

# How to prevent tanker cargo shortage claims

*The cause of claims and how to avoid them during pre-loading, loading and unloading*



## PRE-LOADING

### Ship suitability for the nominated cargo

- Have charterers given full details of the nominated cargo with reference to quantity, quality, carriage and discharge? If not then ask for full details before the cargo is loaded.
- Can the ship load, carry and discharge the nominated cargo quantity safely and, if applicable, comply with any cargo segregation instructions given by the charterers?
- Have the cargo tanks and lines been suitably prepared to load the nominated cargo(es)? Are all cargo lines and tanks completely empty of wash water and/or the last cargo carried?
- If applicable, can the vapour side of each nominated cargo parcel (inert gas and vapour relief systems) be segregated throughout the entire voyage?
- To avoid large vapour losses, is the Reid vapour pressure (RVP) of the cargo within the ship's capacity?
- If applicable, have charterers given suitable cargo heating instructions for loading, the loaded voyage and subsequent discharge of the nominated cargo? Masters/Owners/Operators should ensure that charterers instructions are appropriate for the carriage and efficient discharge. If instructions are not found to be suitable then charterers should be informed as soon as possible.
- If the cargo is required to be heated on the loaded voyage ensure that an accurate record of daily individual cargo tank temperatures (upper, middle and lower) is maintained throughout the whole loaded voyage, together with daily ambient air and sea temperatures.
- If the vessel is required to crude oil wash (COW) under the terms of the governing charterparty the master is to ensure that the nominated cargo is suitable for COW. If not then owners/charterers should be informed as soon as possible.
- If the specific gravity of the cargo is high, confirm what ullages will be required to avoid exceeding the maximum weight for which the ship's tanks were designed.
- Can the nominated cargo(es) be loaded safely with regard to trim and stability (free surface effect) limitations?

### Preparing the cargo plan

- When loading to maximum capacity make sufficient allowance for cargo expansion on the loaded voyage. Company policy

often dictates the allowable filling limit but, in general, loading to 98 percent of a tank's capacity allows for a cargo temperature increase of 20°C. Be aware that the temperature difference between northern Europe and the tropics often exceeds this figure.

- Ullages outside of the limits set out in the ship's stability book can lead to excessive free surface and cargo sloshing. This sloshing effect can damage the cargo tank structure and will result in excessive boil-off of the lighter fractions in the liquid. This, in turn, will lead to an increase in vapour loss through the pressure/vacuum valves on each tank. Consequently, try to minimize the number of slack tanks when planning the loading operation.
- Endeavour not to load high RVP or light distillate cargoes into tanks adjacent to those containing heated cargoes as this will promote evaporative losses.

## LOADING

### Working with terminal representatives

The key meeting should not be limited to filling out cargo and safety checklists – it is in the ship's interest for the chief officer to take this opportunity to build a strong working relationship with shore personnel.

The chief officer must, in order to monitor the transfer of cargo from the shore to ship efficiently, ascertain the following information from the terminal representatives:

- How the ship and the shore will communicate.
- Grade(s) and quantity(ies) of cargo(es) to be loaded and whether it will be a ship or shore stop.
- Number of shore tanks to be loaded from, and the quantity, temperature and density of cargo in each.
- Whether density is being expressed '*in air*' or '*in vacuum*'.
- Whether shore pipelines are full or empty at the start of loading, and details of any pipeline displacement checks planned.
- Proposed loading rate(s) and the notice required by the shore for stopping.
- Whether loading will be interrupted for shore tank changeovers.
- The procedure for stopping in an emergency, ensuring that all of the equipment is in good working order.
- Whether loading will be by gravity or shore pumps.

- If applicable, whether pumps are displacement or non-displacement (only a non-displacement pump can tolerate the ship shutting valves, in an emergency, whilst the pump is running).

## **Working with the cargo inspector**

### **(OBQ) surveys prior to loading**

If any cargo tanks are not dry, the inspector must determine the on board quantity (OBQ) of the previous cargo. At the time of the OBQ survey all cargo line valves should be in the open position.

To do this accurately, the inspector must establish:

- The amount of any sediment and/or free water present in each cargo tank. Ideally each tank should be dipped from at least three locations, with one dip taken at the aft most dipping point.
- Whether the residues are liquid or non-liquid. If applicable, liquid residues should be determined by wedge formula calculation.
- If applicable, the temperature of any liquid residues in each tank.
- The ship's trim and list at the time of the OBQ survey.
- If material remains in the ship's pipelines, tell the inspector how much. He is unlikely to certify these figures but should include them in his report, prefaced '*said to contain*'.

*It is never in the ship's interest for the OBQ to be underestimated. This will result in an overstatement of the ship loaded figure, exposing the ship to an unwarranted short delivery claim.*

### **Establishing the amount of cargo loaded**

Claims for alleged shortages, after completion of discharge, are always based on the difference between the net bill of lading and outturn quantities in the first instance. Even if both terminals carry out their measurements diligently, each will (quite legally) round off temperature and ullage readings in its favour, so differences are only to be expected. In general the bill of lading quantity may be overstated and the outturn quantity may be understated.

In the absence of a like for like comparison, the ship is the only common factor and, therefore, the measurements taken on board are critical.

It is vital to the ship's interests to ensure that all cargo inspections are carried out carefully and comprehensively. The inspector must be accompanied at all times and his ullage measurements actively

verified. In all instances where more than one method of measurement is available use all methods independently to confirm the accuracy of measurements obtained.

*Remember, an inspector is as prone to error as the next person.*

## Measurement errors

Measurement errors often result from:

- Commercial pressures.
- Use of defective equipment.
- Improper measurement technique.

Risks and mistakes can be reduced by:

- Remembering that, long after the immediate pressure has been forgotten, the ship will remain responsible for having ensured that the measurements were carried out correctly. If, in spite of all measures taken, the ship is exposed to an unwarranted liability then a protest must be made.
- Frequently maintaining and checking ship's electronic measuring devices. These devices should be regularly calibrated by an agent approved by the manufacturer.
- Doing homework, sharing experience around and encouraging everyone to talk about their mistakes can help to avoid making the same mistakes in the future.
- Never permit the sole use of the terminal's measuring equipment on board. Always compare the ship's equipment with the shore equipment.
- If measurements, taken with the independent inspector's equipment differ from those taken with the ship's equipment then record the differences and note protest accordingly.
- Retro-fitted vapour lock valves, required by electronic gauging equipment, may have changed the height and/or position of the reference ullage point. If so measurements, taken at such points, must be corrected to the official reference point before use.
- If the ship is pitching or rolling, five measurements should be taken from each tank. The highest and lowest should be ignored and the middle three averaged. Weather and sea conditions should be logged at the time of the measurement survey.
- In the same conditions on inerted ships, or where electronic closed gauging equipment is used, the probe should be withdrawn and lowered until three readings differ by no more than 5mm.

## Taking cargo temperature

- The temperature of every cargo tank should be recorded separately.
- Cargo temperature may vary by 5°C at different levels in the tank, so must be averaged from at least three readings (upper, middle and lower). Some digital probes can measure at more frequent intervals.

*A measurement error of 1°C can distort the volume calculated by ±0.1%, depending on cargo density – on a VLCC typically 2,000 barrels (approx. US\$ 200,000 in June 2011).*

## Checking cargo density

- Despite practical difficulties, it is best practice to make sure the density of the cargo on board is measured and compared with the figures supplied by the terminal.
- If the loading terminal measures densities 'in vacuum' and the discharge port 'in air', the figures must be corrected to avoid an apparent loss.

*A difference of 0.0100 kg/litre in cargo density can alter a VLCC's tonnage calculation by some 3,000 metric tonnes (equivalent to approx. US\$ 2,180,000 in June 2011).*

## Allowing for trim and list

- Many load port cargo measurement errors are caused by failing to make due allowance for trim and list. These should be based on visual draft readings whenever possible.

*A list correction error of 1° could lead to overstating a VLCC's cargo by 10,000 barrels (approx. US\$ 1,000,000 in June 2011).*

## Sediment and water

- The quantity of any free water detected must also be corrected for trim and list. Protest even small amounts as there is likely to be more in suspension, which will settle to the bottom during the loaded voyage.
- If crude oil has been loaded in the Arabian Gulf then it is imperative that a careful record is maintained, on the loaded voyage, of any free water increase. If a free water problem is suspected then it is recommended that charterers are asked whether the ship can stop at Fujairah outbound so that an independent check can be made on any free water present. Once the voyage has been resumed then a check on free water should be made at least every three days.

## Calculating cargo quantity

- Make sure all parties are using the same edition of the ASTM petroleum measurement tables.
- The pre-1980 Table 6 (still used, instead of Table 6A or 6B, by some terminals – particularly in the Middle East and Asia) will overstate the quantity of cargo loaded, if the cargo temperature exceeds 60°F (approx. 15°C).
- If applicable, ensure the contents of the ship's pipelines are included in the calculations. In general new buildings now have the cargo lines above main deck level.
- Sign the inspector's report '*for ullages and temperatures only*'.
- Apply the vessel experience factor (VEF) to obtain a more representative '*ship loaded*' quantity.
- If the ship's figures (adjusted for VEF) differ from the shore's figures, review the calculations.
- If the difference is confirmed, initiate the owner's standard procedure.

## UNLOADING

### Working with the cargo inspector

#### Monitoring the discharge of cargo

- Accompany the inspector at all times, ensuring that he measures temperatures, ullages, densities, list and trim accurately.
- Water delivered with the cargo at the load port is invariably understated on the bill of lading, whilst the amount of water said to have been received at the discharge port is almost always overstated. The result of this under and overstatement leads to a shortfall in the declared net quantity outturned.
- If sludge is found, during the free water dipping operation, try to obtain a representative estimate of the quantity in each tank.
- Ensure that the arrival trim and list are accurately recorded and that the trim/list corrections are applied to all ullage measurements.
- Before discharging cargo, ask the inspector to witness that the overboard valves are sealed and record the seal numbers in the log.
- Make sure pumproom valves are properly set and bypass valves closed.

- As soon as cargo starts to be discharged, check over the ship's side for any signs of leakage.
- Verifying that ullages are constant in idle tanks confirms that the cargo is not being misrouted or leaking within the ship, during discharge operations.
- Ullaging active tanks regularly, and comparing results with hourly shore tank received rates, helps ensure that cargo is not being misdirected in the receiving terminal.
- Ensuring that cargo heating is maintained in the tanks being discharged and recording when the heating coils are shut down, and the time the tank has been completely drained, provides valuable evidence in cases of dispute on the quantity of ROB.
- Monitoring air and sea temperature (and sea state) can provide valuable evidence in case of a subsequent dispute about the pumpability of the cargo.

## Maximising outturn

### Crude oil washing (COW)

A well thought out, carefully executed, COW plan is central to maximising the outturn of a crude oil cargo.

Where applicable, clingage can account for as much cargo as remains on the tank bottoms if a ship is not able, or permitted, to COW. On new buildings, with double-hulled construction, clingage may be minimal.

To avoid delaying the discharge operation, any officer involved in crude oil washing must hold the appropriate certificate of competence and be familiar with the vessel's COW systems.

In case the ship is called upon to prove COW was performed efficiently, log, every hour:

- Which pump is being used.
- Start and stop times for each tank.
- Number of cycles each tank is washed.
- Wash program used (e.g. top wash, bottom wash).
- Depth of residue detected on the bottom of each tank before and after the wash. These measurements should be taken in at least three points in each tank.
- Type of machine, and settings, used.
- Pressure in the wash line at the pump and on the wash line on deck.



Ask the cargo inspector to witness that COW is being carried out efficiently.

If either the terminal or the charterer will not permit COW, ask for written confirmation and consider a protest to protect against a subsequent shortage claim.

## Stripping

The best way to avoid losses, resulting from charterparty freight retention clauses, is to make sure the ship can demonstrate it handled the cargo appropriately, and did everything possible to discharge all of the cargo.

As crew knowledge of their ship, and its cargoes, increases the better the outturn will be, with less time spent at the discharge berth.

The discharge plan must take account of the locations of the tank stripping suctions and give directions for achieving the desired trims and lists.

Provided it is within the ship's stress limits, the greater the trim aft, the better the drainage.

When stripping high pour-point cargo:

- Maintain cargo at the recommended discharge temperature until the heating coils are exposed.
- Start stripping as soon as cargo pumping stops.
- Protest any request from the shore to stop during stripping operations.
- If the stop is essential, continue stripping to an accumulation tank. Heating should be maintained until the cargo is below heating coil level.

When stripping high vapour pressure cargoes:

- Avoid operating pumps at excessive speed as this will increase vaporisation, causing cavitation and reduced suction.
- Increasing the pressure of inert gas in the cargo tank, or manipulating the discharge valve on the pump to maintain high back pressure on that pump.

Re-inspect 'empty' tanks before declaring a grade finished, or discharging the last cargo (or slops) capable of driving eductors.

Additional cargo may have accumulated due to:

- Changes in list and trim.
- Bulkhead, pipeline or valve leaks.

# Working with the cargo inspector

## Remaining on board (ROB) surveys

Determining an accurate ROB quantity is difficult due to:

- Difficulty of calibrating bottom levels of tanks.
- Where applicable, blocked limber holes. New building double-hulled cargo tanks do not have this problem.
- Unmeasurable tank side clingage.
- Uncertainty about the liquidity of bottom residues.

*It is always important to observe and log precisely how the inspector measures ROB.*

- Ensure he surveys all the cargo tanks, not just those operated on this occasion.
- Make sure he takes great care reading sounding rods or bobs, to avoid the common mistake of overstating the liquid element of bottom residues because it has run down over the sediment as the rod is raised.
- Ask him to take samples of the bottom residue, from more than one point in each tank, if possible.
- If you suspect that the samples may be unrepresentative, because of the tendency of less viscous material to flow more easily into the sampling device, ask the inspector to sample the more viscous material found in the pump mud box or the manifold when it is disconnected.
- Urge that the wedge formula be applied only to the liquid element of the ROB, since it can be argued that there must be as much sediment under the liquid as there is in the dry parts of the tank.
- Invite the inspector to sight every ballast tank and void space to confirm that no cargo has leaked.
- If the ship's cargo lines have been drained, demonstrate this to him and ensure it appears on the inspection certificate.
- Calculate the ROB independently, compare results with the inspectors, and log any differences.
- Do not allow the shore hoses to be disconnected until the inspector has signed a dry tank certificate, or a statement of ROB, that you agree with.
- If you dispute the inspector's figures, initiate the owner's standard procedure.

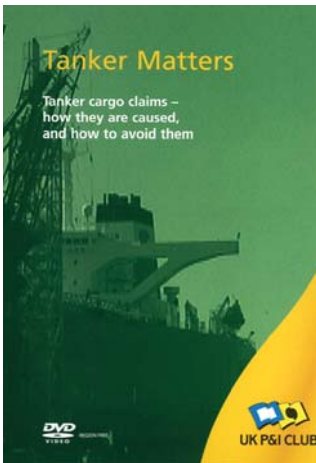
# Tanker Matters video

## Tanker cargo claims – how they are caused, and how to avoid them

The UK Club's *Cargo Matters* series of videos aims to increase awareness of the causes of P&I claims for cargo damage and loss. *Tanker Matters* focuses on some of the most frequent causes of tanker cargo claims and how to avoid them.

The DVD can be viewed continuously, or scene by scene:

- Introduction
- Ensuring the ship is suitable for the cargo
- The cargo plan
- Preparing cargo systems
- Before loading – the key meeting and lining up
- Loading
- The loaded voyage
- Discharging
- Summary



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