

U.S. Regulation of Large Marine Diesel Engines under MARPOL Annex VI

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I. Introduction

Balancing valuable maritime shipping interests with environmental concerns is one of the biggest challenges facing policymakers charged with regulating air pollution from large marine diesel engines in the U.S. and around the world. A fragmented, country-by-country approach raises the specter of inconsistent regulatory regimes – a highly ineffective and burdensome state of affairs.

Achieving uniform regulation of shipping is difficult because of the global movement of people and goods through many sovereign jurisdictions. U.S. participation in the effort to globalize an international standard for air pollution from ships through Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL)² can serve commercial and environmental interests by increasing worldwide compliance and easing the burden on regulated entities.

Marine diesel engines, used on a wide range of vessels, are significant contributors to air pollution in many coastal areas. Diesel engine exhaust emissions contain a number of substances which are potentially hazardous to human health and the environment, including nitrogen dioxide (NO_x), sulphur dioxide (SO_x), and particulate matter. NO_x causes ground level ozone,³ acid aerosols, acid rain, nutrient overload, and visibility impairment, and also contributes to global warming.⁴ SO_x contributes to respiratory illness and the formation of acid rain, and also impairs visibility.⁵ Diesel exhaust is especially

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² The International Convention for the Prevention of Marine Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78), Nov. 2, 1973, 12 ILM 1319 (1973), as amended Feb 17, 1978, 1340 U.N.T.S. 184.

³ "Smog" is mostly ground level ozone.

⁴ See Environmental Protection Agency, Six Common Air Pollutants: Chief Causes for Concern - NO_x, <http://www.epa.gov/air/urbanair/nox/chf.html> (last visited Dec. 1, 2008).

⁵ See Environmental Protection Agency, Six Common Air Pollutants: Chief Causes for Concern - SO₂, <http://www.epa.gov/air/urbanair/so2/chf1.html> (last visited Dec. 1, 2008).

problematic in ports where ships, trucks, and heavy equipment often run twenty-four hours per day.

This article summarizes federal and international regulation of marine diesel engines on ocean-going vessels, such as container ships, cruise ships, and tankers. These ships propel through the water using large marine diesel engines, ranging in size from 2,500 to 70,000 kilowatts (kW).⁶ In addition, these ships carry a variety of auxiliary diesel engines from small generators to large engines.

II. What is MARPOL?

MARPOL arose out of the efforts of the International Maritime Organization (IMO), a specialized agency of the United Nations, to protect the environment from operational and accidental pollution from ships.⁷ The IMO utilizes conventions, codes, and guidelines to address international maritime issues.⁸ Member States are encouraged to ratify these conventions and incorporate the standards into their domestic legislation.⁹ The IMO believes that it can best accomplish its goals of safety, efficiency, and cleanliness by creating standards that all shipping nations adopt and adhere to.¹⁰

MARPOL emerged in the 1970's from a combination of two treaties. The first convention, adopted by the IMO on November 2, 1973, covered pollution from oil, chemicals, sewage, garbage, and harmful substances in packaged form but never went into effect.¹¹ IMO conventions must be ratified by a particular number of States representing a certain percentage of the world's shipping fleet before they will come into force.¹² The 1973 Convention required ratification by fifteen States with a combined merchant fleet representing over fifty percent of the world's shipping.¹³ As of 1976, just three States representing less than one percent of the world's merchant shipping fleet had ratified the 1973 Convention.¹⁴ In time, a 1978 protocol did eventually enter into force on October 2, 1983 and it absorbed the parent convention.¹⁵

MARPOL contains six Annexes addressing specific areas of concern to the international maritime pollution problem. Annex I: Regulations for the Prevention of Pollution by Oil and Annex II: Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk

⁶ DieselNet.com, Emission Standards: US: Marine Diesel Engines, <http://www.dieselnet.com/standards/us/marine.php> (last visited Dec. 1, 2008).

⁷ See International Maritime Organization, Introduction to IMO, http://www.imo.org/home.asp?topic_id=3 (last visited September 1, 2008).

⁸ *Id.*

⁹ *Id.*

¹⁰ *Id.*

¹¹ See International Maritime Organization, MARPOL, http://www.imo.org/Conventions/contents.asp?doc_id=678&topic_id=258#6 (last visited Sept. 1, 2008).

¹² *Id.*

¹³ *Id.*

¹⁴ *Id.*

¹⁵ Ratifications increased following a series of oil tanker accidents in the late 1970's and a procedural change that allowed countries to become parties to MARPOL by only ratifying Annex I. *Id.*

became effective on October 2, 1983.¹⁶ Annex III: Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form entered into force in July 1992. Annex IV: Prevention of Pollution by Sewage from Ships became effective on September 27, 2003 and Annex V: Prevention of Pollution by Garbage from Ships on December 31, 1998. Annex VI: Prevention of Air Pollution from Ships, which is the main focus of this paper, took effect on May 19, 2005.

III. MARPOL Annex VI Regulation

Annex VI regulates emissions of NO_x¹⁷ and SO_x,¹⁸ prohibits intentional emissions of ozone depleting substances, regulates onboard incinerators, and sets standards for tanker vapor emissions.¹⁹ Annex VI does not distinguish between recreational and commercial vessels, or between international and domestic vessels.²⁰ A vessel is only exempt from compliance when assisting with rescue operations or if suffering from damage caused without the fault of the vessel operator.²¹

Annex VI seeks to limit emissions of NO_x and SO_x by establishing standards concerning emissions and fuel content. Under Annex VI, NO_x standards apply to marine engines rated above 130 kW if the vessel was constructed, or the engine has undergone major conversion,²² on or after January 1, 2000.²³ Annex VI relates NO_x emissions standards to engine-rated crankshaft speed.

Engine Speed	NO _x Emission Limit g/kW-h
Less than 130 rpm	17.0
130-1999 rpm	45.0 x [engine speed] ^{-0.2}
2000 rpm and above	9.8

The NO_x Technical Code²⁴ outlines the testing parameters for compliance with Annex VI standards. Regulated vessels can meet NO_x standards by utilizing exhaust gas cleaning systems or any other equivalent method that will reduce emissions to within the specified range.²⁵

¹⁶ Annex I and Annex II went into force with MARPOL 73/78. Annex III, IV, V, and VI were added subsequently.

¹⁷ Annex VI, Chapter III, Reg. 13.

¹⁸ *Id.*, Reg. 14.

¹⁹ Regulations on these last three issues are beyond the scope of this paper, but are found in Annex VI, Reg. 12, 16 and 15 respectively.

²⁰ Vessels include fixed and floating platforms, except in respect to emissions directly relating to drilling, processing, or production.

²¹ Annex VI, Chapter I, Reg. 3.

²² The major conversion clause is significant because it extends the scope of the controls to engines installed on ships prior to January 1, 2000. According to Annex VI, major conversion is defined as: replacement with a new engine built on or after 1/1/2000, increasing engine output by more than ten percent, or substantial modification. Substantial modification encompasses operational or technical modifications which could increase NO_x emissions.

²³ Annex VI, Chapter III, Reg. 13, paragraph 1(a).

²⁴ Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines adopted by Conference Resolution 2 at the 1997 Conference of Parties. *See also* Annex VI, Chapter 1, Reg. 2(5).

²⁵ Annex VI, Chapter III, Reg. 13, paragraph 3(b).

Sulfur content in fuel is limited to 45,000 parts per million (ppm) irrespective of fuel grade or machinery used.²⁶ The IMO is required to monitor the worldwide sulfur content average.²⁷ Suppliers must document sulfur content of the fuel in a bunker delivery note, which must be retained onboard the vessel for a period of three years along with a representative sample of the fuel that must be retained for twelve months.²⁸ In special SO_x Emission Control Areas (SECA) the sulfur content in fuel cannot exceed 15,000 ppm.²⁹ Ships burning fuel with higher sulfur content may enter a SECA only if the engine has been outfitted with an exhaust cleaning system or other technology such as segregated bunker capacity and the ability to switch upon entering to lower sulfur fuel.³⁰ State parties can propose new SECAs which are evaluated based on the costs of reducing sulfur from ships compared to land-based control as well as the impacts on shipping and trade.³¹ Amendments to Annex VI established the Baltic Sea SECA in 1997 and the North Sea SECA in 2005.³²

Compliance with Annex VI is the responsibility of vessel owners/operators. Enforcement of MARPOL is the responsibility of signatory States acting within their own jurisdictions. Enforcing parties conduct surveys to ensure that vessels and engines comply with the requirements of Annex VI. Survey requirements apply to vessels over 400 gross tons and to floating drilling rigs and other platforms.³³ If a vessel meets the Annex VI criteria, the surveying State issues an International Air Pollution Prevention Certificate (IAPP). If a vessel is determined to be operating with equipment not corresponding with the IAPP, the State with jurisdiction over the waters in which a vessel is operating may take action.

Vessel surveys take place throughout the life of a vessel and include:

- Initial surveys occurring before the ship enters service or before issuing an IAPP for the first time to ensure that the equipment complies with the standards;³⁴
- Periodic surveys occurring at least every five years after the initial survey to ensure that no modifications have been made that would take equipment out of compliance and require the re-issuance of the IAPP;³⁵
- Intermediate surveys occurring at least once during the period between issuance of an IAPP and the periodic surveys to ensure that equipment is still compliant;³⁶
- Unscheduled surveys occurring periodically, unless annual periodic surveys are required, in which case unscheduled surveys are not obligatory;³⁷

²⁶ *Id.* Reg. 14, paragraph 1.

²⁷ *Id.* paragraph 2.

²⁸ *Id.* paragraph 5; Reg. 18, paragraph 3-6.

²⁹ *Id.* Reg. 14, paragraph 4(a).

³⁰ *Id.* paragraph 4(b), (c).

³¹ Annex VI, Appendix III.

³² U.N. Oceans Atlas, Particularly Sensitive Sea Areas,

http://www.oceansatlas.org/unatlas/issues/pollutiondegradation/special_areas/sensitive_sea_areas.htm (last visited Sept. 1, 2008).

³³ Ships less than 400 gross tons may be checked by the enforcing administration by appropriate means to ensure compliance. *See* Annex VI, Chapter II, Reg. 5, paragraph 1(a), 2.

³⁴ Annex VI, Chapter II, Reg. 5, paragraph 1(a).

³⁵ *Id.* paragraph 1(b).

³⁶ *Id.* paragraph 1(c).

- Pre-certification surveys occurring prior to an engine installment onboard a vessel to ensure compliance with NOx limits (An engine meeting the standards will be issued an Engine International Air Pollution Prevention Certificate (EIAPP) in accordance with the NOx Technical Code);³⁸
- Re-survey/certification is required (1) if inspections and surveys are not carried out within the specified periods; (2) if significant alterations occur to the equipment, systems, fittings, arrangements or material to which Annex VI applies; or (3) upon transfer of the ship to a flag of another State;³⁹ and
- Cautionary inspections may be conducted if there are grounds to believe that the vessel's master or crew is not familiar with essential procedures relating to prevention of air pollution.⁴⁰

While ships are on international voyages, they must carry their IAPP onboard, which serves as *prima facie* evidence that the ship complies with the Convention. To be IAPP-compliant, ships must possess the EIAPP or Statement of Compliance,⁴¹ in addition to a Technical File,⁴² and a Record Book of Engine Parameters.⁴³ If there are clear grounds for believing the ship is not compliant with Annex VI or its certificates, or if a ship does not possess a certificate, the enforcing party may detain the ship until satisfied that it can travel to sea without unreasonably harming the environment.

IV. Domestic Implementation

A. Maritime Pollution Prevention Act of 2008

The United States implemented Annex VI by passing the Maritime Pollution Prevention Act of 2008 (the Act)⁴⁴ which amended the Act to Prevent Pollution from Ships.⁴⁵ The Act passed the House and Senate in March 2007 and June 2008, respectively, and the President signed the Act into law on July 21, 2008. The Act applies to vessels flying the flag of, or under the authority of, a party to Annex VI in U.S. waters while at or in transit to or from ports, shipyards, offshore terminals, internal waters, and the U.S. Exclusive Economic Zone.⁴⁶ The Administrator of the EPA (Administrator) is responsible for issuing EIAPP

³⁷ *Id.* paragraph 5.

³⁸ *Id.* paragraph 4. See also Press Release, International Maritime Organization, *IMO says ship engines should comply with NOx code from 1 January 2000*, http://www.imo.org/dynamic/mainframe.asp?topic_id=69&doc_id=560 (last visited Sept. 1, 2008).

³⁹ Annex VI, Chapter II, Reg. 9, paragraph 4.

⁴⁰ *Id.* Reg. 10, paragraph 1.

⁴¹ Prior to U.S. implementation of Annex VI, U.S. manufacturers may have obtained a Statement of Voluntary Compliance from the EPA.

⁴² The Technical File must be approved by the vessel's flag state, including any noted changes, and kept with the engine. Any changes to the engine, and thus to the file, must be approved by the flag state.

⁴³ The Record Book applies when the NOx measurements are to be done onboard, and is required by the NOx Technical Code for a record of changes to NOx critical components or setting. Unlike the Technical File, the vessel's crew can complete it.

⁴⁴ Pub. L. 110-280, 122 Stat. 2611 (July 21, 2008).

⁴⁵ 33 U.S.C. 1901 *et seq.*

⁴⁶ *Id.* § 1902.

certificates.⁴⁷ The Secretary of the Department in which the Coast Guard operates, currently the Department of Homeland Security, inspects vessels for compliance.⁴⁸ Either the Secretary or the Administrator can undertake enforcement actions if there is an indication of a violation.⁴⁹ In addition, like many other environmental laws, the Act expressly allows any adversely affected person to bring an action on his or her behalf against the Administrator for failure to perform any nondiscretionary act or duty.⁵⁰

The United States deposited an instrument of ratification with the IMO on October 8, 2008 and Annex VI will enter into force for the United States on January 8, 2009.⁵¹ At that time the U.S. will be able to issue IAPPs to ships entitled to fly flags of States which are parties to Annex VI.⁵²

B. EPA Regulation of Air Pollution from Ships

Under the Clean Air Act, the EPA has a duty to protect air quality from all harms, including marine diesel engine emissions. Section 213(a)(3) of the Clean Air Act⁵³ instructs the EPA to set standards that achieve the greatest emission reductions through the use of the best technology available to the regulated industry. The EPA reviews and revises the standards periodically in light of industry developments and effectiveness.

When dealing with marine diesel engines, the EPA divides engines into three categories based on per-cylinder displacement. Category 1 engines have “a rated power greater than or equal to 37 kilowatts and a specific engine displacement less than 5.0 liters per cylinder.”⁵⁴ Category 2 engines have “a specific engine displacement greater than or equal to 5.0 liters per cylinder but less than 30 liters per cylinder.”⁵⁵ Category 3 includes the largest engines with per cylinder displacement greater than or equal to 30 liters.⁵⁶ Standards and regulations pertaining to marine engines get progressively stricter in intervals, called Tiers, which increase numerically starting at Tier 1. As technology improves and the EPA determines that technology warrants a stricter standard, the next Tier of standards enters into effect. Existing Tiers reflect the IMO’s work under Annex VI; however, Annex VI was not binding in the U.S. when the Tiers went into effect.

1. The 1999 Rule

⁴⁷ *Id.* § 1903.

⁴⁸ *Id.* § 1907(f).

⁴⁹ *Id.*

⁵⁰ *Id.* § 1910.

⁵¹ Protocol of 1997 to Amend the International Convention for the Prevention of Pollution from Ships, 1973, as Modified by the Protocol of 1978 relating thereto, Ratification by the United States, PMP.7/Circ.21 (Oct. 15, 2008), *available at* http://www.imo.org/includes/blastData.asp/doc_id=10431/21.pdf (last visited Dec. 1, 2008).

⁵² *See* Annex VI, Reg. 7, paragraph 4.

⁵³ 42 U.S.C. § 7547(a)(3).

⁵⁴ 40 C.F.R. § 94.2(b).

⁵⁵ *Id.*

⁵⁶ *Id.*

In 1999, the EPA promulgated a rule entitled Control of Emissions of Air Pollution from New Compression-Ignition Engines at or above 37 kilowatts (1999 Rule).⁵⁷ The new regulations governed both propulsion and auxiliary engines.⁵⁸ Although the rule did not adopt the Annex VI standards, the EPA encouraged manufacturers, through voluntary measures referred to as Tier 1 standards, to build engines that were compliant with Annex VI. The EPA also adopted a schedule for future implementation of a set of mandatory Tier 2 standards for Category 1 and 2 engines that would be similar to the standards for land-based diesel engines.

Notably, the EPA expected Category 3 engines to meet voluntarily the Annex VI standards and did not establish a schedule for implementation of stricter standards. This resulted in the largest engines being left without finalized emission standards. In addition, the 1999 Rule included a Foreign-Trade Exception applicable to all U.S. vessels that spent less than 25% of their total operating time within 320 km of U.S. territory and to vessels not operating between two U.S. ports.⁵⁹ This exception also allowed qualifying vessels with Category 3 propulsion engines to exempt other onboard auxiliary Category 1 and 2 engines from national emission requirements. This created a loophole that allowed some vessels to operate their propulsion and auxiliary engines while in U.S. jurisdiction without regulation.

2. The 2003 Rule

A lawsuit over the EPA's decision to leave the largest engines unregulated resulted in a court settlement requiring the EPA to develop Category 3 NOx emission limits.⁶⁰ In 2003, the EPA established Tier 1 emission standards for Category 3 engines flagged or registered in the U.S.⁶¹ Compliance was mandated by 2004. The Tier 1 NOx emission standards were equivalent to the Annex VI limits, and were to be achieved using engine-based controls without the need for exhaust treatment. The rule also committed the EPA to more stringent Tier 2 standards for Category 3 engines by April 27, 2007.⁶² The 2003 rule also abolished the 1999 Rule's Foreign-Trade Exception.⁶³

The 2003 Rule is applicable to owners, operators, and manufacturers of marine diesel engines. Unlike Annex VI, which targets ship owners and operators, the EPA rule focuses on manufacturers. The EPA requires ship operators to operate the engine within the certifiable parameters (including adjustable parameters) and maintain all records of

⁵⁷ Control of Emissions of Air Pollution From New Marine Compression-Ignition Engines at or Above 37 kW, 64 Fed. Reg. 73300 (Dec. 29, 1999).

⁵⁸ Exceptions to the 1999 Rule's standards included engines in recreational vessels, certain land-based engines modified for marine applications, competition engines, military vessels, and other specific applications such as testing, displaying, and exporting.

⁵⁹ 64 Fed. Reg. 73304-05.

⁶⁰ *Earth Island Inst. v. EPA*, No. 00-1065, Settlement Agreement (D.C. Cir. 2000), available at <http://www.epa.gov/otaq/regs/nonroad/largesi/setlemnt.pdf> (last visited Dec. 1, 2008).

⁶¹ Control of Emissions From New Marine Compression-Ignition Engines at or Above 30 Liters Per Cylinder, 68 Fed. Reg. 9746 (Feb. 28, 2003).

⁶² This deadline was challenged in *Bluewater Network v. EPA*, 372 F.3d 404 (D.C. Cir. 2004) as being too low of a standard, but the court upheld the rule relying on the EPA to publish the new rule by April 27, 2007.

⁶³ 64 Fed. Reg. 9751.

maintenance, repair, and adjustment as it relates to emissions. The vessel owner must complete an annual compliance statement.

Most of the burden of the 2003 Rule falls on engine manufacturers. To certify their engines, manufacturers must:

- Divide engines into “engine families” with similar characteristics;
- Test the highest emitting engine configuration within the family;
- Determine deterioration rate for emissions and apply that rate to the “zero-hour” emission rate;
- Determine the emission-related maintenance that will be necessary to keep the engines in compliance;
- Submit the test data to the EPA in an “application for certification;”
- Demonstrate prior to production that engines will comply throughout their useful life;
- Warrant to purchasers that engines will comply throughout their useful life; and
- Specify how the operator should adjust the engine and testing protocols.⁶⁴

Engine manufacturers who were already complying with the Annex VI NO_x Technical Code specifically needed to examine their methods of emission testing to ensure compliance with the EPA regulatory scheme.

The EPA justified the short lead-time between announcement of the 2003 rule and the 2004 compliance date based on the fact that manufacturers were already meeting Annex VI standards and, therefore, already Category 3 Tier 1 compliant.⁶⁵ The EPA chose not to initially set standards higher than Annex VI because of possible delays in achieving greater environmental benefits including: recognition that manufacturers can achieve additional reductions with more lead time, questions pertaining to applicability of advanced technologies that existed at that time, and the hope of future pursuit of more stringent international standards.⁶⁶ The anticipated creators of the more stringent Tier 2 standards were to further assess changes in technology and consider application to engines on foreign vessels entering U.S. ports by an April 27, 2007 deadline.⁶⁷

Interestingly, when the April 27, 2007 deadline arrived for the EPA to promulgate a new Tier of emission standards for Category 3 engines, the EPA decided instead to propose a new deadline of December 17, 2009.⁶⁸ The EPA published this decision as a direct and final rule because it did not anticipate adverse comments on what they saw as a noncontroversial issue.⁶⁹

⁶⁴ 68 Fed. Reg. 9769-73.

⁶⁵ *Id.* at 9749.

⁶⁶ *Id.* at 9748. *See also Bluewater Network v. EPA*, 372 F.3d 404 (D.C. Cir. 2004) (holding that EPA’s failure to adopt stricter standards was not arbitrary and capricious, and finding the challenge to deferral of foreign-flagged vessel regulation to be premature).

⁶⁷ 40 C.F.R. § 94.8(a)(2)(ii).

⁶⁸ Change in Deadline for Rulemaking To Address the Control of Emissions From New Marine Compression-Ignition Engines at or Above 30 Liters per Cylinder, 72 Fed. Reg. 20977 (proposed Apr. 27, 2007).

⁶⁹ *Id.*

However, in September 2007, Friends of the Earth filed a Complaint for Declaratory and Injunctive Relief against the EPA.⁷⁰ In the complaint, Friends of the Earth argued that the EPA had violated § 213(a)(3) of the Clean Air Act by failing to meet its deadline and also violated the Administrative Procedure Act by failing to fulfill the non-discretionary duty to create a new Tier of Category 3 standards.⁷¹ The EPA responded to the environmental group's complaint by supporting standards as reflected in its proposal to the IMO for new Annex VI rulemaking.⁷²

The EPA is "considering standards for achieving large reductions in NO_x and particulate matter (PM) through the use of technologies such as in-cylinder controls, aftertreatment, and low sulfur fuel, starting as early as 2011."⁷³ The proposed standards consist of two Tiers for NO_x emissions and new performance-based SO_x standards that reflect technology improvements and expectations. The standards consist of:

- New Particulate Matter and SO_x limits applying in 2011/2012 to all ships operating in specific areas defined under the treaty.
- Tier 2 NO_x limits for new Category 3 propulsion engines beginning in 2011 (to achieve a 15% to 25% NO_x reduction).
- Tier 3 NO_x limits for new Category 3 propulsion engines beginning in 2016 applying when ships operate in the Particulate Matter/SO_x geographic areas requiring the use of high-efficiency catalytic aftertreatment emission control technology (to achieve NO_x reductions of more than 80%).
- NO_x limits for engines built before Jan. 1, 2000 that would achieve a 20% NO_x reduction to phase-in beginning 2010/2012.⁷⁴

Given U.S. ratification of Annex VI, the EPA has appropriately shifted focus from domestic rulemaking to amending the international standards set by the IMO. Amendments to Annex VI, if agreed to by a committee or conference, automatically enter into force on a specified date unless an agreed number of States object by a certain time in a process known as "tacit acceptance."⁷⁵ This acceptance procedure greatly eliminates delays associated with waiting for States to vote for approval.⁷⁶ In the past, either IMO's Marine Environment Protection Committee, or a Conference of Parties to MARPOL, has adopted amendments pending the acceptance procedure.⁷⁷

C. Criticisms of Current Domestic Regulations

⁷⁰ *Friends of the Earth v. EPA*, 1:07-cv-01572, Complaint for Declaratory and Injunctive Relief (D.C. Sept. 5, 2007).

⁷¹ *Id.*

⁷² Advanced Notice of Proposed Rulemaking, Control of Emissions From New Marine Compression-Ignition Engines at or Above 30 Liters per Cylinder, 72 Fed. Reg. 69522 (Dec. 7, 2007); *See also* EPA, IMO MARPOL Annex VI Amendments, Main U.S. Submittals to Amendment Process, <http://www.epa.gov/otaq/oceanvessels.htm#imo> (last visited Feb. 2, 2009).

⁷³ 72 Fed. Reg. 69522.

⁷⁴ *Id.*

⁷⁵ IMO, Conventions, http://www.imo.org/Conventions/mainframe.asp?topic_id=148 (last visited Feb. 2, 2009).

⁷⁶ *Id.*

⁷⁷ *Id.*

Critics identify at least five procedural and substantive shortcomings concerning the current 2003 Rule. First, the 2003 Rule does not regulate foreign-flagged vessels.⁷⁸ This lack of regulation violates the intent of the Clean Air Act⁷⁹ and is of great concern due to the high number of U.S. shipping interests avoiding the high costs of registering under a U.S. flag and more stringent U.S. environmental and labor laws by registering under the flag of another country.⁸⁰ The result is that the EPA does not regulate truly foreign vessels or any U.S. interests operating under “flags of convenience.”⁸¹

Second, the 2003 Rule failed to set any standards that would regulate the sulfur content of marine fuel. Third, the lack of a higher standard for Category 3 engines has created controversy, especially considering that these engines burn bunker fuel which can produce much higher pollutants than other highly-regulated diesel engines.⁸²

Fourth, the shipping industry has argued that any differences between the EPA and Annex VI will result in disadvantages to U.S. flagged vessels because of the need for dual certifications and compliance strategies. Finally, some critics claim the EPA has not met its burden of endorsing a “technology forcing standard” which would consider, and require, the highest technology available when determining emission limits.⁸³ U.S. implementation of Annex VI would resolve at least four of these issues while leaving the technology questions for resolution in the proposed rulemaking.

V. Anticipated Change in Compliance and Enforcement

The Annex VI standards should be easy to achieve for those manufacturers already achieving and certifying under the standards via the Voluntary Statement of Compliance Program.⁸⁴ Although similar, there are four major areas of difference that are important to note between the existing EPA standards and Annex VI emission requirements: 1) the EPA allows, while the Annex requires, witness testing; 2) the EPA holds the manufacturer primarily responsible, while the Annex focuses on the vessel owner/operator; 3) the EPA specifies a broader range of test temperatures in order to represent normal operations; and 4) the EPA standards are based on the date of first full assembly, while the Annex focuses

⁷⁸ *But see, Bluewater Network v. EPA*, 372 F. 3d 404 (D.C. Cir. 2004) (holding that EPA’s deferral on its decision to regulate foreign vessels was not arbitrary and capricious because the vessels were already regulated by a similar international standard).

⁷⁹ Sandra Snyder, *EPA’s Category 3 Marine Emissions Standards: Mimicking MARPOL Annex VI or Mocking the Clean Air Act?*, 71 BROOK L. REV. 1065, 1081-1083 (2005).

⁸⁰ *Id.* at 1089

⁸¹ A flag of convenience, or open registry, ship is a ship that flies a flag of a country other than the country of ownership. Given the financial advantages, many U.S. interests operate under flags of convenience. Over 90% of the vessels in U.S. ports are foreign flagged, and therefore not regulated under the EPA’s rule. *Id.* at 1089-90.

⁸² *Bluewater Network v. EPA*, 372 F. 3d 404, 407 (D.C. Cir. 2004).

⁸³ *Husqvarna AB v. EPA*, 254 F. 3d 195, 201 (D.C. Cir. 2001); *see also* Snyder, *supra* note 79, at 1084-85.

⁸⁴ Prior to the Annex going into force the EPA set up a process for manufacturers to obtain a Statement of Voluntary compliance which can be exchanged for an EIAPP. 68 Fed. Reg. 9746, 9757.

on the start date of vessel manufacturing.⁸⁵ In addition, the U.S. may set alternative standards for those vessels operating exclusively in its jurisdiction.

For foreign manufacturers complying with Annex VI, the additional work needed to comply with EPA standards would depend on their current emissions testing procedures. Manufacturers would need to show that, prior to production, engines would comply for their useful life; warrant to purchasers that engines would operate in compliance for their useful life; perform a production test after installation; install onboard measurement systems; specify how the operator should adjust and use the engine; and specify how proper adjustments should be verified through testing. In addition, manufacturers would need to supply operators with a technical file and ensure properly witnessed engine testing.

VI. Conclusion

International and federal standards on propulsion engines are not the only way to reduce shipping's environmental impacts while also considering economic concerns. Some ports have adopted pollution reduction policies aimed at changing behaviors on site, while maintaining the desired level of economic activity. The Port of Long Beach has been effectively utilizing a lease, which shipping interests must sign with the ports, to improve environmental standards. For example, in 2006, the Port entered into a lease agreement with International Transportation Service, Inc. which requires ships to use shore-side equipment while at the ITS terminal and replace cargo-handling equipment.⁸⁶ The lease agreement is expected to reduce air pollutants by 90% at the Port's third-largest cargo terminal.⁸⁷ The EPA has applauded pollution-reducing policies at the Port of Long Beach.⁸⁸ The interests of ports, both economically and environmentally, will be best served by taking an active role in regulations.

State governments enacting legislation to improve the environmental regulations pertaining to maritime air pollution have not always had the same success. A federal court recently held that federal marine diesel regulations preempted states from imposing emission standards that are different or more stringent.⁸⁹ Specifically, challenges to

⁸⁵ See Appendix A, at page 14, for additional detail about the differences between the EPA's voluntary program and Annex VI.

⁸⁶ Press Release, The Port of Long Beach, *Board Votes for Landmark "Green Lease,"* available at <http://www1.polb.com/news/displaynews.asp?NewsID=62>. Other examples of port policies include switching ocean-going vessels to cleaner fuels, requesting vessels to shut off engines and use land based power while at port, speed reduction, as well as utilizing cleaner locomotives and work trucks. See Press Release, Port of Long Beach, *Port Releases 2006 Air Quality Study: Inventory Underscores Need for Port's Anti-Pollution Initiatives,* <http://www.polb.com/news/displaynews.asp?NewsID=421&TargetID=16> (last visited September 4, 2008).

⁸⁷ *Id.*

⁸⁸ Press Release, EPA, *U.S. EPA honors Port of Long Beach for Environmental Efforts* (June 1, 2005), available at <http://yosemite.epa.gov/opa/admpress.nsf/a4a961970f783d3a85257359003d480d/dcce9b650a0344cc852570d8005e1763!OpenDocument> (last visited Sept. 4, 2008).

⁸⁹ See *Pacific Merchant Shipping Association v. Goldstene*, 2008 U.S. App. LEXIS 4171 (9th Cir. Feb. 27, 2008).

California's attempt to limit particulate matter, NO_x, and SO_x were successful on summary judgment and the court enjoined the state from enforcement.⁹⁰

The Ninth Circuit Court of Appeals held that the state did not have the authority to establish such standards without EPA approval.⁹¹ This decision shows that a state's creation of laws will probably have little or no effect on environmental standards without the EPA creating a plan granting them authority to do so.⁹² In fact, the 1970 amendments to the Clean Air Act transferred authority to set air quality standards from the states to the EPA.⁹³

States chiefly regulate stationary sources because Congress has preempted state regulation of emission standards of vehicles or road/non-road engines.⁹⁴ Notably, states can adopt "in-use" requirements for engines that apply to the use, operation, and movement, but not the engine itself.⁹⁵ This allows states to adopt limits on the use of engines, even though they have no authority to specifically set emission standards.

The good news for proactive states, like California, is that when the U.S. becomes a party to Annex VI, there will be opportunity to request designation of their coastal waters as a SECA. The process for setting up a SECA takes into consideration the costs of reducing SO_x emissions by ships versus land-based controls, as well as the impact on international shipping.⁹⁶ Setting up a SECA requires an amendment to the Annex that will be supported if there is a need to "prevent, reduce, and control" SO_x pollution from ships.⁹⁷ To begin the process, a party to the Convention must submit a proposal showing: (1) boundaries of the proposed SECA; (2) a description of the areas at risk from high SO_x levels; (3) assessment of current effects of SO_x from the proposed SECA area; (4) meteorological data on the area; (5) ship traffic in the area; and (6) descriptions of land-based measures to control SO_x in the at-risk area.⁹⁸

While the EPA created standards that reflect those of the global community, and seeks to set higher standards both domestically and internationally, it is imperative to understand that U.S. domestic regulation will not be enough. MARPOL's Annex VI should serve as a baseline global standard in order to facilitate global acceptance. Annex VI may not be the

⁹⁰ *Pac. Merch. Shipping Ass'n v. Cackette*, No. S-06-2791 (E.D. Cal. Aug. 30, 2007) (order granting summary judgment).

⁹¹ *Id.*

⁹² California's Environmental Protection Agency, however, is making another attempt at similar regulations. See California Air Resources Board, Rulemaking to Consider the Adoption of a Proposed Regulation for Fuel Sulfur and Other Operational Requirements for Ocean-Going Vessels Within California Waters and 24 Nautical Miles of the California Baseline (July 24, 2008), available at <http://www.arb.ca.gov/regact/2008/fuelogv08/fuelogv08.htm> (last visited Feb. 2, 2009).

⁹³ 42 U.S.C. § 7409.

⁹⁴ See *Engine Mfrs. Ass'n, v. EPA*, 88 F.3d 1075 (D.C. Cir. 1996) (referring to the spectacle of trying to regulate motor vehicles state-by-state since they easily move interstate).

⁹⁵ *Id.* (included in the Court's examples were carpool lanes, restricting cars in downtown areas, and programs to control idling of vehicles even when focused on limiting emissions).

⁹⁶ Annex VI, Appendix III, § 3.3.

⁹⁷ *Id.* § 1.1.

⁹⁸ *Id.* § 2.2.

highest standard possible, but it may be the most effective because of its worldwide application.

The EPA can best serve its MARPOL and Clean Air Act obligations by accepting the Annex VI standards, and then lobbying for further change. Implementation of Annex VI will not require drastic change in the industry; however attention to the few changes will be very important to ensure a smooth and economical transition.

Appendix A

Main differences between the EPA's voluntary program and MARPOL Annex VI⁹⁹

Requirements	The EPA's Control Program	MARPOL Annex VI
Liability for In-Use Compliance	Engine manufacturer is responsible for designing and producing an engine that complies with emission standards for the full useful life of the engine. Ship operators must maintain their engines and keep records of maintenance and engine adjustment.	Ship operators are solely responsible for ensuring in-use compliance. Ship operators must maintain engines and keep records of maintenance and adjustments throughout life of engine. Annex VI refers to these records as the Record Book of Engine Parameters.
Durability Demonstration	Engine manufacturer must demonstrate prior to production that a properly maintained and used engine will comply with emission standards of the useful life of the engine.	Manufacturers must demonstrate that the engine meets the standards when it is installed, and there is no durability demonstration required.
Witness Testing	Allowed, but not required	Certain witness requirements.
Test Conditions	Category 3 Engines use Annex VI test procedures with certain modifications to reflect real operating parameters.	Specifies narrow ranges for air and water temperature.
Test Parameters	In order to avoid unrealistic parameter settings, judgment is used in selecting values. Engine maximum test speed is based on the way the engine will operate in-use.	Manufacturers have full discretion to adjust certain engine parameters to appropriate settings, some of which may affect emission levels. Manufacturers may also set a maximum test speed that selectively includes lower-emission operation, even if those speeds do not represent actual operations when installed.
Compliance Date for Standards	Apply on the date engine is fully assembled. This difference in MARPOL and the EPA does not matter since the Annex VI effective date has passed.	Applies standards based on the date that a vessel is manufactured. This difference with the EPA does not matter since the effective date of Annex VI limits has passed.
Parameter Adjustment	Allows manufacturers to specify in their applications for certification which engine settings comply with standards and operators are prohibited from varying beyond these settings.	Prohibits operators from adjusting engine calibrations to be different from those specified by the manufacturer.

⁹⁹ Chart information can be found at 68 Fed. Reg. 9774-75.