



## Chapter 19 – Samples and Sampling in the Carriage of Liquid Bulk Cargoes

The period of the carriers' responsibility for liquid bulk cargoes, under the Hague and Hague-Visby Rules, extends from the time when the cargo is loaded until the time it is discharged, including the loading and discharging operations (Reference 29). Under the Hamburg Rules, which came into effect in 1992, the carrier, servants and agents will be responsible from the time the cargo is received by them at the load port until the time it has been delivered at the discharge port (Reference 31).

The carrier, the Master or agent is required to issue to the shipper a B/L showing, among other things, the apparent order and condition of the cargo as received on board. 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 load and discharge ports and these, together with the nature of the cargo, are important factors. Most B/Ls include the words 'shipped in apparent good order and condition'.

As there is a wide variety of liquid cargoes carried and many different types of ships involved, the subject of sampling is necessarily a very wide one. This chapter deals with 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. The samples are numbered and details entered in a sample logbook.

An 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 discharge port. It is sometimes the case that sampling by shippers at the load port is not witnessed by ship's officers and samples allegedly drawn from ship's tanks are handed to the ship's personnel just prior to departure, underlining 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 P&I Club's correspondents so that expert advice may be sought and samples analysed at the load port. In case of serious doubt about the condition of the cargo, B/Ls should not be signed until the results of the analysis are available.

It should be emphasised that, as with bulk or general cargo, the description on the B/L 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 that the carrier has no means of checking.

In most instances, the ship's personnel cannot question the condition of a product upon loading, unless they detect the presence of free water, haziness or dull appearance, a strong foreign odour or an obvious deviation in the colour of the product.

It is, therefore, important that samples 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 load port samples have been drawn and retained on board, 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 that takes place prior to loading, the shipper 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 available. The ship's personnel 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 as the shipper may have found the product to be only slightly off-specification and 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 personnel being aware of it.

Carefully cleaned tanks, compatible tank coatings and well maintained pipelines, heating coils, valve systems, hoses and pumps are essential.

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. Sampling after the first run of cargo has been loaded, after completion of loading and prior to discharge is important if analysis of 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 emphasised that it is the duty of the ship's crew to assist shippers and/or consignees 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 on board.

## 19.1 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 a specification that, in most cases, relates 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 for ship's officers to detect anything 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's 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, extremely important. Claims lodged at the discharge port 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 on board ship and for a B/L 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, particularly at the load port, and must see that their interests are properly protected.

## **19.2 Sampling**

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

- 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.

### **19.2.1 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 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 on board. These tankers are generally used for a variety of commodities, including both vegetable and mineral oils, and their cleanliness should not always be assumed. 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. When loading is 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.

### **19.2.2 Sampling During Loading**

The first requirement is that, on commencement of loading, samples are taken from the ship's manifold or first run 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 are split between the parties. Whenever loading operations are interrupted and hoses, pumps or line systems are changed, sampling of the relevant ship's tanks before and after the changeover will be necessary unless it is certain that the 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. For 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.

### 19.2.3 Load Port Samples other than those Taken by the Carrier

Samples are sometimes handed to the ship to be delivered to the consignees in accordance with the seller's contractual obligations. In such cases, ship's personnel will be unaware of 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 will conform to the required specification while the cargo on arrival does not. At the discharge port, such shipper's loading samples are collected by inspectors appointed by the shipper or consignees, who may also measure and sample the ship's tanks. Samples drawn at the load port jointly by ship's officers and shipper's representatives may then serve to prove that the samples handed to the ship's personnel for delivery to consignees do not represent the true condition or quality of the cargo.

### 19.2.4 Sampling Before Discharge

On arrival at the discharge port, and immediately after tank ullages and temperatures have been carefully checked, samples should be taken of all cargo on board. 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 on the product. Where a cargo 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 whether 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 P&I Club correspondent to arrange for attendance of an independent surveyor and for analysis of loading samples.

## 19.3 Sampling Procedures

Cargo sampling is a process that requires careful attention and each sample must be representative of the product concerned. Continuous sampling at the ship's manifold to obtain a so-called 'ship's rail composite' sample, while 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. The most important samples are 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. 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.

The importance of cleanliness cannot be too strongly stressed. All sampling work should be carried out with clean hands and, where protective clothing is necessary, such as in the case of toxic products, clean gloves of a suitable material should be worn. The apparatus used should be of a suitable material that does not react chemically with the cargo being sampled. Various types of sampling bottle can be used, particularly in large tanks, but if glass bottles are employed, 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 extensively 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, 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 corrosive liquids, liquefied gases and products that react dangerously with water and/or air cannot be sampled by normal means. It may also be dangerous to keep samples of some products for too long as they become unstable.

## 19.4 Labelling of Samples

All samples taken jointly should be properly labelled and sealed and identical sets should be kept by all parties. Should shippers refuse to seal the samples jointly, an appropriate entry should be made in the logbook. They should be unilaterally labelled and sealed by a ship's officer and/or the independent surveyor representing the carrier.

The samples themselves must 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 any refusal to seal these identical samples jointly with the carrier.

In some ports, the chief officer may be asked to sign paper labels that state the name 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. This practice should be discouraged as the only way to be certain that the proper label is put on the proper sample container is for ship's personnel to participate in the whole procedure of sampling and sealing and to insist that the sealing and the labelling takes place on board the ship.

All labels should be properly dated and should indicate the local time when they were drawn, the name of the product and its destination, the name of the shippers and whether the sample was drawn jointly with them. The label should also record the quantity, tank number, the tank ullage and temperature, the B/L and voyage number and whether it is a manifold, pipeline, first run or average ship's tank sample after completion of loading. Care must be taken that all these details will remain legible by using permanent washable ink. Having signed the labels, the ship is entitled to retain a set of the samples.

## 19.5 Storage of Samples

Samples should be stored in a dark, well-ventilated place where daylight cannot enter and away from sources of heat and 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 that will not become affected by the contents. They should be closed with corks or suitable plastic stoppers.

A sample logbook should be maintained recording the sample number, the sampling date and 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 on board and notes on disposal. Samples should be retained for a period of three months after the ship has discharged.

## 19.6 Sampling Instruments

Sampling instruments may be made of glass, stainless steel, aluminium, etc, and it is important to use an instrument made of a material that is compatible with the cargo being sampled. It is generally advisable to avoid instruments made of copper or copper-based alloys.

Sampling instruments should be simple, robust and easy to clean. Figures 19.1 to 19.4 illustrate sampling instruments for bulk oil shipments and some other liquid bulk cargoes. The Association is grateful to the British Standards Institution for allowing material from BS EN 627:1996 to be reproduced (Reference 32).

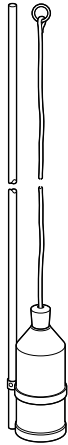


Figure 19.1: Sampling bottle or can.

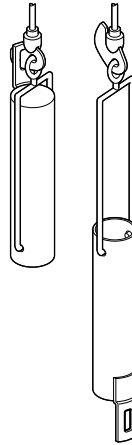


Figure 19.2: Sampling tipping dipper.

The sampling bottle (Figure 19.1) 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 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 desired depth, where the stopper or top is removed and the container allowed to fill.

The tipping dipper (Figure 19.2) consists of a cylinder approximately 6 inches (150 mm) long and 2 inches (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, whereupon the cylinder rights itself and fills with oil.

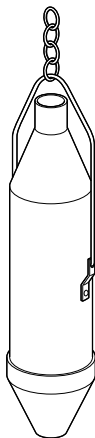


Figure 19.3: 'Go Devil' sampling bottle.



Figure 19.4: Bottom, or zone, sampler.

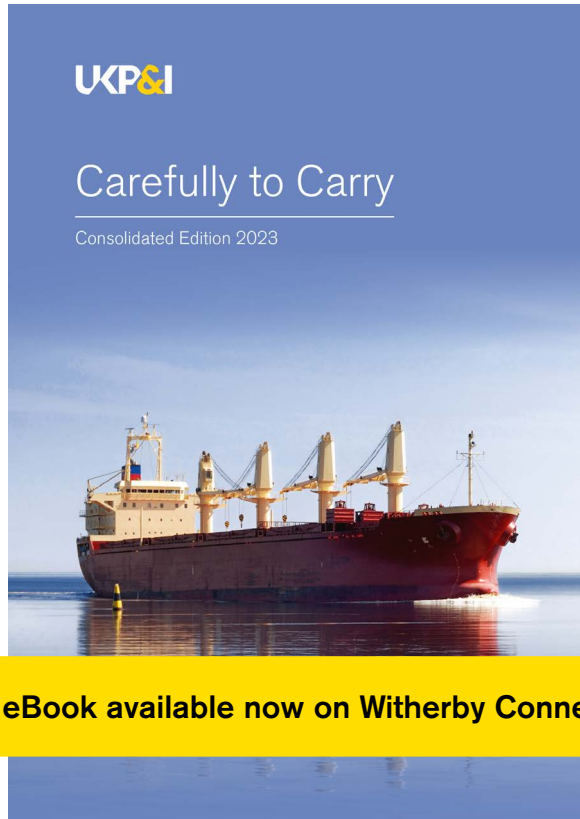


The 'Go Devil' (Figure 19.3) sampling bottle consists of a bottle, heavily weighted at the bottom, with a chain attached. When placed in oil in a tank, it drops so quickly that it does not begin to fill with oil until it reaches a fixed position.

The bottom sampler, or zone sampler, (Figure 19.4) 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. On contact with the bottom, 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.



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