Bunkers and Bunkering

A selection of articles previously published by Gard AS

Contents

Introduction

This booklet contains a collection of loss prevention materials relating to bunkers and bunkering, which has been published by Gard over the years.

Problems occurring onboard the vessels and which arise from bunker related issues are diverse, and may involve disputes varying from engine/equipment problems and vessel delay to off loading/re-bunkering. Main and auxiliary engine related claims constitute approximately 31 per cent of Gard's total hull and machinery claims. This figure should also be compared with statistics from the industry indicating that 80 percent of all engine breakdowns are related to problems with either the fuel or the lubricating oil.

As with most claims, bunker related claims can be avoided. The following points may serve as a reminder and assist in ensuring a claim free voyage.

1. Be selective when choosing a supplier. Order fuel to desired ISO grade and describe the required grade in the charterparty as well as in the requisition to supplier.

2. Take samples at the time of delivery and obtain confirmation from the suppliers that the samples are representative. Ensure that the samples taken are properly labelled.

3. If the supplier takes other samples at the time of the delivery, try to establish how and when they were taken. Issue a protest if you are not invited to witness the sampling.

4. Use a fast, reliable testing service to analyse the samples.

5. Segregate new fuel from that already held onboard.

6. Avoid using new fuel until the analysis results have been considered and it has been established that the fuel is suitable.

7. Maintain accurate daily records of the contents of and consumption from each fuel tank

   If off-spec bunkers have been delivered and are found to be unsuitable for use the bunkers should be off-loaded and replaced by new on-spec bunkers. If inferior bunkers have to be used or have already been used the following should be done:

8. The vessel should immediately notify the shipowner if it is experiencing problems with off-spec fuel. If the shipowner purchased the fuel directly from the supplier, he should notify the bunker supplier and forward a copy of the test results.

9. Expert advice should be considered and a reliable fuel testing services such as DNV Petroleum Services (DNVPS) or Lloyds Register (FOBAS) should be used to obtain advice on how to proceed in order to solve the particular problem and to avoid damage and mitigate any losses.

10. Contact the engine manufacturer as well as the fuel supplier for advice. Further action will depend on which parameter is off-specification and/or what the particular problem is. The degree of quality deviation from the specification must be considered.

11. The charterer should be notified, if the charterer purchased the fuel, and other interested parties.

12. The parties should inform their insurers.

Gard News 199
August/October 2010

Hull and machinery incident - Consequences of using off-specification bunkers

Another example of the importance of sampling and testing bunkers.

Bunkering

A medium-sized bulk carrier was delivered HFO (heavy fuel oil) bunkers whilst at anchorage at a port in the Far East. Since the vessel was scheduled to sail to Europe, and due to the prevailing fuel prices, charterers decided to bunker the vessel to almost full capacity. The operation itself took several hours and was completed without problems. However, the vessel did not take its own fuel samples during the bunkering, but instead received two sealed samples from the barge operator. Both samples were signed by the vessel's chief engineer; however, neither of the samples was sent ashore for further analysis.

The fuel delivered was specified as 380cst -RMG 35, which was in accordance with the applicable charterparty.

Problems

Soon after leaving port, the engineers started using the new bunkers. Shortly thereafter, they experienced abnormal sludge generation in the purifier, which resulted in excessive water-sludge content in the settling and service tanks. A large amount of water and sludge was drained from these tanks. The amount of water and sludge also resulted in problems with the performance of the main engine, in the form of fluctuations in exhaust temperatures, as well as a rise in the scavenge temperatures of the various units. The main engine fuel pumps and fuel injection valves also sustained some damage.

In order to prevent any power failure, the fuel consumption of the auxiliary engines was switched to diesel oil. The engine crew switched the fuel consumption to another double bottom tank, containing the newly bunkered HFO, but with the same result. Consequently, the engine crew had to consume the recently bunkered HFO for the propulsion machinery as nothing else was available and as a result the vessel had to reduce speed and slow steam to the next port, which was 12 days away. It took several days to reach the next port whilst maintaining reduced speed. They also had to stop several times each day to replace fuel valves, fuel pumps and to clean filters and change exhaust valves dealing with turbocharger problems. The service and settling tanks were being drained almost continuously.

Repairs

The vessel finally arrived at the next port of call several days late. The owner decided to pump the off-specification bunker ashore and ordered new bunkers. During the vessel's stay in port, various repairs were carried out to the main engine. All pistons were dismantled and overhauled and piston rings were replaced. Several of the piston top rings were broken whilst one was badly worn. One of the cylinder liners was cracked and had to be replaced. The main engine fuel system and turbocharger had to be completely overhauled and the settling and service tanks had to be emptied and cleaned.

Several fuel samples were taken during the vessel's stay in port and sent ashore for testing, which revealed that the fuel was off- specification. The whole operation became very costly, time-consuming and caused delays to all involved.

Lesson learned

It is strongly recommended that:
- the crew ensure there is sufficient quantity of tested reserve HFO on board for consumption to cover the time delay involved in sending newly-bunkered representative samples for testing and receiving the laboratory test results.
- the crew take sufficient representative samples of bunkers received and send them ashore for testing.
- laboratory test results for newly received bunkers are known before consuming the bunkers.

View of damaged cylinder liner.

View of damaged cylinder liner with piston fitted.

Piston complete.

The importance of an efficient fuel oil treatment system

Gard News 195,
August/October 2009

Fuel-related engine breakdown is not a novel problem, and even as more stringent rules, regulations and procedures are implemented, Gard regularly sees engine casualties where the cause can be traced to poor fuel quality or poor on-board fuel treatment. This article will focus on the latter.

The current international standard for heavy fuel oil (HFO) to be used in marine diesel engines and boilers is ISO 8217:2005. It defines limit values for a large number of substances and impurities which the HFO can contain. However, even if the HFO received satisfies these requirements, operational problems may occur if the HFO separators are not properly operated and maintained.

HFO contains catalytic fines such as aluminium and silicon oxides, which are remnants from the refining process. These are hard abrasive particles, and ISO 8217:2005 regulates the amount of catalytic fines permitted in HFO, expressed as Al+Si, to 80 mg/kg (ppm). However, due to the abrasive nature of these particles, most engine manufacturers limit the amount of catalytic fines in the fuel injected into the engines to 15 mg/kg. Excessive wear of components in the combustion chamber (piston grooves, piston rings, cylinder liners) and of the fuel injection equipment (fuel pump plunger and barrel, fuel injection valves), will be the consequences of exceeding the level of catalytic fines of 15 mg/kg.

In order for the HFO separators to efficiently reduce the level of catalytic fines and other impurities that can be present in the fuel oil, such as rust, sand, dust and water, the following precautions should be taken:
– Keep the HFO inlet temperature at 98oC. The efficiency of the separators is highly dependent on the inlet temperature of the fuel, and even a

Picture 1 – Example of a fuel system analysis.

Sample Number	Sample Date ddm-myy	Bunker Port or Fuel System Position	Dens kg/m3 @15c	H20 % v/v	S % m/m	V mg/kg	Na mg/kg	Al mg/kg	Si mg/kg	Fe mg/kg	TSP % m/m
F307003850	260209	ULSAN	977.4	<0.10	3.06	54	6	6	7	6	<0.01
F307004249	180309	SINGAPORE	987.0	0.30	2.93	217	31	15	17	12	0.03
F307005251	170309	SINGAPORE	989.8	0.16	3.38	190	17	14	15	10	0.03
F407006350	200409	ANTWERP	984.2	<0.10	2.04	90	15	2	4	12	<0.01
F407006372	260409	ROTTERDAM	989.7	0.11	1.31	66	11	30	25	13	0.03

Bunker tank in use: Port Fwd 11 F. Centrifuge operation: Parallel.

The fuel in use is indicated as being the fuel bunkered in: ROTTERDAM on 26th April 2009.

The sample taken at the transfer pump indicates low levels of sludge and water and somewhat high levels of impurities. Compared with the bunkering sample some settling of impurities appears to have taken place in bunker tank(s).

Water and sediments remain at low levels throughout the fuel system.

Sample after Separator 1:
The somewhat high levels of solid contaminants have been reduced to acceptable levels for diesel engine use.

Sample after Separator 2:
The levels of solid contaminants have been reduced but still on the high side for consumption, hence some marginal increase of wear in cylinder gear and injection equipment may be expected.

NB. Please ensure that fuel treatment is operated at optimum condition with centrifuges in parallel using the lowest possible throughput while keeping the fuel temp. near to 98°C.

NB. As always when 'Cat-fines' and water are detected – Frequent bottom draining of all tanks and filters in use is advisable.

An efficient fuel treatment system reduces the risk of casualties.

small reduction in temperature will reduce the quality of separation. The recommended inlet temperature is 98oC, but this is often not achieved due to limited steam supply to the pre-heaters, wrong set point, the pre-heaters being too small, fouled or in other ways defective.
– Use correct flow ratio. The longer the fuel is present in the separator, the better the cleaning of the fuel oil will be. Since the 1980s, separators without gravity discs have been more or less standard, and it is recommended to always use all available HFO separators and to run them in parallel, with corresponding feed rate. If the separators are of the manual type with gravity discs, they must be operated in series with a purifier followed by a clarifier, but with the lowest possible flow.
– Maintenance. Maintain the separators according to maker's instructions and use maker's approved parts only. In addition, it is recommended to have the separators checked by maker's service engineers at regular intervals.
– Regularly clean storage, settling and service tanks. Large particles will settle in the storage, settling and service tanks, and over time the concentration of abrasive particles in the bottom of the tanks can be excessive. During rough weather these components can be whirled up and supplied to the separators, sometimes in concentrations above the limits set out in ISO 8217:2005. Hence, these tanks should be drained and cleaned at regular intervals, typically during scheduled yard stays. This also illustrates that it is beneficial to run all available separators, even when the fuel used initially has a low level of catalytic fines.

Further to the above recommendations, it is also important that the quality of the on-board fuel treatment has a strong focus from owners' and managers' side. Regular monitoring of the performance is vital to ensure that the systems on board are capable of handling the HFO supplied at all times. Important issues in this context are:
– Educate and train responsible personnel. Ensure that the junior engineers responsible for the operation and maintenance of the separators are properly trained and are familiar with the equipment and how to perform the regular maintenance. This increases reliability, and also reduces the consumption of non-wear parts.
– Check fuel system efficiency. To verify that the fuel treatment system really works as it should, procedures should be implemented where fuel samples are taken before and after each separator at intervals of four to six months. The samples should be sent to an established fuel analysis institute, and the result will provide an indication of the efficiency of the separators. The analysis will be most accurate if performed once the analysis of the regular bunker manifold sample confirms that a certain amount of cat fines is present in the bunkered fuel oil. Above 25-30 mg/kg is preferable. The results of the analysis gives owners/managers regular verification of the quality of operation and the superintendent can, in co-operation with the chief engineer, discuss relevant actions if required. Picture 1, below, is an example of such an analysis.

In this context it should also be mentioned that companies such as DNV Petroleum Services and Lloyd's Register (FOBAS) offer fuel management services that can assist shipowners in efficiently running on-board fuel treatment systems.

By following the above recommendations, the fuel treatment system should operate with optimum efficiency, which will increase the likelihood of the engines having an acceptable level of wear, and reduce the risk of casualties creating costly business interruption losses.

Read more about fuel oil in Gard News:
– "Liquid gold – Fuel oil and lubricating oil" in issue No. 156.
– "The quality of bunkers" in issue No. 163.
– "Some technical aspects of marine fuels testing" in issue No. 165.
– "The interplay of fuel and lubricating oil quality on the reliability of diesel engines" in issue No. 174.

U.S. Guidelines on MARPOL Annex VI

Loss Prevention Circular No. 5-09

The requirements of MARPOL Annex VI, relating to air pollution from ships, entered into force on 8 January 2009 in the USA as part of the Maritime Pollution Protection Act of 2008. This enactment follows the greater emphasis being placed in the U.S. on vessel air emissions. As of this date, foreign flagged ships operating in U.S. waters and U.S. flagged ships must be able to demonstrate compliance with MARPOL Annex VI. Compliance verification should primarily focus on (1) documentation, (2) equipment certification/approval and (3) cursory materiel tests/examination.

The U.S. Coast Guard issued *Guidelines for Ensuring Compliance with Annex VI…* on 4 February 2009. These guidelines set forth the types of criteria that USCG inspectors may use when conducting inspections on ships in relation to air emissions. These inspections can occur either within the context of a Port State Control inspection, or as a 'stand alone' examination.

These regulations apply to all U.S. flagged inspected and uninspected vessels, as well as all non-U.S. flagged vessels above 400 gross tons operating in U.S. waters.

Previously obtained Statements of Voluntary Compliance (SOVC) can be used as documentary proof of compliance until a vessel's first scheduled dry-docking, but in no case later than 8 January 2012. Otherwise, a valid International Air Pollution Prevention Certificate (IAPP) and an Engine International Air Pollution Prevention Certificate (EIAPP) will be needed. The USCG Guidelines, at pages 1-4, discuss in detail the applications of the regulations on this certificate issue.

These Annex VI instructions and criteria of the USCG can be found at:

http://www.gard.no/gard/Publications/USCG_Guidelines.pdf

The following list of MARPOL Annex VI detainable deficiencies is, by no means, a complete listing, however, it provides an excellent definition of "substandard" for the purposes of Annex VI:

- Absence of a valid IAPP Certificate, EIAPP certificate, or Technical Files;
- A diesel engine for which an EIAPP Certificate is required, which does not meet the NOx Technical Code;
- The sulphur content of the onboard bunkers exceeds 4.5% m/m;
- Non-compliance with SECA requirements in U.S. waters;
- An incinerator or required emission scrubbers that does not meet approval requirements, or meets approval requirements, but does not function properly;
- Ozone-depleting substances are being emitted;
- The vessel has a substantially incomplete file of bunker delivery notes and associated fuel samples; and
- Master or crew is not familiar with essential procedures regarding the operation of air pollution prevention equipment.

Recommendation

Vessel owners/operators and vessel personnel are advised to consult the USCG Guidelines to ensure regulatory equipment and operational compliance and that the appropriate documentation covering these items is in order. By consulting the Guidelines owners and operators will also become familiar with the types of items subject to such USCG inspections and will ensure that the vessel successfully passes this type of official surveys and inspections.

Marpol Annex VI - New risks and challenges for owners and charterers

Gard News 187, August/October 2007

Gard News has a look at some of the challenges of compliance and potential consequences of non-compliance with MARPOL Annex VI.

What is MARPOL Annex VI?

MARPOL Annex VI is a section of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78), drafted by the International Maritime Organization (IMO).[1] The individual sections of the convention have entered into force at different times as they gained the required number of signatory states. For example, MARPOL Annex I, regulations for the prevention of pollution by oil, have been in force for more than 20 years. Annex VI, regulations for the prevention of air pollution from ships, entered into force on 19th May 2005. Presently 37 countries have ratified Annex VI covering 70 per cent of the global tonnage.

Annex VI sets limits on sulphur oxide (SOx) and nitrogen oxide (NOx) emissions from ship exhaust and prohibits deliberate emissions of ozone depleting substances. The Annex places a global cap on the sulphur content of fuel oil at 4.5 per cent m/m (percentage by mass) and a 1.5 per cent m/m cap in "SOx Emission Control Areas" (SECAs). The Baltic Sea is currently defined as a SECA. In July 2005 the IMO adopted amendments which identify the North Sea as a SECA, with an implementation date of November 2007. Annex VI also prohibits the introduction into fuels of inorganic acids or chemical wastes that could jeopardise the safety of the ship, or harm ships' personnel.[2]

Ships of 400 GT or more engaged in international voyages to or from countries that have ratified the convention or ships flying the flag of those countries are required to have an International Air Pollution Prevention certificate (IAPP Certificate) issued by the flag state (usually the class society as designated agent by flag state or for ships that are not registered in a MARPOL Annex VI signatory state).

In order for flag and port states to monitor compliance with the regulations, MARPOL Annex VI requires a bunker delivery note to be obtained and retained on board stating the sulphur content of the bunkers supplied, as well as samples of the oil. Fuel oil suppliers that are located in MARPOL Annex VI signatory states are subject to the regulations but those in non-signatory countries are not subject to oversight by the port state authorities.

The challenges of compliance and potential consequences of non-compliance

An article written by a DNV expert and published in Gard News issue No. 184[3] outlines some of the possible

1 See article "Annex VI of MARPOL 73/78 – Regulations for the Prevention of Air Pollution from Ships" in Gard News issue No. 176.
2 See article "MARPOL Annex VI – Solving the low sulphur issue" in Gard News issue No. 184.

problems with low sulphur fuels and with the addition of the North Sea SECA. Among those issues identified are ignition and combustion problems due to the low sulphur content and an increased presence of catalytic fines, abrasives that can damage the engine. Toxic materials may find their way into fuels. Such materials can lead to personal injury of crew or others aboard or on shore. DNV has also questioned the market availability of sufficient low sulphur bunkers due to the addition of the North Sea SECA. Finally, as an operational problem DNV has identified the difficulty of timing a change over to fuel required to enter and operate within a SECA. Even with the required fuel on board, a mistimed or improperly executed change over will result in violations within a SECA.

In the event that the fuel does not meet the low sulphur requirements, port state or flag state authorities may require deviation, de-bunkering and replacement of fuel, causing delay and additional costs. MARPOL violations may also result in fines against the vessel. Reportedly, enforcement activity has, to date, been light but if history with respect to MARPOL Annex I serves as an example, penalties will increase if the industry is slow to comply.

The vessel owners' and charterers' responsibilities for compliance

When the vessel is under a time charter, at a minimum the following parties will be involved in bunkering: shipowner, time charterer, bunkers broker and physical supplier. As a starting point, compliance with MARPOL Annex VI is the responsibility of the vessel owner. Ultimate liability for the consequences of off specification fuel, however, may be subject to contract indemnity provisions commonly found in time charterparties, or liability may rest with the supplier depending upon the terms of a sales contract. At least under English law, the bunker broker is ordinarily considered the agent of the purchaser and is not a party to the bunker sales contract and is therefore not generally subject to liability.

The time charterer is ordinarily obliged to purchase the bunkers pursuant to various forms of charterparty clauses. Typically a bunker clause will refer to a specific grade of fuel that meets "ISO 8217 Third Edition 2005" specifications. This standard was amended in 2005 to track MARPOL requirements, including the sulphur limits and elimination of waste oils. Bunkers clauses would also typically warrant that bunkers supplied by charterers comply with MARPOL requirements as well as any special regional requirements where the vessel may trade. The United States is not currently a signatory to Annex VI but California, for example, has its own standards and requirements for ship stack emissions.

As an addition to fuel specification, BIMCO has published a clause that is intended to balance the rights and responsibilities of owners and charterers.[4] Pursuant to this clause the charterer will be liable to the owner when the physical supplier has delivered non-compliant bunkers. If the bunkers supplied are compliant, the owner will be responsible for the consequences of operational failures such as failure to timely change over to low sulphur fuel before entering a SECA which results in sulphur content in excess of 1.5 m/m.

The bunkers sale contract and possible recourse against the bunkers supplier

The business of supplying bunkers is said to be one of slim margins. Yet the commodity is essential. Suppliers generally have the upper hand with respect to dictating the terms of the sales contract. Suppliers in MARPOL signatory countries do have an obligation to comply with the Annex VI requirements and should not have an issue with wording in the sales contract that confirms the obligation.

The buyer is responsible for specifying the quality ordered and should ensure that the bunkers sale is ordered and confirmed as: "fully in accordance with ISO 8217 Third Edition 2005 and MARPOL Annex VI" and any other specific regional requirement for ports where the vessel will call. When fuel is required for a SECA, the following should be added: "and with maximum sulphur content of 1.5 per cent." Additionally, the contract should state that "the supply procedures shall comply in all respects with the requirements of MARPOL Annex VI regulations in respect of sampling and documentation including the bunker delivery note".

It takes time to analyse fuel, so it may not be practical or possible to independently test quality before delivery. The bunker delivery note requires the supplier to declare the sulphur content of the bunkers delivered and MARPOL does not require the supplier or the vessel to analyse the product before acceptance but, instead, merely requires sampling and retention of samples for analysis should there later be a question as to compliance. But testing should be done in any event to make sure the bunkers supplied meet the specifications. Sampling should be witnessed by vessel personnel or a designated surveyor and samples should be taken at the ship manifold. It is not recommended to accept samples from the supplier that have not been witnessed. Ideally, the sale contract should include an agreement to the test protocol and lab for the analysis.

If the fuel is ultimately determined to be off-spec, can the buyer seek recourse against the seller for additional costs or liabilities they may have? Yes, but often the sale contract contains provisions that either extinguish the claim or limit it. Bunker supply contracts are notorious for extremely short claim notification limits. Seven days from delivery is common. The short window for claims against the supplier underscores the importance of immediate analysis and notice to the supplier. Another common clause limits the claim to the value of the bunkers supplied which will be insufficient to cover losses such as damage to an engine.

The bunker sale contract should contain a dispute resolution clause which also specifies law and jurisdiction. In an ideal world, the forum would be the same in the charterparty and the bunker sale contract: for example, English law and arbitration. That way, in the case of dispute, all three parties could be brought into one proceeding. In the real world, the contract between owner and charterer and the contract between charterer and bunker supplier are both based on form contracts and favoured terms which may not be negotiable.

P&I and Defence cover respond to the new risks

Gard's Defence cover provides compensation for legal and other costs pertaining to disputes related to MARPOL Annex VI non-compliance, whether under charterparties or bunker sale contracts, and whether pursuing or defending such claims. The Defence cover also includes fees and expenses due to claims by authorities for fines whether they are presented directly or via a charterparty indemnity provision. Gard's lawyers and solicitors may also assist in advising members concerning contract provisions before a claim arises.

Damage to the ship itself is not an owners' risk under P&I (but may be an insured risk under hull and machinery

3 See footnote 2.
4 See article "New BIMCO bunker fuel sulphur content clause" in Gard News issue No. 179.

insurance). Gard's Comprehensive Charterers P&I Cover, however, includes charterers' liability for damage to hull. Thus, liability for physical damage to the vessel caused by bunkers, and de-bunkering costs, if in mitigation of liability for damage to the vessel, are covered risks under the charterers' P&I policy. Liability for personal injury due to toxic substances to persons on board or ashore is a covered P&I risk. Rule 38 of Assuranceforeningen Gard's Statutes and Rules covers liability for pollution (with the exception of fines) caused by stack emissions whether it is direct liability or via indemnity under the charterparty. Legal costs associated with any of these covered risks are also picked up by Gard provided such costs are approved by Gard.

P&I cover for fines is narrow. Under Rule 47.1.c, pollution fines are covered if they arise from an "accidental escape or discharge" of a pollutant from the vessel.

Fines for stack emissions exceeding the MARPOL cap may not be considered "accidental" in that the emission itself is intentional. Fines may be considered for discretionary cover on a case-by-case basis under Rule 47.2, provided "the member has satisfied the Association that he took such steps as appear to the Association to be reasonable to avoid the event giving rise to the fine".

Finally, costs associated with delay, detention and deviation are not covered under owners' P&I. Charterers' liability for delay is covered if in consequence of damage to the hull caused by off-specification bunkers. Loss of use claims are of course subject to the Defence cover with respect to owners and charterers.

Conclusion

The focus on air pollution, including stack emissions reflected in the MARPOL requirements, will no doubt increase. Bunker quality claims under sale contracts and charterparties will certainly grow in number and value. Owners and charterers can meet these new challenges with practical loss prevention measures on both a technical and legal basis. Gard is here to help its members meet the new challenges.

Gard News 184,
November 2006/January 2007

Marpol Annex VI - Solving the low sulphur issue

By Olav Tveit, DNV Petroleum Services

With the entry into force of the North Sea SECA there will be increased pressure on charterers and operators to provide ships with low sulphur fuel oil.

Background

MARPOL Annex VI, Regulations for the Prevention of Air Pollution from Ships, entered into force on 19th May 2005. MARPOL Annex VI Regulation 14 restricts SOx emissions from ships by introducing a maximum sulphur content in marine fuels of 4.5 per cent. In addition, MARPOL Annex VI identifies SOx emission control areas (SECAs). In these areas the maximum sulphur content of marine fuels used is 1.5 per cent. The Annex also set forth requirements for documentation and representative sampling of fuel oil.

EU Directive 2005/33/EC deals with issues similar to those in MARPOL Annex VI, although its dates for implementation do not coincide with those of Annex VI. It also provides for a maximum sulphur content in marine gas oils of 0.2 per cent from 11th August 2006. Further, there will be a reduction of sulphur content of marine fuels for vessels at berth in EU ports, the entry into force date being 2010, with the maximum sulphur content from that date being 0.1 per cent. Other implementation dates are as follows:

On 19th May 2006 the Baltic Sea SECA under IMO came into force. On 11th August 2006 the Baltic Sea SECA became enforceable by EU member states. On 11th August 2007 the North Sea SECA will become enforceable by EU member states. On 21st November 2007 the North Sea SECA enters into force under IMO.

Bunker management

There is uncertainty as to whether suppliers will be able to meet the demand for low sulphur fuel oil (LSFO) in main bunker ports world-wide. What is clear today is that operators with a contract for LSFO in general have their demands covered by the majors/larger independents at main bunker ports at a premium of USD 30-50/MT. Fortunately, it appears so far that the demand has been met with respect to the Baltic Sea SECA. There is, however, uncertainty as to whether world-wide supply will be sufficient when the North Sea SECA enters into force next year.

Needless to say, the pressure on charterers and operators to provide ships with LSFO will increase. As a result, bunker management will be more complex. It is also vital that owners/charterers and bunker purchasers ensure that MARPOL Annex VI clauses (Regulations 14 and18) are included in their charterparties and bunker purchase confirmations. INTERTANKO has developed contract clauses that may be suitable in this respect.[1]

Bunker quality

In order to produce LSFO refineries have the following options:
– Use inherently low sulphur crude stocks.
– Invest in de-sulphurisation units.
– Blend to LSFO specification, using a variety of cutter stocks, inland quality LSFO or purchased inherently LSFO.

The blending option seems to be the preferred future method. Regrettably, it appears that this option is also the one which could impact the bunker quality in a negative way as explained below.

Increased stability and compatibility problems

The more you blend, the greater the risk of making products unstable. This should be detected through fuel quality testing (total sediment potential). However, if products are blended on the stability limit, subsequent mixing on board with an existing fuel with different properties (e.g., viscosity, density) or gas oil/diesel oil could lead to unstable fuels and subsequent sludging. The risk increases during LSFO change-over, depending on system configuration.

Sulphur content deviations

In some cases certain ports blend to the sulphur limit of just below 4.5 per cent. From time to time, the 4.5 per cent limit may be exceeded, although marginally.

Some samples tested also exceed the 1.5 per cent limit, although in most cases only marginally. The IMO has not yet provided guidance as to whether an allowance can be made, like for instance whether 1.54 per cent can be acceptable as 1.5 per cent. Currently this is left to the discretion of the individual port and flag states.

Some suppliers and certain testing companies introduce a default standard margin of error (reproducibility). It is argued that deviations above 4.5 per cent or 1.5 per cent would be caused by a default margin of error during testing. The problem is that the concept of margins of error has not been discussed at IMO so one can not say whether authorities will accept any result above 1.5 per cent in a subsequent flag or port state control. Hence, until further notice it is recommended that any indication of sulphur levels above 4.5 per cent or 1.5 per cent respectively should be accompanied by a notification to the flag administration, bunker port administration and supplier according to the requirements of the IMO Port State Control Guidelines for MARPOL Annex VI.[2]

Following the ISO 4259 standard, for a supplier to be 95 per cent confident that the fuel delivered will have a sulphur level of 1.50 per cent, the suppliers' target should not be higher than 1.42 per cent.

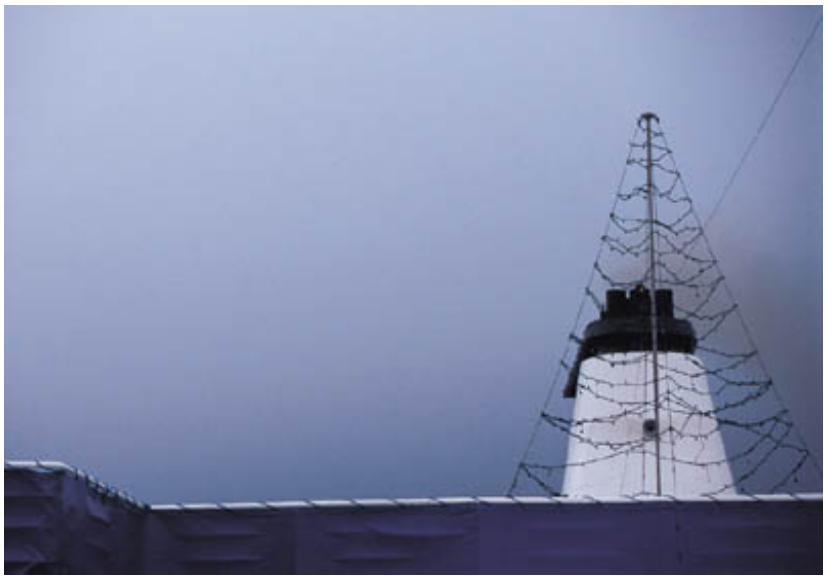
Considering the possible margin of error, as well as the aspect of fuel oil change-over, owners should consider whether a limit of 1.5 per cent in orders is sufficient or whether they should specify a lower sulphur limit.

Increased levels of catfines (Al/Si)

With decreasing sulphur content there may be an increasing level of catfines. This may be due to an increased use of cycle oils as cutter stock in the fuel blend (cycle oils are a low sulphur, highly viscous refinery product which tends to contain an elevated amount of catfines).

Increased ignition and combustion problems

Increasing ignition and combustion problems may also occur when using LSFO. This could be related to an increased use of high density and high aromatic cycle oils as cutter stock during blending.



Bunker deliveries

MARPOL Annex VI has not yet been subject to significant enforcement and as such the stringency applied is uncertain. It is recommended that ships adhere to the MARPOL Annex VI sampling procedures and documentation requirements as laid down in IMO Resolution MEPC 96(47).[3] At the recent IMO MEPC 54 meeting a circular was adopted urging IMO member states to ensure that bunker suppliers within their jurisdiction apply this resolution.

As a minimum, the crew must verify the sulphur content in the bunker delivery notes and that the official MARPOL sample is representative of the bunker supplied. In accordance with the IMO Port State Control Guidelines for MARPOL Annex VI, any non-compliance must be reported through a notification to the flag state and the bunker port authorities.

High sulphur fuels

It is of vital importance that operators specify and crew verify that the sulphur level in the bunker delivery note is below the respective MARPOL limits.

In the event a fuel testing company detects a sulphur level which exceeds the MARPOL limits and is above that specified in the bunker delivery note, the following course of action should be taken:
– A notification should be sent to the flag state and the bunker port authorities, highlighting the indicated sulphur level deviating from the bunker delivery note level.
– It would be unreasonable for the administration to require the ship to deviate due to a possible non-compliance for which a supplier is responsible. The operator should therefore request that the ship be permitted to proceed to the next port of call.
– The operator should agree with the flag state administration regarding verification testing of the on board MARPOL sample (the on board MARPOL sample is the official sample which is legally binding). If the supplier's MARPOL sample has not been taken in accordance with the IMO sampling guidelines, then the operator should propose to test the ship's MARPOL sample (if taken) as well. It is the prerogative of the administration to select an appropriate laboratory for the purpose of verification testing. However, the administration should be encouraged to select a laboratory which is accredited with respect to the ISO sulphur test method and has documented experience with fuel testing. The laboratory should, in addition to sulphur, also test for fingerprint parameters such as density, viscosity, nickel and vanadium. The MARPOL sample should be forwarded to the laboratory in question. The result is to be communicated to the administration, which is subsequently obliged to inform the bunker port state administration.
– In case non-compliant fuel is detected, de-bunkering is not the only option available. As an emergency measure, provided existing fuel is on board and it is verified compatible with the new fuel, the owner may request acceptance for on board blending (depending on sulphur differences, the blending ratio could be very low). This procedure has been successfully adopted and accepted by at least two administrations.

Fuel change-over

Fuel change-over contains both commercial and statutory compliance elements. On the commercial side, with a premium of up to USD 30-70/MT, the change-over from normal to LSFO and vice-versa should be as fast as possible. On the statutory compliance side, owners need to be confident that the crew has managed to change over from normal to LSFO before crossing the SECA boundary.

With a high sulphur limit of 4 per cent and a LSFO level of 1.49 per cent, reaching the required 1.5 per cent limit will take time, if it can be done at all.

Although not yet specifically required, realistic and proven change-over procedures should be developed for each ship or group of ships with similar fuel tank configuration and system set-up.

The pre-requisite for change-over is the exact sulphur level of existing fuel and LSFO, i.e., a bunker delivery note sulphur level set as "less than 4.5 per cent" and "less than 1.5 per cent" should not be accepted as it creates uncertainty regarding change-over time (in addition to uncertainty regarding the selected base number (TBN) of the cylinder lube oil used on board).

Some owners have converted their ships by dedicating a bunker tank to LSFO with separate bunker line, as well as introducing separate LSFO service and settling tank with piping ensuring split separator operation. This option means that the change-over can be carried out quickly.

However, the majority of ships have conventional fuel oil systems with a limited number of bunker tanks and only one service and settling tank. For these ships the main contributors to change-over time are the following:
– Total consumption (main engine + auxiliary engines + boilers).
– Total volume of high sulphur fuel oil remaining in piping systems, settling and service tanks prior to change-over.
– Initial high sulphur level and LSFO level.
– Transfer pumps capacity.
– Separators capacity versus total consumption.

1 For details go to www.intertanko.com.
2 www.imo.org/includes/blastDataOnly.asp/data_id%3D12749/472.pdf.
3 A copy can be found at www.intertanko.com/pdf/weeklynews/MEPC%2096-47%20Resolution%20-%20Bunker%20sampling.pdf#search=%22IMO% 20Resolution%20MEPC%2096(47)%22.

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Cylinder lube oil

Oil and engine manufacturers have varying requirements and recommendations. In general there are two alternatives related to cylinder lube oil during LSFO operation:
– Feed-rate regulation.
– Change of cylinder lube oil.

Some shipowners have flagged their intention to continue operating with TBN 70 cylinder lube oil at LSFO down to 1 per cent, by feed-rate regulation, provided not already on the limit. This alternative also appears to be supported by engine manufacturers, provided the operation on LSFO is limited to approximately 1-2 weeks.

There are, however, examples of shipowners who have operated with reduced feed rate on South American LSFO for instance down to 0.5 per cent over approximately a month without experiencing any excessive deposits or wear.

However, some owners have decided to make modifications on board and install redundant service tanks: one for TBN 70 and one for TBN 40/50 with a three-way switch-over valve in-between.

Regardless of alternative chosen, it is recommended that the crew perform periodical checks of cylinder condition (including ring-pack) shortly after change-over. As always, the quality of the cylinder lube oil regarding thermal stability, detergency and dispersion is also essential.

Abatement technology (exhaust gas cleaning)

Recent developments are encouraging, as at least three concepts are now in a prototype test stage either on board ships or on test beds. At least two of these prototype concepts have shown very promising results. Some manufacturers have shown increasing interest in the commercial feasibility of exhaust gas cleaning concepts. Needless to say, it will be some time before they are commercially available.

One additional challenge is future requirements (particularly EU and US requirements) for handling of waste water from such units before discharge to sea.

Although the investment is high, exhaust gas cleaning systems have the advantage of eliminating the LSFO premiums as well as bunker management complexity. Further, they will reduce the particulate matter in the exhaust, for which new legislation is coming soon.

Warning - Fuel oil quality might be at stake

Loss Prevention Circular No. 08-07

Fuel oil quality is directly related to the safe operation of ships and it is important for any ship operator to focus on preserving fuel oil quality.

Bearing in mind that the European Union Directive 2005/33/EC which deals with sulphur content comes into force on 11 August 2007 and the North Sea Sox Emission Control Area (SECA) will be fully implemented on 22 November 2007, the refinery industry may explore more advanced production/blending processes to satisfy the global demand for low sulphur fuel. The traditional method of assessing fuel oil quality and suitability may be unreliable in certain circumstances. In relation to the delivery of low sulphur fuel, a growing number of deliveries with excessive Aluminum and Silicon content, problems with fuel stability and ignition quality have been reported.

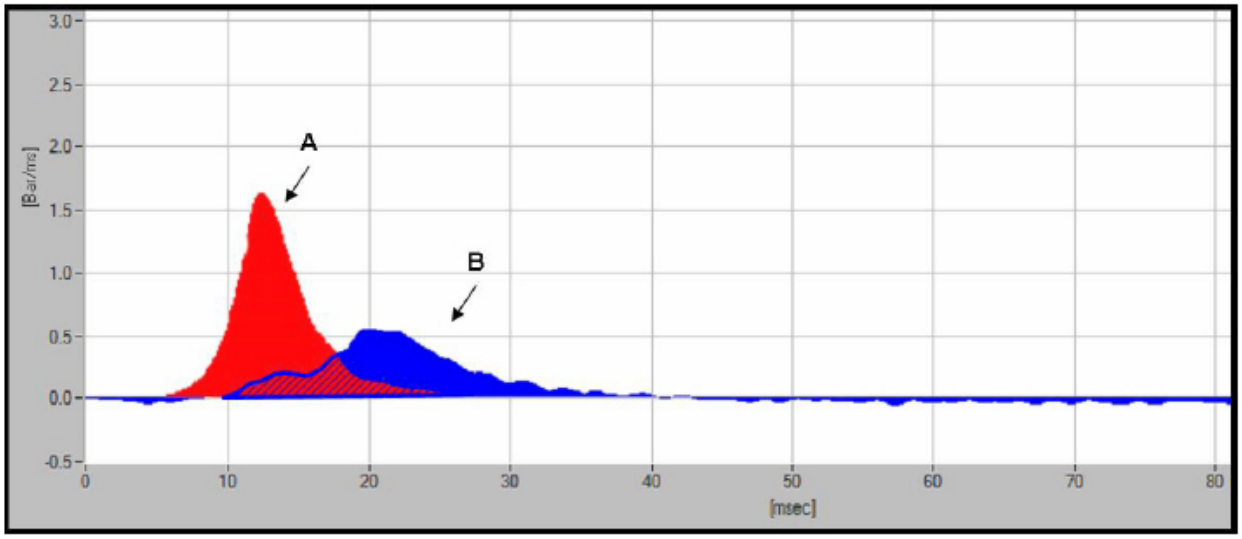
Fuel oil ignition and combustion quality is not yet part of the ISO 8217 fuel oil specification and the Calculated Carbon Aromatic Index (CCAI) has historically been the default method of estimating heavy fuel oil ignition quality. The fuel oil density and viscosity are the key parameters needed for calculating the CCAI, and the number 860 has for years been considered the limit for an acceptable ignition quality for a trunk piston engine. With refineries increasingly using Heavy Cycle oil (HC) in the blending process to achieve low sulphur values, the CCAI and the Calculated Ignition Index (CII) have often been found to be too inaccurate and inadequate to detect fuel with poor ignition properties. The most widely used equipment for fuel ignition tests has been the FIA-100 FCA, which is already available from some test laboratories and comes with an Institute of Petroleum approved test method, IP 541/06.

Typical engine problems experienced when using a fuel oil with poor ignition properties are:
— Difficulties or complete failure in starting the engine
— Undesirable peak pressures which can lead to blow by and collapse of piston rings
— Unstable operation and loss of power
— Varying revolutions, which are highly undesirable for the operation of auxiliary engines
— Increased deposits in the combustion area and in the exhaust gas system, including turbo charger and boiler
— Increased emissions of NOx

In a worst case scenario poor fuel oil ignition and combustion properties can render the engine inoperative and compromise the safe operation of the ship.

To illustrate the consequences of poor ignition and combustion properties, a vessel recently reported a knocking sound to the main engine as well as numerous piston seizures. Temporary repairs were executed, but the vessel's C/E did not realise that the problems experienced might have something to do with the fuel oil properties, and opted to continue running the engine at reduced RPM with the same fuel oil until the vessel reached a port of refuge. When the engine was opened up severe damages were discovered to all cylinder units. Main bearings had to be renewed and the crankshaft's main bearing journals had to be polished in addition to numerous of different parts inspected/overhauled. The damage repairs amounted to USD 1.2 million, and involved 40 days off-hire.

During repairs it was felt that the damage seen had similarities to that which could have been caused by fuel oil with poor ignition and combustion properties, and a decision was made to perform an ignition quality test.



A: Reference curve. Normal peak pressure and an ignition delay of 5.9 ms (millisecond). Start of main combustion, 7.85 ms.
B: Our vessel. Low peak pressure with "after burning" effects. Ignition delay 13.8 ms, start of main combustion, 21.6 ms.

The diagram below illustrates the results from the fuel oil ignition tests performed with the FIA 100/3 (A), compared with a reference curve illustrating test results for 'normal' fuel oil.

Among the comments made by the laboratory were;
The combustion properties are bad … Fuel oils with poor ignition and combustion properties may contribute to high pressure peaks and thermal overload in the combustion chamber. This causes what is known as hard, knocking or noisy engine running, especially at low load operation, and which is highly undesirable over extended periods of time. Among the possible effects is poor fuel economy, loss of power, build up of carbonaceous deposits, damaged piston rings, burned down piston crowns and ruined cylinder lubrication.

The severity of these impacts is influenced to a great extent by engine type, model and age, load profile and operational condition. In general engines of older design are more prone to operational problems caused by poor ignition and combustion properties than engines of more recent design, while slow speed engines seem to be less prone to operational problems than medium and high speed engines. (It should be noted that this fuel was bunkered outside the SECA area)

Lessons learned

— It is important to secure adequate quality control of your fuel oil purchase contacts/providers.
— The ship's crew should be better trained to detect these types of problems when they occur in order to minimise costs, vessel's off-hire periods and not least the safety of crew and ship/cargo.
— Fuel oil tests do not always adequately describe the fuel oil's properties, in particular with respect to ignition and combustion quality
— The increased demand for low sulphur fuel will require better understanding of fuel parameters which are not described in the ISO standard.

Please also contact your engine manufacturer and your fuel oil test laboratory service provider to obtain further information on the above.

Off-spec bunkers – Some practical cases

Gard News 174, May/July 2004

Gard has recently assisted two charterers in the handling of claims arising from delivery of off-spec bunkers. These cases show how important it is for both charterers and owners to have a good bunker testing system in place.

Damage to fuel injection pumps

The first case concerns a general cargo vessel, whose main engine had undergone a complete overhaul whilst the vessel was dry-docked. The bunker tanks were cleaned and all sediment removed. Following that, the vessel took delivery of 170 MT of bunkers at Rotterdam for a round trip to the Mediterranean and return to Norway. The bunkers were put into fuel oil tanks No.6 starboard and port and, in accordance with the Baltime charterparty, were provided and paid for by the charterers.

When the vessel started to take fuel from tanks No. 6 port and starboard during the voyage, she experienced severe problems with sediment. The problems continued for the rest of the trip and on arrival in Kristiansund, Norway, assistance from the engine manufacturer was needed. A without prejudice joint survey was arranged, which was attended on behalf of the owners, charterers and bunker suppliers. Fuel oil samples were taken from the relevant tanks, a survey of the vessel's engine and all relevant machinery was performed and an investigation into the cause, nature and extent of the damage was carried out.

The engine manufacturer's representative concluded that all 18 fuel injector pumps had to be replaced. The damaged pumps and valves were sent to the engine manufacturer's plant in Denmark for overhaul/repairs, and a joint survey was also carried out there. Sixteen of the fuel oil pumps were dismantled for further examination. Fifteen of the pistons were found to be brown-coloured, one was found to contain water drops, some were found with corrosion and several pump hoses contained water. Due to the corrosion and browning, the manufacturer advised replacement of all the pistons and cylinders, which were replaced with reconditioned fuel oil pumps.

It was considered whether there could have been leakage between the ballast and fuel oil systems. According to the ship's plans, there was no direct connection between them and no ballast pipes were routed through the fuel tanks. There was also no evidence of oil in the ballast water. Furthermore, the tanks were reported to be tight and in order during a recent overhaul. This possibility was therefore ruled out.

The surveyor's conclusion was that the damage was probably caused by water in the fuel.

Based on the entries in the engine room log book, it was evident that there had been a certain quantity of water in the fuel oil tanks No. 6 starboard and port. How the water entered the tanks, however, had not been established.

The owners put the charterers on notice that they held them responsible for all costs incurred and time lost during the period the vessel was out of service due to supply of inferior bunkers. The charterers in turn held the bunker supplier responsible.

The bunker supplier rejected liability, relying on an analysis of a sample of the fuel oil taken from the vessel after the bunker delivery. This analysis confirmed the bunkers delivered to the vessel were within specification. The test sample taken from the bunker barge had been lost and samples from the fuel in tanks No.6 port and starboard which purportedly showed that they were contaminated with water, could no longer be traced.

Fortunately for charterers, in this case the owners did not have a system in place to take bunker samples for analysis when bunkering, so no samples of

the bunkered fuel were available. As a result, the owners had no evidence and therefore no case against the charterers and had to bear the losses.

High Total Sediment Potential

The second case concerns a 1995-built bulk carrier which was time-chartered under a NYPE 1993 form. The vessel was sub-chartered and upon re-delivery sub-charterers supplied the vessel with 900 MT of IFO, which was taken into DB tanks Nos. 1 and 2.

The shipowners had an agreement with Det Norske Veritas (DNV) for testing bunker samples, so a sample of the fuel oil was mailed to Det Norske Veritas Petroleum Services (DNVPS) for analysis. A fuel quality report was sent to the owners, which showed a Total Sediment Potential (TSP) of 0.22, the standard TSP being 0.10. DNV advised that at this level of TSP, increased sludging was likely to occur and fuel stability was at risk. They advised the owners to purify the fuel, not to mix it with any other fuel and to take and retain periodic samples before and after centrifuging and record the sampling details in the logbook.

Charterers were put on notice that owners held them responsible for the consequences of supplying off-spec bunkers, including the cost of de-bunkering if required and any damage to the vessel's engine. The head charterparty included detailed and comprehensive clauses concerning responsibility for delivery, quality, testing and analysis of bunkers, but these clauses were not included in the sub-charter.

The vessel sailed for Richards Bay to load a cargo for Praia Mole, Brazil. During the voyage, the master advised that the vessel was experiencing a critical situation on board in trying to purify the off-spec bunkers. For safety reasons, he decided to deviate to Port Louis, Mauritius, which was the nearest port with enough bunkers to enable the ship to reach Richards Bay safely. The owners requested charterers to make provisional arrangements for de-bunkering. Charterers put the sub-charterers on notice, requested them to make the necessary arrangements to take the inferior bunkers ashore and re-supply at Port Louis. The sub-charterers did not admit any liability for the problems experienced by the vessel, but advised they would appoint a surveyor to inspect the vessel and bunkers.

Accordingly, the charterers had little choice but to arrange delivery of fresh bunkers at Port Louis, so it was decided to de-bunker the off-spec bunkers at Richards Bay. Charterers invited the shipowners and sub-charterers to take part in a survey of the vessel's engines and purifiers at Richards Bay and a without prejudice joint survey of the sealed samples held on board by the master for charterers' use was arranged, and the fuel in the vessel's tanks was tested.

Owners and charterers agreed to use an independent laboratory to analyse the fuel oil samples. The sub-charterers appointed a different laboratory to carry out their analysis. Surveyors were instructed to attend the laboratory to witness the sample analysis. The owners and charterers' surveyor monitored the analysis done on behalf of the sub-charterers and vice versa. In addition, an analysis was also carried out by a third independent company.

Owners and charterers' analytical report from tanks Nos. 1 and 2 confirmed a TSP of between 0.13 and 0.21. The analysis of the sub-charterers and the independent laboratory showed TSP of between 0.04 and 0.05. According to technical experts, however, the analysis method used by sub-charterers and the independent laboratory was unacceptable as the tests were not in accordance with IP 390 specifications, in which case, the fuel oil supplied was indeed off-specification.

The vessel had three IFO tanks, two large ones and one smaller one. The third, smaller, tank was not big enough to take the amount of bunkers required for a safe passage to Praia Mole, so since it proved impossible to arrange de-bunkering at Richards Bay, there was no other alternative but to proceed to Cape Town and de-bunker there, thus incurring further costs and delay. Tank cleaning was not possible because the vessel was loaded with coal, which meant access to the tanks was blocked. However, a bunker quality/quantity survey of the 675 MT of fresh bunkers put on board was carried out.

Fortunately, the off-spec bunkers caused no damage to the vessel's engine, auxiliary engines or purifiers. However, the total distance deviated from the voyage was 1,074 nautical miles, involving four days, five hours and 18 minutes. Charterers claimed from sub-charterers the cost of the calls at Port Louis and Cape Town, the cost of removing and replacing the off-spec bunkers, the cost of repairs to the purifiers, the time lost, costs of the surveyors and fuel experts as well as legal costs, which amounted to a total of USD 182,000. Legal proceedings were commenced but immediately prior to the hearing the case was settled by sub-charterers for USD 150,000 plus recoverable costs of GBP 35,000.

Lessons learned

Shipowners – and charterers, if they supply bunkers to a vessel – should always:[1]
– Be selective when choosing a supplier. Order fuel to desired ISO grade and describe it in the charterparty as well as in the requisition to supplier.
– Take representative samples at the time of delivery and agree with the suppliers that the samples are representative. Ensure that the samples taken are properly labelled.
– If the supplier takes other samples at the time of the delivery, try to establish how and when they were obtained. Protest if not invited to witness the taking of these samples.
– Use a fast, reliable testing service to analyse representative samples.

Owners should also:
– Segregate new fuel from that held on board.
– Never use new fuel until the analysis results have been examined and it has been established that it is suitable.
– Maintain careful reliable daily records of the contents and consumption from each fuel tank.
– Ensure good maintenance and calibration records are kept for all machinery.
– Ensure engine log books properly record all temperatures, pressures and remarks of engine performance on a daily basis.

If off-spec bunkers have been delivered and are unsuitable for use they should be off-loaded and replaced by new on-spec bunkers. If inferior bunkers have to be used or have been taken in use the following should be done:
– The vessel should notify the shipowner immediately if they are experiencing problems with an off-spec fuel. If the shipowner purchased the fuel directly from the supplier, he should notify the bunker supplier and send a copy of the test results.
– The shipowner should contact an expert and make use of reliable fuel testing services such as DNV Petroleum Services (DNVPS) or Lloyds Register (FOBAS) to obtain advice on how to proceed to solve the particular problem to avoid damage and mitigate losses.
– The shipowner should contact the engine manufacturer as well as fuel supplier for advice. Action will depend on which parameter is off-specification and/or what the particular problem is. The degree of quality deviation from the specification must be considered.
– The shipowner should notify the charterer (if the charterer purchased the fuel) and other interested parties.
– The parties should inform their insurers.

Conclusion

These two cases illustrate the importance for shipowners and charterers of having in place a good system for testing bunker quality with a reputed organisation, as well as having protective contractual clauses in charterparties.

Marpol Annex VI – Challenges in operating on low sulphur fuel

Loss Prevention Circular No. 06-06

Background

International regulations to control harmful emissions from ships' exhausts entered into force on 19 May 2005. MARPOL Annex VI contains provisions allowing special "SOx Emission Control Areas" (SECAs) to be established with more stringent controls on sulphur emissions. In these areas, the sulphur content of fuel oil used onboard ships must not exceed 1.5% m/m. Alternatively, ships must fit an exhaust gas cleaning system or use other methods to limit SOx emissions. The regulation requires any such alternative methods to be approved by the relevant flag state. Sanctions for Marpol violations are becoming increasingly severe around the world, and there is no reason to believe Annex VI will not be treated to the same scrutiny.

The regulation allowed for a 12-month period from the date of entry into force before the limits within a SECA could be enforced, and they will thus be enforced from 19 May 2006. The Baltic Sea Area is the first area designated as a SECA under the Protocol and will permit a maximum 1.5% sulphur content in any fuel used onboard. In 2007, the second SECA, covering the North Sea and English Channel, will be come into force, requiring similar sulphur levels.

The effects of low sulphur fuel

There are several implications of operating on low sulphur fuel or altering between high and low sulphur fuels. The issues listed below are some of the most common challenges that must be considered by the shipowners and operators to avoid problems related to operation and maintenance of the ship engines.

Fuel related issues

- Incompatibility of different fuels
- Combustion characteristics and impact on engine deposits and wear
- Varying fuel viscosity, and impact on fuel injection
- Low sulphur fuel having less anti-wear capability
- Supply and storage for low sulphur fuels

Lube oil related issues

- Matching cylinder oil BN fuel sulphur level across operating conditions
- Possible additional storage tanks
- Cylinder lubrication monitoring
- Cylinder oil feed rate

Operations related issues

- Monitoring sulfur content in fuel
- Engine load
- Cylinder Liner Temperature
- Water content in scavenge air

Recommendations

Shipowners and operators should thoroughly consider all undesired effects of operating on low sulphur fuel. It is recommended that the engine makers and the lube oil suppliers are contacted to obtain their detailed instructions and guidelines. Specifically worded charterparty clauses regarding bunkers supplied by Charterers are important to ensure that any problems are avoided.

Global lube oil and additive supply shortage

Loss Prevention Circular No. 14-05

Background

The marine lubricants industry has been walking a supply tightrope since the end of 2004. The industry is now facing a new and deepening supply crisis compounded by a period of unprecedented raw material price increases. The price of heavy base oil, one of the key components in the manufacturing of marine lubricants, has increased by over 50% in the past 12 months, while many of the additive components have increased by in excess of 40%.

The full gravity of the situation became clear when a fire at the Chevron Oronite plant in Singapore caused a shortage of cylinder oil additives in the local area. Hurricane Katrina has since that time damaged similar facilities in the US Gulf coast and thus exacerbating the problem.

Consequences

In addition to a shortage of lube oil, shipowners will most probably be facing situations where lube oil with the required BN (Base Number) cannot be supplied. The low BN cylinder oil with BN levels of 40 - 50 - 60 will most likely be easier to obtain than the high BN level oil. A high sulphur level in fuel oil necessitates a high BN in lube oil. The low BN lube oils generally require a sulphur content of maximum 3% for proper performance.

Loss Prevention

The lube oil industry and the main engine manufacturers are issuing service letters and technical bulletins to shipowners these days. The letters and bulletins describe the shipowners' options to blend high and low BN oils and adjusting the feed rates. It is also not recommended to take fuel with a sulphur level higher than 3%. The general assumption is that proper adjustment of feed rates, proper blending of lube oils and the use of low sulphur fuel will not create operational problems. This might be the plausible way to ensure that the industry goes through this difficult period with minimum disruption.

However, the other side of the picture is that the above measures may create a slight increase in cylinder wear and some reduction in performance. It is therefore important from a maintenance point that the ship operator conduct a scavenge air port inspection before commencing operation on the low BN oil. A baseline reference for cylinder condition can then be established. Shipowners and managers must contact their lube oil and fuel suppliers – and their engine manufacturers – to obtain the correct guidelines for operation of their own specific equipment with low BN lube oil and low sulphur fuel.

Important changes to the new edition of the ISO 8217 Fuel Standard

The new (third) revision of the ISO 8217:1996 (E) Marine Fuel Specification was officially published on 1 November 2005.

The new marine fuel specification ISO 8217:2005 (E) should be referred to when ordering fuel. The specification contains amendments to the ISO RM (residual Fuel) and DM (distillate Fuel) grades.

The new specification incorporates changes to the following parameters for the ISO RM grades:
- Viscosity: Viscosity grades are now based on centistokes (cSt) at 50°C, and the number of grades has been reduced from 15 to 10. This aligns the new ISO grade measurement temperature with commercial reality.
- Maximum water content has been reduced from 1% to 0.5%
- Maximum sulphur content has been reduced from 5.0% to 4.5% (This aligns the ISO maximum sulphur content with the IMO MARPOL Annex VI)
- The elemental specification has been expanded to include a maximum limit for three new elements; zinc (Zn), Calcium (Ca) and phosphorous (P). A fuel shall be considered free of used lubrication oil (ULO) if one or more of these elements are below or at the specified limits.
- Density: For the RM grades 30 and 80 maximum density has been reduced.
- Ash: A minor change in ash limits, with the maximum permitted level for some of the high viscosity grades reduced from 0.2% to 0.15%.

The new specification contains the following changes for the ISO DM (Diesel, marine) grades:
- Sediments: For the ISO DMB grade, formerly tested according to sediment by extraction, will now be tested according to the Total Sediment Existent (TSE) test procedure. The new limit is 0.10% maximum.
- In addition several informative Annexes have been added to the revised standard, including interpretation of test results, sodium and vanadium, used lubricants and acidity in marine fuel.

The revised fuel standard is no doubt an improvement on the existing one, and owners should feel secure that better quality fuel is delivered onboard.

The most substantive change in ISO 8217 is the introduction of limits on the elements zinc (Zn), phosphorus (P) and calcium (Ca). This inclusion is intended to severely restrict the potential utilisation of used lubrication oil (ULO) as a fuel blend stock.

Although Gard welcomes the changes made to the fuel standard we are of the opinion that the process of revising the standard and the changes made should have been more comprehensive. It is a fact that parameters not included or with too high limits in the today's standard can lead to extensive engine problems resulting in loss of time and additional costs to the Owner. Examples are a reduction of the maximum allowable catalyst fines (AL+Si), inclusion of Sodium (Na) and not least an introduction of an ignition and combustion quality parameter.

A copy of the new ISO 8217:2005 (E) is available through ISO (www.ISO.org) or their respective National Standards Institute.

Controlling bunker costs

By Ivar Tønnensen, Gearbulk (UK) Ltd, London; Member of the Executive Committee of the International Bunker Industry Association, Ltd,

Gard News 165, February/April 2002

Introduction

Is it possible to make money on bunkers? Yes, and not just by selling them. Owners generally can not control their earnings, and are at the mercy of the market when it comes to freight and time charter rates. But they can control costs, and every cent saved on a direct cost like fuel is welcome. So you can make money on bunkers, by cutting costs.

Bunker prices are just as much market-driven as freight rates, but the market price of bunkers is far from the only cost involved. Too many owners fail to realise that and give too little attention to bunker purchasing and management. This article shows how attention to bunkers can generate real cost savings, and a real boost to bottom line results.

Bunkers have always been an important part of ship operations and, as such, bunkering is a vital part of an owner's day to day operation. Fuel costs have become a major part of the running costs of a vessel – in some instances as high as 60 per cent. This weighs heavily on the profit margin and may lead to financial loss through lack of knowledge, skill or care on the part of the buyer and/or the crew. Depending on the development of the bunker market, one can safely say that the bunker department is both loved and hated. But all too often companies have no actual bunker department, or there is a difference of opinion within the organisation as to what the bunker department should actually be doing.

The chartering department usually looks upon bunkering a vessel as synonymous with a car pulling up to the local petrol station, and they usually need the fuel in a rush. The management looks at the department as the biggest spender in the organisation and is always asking: "couldn't you get the fuel cheaper somewhere else?" The technical and operational departments treat it as a necessary evil and are constantly complaining about the quality of the fuel, and that it is always delivered outside office hours. But either way, bunkers must be bought and therefore it is of vital importance for an owner that the persons involved with fuel purchasing have the necessary knowledge on how, where, and when to procure the fuel in an efficient and economical way.

Liner operators, who see their fuel costs clearly, have implemented sophisticated purchase and management strategies for bunkers. Tanker owners all too often leave it to the market. It is suggested that educated buyers who follow proper purchase routines with proper follow up, who know the market, and know whom they are buying from, will have a significant positive effect on the bottom line.

If two shipowners are buying fuel in the same market for a similar route, why can one get a better result than the other? Because one employs staff that pay attention to where the money goes, and the other simply looks at the market price. Anyone with a trading instinct can play a market. Bunker management requires more knowledge than that.

Your money can go up in smoke without pushing the ship one metre forward. You may lose on the volume/weight conversion, or more simply, you may pay for more than you get because your crew does not supervise and ensure the quantity is lifted correctly. You may lose money because the energy content of your cheap fuel is much less than the

energy content of the expensive fuel bought by the clever owner up the road. You may lose money through barges cheating you out of some of what you think you are getting. And you may lose out on the headline price through not knowing this specialised and fast-moving market properly. Finally, you may lose an awful lot of time and money if you lift bad bunkers. Even if you win a subsequent dispute, it will still hurt. Better to avoid problems in the first place.

The first step to better buying is to have a purchasing strategy.

Purchasing

The purchasing aspect of the business can be broken down into three parts, namely: 1) activities leading up to the purchase, 2) the purchase itself and 3) the control functions that must be performed once the purchase has been concluded and the fuel delivered.

Pre-purchase

When a vessel is in need of fuel replenishment, it triggers a series of events. It starts with the operator approaching the bunker department with a request for bunkers. Together, they look at the schedule of the intended voyage and the various criteria indicating how much, where and when the bunker is to be bought. Some of these criteria can typically be:
– Intended cargo (freight v. bunker).
– Ensuing voyage.
– Low priced market v. high priced market.
– Alternative bunker ports.
– Time factor (deviation, time to bunker).
– Timing of purchase.

Intended cargo: The freight rate must be considered against the price difference of the fuel between the load port and discharge port. If the price of fuel at the load port is lower than at the discharge port and the difference in price is greater than the freight rate, it is more economical to take fuel than cargo.

Ensuing voyage: One must also take into consideration what are the intentions for the following voyage. As indicated in the introduction, bunkering a vessel is not like driving a car into the local petrol station. Your vessel may end up in a port where the fuel is very expensive, or in the worst case, there is no fuel available.

Low priced market v. high priced market: It is also important for the purchaser to have a good knowledge of the bunker market. Every vessel has a certain steaming range, based upon the capacity of her bunker tanks. Thus, if the vessel is in a low cost area and going to a high cost area, it makes sense to bunker as much as possible, provided draft, cargo intake, etc., permit, thereby ensuring that one buys as little as possible in the high cost port if the vessel is returning to an area of lower prices.

Alternative bunker ports and time factor: The discharge port (inbound voyage) must be considered against the load port (outbound voyage), provided they are in the same geographical area and price range. One must also compare the economics of bunkering while working cargo against bunkering en route in a typical bunker port. The rule of thumb is that one can calculate at least 12 hours' loss of time for a 1,000 MT stem. Time has a value, which together with port cost adds up to a cost per tonne of fuel to be bunkered. Needless to say, the smaller the stem, the larger the difference, since both time value and port cost are constant. In addition, there is the weather factor. Conditions may be such that it is impossible to bring a barge alongside, thus additional time is lost. Hence, when comparing bunker prices at a discharge port or a load port with prices at a potential bunker port en route, it may be advantageous to bunker while working cargo in port, even if the price is higher than at the potential bunker port en route.

Timing of purchase: "Should I buy today, or wait till tomorrow?" Many oil companies only give quotes valid for a maximum of seven days. However, if you can narrow the time for lifting the bunker to one or two days, firm quotes may be obtained sometimes up to two weeks in advance. The drawback, unfortunately, is that the price may fall again. Just be aware that entering the market too close to the lifting date may pose problems, after all, the barge must be loaded, the supplier must prepare documentation, etc. The suppliers may even be sold out, or committed to other vessels, forcing you to let the vessel wait. Fifty cents on the dollar saved going into the deal may easily cost you much more at the end of the deal. This should also be kept in mind when choosing a supplier.

Purchase

Once a decision on where and how much to purchase has been made, one may proceed with the order. This can be done in several ways: directly with the supplier, via one or more brokers, or via the Internet. Irrespectively, it is important to indicate clearly the type of fuel needed, referring to the relevant ISO Standard (e.g., 380 CST, ISO 8217/1996/RMG35). ISO 8217 is an efficient specification that calls for a minimum of tests and expenses required to control a desired property, and for tests which are as independent of each other as possible. Since this specification normally protects the buyer fully, accidental problems should be kept to a minimum.

Having in mind the debate over the past few years on the issue of waste lube oil in the fuel, it may be prudent to add the following wording when specifying which fuel is required: "The Seller warrants that the bunkers delivered under this contract do not contain chemical waste, waste lubricating oil of any kind or other substances detrimental to the vessel, her engine(s) and/or her crew."

However, "when" to purchase is often the big dilemma for the spot buyer. Timing may result in big savings, depending on volume. There are no set rules for "when" - it is normally a combination of "gut feeling", market information and luck. However, do not think for a minute that you will be able to strike when the prices are at the bottom. Usually, when one thinks prices are at their lowest they are actually on the way up again, so the best time should be when they are on the way down, just before the market bottoms out.

If you use brokers it is recommended to use a minimum of two. This makes it more likely that the market will be covered properly and, most important, gives you the necessary leverage to obtain the best price possible. However, you should ensure that each broker covers different suppliers, as otherwise the market becomes confused. The Internet is as yet only a limited option, but you can use it to check what brokers are saying.

Once in the marketplace, consider which possible suppliers you will or can use. Have you used them before, are they newcomers to the market, are they traders or actual suppliers? What is their reputation, how do they handle claims? If you do not know all the answers, ask the brokers. Remember that the supplier has the same attitude towards you, hence asking questions is a vital part of the trade.

Another method to differentiate between sellers is to look at the energy content of their fuel. When converting their offered price into cost per mj/kg an interesting picture emerges. Let us assume supplier A offers USD 150/MT and supplier B offers USD 147.50/MT. You know from past history that A's oil has an energy content of around

41.2 mj/kg and that B's level is around 39.9 mj/kg. From the outset, one would assume seller B is the cheaper alternative. However, seller A is actually the best buy, as seller B would have to lower his price to USD 145.27 in order to match A (USD150: 41.2 x 39.9).

When you have decided which supplier(s) you would like to deal with, you must negotiate the price and conditions under which the fuel is to be delivered. With respect to the latter, you may discover that many suppliers refuse to negotiate their terms of sale, but one should always try. Quite often one will find that a supplier is more willing to negotiate an addendum to the terms of sale than to actually alter the printed text. Some call this process "Dutch auction". Be that as it may, the buyer's function in the company is to obtain the best quality fuel for the most reasonable price delivered at the time one has requested and agreed.

Most large buyers of fuel do part of their purchases on a spot basis, while other portions of their overall requirements are met by short and/or long term contract(s) with one or more suppliers. The contract can cover a specific grade or port or an area, depending on the overall trading pattern of the owner's fleet. Since monetary savings are the exception rather than the rule with regards to contracts, there are basically two major reasons for entering into contracts: 1) quality and 2) availability. We all like to buy top quality fuel every time, as this reflects on the maintenance costs. Hence, one would tend to enter into contracts in ports with questionable quality and go spot in ports where good quality fuel is always available. Likewise, with regard to availability, one tends to contract in ports which are strategically located where one must have fuel in order to perform the voyage.

This applies especially to the liner trades. The benefit of contracts is that one always deals with the same supplier, the parties know each other's requirements, quality and quantity disputes are rare and so is the hassle of solving them. But you do not get something for nothing, so you may experience that prices may not be as advantageous as if you went into the spot market. Normally pricing is based on Platt's Bunkerwire and it may be Platt's average for the port or area. Some suppliers use monthly averages, some use weekly or even the issue published closest to lifting day. Contracts are also known to have been entered on the basis of Platt's Marketscan, which is a commodity-oriented publication and as such not widely known among buyers. Either way, the question really becomes: "how much are we willing to sacrifice on the price for the benefit of quality and service?". Only you can answer this question, but if your answer is "nothing" then you are certainly going to lose money on bunkers.

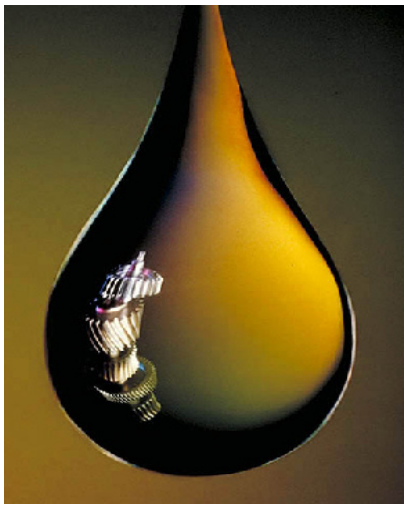
Post-purchase

You have now placed a stem with a supplier and the fuel has been delivered as requested. Then comes the task of checking whether the vessel has received what was ordered and paid for. This will be discussed in more detail a little later on, but the importance of properly instructing the crew on what to do prior to, during and after bunkering, especially with respect to the sampling, should be stressed. The sample is the sole evidence of the quality of the fuel delivered and becomes the focus in a quality dispute.[1] The standard questions to the chief engineer are: "how, where and when were the samples taken, and did you witness the process?". In virtually all terms of sale it is the sample retained by the barge that is to be re-tested, so the importance of properly witnessing the sampling is evident.

There are only two items the crew can correctly verify: the volume and temperature of the fuel, and both are important as they, together with the density, are the basis to determine the weight which the invoice is based upon. Since you can not witness all bunkerings yourself, the crew becomes your ears and eyes on the spot, and their report, together with the delivery receipt, is of importance for the final control of the invoice.

The sample should always be tested at an independent laboratory. There are obvious reasons why. Firstly, to know if the quality is according to specifications ordered and secondly, to find out if the weight is correct. Based on experience it can be said that the tested density is seldom equal to the density declared on the delivery receipt. Large variation means that you are paying for fuel that you have not received, or have received more fuel than what is stated. This can be illustrated as follows:

One can easily imagine what this may amount to over the years, if the fleet is sizeable and it happens a few times per vessel. However, it can also happen the other way around, in which case one must add the extra weight when controlling the invoice. Normally, when you are faced with large differences in density, a re-test of the retained sample is called for and the result of this test



is final and binding for both parties. Again, it is important to properly verify that the sample is true and representative, because in the end it can mean money.

Another item to look out for is correct temperature conversion, which can be illustrated as set out in the left table to the left.

There are tables explaining which factor to use when adjusting for temperature and it is strongly recommended that they be used. As a general rule, it is recommended not to pay an invoice which is not accompanied by a copy of the bunker receipt, or at least hold off on the payment until the receipt is received – otherwise the invoice can not be controlled properly. A word of caution, though: always pay the undisputed amount.

Hedging

Hedging has been used in the bunker industry for many years, but only recently has hedging reached the popularity it presently enjoys. While it was basically the oil companies that offered owners hedging instruments in the past, today banks, trading houses and others have jumped on the bandwagon. They offer hedging in commodities such as crude oil, heating oil, jet fuel, gas oil, etc., but as an owner, one should concentrate the hedging in fuel oil. In general, the main rule should be that one hedges in the product that the vessel burns.

Here are a few thoughts (from an owner's point of view) on why and how to hedge.

When looking at the futures market, it is important to distinguish between the paper and the physical market. In this connection, the physical market means that one buys a pre-determined amount

of fuel at a set price for delivery at a specified period. The paper market, however, differs from the physical in that one settles one's positions in cash, either way, and no physical oil is involved. You should always keep the objectives in mind when you enter the paper market: speculation or insurance?

In general terms, one should look upon hedging as insurance. This means best possible coverage at minimal cost and risk.

What do we hedge? Primarily the bunker prices in the annual budget, but it can also be the bunker prices in a freight contract or even the bunker consumption for a vessel taken on time charter.

If a cargo contract already has a bunker clause built into it, that in itself is a hedge. However, one should note that a bunker clause in a freight contract might be converted into a hedge. If a bunker clause is an asset for an owner, it is a liability for the charterer, for which he may be prepared to pay additional freight to get out of. The owner can use the extra few cents to the freight to buy an option. This can be illustrated as in the above table.

When the decision has been made to hedge, the next question is what instrument to use. There are different instruments available, such as swaps, caps, participation, etc., but common to them all is the element of risk, and do not forget, you still have to pay market price for the fuel.

The two most commonly used instruments are swaps and options. Swaps are possibly the most used way of hedging. The main principle is that one agrees on a strike price with a set volume over a certain period. In other words, buy in the future at a price set today. The benefits of this instrument are that you are fully covered if the price goes over the strike price and there is no premium to pay. The drawback, however, is that if the price falls below the agreed strike price, you are faced with the opportunity loss and this cost is an unknown factor in the overall budget. A swap makes sense in a low market when the downside potential for cash payoff is low.

The main principle in options is that one buys the right to a product at a set price for a set period at a set time. One buys the right, but not the obligation to buy. With this instrument the benefits are that one has full coverage on the upside, and at the same time can take full advantage of the lower priced fuel plus a cost factor that is locked in. The drawback, however, is that one must pay the total premium up-front, which may influence the overall cash flow. The premium is based on several factors such as volatility, time period, base price of the product, interest rate, etc. The general principle is that the further away the strike price from the market price, the lower the premium.

There are other instruments available and it seems that there is no end to some of the players' imagination. For those of you who are not familiar with hedging, but would like to get involved with it, take time to learn the differences between the various instruments available. Learn the difference between Platt's Bunkerwire and Platt's Marketscan, as it is on the latter that most hedges are based.

Irrespectively, keep in mind that you are the buyer and it is your needs that have to be covered. "Here is my problem and what can you do to help me? What are the benefits and drawbacks with the particular instrument you propose?". One has, unfortunately, heard too many stories of owners who hedge in crude oil, etc., with a strike price based on a port or an area they do not even call.

Organisation

After discussing efficient purchasing practices it is prudent to also say a few words about how the shipowner or operator organises the fuel purchases. There appears to be two ways buyers handle this task: either they let each operator buy fuel for the vessel(s) it handles or they have designated one person to perform this task. While there is not much to say about the former, there is much to be said about the latter and just to name a few points:
– Streamline the broker network.
– Avoid confusion in the marketplace.
– Easier to develop/maintain internal database.
– More "clout" in the marketplace.
– Better buying practices.

One comment heard from a buyer is: "but we can not afford to have a bunker department ...". The answer is simple, it is not a question of establishing a "new" bunker department, it is just a matter of taking one of the persons who presently buys and letting him or her buy for the whole fleet.

On board handling and claims

You buy the fuel carefully, but things can go wrong on board. It is vitally important to have a clear bunker policy for the crew, and to make sure it is followed every time. Firstly, for

Measured volume ex barge is 1,850 cbm at 35°C. Density on delivery ticket is 0.964 basis 15°C. It is easy to say:

1,850 x 0.964 = 1,783.4 MT.

However, the correct picture is:

1,850 cbm at 35°C = 1,823.73 cbm at 15°C x 0.964 = 1,758.075 MT.

This gives a difference of 25.324 MT. (1,783.4 – 1,758.075 = 25.342). Multiply this by USD 150 and you get a difference of USD 3,798.60 – again, money paid for something not received.

The supplier claims he has delivered 1,500 MT based upon a density of 0.990. However, the test shows that the actual density is 0.978. The formula to calculate the actual quantity is quite simple:
Using the above formula, the calculation becomes:

$$\frac{\text{Invoiced weight} \times \text{tested density}}{\text{Declared density}} = \text{actual weight}$$

$$\frac{1{,}500 \text{ MT} \times 0.978}{0.990} = 1{,}481.82 \text{ MT}$$

If the price was USD 150/MT, there has been an over-payment of USD 2,727.

1 See also articles "Some technical aspects of marine fuels testing" and "Effects of off-spec bunkers" elsewhere in this issue of Gard News.

their safety. Secondly, because a small accident while bunkering will often lead to a small oil spill right under the noses of the authorities, which will become a considerable and very expensive problem. So your first priority must be to ensure that the crew follows correct routines to prevent safety problems or pollution. These are well documented, and should be in your ISM system, but it is easy to cut corners at night or in less regulated ports. Do not allow it to happen.

Whatever you do, sooner or later you will be faced with a claim. Types of claims will vary, but there are two major: quantity and quality. Of these two, quantity may be rated as problem number one, followed by quality.

As discussed earlier, the quantity (weight) is based upon volume and density at a set temperature.

A classic scenario is that the barge claims it has delivered a certain volume, the vessel claims it has only received so much and we have a dispute on our hands. How do we solve this? Firstly, let us take a look at a common clause used in terms of sale:
"Quantity shall be determined at Seller's or Seller's supplier's option from the gauge or meter of shore or barge tanks. The Seller's determination of quantity shall be final and conclusive, but the Buyer shall have the right to be represented at the measuring. Any challenge by the Buyer of the said measurement shall only be admissible if made to the Seller's representative and noted on the delivery receipt at the time of delivery and confirmed in writing by the Seller within 14 days of delivery."

(A x B):(C x D) = E	
A: Total cargo to be carried.	500,000 MT
B: Freight increase per ton.	USD 0.05
C: Bunker consumed per voyage.	1000 MT
D: Number of voyages for the contract.	10
E: Option premium per MT.	USD 2.50

Faced with such a clause or similarly worded clauses, a buyer must exercise its right to be present or represented at the measuring. Fortunately, measurement at storage tanks ashore is about to be a thing of the past, but measurement at barges is very much a reality. One can always have a surveyor present, but many owners look at the cost issue and leave it to the crew to perform this task. Things to watch out for are:
– Correctness of calibration tables.
– Ensure that actual measurement is carried out by the crew, and that they report it to the head office.
– Note the temperature and make sure it matches what is on the delivery receipt.

The crew should always make proper remarks on the delivery receipt, as the supplier will use it later against you as evidence. Preventive measures are the best way to fight and/or eliminate quantity disputes.

Unfortunately, quality disputes are unavoidable and measures are similar to those applicable to quantity disputes. Preventive medicine is the most important feature. What is then the prescription?
– Be selective in choosing a supplier.
– Always test the fuel.
– Do not use the new fuel before the test result is available.
– Avoid mixing new fuel with old fuel in the same tank(s).
– Ensure that the samples taken are as representative as possible and that they are properly labelled. They are the sole evidence of the fuel the vessel has received.

But even after having done all of the above, you may still be faced with a

dispute. The nature of the dispute, more often than not, dictates which actions you must take. It is always preferable to try to solve a dispute outside the courtroom, and experience shows that most suppliers share the same point of view. It then comes down to your negotiating skills. However, should the dispute be of such a nature that the courtroom is unavoidable, make sure that all communication between you and the other parties involved is in writing. In this day and age too much is done via the telephone and when you are in the heat of the battle, maybe a year later, it is hard to remember who said what to whom. It only takes a few minutes to summarise the contents of a telephone call in writing and send a copy of your notes to the person you spoke with. Get into the habit of doing it. Hearsay, or "I think I said..." unfortunately does not help your case. Keep in mind that in the end what is written down will be your strongest evidence.

Conclusion

Certainly there are those of you who feel that important points have been left out of this article. They probably have, but it is hoped that the few issues raised may point you in the right direction. A good piece of advice, though: make sure the person who buys your fuel learns from past mistakes. Look at old claims and analyse them for the purpose of determining what went wrong and what must be done to ensure it does not happen again. The result may be frightening, but it sets in motion a process with the ultimate goal of overall improvement of routines, both in the office and on board.

Where to go for help

To some owners, the contents of this article will be familiar stuff. But to many, the idea of a sophisticated approach to bunkers will be novel. Where do you go for help? The first port of call should be IBIA, the International Bunker Industry Association.[2] This is not a trade body for suppliers, or for buyers. It is a forum for everyone dealing with bunkers. IBIA offers free training courses all over the world to bunker buyers, it publishes numerous guides to good practice and its officers can help with both simple and technical bunker questions. There is a reservoir of expertise to tap into, both to help avoid problems and to resolve any that arise. A call to IBIA will add to your bottom line because by knowing more about bunkers they will cost you less. Money saved is money earned.

2 For further information look at http://www.ibia.net/.

Liquid gold - Fuel oil and lubricating oil

Gard News 156
December 1999/February 2000

By Lindsay Gordon, Gordon, Giles & Company Ltd, London

INTRODUCTION

Poor quality fuel oil or lubricating oil in an engine can result in damage or breakdown. In relation to the high cost of these essential products, testing and careful handling on board requires little effort and minimal cost. This article considers these aspects.

FUEL OIL

The advice below applies to fuel oil and diesel oil.

BUNKERING

There are a few "golden rules" to be observed when bunkering fuel oil. These are as follows:

Rule No. 1

Always order fuel according to the engine maker's recommendation, using the industry fuel oil standard ISO 8217. This requirement should be included in the charterparty. For each fuel category within ISO 8217 the characteristics are given as maximum values with the exception of flash point and for this reason it is not sufficient to only refer to ISO 8217.

Rule No. 2

Check the supplier's paperwork to ensure that the delivery conforms in terms of quantity and specification with what has actually been ordered.

Rule No. 3

Whenever possible, place new bunkers into empty tanks. New fuel oil should not be used until analysis results have been received.

Note: Even when it is possible to do this, it is essential that the Chief Engineer carries out a compatibility test. Simple, cheap test kits are available.

Rule No. 4

Employ the services of an independent fuel analysis contractor, e.g., Lloyd's Register, FOBAS (Fuel Oil Bunker Analysis & Advisory Service), Det Norske Veritas – Veritas Petroleum Services. The cost is a few hundred dollars and test results are usually available within 36 hours.

Note: Regardless of whether the service of an independent fuel analysis contractor is utilised or not, an owner should ensure that the Chief Engineer takes a continuous drip sample at the manifold throughout the entire bunkering procedure. The equipment necessary to do this is relatively small cost compared with the cost of the bunkers.

Rule No. 5

The Chief Engineer should check that the bunkers to be loaded do not contain an unacceptable amount of water. In the case of distillates, a simple test involving a dip tape and water finding paste can be used. For fuel oil this may not always be accurate and a water test kit can be used. The kit is cheap and simple to use.

Note: If the bunker supply is from a barge, a Chief Engineer should be wary if the supply is continually being circulated in the barge tanks. The circulating process may be disguising a nasty cocktail!

HANDLING FUEL OIL

Heavy fuel (residuals and mixtures of residuals and distillate) must be purified in an efficient centrifuge before entering the service tank. There are several key points.

(1) Ensure that the correct gravity disc is used.

(2) Never exceed the flow rate recommended for the centrifuge for the grade of fuel in use. The lower the flow rate the better the efficiency. Consider using two or three centrifuges in series/parallel as purifier/clarifier.

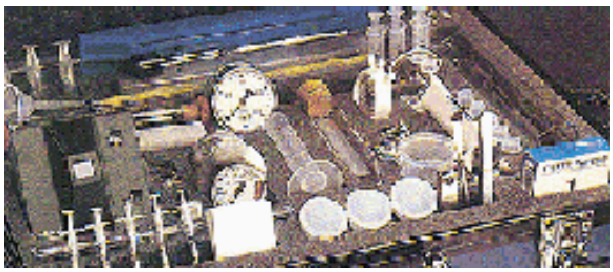
(3) Centrifuging is still recommended for the distillate fuels, MDO/MGO, as the fuel may be contaminated in the storage tanks.

(4) Keep the fuel temperature about 10°C above the minimum storage temperature, to minimise the risk of wax formation and the temperature after the final heater 5°C to 10°C above the recommended fuel injection temperature to compensate for heat losses between heater and fuel injector.

(5) The temperature at the purifier should be steady – a typical optimum temperature is 98°C. Note: Temperatures at storage, settling and service tanks should be monitored at least twice daily. Overheating can degrade the fuel and result in cargo damage in holds.

(6) The importance of operating the settling and service drain test cocks is often overlooked, particularly in unattended engine rooms. Twice a day is the minimum for this simple operation, which will reduce the risk of water or sludge entering the fuel system.

(7) Fuel oil filters should be examined, say, every few days in service – even if the differential pressure gauges are normal. The reason for this is twofold. First, a filter will often allow fuel to pass even when partially choked. It can then suddenly choke completely. Second, although Class Rules require a standby filter to be available, difficulties have been encountered in changing over to the standby filter in an emergency situation, resulting in engine stoppage.



An on-board portable fuel test kit.

(8) An automatic viscosity controller (viscometer) should be in proper working order to maintain correct viscosity of the fuel at the engine. Failure to do this can result in poor combustion and even damage.

Note (1): Remember, viscosity in itself is not a measure of the quality of a fuel.

Note (2): Fuel oils having a high density in combination with low viscosity have low ignition quality. This can mean poor combustion and "diesel knock".

Ignition quality can be calculated in terms of calculated carbon aromaticity index (CCAI). Typically, while not an exact tool for judging ignition quality, engines running at constant speed and load (over 50 per cent) can without difficulty use fuels with CCAI 870 (maximum). Engines running at variable speed and load can without difficulty use fuels with CCAI 860 (maximum).

WHAT CAN BE DONE

(1) If an independent analysis recommends that a fuel should not be burnt, do not do it! Place the supplier on notice, seek advice from your P&I Club and consider a port of refuge.

(2) Excess water can be settled out with time and heat. Purify slowly. Check to see if contamination is saline – do not use the fuel if it is.

(3) If a fuel has a poor compatibility rating, do not mix with any other fuel.

(4) If "diesel knock" (high CCAI) occurs, ensure that engine and fuel temperatures are maintained. Do not advance ignition timing.

(5) If problems occur, samples should be taken at various points in the fuel system, e.g., transfer pump, setting and service tanks, before/after purifier. It is also useful to take sludge or deposit samples at the purifier, filter, scavenge spaces and piston rings/crowns. Note: some of the current problems with fuels are:
– "cat fines" – abrasive
– waste automotive lube oil – abrasive
– bacteria in MDO and gas oil – corrosive, etc.

LUBRICATING OIL

Many of the points discussed above regarding purifiers, filters, test cocks on storage tanks apply to lubricating oil. In addition, there are several key points to consider.

(1) Ensure that the correct grade of oil is being used.

(2) Lubricating oil is not technically clean when supplied and, inevitably, becomes dirty and often contaminated in service. It should be purified constantly at sea. Water must not be added when centrifuging.

(3) The oil should be heated to about 90°C at the centrifuge. Check with supplier.

(4) Try and use only about 20 per cent of the rated flow capacity of the separator.

(5) Check that the correct gravity disc is in use at the purifier.

(6) Take samples for analysis about every 1,000 operating hours, to ensure safe engine operation. The sample (minimum 1 litre) should be taken with the engine in operation, after the oil filter on the engine. Provide the following details with the sample – name of vessel, date, installation, engine number, oil brand, engine operating hours, hours oil has been in use, where taken, type of fuel oil, other remarks.

(7) If the water content of an oil charge exceeds 0.5 per cent to 1 per cent, and can not be removed by purification in service, change the complete charge and renovate. If problems are experienced, tell the analyst as various types of analysis are available.

(8) In general, changes in the analyses provide a better idea of the condition and trends in the oil than the absolute values.

(9) Send or ask the oil supplier to send copies of the analyses to the engine maker for comment.

If the lube oil in an engine is suspect, pump contents up to an empty storage tank. Allow to settle – drain – take

Fuel oil samples taken and sealed on board.

sample for analysis. Meanwhile, clean out sump tank, filters, etc., renew charge.

SHORT STORY

One of the world's largest marine diesel engines burnt untested fuel containing "cat fines" (catalytic aluminium/silicon fines). In a few hours of operation, several years wear and tear occurred in the new engine. An independent few hundred dollar test would have avoided this expensive claim.

SUMMARY

Based on experience it can be said that excessive wear and tear, damage and salvage of vessels with broken down engines often relate back to basic problems with fuel oil and lube oil quality.

What is so amazing is that having fuel oil independently analysed costs a few hundred dollars. Suppliers often analyse lube oil free of charge. The amazement is that many owners still, on the threshold of the year 2000, do not do this!

Taking a lube oil sample at the purifier.

Bunker Quality

Loss Prevention Circular
No. 03-01, May 2001

Introduction

The securing of bunkers of an acceptable quality depends on a variety of factors such as availability, demand, area, choice of suppliers etc. The problems have, to a certain degree, fluctuated with the bunker prices. The market has seen fuels contaminated with waste chemicals detrimental to the health of the crew as well as damaging to the ships engines. For many years, it has been normal in certain areas of the world to dispose of used automotive lubricants in bunkers, thus possibly adding to engine operating problems.

High-density fuels which far exceed the capabilities of the onboard fuel treatment plants are being delivered to vessels.. Water in the fuels is not uncommon, resulting in emulsified fuels and fuels that cannot be treated in shipboard fuel treatment plants. Some of the problems mentioned result in damages that are insured against, but in most cases the associated costs fall below the deductible. Occasionally, blending contaminated fuel with good quality fuel may solve the problem. In other instances, the damages in the form of wear and tear of moving parts are so great that the vessel has to divert to an emergency port for major repairs.

Primary problems

We see mainly three problems:

1 Catfines, aluminium and silicon resulting from the refinery cracking processes, are very abrasive to ship's machinery, unless properly removed. The end result can be machinery damage unless the Catfines are removed to an acceptable level (contact your engine manufacturer) through effective fuel treatment onboard, i.e. optimum use of the centrifuges. The mode of centrifuge operation must be discussed with the manufacturer as the type and year of manufacture of the separators is of significance.

2 As the global demand for premium products such as gasoline, jet fuel, heating oils and gas oils has increased sharply, the use of refinery conversion processing have markedly influenced the quality of the end product, the residual component which is the major component used for blending Intermediate Fuel Oil (IFO) for ships. The result is fuels with higher density, carbon residue, sulphur etc. Practically every parameter has increased significantly throughout the refinery processing. Ships fitted with older centrifuges are unable to effectively treat such fuels, particularly the "high density" products, i.e. fuel densities of 990 Kg/m^3 and above. Centrifuge manufacturers offered upgrade kits for the "old" separators, but few operators invested in these kits.

3 Poor ignition quality is another problem that has arisen recently. The standard laboratory tests do not test the ignition quality, and it is not a part of the ISO 8217 Fuel Standards. The problem is normally associated with low viscosity/high density fuels. If a vessel receives this type of fuel, the ship should keep temperatures as high as possible, thus avoiding low load operation. Gard has seen a number of claims in the last few years where the vessel has had to be assisted to an emergency port. The use of inferior ignition quality fuels may well result in major repairs to the vessel's engine(s).

Recommendations

Owners should be aware that the increased demand from shore side industries for premium products has resulted in a deterioration of IFO used in marine engines. Compounding the problem is the demand from shipowners for high performance lighter engines.

IFO used as bunkers should, as a minimum, meet the requirements of the specifications set out in ISO 8217, latest issue. Bunker testing agencies such as DnV Petroleum Services (DnVPS) and Lloyd's Register's FOBAS are set up to monitor that this is the case.

If the vessel has performance difficulties and poor ignition quality is suspected despite a satisfactory CCAI value, a further test for the ignition quality should be performed. Fueltech, FOBAS and DnVPS can perform these services (see Gard Loss Prevention Circular 04-01, Charterers Liabilities and Bunkers).

If the vessel is in the unfortunate situation of having received a high Catfines fuel, and has to use the fuel, owners should be prepared for a succession of replacements of plungers, nozzles and other moveable engine parts. A normal full set of spares may not be sufficient to see the problem through. The fuel testing service provider should also be contacted, together with your centrifuge manufacturer and fuel supplier for advice and decision-making. Separators must be in prime conditions. Considerations should be given to replacing separators manufactured prior to 1984/1985.

If the vessel has been on extended lay-up, Catfines and other impurities may settle in the bunker tanks if a sufficient amount of bunkers remain onboard during the lay-up period. When subsequently re-commissioned, these Catfines and impurities are likely to be stirred up in heavy seas and cause damage to the engine(s). Therefore, consideration should be given to the cleaning of bunker tanks prior to bringing a vessel out of an extended lay-up to prevent the occurrence of this type of problem.

The settling of Catfines is a continuous process taking place onboard every seagoing vessel. As a rule, fuel tanks should be cleaned regularly. Settling and daily service tanks should be cleaned at least once a year. This messy, but important task would save ship operators a lot of problems.

For further information on bunker quality, testing and other relevant information, can be found on websites such as www.bunkersworld.com, www.dnvps.com, and www.lrfobas.com and www.fueltech.no.

Gard would like to thank and acknowledge Mr. Kjell Haugland's assistance in preparing this circular.

Some technical aspects of marine fuels testing

Gard News 165,
February/April 2002

By Kjell Haugland, Marine Fuels Consultant, Oslo

Introduction

Ships use the cheapest liquid fuels available on the market, hence the fuel quality varies greatly. The safe operation of ships depends on knowledge of the quality of the fuel used.

Fuel Testing

It is estimated that only one third of all marine fuels delivered to ships trading internationally is tested. Even so, the experience from the testing services indicates that things are far from perfect. The comparison of a car filling up with fuel at a petrol station with a ship lifting bunkers via a barge does not apply. And for good reasons, which will be explained later.

Marine fuels are practically all custom blended to a buyer or ISO specification. The supplier may or may not have detailed information on the quality of the components he is using in the blend. Satisfactory quality components in themselves may well result in an unsatisfactory blend, unless you know exactly what you are doing, and we all know that blends are made directly to the vessel bunkering, either through line blending from shore installations, blending on board barge, or in-line blending from the bunker barge. The only way to ascertain the quality of the product actually received on board is through representative sampling and testing by specialised laboratories.[1]

It is true that any analysis result is only as good as the sample analysed. If the sample is not representative of the average quality of the product transferred from supplier to buyer, then the analysis result is of little or no value. Therefore, there should be rules and routines on board to ensure that every bunkering is properly sampled, including fuels for the auxiliary engines. Each and every vessel should have fixed routines describing in detail the bunkering operation, including the stages before, during and after bunkering, and listing the responsibilities of each individual involved. It is the owner/operator's responsibility to set up such an instruction manual. It is also his responsibility to provide the ships with suitable samplers. Prior to placing the order, it is his responsibility to agree on a joint sampling procedure with the supplier, including where and when the sampling shall be carried out. If the vessel does not have a fuel sampler acceptable to the supplier, the buyer is not likely to be in a position to stipulate sampling at the point of custody transfer, i.e., at the ship's fuel manifold.

Proper sampling during a bunker transfer operation is extremely important, because continuous drip sampling at the point of custody transfer is the only secure way to ascertain the quality of the product received by the buyer. Sampling either before or after the event will not, for obvious reasons, bear the same weight. It is good news that Singapore, being by far the largest bunkering port in the world, has decided to introduce legislation requiring all bunkerings taking place by barge to be sampled continuously during the bunkering operation at the receiving vessel's manifold. The bunker barges will all be required to fit a defined quality sampler at the receiving vessel's end of the bunker delivery hose. The new law will become effective on 1st January 2002.

The Marine Environment Pollution Committee (MEPC) of the IMO (International Maritime Organization) has also recently drafted guidelines indicating where and how samples should be taken in connection with the bunkering of ships. The "Guidelines for the sampling of fuel oil for determination of compliance with ANNEX VI of Marpol 73/78" state: "For the purpose of these Guidelines a sample of the fuel delivered to ship should be obtained at the receiving ship's bunker manifold and should be drawn continuously throughout the bunker delivery period". It is hoped that these guidelines will be adopted by all the major shipping nations, because they make good sense.

Even if the bunker industry has come a long way in its endeavour to safeguard the interests of the various parties involved, there are still strong objections from some supplier quarters to accept joint sampling by buyer and seller, despite the obvious fact that this is only fair and square. The practice of multiple sampling by both parties makes dispute resolution difficult, and is always costly and time-consuming to all involved. The sophisticated buyer, who sees the benefit of fuel quality control, should always insist on joint sampling at the point of custody transfer. If declined by the supplier, then he should make a reference to this in the ship's logbook.

Testing services provide their customers with sound and practical advice relating to bunkering operations. Following them is good practice.

It is customary in some ports to request the pre-signing of documents relating to the bunkers being transferred, including the signing of labels for the bunkering samples. This is not acceptable, as the buyer has no control over which sample bottles the labels will be placed on.

Sample transport

The operator pays good money to the testing service for speedy analysis results. The chief engineer must therefore arrange for a courier company to pick up the sample immediately after collection. It is advisable to inform the courier company of the sample's whereabouts by e-mail or fax, with copy to the agent and owner/operator.

This will put pressure on the ship's agent and courier, and will enable the operator to follow up in order to avoid delays.

Use of new fuel

The ship should avoid using the new fuel until its quality has been confirmed to be satisfactory by the laboratory report. It has been customary to bunker just prior to leaving port. However, analysis results on the new bunkers may not be available until a few days after leaving port, so some operators have started to bunker when entering port, whenever possible (draft, cargo, timing, etc., permitting). This allows the analysis results of the new fuel to be available prior to leaving port, which of course is the ideal situation. Should the fuel be

1 See article "Effects of off-spec bunkers" elsewhere in this issue of Gard News.

unfit for use, then the operator will be able to take appropriate action while the ship is in port, which will be a lot cheaper for all involved.

A number of operators give clear instructions to their ships not to use new, untested fuel until the analysis report is at hand, indicating satisfactory fuel quality. These ships carry larger reserves of the "old" and tested fuel, or may even change to the more costly MDO or gasoil. Such measures may be considered as extra insurance, naturally at a cost. However, avoiding delays and/or engine damage will enhance the ship operator's reputation in the market, and influence the premium paid for insurance.[2]

Having said that, as ships frequently may have to set sail prior to receiving the fuel analysis report, operators will be well advised to provide fuel test kits for their vessels, thus enabling their chief engineers to verify the fuel's density, viscosity and water content, plus the nature of the water, whether fresh or salty. The issue of seaworthiness is likely to arise if a vessel leaves port with fuel having a density higher than the ship's fuel separators are designed to handle, a viscosity too high for the heat available on board, or a density/viscosity relation indicating that the fuel may be deficient in ignition quality (CCAI), since this could result in ignition delay, severely hampering the ability of the main engine to provide propulsion. A too high water content speaks for itself, particularly if it is sea water.

While fortunately most fuels delivered are of satisfactory quality, every operator knows from experience that mistakes are made and problem fuels are supplied. Such products will be discovered at an early stage through proper sampling and professional analysis of representative samples.

While at sea, a ship having received the report indicating a satisfactory fuel quality can optimise the fuel treatment, knowing the precise values of important fuel parameters, such as density (selection of the correct gravity disc for the purifier), the viscosity (adjustment of temperature), water content (checking of water content in the fuel after treatment in order to decide on the use of an emulsion breaker additive) and so on.

However, if the analysis report indicates an unsatisfactory fuel, the fuel testing service will also provide recommendations on how to optimise its treatment and use, if necessary. Through communication with all parties involved, including supplier, testing service, perhaps also class and/or insurer, sound decisions can be made based on facts. The problem may be related to the separation of a high-density fuel. The advice could then be to modify the purifier into a clarifier, by installing the smallest gravity disc of the set, thus converting the separator into a clarifier, frequent shooting of the clarifier bowl, possibly operating two clarifiers in parallel, depending on other fuel parameters such as water, sediments or catalytic fines (al+si). Provided you know exactly the quality of the fuel received on board, the operator will be in a position to make the right decision.

Now imagine a vessel also having received inferior quality bunkers, but without any sample sent for testing. She will carry on until engine damage of some sort occurs, resulting in delay and extra cost, usually far exceeding the cost of regularly using a testing service.

Marine Fuels Specifications

The operator who realises that the quality of marine fuels varies considerably, being "the bottom of the barrel", the "leftovers" at the refineries, a "low priority product" in the eyes of the manufacturer, accepts that fuel quality control is required for safe ship operation. He realises that even though "highly priced", marine fuel is priced way below the crude oil from which it is derived.

Marine fuels are in the main produced to company specifications, which are normally stricter than or at least equal to ISO specifications.

The purpose of fuel specification is to stipulate a product quality which, when meeting the requirements of the specification, should perform satisfactorily in the application for which it is intended, provided that application (the diesel engine/boiler) is in normal good condition. However, fuel specification can not safeguard every aspect of satisfactory fuel quality, otherwise it would be far too detailed to be of practical use. And remember, we live in a competitive world. It is naturally in the supplier's interest to deliver a product which just meets the requirements of the specification at the highest possible price. Independent, third party testing is therefore very important, a must for safe and effective ship operation on today's fuels.

Know the limitations of your fuel treatment plant

The only way to effectively treat marine fuels on board is to use centrifuges. But even centrifuges can not remove 100 per cent of all the sludge and particles detrimental to engine components. Centrifuge manufacturers may claim that some 70 to 80 per cent of catfine particles will be removed when their machines are operated optimally. Documented reports, however, show that during manufacturer-controlled tests at their factory, the removal of catfines was just over the 50 per cent mark. But even if one accepts a figure of 70 per cent removal of particles and sludge, it still leaves 30 per cent of the particles and sludge in the treated fuel entering the vessel's daily service tanks.

Is it customary to re-centrifuge the fuel in the service tank? Some vessels have a fuel piping arrangement to enable this to be done. Still, not all carry out this very important operation regularly.

Are bunker fuel tanks cleaned from time to time? The answer is only very occasionally. Tank cleaning may be on the list of items to be carried out during docking, but it is frequently the item that is dropped either due to cost or time, or both. Settling and daily service tanks (or at least the daily service tank) should be cleaned annually. Just imagine what happens to the sludge and particles accumulated in the tank bottom when the ship runs into stormy weather! This is almost certainly the time when excessive engine components wear occurs.

How effective is the fuel treatment plant on your ships? Most operators probably have no idea. The centrifuges are spinning, the fuel is separated at the throughput matching the engine consumption, the fuel temperature and flow are kept as constant as the fuel treatment plant auxiliary components will allow. The fuel quality is known through testing, and hopefully the

2 See article "Effects of off-spec bunkers" elsewhere in this issue of Gard News.

correct gravity disc has been installed in the purifier. The chief engineer, having done his best to optimise the fuel treatment, will have little or no idea as to the quality of the fuel entering the ship's engines. He can not see what is going on in the treatment plant and is not supposed to taste, smell or even touch the product. In fact, he has to cross his fingers and hope that satisfactory quality fuel is entering his power units.

In practice it is very simple and easy to ascertain the effectiveness of the treatment plant through sampling and testing. Some sophisticated operators do this in a planned way, and they have an experience factor at hand as to which quality product they can treat satisfactorily. The day such operators receive an off-specification fuel, they will know whether or not their vessel can handle the product in question and whether to arrange an off-lift operation. This does not mean that the buyer must accept off-specification products without having compensation from the supplier. However, in many cases it will be able to avoid a costly deviation and off-lift operation. At least one of the fuel testing services recommends a "Fuel System Check" programme to their customers. They are well advised to make use of it.

Effects of off-spec bunkers

Loss Prevention Circular No. 08-01, November 2001

Introduction

Taking onboard off-spec bunkers can cause significant disruption to a vessel's ability to trade. In addition, it creates problems in recovering from the insurers costs incurred due to a lack of and/or limitation in cover. This circular is intended to provide an example of the problem as experienced by shipowners. The case described below relates to a passenger ship, but applies equally to all types of vessels. Loss Prevention Circular No. 08-01 is the next instalment in a series of circulars produced by Gard dealing with damages associated with bunkers and bunkering[1] and outlines problems which may arise when passenger ships have to deal with off-spec bunkers.

Passenger ship operations are very sensitive to operational disruptions. Costs of disruption can occur in the form of hull and machinery damages, damages and compensation to passengers and crew as well as damage to reputation that may influence future bookings and earnings. Compensation to customers beyond the initial costs due to commercial considerations can easily fall outside the scope of cover of hull and machinery, loss of hire and P&I cover.

Course of events

Upon arrival in Singapore, the vessel was firmly secured to the pier at 0550 hrs. At 0800 hrs, a bunker barge came alongside to deliver bunkers to the vessel. The barge commenced bunkering at 0810 hrs and completed the operation at 1255 hrs. The bunker delivery statement noted that 90 metric tonnes of supposedly IFO 180 cst was supplied. Fuel samples were taken for testing by a credible bunker quality testing company. However, the results from this bunker test would not be available for another 2 – 3 days.

The vessel departed Singapore for Thailand at approximately 1745 hrs on that same day. At 2215 hrs that evening, the vessel experienced a total blackout, including the loss of all navigational equipment. Power was temporarily restored at 2217 hrs. A second blackout occurred at 2218 hrs resulting in the vessel not being under control. Although power was finally restored at 2220 hrs, the vessel was only able to continue at half speed.

The Chief Engineer observed that the bunker which had been supplied in Singapore that day, had a high degree of carbon residue, clogging the complete fuel system in the main and auxiliary engines. The Master informed the owners of the problem and the decision was made to return to Singapore due to safety considerations.

At 1100 hrs the following day, fuel samples were taken in the settling and service tanks where the bunkers had been loaded and the vessel began discharging the off-spec bunkers at 1200 hrs. A representative from the Singapore Maritime Port Authority informed the vessel at 1230 hours that they were being cautioned due to the emission of black smoke – apparently the result of the burning of the off-spec bunkers. An engine repair contractor boarded the vessel at 1600 hrs and upon surveying the situation, indicated that repairs would take at least two days provided no extensive damage was found. After consultations with the owners, the Master decided to abort the cruise.

At 0630 hrs the following day, the debunkering operation was completed. Another bunker barge began loading a fresh supply of IFO 180 cst at 0810 hrs and the operation was concluded at 0945 hrs. All passengers were discharged from the vessel at 0945 hrs. A second agency was used for the sampling of the second bunkers taken and a different bunker testing company was used to analyse the second bunkers. The results of the tests of the first and second bunkers indicated high ash, water and total sediment potential (TSP) content. In addition, high sodium to water content was also reported, indicating the presence of seawater in the bunkers.

However, the bunker brokers advised the company that the samples had not been taken at the bunker barge as required by the Singapore Standard CP60:1996. Further samples were drawn at the barge's manifold and sealed with a barge seal.

Damage to machinery

The damage to the main engine as a result of using the off-spec bunker was abrasive wear marks on all fuel nozzles, abrasive wear on all fuel pump barrel/plunger assemblies as well as heavy fouling of all turbochargers. The turbocharger impellers were noted to be heavily fouled, the labyrinth seals on the gas sides were choked with carbon deposits, and the bearing bushes were worn. In addition, the boiler burner unit was also heavily fouled. Upon review of the engine logbooks, there was no evidence of any problems with the engines prior to taking on the off-spec bunker. The running hours of the main and auxiliary engines were noted to be well within acceptable limits for overhauls.

In this case, there was no indication that the vessel had received the results from the first fuel test prior to sailing. In addition, the vessel had apparently a very limited amount of bunkers onboard prior to loading the first off-spec bunkers. Therefore, the vessel had to commence using the new bunkers prior to receiving the test results. In this circumstance, the vessel was not able to create a 'buffer' by using the existing bunkers while awaiting the test results. Had this been the case, the company may have been able to discharge the off-spec bunkers and taken on replacement bunkers.

What types of damages are actually covered? In this type of case, shipowners can find themselves in a situation where insurance cover can only pay a portion of the costs incurred. For example, in this instance the cost of repairs to the damage to the machinery was below the deductible. For loss of hire, the vessel was off hire but within the off hire deductible. The P&I

1. Gard Loss Prevention circulars related to bunkers are: Loss Prevention circular 01-00 (Main Engine Damage Due to Ignition Delay), Loss Prevention circular 03-01 (Bunker Quality), and Loss Prevention circular 04-01 (Charterer's Liabilities and Bunkers). These circulars can be found on the Gard website at www.gard.no.

entry covered the Member's "liability to pay damages or compensation to passengers onboard the Ship in consequence of a casualty" as per Rule 28(b) of Gard P&I Club's Statutes and Rules. As stated in the Gard Handbook on P&I Insurance[2]: "'compensation' relates only to the Member's legal liability to the passengers and cannot include any claim by the Member in respect of payments made to passengers to protect the Member's commercial reputation." P&I cover thus, does not include additional compensation to passengers above the Member's legal liability made to foster customer goodwill.

The shipowners is therefore left to bear a significant cost for business disruption in these types of instances, where only limited insurance cover would be available under hull and machinery, loss of hire and P&I. Dependent upon the circumstances, demurrage may also need to be charged and thus creating problem for the shipowner.

Lessons learned

The lessons learned from this case apply to all types of ships. However, the passenger ship industry can be more sensitive than most industries.

Fuel testing

1. Bunkering procedures, including fuel-testing procedures, should be reviewed to ensure correct procedures when dealing with off-spec bunkers. The crew involved should also be properly briefed on these procedures to avoid costly and time-consuming interruptions. In the Det Norske Veritas Annual Report 2000, it is stated that only 40 per cent of the world fleet performs fuel testing.[3] This lack of testing can lead to extensive damage to the vessel's machinery which is costly both to the owner and insurer alike.

   On the other hand, there are cases where there is a company fuel testing procedure but due to commercial or other reasons the results of the tests are neither received in time nor actions taken to adjust the fuel equipment and engines accordingly. The improper use of off-spec fuel can cause significant damage to the vessel and its ability to trade. In the case outlined above, the costs were considerable and were only partially recoverable from insurers.

Taking on bunkers

2. Every precaution should be taken to ensure that adequate bunker supplies are available to allow for the proper testing before use of any new bunkers taken on. It is imperative that passenger ships, as well as other vessels on tight charter schedules, are able to deal with situations where it is necessary to use bunkers without the test results being available. This may involve complex contingency planning in order to properly evaluate and ensure that a 'buffer' exists. For example, some shipowners maintain a quantity of marine diesel oil (MDO) onboard for situations where off-spec bunkers need to be discharged and only limited IFO is available.

2. Gard Handbook on P&I Insurance by Simon Poland and Tony Rooth. Published by Assuranceforeningen Gard. Arendal, Norway 1996. The preface of this handbook can also be found on the Gard website at www.gard.no.
3. Det Norske Veritas Annual Report 2000 can be accessed via their website at www.dnv.com.

Main Engine Damage Due to Ignition Delay

Loss Prevention Circular No. 01-00, July 2000

Ship Type: Panamax bulk carrier (built 1980)

Course of Events

In a Gulf of Mexico port, the vessel received heavy fuel oil IFO 180 according to ISO category RME 25 with a density of 989,6 kg/m^3 and a viscosity of 172 Cst. The bunker receipt information and the following DNVPS analysis coincide with respect to these parameters.

Based on the density and viscosity information, the ignition qualities of this fuel (CCAI) were calculated to 860 which is acceptable for slow speed engines. The vessel is equipped with a 16-cylinder medium speed main engine of European design, and this fuel is on the limit of where operational problems could be expected for medium speed engines. As a result, the chief engineer on board and the ship management office were informed by DNVPS that precautions should be taken to ensure satisfactory combustion.

The chief engineer on board and the ship manager ashore did not pay any attention to the fuel analysis. They did not considered the specific recommendations issued by the engine maker or DNVPS's precautions for operating the main engine with fuel with inferior ignition characteristics. To compound the problem, the vessel was sent to areas for trading including days with river passage with variable loads on the main engine. This made it difficult to maintain maximum combustion temperature and thus made it virtually impossible to follow the operational recommendations.

The delayed combustion resulted in increased combustion pressure, combustion close to the cylinder walls and the consequential failure of the lubrication of the pistons and liners.

Extent of the Damage

The result was a complete breakdown of all pistons, cylinder liners and cylinder heads with related parts. Due to lack of availability of spare parts onboard ship, only preliminary repairs were made. Thus, the voyage to the discharge port was made at reduced speed. Meanwhile, the company had to make arrangements at the discharge port to acquire spare parts and make preparation for final repairs. The vessel was taken off-hire upon arrival at the discharge port.

As a result the total cost to repair is approximately $530,000 USD and the total time off-hire is approximately 45 days.

Probable Cause

The ship manager and/or commercial operator of the vessel made the error in believing that a lower viscosity fuel (180 Cst) was of better quality than a high viscosity fuel (380 Cst). This is commonly seen when a fuel supplier lowers the viscosity by adding lighter components that may seriously alter the ignition characteristics.

The ship manager had arranged for sampling and analysis of fuel. However, the ship manager had not ensured that their chief engineers were provided with proper procedures and instructions to take the necessary precautions against damages that could be incurred by inferior quality fuel.

The result was that the vessel left the bunkering port with no preventive actions and precautions on how to deal with a situation with a fuel on board with inferior combustion characteristics.

Lessons to be Learned

The importance of fuel sampling and analysis is essential for verification of the quality of the fuel received on board. There is however little value in companies spending money on sampling and testing if shipboard engineers are not properly trained to understand the fuel quality analysis and provided with procedures and instructions on how to adjust the fuel equipment and engines accordingly.

Procedures and instructions should be established in the technical or operational departments on how to:
- establish requirements for fuel quality depending on the fuel treatment equipment and engines on board
- follow-up the vessels' bunkering schedules, ensure correct sampling and where to send samples for analysis
- ensure the engineers on board and technical staff ashore will understand the analysis and the limitations for their equipment, and
- in the event of having taken on fuel of inadequate quality, establish communication with the engine makers and fuel analysing company in order to provide proper instructions to the vessel.

The interplay of fuel and lubricating oil quality on the reliability of diesel engines

Gard News 174, May/July 2004

There is a basic relationship between engine reliability and quality of fuel oil and lubricating oil.

Introduction

Hand in hand with new secondary refinery processes, which have developed during the last decades, new engine problems have emerged. It is, unfortunately, a proven fact of life that the end users often have to "pay" for technological advances, until all the links in the chain have adapted to the new parameters.

The significance of fuel oil quality in relation to the condition of an engine is obvious. But this will always have to be considered taking into account the complex system of the main parameters, such as engine/turbocharger specifications, load parameters (high/low), environment, filters, purifying systems, quality of the lubricating oil and the qualifications of the operating engineer. It is not the intention to expand on all the aforementioned aspects in this article, but mainly to highlight the basic relation between engine reliability and quality of fuel oil/lubricating oil.

Statistics

Gard Marine's statistics show that machinery-related claims constitute 42 per cent of all claims under hull and machinery policies, of which 73 per cent are main and auxiliary engine-related claims. This means that main and auxiliary engine-related claims constitute approximately 31 per cent of Gard Marine's total hull and machinery claims.

The above figures should be compared with indications from the industry that 80 per cent of all engine breakdowns are related to problems with either the fuel or the lubricating oil.

Trilateral interplay

In any particular engine installation the choice of lubricating oil must not only satisfy the requirements of the engine design, condition and load, but also requirements put forward by the quality of the fuel oil. This may be described by a trilateral interplay involving the lubricating oil, the fuel oil and the engine.

Trouble-free engine management requires each of these three elements to have both design and quality within certain limits. Exceeding these limits may lead to reduced service intervals or, in the worst case, serious engine damage.

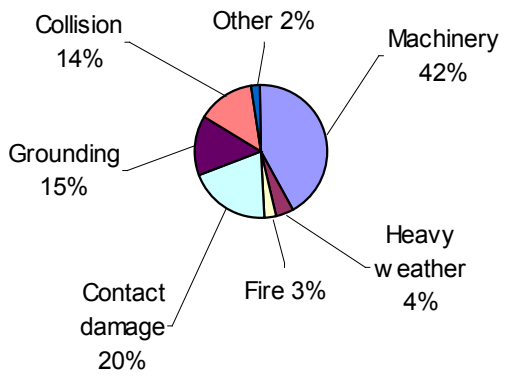
Lubricating oils can vary both in quality and characteristics, but most engine manufacturers attempt to avoid these problems by extensively testing different types of lubricating oils during shop trials.

It is generally agreed that the fuel oil, which is the third element in this interplay, has the most influence and the biggest variation in terms of quality and properties. The continuous development of refinery processes during the last decade has resulted in changes in the characteristics of both distillates and heavy fuel oils. Increased demands with respect to environmental issues have also resulted in changes, in particular for the lighter distillates. Possibly, a high quality grade of lubricating oil may prevent the negative effects of unwanted fuel oil properties and secure satisfactory engine performance. Even with a high quality grade lubricating oil, the risk of experiencing problems with low-quality fuel oils is high, particularly in combination with certain load conditions.

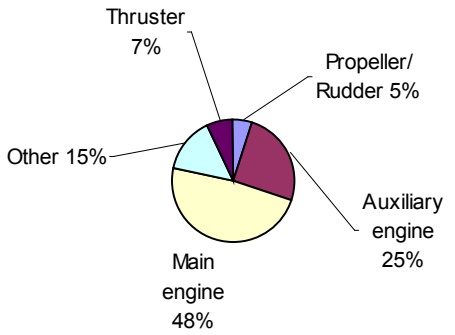
The interplay involving fuel oil, lubricating oil and the engine can be illustrated as in the below table.

The areas of concern mentioned in the illustration above may (hopefully) not materialise very often, but, if they do, they will cause serious problems. Very often these problems may be traced

Overview of hull and machinery claims divided by number of claims (1998-2002)



Overview of machinery claims divided by number of claims (1998-2002)



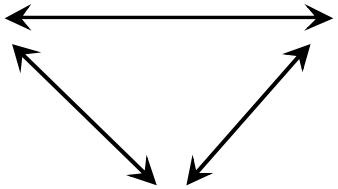
directly back to unwanted fuel oil characteristics, but in some cases they are due to inappropriate adjustment of the properties of the lubricating oil to the characteristics of the fuel oil.

Off-spec bunkers

A major concern related to marine fuel oil is the receipt of off-spec bunkers. Although this article does not deal specifically with this issue, the areas of concern mentioned above are also applicable to off-spec bunkers problems. The importance of proper fuel oil sampling and analysis procedures can not be over-emphasised. The incidents described in the following article in this issue of Gard News highlight the benefits of good sampling and analysis routines.

Fuel Oil – Engine – Lubricating Oil
Areas of concern

Fuel oil:
Stability
Sulphur
Particles/Cat. fines
Fouling
Ignition
Combustion



Lubricating oil:
Sludge
Separation
Oxidation
Additive
Concentration
Thermal degrading
Concentration

Engine – Problems:
Cylinder wear
Piston ring groove deposits
Cylinder liner polishing
Piston crown deposits
Gas leakage
Crankcase deposits
Fuel oil leakage to the crankcase

Bunker spills

Gard News 165,
February/April 2002

Every vessel needs bunkers. Some are run by fuel oil, others by gas oil, and some need both for their machinery. In addition, vessels need lubricating oils and hydraulic oils. The oils are normally taken on from barges or shore connections through hoses. Hydraulic oils or lubricating oils may be taken on in drums.

Seamen know these things. They know how to plan the bunkering operation, how to follow the routines set out in the vessel's safety programme. They know how to calculate their need for bunkers and how to order. They know how to hook up the bunker barge and how to connect the hoses to their manifolds. And they know how to monitor the bunkering operations.

And yet, bunkering spills do happen. Over the last 20 months, 350 pollution incidents have been registered in the Gard system. Many of these cases (165) have been reported merely for precautionary reasons and are not expected to cost anything. Of the remaining cases, the majority is expected to cost Gard between USD 100 and USD 100,000 each. There are also a few cases expected to cost more than USD 100,000 each, of which three are expected to cost more than USD 1 million. The most expensive will cost somewhere around USD 25 million.

It is true that not all of these incidents involve bunker spills. However, the majority of the 165 no-cost cases involve minor spills during bunkering operations – spills so miniscule that they would not, some years ago, have been reported to Gard at all. It is also true that the majority of the remaining cases relates to bunker spills one way or the other and this article will analyse some of these events to provide a picture of what happens, and how a mishap is treated in different countries around the globe.

United States

The vessel was bunkering in Oregon. It appeared that the engineer in charge of the operation had unscrewed an ullage pipe cover to be able to check the quantity in the particular tank. Unfortunately, as often happens, a "blurp" forced a small quantity of oil to come out of the hole, and five litres reached the sea. The costs paid by Gard reached USD 3,000, in addition to what the member had to pay under the agreed deductible. How could this have been avoided? First of all, were the scuppers plugged? No. So, whose fault is this? Is there a routine on the vessel for plugging the scuppers when bunkering? Somebody must be responsible for that job and it should be set out in the safety programme. It is essential that the responsibility for doing a job be allocated to a specific individual – not in order to be able to blame somebody when something goes wrong, but in order to make sure that the job gets done. Could the "blurp" have been avoided? A "blurp" is most often caused by an air pocket being trapped between the beams underneath the tanktop depending on the trim of the vessel. It is essential that the person in charge is aware of what trim the vessel has, and what can happen in certain circumstances. Hence, it is better to stop the operation one or two centimetres short and avoid the very expensive oil being lost overboard. [5litres = USD 3,000; i.e., 1 ton = about USD 750,000]. Another way of trying to avoid the oil slipping overboard is of course to have absorbent material ready near to every opening from which oil could possibly escape – not only by the manifold.

Another vessel was bunkering in Texas. In order to be able to follow the operation a manhole had been taken off. Despite such a precaution, the tank was filled faster than expected and 1,000 litres were reported to have reached the surrounding waters. The product was heavy fuel oil, and the vessel's response plan under OPA 90 was activated. Everything went well in the end, but the operation, including QI (Qualified Individual), OSM (Oil Spill Manager), oil spill response company, US Coast Guard, etc., cost USD 180,000. How could this have been avoided? Obviously, by closer monitoring of the operation. The person responsible for the operation should not be distracted by having to do other things simultaneously.

What about the bunkering speed? Quite often it is said that nobody monitored an operation from the shoreside, or that shoreside monitoring was sloppy, and that the speed was excessive compared to what had been agreed. How can that be proved afterwards? Is there evidence that the vessel had told shore personnel to slow down? It has to be remembered that it is the spiller who is the responsible person and who shall have to pay in the first place. Under OPA 90 the spiller can only avoid responsibility if he can show, by a preponderance of evidence, that somebody else, not being at all related to him, was the sole cause of the oil discharge.

None of the cases mentioned above involved criminal investigation of the responsible crewmember or company. However, nowadays it is quite likely that the Coast Guard will look closely into the vessel's routines and safety programmes whenever a spill occurs. If they find that something is not in accordance with rules and regulations, e.g., MARPOL 73/78, the FBI may be informed about the case and start a criminal investigation. This means that criminal lawyers may have to be appointed to defend the master, chief engineer and others, and, if non-compliance is grave enough, the shipowning or operating company. At this stage Gard and its local correspondents have to step aside because of the attorney/client privilege aspect.

Japan

A vessel was transferring oil internally into the settling tank. Unfortunately the tank overflowed and some oil found its way into the sea through the airpipe. Whenever there is a pollution incident in Japan the Maritime Police will start investigating to find the culprit of the mishap. Such investigation may take some hours, but it may also take days, and in the meantime the vessel is not allowed to leave the port. After having interrogated the chief engineer and other engineers it was found that the second engineer was the wrongdoer. The investigation took two days, which meant that the operators of the liner vessel involved, being on a tight schedule, had all sorts of problems with their customers. Criminal proceedings started and bail of USD 10,000 had to

be put up for the second engineer, with a promise that he should come back to Japan for trial at a later date. If he does not show up when called upon to do so, the bail will be cashed in favour of the Japanese authorities.

The spill in this case was miniscule. In other cases clean-up costs will be added to the bail costs.

Ukraine

Heavy fuel oil had leaked into the tunnel of a vessel, and the tunnel was emptied overboard in Ukrainian waters. An unspecified quantity of oil escaped. The system in Ukraine is to impose a fine and any clean-up costs on the vessel. A table is used to assess the amount of the fine. In this case, since the quantity discharged was unknown, USD 3.1 million had to be paid.

Of course, the original reason for this mishap was a structural fault allowing the oil to enter the tunnel. But who decided to empty the tunnel overboard? Could that have been done otherwise?

Singapore

After having touched the dock, a hole appeared in a bunker tank of a vessel. Approximately 27 MT escaped into the sea. The cost of clean-up reached USD 465,000.

Another case involved a fractured ballast line passing through a bunker tank. In this case the quantity of oil was unspecified but the mishap was detected and stopped quite rapidly. The cost of clean-up reached USD 33,000.

Singapore is quite effective when it comes to combating spills. A lot of money has been put into their contingency plans and there is plenty of equipment which can be used in the area. Still, with all the islands and the sea currents in the Straits, clean-up operations of some magnitude do not come cheap. In addition, the Prevention of Pollution of the Sea Act (PPSA) imposes criminal liability for, amongst other things, the following:
– discharge of any oil or oily mixture from any ship into Singapore waters;
– failure to report any actual or probable discharge of any oil or oily mixture into Singapore waters; and
– failure to properly maintain oil record books on board a ship.

It should be noted that the Singapore High Court has held that the prohibition on discharge of oil and oily mixtures from ships is a strict liability offence. In other words, the offence is committed the moment there is a discharge of any oil or oily mixture irrespective of whether there is fault, and the state of mind of the offender is irrelevant. Only certain limited defences are available.

These are some of the penalties under the PPSA:
– for discharge of any oil or oily mixture from a ship, a fine of between SGD 1,000 and SGD 1 million, or imprisonment not exceeding two years, or both;
– for failure to report any actual or probable discharge of any oil or oily mixture, a fine not exceeding SGD 5,000;
– for failure to properly maintain oil record books, fines ranging between SGD 5,000 and SGD 10,000, or imprisonment not exceeding 12 months, or both.

While imprisonment for an offence under the PPSA is rare, in a recent case involving a VLCC, the master was sentenced to three months imprisonment and fined SGD 400,000 for the discharge of oil and oily mixtures from the ship. On another charge of failing to properly maintain the oil record book, the master was imprisoned for 10 months.

Imprisonment is not covered by the P&I Club. Neither is a fine for having contravened Marpol or other regulations or for having committed a criminal act.

Turkey

During bunkering, an unspecified quantity of heavy fuel oil escaped through a manifold valve which had not been checked. A fine for USD 45,000, based on the size of the vessel, was imposed.

One wonders how it is possible to forget to check that other manifold valves are closed. However, this case is one of many involving just such a cause of pollution. Are routines and safety programmes unsatisfactory, or are the individuals in charge reckless?

The human element

The reader will have noted that in the cases mentioned above the human element has been of relevance. It is a fact that very often the human element is the cause of mishaps. So what is this "human element"? It usually seems to consist of the individual who does not do what he should under certain circumstances. Rather than checking the ullage of the tank he goes aft to have a cigarette. Rather than checking the safety programme he feels he is so experienced he knows how to handle this operation. Rather than making sure that the scuppers are plugged or the manifold valve on the other side of the vessel is closed, he feels that somebody else should be responsible for those things so he does not bother. Rather than showing interest in doing a good job, he feels that the master or the chief engineer does not appreciate what he does anyway, so why bother?

There are so many excuses for behaving carelessly. Not all of them can be mentioned here. But what can be done to try and avoid mishaps caused by sloppy behaviour? Should one have the careless individual replaced? Is there any guarantee that the replacement will not behave in the same way after a while? There appears to be no easy answer to these questions. But it seems that companies that have closer ties to their crew members, that offer them the option to come back to the same vessel or other company vessels after a vacation period, have less mishaps than companies that do not. But people are different and what is good for one may not be good for another. Still, making the crew member feel he is part of the company in which he serves can only have a positive effect.

The cover

The cover provided is set out in Rule 38.1 of Assuranceforeningen Gard's 2001 Statutes and Rules:
"Rule 38 Pollution
1.The Association shall cover:
a.liabilities, costs and expenses (excluding fines) arising in consequence of the discharge or escape from the Ship of oil or any other substance or the threat of such discharge or escape."

It should be noted that the rule covers pollution caused both by oil and other substances. Hence, it is a very wide cover. The cover responds equally where oil is spilt during bunkering or a chemical cargo overflows from the tank during loading. It should also be noted that the substance must have been discharged or have escaped from the ship. This means that the cost of cleaning up the vessel's deck after an overflow is not recoverable.

The rule says that "liabilities, costs and expenses" are covered. Liabilities in this context mean legal liabilities.

Fines are not covered under Rule 38.1, but under Rule 47, which will be considered later.

To give a picture of actual liabilities which are covered under Rule 38.1, let us examine a specific section of OPA 90:
"Sec 1002. Elements of Liability
(a) In General: (…) each responsible

party for a vessel (…) from which oil is discharged, (…) is liable for the removal costs and damages specified in subsection (b) that result from such incident.
(b) Covered Removal Costs and Damages
(1) Removal Costs – The removal costs referred to in subsection (a) are
(A) all removal costs incurred by the United States, a State, or an Indian Tribe (…), and
(B) any removal costs incurred by any person for acts taken by the person which are consistent with the National Contingency Plan. (…)"

Removal costs are costs incurred in removing the oil from the sea or land, marsh areas, soiled boats, beaches, docks, and so on. They include the cost of boats and people, safety equipment for people and other equipment, storage and hauling of waste to a dump yard or place for incineration, including the cost of getting a permit as a waste generator to haul the waste to the site of destruction or storage.
"(…) (2) Damages – The damages referred to in subsection (a) are the following:
(A) Natural Resources – Damages for injury to, destruction of, loss of, or loss of use of, natural resources, including the reasonable costs of assessing the damage, which shall be recoverable by a United States trustee, a State trustee, an Indian tribe trustee, or a foreign trustee."

This paragraph is of vital importance whenever there is a spill of some significance in the US. It should be noted that those who can formulate a claim under this paragraph are the federal or state authorities, or Indian tribes. It should also be noted that "reasonable" costs of assessing the damage are recoverable. Unfortunately, it does not say who should decide on what are "reasonable" costs.

Natural resources in this context are for instance birds, sea otters and fish. One of the intricate points from the Club's perspective is the "loss of use of" aspect. In one case some years ago the shipowner was found liable to the trustees for approximately USD 12million because people were not allowed to visit a beach for about 2 weeks while clean-up was being undertaken there.

There are further elements of liability described in the OPA 90, but these are beyond the scope of this article. However, the US is not the only country imposing strict liability on an offender. Singapore is mentioned above, but most countries with interest in shipping have the same attitude, although not, perhaps, to the same extent as the US.

The second Rule of particular interest in respect of pollution is Rule 47.1.c:
"Rule 47 Fines
1.The Association shall cover fines or other penalties imposed upon a Member (or imposed upon a third party whom the Member is legally obliged to reimburse or whom the Member reimburses with the agreement of the Association) by any court, tribunal or other authority of competent jurisdiction for or in respect of any of the following:
(…) c. the accidental escape or discharge of oil or any other substance or threat thereof, provided that the Member is insured for pollution liability by the Association under Rule 38, and subject to the applicable limit of liability under the P&I entry in respect of oil pollution risk."

It should be noted that not only fines imposed upon the member as shipowner are covered under this rule. If the member is legally obliged to reimburse a crewmember, for instance, for a fine imposed on that person, it may also be covered. Where the member is not legally liable to reimburse the fine, but wishes to do so for other reasons, he could still apply for cover. It is then up to the discretion of the Club whether to provide cover or not.

It should also be noted that for a fine to be covered under Rule 47 there must have been an accidental escape. Rule 38 mentions nothing about the escape having to be accidental. So it could happen that even though the Club would cover clean-up and other costs related to a spill, cover would not be provided for a fine if the escape had not been accidental. From a practical point of view, the provision in Rule 47 is there in order to exclude fines where a deliberate action from those on board has caused a pollution incident. It does not matter whether the fine is imposed upon the vessel or any of the crew responsible for the deliberate action. This means that a fine imposed because of a deliberate and unauthorised pumping of bunkers or bilge water overboard would not be covered. On the other hand, a fine imposed upon the vessel or a crewmember due to an accidental over-bunkering would be covered.

Civil fines do not create problems for the cover provided the above requirements are fulfilled. Criminal fines, however, do create problems. Although it might seem from a shipowner's or a seaman's perspective to be totally insane to be criminally charged because, for instance, some oil gets in the water after an incident, many countries today do have legislation under which the individual will be charged. The US and Singapore are examples mentioned before. Fines (or imprisonment) in such cases are not covered under the Rule set out above.

Conclusions

- Use your brain when you are in charge of or part of a bunkering operation.
- Know what you are doing.
- Check valves once more, even if it is not your responsibility.
- Check that scuppers and absorbent material are in place.
- Make sure that there is good communication with the bunker supplier.
- Make sure the bunker supplier is going to deliver the quantity you ordered.
- Remember that a fine may cost you dearly.
- Remember that your family may not be able to visit you in prison.

Charterer's Liabilities and Bunkers

Loss Prevention Circular No. 04-01, May 2001

Introduction

Neither shipowner nor charterer likes receiving poor quality bunkers. This can lead to a number of problems for shipowners and charterers. These problems include:

- damages to main or auxiliary engines;
- finding terminals willing to receive de-bunkered fuel;
- co-ordinating and bearing the costs associated with diverting the vessel for off spec bunker discharge;
- coordinating and bearing the costs of providing new bunkers to the vessel;
- reducing speed to accommodate the use of off spec bunkers; and or
- Co-ordinating and bearing the cost of lost time, i.e. off-hire.

These problems can lead to disputes between ship owners and charterers. Therefore, it is important for both shipowners and charterers to protect themselves in the event of disputes. The objective of this circular to present case study examples of these types of incidents, how disputes can arise, and provide some guidance as to how shipowners and charterers can protect their interests.

Case 1: Fresh water contamination

Upon arrival in port, ship A had a remaining 24.8 MTs of bunker fuel in the settling tank and requested that an additional 150 MTs of intermediate fuel oil (IFO) be stemmed. The bunkers were loaded into an empty bunker tank. Since there were little remaining bunkers onboard prior to loading the new bunkers, the Master and Chief Engineer agreed that the new bunkers should be used. When the separators were started, it was noticed that large quantities of sludge and water were clogging sludge discharge passage. A separate sludge line was then fitted to collect the sludge in drums so as not to overload the vessels sludge tank.

It was determined that approximately 15% of the separators throughput was sludge. It was believed that the IFO did not have the proper time to settle due to the short time period between the stemming and purifying the bunkers. This created the large quantities of emulsified sludge. The bunker-testing agency stated that the amount of water in the IFO was likely to be difficult to remove.

A dispute arose between the owners and the providers of the bunkers. It is common practice that the fuel supplier attends the bunker sampling procedure. In this case, the request to witness the sampling had been signed by the supplier prior to commencement of the bunkering. The validity of the samples drawn by the ship was questioned since neither the fuel supplier nor other unbiased personnel observed the sampling procedure and handling. The supplier contested that the contamination of the bunkers occurred after being loaded onboard the vessel.

The vessel secured a continuous drip sample using the flange sampler fitted at the ships bunker manifold. The bunker supplier took the bunker samples at the point where the bunker hose was connected to the shore bunker installation. The supplier refused to make arrangements to arrange for the discharge of the inferior bunkers contending that it was the vessel's fault for the contaminated bunker. They contended that other vessels had bunkered soon before and after ship A and had no water contamination problems. The vessel was required to retain and use the bunkers and eventually discharge the remaining unsuitable fuel during a scheduled dry-docking some months later. The off spec bunkers added additional deadfreight to the vessel, thus reducing the amount of cargo that could be carried.

Case 2: Motor lube oil contamination

Ship B took on IFO and marine diesel oil (MDO) bunkers and the bunker-testing agency received the bunker samples 5 days after the operation. The bunkers were placed into 7 different tanks. The sampling procedure was in accordance with the vessel's bunkering procedure. Two days later the bunker-testing agency informed the vessel of the results of the sample analysis. The specifications stated in the charterparty required that the bunkers be in accordance with ISO 8217.

It was determined that both the IFO and MDO bunkers contained non-hydrocarbon additives typical for motor vehicles lubricants. These additives may negatively influence ship's machinery (see the Gard Loss Prevention Circular 03-01, Bunker Quality). Their use may lead to increased wear rates of machinery by inhibiting the separators that remove abrasive particles and water from the bunker fuel and contribute to fouling in the exhaust spaces, turbocharger blades and nozzle rings. In addition, it was explicitly stated in the charterparty agreement that no spent lubricants were to be found in bunker fuel used onboard the ship.

The vessel informed the owner and charterer of the results of the analysis. The owner then requested that immediate action be taken to discharge the off spec bunkers. On the same day that the sample evaluation was received, it was arranged for additional samples to be taken by a survey agency appointed by the charterer. The surveyor took various samples of the IFO and MDO. Analyses of the three samples showed that for one sample, blending with another fuel had occurred and hence less spent lubricants in the mixture. The MDO was needed to run the auxiliary engines and the donkey boiler. Results from the two other samples showed no drop in the elements that indicated the presence of the automotive lubricants. However, it was the view of the charterer's surveyor that the bunkers were not as bad as the owner had suggested.

The charterer then arranged that the original shipboard sample be sent to a second bunker-testing agency for analysis. The results of that test showed that the IFO and MDO conformed to the requirements of ISO 8217 as required by the chartering agreement, but contained spent automotive lubricants.

The charterer contended that none of the surveyors or the bunker-testing agency ever requested for the bunker to be removed. In addition, some of the presumed off spec bunkers had already been mixed with other bunkers onboard by that time. However, the

owner the MDO that was used resulted in the black out of the auxiliary engines.

In addition, the filters needed cleaning twice a day whereas this procedure normally done only once a week.

Eventually, it was decided that the ship would use the IFO after ensuring that all procedures were implemented to optimise the fuel treatment onboard. However, the auxiliary machinery was sensitive to traces of catfines (e.g. aluminium and silicon) that were found in the fuel. The charterer made all arrangements to discharge the off spec MDO and replace it with MDO without any traces of spent lubricants and catalytic fines.

Recommendations

Similar cases as those described above are common in our industry, and we suggest that the following recommendations be considered by both the owners and charterers to protect their interests:

1. Both owners and charterers should ensure that standard agreements are in place with regard to ensuring that the quality of bunker fuel meets recognised quality standards. That is, make use of responsible fuel testing services such as DNV Petroleum Services (DNVPS) or Lloyds Register (FOBAS). Ensure that proper wording in the charterparty form is included to ensure that bunkers are ordered against the appropriate fuel specifications.

2. Procedures are in place and implemented onboard the ship to test the bunkers for density, viscosity and water, using a simple test kit. A suitable sampler should be used drawing a continuos drip sample at the vessels fuel manifold during the entire bunkering operation.

3. The Master should ensure that all relevant parties including the fuel supplier's representative witness the sampling procedures. If the supplier refuses to witness the sampling procedure, preparation, signing and sealing, the Master should document their refusal in order to protect the interests of both the owner and the charterer.

4. All efforts should be made by the ship's crew to segregate new and old bunkers. If for some reason new and previous fuels have to be mixed, avoid equal proportions. This includes ensuring that records of all fuel transfers are properly documented in the vessel's logbook. If problems are experienced, secure samples from the tanks involved and describe the problems.

5. The vessel should notify the owner immediately if they are experiencing problems with an off spec fuel. This enabling the operator to register a complaint against the supplier. The vessel must also receive clear instructions from the operator as to the handling of the product in question, including that of de-bunkering.

For further information on bunker quality, testing and other relevant information, you can visit such websites as www.bunkersworld.com, www.dnvps.com, and/or www.lrfobas.com and www.fueltech.no.

Gard would like to thank and acknowledge Mr. Kjell Haugland for is assistance in preparing this circular.

Stone cold bonkers – FD&D bunker disputes

Gard News 165,
February/April 2002

The phrase "stone cold bonkers" (stone in coal bunkers), which was used to describe a chief engineer's demeanour on discovering large lumps of flint amongst what was supposed to be best Welsh anthracite, suggests that the problems concerning bunkers, if not just fuel oil, coincide with the introduction of mechanical propulsion on vessels.

Whilst the problems associated with poor quality bunkers have given rise to a number of serious disputes between the respective parties involved in bunker operations (owners, charterers, physical suppliers and brokers), it has been noted by a London solicitor that the potential for a major casualty is enormous where such casualty arises out of the provision of substandard bunker fuel.

The question of bunkers has provided a considerable number of disputes for members and clients over the years. The following disputes appear most frequently:
– Disputes in respect of bunker quality.
– Disputes in respect of bunker quantity (quantity actually stemmed and quantities upon re-delivery).
– Disputes in respect of damage done to bunkers whilst aboard the vessel.

Bunker Quality

The solicitor referred to above also mentioned that he could not recall the last time he had seen a decent bunker clause in a charterparty and, by and large, that comment holds true. In Nippon Yusen Kaisha v. Alltrans Group of Canada Limited,[1] the court was asked to consider whether Clause 2 of the NYPE form (1946 edition) imposed a strict liability on the charterers with respect to the quality and fitness of the fuel supplied to the vessel, or, in the alternative, the charterers were merely under a duty to use due diligence in ensuring that there were proper bunkers. The court held that the duty on the charterers was an absolute one.

In a subsequent London arbitration[2] a tribunal was asked, again, to deal with this issue (namely Clause 2 of the NYPE form), albeit that the charterers also referred to a clause dealing with a vessel's description where the fuel was described as "IF 180 CST". The vessel, after taking fuel on board, sustained problems with the fuel injection equipment, which led to damage to both cylinder liners and piston crowns, which necessitated a deviation for repairs. The charterers argued that their obligation was confined to supplying fuel with a designation "IF 180 CST", given that that was the sole criteria contained within the charterparty. The owners, on the other hand, referred to the passage in Wilford on Time Charters[3] at page 138, namely:
"The bunkers supplied by the charterers must be of reasonable general quality, suitable for the type of engines fitted to the particular ship."

The tribunal found in favour of the owners. It is perhaps of note that the tribunal seemed to have placed considerable reliance upon the fact that it was the charterers who had control of the bunker supply operation, in that they contracted with the supplier, controlled where the vessels bunkered, at what price were the bunkers and how much was to be bunkered.

Finally, the authors of Bunkers[4] opine as follows on page 109:
"(…) there appears to be a growing consensus that, even without a bunker quality clause/fuel specification in the charterparty, charterers are under an absolute obligation to provide bunkers which are reasonably fit for the vessel's engines. If the engines are non-standard in any respect, thereby requiring non-standard bunkers, then it is of course for the owners to so advise charterers whose obligation, otherwise, is simply to provide bunkers which would be reasonably fit for the standard engine of the type in question."

The point being made reinforces the comment referred to at the beginning of this section: a properly drafted clause, applicable to the vessel in question, may assist in avoiding problems or, at least, if problems do occur, in identifying which party bears the risk involved. Of course, if there is an express stipulation with regard to the bunkers then that must be complied with.

Quantity of bunkers

Disputes in respect of the quantity of bunkers delivered

It will come as no surprise to anyone to hear the complaint from a vessel owner alleging that he has been charged for bunkers in excess of what he, purportedly, received. Whilst tanks that are large and of a regular shape pose few difficulties insofar as ascertaining quantities, tanks which are of an irregular shape pose much greater problems. Any dispute will largely depend upon the evidence available (this comment applies equally for disputes in respect of quality). If operational circumstances permit, the bunkers can be loaded into previously empty tanks, then it will be easier, from an evidential standpoint, to convince a judge/tribunal that the position is correct. Further, well kept records and contemporary documents are of paramount importance. Lastly, as disputes of this nature arise between the owner/charterer and the bunker supplier, it should be noted that the contracting party with the bunker supplier may have to act with considerable speed, as it is a feature of many bunker supply contracts that should claims not be presented, or proceedings commenced, within a reasonably short period of time, then the purchaser waives all its rights against the bunker supplier; this is, by and large, to be contrasted with the position between owner and charterer.

Disputes in respect of bunkers upon re-delivery

There are usually two types of dispute in respect of bunkers upon re-delivery, but there is one common denominator: the volatility of bunker prices. The

1 1984, unreported.
2 Lloyd's Maritime Law Newsletter 1/88.
3 Time Charters by Wilford, Coghlin & Kimball, 2nd Ed, 1982.
4 Bunkers by Fisher & Lux, 2nd Ed, 1994.

first scenario concerns the case where the vessel is to be re-delivered with "about" the same quantities of bunkers as on delivery and, additionally, where the bunker price has been stipulated in the charterparty. Obviously, it is difficult to determine when, precisely, a vessel will be re-delivered and, accordingly, common sense dictates that some allowance must be made. The question is, therefore, how much of an allowance. The answer will be a matter of fact and will depend upon factors such as the daily consumption expected, the quantities stipulated in the charterparty and the characteristics of a particular vessel. An accurate determination of the quantity of fuel used, together with historical records (daily tank soundings, daily flow meter readings, records of bunker receipts and records in respect of sludge and settled water spring to mind), will assist in resolving any dispute that arises.

The second scenario is where the charterparty is silent on the question of re-delivery bunkers but the price of those bunkers is pre-determined. The charterers stem bunkers to take advantage of this contractually agreed price by bunkering the vessel to full capacity just prior to re-delivery. The courts, both at first instance and in the Court of Appeal,[5] held that the charterers had no power to order fuel that was "in no way required for charterparty purposes".

Damage to the bunkers whilst on board the vessel

It is generally accepted that under all time charterparties the charterers become the owners of the fuel on board the vessel at the time of delivery, with the owners taking over the property in the bunkers upon re-delivery. Accordingly, whilst the vessel is on charter the owners are bailees of the bunkers on board and they are, accordingly, under an obligation to care for the bunkers. In one incident cargo gained access to the bunker tanks due to a failure of a sounding pipe that ran through the cargo hold. The ensuing contamination of the bunkers in the adjacent double bottom tank caused considerable damage to the vessel's main engines and, further, the owners were obliged to compensate the charterers for the bunkers on board which had become unusable by reason of the contamination.[6]

Evidence

With the exception of some disputes in respect of quality, where considerable technical expertise may be required, the majority of these disputes do not involve "rocket science"; the disputes are, however, to quote our London solicitor, "very expensive claims to run". From a legal standpoint, a good case without good evidence simply becomes a bad case. Good on board practice is only good on board practice if there are records to place before the appropriate tribunal. The provenance of the samples of the fuel alleged to have caused the problems must be clear. Further, of course, the link between the fuel in question and the damage has also to be proven. Usually the latter is easier to establish than the former.

A good example on the question of evidence can be gleaned from the following arbitration.[7] There was an allegation that the bunkers supplied to the vessel were contaminated. The owners relied upon analysis of samples they had taken from the ship's manifold. The arbitrators held that the vessel's samples had been taken in the normal and correct manner by means of continuous drip mechanism. Conversely, no samples had been taken on the barge itself. The award then goes on to state as follows:
"Had they [the samples] been taken, properly witnessed and acknowledged, analysis of them would have been of considerable weight. As it was, some 'samples' were handed to the Chief Engineer, who had been persuaded to sign for them but there was no evidence (our emphasis) as to where, how and when those 'samples' were taken."

The tribunal found in the owners' favour, and whilst it may well be that others will not follow it, that tribunal's methodology is reasonably clear, in that the absence of evidence placed the charterers at a considerable disadvantage, notwithstanding a significant number of arguments put forward by them.

5 THE CAPTAIN DIAMANTIS (1997)1 Lloyd's Rep. 362 and (1978)1 Lloyd's Rep. 346.
6 Liability for said damage falls under the P&I cover – see Rule 39 of Assuranceforeningen Gard's 2001 Statutes and Rules.
7 London Arbitration 8/98.

Air pollution - EU Parliament adopts marine fuel directive in second reading

Gard News 179, August/October 2005

A new EU directive sets limits on sulphur content in marine fuels

In November 2002 the EU Commission presented a proposal to reduce the sulphur content in marine fuels, in the form of a draft directive. On 13th April 2005 the European Parliament adopted compromise amendments (2005/C63E/03), which had been agreed upon with the European Council. The resulting directive will enter into force after its publication in the EU Official Journal, once jurist linguists have finalised the text in all EU languages. The directive aims to reduce ships' sulphur dioxide (SO2) and particles emissions from ships by 500,000 tonnes a year from 2006.

Marine fuel today has an average of 2.7 per cent sulphur content. The new sulphur limits in the directive are:
– 1.5 per cent for fuels used by all ships in the Baltic Sea from 19th May 2006 and the North Sea and English Channel from the autumn of 2007 (as in MARPOL Annex VI).
– 1.5 per cent sulphur limit for fuels used by passenger vessels on regular services between EU ports from 19th May 2006.
– 0.1 per cent sulphur limit for fuels used by inland vessels and by sea-going ships at berth in EU ports from 1st January 2010.

All sulphur dioxide and particle emission control measures for marine fuel will be reviewed in 2008 with a view to introducing second-phase limits of 0.5 per cent sulphur content (or less) for all shipping in EU waters, as well as to consider additional IMO Sulphur Emission Control Areas in EU waters.

EU member states will be required to put in motion appropriate measures to ensure that fuel suppliers deliver compliant fuel in sufficient quantities, as well as taking action against non-compliant suppliers.

The EU Commission has been criticised for spending large resources on developing the directive instead of putting pressure on the member states to ratify MARPOL Annex VI, which was adopted in 1997. Only eight EU member states have ratified MARPOL Annex VI to date.[1] Annex VI came into force on 19th May 2005.[2]

The Commission will present more proposals on air pollution in its Clean Air for Europe programme (CAFE) later this year.

Further information can be found at www.europa.eu.int/comm/environment/air/transport.htm.

1 Cyprus, Denmark, Finland, Germany, Greece, Spain, Sweden and the UK.
2 See the article "Annex VI of Marpol 73/78 – Regulations for the Prevention of Air Pollution from Ships" in Gard News issue No. 176.

P&I incident – How not to do it – Bunker operations

Gard News 154, June/August 1999

A Member's vessel – a bulk carrier – recently had a spill of bunker oil in a dock area and clean up costs alone amounted to around USD 130,000. The vessel was conducting an internal transfer of heavy fuel oil from a deep tank to a settling tank and as a result the bunker line became pressurised. Whilst ordinarily this might not have been a problem, the deck manifold for the bunker line had not been closed. Consequently fuel escaped onto the starboard side of the deck and via the scuppers into the dock.

It was estimated that a quantity of 5 to 10 MT of oil found its way overboard and the slick spread, contaminating the walls of four berths. A number of barges and other vessels in the vicinity of these berths were also contaminated. The vessel's discharge operations were temporarily suspended.

Clean up was made difficult and protracted because heavy fuel oil is persistent in nature, meaning that it naturally dissipates slowly.

Claims from stevedores and barge owners for idle time, as a result of the spill and clean up, are currently being reviewed. The Master is also to be fined.

The above incident demonstrates how simple deficiencies and a small amount of oil spilled can have significant consequences. Before any bunkering operation, including the internal transfer of oil, procedures must be followed to ensure that any potential deficiencies are rectified before it is too late. On this occasion the importance of blanking off manifold connections not in use and plugging the scuppers became regrettably obvious.

New BIMCO bunker fuel sulphur content clause

Gard News 179, August/October 2005

BIMCO has updated its bunker fuel sulphur content clause.

The article "Annex VI of Marpol 73/78 – Regulations for the Prevention of Air Pollution from Ships", which appeared in Gard News issue No. 176, made reference to the BIMCO Fuel Sulphur Content Clause for Time Charter Parties. Readers will be interested to learn that BIMCO has now updated the clause in response to the entry into force on 19th May 2005 of Marpol Annex VI. The amended clause seeks 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 reads as follows:

"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."

For more information about the new clause readers should refer to www.bimco.org.

SECA – North Sea and English Channel

Loss Prevention Circular No. 05-07

This circular is issued to remind all operators of the general requirements for the North Sea and English Channel SECA . More details on the subject, including charterparty and bunker sales contracts can be found in Gard News 187, August/October, which will be published in August 2007.

The North Sea SOx Emission Control Area (SECA) entered into force on 21st November 2006, and will be fully implemented 12 months later, on 22nd November 2007. Annex VI of Marpol 73/78 limits the content of sulphur oxide (SOx) and nitrogen oxide (NOx) emissions from ship exhausts and prohibits the deliberate emissions of ozone-depleting substances.

Any vessel entering a SECA must switch to a low sulphur fuel oil (LSFO) before entering the area. The regulations require ships to allow sufficient time for the fuel oil systems to be fully flushed of all fuels exceeding 1.5% sulphur prior to entry.

The European Union Directive 2005/33/EC dealing with the sulphur content of marine fuels will come into force and will apply to the North Sea SECA prior to the full implementation of Annex VI. The EU fuel sulphur regulations will enter into force in the North Sea Area and English Channel SECA on 11 August 2007 and requires ships to burn fuel oil with less than 1.5% sulphur by mass. This limit will also apply to passenger vessels operating on a regular service to or from any EU port. The sulphur limit will be enforced for vessels of all flags from this date by port state control of all EU state ports.

Marpol Annex VI also requires ships of 400 gt or more, engaged in voyages to or from countries who have ratified the Convention or, ships flying the flag of the same countries, are required to have onboard an International Air Pollution Prevention certificate issued by the flag state. To enable flag and port states to monitor compliance with the regulations, Marpol Annex VI requires a bunker delivery note to be obtained and retained on board stating the sulphur content of the bunkers, as well as a sample of the oil.

There are several challenges involved in complying with the regulations contained in Marpol Annex VI. One of the key issues for operators to address is the need for proper changeover procedures and the importance of following these. Even with the required fuel on board, a mistimed or improperly executed changeover will result in violation of the SECA rules.

In the event the fuel onboard does not meet the Marpol requirements, port state or flag state authorities may require a deviation, de-bunkering and replacement of fuel, causing delay and additional costs.

Marpol violations may also result in fines against the vessel. The enforcement has reportedly been light so far, but there is reason to believe that enforcement of Annex VI will follow that of Annex I and severe penalties will be imposed if the industry is slow to comply with the new rules.

The Gard Group

Gard AS
Kittelsbuktveien 31
NO-4836 Arendal
P.O. Box 789 Stoa
NO-4809 Arendal
Norway

Tel: +47 37 01 91 00
Fax: +47 37 02 48 10

Gard AS
Skipsbyggerhallen
Solheimsgaten 11
NO-5058 Bergen
Norway

Tel: +47 37 01 91 00
Fax: +47 55 17 40 01

Gard AS
Støperigt 2,
Aker Brygge
NO-0250 Oslo
Norway

Tel: +47 37 01 91 00
Fax: +47 24 13 22 33 (Energy)
Fax: +47 24 13 22 77 (Marine)

Gard (UK) Limited
85 Gracechurch Street
London EC3V 0AA
United Kingdom

Tel: +44 (0)20 7444 7200
Fax: +44 (0)20 7623 8657

Gard (Japan) K.K.
Kawade Building, 5F
1-5-8 Nishi-Shinbashi
Minato-ku
Tokyo 105-0003
Japan

Tel: +81 (0)3 3503 9291
Fax: +81 (0)3 3503 9655

Gard (Sweden) AB
Västra Hamngatan 5
SE-41117 Gothenburg
Sweden

Tel: +46 (0)31 743 7130
Fax: +46 (0)31 743 7150

Gard (HK) Ltd
Room 3505, 35F
The Centrium,
60 Wyndham Street
Central
Hong Kong

Tel: +852 2901 8688
Fax: +852 2869 1645

Oy Gard (Baltic) Ab
Bulevardi 46
FIN-00120 Helsinki
Finland

Tel: +358 9 6188 380
Fax: +358 9 6121 000

Gard (North America) Inc.
30 Broad Street
New York, NY 10004-2944
USA

Tel: +1 (0)212 425 5100
Fax: +1 (0)212 425 8147

Gard (Greece) Ltd.
2, A. Papanastasiou Avenue
185 34 Kastella, Piraeus
Greece

Tel: + 30 210 413 8750
Fax: + 30 210 413 8751

Lingard Limited
17A Brunswick Street
Hamilton HM NX
Bermuda

Tel: +1 441 292 6766
Fax: +1 441 292 7120
Web: www.lingard.bm
Email: companymail@lingard.bm

www.gard.no