



Exceeding Expectations

Sampling Under Closed vs. Open Conditions

One of the biggest problems encountered in today's inspection world is sampling under closed conditions. What does this mean for you and how does it affect the samples we draw?

In the good old days, inspectors could open vessel product compartment hatches to the atmosphere and draw samples using a bottle and rope (Fig.1.).



Fig.1. Hatch

With the onset of today's environmental concerns and laws, the opening of ship / barge compartments to the atmosphere is largely prohibited in many ports around the world thus the term "**sampling under closed conditions**" is derived.

Here's a simplified explanation...

The most representative methods of sampling a tank is one, an all-levels sample and two, a running sample. (These are referenced in our Tech Talk # 0001). **The all-levels sample method** is described as lowering a stoppered bottle to the lower part of the tank, then popping the corked bottle open and pulled up at a uniform rate. **The running sample method** is described as lowering a un-stoppered bottle to the lower part of the tank and pulling up at a uniform rate.

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With both of these methods, the inspector has full control of the rope and knows, by feel, the sample is captured correctly.

In today's environmentally driven world, when an inspector opens a ship / barge compartment, it is usually under pressure. This is due to inert gas which is used to reduce the oxygen content (to minimize the risk of explosion) and the vapor pressure of the cargo.

In order to control the escape of vapors to the atmosphere, ships and barges are now equipped with vapor locks which prevent inspectors from opening hatches to sample with a bottle and rope.

What is a vapor lock? It is a valve equipped with either a threaded connection or a quick connect piece (Fig.2.).



Fig.2. Vapor Locks



Fig.3. Sampling Device

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The use of vapor locks is a great idea in terms of controlling emissions, however the downside is it is often difficult to obtain good representative samples when vapor locks are present. The sampling device (Fig.3.) is attached to the vapor lock and as the device is gas tight, it literally becomes an integral part of the tank. Within the device is a sampling tube attached to a steel tape so that the tube can be lowered into the liquid and a sample obtained. Because the inspector uses a winding device to lower the sample tube into the product, the inspectors "feel" is non-existent so it is difficult to judge whether a good sample is obtained. When inspectors sample with a bottle and a rope, they are able to obtain more accurate and representative samples.

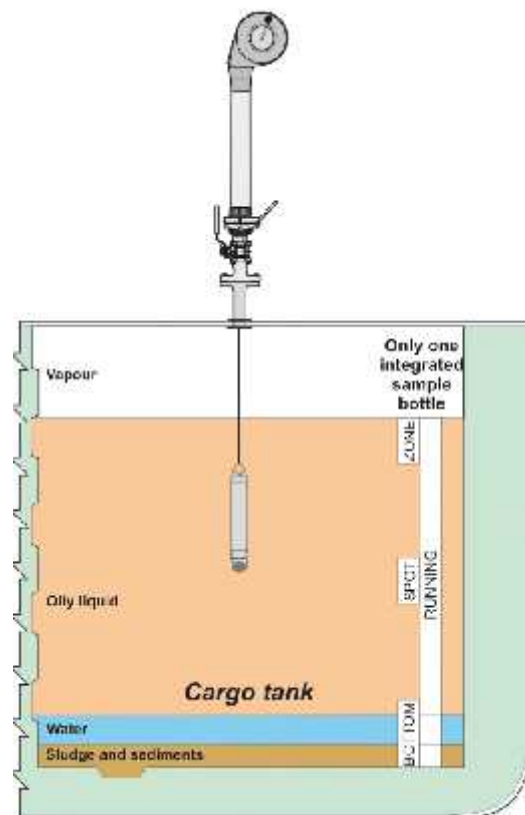


Fig.4. Vapor Lock Sampling

Other problems associated with closed sampling are:

1. Vapor lock sample tube diameter is usually 2 inches therefore reducing the amount of sample taken usually a pint of sample can be obtained; not enough to run an octane therefore additional sampling time is required.

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2. Sample tubes are stainless steel and the design is such that it impossible to judge if an 80% representative sample has been obtained.
3. As the device has a single tube, this same tube is used for all cargo tanks, therefore potentially cross contaminating other samples from a contaminated cargo tank. When we perform open hatch sampling, we use new bottles for each sampling, therefore eliminating any cross tank contamination.
4. The vapor lock itself may be contaminated and can contaminate our sample.
5. Some ships have vapor locks that do not fit the closed sampling equipment available in the USA resulting in the use of the ships own equipment which can be of questionable cleanliness.

To summarize, the major issue of closed sampling is the inability to draw representative samples of blended cargoes on board the vessel. The only effective way to sample such a cargo is good running averages samples which we cannot accurately obtain due to using these devices. Therefore, it is necessary to obtain multiple level samples from each ships tank and make composites. This is very time consuming and usually very frustrating because of the 'hit or miss' of matching the pre load hand blend results with the final vessel composite sample.

Amspec recommends when loading multi-component cargoes, arrangements are made to open sample the cargo after loading at a location where opening the hatches is permitted.

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