Strict air pollution regulations on the horizon
Sharing expertise

This briefing is one of a continuing series which aims to share the legal expertise within the Club with our Members.

A significant proportion of the expertise in the Managers’ offices around the world consists of lawyers who can advise Members on general P&I related legal, contractual and documentary issues.

These lawyers participate in a virtual team, writing on topical and relevant legal issues under the leadership of our Legal Director, Chao Wu.

If you have any enquiries regarding the issues covered in this briefing, please contact the team via Chao Wu (chao.wu@thomasmiller.com or +44 20 7204 2157) and we will be pleased to respond to your query. The team also welcomes suggestions from Members for P&I related legal topics and problems which would benefit from explanation by one of these briefings.

Previous issues
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AIR EMISSIONS

Stricter air pollution regulations on the horizon

Air pollution from ships has been in the spotlight over recent years due to its increasing impact on the natural environment. The outcome has been a series of new regulations to limit exhaust and other atmospheric emissions from ships – globally, regionally and nationally.

MARPOL Annex VI sets global limits on ship exhaust emissions together with provisions for stricter emission control areas. For example in the North American Emissions Control Area, where the sulphur content of maritime fuel was limited to 1% in 2012, two UK Club member’s vessels have already been fined for not switching to low-sulphur fuel.

By 18th June 2014 all European Union member states are expected to implement directive 2012/33/EU, which brings European national air pollution laws in line with MARPOL Annex VI. They and other countries are also introducing regulations which go beyond MARPOL Annex VI requirements.

UK Club Members need to be fully aware of the growing and stricter atmospheric emissions measures being introduced around the world. This update summarises the global, regional and national regulations currently in force and proposed. Club Members should be aware of the growing and stricter measures that will be brought in in the next few years.
Prevention of air pollution from ships

International Maritime Organization (IMO) Regulations for the Prevention of Air Pollution from Ships were adopted in the 1997 protocol to the International Convention for the Prevention of Pollution from Ships (MARPOL). The regulations became Annex VI of the convention, which entered into force in May 2005.

Annex VI sets limits on sulphur oxides (SOx), particulate matter (PM) and nitrogen oxides (NOx) emissions from ship exhausts, as well as on volatile organic compound emissions from cargo tanks of oil tankers. It also prohibits deliberate emission of ozone-depleting substances from refrigerating plants and fire-fighting equipment. Annex VI applies to all ships of 400 gt and above, and to all fixed and floating drilling rigs and other platforms. At present it has been ratified by 75 countries, including the USA, representing 94.77% of world tonnage.

Two sets of emission and fuel quality requirements are defined by Annex VI: (1) global requirements, and (2) more stringent requirements applicable to ships in Emission Control Areas (ECA). An ECA can be designated for SOx and PM, or NOx, or all three types of emissions from ships subject to a proposal from a country party to Annex VI.

A revised version of the Annex VI came into force on 1st July 2010, reducing progressively the existing limits on SOx and NOx emissions. The associated NOx Technical Code 2008 entered into force at the same time, making the ship operator and not the engine manufacturer responsible for compliance.

The latest amendments introduced new regulations on energy efficiency for ships (from 1st January 2013) and the United States Caribbean Sea ECA (from 1st January 2014).

Key elements

SOx and particulate matter limits

Regulation 14 of Annex VI sets a global cap on the sulphur content of any maritime fuel oil. It has been reduced gradually from 4.5% m/m prior to 1st January 2012 to 3.5% m/m from 1st January 2012 and 0.5% m/m from 1st January 2020 (see Figure 1).

The latter limits will be revised and potentially brought forward to 2018 if factors related to the availability of fuel oil in the market and the analysis of trends make it possible. Otherwise, it could be postponed until 1st January 2025.

These limits are reduced in an ECA to:

- 1.5% m/m prior to 1st July 2010
- 1.0% m/m on and after 1st July 2010
- 0.1% m/m on and after 1st January 2015

Sulphur content needs to be documented by the fuel oil supplier following regulations on fuel oil availability and quality (regulation 18).

NOx limits

NOx limits are covered by regulation 13 of Annex VI, which sets progressive and tighter standards for new engines in a three-tier scheme (see Figure 2).

Tier I standards, defined in the 1997 version of Annex VI, apply to a diesel engine which is installed on a ship constructed on or after 1st January 2000 and prior to 1st January 2011, and represents the 17g/kWh standard.

Tier II, defined together with Tier III in the Annex VI amendments adopted in 2008, NOx emission levels for a diesel engine installed on a ship constructed on or after 1st January 2011 are reduced to 14.4 g/kWh. For Tier III, NOx emission levels for a diesel engine installed on a ship constructed on or after 1st January 2016 are reduced to 3.4 g/kWh when the ship is operating in a designated ECA. Outside a designated ECA, Tier II limits apply.

The same Tier I limits will apply to those existing marine diesel engine with a power output of more than 5,000 kW and a per-cylinder displacement at or above 90 litres installed on a ship constructed between 1st January 1990 and 1st January 2000.

A certified approved method must be provided following the requirements set in the NOx Technical Code.

The NOx Technical Code provides,
GLOBAL REGULATIONS

Figure 2. NOx limits under MARPOL Annex VI, Regulation 13

<table>
<thead>
<tr>
<th>Tier</th>
<th>Ship construction date on or after</th>
<th>Total weighted cycle emission limit (g/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$n$ = engine's rated speed (rpm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$n &lt; 130$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$n = 130 - 1999$</td>
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<tr>
<td></td>
<td></td>
<td>$n \geq 2000$</td>
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<tr>
<td>I</td>
<td>1 January 2000</td>
<td>17.0</td>
</tr>
<tr>
<td></td>
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<td>e.g. 720 rpm – 12.1</td>
</tr>
<tr>
<td>I</td>
<td>1 January 2011</td>
<td>14.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e.g. 720 rpm – 9.7</td>
</tr>
<tr>
<td>III</td>
<td>1 January 2016</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e.g. 720 rpm – 2.4</td>
</tr>
</tbody>
</table>

mandatory procedures for the testing, survey and certification of marine diesel engines which will enable engine manufacturers, shipowners and administrations to ensure that all applicable marine diesel engines comply with the relevant limiting emission values of NOx as specified within regulation 13 of Annex VI.

The IMO Marine Environment Protection Committee at its 66th session agreed to set the Tier III requirements to be applied to the marine diesel engines installed on

- ships constructed on or after 1st January 2016 and which operate in the North American ECA or the United States Caribbean Sea ECA, both designated for the control of NOx emissions

- ships constructed on or after the date of adoption by the committee of a new ECA, or a later date as may be specified in the amendment designating the new NOx Tier III ECA.

The amendments will come into force on 1st September 2015.

Ozone-depleting substances

Regulation 12 of Annex VI prohibits deliberate emissions of ozone-depleting substances.

Installations on ships constructed on or after 19th May 2005 will be prohibited when containing ozone-depleting substances other than hydrochlorofluorocarbons. They will be prohibited even if the ship had been constructed before that date when it had a contractual delivery date or the actual delivery of the equipment was on or after 19th May 2005.

Installations containing hydrochlorofluorocarbons will be prohibited on ships constructed on or after 1st January 2020. They will be prohibited even if the ship had been constructed before that date when it had a contractual delivery date or the actual delivery of the equipment was on or after 1st January 2020.

Volatile organic compounds (VOC)

The control of volatile organic compounds emitted to the atmosphere is governed by regulation 15 of Annex VI, which applies mainly to tankers. However, this regulation also applies to gas carriers only if the types of loading and containment system allow safe retention of non-methane compounds on board or their safe return ashore.

There are two aspects of volatile organic compounds control within regulation 15. In the first, control on volatile organic compounds emitted to the atmosphere in respect of certain ports or terminals is achieved by a requirement to utilise a vapour emission control system. Where so required, both the shipboard and shore arrangements are to be in accordance with the standards for vapour emission control systems set in MSC/Circ.585.

A country party to Annex VI may choose to apply such controls only to particular ports or terminals under its jurisdiction and only to certain sizes of tankers or cargo types. Where such controls are required at particular ports or terminals, tankers not so fitted may be accepted for a period of up to three years from the implementation date. Where a control system is requested, the relevant party is to notify IMO of that requirement and its date of implementation.

The second aspect of regulation 15 requires that all tankers carrying crude oil have an approved and effectively implemented ship-specific volatile organic compounds management plan covering the points given in the regulation. Guidelines for development
of these plans is given by resolution MEPC.185(59), and related technical information on systems and operation of such arrangements is given by circular MEPC.1/Circ.680.

Other means to comply

Annex VI regulation 4 allows national administrations to approve alternative means of compliance that are at least as effective in terms of emissions reduction as the ones prescribed in regulations 13 and 14. The equivalent method used must have been approved by the appropriate administration according to guidelines developed by IMO.

In 2009, the MEPC.184(59) guidelines for Exhaust Gas Cleaning Systems (EGCS) were adopted. These guidelines enable a ship to achieve low-sulphur requirements by water washing the exhaust gas stream prior to discharge to the atmosphere. Each country party to Annex VI needs to ensure that its port and terminal facilities can accommodate residues from exhaust gas cleaning systems.

Documentation requirements

International Air Pollution Prevention Certificate (IAPP)

Every ship of 400 gt and above subject to an initial or renewal survey which confirms its equipment, systems, fittings, arrangements and materials fully comply with MARPOL Annex VI requirements, will be issued with an International Air Pollution Prevention Certificate. This will apply to ships registered under the flag of a country party to Annex VI and trading internationally within other Parties’ jurisdiction. The certificate will be issued for a period not longer than 5 years (regulation 6).

The bunker delivery note

Regulation 18 states that when a ship is found not complying with MARPOL Annex VI standards, the appropriate authority may require the ship to present the circumstances, information and evidence of the actions carried out to achieve compliance. Furthermore, regulation 18 prescribes under the fuel oil quality section that details of the compliant fuel used must be recorded in a bunker delivery note that should always be kept on board for any inspections undertaken. The master or person in charge might be required to certify the truth of the note and to issue certified copies.

Every bunker delivery note must be accompanied by a sample of fuel oil following MEPC 96(47), guidelines for the sampling of fuel oil for determination of compliance with Annex VI of MARPOL 73/78. That sample must be sealed and signed by its supplier and the master or officer in charge of the bunkering and shall be kept at least for 12 months. The bunker delivery note must be kept for a period of three years after the fuel oil has been delivered. This requirement applies to ships subject to the International Air Pollution Prevention Certificate.

Compliance

Port State Control of a State Party to Annex VI can inspect a ship berthed when there are clear grounds for believing that the master or crew are not familiar with Annex VI procedures. Port State Control can then ensure the ship will not sail until the ship complies with Annex VI requirements.
EU encourages stringent measures

EU regulations have recently been brought in line with MARPOL Annex VI to ensure coherence with international law. However EU member states are also being encouraged to introduce more stringent measures to speed up implementation of lower sulphur limits for marine fuels.

The first step towards reducing SOx emissions by ocean-going ships was taken in 1999 through the EU Directive 99/32/EU. It established limits for sulphur content in heavy fuel oil (1.0% after 1st January 2003) and gas oil, including marine gas oil (0.1% m/m after 1st January 2008). Later on, following entry into force of MARPOL Annex VI, an amending Directive 2005/33/EU became effective on 1st January 2010 and barred any ship (irrespective of flag, type, age or tonnage) berthed or anchored in EU ports from using marine fuels with a sulphur content exceeding 0.1% m/m.

Further amendments were introduced by Directive 2012/33/EU, which has been in force since 17th December 2012 and will be implemented in EU member states by 18th June 2014. The directive underlines the need for a stronger monitoring and enforcement regime to guarantee proper compliance, suggesting periodic sampling, regular verification of ships’ logbooks and bunker delivery notes as well as dissuasive penalties. The directive also prescribes a publicly available register of local suppliers. However, it acknowledges the negative effects compliance could have on industry competitiveness, particularly regarding ECA regulations, and calls on the European Commission to use all instruments needed to minimise this risk.

**Key elements of the EU sulphur directive**

**Maximum sulphur content in marine fuel**

Figure 3 shows the maximum sulphur content of marine fuel to be used in Europe and how this compares with MARPOL Annex VI.

Furthermore, from 1st January 2010 marine diesel oils sold within the EU will not exceed 1.5% m/m sulphur and marine gas oils sold and used within the EU will not exceed 0.1% m/m sulphur.

**Other means to comply**

Emission abatement methods as an alternative to using low-sulphur marine fuels are allowed in EU member states’ ports, territorial seas, exclusive economic zones and pollution control zones. Ships using these methods should continuously achieve reductions of SOx emissions that are at least equivalent to the reductions that would be achieved by using low-sulphur marine fuels. The directive encourages member states to recognise alternative methods, such as using liquefied natural gas, on-board exhaust gas cleaning systems and biofuels. In addition, member states should promote the use of onshore power supply systems by docked vessels.

Regarding the availability of port waste reception facilities to meet the needs of ships using exhaust gas cleaning systems in member states’ ports, the directive states that the European Commission should consider the inclusion of this waste under the principle of ‘no special fee applied’ in port fees.

**Sampling and Analysis for Sulphur Content (article 6)**

EU member states require periodic sampling of marine fuel for on-board combustion both when it is being delivered and when it is already in tanks. The sampling, analysis and inspection of marine fuel must be registered in a ship’s logbooks and bunker delivery notes. Sulphur content should be determined by ISO method 8754 (2003) or PrEN ISO 14596 (2007).
Prevent, reduce and control

Emission Control Areas (ECAs) are defined by regulation 1, paragraph 8 of MARPOL Annex VI as an area where the adoption of special mandatory measures for emissions from ships is required to prevent, reduce and control air pollution from NOx, SOx or particulate matter, or all three types of emissions, and their attendant adverse impacts on human health and the environment.

What do operators have to do to comply?

SOx and particulate matter emission controls apply to all combustion equipment and devices on board, that is main and all auxiliary engines plus items such as boilers and inert gas generators.

A ship which is operating within and outside of an ECA shall use different fuel oils to comply with the relevant limits (see Figure 6). Therefore, prior to entry into an ECA, a full change over to a compliant ECA fuel is mandatory and there must be written procedures on board of how this should be undertaken. These procedures should allow enough time for the fuel oil service system to be fully flushed of all fuel oils that exceed the sulphur content limit before entering into the ECA. Likewise, there should not be a change over from the compliant fuel until the ship has left the ECA.

The sulphur content of fuels must be documented by its supplier. Every changeover is required to be recorded, depicting the quantities of the ECA-compliant fuel oils on board, the date, the time and the position of the ship when either completing the change over prior to entry or commencing change over after exit from such areas. These records must be made in a logbook as prescribed by the ship’s flag administration.

The recently designated ECAs – North American and the United States Caribbean Sea – are the only ones where in addition to limits for SOx there is a limit for NOx emissions below tier III. Under MARPOL Annex VI Tier III, NOx control requirements will apply to installed marine diesel engines of over 130 kW output power and built after 2016 while operating in ECAs.

Figure 4. Prevention of air pollution by ships (Emission Control Areas)

<table>
<thead>
<tr>
<th>Special areas</th>
<th>Date adopted</th>
<th>Date entered into force</th>
<th>Date effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baltic Sea SOx (as defined in Annex I-MARPOL)</td>
<td>26 September 1997</td>
<td>19 May 2005</td>
<td>19 May 2006</td>
</tr>
<tr>
<td>North Sea SOx (as defined in Annex V-MARPOL)</td>
<td>22 July 2005</td>
<td>22 November 2006</td>
<td>22 November 2007</td>
</tr>
<tr>
<td>North American SOx, NOx and PM (as defined in Appendix VII of Annex VI-MARPOL)</td>
<td>26 March 2010</td>
<td>1 August 2011</td>
<td>1 August 2012</td>
</tr>
<tr>
<td>United States, Caribbean Sea ECA SOx, NOx and PM (as defined in Appendix VII of Annex VI-MARPOL)</td>
<td>26 July 2011</td>
<td>1 January 2013</td>
<td>1 January 2014</td>
</tr>
</tbody>
</table>

Source: IMO
Greenhouse gas emissions regulations updated

IMO added a new chapter 4 to MARPOL Annex VI in July 2011, providing new regulations on energy efficiency for ships. The regulations introduce two mandatory measures: an Energy Efficiency Design Index (EEDI) for new ships and Ship Energy Efficiency Management Plans (SEEMP) for all ships.

The regulations apply to all ships of 400 gt and above and entered into force on 1st January 2013. Flexibility exists in the initial period of up to six and a half years after entry into force, when the IMO may waive the requirement to comply with the EEDI for certain new ships, such as those already under construction.

The EEDI is a performance-based mechanism that requires a certain minimum energy efficiency in new ships and ships that have undergone major alteration from 1st January 2013. Ship designers and builders are free to choose the technologies to satisfy the requirements in a specific ship design.

From 1st September 2015, the EEDI will be applied to liquefied natural gas carriers, ro-ro cargo ships and passenger ships, as well as cruise passenger ships with non-conventional propulsion. Ships not propelled by mechanical means and cargo ships with ice-breaking capability are exempt.

The SEEMP establishes a mechanism for operators to improve the energy efficiency of their ships and is mandatory for all ships.

Ships under the chapter 4 regulations are required to undertake an appropriate survey which will verify that the ship attains the EEDI and SEEMP requirements. The relevant administration will then issue an International Energy Efficiency Certificate before the ship is engaged in any voyage to ports or offshore terminals under the jurisdiction of any country party to MARPOL Annex VI. The certificate will be valid throughout the life of the ship subject to special circumstances covered in Annex VI.

European Union

On 28th June 2013, the European Commission published a proposed regulation on monitoring, reporting and verification of carbon dioxide emissions from ships of over 5,000 gt using EU ports. If approved by the European Parliament and Council and becomes law, it would be directly effective in member states from 1st July 2015 and the monitoring, reporting and verification system would be compulsory from 1st January 2018.

Under the new regulation shipowners would have to monitor and report the verified amount of carbon dioxide emitted by their ships and provide certain other information, such as data to determine the ships’ energy efficiency. This would be the first step towards reducing carbon dioxide emissions through a monitoring, reporting and verification programme addressed to any ship, regardless of its flag, in a non-discriminatory manner when on intra-EU voyages and voyages from and to EU ports.

The next stage will be the implementation of market-based measures, which will provide an economic incentive for the maritime industry to operate more energy-efficient ships.
The US Act to Prevent Pollution from Ships implements MARPOL Annex VI. Record-keeping obligations for vessels are mandatory to comply with the air emissions requirements and shipowners are advised to be aware of these obligations. The US Coast Guard is likely to take a similar approach to surveillance and prosecution as it currently does for discrepancies in oil logbooks and oily-water discharges.

**California**

New requirements in the California Ocean-Going Vessels Fuel Regulation came into force on 1st January 2014. The new regulation limits the maximum fuel sulphur for both marine gas oil (DMA) and marine diesel oil (DMB) to 0.1% m/m and achieved the phase II requirements within the California regulatory zone for ocean-going vessels as shown in Figure 5. The regulation comprises a fee provision by which ships that are unable to achieve the fuel compliance can pay a fee instead. Any person who commits a violation of any provision is subject to penalties specified in the Health and Safety Code. The California Air Resources Board has recently levied fines up to US$300,000 on three vessels that failed to switch to low-sulphur fuel as prescribed by the regulation.

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**Canada**

Canada’s new Regulations Amending the Vessel Pollution and Dangerous Chemicals Regulations include new standards that address the air emissions from ships over 400 gt operating in Canadian waters.

The amendments refer to implementation of the North American ECA, energy efficiency and Canadian vessels operating in the Great Lakes and St Lawrence waters.

The regulations implement the North American ECA, which comprises waters along the Pacific coast, the Atlantic coast, the Gulf of Mexico and the eight Hawaiian Islands. It also includes the waters under Canadian jurisdiction on the east and west coasts south of latitude 60°N and almost 200 nautical miles offshore. Within this area, the sulphur content limit of marine fuel is of 1.0% m/m, which will decrease to 0.1% m/m after 1st January 2015. Outside the ECA the same standards as set in MARPOL Annex VI will apply.

If a vessel heading to Canada does not obtain compliant fuel, it will be reported to Transport Canada. The regulations require vessels subject to MARPOL Annex VI to comply with the global standards for ECAs for both SOx and NOx limits and for the alternative compliance methods. Under this provision, Transport Canada assesses and approves equivalencies for Canadian vessels in accordance with IMO guidelines. For foreign vessels, flag states will assess and approve these alternative compliance methods.

New vessels built after 30th June 2013 that trade internationally are required to have their EEDI with the exemption of new Canadian vessels that only sail in Canadian waters or the Great Lakes. Canadian vessels voyaging in the Great Lakes and St Lawrence waters will follow the new fleet-averaging regime.

As an example of the types of claim that may be expected in Canada, one Club member has recently received a claim from a terminal for shutting down crane operations at adjacent berths due to pollution. The member switched to low-sulphur fuel but there were problems with the generator and, following reports of black smoke from the ship at berth, the terminal shut down crane operations at adjacent berths due to pollution. Fortunately no fine was imposed by the authorities.
NATIONAL REGULATIONS

China

As a contracting state to MARPOL, China will enforce the air emissions control regulations in Annex VI. Although administrative notes have been issued by the China Maritime Safety Administration, there are no specific provisions regulating emissions from ships.

Hong Kong: A new initiative

In Hong Kong, the Air Pollution Control (Marine Light Diesel) Regulation came into force on 1st April 2014. It introduces a new sulphur content cap of 0.05% m/m for locally supplied marine light diesel. The Hong Kong Environmental Protection Department has proposed requiring all ocean-going vessels to use low-sulphur fuel, defined in the new legislation as fuel with sulphur content not exceeding 0.5% m/m, when at berth in Hong Kong waters. All ocean-going vessels must initiate a switch to low-sulphur fuel upon arrival at berth, complete the switch within one hour, then use low-sulphur fuel throughout the berthing period until one hour after departure.

The Hong Kong government has declared its long-term intention to set up an ECA for the Pearl River Delta. Meanwhile, since 2011 vessels have been participating in an industry-led scheme called the Fair Winds Charter by which they switch voluntarily to low-sulphur fuel when at berth in Hong Kong.

France

In France, there are new carbon dioxide reporting requirements, under which foreign ship operators need to provide information to their French customers about carbon dioxide emissions. Article L. 1431-3 of the French Transport Code came into effect in October 2013 for all foreign shipping companies.

Turkey

On 1st January 2012, Turkey enacted new regulations on the sulphur content limits of marine fuels. The sulphur content must not exceed 0.1% m/m in all vessels coming to Turkish ports and not exceed 1.5% m/m in passenger vessels sailing in Turkey’s marine jurisdiction. These limitations apply to berthed ships but not to vessels transiting the Turkish Straits without calling at a Turkish port.
For further information about low-sulphur fuel problems and solutions, please see UK P&I Club Risk Focus: Loss of Power (3/10/12) on the Club’s website.