The regulation of emissions from ships – Industry self regulation -what it means for commercial shipping

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The issue of controlling air pollution from ships - in particular, noxious gases from ships' exhausts - was discussed in the lead up to the adoption of the 1973 MARPOL Convention. However, it was decided not to include regulations concerning air pollution at that time.

Air pollution was, however, being discussed in other arenas. The 1972 United Nations Conference on the Human Environment in Stockholm marked the start of active international cooperation in combating acidification, or acid rain. Between 1972 and 1977, several studies confirmed the hypothesis that air pollutants could travel several thousand kilometres before deposition and damage occurred. This damage includes effects on crops and forests.

Most acid rain is caused by airborne deposits of sulphur dioxides and nitrogen oxides. Coal and oil-burning power plants are the biggest source of sulphur dioxides while nitrogen oxides come from car, truck - and ship - exhausts.

In 1979, a ministerial meeting on the protection of the environment, in Geneva, resulted in the signing of the Convention on Long-range Transboundary Air Pollution by 34 governments and the European Community. This was the first international legally binding instrument to deal with problems of air pollution on a broad regional basis.

Protocols to this Convention were later signed on reducing sulphur emissions (1985); controlling emissions of nitrogen oxides (1988); controlling emissions of volatile organic compounds (1991) and further reducing sulphur emissions (1994).

During the 1980s, concern over air pollution, such as global warming and the depleting of the ozone layer, continued to grow, and in 1987 the Montreal Protocol on substances that Deplete the Ozone Layer was signed.

The Montreal Protocol is an international environmental treaty, drawn up under the auspices of the United Nations, under which nations agreed to cut consumption and production of ozone-depleting substances including chlorofluorocarbons (CFCs) and halons in order to protect the ozone layer.

A Protocol was adopted in London in 1990 - amending the original protocol and setting the year 2000 as the target completion date for phasing out of halons and ozone-depleting CFCs. A second Protocol was adopted in Copenhagen in 1992, introducing accelerated phase-out dates for controlled substances, cutting short the use of transitional substances and the introduction of phase-out dates for HCFCs and methyl bromide (a pesticidal gas which depletes the ozone layer).

CFCs have been in widespread use since the 1950s as refrigerants, aerosol propellants, solvents, foam blowing agents and insulants. In shipping, CFCs are used to refrigerate ship and container cargo, insulate cargo holds and containers, air condition crew quarters and occupied areas and refrigerate domestic food storage compartments.

Halons, manufactured from CFCs, are effective fire extinguishers used in portable fire extinguishers and fixed fire prevention systems.

When this first became an issue in the early 1990's, air pollution from vessels accounted for only a small minority of all such pollution. A paper submitted by Norway to the Marine Environment Protection Committee [MEPC] of the International Maritime Organization [IMO] in 1990 calculated that :
- sulphur emissions from ship's exhausts amounted to 4.5~6 million tonnes p.a., or about 4% of total global emissions
- nitrogen oxide emissions from ship's exhausts amounted to 5 million tonnes p.a, or about 7% of total global emissions
-Chlorofluorocarbons [CFC] emissions from vessels amounted to 3~6 million tonnes p.a, or about 1~3% of total global emissions
- Halon emissions from vessels amounted to 300~400 tonnes p.a, or about 10% of total global emissions
However, as land based industries became subject to regulation in this regard, their levels began to fall, making emissions from merchant vessels a growing percentage of the total - hence the impetus for legislation in the marine sector.

This started with IMO resolution A719 (1) in 1991 which eventually developed into **Annex VI of MARPOL**.
Annex VI sets limits on sulphur oxide and nitrogen oxide emissions from ship exhausts and prohibits deliberate emissions of ozone-depleting substances. The regulations include a global cap of 4.5 per cent m/m on the sulphur content of fuel. It also contains provisions allowing for special **"Sulphur Emission Control Areas" (SECA's)** to be established, with more stringent controls on sulphur emissions. In these areas, the sulphur content of fuel oil used on board ships must not exceed 1.5 per cent m/m. Alternatively, ships must fit an exhaust gas cleaning system or use any other technological method to limit Sulphur Dioxide emissions.

Annex VI prohibits deliberate emissions of ozone depleting substances, which include halons and chlorofluorocarbons (CFCs). New installations containing

ozone-depleting substances are prohibited on all ships, but new installations containing hydrochlorofluorocarbons (HCFCs) are permitted until 1 January 2020. The Annex also sets limits on emissions of nitrogen oxides (NOx) from diesel engines, and prohibits the incineration on board ships of certain products, such as contaminated packaging materials and polychlorinated biphenyls (PCBs).

Annex VI was adopted in 1997 but finally came into force on 19th May 2005, 12 months after sufficient signatures had been obtained. It is now in force in 53 countries representing 81.88% of the world's merchant fleet by tonnage. Two Sulphur Emission Control Areas [SECA's] are currently in force; the Baltic Sea as from 19th May 2006, and the North Sea as from 22nd November 2007.

The Annex VI regulations impose a regime of survey, inspection and certification for vessels of 400GT or above, and every fixed and floating drilling rig and other platform. Flag states must ensure that equipment, systems, fittings, arrangements and material all comply with the relevant requirements.

Surveys are required for:

*New vessels - before entry into service

*Existing vessels - at the first scheduled dry docking after entry into force of the Regulations, i.e 19 May 2005, but in no case later than 3 years after entry into force, ie 19th May 2008, and at least every 5 years thereafter, with at least one intermediate survey during that period.

Assuming the survey shows compliance, vessels will be issued with an International Air Pollution Prevention (IAPP) Certificate by the flag state administration. The certificate shall be valid for a period not exceeding 5 years from the date of issue. (An extension of this period by 5 months is available only in limited circumstances.) The certificate ceases to be valid if:

- inspections and surveys have not been carried out as required
- significant alterations have been made to the vessel's equipment, systems, fittings, arrangements or material
- the vessel is transferred to a different flag state

Revisions to Annex VI (called Annex 13) were unanimously adopted by the Marine Environment Protection Committee (MEPC) of the International Maritime Organization (IMO) under MEPC.176(58) in October 2008:

The amendments run to 45 pages of text but the principal amendments progressively reduce harmful emissions from ships even further, such that the global sulphur cap is reduced initially to 3.50% (from the current 4.50%), effective from 1 January 2012; then progressively to 0.50 %, effective

from 1 January 2020, subject to a feasibility review to be completed no later than 2018.

The limits applicable in Sulphur Emission Control Areas (SECAs) will be reduced to 1.00%, beginning on 1 July 2010 (from the current 1.50 %); being further reduced to 0.10 %, effective from 1 January 2015.

Progressive reductions in nitrogen oxide (NOx) emissions from marine engines were also agreed, with the most stringent controls on so-called "Tier III" engines, i.e. those installed on ships constructed on or after 1 January 2016, operating in Emission Control Areas.

The revised Annex VI will enter into force on 1 July 2010, under the tacit amendment procedure which automatically amends the legislation unless it is specifically objected to by sufficient states.

When determining the revised Marpol Annex V1 [Annex 13] the MEPC contemplated the very strong possibility that trading vessels might very well not be able to source the requisite fuel grade to be in compliance with particular Port/State requirements and so included regulation 18.2 which states:

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2- The Committee agreed to invite Member States to consider applying the principles in regulation 18.2 of revised MARPOL Annex VI, as set forth below, where ships are not in compliance with the standards for compliant fuels set out in the current MARPOL Annex VI (1997 Protocol to MARPOL):

.1 If a ship is found by a Party not to be in compliance with the standards for compliant fuel oils set forth in the current MARPOL Annex VI (1997 Protocol to MARPOL), the competent authority of the Party is entitled to require the ship to:

.1.1 present a record of the actions taken to attempt to achieve compliance; and

.1.2 provide evidence that it attempted to purchase compliant fuel oil in accordance with its voyage plan and, if it was not made available where planned, that attempts were made to locate alternative sources for such fuel oil and that despite best efforts to obtain compliant fuel oil, no such fuel oil was made available for purchase.

.2 The ship should not be required to deviate from its intended voyage or to Delay unduly the voyage in order to achieve compliance.

.3 If a ship provides the information set forth in paragraph 1.1 above, a Party Shall take into account all relevant circumstances and the evidence presented to determine the appropriate action to take, including not taking control measures.

.4 A ship shall notify its Administration and the competent authority of the

Relevant port of destination when it cannot purchase compliant fuel oil.

.5 A Party shall notify the Organization when a ship has presented evidence of The non-availability of compliant fuel oil.

3 Member Governments are invited to disseminate this circular to interested parties,including maritime authorities and port State control officers.

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On the surface, this looks good from the point of "what's a poor shipowner to do?" and is a bit of common sense from IMO, but its actual effect is limited and is no more than guidance and is likely to have little effect on the more draconian states.

In addition, there are 2 EU Directives which provide stricter requirements than those contained in MARPOL, i.e.

EU Directive 1999/32/EC which came into force from May 1999. .All distillate fuels (e.g. MGO, MDO) cannot have more that 0.2% Sulphur. This reduced to 0.1% in Jan 2008. This is not a new directive and has been in force for some time. However, no-one seems to enforce it, except the Belgians (allegedly).

EU Directive 2005/33/EC - This came into force from Aug 2005. From Jan 2010 ALL fuels used when vessel at berth or trading inland cannot have more than 0.1% Sulphur. Whether and to what extent the States enforce this remains to be seen. Again, it will be necessary to look at this closely as we reach the end of 2009.

Meanwhile, the USA signed up to MARPOL Annex VI in July 2008, and Canada is expected to sign up to Annex VI imminently. However, in March of this year the USA and Canada jointly proposed the designation of an **Emission Control Area (ECA)** extending 200 nautical miles along much of the US/Canadian coastline. Under the proposed legislation, there will be stricter emission limits, the sulphur limit being 1.5% until 1/7/2010, 1% until 1/1/2015 and 0.1% thereafter.

However, California then got into the act, as they would, and has meanwhile unilaterally enacted state legislation that is even more draconian. On 24 July 2008 the **California Air Resources Board (CARB)** announced the adoption of a new regulation requiring the use of low sulphur marine fuel within 24 miles of the California coastline. With effect from 1 January 2009 vessels will be required to use marine diesel oil with 0.5% sulphur or less. On 1 January 2012 the level will be reduced to 0.1%.

It is estimated that over 40% of all marine freight imported to the U.S. moves through the Californian ports of Los Angeles and Long Beach. The new regulation is, therefore, likely to affect a very large number of vessels.

An earlier CARB regulation, the **Ocean-Going Vessel Auxiliary Diesel Engine Regulation**, proved controversial; it resulted in a lawsuit brought against CARB by the Pacific Merchant Shipping Association (PMSA) on the basis that the Federal Clean Air Act pre-empts regulations adopted by individual states and that California had developed and implemented these regulations without the consultation and authorization of the U.S. Environmental Protection Agency.

CARB has sought to distinguish the new Regulation for fuel sulphur and other operational requirements for ocean-going vessels in California waters and within 24 nautical miles of the California baseline from the earlier regulation on the basis that it is an "in-use operational requirement", for which no federal authorization is required, rather than an "emissions standard". In addition, CARB maintains, the new regulation does not require retrofitting or redesign but only requires that specified fuels are used in OGV engines and auxiliary boilers while vessels remain in regulated waters.

CARB has acknowledged that uniform national and international regulation is preferable to individual state regulation and is aware that IMO is currently working towards strengthening the international standard to reduce emissions from ships. However, even though the final fuel sulphur limits being considered by IMO mirror those imposed by CARB, such limits are unlikely to be implemented by IMO before 2015. Due to the health impacts attributable to ship emissions CARB says that California cannot wait until 2015 and is acting now.

Proposed Regulations:

The California Air Resources Board (CARB) has approved regulations to reduce diesel particulate matter (diesel PM), particulate matter (PM), nitrogen oxides (NOx), and sulphur oxides (SOx) by requiring the use of low sulphur marine distillate fuels in auxiliary diesel and diesel-electric engines, main propulsion diesel engines, and auxiliary boilers in Oceangoing vessels operating within Regulated California Waters (RCW).

For purposes of these regulations, CARB considers RCW as extending to 24 miles off the coast of California.

Commencing July 1, 2009, all vessels in RCW shall operate any main engine or auxiliary boiler, with either marine gas oil (MGO), with a maximum of 1.5 percent sulphur by weight, or marine diesel oil MDO) with a maximum of 0.5 percent sulphur by weight, or apply for alternative methods to achieve the same level of reducing air pollution.

Beginning January 1, 2012, all vessels in RCW shall operate any main engine or auxiliary boiler, with marine gas oil (MGO) with a maximum of 0.1% sulphur by weight or marine diesel oil (MDO) with a maximum of 0.1% sulphur by weight.

In addition to the new main engine and auxiliary boiler requirements CARB will once again enforce the auxiliary diesel engine requirements. This will begin upon the date the Main Engine Regulations are approved by the Office of Administrative Law..

The auxiliary engine regulations require all vessels in RCW to operate any auxiliary diesel engine with either marine gas oil (MGO) with a maximum of 1.5 percent sulphur by weight or marine diesel oil (MDO) with a maximum of 0.5 percent sulphur by weight and, by the beginning of January 1, 2012 all vessels in RCW shall operate any auxiliary diesel engine, with marine gas oil (MGO) with a maximum of 0.1% sulphur by weight or marine diesel oil MDO) with a maximum of 0.1% sulphur by weight.

Vessels are required to keep records for at least three years. The records must have at least the following information, date, local time, and position (longitude and latitude) of the vessel for each entry into RCW and each departure from RCW. The date, local time, and position (longitude and latitude) of the vessel at the initiation and completion of any fuel switching procedures used prior to entry into RCW. The date, local time, and position (longitude and latitude) of the vessel at the initiation and completion of any fuel switching procedures in RCW; completion of fuel switching procedures occurs the moment all engines subject to this section have completely transitioned from operation on one fuel to another fuel.

The type of fuel used (e.g., marine gas oil, marine diesel oil or heavy fuel oil) in each auxiliary engine, main engine, and auxiliary boiler operated in RCW; and the types, amounts, and the actual percent by weight sulphur content of all fuels purchased for use on the vessel, as reported by the fuel supplier or a fuel testing firm...

Vessels may comply with the regulations through alternative means such as shore-side electrical power or exhaust emission controls. If an alternative method is chosen, vessel owners must submit an application demonstrating that the alternative strategy used will result in emissions no greater than if the vessel used the specified fuel

The vessel owner must have the application approved by CARB before the alternative means of compliance can be used.

Vessels may pay a noncompliance fee in lieu of compliance under the following circumstances:

Unplanned redirection to a California port, inability to purchase complying fuel, inadvertent purchase of defective fuel, or inability to schedule vessel modifications in time for compliance.

The noncompliance fee is applied to each port visit at a rate of $45,500 for vessels on their first call. These rates increase on a sliding scale. Consequently, for every port that the vessel calls in California and is still in noncompliance the rate doubles. For example, if a vessel that is not in compliance calls on San Diego, the fee would be $45,500. If the vessel continues to Long Beach and is still not in compliance, the fee would $91,000 at Long Beach.

They certainly don't set out to make it easy!!

Having addressed the background and legislation, we now look at the practical effects and impact on the Shipowner, and in this regard I am assisted by a paper prepared by Casebourne Leach, Marine Engineering Consultants of London which reviews the Practical implications of Low Sulphur fuel regulations.

1. Global Limit

Marine fuels supplied worldwide have an average Sulphur content of between 2.5% and 3.0% with normally only 0.5% of all fuels supplied containing over 4.5% Sulphur.

In fact the latest figures from IMO show that over a 3 year rolling period between 2003 and 2005 the average of all fuels sampled was 2.7% with only 0.3% over the 4.5% limit.
So the global limit will have very little practical effect on ships, at least until after 2012.

2. Sulphur Emission Control Areas [SECA's]

As I said earlier, the first SECA was the Baltic Sea and this came into force 1 year after Annex VI i.e. on 19th May 2006.
The North Sea was the next SECA and came into force on 22nd November 2007.
The first point to appreciate is that Annex VI refers to Fuel Oil, and makes no differentiation between residual fuel oils (i.e. IFO) and distillate fuel oils (i.e. MDO).

None of the grades of residual fuel in the present IFO 8217 standard have a limit on Sulphur which would comply with the limit of 1.5%. So if a vessel wanted to continue using residual fuel, it would have to have a separate low Sulphur fuel oil and would have to properly segregate it.

In fact the only grade of fuel in the ISO 8217 standard which would meet the SECA limit is DMA or gas oil. Both the normal grades of MDO, DMB and DMC, have a limit on sulphur of 2.0%.

3. Segregated Storage
The problem of different grades of fuel could require segregated storage tanks, but it also raises the possibility of dual pumping systems etc. At the moment most ships do not have enough individual tanks to be able to keep some tanks just for low sulphur fuel for those few occasions when a vessel will be in a prescribed Sulphur Emissions Control Area.

Charterers are also raising concerns, because if a vessel keeps certain tanks just for low sulphur fuel, they are not available to the Charterer to use for bunkering in low cost ports. Also if these segregated tanks are relatively small, they may not have the capacity to take the minimum quantity of a grade imposed at some ports with financial implications for Charterers.

One way around the problem of dual pumping systems would be to change over to low sulphur fuel early enough so that the transfer system and daily use tanks are flushed through before the vessel enters a SECA but this would have to be planned well in advance of entering a SECA.

4. Cylinder Oils
One of the more serious points to bear in mind is that the cylinder oil used in large slow speed diesel engines is highly alkaline to counteract the acidic conditions produced when burning the more normal high sulphur fuel oil. The affect of using low sulphur fuel could lead to the situation where excess alkalinity occurs.

Recent experience has shown some vessels suffering serious problems when using low sulphur fuels with their normal grade of cylinder oil for extended periods. There has been very little research done on this but there are two schools of thought. Firstly it is thought that excess alkalinity could be as corrosive as excess acidity. A second problem is thought to be that the alkalinity in cylinder oils is due to an additives package and with the reduced sulphur content, these additives are not used up and the remnants of them build up around the top of the piston above the top piston ring. This build up then wipes the cylinder oil off the surface of the cylinder liner, leading to metal to metal contact between the liner and the piston rings and the consequent rapid wear of both of them.

The grade of cylinder oil should therefore be matched to the sulphur content of the fuel and both Owners and engine manufacturers may have to consider the possibility of dual cylinder oil systems.

5. Compliance
Annex VI places the burden on bunker suppliers to supply fuel which conforms to the sulphur limits but the burden on demonstrating compliance will be on ships and their Owners. The requirements to cover this aspect include retaining Bunker Delivery Receipts, which have to show the sulphur content, of all fuels received for 3 years and for the taking of what will be known as "Regulatory or MARPOL Samples" so that, should a port authority require it, it can be tested to prove compliance. These samples need to be retained for at least 12 months.

What is of interest is that IMO has decided that this sample should be taken by one of three methods, which include the normal continuous drip method, at the receiving vessel's bunker inlet manifold i.e. not on the bunker barge.
Owners will also have to ensure that not only do the crew properly segregate low sulphur fuel but that they also properly document it and the change over procedure so that the evidence is available. The best place to document this will be the vessel's log books so will these also have to be retained on board for the same 3 year period as the delivery receipts?
Retaining the documentary evidence and MARPOL samples for the required periods may require dedicated storage such as a separate locker.

6. Availability & Cost
Availability of low sulphur fuels is generally not considered to be a significant problem, but there are regional variations. In Europe availability has not been a problem, but in for instance, in Singapore there is only one supplier offering it with a minimum of 400 MT per delivery. One point to bear in mind with the North Sea SECA is that bunkering low sulphur fuel in Europe may be too late given the time required to flush through a vessel's systems so availability in other parts of the world may become an issue.
The cost premium for low sulphur fuels also varies but the best information is that this is about $20.00 to $50.00 per MT over and above the cost of normal fuel oil.

7. Regional Measures
Naturally, this is not the end of it and the European Union has also decided to bring in its own regulations. This would appear to be because of the EU's frustration at the delay between Annex VI being adopted by IMO in 1997 and it coming into force in 2005. Fortunately, the EU has fallen into line with the regulations concerning SECA's but have their own rules for distillate fuels. The EU directive covers the use of distillate fuel within Member States national waters, i.e. within the 12 mile limit, or alongside berths and allows a maximum Sulphur content of 0.2% (some exceptions have been negotiated). It is possible that this limit will be reduced to 0.1% in 2010.

This means that if a vessel uses diesel oil in its generators and goes into an EU Member State port, it will also have to have low sulphur gas oil to comply with the 0.2% limit, with even more segregated storage tanks etc. If my understanding of the EU regulations is correct they only cover distillate fuels so a uni-fuel ship

using only residual fuel in its generators as well as main engine, could continue to use fuel oil of up to 4.5% sulphur in port as long as it is not in a SECA.

Everyone must be aware of the need for environmental protection and shipping must play its part in this. The way to achieve this should be through global measures under the auspices of IMO. Regional measures would create confusion and disruption for shipping and may even be counter-productive. Europe and California may be the first to take such regional measures but you can be sure they will not be the last.

8- Availability

A study in 2006 indicated that most bunker fuel falls within the 4.5% sulphur limit, with less than 0.3% of all marine fuel produced having a sulphur content greater than 4.5% and the latest 3 year rolling average produced by IMO (2003~2005) showing the average sulphur content of marine fuels to be 2.7% However, only 4% of fuel oil was produced with a sulphur content below 1.5% and it is estimated that the demand for low sulphur fuel oil (less than 1.5%) in SECA's will be of the order of 14~20 million tonne pa whereas only 0.7 million tonne was then currently available in NW Europe.

Shipowner members of INTERTANKO are now commencing to experience these very real problems of supply of sufficiently low sulphur fuels in order to maintain compliance with the new regulations as they come into force at the end of this year and by way of response, INTERTANKO have advised as follows:_

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" Some advice and clarifications which take into account an ongoing dialogue INTERTANKO and OCIMF are having with the EU Commission and EU Member States.

No supply of 0.1% sulphur content fuel
The EU Sulphur Directive does not have any provisions or guidelines on what should be done in case ships do not find compliant fuel. INTERTANKO recommended that the EU Commission advise the Paris MoU to follow the provisions in the amended Reg. 18 of MARPOL Annex VI, giving due regard to when the ship could document that it could not find supply. Our suggestion was not accepted. The EU Commission explained that such an action would involve amending the Directive, which is a very long process. They also said that such a provision might result in ships not seeking supplies outside EU ports. Concluding, the EU Directive gives little flexibility to ships in this matter. INTERTANKO will continue its dialogue with DG ENV and with the EU Member States in order to find a practical solution.

With regard to CARB regulations, until 1 January 2012 (phase I) ships can use MGO (DMA grade) with a sulphur content of up to 1.5% (!) or, if they use MDO (DMB grade), this should have a maximum sulphur content of 0.5%. So, one assumes that ships will have less problems with supply in order to comply with CARB rules, at least until the end of 2011.

Safety of switching from HFO to MGO in auxiliary boilers
The EU Sulphur Directive does not actually impose an upgrading of boilers/systems. It only requires the use of 0.1% fuel with no consideration given to the safety aspects linked to the switch in auxiliary boilers, particularly in auxiliary boilers oil tankers use to power cargo pumps. Our dialogue with DG ENV and the EU Member States addressed these safety aspects. It seems to be accepted by regulators that safe operations in some of these auxiliary boilers would be achieved through system modifications. It is our hope that port authorities will provide sufficient time (a phase-in period) in which modifications to auxiliary boilers could be completed. It is too early to predict whether we will be successful in this and if so, too early to predict what mechanism could be used. In any case, a possible phase-in would be quite limited in time and the mechanism used should ensure it does not result in distortion of competition.

The CARB regulations provide two alternatives for non-compliance with their regulations. The first is Non-compliance for Vessels Based upon the Need for Essential Modifications and the second is Non-compliance Fee in Lieu of complying. The first indicates what a ship operator can do if major modifications are needed on their vessel to comply with the regulations. The second allows the ship operator to pay a set fee in lieu of meeting the sulphur requirements. Details are given in pages 3 and 4 of the CARB second advisory (Marine Notice 2009-2).

As far as the operational safety aspects are concerned, please note the USCG Marine Safety Alert 03.09. :-

Avoiding propulsion loss from fuel switching: American Petroleum Institute Technical Considerations

Ships switch fuel oil from residual fuels to distillate fuels in order to reduce emissions. The Coast Guard expects ships will switch fuel more frequently to comply with new emission reduction regulations. When switching fuel oil, some ships have experienced propulsion losses linked to procedural errors or fuel oil incompatibility.

API developed a paper titled “Technical Considerations of Fuel Switching Practices” that discusses problems that lead to propulsion loss while switching fuel. It is available at http://marineinvestigations.us >Safety Reports. This document may be useful to vessel owners, operators, and engineers interested in preventing fuel system failures and propulsion casualties while meeting current and future exhaust emission control requirements.

In order to prevent casualties associated with fuel oil switching, the Coast Guard **strongly recommends** that owner and operators:

- Consult engine and boiler manufacturers for fuel switching guidance;
- Consult fuel suppliers for proper fuel selection;
- Exercise tight control when possible over the quality of the fuel oils received;
- Consult manufacturers to determine if system modifications or additional safeguards are necessary for intended fuels;
- Develop detailed fuel switching procedures;
- Establish a fuel system inspection and maintenance schedule;
- Ensure system pressure and temperature alarms, flow indicators, filter differential pressure transmitters, etc.., are all operational;
- Ensure system purifiers, filters and strainers are maintained;
- Ensure system seals, gaskets, flanges, fittings, brackets and supports are maintained;
- Ensure a detailed system diagram is available;
- Conduct initial and periodic crew training;
- Complete fuel switching well offshore prior to entering restricted waters or traffic lanes.

Conclusion
Members are urged to consider the above when setting up their strategies for complying with CARB regulations and with the EU Sulphur Directive provision. Should there be a need to undertake modifications to auxiliary boilers; these should be initiated as soon as possible. Advice from manufacturers needs to be sought.

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Finally, these new regulations have spawned a number of Charter Party clauses to govern responsibility for compliance as between Owners, Charterers and Suppliers.

INTERTANKO's Documentary Committee has prepared the INTERTANKO Bunker Emission Clause for Time Charters and the INTERTANKO MARPOL Annex VI Clause for Bunker Supply Contracts to assist owners and charterers in ensuring compliance with the MARPOL Annex VI regulations and similar European regulations.

These are reproduced below (with explanatory notes) with permission of INTERTANKO:

INTERTANKO BUNKER EMISSION CLAUSE FOR TIME CHARTERS

1. Owners warrant that the vessel shall comply with the emission control and other requirements of Regulations 14 and 18 of MARPOL Annex VI and any

other laws or regulations relating to bunker specification and bunkering procedures applicable in any areas to which the vessel is ordered.

2. Charterers warrant that they will supply bunkers:

a. of sufficient quantity and quality to enable the vessel to meet the emission control and other requirements of Regulations 14 and 18 of MARPOL Annex VI and any other laws or regulations relating to bunker specification and bunkering procedures applicable in any areas to which the vessel is ordered, and

b. in accordance with the specifications in the latest version of ISO 8217 as at the time of supply and any other specifications contained elsewhere in this charterparty.

3. Charterers further warrant that all bunker suppliers shall comply with the requirements of MARPOL Annex VI and MEPC96(47) in respect of sampling and the provision of a bunker delivery notes and, where bunkers are supplied in a state where MARPOL Annex VI is in force, that suppliers shall be registered in accordance therewith

Note -This clause confirms that owners will meet the emission limits in MARPOL Annex VI and any similar laws or regulations. It also places an obligation on charterers to ensure that their suppliers provide bunkers which enable owners to comply with the emission controls. The suppliers must also meet the requirements laid down in Annex VI in relation to sampling and bunker delivery notes. Suppliers in states where Annex VI is in force must also be registered.

Many owners participate in fuel testing programmes, and those owners who do so may wish to assume this obligation formally in the charterparty by adding a provision in the bunker clause that Owners further warrant that they shall throughout the currency of the charterparty participate in a fuel testing programme.

INTERTANKO MARPOL ANNEX VI CLAUSE FOR BUNKER SUPPLY CONTRACTS

1. Notwithstanding any other provision in the bunker supply agreement, the suppliers hereby warrant the following:

a. All bunkers supplied shall comply with the quality requirements of MARPOL Annex VI,

b. The vessel shall be provided with a delivery note in accordance with and containing the minimum information required by MARPOL Annex VI,

c. The vessel will be provided with a representative sample of the bunker oil delivered in accordance with MARPOL Annex VI and the guidelines set out in MEPC96(47).

Note- Both owners and time charterers depend on suppliers in order to comply with Annex VI. A Clause has therefore been provided for incorporation in bunker purchase contracts to ensure that the suppliers provide bunkers which meet the quality requirements set out Annex VI, follow the correct sampling procedures and supply a bunker delivery note in the correct form. This clause can be used by owners or time charterers.

The other major International ShipOwner organization, BIMCO, has also updated its Standard Fuel Sulphur Content Clause for Time Charter Parties in response to the new MARPOL air pollution regulations that came into force on 19th May 2005.

The aim of the Clause is to provide a clearly worded and balanced provision to help owners and charterers comply with the requirements of Regulations 14 and 18 of Annex VI of MARPOL and with the requirements of other regulations relating to fuel sulphur content emission limits.

The new Clause takes stock of the obligations of owners, time charterers and their bunker suppliers under the new MARPOL regime. According to BIMCO "The basic premise of the Clause is that the charterers must provide the vessel with fuels of the necessary sulphur content to allow the vessel to trade within the emission control zones ordered by the charterers". The charterers are also required to use bunker suppliers that operate in accordance with Regulations 14 and 18 of MARPOL Annex VI. The Clause gives emphasis to the provision of bunker delivery notes and sampling procedures.

The owners' obligations under the Clause are subject to the charterers having fulfilled their obligation to provide fuel in accordance with the Clause. "The responsibility for the storage, management and use of the fuels supplied rests with the owners as does the emission control requirements of Regulations 14 and 18" BIMCO said. The owners warrant that the vessel will comply with the emission control regulations of the places she is ordered to trade by the charterers and that the vessel is capable of consuming the fuels provided.

BIMCO further states that "the BIMCO Bunker Fuel Sulphur Content Clause for Time Charter Parties 2005 provides a clearly worded, balanced and practical

clause which should find favour both with owners and charterers when concluding time charters".

The new Clause, says BIMCO, "neatly interfaces with BIMCO's Standard Bunker Contract, which was developed in co-operation with IBIA a few years ago". The Standard Bunker Contract provides a comprehensive set of terms and conditions for the sale of marine fuels and provides for bunker sampling and bunker delivery notes that are in accord with the new MARPOL Annex VI regulations. According to BIMCO "it would be well worth the while of any fuel purchaser or supplier to take a few minutes to read through the terms and conditions of the BIMCO form before entering into any other agreement for marine fuels – this contract deals comprehensively with the issues that should be essential considerations for both parties in the increasingly regulated bunker sector".

BIMCO Bunker Fuel Sulphur Content Clause for Time Charter Parties 2005

(a) Without prejudice to anything else contained in this Charter Party, the Charterers shall supply fuels of such specifications and grades to permit the Vessel, at all times, to comply with the maximum sulphur content requirements of any emission control zone when the Vessel is ordered to trade within that zone.

The Charterers also warrant that any bunker suppliers, bunker craft operators and bunker surveyors used by the Charterers to supply such fuels shall comply with Regulations 14 and 18 of MARPOL Annex VI, including the Guidelines in respect of sampling and the provision of bunker delivery notes.

The Charterers shall indemnify, defend and hold harmless the Owners in respect of any loss, liability, delay, fines, costs or expenses arising or resulting from the Charterers' failure to comply with this Sub-clause (a).

(b) Provided always that the Charterers have fulfilled their obligations in respect of the supply of fuels in accordance with Sub-clause (a), the Owners warrant that:

(i) the Vessel shall comply with Regulations 14 and 18 of MARPOL Annex VI and with the requirements of any emission control zone; and
(ii) the Vessel shall be able to consume fuels of the required sulphur content when ordered by the Charterers to trade within any such zone.

Subject to having supplied the Vessel with fuels in accordance with Sub-clause (a), the Charterers shall not otherwise be liable for any loss, delay, fines, costs or

expenses arising or resulting from the Vessel's failure to comply with Regulations 14 and 18 of MARPOL Annex VI.

(c) For the purpose of this Clause, "emission control zone" shall mean zones as stipulated in MARPOL Annex VI and/or zones regulated by regional and/or national authorities such as, but not limited to, the EU and the US Environmental Protection Agency.

In concluding, I have endeavored to show that the International Shipping Industry has, through its various forums, been addressing the problem of Greenhouse Gas Emissions for almost two decades and, through Annex V1 and the revisions under Annex 13, have structured a global strategy that will result in substantial reductions going forward.

It is a pity that some states feel it necessary to outguess IMO and introduce their own regional controls. A plethora of varying regulations will just make it more difficult to obtain uniformity, and thus better control over the world fleet.

I have attempted to outline some of the engineering, logistical and legal difficulties many Shipowners will experience in their operational relations with TimeCharterers, Bunker Suppliers, Port State regulators as the requirements gradually tighten over the next few years

The new regulations, together with the new Charterparty Clauses coming into use will no doubt result in a spike of legal cases before everyone is sure what they mean.