

KISH P & I LOSS PREVENTION CIRCULAR KPI-LP-84-2012 **(Avoiding Cargo Contamination on Tankers)**

► **Possible causes of contamination:**

A) Shore-side:

- Residues of previous contents of storage tanks, lines and hoses;
- Tank and line cleaning media, including water;
- Other products, because of valve leakage or wrong operation or poor in-line blending;
- Fresh water or impurities carried over from the manufacturing process;
- Fresh water from leaking heating coils or tank roofs;
- Salt water from leaking sub-sea pipelines.

B) Shipboard:

- Residues of previous contents of ship's tanks, lines, pumps and hoses;
- Contaminated or Dirty sounding and ullaging equipment;
- Tank coating deficiencies;
- Tank and line cleaning media, including water;
- Other part cargoes, because of valve leakage, wrong valve operation or tank structural deficiency (e.g. bulkhead cracks);
- Other part cargoes' vapour via common inert gas systems;
- Salt water from leaking tank hatches, sounding pipes and accesses;
- Fresh water from leaking heating coils and accesses;
- Copper leaching from alloys used to manufacture heating coils (e.g. alloy brass contamination of jet fuel).



► **Considerations:**

A) Ship suitability for the nominated cargo:

To ensure the ship can and does meet all the governing charter party's conditions regarding cargo quality, consider:

- Is the product included on the vessel's International Maritime Organization (IMO) Certificate of Fitness, or is the product accepted under a tripartite agreement and is the original acceptance letter on board?
- Can the different grades of cargo be arranged to maintain the degree of separation required?
- All chemicals must be separated by positive segregation.
- Can the ship maintain the required cargo carriage and discharge temperature(s)?
- Is the tank coating suitable for the nominated cargo?
- Some cargoes can permanently damage certain coatings, others make coatings soft for a while, during which time the range of cargoes they can tolerate is restricted. Refer to the coating manufacturer's resistance lists. The listing of a cargo on the vessels Certificate of Fitness does not necessarily mean that the tank coating is suitable.
- If applicable, is the cargo tank coating in good condition?
- Have the cargo tanks and lines been suitably prepared to load the nominated cargo(es)?
- If applicable, have previous cargo vapours been reduced to less than 2% by volume so that potential flashpoint contamination of nominated cargoes is eliminated?
- With reference to the quality of multiple oil products loaded can two-valve segregation, on the liquid side, be maintained throughout the voyage? Chemicals must be carried under positive segregation.
- Can the vapour side of each oil product parcel (inert gas and vapour relief systems) be segregated throughout the entire voyage? Chemicals must be positively segregated.

B) Preparation of the cargo plan:

- The cargo plan should minimize stress on the ship and eliminate the risk of cross-contamination of different grades of cargo;



- For multi-grade loadings, plan the use of pumps and pipelines to avoid or minimise commingling or downgrading;
- Ensure that line displacements are calculated such as to avoid cross-contamination;
- If liquid levels are too high, cargo from one tank can slosh through a common vent line to contaminate non-compatible cargo in an adjacent tank, if the ship rolls;
- The vapours of one grade can put another grade out of specification. Gasoline vapours can contaminate kerosene, diesel and residual oils, if kept on a common venting line. If there is only one venting line, isolate one of the grades from the system;
- Remember, certain cargoes cannot tolerate heat from an adjacent tank;
- Heat reduces the effectiveness of inhibitors. Never stow inhibited cargoes adjacent to heated tanks;
- To avoid stowing dangerously reactive cargoes in adjacent tanks, or allowing them to mix in lines, pumps or slop tanks.

C) Cargo system preparation and preventive maintenance:

- Flush and drain pumps, pipelines, valves and draining systems;
- Washing water and previous cargo in dead ends and branch lines causes contamination;
- Thoroughly rinse away any cleansing agents used;
- For cargoes that cannot tolerate water (e.g. jet fuel and lubricating oil) mop tanks and remove valve inspection plates to eliminate every trace of moisture;
- Clean vent lines;
- Chemical tankers should carry out their own wall wash tests prior to inspection.
- When a tank is gas free, take the opportunity to inspect its structure and equipment and carry out maintenance where possible;
- The condition of tank coatings should be monitored but specialist attention is usually required if they are found to be defective;
- Never overlook the rules for safe confined space entry;
- Clean the gasket face of tank openings; check rubber gaskets and replace if necessary; replace fibre gaskets and tighten hatch lids correctly;
- Test for oil, water and vapour tightness by using the inert gas system to pressurise tanks;
- Check valves spindles for vapour leaking from glands;
- Make cold weather preparations if necessary;
- Regularly check and maintain:
 - ✓ All cargo valves, pipelines, expansion joints and couplings by pressure testing
 - ✓ Sea-chest valves and overboard discharge valves;
 - ✓ High level and pump room alarms;
 - ✓ Hydraulic valve operating systems;
 - ✓ CCR and pump room instrumentation;
 - ✓ Cargo pumps, stripping pumps, draining systems and COW machines to prevent extended discharge times;
 - ✓ Pressure/vacuum valves to prevent vapour losses and cross contamination;
 - ✓ Sampling and measuring devices (Whesoe gauges, trimoda gauges, explosimeters, oxygen meters)
 - ✓ Heating coils, using air or fresh water to check for leaks (which cause contamination) or blockages

(which cause cargo to solidify). If coils are not intact, they may contain residues of previous cargoes;

- ✓ The inert gas system, to ensure it can maintain required pressure; reduce oxygen content to required level; avoid contaminating cargo with soot deposits from inadequately scrubbed flue gases;
- Ship's staff must be trained in the use and calibration of electronic equipment. It must also be calibrated and certified by an approved agency yearly;
- Records of annual calibration and comparison of all gauges (level, temperature and pressure – include remote gauges) must be kept. These records must show all the observed readings – a simple statement 'all gauges tested OK' is NOT acceptable.
- Records of testing for all cargo equipment (heating coils, pressure relief valves, manifold valve closing times etc.) must be kept.



► **Loading:**

A) Information Exchange & Coordination 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 from 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;
- Density(ies) of cargo(es) to be loaded and whether they are expressed 'in air' or 'in vacuum';
- Has an MSDS been provided by the loading terminal for each product to be carried and does it state the minimum requirements for safe transportation of the cargo (see IBC Code – Section 16.2). Do NOT use old MSDS as the information contained may be incorrect;
- Whether the shore pipeline is dedicated;
- Whether the shore pipelines are full or empty at the start of loading. Details of any shore pipeline displacements planned to include length, nominal diameter and volume of pipelines used (from ship to reception tank).

- Number of shore tanks to be loaded from, and the quantity, temperature and density of cargo in each;
- Whether loading will be interrupted for shore tank changeovers;
- If change-overs are to take place without stops, that the ship receives notification of every change for sampling purposes;
- Whether the ship will be receiving two sets of samples from each shore tank used (i.e. one for the receiver and one for the ship-owner). If not, log that the request was made and refused.

B) Working with the cargo inspector:

**Tank inspections:*

- Remember, an 'independent inspector' is independent in name only. Expect him to give the ship's interests low priority, and make sure he is accompanied by an officer at all times;
- An experienced officer may well be more expert than the inspector;
- Tanks cannot be entered where local regulations insist on constant operation of the inert gas system but, whenever possible, make sure that the inspector checks every tank thoroughly;
- If the ship's pipelines have been drained, demonstrate this to him and ensure it appears on the inspection certificate;
- Outside the chemical trade, tank inspections are often subjective so, if you do not agree with the inspector, try to reach a commercial solution – always faster and cheaper than a legal one;
- As soon as it becomes apparent that you cannot agree, protest.

***Taking samples:*

- Adopt a sampling procedure that satisfies the relevant authorities;
- Make sure the ship has the right equipment, including clean bottles, seals and labels;
- Label samples with the following information:
 - ✓ Ship's name - Date and time - Location
 - ✓ Cargo name
 - ✓ Operational status (e.g. 'after loading')
 - ✓ Sample source (e.g. 'tank number...') & Sample type (e.g. 'top': 'composite')
 - ✓ Identity of sampler
 - ✓ Seal number.
- Make sure each sample is signed and sealed, preferably by the independent inspector;
- Note the particulars of every sample taken for the ship's purposes in a sampling log;
- Present the inspector with a list of samples drawn and retained by the ship for acknowledgement and signature;
- Require any party to whom a sample is handed over to sign a receipt for it;
- If the sample is the subject of a cargo dispute, then always obtain written permission from vessels operators before handing over a sample to a third party;
- Store samples in a secure space which is cool, well ventilated and not exposed to light. *Samples must never be stowed within the accommodation, and must be stowed in*

cell-divided spaces made of material resistant to the cargo and with adequate ventilation arrangements.

- Since the Hague Rules allow claims to be presented up to a year after the event, samples should not be disposed of until that period of time has elapsed.

► Un-Loading & Monitoring the discharge of cargo:

- Maintain a minimum of two valve separation throughout the discharge of multiple grade oil products. Chemicals must be maintained under positive segregation;
- Valves should be sealed (if they were not sealed in the load port) and the seals pointed out to the inspector and logged.
- If possible, leave seals in place until discharge is completed and ask the inspector to note the fact;
- The most easily contaminated grades should be discharged first, if possible;
- If any grade cannot tolerate contact with residues of the grade before, strip the cargo line;
- If necessary flush the line with the second grade and re-strip; it is better to lose part of the cargo through downgrading than to contaminate all of it and the shore tank besides;
- A watch officer discovering contamination should:
 - ✓ Stop discharging the relevant cargo
 - ✓ Close that system's valves
 - ✓ Advise the chief officer, who advises the master, who contacts the owner and his local P&I correspondent.
- The master should:
 - ✓ Sample the remaining cargo and request testing
 - ✓ Await instructions from the owner
 - ✓ Never try to conceal a handling error which may result in contamination. The sooner problems are identified, the less the owner's potential exposure.

► General Recommendations:

A leading firm of cargo surveyors reports that approximately 40% of alleged shipboard contamination problems are, on investigation, found to be shore related.

- Samples showing that the condition of the cargo did not change between loading and discharge provide the best defense against unfounded contamination claims;
- If the laboratory analysis report is to be right, the sample must be right too – an inspector is as prone to error as the next man;
- The inspector must be accompanied at all times, to ensure that the sampling procedure satisfies the relevant authorities;
- Refer to the Energy Institute (formerly Institute of Petroleum) Petroleum Measurement Manual or the American Petroleum Institute (API) Manual of Petroleum Measurement Standards to be certain you know what is required.
- If the inspector fails to do something he should, or does it wrong, point it out to him – and log anything he does not put right;
- Log any faults with his equipment and any occasions when he borrows the ship's equipment;
- As well as any samples he takes for the consignee, the receiver and his own firm, ask the inspector to take another set for the ship;
- If he refuses, note it in the log – and take your own;

- Chief officers should ensure they receive two sets of shore tank samples for each grade: one set for delivery to the receiver's agent; the other to be retained by the ship;
- Asking the inspector to take starting samples at the manifold, with the manifold valve closed if possible, at the start of loading operations, is the best way to detect contamination or commingling in shore lines;
- Make sure first foot samples are taken to verify that the ship's lines are clean;
- Discourage the inspector from subjecting them to visual analysis only, while loading continues;
- Loading should be stopped while proper tests are carried out, particularly when the specification is critical;
- If any samples are out of specification, advise the charterer without delay;
- Even if tests reveal no problems, the ship must retain its duplicate samples in case of any later dispute;
- Carry out spot checks at the manifold whenever practicable during loading, particularly after any shore stops, and preferably accompanied by the inspector, or a representative of the terminal.
- Accompany the inspector when he opens the sealed unit of any composite sampler;
- 'After-loading' samples should be taken from upper, middle and lower layers of each cargo tank;
- If the cargo is to be treated with an additive, the fact should be recorded on the bill of lading. Unless you are certain that the shipper and receiver have agreed to this taking place after loading, require any party proposing to do this to sign for receipt of a letter protesting the procedure – before he carries it out;



The readers of this circular are advised to refer to & study the club's earlier circular: KPI-LP-19-2012(Prevention of Chemical Products Contamination)

Useful addresses:
 Energy Institute (formerly Institute of Petroleum) www.energyinst.org
 & American Petroleum Institute (API) www.api.org

- Make sure you receive a certificate in respect of cargoes that are inhibited and that the certificate specifies the information required under IBC Code 15.13.3;
- At the discharge port, in-line samples of each grade of cargo should be taken at the manifold:
 - ✓ At the start of discharging
 - ✓ Once during every watch that the grade is being discharged
 - ✓ During stripping.
 - ✓ If the inspector fails to take any of these samples, the ship should take its own.
- Make sure the inspector samples any free water found, so that its source can be established;
- Sampling bunker tanks after loading and before discharging helps defend against claims that cargo has been used as bunkers.