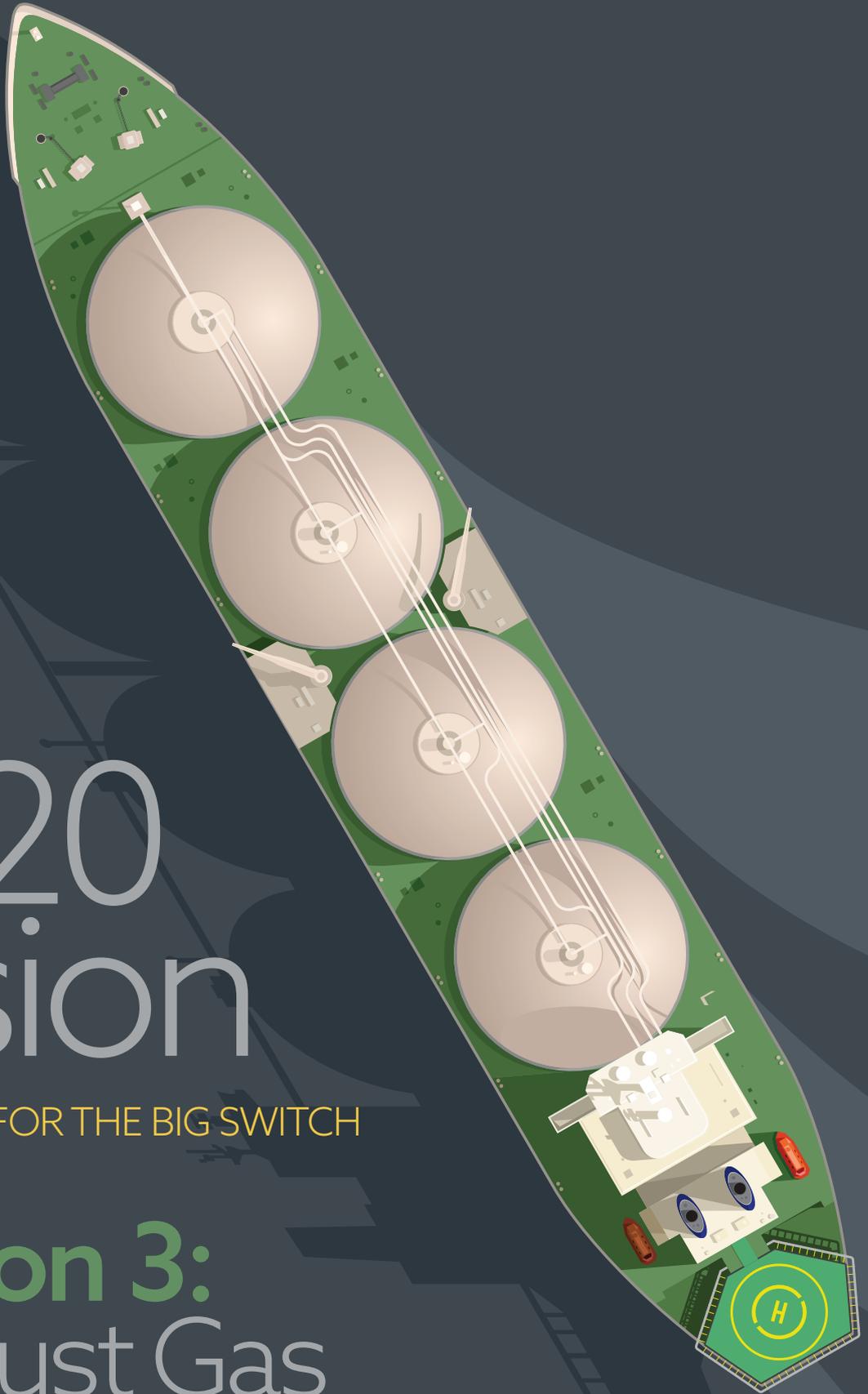


NORTH



SERVICE, STRENGTH, QUALITY



2020 Vision

PREPARING FOR THE BIG SWITCH

Option 3: Exhaust Gas Cleaning Systems

UPDATED JULY 2019

2020 Vision

Option 3: Exhaust Gas Cleaning Systems

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: **exhaust gas cleaning systems**. 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.

Option 3: Exhaust Gas Cleaning Systems

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.

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. The IMO guidance is focused on vessels that intend to use compliant fuel rather than those operating with scrubbers. But a number of the principles are transferrable and could assist vessels using scrubbers with their planning, particularly on what to do in the event of a scrubber failure.

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 requirements

Although a ship implementation plan is not mandatory, it could assist in satisfying visiting port State control officers 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.)

Scrubber Installation and Maintenance

Exhaust gas cleaning systems operate in a harsh environment. If the installation is not correctly matched to the vessel's engines, or is poorly executed, inferior materials used or is not properly maintained, problems are likely to arise.

At the time of writing, open-loop scrubbers are the most popular EGCS option. They are generally much cheaper than closed-loop and hybrid systems and are relatively simple to operate and maintain.

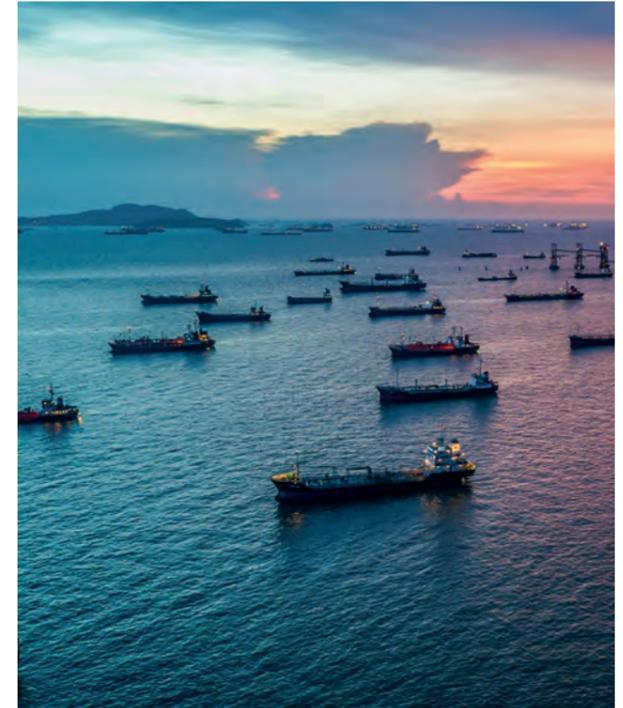
Installation

Installation is a significant project and must not be underestimated. It requires several months of planning and the careful selection of the right equipment and materials as well as the right contractors to perform the work.

Although scrubber technology isn't new – inert gas systems on tankers have long operated on a similar principle – the maritime industry is still learning about what works well and what needs to be improved.

Some aspects to consider:

- Safe access to equipment and sensors, and any other areas that may require regular attention
- If chemical dosing is used, safe positioning of drums and equipment
- Choose high-quality, corrosive-resistant materials. Some installations now use glass reinforced plastic/epoxy (GRP/GRE) piping instead of steel because of its superior corrosion-resistance characteristics. But be aware that this in turn has different securing requirements due to its different rigidity characteristics
- Capability of power generation plant to meet the increased power demands from high-capacity water circulating pumps
- Impact on fuel consumption rates – scrubber use is estimated to increase consumption up to 5%. If so, the performance warranties in the charterparty may need to be reviewed.
- If the vessel is under charter then the charterparty will need to be reviewed to determine whether there is a right for the shipowner to dry dock/take the vessel out of service for scrubber installation



Maintenance

The vessel's planned maintenance system will need to be updated to allow for the installation of the scrubber and any associated equipment, with manufacturer's guidance used as a minimum. Scrubber technology will be new to many shipowners and seafarers so planned maintenance should evolve based on experience and 24/7 operation. When deciding on maintenance strategy, take into account the following:

- Sensor faults have been reported on numerous vessels. This may be due to mechanical or electrical failures and some are prone to fouling by residues – keep spare sensors in stock and ensure crew are able to change them, to avoid delays or possible enforcement action due to failure to show scrubber effectiveness.
- Ensure sensors undergo periodical cleaning and calibration to prevent false readings and risk of failure in-service.
- Entry into the scrubber towers or any other enclosed spaces should be treated with extreme caution and enclosed space entry procedures (controlled by a permit to work) should be followed.

Plan the Switch (cont.)



Availability of high sulphur fuels

The installation of scrubbers is a significant investment and the primary incentive of many subscribing shipowners is the projected low cost of high sulphur residual fuels post-2020. The forecasted difference in price between compliant distillates and high sulphur residuals is estimated between US\$200-400 per ton.

However, a risk remains that refineries may cease to produce these cheaper fuels if the market is deemed insufficient and the take up from shore-side power stations is low. Also, changing refinery processes could affect availability. For example, improved coking processes (to extract as much of the higher-value distillates as possible) could mean less residual is left over.

Ultimately, a choke in the supply of high sulphur residual products could result in shipowners having to use the more expensive compliant fuels.

Furthermore, many bunker supply barges are expected to have cleaned their tanks out before 1 January 2020 to remove all residues from higher sulphur fuels.

Shipowners opting for scrubbers as the method of compliance should satisfy themselves that the desired fuel is sufficiently available in the vessel's trading area. This may require entering into special arrangements with suppliers to guarantee that availability is maintained.

Ship's engineers are likely to require training in the safe use and maintenance of the scrubber system installed on the vessel.

Scrubber Installation and Maintenance (cont.)

Operation

Inefficient combustion can lead to an increase in soot generation in the uptakes and can lead to fouling within the scrubber, significantly increasing backpressure.

To ensure the scrubber operates optimally and the plant runs efficiently, it's important to have good combustion in the main and auxiliary engines.

This requires regular monitoring of engine performance (power cards or electronic equivalent), correctly set injector pressures and correct timing.

Fuel additives can be used to improve the combustion properties of the fuel.

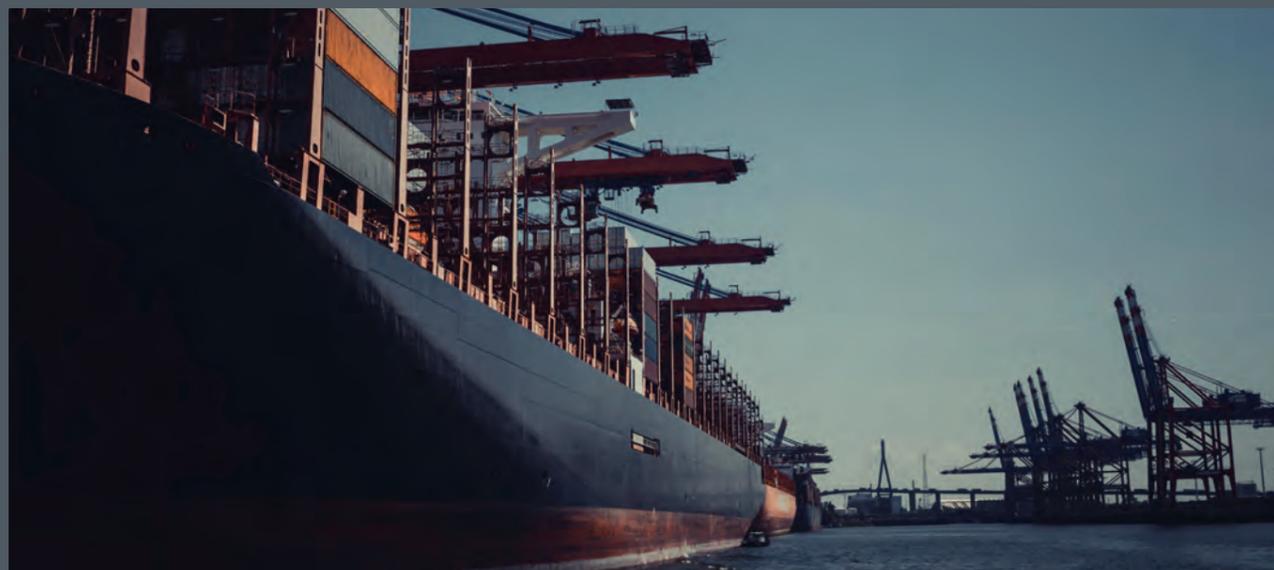
Ship's engineers are likely to require training in the safe use and maintenance of the scrubber system installed on the vessel.

They must also be aware of the associated risks, such as safe isolation before carrying out maintenance or repairs, and the safe use and storage of dosing chemicals.



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.



Scrubber Malfunction

At MEPC 74, a draft circular (MEPC.1/Circ.884) was approved that provides clarity on the action to be taken in the event of a scrubber failure.

This includes the following key aspects:

- Any EGCS malfunction that lasts more than one hour, or repetitive malfunctions, should be reported to the flag and port State along with details on the steps the ship operator is taking to address the failure.
- If there is a malfunction that can't be rectified within an hour, then the vessel should change over to compliant fuel.
- If the ship does not have sufficient compliant fuel oil on board, proposed action such as sourcing compliant fuel oil or carrying out repairs, should be sent to next port and flag State, for their agreement.
- In the event of a single sensor failure, compliance can be evidenced using data from other sensors as many parameters relate to each other.

New Fuel Risks

Although the vessel will operate on high sulphur residual fuel most of the time, areas exist where open-loop scrubber operation is prohibited and the chosen alternative for some will be to burn compliant fuels.

It is expected that most shipowners will initially turn to compliant distillates, such as marine gas oil (MGO) or marine diesel oil (MDO) for such a contingency.

But it is likely that the popularity of hybrid/blended VLSFO products will increase as more products enter the market.

For more information on the use of compliant fuels, including their characteristics, risks, fuel system modifications, changeover procedures and tank cleaning requirements, refer to our associated guidance documents:

- Distillates: www.nepia.com/insights/2020-vision/preparing-for-the-big-switch
- VLSFO Products: www.nepia.com/insights/2020-vision/preparing-for-the-big-switch

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.

Fuel Oil Non-availability

For vessels fitted with scrubbers, it will be necessary to use compliant fuel if the scrubbers can't be used (for whatever reason). However, what happens if compliant fuel is not available?

There are already existing provisions in MARPOL Annex VI Regulation 18.

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.

Shipowners should continually monitor changes and review their compliance strategy and how their vessels operate.

Changing Regulations

The future is uncertain. Regulations will expand and market conditions continue to be volatile. Shipowners should continually monitor changes and review their compliance strategy and how their vessels operate.

It is very likely that more emission control areas will emerge – either as designated MARPOL Annex VI ECAs (achieving same status as North Sea, Baltic Sea or North America) or enacted through domestic legislation (e.g. China).

Vessels fitted with open-loop scrubbers are most vulnerable to the effects of changing environmental legislation.

Ban on open loop scrubber use

Ports around the world are looking at the impact of scrubber use in their waters.

To date, it can be argued that too little scientific research has been carried out on their use in confined waters. Existing IMO guidelines on scrubber discharges focus on pH and PAH levels whereas there is now increasing emphasis on the presence of heavy metals. This void of scientific information has contributed to the polarisation of the shipping community on this subject.

A number of ports and regions have already stated that they will not allow the discharge of wash-water from scrubbers. This list is likely to grow.

North has collated a table that summarises our understanding of the positions taken by ports that have or will prohibit the use of scrubbers, or have placed conditions on their use.

www.nepia.com/insights/industry-news/no-scrubs-more-ports-declare-ban-on-egcs-discharges-starupdatestar/

It is likely that it would be the time charterer's obligation to supply compliant fuel where the vessel trades to an area where open loop scrubber discharges are banned. However, it may be wise for the parties to address this specifically in the charterparty.

Processing wash-water

There is currently no international requirement to process or further clean wash-water discharge. However some systems are fitted with a means to collect soot and particles (which in itself introduces challenges on waste disposal) and this may be indicative of future movement in regulation.

Discharging closed loop/hybrid scrubber waste

Such waste will typically be stored on board in IBC containers until it can be discharged ashore. Not all ports will have suitable discharge facilities, and this will need to be considered as part of passage planning.

It would also be sensible to include provisions in the charterparty about who will be responsible for arranging and paying for the discharge of such waste, and providing fresh chemicals.

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.

Vessels fitted with scrubbers will be exempt from the carriage ban that will come into force on 1 March 2020, provided the scrubbers are operating effectively.

A draft circular was approved at MEPC 74: *"Guidance on indication of ongoing compliance in the case of the failure of a single monitoring instrument, and recommended actions to take if the EGCS fails to meet the provisions of the 2015 EGCS Guidelines"*.

Where EGCS is used, the PSC should check that it has been installed and operated, together with its monitoring systems, in accordance with the associated approved documentation according to the survey procedures as established in the manuals.

PSC should verify that the scrubber system is properly functioning and is in use. They are likely to check that there are continuous-monitoring systems with tamper-proof data recording and processing devices (if applicable) and the records demonstrate compliance when set against the limits given in the approved documentation.

Checking can include but is not limited to: emissions ratio, pH, PAH, turbidity readings as limit values given in ETM-A or ETM-B and operation parameters as listed in the system documentation.

The flag and port State have the discretion to take what they consider to be appropriate action in the case of a scrubber malfunction - this of course includes not taking any action.

Maintaining proper and accurate evidence and ensuring early reporting of any scrubber/sensor malfunction should assist with credibility, which will be important if authorities are to be persuaded to take no action.

Short term temporary emission exceedances due to changes in load are recognised and are to be expected – and should not be considered as a breach of the regulations.

2015 EGCS Guidelines

Little progress has been made on the revised EGCS guidelines, which will be referred to the 7th session of the Sub-Committee on Pollution Prevention and Response (PPR 7) in February 2020, therefore, the 2015 guidelines will remain in place in the meantime.

A new work programme was agreed to investigate the environmental impact by the wash water. This will be started at PPR 7.

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.

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.

For vessels fitted with scrubbers, there will be additional considerations, including:

- Who is to provide fuel when scrubbers can't be used or breakdown
- Who is responsible for discharge of waste and supply of chemicals (for vessels with closed loop or hybrid scrubbers)
- Specifically what type and quantities of fuel should be supplied to the vessel
- If the scrubber system has any limitations for dealing with fuel above a certain sulphur content e.g. 3.5% S
- The effect of scrubber use on performance warranties, which might need to be amended.

The use of the BIMCO quality and BIMCO 2020 sulphur content clauses are recommended for use in all charterparties, including for vessels fitted with scrubbers.

Intertanko/BIMCO guidance on contractual issues for scrubber-fitted ships provides useful guidance for those entering into charterparties for such vessels: www.bimco.org/BIMCO-INTERTANKO-Scrubber-QA

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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