



Carefully to Carry

Samples and sampling in the carriage of liquid bulk cargoes

The period of the carriers' responsibility for liquid bulk cargoes is essentially the same as that for bulk or general cargo. Under the Hague and Hague Visby Rules, the period extends from the time when the goods are loaded until the time they are discharged and includes the loading and discharging operations. Under the Hamburg Rules, which came into effect 1992, the carrier, his servants and agents will be responsible from the time the goods are received by them at the port of loading until the time the goods have been delivered at the port of discharge.

Having received the goods, the carrier, the master or agent is required to issue to the shipper a bill of lading showing, among other things, the apparent order and condition of the goods as received onboard. With the exception of cargoes carried in the deep tanks of liner vessels, which may be loaded by the shipper and discharged by the consignee, most loading and discharging operations with bulk liquid cargoes are performed by the actual carrier. There may be different practices in the loading and discharging ports and these together with the nature of the cargo are important factors. Most bills of lading include the words "shipped in apparent good order and condition". Can order and condition be ascertained by ship's officers when loading takes place via a closed pipeline system?

The answer lies in an effective sampling system!

By reason of the wide variety of liquid cargoes that are carried and the vastly different types of ships involved, it will be appreciated that the subject of sampling is a very wide one. This article is confined to the general principles of how to ascertain the apparent order and condition of goods when they are shipped and, just as importantly, how to preserve the evidence.

Many parcel-tanker owners have issued instructions to their masters to sample each type of cargo at the ship's manifold on commencement of loading, after the first test-load (so called 'first run' sample) and from the ship's tank after completion of loading. Such samples are numbered and entered in a special sample log book. An additional advantage of this procedure is that the ship's officers who attended the sampling, or who actually drew the samples, are available for questioning at the port of discharge. It is so often the case that unilateral sampling by shippers at the loading port is not witnessed by ship's officers and samples allegedly drawn from ship's tanks are handed to the ship's staff just prior to departure. These problems confirm absolutely the need for a joint sampling procedure between shippers and carriers and carriers and consignees.

Owners are strongly recommended to instruct their ship's officers that whenever they are in doubt as to the apparent good order and condition of a liquid bulk cargo, they should notify both the shipper and the Club's correspondents so



"The carrier shall properly and carefully load, handle, stow, carry, keep, care for and discharge the goods carried."

Hague Rules,
Articles iii, Rule 2

Carefully to Carry Advisory Committee

This report was produced by the Carefully to Carry Committee – the UK P&I Club's advisory committee on cargo matters. The aim of the Carefully to Carry Committee is to reduce claims through contemporaneous advice to the Club's Members through the most efficient means available.

The committee was established in 1961 and has produced many articles on cargoes that cause claims and other cargo related issues such as hold washing, cargo securing, and ventilation.

The quality of advice given has established Carefully to Carry as a key source of guidance for shipowners and ships' officers. In addition, the articles have frequently been the source of expertise in negotiations over the settlement of claims and have also been relied on in court hearings.

In 2002 all articles were revised and published in book form as well as on disk. All articles are also available to Members on the Club website. Visit the Carefully to Carry section in the Loss Prevention area of the Club website www.ukpandi.com for more information, or contact the Loss Prevention Department.

that expert advice may be sought and samples analysed at the loading port. In case of serious doubt as to the condition of the cargo the results of the analyses should be awaited before any bills of lading are signed.

It should be emphasized that as with bulk or general cargo, the description on the bill of lading relates to the external and apparent condition of the goods. Claims on liquid bulk cargoes often involve the question of quality, which is not usually apparent and these claims may be based on a detailed analysis which the carrier has no means of checking. Furthermore, in the majority of instances, the ship's staff cannot question the condition of a product upon loading, except perhaps where the presence of free water, haziness or dull appearance, the presence of a strong foreign odour or an obvious deviation in the colour of the product is readily apparent.

It is therefore important that samples carefully taken at the time of loading and prior to discharge are truly representative of the condition of the cargo and are available in the event that any dispute arises. Where loading port samples have been drawn and retained onboard, any uncertainty about the quality of the cargo at the time of loading can be clarified at relatively low expense.

The shipper however, is in quite a different position because apart from the sampling and analysis which takes place prior to loading he may consider it necessary to take 'first run' samples from the ship's tanks at the commencement of loading operations and suspend loading until analysis is attained. The ship's staff may not be involved or even informed about the results of this analysis. Bona fide shippers will usually provide this information, however, and will require the ship to discharge the 'first run' of cargo if this analysis shows it to be 'off specification'.

When loading operations are resumed it should not be assumed that the 'first run' of cargo will be in good order and condition. This may not necessarily be the case as the shipper may have found the product to be only slightly off specification and have decided to 'blend' the cargo during subsequent loading operations. Furthermore, water may be introduced into the product via the installation's pipeline system without the ship's staff being aware of it.

The importance of carefully cleaned tanks, compatible tank coatings, well maintained pipe lines, heating coils, valve systems, hoses and pumps cannot be too strongly stressed and some brief comments on the subject of hoses and pumps may be helpful.

When cargo is loaded by shippers and discharged by consignees, it is their responsibility to ensure that the hoses and pumps supplied are suitable for the product concerned. The importance of sampling firstly, after the 'first run' of cargo has been loaded, secondly, after completion of loading and thirdly, prior to discharge, is paramount in order to establish by analysis whether or not any alleged damage or contamination could have been caused as a result of the use of unsuitable equipment supplied by the shipper or consignee, or by defects in the ship's loading system.

It must also be emphasized that there is duty on the ship's crew to assist shippers and/or consignee with the proper

connection of hoses and to ensure that, in the case of loading over the top, hoses are placed in the proper tanks. The crew should also ensure that where the ship's integral piping system is involved, the cargo is directed to the correct tank during loading, and that the lines used during loading and discharging are properly isolated to avoid contamination with other products onboard.

Sale contracts

The condition of liquid bulk cargoes when shipped should be in accordance with either the specification in the contract of sale, or the usual grade specifications used in the trade. The carrier is not a party to the contract of sale and cannot be expected to have knowledge of the specification that in most cases relate only to quality.

Certain limited quality descriptions such as 'clear', 'colourless' etc. may be apparent upon visual inspection of samples and the presence of water can usually be detected by an experienced ship's officer. However, the wide variety of products, frequently referred to only by trade names or codes, makes it difficult, if not impossible, for ship's officers to detect other than the most obvious deviations in the condition of the cargo.

Sale contracts, while regulating the relationship between seller and buyer, also have some bearing on the carrier's position. They usually require certain sampling procedures to be carried out and the appointment of an independent surveyor to certify the fitness and cleanliness of the ship's tank and pipelines. Many standard vegetable oil contracts require discharging samples to be drawn in the presence of both seller and buyer's representatives and analysed by an independent chemist. Almost all oils and fats are sold subject to such sampling and analysis but the contracts rarely provide for the carrier to be given such samples.

Evidence of the condition of a liquid bulk cargo on loading is therefore of paramount importance. Claims lodged at the port of discharge have frequently been defeated as a result of analysis of loading samples.

Most sale contracts provide for the change of ownership of the cargo to take effect at the time of loading onboard ship and for a bill of lading to be obtained from the carrier. It is therefore important for both seller and carrier to have evidence of the condition of the cargo at that time. The carrier's responsibility may however commence at an earlier time depending on the moment of taking charge of the cargo.

The sampling activities of shipper and buyer often lead ship's officers to believe that nothing is required of them, as the carrier's position has been sufficiently protected. This however is not always the case.

The carrier must take an active part in the sampling procedures especially at the loading port and must see that his interests are properly protected.

Sampling

There are several other important reasons why samples should be taken during loading of bulk liquid cargoes, i.e:

- To enable protest to be made to the shipper if the product loaded is not in apparent good order.
- To enable the loading operation to be followed in all its stages.
- To provide evidence should the ship's tank coatings be found damaged upon discharge.
- To enable the carrier to provide evidence should local authorities lodge pollution claims against the ship.
- To enable the specific gravity and temperature of the cargo to be established.
- To investigate subsequent claims against the carrier for admixture or contamination.

Sampling prior to loading

Shippers of liquid bulk cargoes will not in most cases allow the carrier to take samples from shore tanks, road tankers, barges or tank wagons, particularly when the shippers are responsible for the loading of the cargo.

It should also be particularly noted that there are many areas of the world where large consignments of vegetable oils are delivered alongside by a wide variety of road tankers, barges or rail tank wagons. With road tankers and rail tank wagons the product is usually drained into the shore containers before being pumped onboard. Invariably these tankers are used for a variety of commodities including both vegetable and mineral oils and their cleanliness should not always be assumed. Indeed, shippers do not always check the suitability of such wagons until they arrive alongside in loaded condition where they are sampled by the shippers' inspectors. It is also common practice in this trade for shippers to 'borrow' from each other to make up the total quantity loaded into a particular ship, so the cargo may consequently be of variable quality and condition. In the case of loading from tank barges, sampling takes place prior to loading into the ship. Even if the ship's officers are provided with such samples they have no control over how they were drawn and there is no certainty about when or from where they were taken.

Sampling during loading

The first requirement is that on commencement of loading samples are taken from the ship's manifold or 'first run', samples from the ship's tanks, even though the loading operation may have to be suspended while this is done. It is essential that shipper's inspectors take part in this sampling procedure and that the samples should be split between the parties. Whenever loading operations are interrupted and hoses, pumps or line system are changed, sampling of the relevant ship's tanks before and after the changeover will be necessary, unless it is certain that hoses, lines and pumps have been previously used for the same product.

On completion of loading, a representative sample from each tank should be taken. In the case of a parcel tanker, each consignment should be similarly treated. Shipper's inspectors frequently take 'first run' samples on their own initiative and will usually make up composite samples of all tanks after completion of loading.

Loading port samples other than those taken by the carrier

Samples are sometimes handed to the ship's staff to be delivered to the consignees in accordance with the sellers contractual obligations. In such cases ship's staff are unaware how or where such samples were obtained and it is rare for the ship to be provided with a duplicate set for its own use. The origin of such samples is uncertain and their labels often bear vague descriptions such as 'average shore tanks' 'average tank trucks' 'average head line' etc. These samples whether relating to vegetable oils, mineral oils, or petrochemicals, may be samples drawn before and/or during and/or after loading, single or duplicate, sealed or unsealed and either against a receipt or not. The carrier has no control over the drawing of such samples and in many cases analyses of them are in conformity with the required specification whereas the cargo on arrival is not. At the port of discharge such shipper's loading samples are collected by inspectors appointed by the shipper or consignees who may also measure and sample the ships tanks. Samples drawn at the loading port jointly by ship's staff and shippers representatives may then serve to prove that the samples handed to the ship's staff for delivery to consignees may not represent the true condition or quality of the cargo.

Sampling before discharge

On arrival at the discharge port and immediately tank ullages and temperatures have been carefully checked, samples should be taken of all cargo onboard. This sampling is usually carried out by the consignee's surveyor and the procedure should be attended by ship's officers. It is usual to take top, middle, lower, and bottom samples, depending upon the product. In the case of cargo that remains homogeneous during the voyage, such samples may be mixed into a composite sample with the largest proportion coming from the middle depth of the tank. It is also desirable to use a water finding instrument to establish if water is present.

In the case of edible oils and animal oils/fats, bottom samples should always be drawn to check for sediment. These bottom samples must be kept in separate jars, sealed and properly labelled for identification. It must be emphasised that sediments, if any, should always be regarded as belonging to the particular consignment involved.

With many products it is the practice to defer commencement of discharge until analysis of the samples has been completed. If the receivers indicate that the cargo does not conform to the required specification, the master should immediately request the local UK Club correspondent to arrange for the attendance of an independent surveyor and for the analysis of loading samples.

Sampling procedures

Because of the wide variety of liquid cargoes carried and the different methods of loading only general advice on sampling can be given.

Cargo sampling is a difficult process and one that requires most careful attention. It should be emphasized that each sample must be representative of the product concerned. Continuous sampling at the ship's manifold in order to obtain a so-called 'ship's rail composite' sample, though a time consuming procedure, may be of value in the case of homogeneous cargoes where tank samples taken prior to commencement of discharge have shown the product to be satisfactory at the time the ship arrived. A sample of the first cargo arriving at the ship's manifold, a 'first run' sample from the ship's tank and a sample or set of samples drawn from the tank on completion of loading are the most important. In the chemical (parcel) trade, running samples during the first five minutes of loading are sometimes also drawn. The object of all these sampling operations is to obtain a manageable quantity of cargo, the condition and properties of which correspond as closely as possible to the average condition and properties of the parcel being sampled.

Most liquid samples can be stored in glass jars with screw type caps or cork plugs. In most cases samples do not each have to be larger than half a litre (500cc).

The importance of cleanliness cannot be too strongly stressed. All sampling work should be done with clean hands and where protective clothing is necessary, as in the case of toxic products, clean gloves of a suitable material should be used. The apparatus used should be of a suitable material, e.g. stainless steel, which does not react chemically with the cargo being sampled. Various types of sampling bottle can be used, particularly in large tanks but should glass bottles be employed, great care should be taken to avoid breakage.

With edible oils, where smell and flavour is important in quality assessment, scrupulous cleanliness is essential and the sampling devices should be thoroughly washed with hot water and soap and rinsed with hot water before use. All sampling equipment should be protected from the weather, rain, dust, rust, grease, etc., and before the sample is divided into suitable glass jars, the outside of the sampling apparatus should be wiped clean.

When sampling from the manifold or pipeline, great care should be taken to ensure that the sampling cock through which the product is drawn is absolutely clean. This method of sampling is most difficult and must be carefully supervised to ensure that both shipper and carrier obtain a part of the same representative sample. It is important that when samples are being taken by this method, a constant rate of flow of the product is involved. If there is a variation in the flow rate, the sampling cock must be carefully regulated to ensure that the full sample is taken at a constant rate.

Certain products, such as those reacting dangerously with water and/or air and corrosive liquids or liquefied gases, cannot be sampled by normal means. It may also be dangerous to keep samples of some products for too long as they become unstable.

Labelling of samples

All samples jointly taken should be properly labelled and sealed and identical sets should be kept by all parties. Should shippers refuse to seal the samples jointly, then an appropriate entry should be made in the log book. They should be unilaterally labelled and sealed by the ship's staff and/or the independent surveyor representing the carrier. The samples themselves must, of course, be identical to those taken together with the shippers and the latter must be notified in writing immediately, to confirm the joint sampling and record their refusal to seal these identical samples jointly with the carrier.

The attention of owners is also drawn to the undesirable practice in many ports of the chief officer being asked to sign paper labels which bear the names of the ship, the shippers, the product, the ship's tank, the date and place of sampling, a seal number (such as the one to appear later on the wax seal) and the signature of shippers' inspectors before the loading operations have been completed or sometimes even before they have started. These labels are later attached to the sample containers after they have been filled and closed.

It cannot be too strongly emphasized that the only way to be certain that the proper label is put on the proper sample container is for the ship's staff to participate in the whole procedure of sampling and sealing and to insist that the sealing and the labelling should take place onboard the ship. All labels should be properly dated and should indicate the local time when they were drawn, name of the product and its destination, the name of the shippers and whether the sample was drawn conjointly with them. The label should also record the quantity, tank number, the tank ullage and temperature, the bill of lading and voyage number and whether it is a manifold, pipe line, 'first run' or 'average' ship's tank sample after completion of loading. Care must be taken that all these necessary details will remain legible by the use of permanent washable ink. Having signed the labels, the ship is entitled to retain a set of the samples.

Storage of samples

Samples should be stored in a dark, well-ventilated place where daylight cannot enter and away from sources of heat, from living quarters and foodstuff storerooms. Edible oils and chemicals should be stored separately. Samples should be contained in clean, dry and airtight containers, preferably of glass, tinned steel or a plastic material which will not become affected by the contents. They should be closed with corks or suitable plastic stoppers.

A sample log book should be maintained recording the sample number, the sampling date, place, ship's tank, quantity and kind of product, name of shipper and place of shipment, name of consignee and place of discharge, where stored onboard, and notes on disposal. It is suggested that samples be retained for a period of three months after the ship has discharged.

The carriage of liquid bulk cargoes requires careful sampling as an essential part of the operation. If this is performed in accordance with the procedures set out in this article it will be of considerable assistance in repudiating unjustified claims brought against the ship.

Sampling instruments

Various types of instruments designed to facilitate sampling are obtainable in most major ports. They may be made of glass, stainless steel, aluminium, etc., so that a choice of material is available to ensure that the instrument is compatible with the cargo carried. It is generally advisable to avoid instruments made of copper or copper based alloys.

Sampling instruments should be simple, robust and easy to clean. On the following pages a number of instruments are shown in diagram form together with their descriptions. The Association is grateful to the British Standards Institution for allowing material from B.S.627 to be reproduced.

Sampling instruments for bulk oil shipments and some other liquid bulk cargoes



Fig1. Sampling bottle or can

The sampling bottle is suitable for sampling large ships and tanks of liquid oil. It consists of a bottle or metal container, which may be weighted, attached to a handle long enough to reach to the lowest part to be sampled. It has a removable stopper or top to which is attached a suitable chain, pole or cord. This device is lowered to the various desired depths, where the stopper or top is removed and the container allowed to fill



Fig2. Sampling tipping dipper

The tipping dipper consists of a cylinder approx. 6" (150 mm) long and 2" (50 mm) in diameter, carrying an extension with a hole at its closed end and a stout wire handle at the open end; the handle carries a small metal catch and a rope. The cylinder is inverted in the position shown on the left, and maintained in that position by the insertion of the catch into the hole, and then sunk into the oil in the tank; at the required depth the rope is twitched to release the catch, where upon the cylinder rights itself and becomes full of oil



Fig 3. Go devil' sampling bottle

The 'Go devil' sampling bottle consists of a bottle, heavily weighted at the bottom, approximately 12" (300 mm) long, 3" (75 mm) body diameter and approximately 1" (25 mm) body diameter and approximately 1" (25 mm) neck diameter, with a chain attached. On being placed in oil in a tank it drops so quickly that it does not begin to fill with oil until it reaches a fixed position



Fig 4. Bottom sampler or zone sampler

The bottom sampler or zone sampler is suitable for withdrawing bottom samples or zone samples at any level from tanks of liquid oil. To withdraw a bottom sample the apparatus is attached to a cord or chain and lowered empty to the bottom of the tank, when the central spindle valve automatically opens and the container fills from the bottom. On withdrawal of the sampler the valve automatically closes again. To withdraw samples at any level the apparatus is lowered empty to the required level and then, by means of an additional cord attached to the top of the central valve spindle, the valve may be opened and the container filled. When the sampler has filled, the valve is allowed to close and the container is withdrawn