphur in Diesel Fuel Regulations*

Sulphur Limit (mg/kg)	Activity	On-Road Diesel Fuel	Off-Road Diesel Fuel	Rail and Marine Diesel Fuel
500	Production or Import	Since 1998	June 1, 2007	June 1, 2007
	Sales	Since 1998	October 1, 2007 ²	October 1, 2007 ²
22	Sales	September 1, 2006	N/A	N/A
15	Production or Import	June 1, 2006	June 1, 2010	June 1, 2012
	Sales	October 16, 2006 ¹	October 1, 2010 ³	N/A

1 - September 1, 2007 in the Northern Supply Area

2 - December 1, 2008 in the Northern Supply Area

3 - December 1, 2011 in the Northern Supply Area

Environment Canada is seeking views of parties on the proposed amendments to the *Sulphur in Diesel Fuel Regulations* as discussed in this document.

1. New Sulphur Limits for Marine and Rail Diesel Fuel

1.1 Background – Emission Control Area (ECA) and the MARPOL Convention

Currently, large vessels operating in Canadian waters use heavy residual fuel which typically has higher sulphur levels. The MARPOL Convention includes the *Regulations for the Prevention of Air Pollution from Ships* under Annex VI, which establish global sulphur limits for marine fuels and nitrogen oxide limits for marine engines as well as more stringent sulphur limits in designated Emission Control Areas (ECAs). In addition, new ships built after 2016, operating within an ECA will be subject to new stringent emissions standards for nitrogen oxides (NO_x).

In 2009, the U.S., Canada and France (for St. Pierre and Miquelon) jointly proposed to the International Maritime Organization (IMO) that the area within 200-nautical miles off the east and west coasts of Canada and the U.S. be designated as an ECA. The IMO adopted the proposal on March 26, 2010 and the North American ECA will come into force on August 1, 2012. Canada and the U.S. are now each required to implement the ECA requirements through domestic regulations.

The ECA requirements will dramatically reduce air pollution from ships and deliver substantial air quality improvements and public health benefits that extend hundreds of miles inland.

1.2 Effects of ECA Implementation on Fuels

From August 1, 2012 until 2015, vessels operating in the ECA must use fuel with a maximum sulphur level of 1.0 wt% (10,000 mg/kg). Beginning January 1, 2015, that limit drops by 90% to 0.10 wt% (1,000 mg/kg).

The 1,000 mg/kg sulphur limit is expected to result in large marine vessels switching from the heavy residual fuel they currently use to lighter distillate fuel (i.e. diesel fuel), unless operators achieve equivalent emissions reductions through other means (e.g. SO_x aftertreatment).

1.3 U.S. Action to Implement the North American ECA

On April 30, 2010, the EPA passed new emission and fuel requirements for Category 3 marine vessels (vessels equipped with engines having a per-cylinder displacement at or above 30 litres) operating within the ECA. ECA-equivalent standards were also applied to U.S. internal waters of the Great Lakes and St. Lawrence River and Seaway. The rule¹ includes a 1,000 mg/kg sulphur limit, effective January 1, 2015, for marine fuel used within the ECA², unless operators use emission control technology to attain compliance with the ECA standards. To enable a fuel supply in advance, marine fuel with a sulphur level of 1,000 mg/kg sulphur may be made available for use within the ECA as of June 1, 2014.

¹ Information on the U.S. EPA Final Rule on marine emission standards is available at:

<http://www.epa.gov/otaq/oceanvessels.htm#regs>

² Additional flexibilities apply to vessels operated on the Great Lakes and Saint Lawrence Seaway

In 2020, the EPA expects emissions from ships operating in the designated area to be reduced by 320,000 tons for NO_x, 90,000 tons for PM_{2.5}, and 920,000 tons for SO_x, which is 23%, 74% percent, and 86%, respectively, below predicted levels in 2020 absent the ECA³. These emissions reductions provide both health and environmental benefits. In Canada, the ECA will save an estimated 175 lives in 2020 and reduce ambient fine particulate matter by up to 15% in some areas.

As previously noted, vessels are expected to switch to diesel fuel in order to meet the 1,000 mg/kg sulphur limit. The EPA rule therefore includes a minor ancillary amendment to EPA's diesel fuel regulation to allow 1,000 mg/kg sulphur diesel fuel to be made available for use in Category 3 vessels⁴ in order to ensure the availability of marine fuel meeting the MARPOL sulphur limit.

Originally, both the U.S. EPA and Environment Canada had prescribed a sales limit for rail/marine diesel fuel of 500 mg/kg in order to serve as an outlet for off-spec higher-sulphur diesel fuel in the market. In conjunction with the recent change to its diesel fuel rule, the U.S. EPA changed the sulphur limit for sales of rail/marine diesel fuel from 500 mg/kg to 15 mg/kg. This change recognizes that diesel fuel for use in Category 3 vessels (which is to be subject to the 1,000 mg/kg limit) could now serve as an outlet for any off-spec higher-sulphur diesel fuel.

1.4 Canadian Action to Implement the North American ECA

Canada is a ratifying member of MARPOL and is internationally obligated to implement the North American ECA requirements through domestic regulations.

Transport Canada currently has regulations under the *Canada Shipping Act, 2001* that restrict emissions from ships operating in Canadian waters, and will amend these to incorporate the North American ECA requirements⁵. Transport Canada's amendments establishing a 1,000 mg/kg sulphur limit for fuel used on-board vessels subject to MARPOL will substantially reduce emissions from such vessels.

The amendments Environment Canada proposes to make to the *Sulphur in Diesel Fuel Regulations* will harmonize Canada's diesel fuel sulphur requirements with those of the U.S. EPA and ensure the availability of lower sulphur marine diesel fuel that meets the MARPOL sulphur limit.

As well, due to the highly integrated fuel market across North America, it is important that fuel quality limits are consistent between Canada and the U.S. Canadian fuel marketers have requested that Environment Canada's *Sulphur in Diesel Fuel Regulations* be amended to allow for the smooth implementation of a national marine fuel supply compliant with MARPOL limits and that is also harmonized with the U.S. EPA's diesel fuel program. With the implementation of the North American ECA, both Canada and the U.S. are internationally obligated to promote the availability of compliant marine fuel to be made available in their respective markets.

³ More information on costs and benefits can be found in EPA-420-R-09-019, December 2009 (available at <http://www.epa.gov/otaq/oceanvessels.htm#regs>)

⁴ Referring to vessels propelled by Category 3 marine vessel engines

⁵ More information is available at: <http://www.tc.gc.ca/eng/marinesafety/oep-environment-sources-air-1778.htm>

Canada's *Sulphur in Diesel Fuel Regulations* include a 15 mg/kg sulphur limit for marine diesel fuel, which takes effect June 1, 2012. In parallel with the U.S. EPA's changes to its diesel fuel rule, Environment Canada proposes to amend the Regulations to:

1. Allow production, import and sale of 1,000 mg/kg sulphur diesel fuel for use in Category 3 vessels⁶ as of June 1, 2014, in order to ensure the availability of marine fuel meeting the MARPOL sulphur limit; and
2. Revise the sulphur limit for sales of locomotive and marine diesel fuel other than for use in Category 3 marine vessels from 500 mg/kg to 15 mg/kg, also effective as of June 1, 2014. This change recognizes that 1,000 mg/kg diesel fuel for use in Category 3 vessels would serve as an outlet for any off-spec higher-sulphur diesel fuel. (Note: the sulphur limit for production and importation of locomotive and non-Category 3 marine diesel fuels will still remain 15 mg/kg as of June 1, 2012.)

2. Miscellaneous Administrative Amendments

Stakeholders have asked that the Regulations be amended to better address diesel fuel for use in scientific research. Currently, such fuel is subject to the full requirements, including sulphur limits and quarterly reporting. This precludes emissions testing of engines using high sulphur diesel fuel and places a disproportionately high administrative burden on businesses importing small volumes of fuel for research purposes.

The volume of diesel fuel used in Canada for scientific research is very small and the effect of reduced regulatory requirements for it is not expected to be detrimental to the environment or health of Canadians.

Neither the *Sulphur in Gasoline Regulations* nor the *Benzene in Gasoline Regulations* include limits for fuel for use in scientific research. Environment Canada proposes to take a similar approach for the *Sulphur in Diesel Fuel Regulations* and to remove the reporting requirement for diesel fuel for use in scientific research.

Suppliers of diesel fuel exclusively for scientific research will still be subject to registration and record-keeping provisions of the *Sulphur in Diesel Fuel Regulations* to ensure adequate proof and tracking of such diesel fuel still remains.

Currently, the regulations require submission of registration information (Schedule 2) 15 days in advance of the first production or import by a person of diesel fuel. The proposed amendments would reduce the 15 days advance notice to 1 day. This change will allow for more timely imports in the event of fuel supply shortages and is consistent with the deadlines for such reports under the recently passed *Renewable Fuels Regulations*.

⁶ Referring to vessels using Category 3 marine vessel engines

In addition, Environment Canada proposes to add a requirement for a 12-hour notification prior to imports of diesel fuel, similar to Canada's current *Benzene in Gasoline Regulations*. Also, it is proposed to revise Schedule 2 so that producers and importers report their civic address of their principal place of business (and mailing address if different) instead of just their mailing address. Such changes will ensure Environment Canada's enforcement officers are better informed of locations where inspections may take place.

Finally, Environment Canada proposes that the standard for comparing test methods be revised from *ASTM D4855-97* to *ASTM D6708-08*, as discussed in the March 2010 "Discussion Paper Proposing to Replace ASTM D 4855-97 referred to in Canada's *Benzene in Gasoline Regulations*, and *Sulphur in Diesel Fuel Regulations*" (Attachment I to this document).

3. Summary

Table 2: Summary of proposed limits and effective dates under *Sulphur in Diesel Fuel Regulations*

Sulphur Limit (mg/kg)	Activity	On-Road Diesel Fuel	Off-Road Diesel Fuel	Rail and non-large vessel⁴ marine Diesel Fuel	Large vessel⁴ marine Diesel fuel
1000	Production or Import	N/A	N/A	N/A	June 1, 2014
	Sales	N/A	N/A	N/A	June 1, 2014
500	Production or Import	Since 1998	June 1, 2007	June 1, 2007	N/A
	Sales	Since 1998	October 1, 2007 ²	October 1, 2007 ²	N/A
22	Sales	September 1, 2006	N/A	N/A	N/A
15	Production or Import	June 1, 2006	June 1, 2010	June 1, 2012	N/A
	Sales	October 16, 2006 ¹	October 1, 2010 ³	June 1, 2014	N/A

N/A – not applicable

1 - September 1, 2007 in the Northern Supply Area

2 - December 1, 2008 in the Northern Supply Area

3 - December 1, 2011 in the Northern Supply Area

4 - Large vessels are vessels propelled by engines having per-cylinder displacement at or above 30 litres

Path Forward

Environment Canada seeks the views of parties on the proposed amendments, and requests that any comments on this matter be provided by August 26, 2011. Comments may be submitted by e-mail to fuels-carburants@ec.gc.ca.

Written comments may also be sent to:

Leif Stephanson
Sulphur in Diesel Fuel Regulations- Proposed Amendments
Environment Canada
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Gatineau, Quebec
K1A 0H3

Thank you in advance for providing us with your views on this issue.

Attachment 1:
**Discussion Paper Proposing to Replace ASTM D 4855-97 Referred to in
Canada's Benzene in Gasoline Regulations and Sulphur in Diesel Fuel
Regulations (March 2010)**

Summary

This discussion paper provides background information and seeks the views of parties on the proposed replacement of a standard used to determine the equivalency of an alternative method, referenced in both the *Benzene in Gasoline Regulations* and *Sulphur in Diesel Fuel Regulations*.

The American Society of Testing and Materials (ASTM) has withdrawn ASTM D 4855-97 *Standard Practice for Comparing Test Methods*, since the Committee responsible for the standard no longer had the expertise to maintain it, and there was no replacement identified⁷. This ASTM standard is referred to in Canada's *Benzene in Gasoline Regulations* and *Sulphur in Diesel Fuels Regulations*. As such, Environment Canada is considering revising the aforementioned regulations to replace ASTM D 4855-97 (withdrawn by ASTM) with ASTM D 6708-08 *Standard Practice for Statistical Assessment and Improvement of Expected Agreement Between Two Test Methods that Purport to Measure the Same Property of a Material*.

Environment Canada has sought advice from various technical experts on a suitable replacement standard. The recommendations provided identify ASTM D6708-08 as the most suitable replacement for ASTM D 4855-97. Environment Canada believes this change will not impact persons choosing to use equivalent methods for sampling or analysis, as per the Regulations.

Requirements of the *Benzene in Gasoline Regulations*

Canada's *Benzene in Gasoline Regulations* prohibit the supply of gasoline that contains benzene at a concentration exceeding 1.0% by volume, and a benzene emission number that exceeds 71 during the summer and 92 during the winter. The Regulations also prohibit the sale or offer for sale of gasoline that contains benzene at a concentration that exceeds 1.5% by volume. The option of meeting the requirements on the basis of a yearly pool average is available.

Subsection 5(1) of the Regulations specifies the reference methods to be used for sampling and analysis of gasoline. When the sampling method specified in subsection 5(1) cannot be reasonably applied, another sampling method may be used by the primary supplier. Paragraph 6(2)(a) of the Regulations, requires that the equivalency of the proposed alternative method be validated in accordance with the ASTM D 4855-97, *Standard Practice for Comparing Test Methods*, or ASTM D 3764-01, *Standard Practice for Validation of Process Stream Analyzer Systems*.

⁷ Details available at <http://www.astm.org/Standards/D4855.htm>

The *Benzene in Gasoline Regulations* are available at:

<http://laws.justice.gc.ca/en/C-15.31/SOR-97-493/index.html>.

The following are the provisions for Equivalent Methods for Sampling and Analysis (section 6 of the *Benzene in Gasoline Regulations*), with the proposed revisions underlined.

Equivalent Methods for Sampling and Analysis

6. (1) When the sampling method specified in subsection 5(1) cannot be reasonably applied, another sampling method may be used by the primary supplier if, at least 60 days before the use of the method, the primary supplier sends the Minister, by registered mail or courier,

(a) an explanation of why the method specified in subsection 5(1) cannot be applied;

(b) a description of the proposed alternative method; and

(c) evidence that demonstrates that the reliability and accuracy of the alternative method are comparable to those of the method specified in subsection 5(1).

(2) For the purposes of sections 8 and 20, either the normally applicable method specified in one of subsections 5(2) to (7) or an alternative method may be used by the primary supplier on the condition that

(a) the equivalency of the alternative method to the normally applicable method be validated in accordance with the American Society for Testing and Materials method ~~D 4855-97, *Standard Practice for Comparing Test Methods*~~ D 6708-08 *Standard Practice for Statistical Assessment and Improvement of Expected Agreement Between Two Test Methods that Purport to Measure the Same Property of a Material*, or the American Society for Testing and Materials method D 3764-01, *Standard Practice for Validation of Process Stream Analyzer Systems*; and

(b) the primary supplier sends the Minister, by registered mail or courier at least 60 days before using the alternative method, a description of the alternative method and evidence that demonstrates that it provides results equivalent to those provided by the normally applicable method.

(3) If the Minister determines that the alternative method is not equivalent to the normally applicable method, the Minister shall reject it and notify the primary supplier to that effect.

Requirements of the *Sulphur in Diesel Fuel Regulations*

The *Sulphur in Diesel Fuel Regulations* set maximum limits for the concentration of sulphur in diesel fuel for use in on-road vehicles, and off-road, locomotive (rail) and vessel (marine) engines. The goal of the *Sulphur in Diesel Fuels Regulations* is to ensure that the level of sulphur in diesel fuel used in on-road, off-road, locomotive and vessel diesel vehicles and engines in Canada will not impede the effective operation of advanced emission control technologies installed on vehicles and engines.

The *Sulphur in Diesel Fuel Regulations* are available at:

<http://laws.justice.gc.ca/en/SOR-2002-254/FullText.html>

Section 4 of the Regulations require that the concentration of sulphur in diesel fuel be measured in accordance with the ASTM method D 5453-03a, *Standard Test Method for Determination of Total Sulphur in Light Hydrocarbons, Motor Fuels and Motor Oils by Ultraviolet Fluorescence*.

Subparagraph 5(2)(b)(i) of the Regulations allows for the use of an equivalent method to ASTM method 5453 03a, on the condition that the equivalency of the method be validated in accordance with ASTM method D 4855-97, *Standard Practice for Comparing Test Methods*.

The following are the provisions for Analysis and Reports (sections 4 and 5 of the *Sulphur in Diesel Fuel Regulations*), with the proposed revisions underlined>.

Analysis

4. The concentration of sulphur in diesel fuel referred to in section 3 shall be measured in accordance with the American Society for Testing and Materials method ASTM D 5453-03a, *Standard Test Method for Determination of Total Sulfur in Light Hydrocarbons, Motor Fuels and Motor Oils by Ultraviolet Fluorescence*.

SOR/2005-305, s. 4.

Reports

5. (1) Every person who produces or imports diesel fuel, other than diesel fuel imported in a fuel tank that supplies an off-road engine, shall submit to the Minister a report for each facility where the person produces diesel fuel and for each province into which the person imports diesel fuel that contains the information set out in Schedule 1

(a) quarterly for each calendar quarter during which diesel fuel is produced or imported, within 45 days after the end of each quarter until December 31, 2014; and

(b) annually for each calendar year during which diesel fuel is produced or imported within 45 days after the end of each calendar year after December 31, 2014.

(2) For the purposes of the report referred to in subsection (1), the concentration of sulphur in diesel fuel shall be calculated using

(a) the method referred to in section 4; or

(b) an equivalent method to the one specified in paragraph (a) on the condition that

(i) the equivalency of the method be validated in accordance with the American Society of Testing and Materials method ASTM D 4855-97 ~~(Reapproved 2002), Standard Practice for Comparing Test Methods D 6708-08~~ Standard Practice for Statistical Assessment and Improvement of Expected Agreement Between Two Test Methods that Purport to Measure the Same Property of a Material, and

(ii) the producer or importer proposing to use the method sends to the Minister, by registered mail or courier at least 60 days before using the method, a description of the method and evidence that demonstrates that it provides results equivalent to those provided by the method specified in paragraph (a).