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2020 Vision

PREPARING FOR THE BIG SWITCH

Option 2: Compliant VLSFO Products

UPDATED JULY 2019

2020 Vision

Option 2: Compliant VLSFO Products

The reduction of the MARPOL Annex VI global fuel sulphur cap to 0.50% will come into force on 1 January 2020.

There will be no transition phase or grace period after this date. Shipowners and charterers need to act now and make the transition to compliance before 1 January 2020 and remove any non-compliant fuel before 1 March 2020.

There are several options on how to comply, the most common being distillates (MGO/MDO), blended very-low-sulphur fuel oils (VLSFO) or installing exhaust gas cleaning systems (scrubbers).

Whichever method of compliance is chosen, the switchover and future operation has to be carefully planned and managed. The risks that threaten safety or impact compliance must be identified and controlled.

This guide looks at the first option: compliant VLSFO products. It is designed to assist you with the transition process and ensure safe and compliant continued operation.

The 74th session of the IMO's Marine Environment Protection Committee (MEPC 74) took place on 13–17 May 2019 at the IMO headquarters in London. This updated guide looks at some of the key outcomes of MEPC 74 and how it may impact your transition to compliance before 1 January 2020.

Plan the Switch

Whatever the method of compliance, it constitutes a major change in vessel operation. Each method of compliance also presents unique risks – and these risks need to be managed.

The Technical, Chartering and Operations departments of the shipping company should meet together as early as possible to discuss planning and what is achievable.

It is important to avoid a scenario where the technical department makes transition arrangements that conflict with agreements already made by the chartering department.

When to Switch to Compliant fuel?

Agree as early as possible a date for the switchover to compliant fuel.

This needs to be discussed internally and, in the case of vessels on charter where the charterer provides the bunkers, externally.

It's likely that most shipowners will want to change over onto compliant fuel well before the 1 January 2020. They will want to make sure all the tanks are clean, systems are flushed and there is little risk of contaminating subsequently bunkered fuel by residues remaining in the system.

But what about vessels on time charter? A charterer may want to keep providing cheaper high sulphur residual fuel as close to the deadline as possible. Or what about a time charter that finishes end of December 2019? Can the owner achieve compliance in such a short time after that charter?

These issues must be discussed at an early stage and planned accordingly.

Ship Implementation Plan

IMO is helping shipowners develop a 'Ship Implementation Plan'. MEPC.1/Circ.878 *"Guidance on the development of a ship implementation plan for the consistent implementation of the 0.50% sulphur limit under MARPOL Annex VI"* outlines how a ship may prepare in order to comply.

This provides a template for a vessel-specific implementation plan and focuses on vessels that intend to use compliant fuel rather than those operating with scrubbers. The plan can, however, prove useful for vessels using open-loop scrubbers that intend to use compliant fuel as a contingency or where wash-water discharge is prohibited.

The ship implementation plan guidance covers:

1. Risk assessment and mitigation plan (impact of new fuels)
2. Fuel oil system modifications and tank cleaning (if needed)
3. Fuel oil capacity and segregation capability
4. Procurement of compliant fuel
5. Fuel oil changeover plan (conventional residual fuel oils to 0.50% sulphur compliant fuel oil)
6. Documentation and reporting

Although a ship implementation plan is not mandatory, it could assist in satisfying port State control when verifying compliance, or if it is necessary to submit a FONAR (fuel oil non-availability report).

It is not the intention of this document to replicate the advice provided by IMO. As such, the guidelines, complete with template plan, can be downloaded at **www.nepia.com/insights/2020-vision/articles-resources**

Plan the Switch (cont.)

New Fuel Risks – VLSFO

It is expected that most shipowners will initially turn to compliant distillates, such as marine gas oil (MGO) or marine diesel oil (MDO). It is equally likely that the popularity of hybrid/blended VLSFO products will increase as more products enter the market.

At time of writing, little information has been publicaly released about these new VLSFO products. There is likely to be a lot of different fuels with different properties marketed under the umbrella term of VLSFO.

These might be blends of distillates and residuals or they might come from less traditional streams from the refinery process or using new refining techniques. Or they could even be heavier products sourced direct from sweet crudes. Some new fuels might consist largely of vacuum gas oil, shale oil or cycle oils.

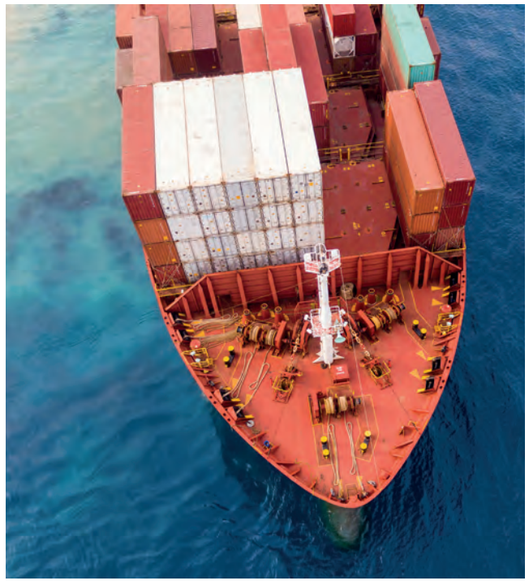
Publicly available schedule (PAS)

An ISO working group is developing a Publicly Available Specification (PAS) 23263 to help deal with new VLSFO products.

The PAS is designed to be used in conjunction with ISO8217:2017 but can also be used with earlier editions.

It does not include any new fuel specifications or an updated table. It will, however, provide general considerations on the expected characteristics of the known new fuel products as well as providing guidance on stability and compatibility.

This should be available in Aug or Sept 2019. Unfortunately, a full new edition of ISO 8217 is not scheduled until 2021 or 2022.



Stability and Compatibility

VLSFO composition is anticipated to vary significantly between regions – European volumes are anticipated to contain significant volumes of low sulphur atmospheric residues, whereas Asian volumes will contain significant portions of cracked and straight run vacuum residues, with North American volumes comprising of more fluid catalytic cracking (FCC) products, such as slurries and cycle oils.

These differences raise a serious concern of incompatibility; and not just incompatibility between different products but even between batches of the same product.

Individually, VLSFO products may pass the stability criteria of the ISO 8217 but become unstable when mixed together – therefore incompatible.

Incompatibility results in sludge formation caused by precipitation of asphaltenes. This leads to blocking of filters, centrifugal separators and, in extreme cases, fuel pipes. The risk of losing propulsion or electrical power becomes very high.

The most effective means to avoid compatibility issues is to prevent any mixing of bunker stems. If co-mingling is necessary, limit it to a 90/10 ratio.

The addition of stabilising chemicals could be beneficial in treating unstable or incompatible fuels if caught at an early stage. But take care in choosing additives as they must be matched to the fuel. A poorly-matched additive could worsen the situation.

Testing for stability and compatibility

Perhaps the most reliable test for compatibility will be carried out by shore-based independent laboratories. As most operators and crew are all too aware when using shore laboratory services, it could be several days before results are known. This places the crew in a difficult position if there is a limited amount of 'safe' fuel on board and the vessel is operating in areas with a poor bunkering infrastructure.

Ship's engineers have long used onboard compatibility test kits where a mixed sample is dried on blotting paper – the 'spot-test'. However, some fuel experts are concerned that this test may not be suitable for use with VLSFO products. In the absence of a better alternative, this should continue but with caution.

Some industry experts have also raised concerns that the current laboratory tests for stability and compatibility may not be suitable for new VLSFO products. The deposition of sludge is a slow process and short timespan tests in laboratories rely on artificially severe conditions.

At MEPC 74, ISO stated that the laboratory test for fuel stability will remain as the Total Sediment Potential (or TSP) test. Compatibility testing on known new fuels by ISO suggests that fuels with a TSP of less than 0.10% by mass have less risk of compatibility issues. The risk increases with fuels with TSP of more than 0.10% at certain mixing ratios.

An additional laboratory test that can be useful in predicting future stability and possibly compatibility problems is 'optical scanning' (Turbiscan ASTM D7061-12). This laboratory test is supplemental to the usual suite of ISO 8217 tests and provides a Reserve Stability Number (RSN), which fuel experts maintain is a better indication of stability than the regular 'total sediment' tests.

Organisations such as ISO, CIMAC and Concawe are currently working together to develop a tool to determine compatibility criteria.

> Until the new bunker market has matured and experience is gained on handling and using the new VLSFO products, shipowners may wish to exercise heightened levels of diligence when purchasing.

To date, only Exxon has publicly given assurance that their batches will be compatible with each other, despite not being tried and tested in the market. Furthermore, this does not mean they will be compatible with every other fuel.

Cold flow properties

Attention to the cold-flow properties of VLSFO products with a high distillate content will be needed, These products, which are more paraffinic in nature, could be prone to wax formation at lower temperatures. It may take the industry time to understand the wax-formation characteristics of these new fuels.

Lubricity

Lubricity problems have traditionally been associated with distillate fuels such as MGO (DMA). However, VLSFO products that contain desulphurised components may also be prone to lubricity problems. This is because of the aggressive nature of the desulphurisation process.

Lubricity-related issues (e.g. sticking of fuel pump plungers) may arise if sulphur content is <0.05%, therefore additives may need to be added to the fuel.

Cat fines

The risk of a fuel containing damaging levels of catalytic (cat) fines is dependent on its composition. Bunkers containing heavy cycle oils (slurry oils) are at most risk of containing elevated levels of cat fines.

Refinery experts have predicted that VLSFO products originating from North America may comprise cycle or slurry oils.

Furthermore, the risk of cat fines is predicted to increase when more products derived by secondary blending enter the market.

Plan the Switch (cont.)

Life Span

Traditionally, only distillate fuels such as MGO were considered to have limited life span. The shelf life of HFO has never been a real issue.

But limited life spans may become an issue with VLSFO products. This is because the components in some VLSFO products will be short-chained cracked residuals, which are highly reactive. For example, a component which may end up in some VLSFOs – Ethylene Cracker Residue – has a shelf life of days. Of course, this does not mean that the whole fuel parcel will have a shelf life of days, but it is something to take into consideration when ordering and managing fuel.

Buying Bunkers

Due to the concerns on compatibility between these products, and the expected variations in their characteristics, fuel purchasing will require much more care.

Be aware that a purchased VLSFO product may be very different to previously stemmed products.

Until the new bunker market has matured and experience is gained on handling and using the new VLSFO products, shipowners may wish to exercise heightened levels of diligence when purchasing.

Be clear on what you want and be satisfied that the supplier can be relied upon to provide safe and on-spec fuel, and try to ensure that requirements are specified in relevant contractual documents.

Extra care should be taken if purchasing a VLSFO product that is not a recognised product or is not a supplier's proprietary blend. VLSFOs produced by secondary blenders may have very different characteristics as well as increasing the risk of high cat fine content.

Fuel System Modifications

Depending on the chosen method of compliance, there may be a need to modify the vessel's fuel storage arrangements, fuel transfer system or fuel supply/pushing system.

The scope and complexities of any modifications can vary; therefore proper planning and project management is vital.

It is also imperative that any modifications to these systems are carried out in full consultation with the vessel's Class and flag State.

Some points to consider:

- If switching to compliant low-viscosity fuels – where there is a risk that the viscosity could drop below that recommended by the engine manufacturer – does the fuel service system need to have a cooler installed?
- How long will the vessel spend operating within emission control areas (ECA) where 0.10%S limit applies? This will help determine storage requirements for each type of fuel and in turn require the change in use of some tanks.
- Does the fuel system require additional segregation to minimise the risk of contamination of 0.10%S bunkers by 0.50%S bunkers?
- Does the fuel system require additional segregation or additional storage to prevent co-mingling of bunkers and therefore reduce the risk of incompatibility?
- Does the fuel transfer system allow for the easy de-bunkering and removal of fuel if found or rendered non-compliant?
- Are there suitable and safe fuel sampling points that allow for a representative sample to be taken from various sections of the fuel supply system (e.g. engine inlet, centrifugal separator inlet and outlet)?

If the system is not properly cleaned, it could contaminate several hundreds of tons of subsequently bunkered fuel.

Plan the Switch (cont.)

Tank and System Cleaning

If choosing new VLSFO products as the method of compliance and the vessel currently burns residual fuels, it is likely that tank and system cleaning will be required.

This is not a simple or quick task. It needs planning. How long will cleaning take and how will it be done?

In many cases, it is unlikely that simply bunkering MGO into a tank that previously held heavy fuel oil, and then flushing through, will achieve compliance. Rather, it is more likely that manual cleaning within each tank will be required or there may be cases where specialist chemical additives could be used.

It is important to do it right. If the system is not properly cleaned, it could contaminate several hundreds of tons of subsequently bunkered fuel.

There also may be a need to clean tanks again after 1 January 2020. If compliant fuel is unavailable in certain geographical areas, a vessel may be left with no choice but to bunker non-compliant heavier fuels. Therefore, these tanks will need to be in a suitable clean condition before returning to low-sulphur service.

Safety considerations will be even more important. Tank cleaning is likely to involve multiple tank entries and we are all fully aware that too many people die in enclosed or confined spaces. Such operations must be subject to a risk assessment and strict adherence to a permit-to-work system.

Record keeping requirements are not specifically addressed within the IMO guidance on Ship Implementation Plans. Planned maintenance records should of course be updated, but official documentation such as the Oil Record Book must be kept up to date. The vessel must be able to account for the removal of any tank residues resulting from manual tank cleaning.

Will it be the shipowner or the charterer that is obliged to arrange for and/or pay for the removal of non-compliant fuel and the cleaning of the tanks prior to bunkering compliant fuel? This will depend on the wording of the charterparty. Therefore, if such tank and system cleaning will be undertaken during a charter then it will be important to consider this at the drafting stage.

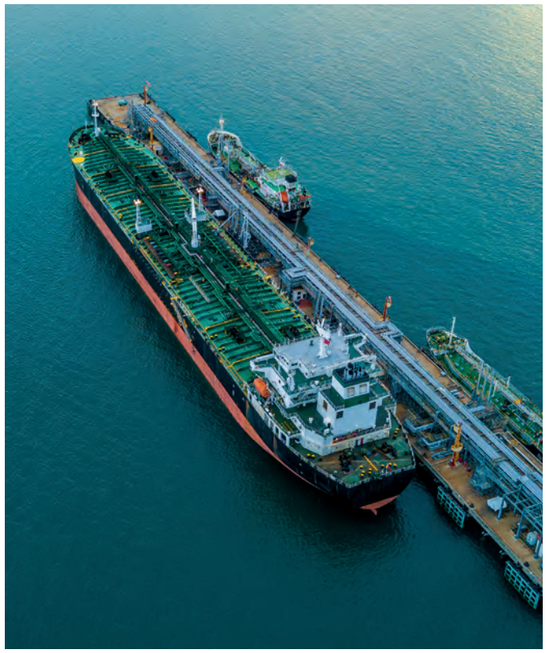
Some key points to consider when cleaning the fuel tanks and system follow:

Manual Cleaning during drydock

In an ideal world, the need for tank cleaning would coincide with the vessel's special survey/ docking cycle. However, in reality this is unlikely and the majority of vessels will not be able to align their tank cleaning with this.

But if circumstances allow for system cleaning and flushing in drydock then the process will be less disruptive than when undertaken in service.

- Resources are plentiful during drydock but there is of course a cost attached to this. Larger cleaning squads can be used. This reduces the overall time to clean tanks and allows for several tanks to be cleaned concurrently.
- Although deadlines are set, there is less commercial pressure applied when tank cleaning in drydock compared to a vessel in service.
- Disposal of residues and sludge to shore side facilities is easier when in drydock.
- If looking to recover expenses, it is easier to present cleaning costs to charterers, if appropriate, as the yard generally provides a detailed itemisation in comparison to when crew perform these tasks when in service.



Manual Cleaning in service

It is likely that most vessels will need to clean their fuel tanks whilst in service.

- Firstly, the tank should be emptied as much as possible using the fuel oil transfer pump. This gets the most use of the fuel and minimises waste – therefore reducing cleaning time and removal costs.
- Take advantage of the crew's vessel-specific knowledge of suction bell-mouth locations and the optimal trim/ list for emptying the tanks.
- It is difficult to accurately estimate how long it will take to clean a tank. It depends on:
  - number of persons
  - size of tank
  - number of frames and longitudinals within the tank
  - current cleanliness
  - quantity of old fuel residue
  - ease of access to and from the tank
- IMO guidance suggests allowing four days per tank but in reality this could be longer. A shore riding squad that are dedicated to tank cleaning may take half this time, especially if they are working shifts.
- Consider inviting Class to carry out tank inspections during cleaning, but in any event we would suggest that an assessment of the tank condition is carried out and recorded. Check the condition of tank coatings and take advantage of the opportunity to carry out maintenance and any required repairs, e.g. heating coils.
- Flushing of fuel transfer and service system must be carried out after the tank cleaning. Failing to do so could result in contamination of subsequently bunkered compliant fuel.
- Be aware of the risk of sludge or other residue that has been dislodged finding its way into the service system. Closely monitor fuel supply and filter differential pressures after flushing.

Fuel tank and system cleaning using specialised additives

An alternative to manual tank cleaning is to dose the fuel with additives that gradually remove the sediments and asphaltenic sludge from fuel tanks and fuel system.

The two main types are 'dispersants' and 'stabilisers'.

Dispersants work to break up sludge, whereas stabilisers work to keep asphaltenes in suspension and stable within the fuel. If a neat dispersant is used, it will break up the sludge, but used without a stabiliser it will dislodge the sludge from one area within the fuel system to another.

It is important to speak to the additive manufacturer and make sure you fully understand the chemistry on offer and how it can be used in your fuel system.

An example of this cleaning additive is Innospec's Octamar BT series (there are others on the market), which contains an asphaltene dispersant stabiliser. Additive manufacturers usually recommend that a gradual clean-up is conducted over several bunkers prior to the change in tank allocation. It may be possible to reduce the time taken, depending on how long it has been since tanks were last cleaned as well the level of sludge build-up.

Additives are introduced directly in to the fuel storage tanks and as the fuel is used, it cleans the full fuel system, including settling and service tanks.

Care must be taken – the action of the dispersant can lead to increased levels of sludge and sediments in the fuel service system. During this process, the vessel's engineers should closely monitor the operation of centrifugal separators and filters for any issues or deterioration in performance.

Where the time for cleaning is for shipowners' account, then using these additives in lieu of manual tank cleaning can reduce the time the vessel is off-hire. The cost of additives is generally around US$1 per treated ton of fuel, so it may be a commercial decision when comparing with the impact of manual tank cleaning.

Fuel tank and system cleaning using new fuel as a solvent

Depending on the amount of sludge and debris accumulation within a vessel's fuel tanks and system, the solvent characteristics of a distillate fuel such as MGO or a light VLSFO can be harnessed.

Some owners have reported success with loading compliant fuel straight into empty tanks without manual cleaning, achieving compliance within a few stems.

This method of tank and system cleaning must be carried out with utmost care. If the accumulation of sludge and other matter is significant, the aggressive solvent characteristics of the distillate fuel could dislodge this at an uncontrolled rate and lead to filter blockages and operational issues.

Before considering this option, it is strongly recommended to assess the current condition of the tanks and system.

Plan the Switch (cont.)

Changeover procedures

There are notable risks when changing between different types of fuels. The nature and frequency of changeovers will depend on the choice of fuel and trading pattern.

For vessels that will turn to VLSFO products, there will be the big switch over from using high sulphur heavy fuel to the new compliant fuel. This will be followed by periodical changeovers between 0.50%S and 0.10%S fuels as the vessel operates in emission control areas.

Do it Safe, Do it Right

In any of these scenarios, changeovers must be properly planned and executed so not to put the vessel and its crew in danger and to avoid contaminating otherwise compliant fuel.

If the changeover is not carried out correctly or there are problems with the fuel at the engine manifold then there is a significant risk of losing electrical power or propulsion.

Contaminating fuel can prove costly. Not only will it potentially leave the vessel in breach of emission regulations, but it could devalue the fuel significantly. It might also result in the need to debunker and carry out further cleaning, which will result in increased costs and time. It is likely that the sulphur content of VLSFO products will be close to the 0.50% limit, therefore leaving little margin for error. A little contamination could render a lot of fuel non-compliant.

Establish and document fuel change-over procedures to cover all scenarios. Consider the following:

- How to control the rate of temperature change when changing between fuels
- Ensure fuel oil spill returns from engines and other equipment are properly routed to avoid contamination of tanks.
- Changeover procedures must be workable and practical.
- Carry out compatibility tests on the different fuels on board before use.
- If possible, carry out the changeover operations away from busy traffic areas and coastal areas.

Crew should receive training and instruction on the fuel change-over procedure and ensure that they fully understand the process and consequences of getting it wrong. Fuel changeover calculators are readily available and will assist in ensuring the right timing of the changeover. Correct use should mean that the vessel is burning compliant fuel before entering the emission control area (or before the new sulphur cap enters into force).

Ensure the time and vessel position is properly recorded and documented for each changeover. These documents come under close scrutiny from Port State Control officials if they suspect non-compliance.

Machinery

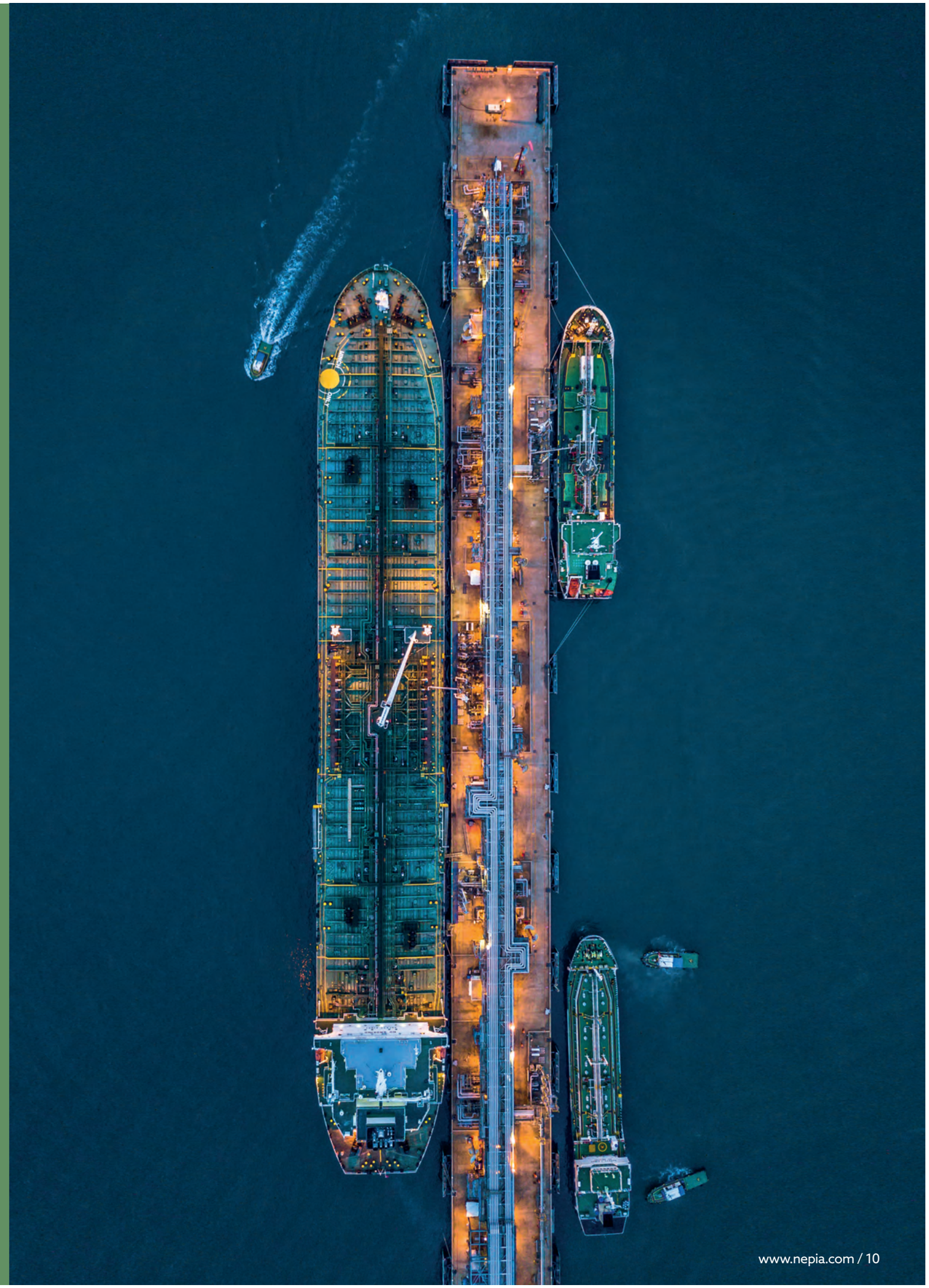
Modifications on board the vessel are not restricted to the fuel systems. When using fuel with lower sulphur content, consider the following:

- Consult the lubricating oil suppliers to ensure the correct grade cylinder oil with suitable base number (BN) is available on board prior to the changeover to lower sulphur fuel. Check also that there are no compatibility issues or cylinder oil tank cleaning requirements.
- The feed rate should be adjusted in accordance with the BN of cylinder oil and sulphur content of the fuel. Incorrect feed rate may lead to liner and piston ring wear. See: **www.nepia.com/insights/signals-online/ships/engine-room-operations/main-engine-breakdown-and-cargo-claims**
- Consult main and auxiliary engine manufacturers about the following:
  - The impact of prolonged running on distillate fuels with low sulphur content. Some manufacturers recommend cermet coated piston rings with a harder coating to prevent liner scuffing caused by bore polished liner surfaces.
  - The use of the specific type of VLSFO to ensure there are no operational concerns.
- Review the operational set-up of centrifugal separators (purifier/clarifier). There may be a need to adjust heating, feed rate and gravity disc sizes.

  Monitor centrifugal separator desludge and fuel filter blowdown frequency – these could provide an early alert of a fuel quality problem.

Consult vessel's Flag State or Class on whether the fuel tanks for the vessel's emergency generator, emergency compressor and lifeboat engines need to be replaced with compliant fuel. If so, cleaning and flushing may be required to ensure compliance.

Ensure the time and vessel position is properly recorded and documented for each changeover



Contingency Planning

There may be times when compliance cannot be achieved. Compliant fuel may not be available in a particular geographical area. It is therefore important to think about contingencies.

Fuel Oil Non-availability

A commonly asked question is what happens if compliant fuel is not available.

There are already existing provisions in MARPOL Annex VI Regulation 18 dealing with this. The shipowner must first notify the vessel's Flag State and the competent authority of the next port of call. They must then evidence reasonable efforts were made to acquire compliant fuel but without the need to deviate from the intended voyage.

FONAR

Guidance on fuel oil non-availability reporting and the format of the IMO FONAR was issued prior to MEPC 74 and was not amended further at the session.

If, despite best efforts, a vessel is unable to obtain compliant fuel, flag State should be notified as well as the competent authority of the port of destination (who in turn notifies IMO).

This requires the vessel to present a record of actions taken to attempt to bunker compliant fuel oil and provide evidence of attempts to purchase compliant fuel oil in accordance with its voyage plan. If compliant fuel was not made available where planned, the vessel should provide evidence of trying to source alternatives. If the vessel is on time-charter then charterers will need to assist with this. Whether you are an owner or a charterer, you might want to clarify in the charterparty the extent of your obligations, and those of your counterparty, in a FONAR situation.

The FONAR should be submitted as soon as it becomes clear that it will not be possible to procure and use compliant fuel oil. A copy of the FONAR should be kept on board for inspection for at least 36 months.

A FONAR does not provide a waiver or an exemption – authorities will still have the discretion to take enforcement action if they choose to do so. Also, the authorities will closely monitor any vessel or owner who regularly submits FONAR reports and may ask for additional information when reviewing a submitted report.

Notifying Non-Compliance

Prior to MEPC 74, concerns were raised by some industry bodies regarding situations where the Bunker Delivery Note (BDN) states the fuel is compliant, but subsequent independent test results of commercial samples taken by the ship during bunkering suggest it is not.

This scenario is not covered by the FONAR system. Chiefly because the vessel's crew initially rely on the BDN and assume they have been supplied with compliant fuel, but also because laboratory tests are carried out on samples taken for commercial purposes to check quality parameters and are not dedicated to verifying MARPOL compliance.

The IMO guidance now addresses the action to take in the event of a possible discrepancy. It suggests a notification is provided rather than submitting a FONAR:

"In addition, if the BDN shows compliant fuel, but the master has independent test results of the fuel oil sample taken by the ship during the bunkering which indicates non-compliance, the master may have documented that through a Notification to the ship's flag Administration with copies to the competent authority of the relevant port of destination, the Administration under whose jurisdiction the bunker deliverer is located and to the bunker deliverer."

Authorities are being encouraged by the IMO to test fuel on bunker barges and shore facilities and act against any suppliers found selling non-compliant fuel to vessels not fitted with scrubbers. But it remains to be seen to what extent, and where, action will be taken against bunker suppliers.

> The FONAR should be submitted as soon as it becomes clear that it will not be possible to procure and use compliant fuel oil.

Managing non-compliant fuel remaining on board

A vessel may find itself having to bunker non-compliant fuel in the event of a non-availability. As is prudent when drafting voyage plans, it is likely that the vessel will bunker more than the voyage requirements to provide for a safety margin.

So, what happens upon arrival at the next port (after proper submission of a FONAR of course!) and there is non-compliant fuel remaining on board?

There are clear concerns on the practicalities of de-bunkering and the subsequent cleaning of bunker tanks (particularly settling and service tanks) of non-compliant fuel before loading any new compliant fuel.

But in any event, there must be communication between the vessel, its flag State and the port State.

MEPC 74 amended the text of MEPC.1/Circ.882 (Guidance for port State control on contingency measures for addressing non-compliant fuel oil). The port State has much discretion on how they manage such situations and leaves several options open.

Any method or solution must be accepted by the port State and could include:

- Discharge non-compliant fuel oil to another ship to be carried as cargo
- Discharge non-compliant fuel oil to an appropriate shipboard or land-based reception facility,
- Operational actions, such as modifying sailing or bunkering schedules and/or retention of non-compliant fuel oil on board the ship.

Enforcement

Broadly speaking, the signatory countries to MARPOL Annex VI are free to decide how they enforce the regulation and how non-compliance will be penalised.

The desired outcome will always be for port State control to act uniformly across the globe. To address this, IMO will provide guidance documents as detailed below.

1. 2019 Guidelines for port State control under MARPOL Annex VI

Updating the 2009 guidelines, these will provide basic guidance on the conduct of port State control inspections for compliance with MARPOL Annex VI – not just Sulphur-related requirements but **all** aspects of Annex VI.

Amongst other things, the 2019 guidelines outline the scope of an initial inspection which includes checking records, Bunker Delivery Notes (BDN), using remote sensing and portable devices, as well as reviewing onboard written changeover procedures.

If there are 'clear grounds' to escalate to a 'more detailed inspection' then port State control are likely to carry out in-depth documentation checks, maintenance verification and fuel sampling/analysis, as well as assessing crew familiarity with the system and equipment.

Some other key points from the guidance to PSC:

- If non-compliance is established, the port State may prevent the ship from sailing until the ship takes suitable measures to achieve compliance, which may include de-bunkering all non-compliant fuel oil.
- All possible efforts should be made to avoid a ship being unduly detained or delayed. Sampling and analysis of fuel oils should not unduly delay the operation, movement or departure of a vessel.
- With the agreement of the destination port authority, a single voyage for bunkering of compliant fuel oil for the ship may be permitted. The single voyage should be one way and minimum for bunkering, and the ship proceeds directly to the nearest bunkering facility appropriate to the ship.
- Any non-compliance of a ship or a fuel oil supplier should be reported by authorities/flag State to the MARPOL Annex VI GISIS module.

2. Guidance for port State control on contingency measures for addressing non-compliant fuel oil

As mentioned in the 'Contingency Planning' section of this guide, the port State, the flag State and the ship should work together to agree on the most appropriate solution, taking into account the information provided in the Fuel Oil Non-Availability Report (FONAR), to address the non-compliant fuel oil situation.

Penalties

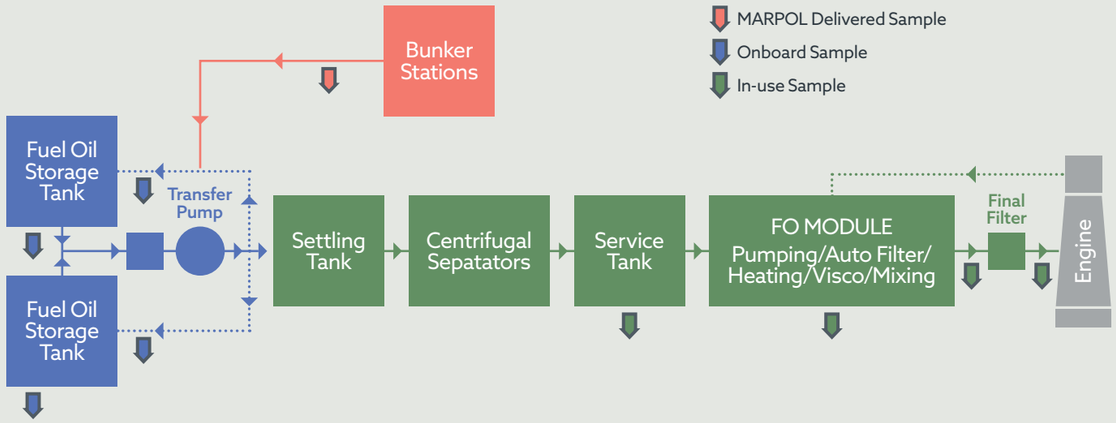
How non-compliance is dealt with will be wholly dependent on the jurisdiction. The usual methods include vessel detention (with the threat of banning orders for repeat offenders) and financial penalties.

The level of financial penalty is likely to vary significantly across the globe and may escalate with repeated violations.

Fuel Sampling

There will now be three fuel samples to consider:

1. The **MARPOL delivered sample** taken at time of bunkering (recommended to be drawn from the receiving vessel's manifold).
2. The **in-use sample** which is drawn as close as possible to the engine inlet.
3. The not in-use **onboard sample** which is representative of the contents of a vessel's storage tank.



MARPOL Annex VI Regulation 14 (Sulphur oxides (SOx) and particulate matter) will be amended to include these new sampling requirements.

The in-use fuel oil sample should be drawn in accordance with the new 2019 Guidelines for on board sampling for the verification of the sulphur content of the fuel oil used on board ships (MEPC.1/Circ.864/Rev.1).

The following points are worth noting:

- Fuel oil sampling points shall be designated for taking representative samples of the fuel oil being used.
- Ships will need to designate sampling points no later than the first IAPPC renewal survey which occurs 12 months or more after this requirement enters force (expected 2021).
- The number and location of designated sampling points should be confirmed by the administration.
- Port State control must use the designated sampling point(s) for sulphur verification purposes.
- Sampling must be performed as efficiently as possible without causing the ship to be unduly delayed.

We sometimes see instances during inspections where the in-use sample was drawn from the bottom of a filter pot or a dead leg in the system. It is questionable how representative these samples are of the fuel in use and this practice should be avoided.

Don't assume that the port State control officer always knows best and be prepared to challenge them if the sampling procedure they propose looks unsafe or would provide a sample that isn't representative of the fuel in use. Guidelines on drawing the on-board fuel oil sample have not yet been developed by the IMO. Drawing a sample from a tank that is truly representative of its contents is notoriously difficult and IMO guidance will be welcomed.

Fuel Testing

It is important to note that the testing criteria for the onboard and in-use samples are different to that of the MARPOL delivered sample. Single test reproducibility (0.59R) is considered for onboard and in-use samples.

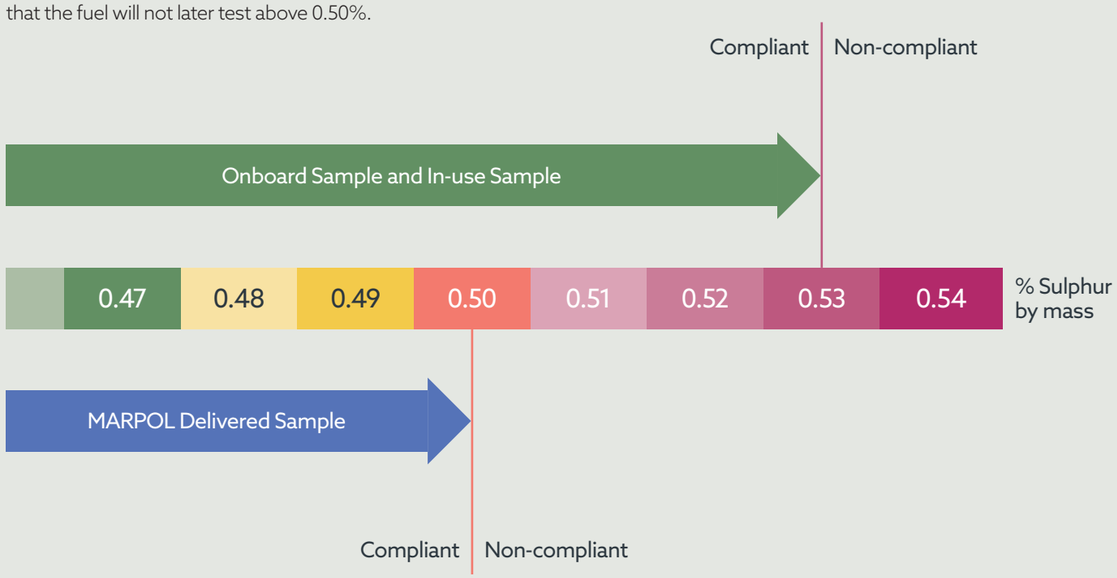
This is the same method used when verifying ISO 8217 specification and adopts a 95% confidence in the test result. In other words, it allows for a small tolerance. This means that a test result of 0.53% (or 0.11% for ULSFOs) should not be considered as being non-compliant.

Testing of the MARPOL delivered sample will not allow any tolerance. A fuel test result showing a sulphur content of 0.51% and above will be declared as non-compliant, despite such fuel satisfying ISO 8217 specification.

To address this, interested parties such as IBIA (International Bunker Industry Association) and fuel testing labs such as Intertek recommend suppliers blend to and purchasers specify bunkers to a 0.47% S limit. This gives 95% confidence that the fuel will not later test above 0.50%.

Alternatively, requiring suppliers to warrant that they will supply MARPOL Annex VI compliant fuel will assist if there are problems with the delivered sample, although any applicable time bars might limit the value of such warranties.

The fuel verification procedure for the MARPOL delivered sample (taken at time of bunkering) has been simplified. Prior to this, the supplier was required to test its sample by two accredited laboratories. Now, the requirement to test the sample by the second laboratory is only at the discretion of the State where bunkering takes place.



Learning From The Past

Previous reductions in fuel sulphur content in 2010 and 2015 saw numerous incidents relating to non-compliance. These led to outcomes such as vessel detentions and financial penalties levied by the Port State as well as commercial disputes between shipowners and charterers.

It's important that these valuable lessons aren't forgotten as we approach 2020. Typical circumstances included:

- Insufficient tank and system cleaning leading to contamination of fuel tanks and lines by residues of waste oil or sludge.
- The fuel system was incorrectly set up, resulting in fuel taken from the wrong tank.
- Fuel isolation or cross-connection valves left open or passing that allowed high sulphur fuel to contaminate low sulphur fuel.
- Change over from high sulphur to low sulphur fuel was not carried out early enough in advance of vessel arriving in an emission control area.
- Engine spill returns directed back to the low sulphur service tank when high sulphur fuel remained in the system – either through a failure to change over the spill returns or changing over the returns too soon.
- The sulphur content of the fuel supplied was already above that as declared on the bunker delivery note (BDN).

Charterparty Protection

Whether it will be shipowners or charterers who are liable for the time, costs, fines and other losses associated with non-compliance will depend on the facts of the case and the terms of the charterparty.

While a shipowner may be liable in the first instance, they will usually seek to pass such costs on to the charterer. The shipowner may also seek an indemnity when it is the charterer's obligation to provide and pay for fuel under the charter and non-compliant fuel has been provided but a charterer will not be liable for non-compliance due to inadequate cleaning by the shipowner.

The use of the BIMCO quality and BIMCO 2020 sulphur content clauses are recommended for use in all charterparties.

Transition Clause

More importantly, a suitable transition clause is highly recommended as part of the transition preparations.

It will be very important to ensure that the technical objectives of the transition plan are reflected in the charterparty to allow for a smooth transition.

Both BIMCO and Intertanko have produced transition clauses, as has North. For more information, please approach your usual North contact.

The BIMCO clause is more general and balanced and therefore more likely to be agreeable to counterparties without amendment. However, it does leave some of the detail for the parties to co-operate on and agree later down the line. Furthermore, it has been drafted for use in charterparties spanning 1 January 2020 only.

By contrast, the Intertanko and North transition clauses can be used for charterparties ending in 2019 or going into 2020. These are more detailed than the BIMCO clause and therefore involve more preparation and planning up-front. But this will result in more certainty for the parties further down the line.

Charterparty Roadmap for Transition

To help prepare for the transition and assist in providing the details for any charterparty transition clauses, we recommend that a timetable is put in place with the following key dates and requirements in mind.

A typical timescale is shown below. The dates in the white circles are given as examples only and will vary from vessel to vessel. The dates in the green and yellow circles are determined by reference to MARPOL Annex VI so they must be met if vessels are to be compliant in time.

NORTH CLAUSE – TIMESCALE

Finally, it is possible that new fuels will affect the performance of the vessel so it might be necessary to review and amend charterparty performance warranties accordingly.

Defining New Fuels

To avoid confusion when ordering fuels and to ensure they are specified correctly the *2019 Guidelines for consistent implementation of the 0.50% sulphur limit under MARPOL Annex VI* provides the following definitions of fuel oils:

- Distillate marine fuels (DM) are as specified in ISO 8217:2017 (e.g. DMA, DMB, DMX, DMZ);
- Residual marine fuels (RM) are as specified in ISO 8217:2017 (e.g. RMD 80, RMG 380);
- Ultra-low sulphur fuel oil (ULSFO) are as specified in ISO 8217:2017 (e.g. maximum 0.10% S ULSFO-DM, maximum 0.10% S ULSFO-RM);
- Very low sulphur fuel oil (VLSFO) (e.g. maximum 0.50% S VLSFO-DM, maximum 0.50% S VLSFO-RM); and
- High sulphur heavy fuel oil (HSHFO) exceeding 0.50% S.

When specifying fuel requirements in charterparties, it is also recommended to state the **actual** sulphur limit in addition to any terminology used.

As explained earlier, bunker suppliers should be asked to warrant that fuel supplied with comply with the requirements of MARPOL Annex VI.

North: Helping Our Members Trade with Confidence

North has published further information and guidance on the 2020 sulphur cap:

- North's dedicated Insights area on 2020: **www.nepia.com/insights/2020-vision**
- Signals Newsletter Special on 2020: **www.nepia.com/media/927346/North-Signals-Issue-112-June-2018-Online.pdf**
- North's loss prevention guide 'Marine Fuels: Preventing Claims and Disputes'

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