

Petroleum and Petrochemical Bulletin

Composite Samples Prepared Outside the Laboratory

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TIC Council Member Companies are frequently asked to prepare composite samples in non-laboratory environments such as the deck of a marine vessel or on the top of a shore tank. These samples are often referred to as “Deck Composites” or “Field Composites”. While such samples may be considered necessary as a matter of expediency, TIC Council would like to point out that the use of such composite samples and any analysis derived from them can be very problematic.

Attention is drawn to Section 9.3.2 of ASTM D 4057 / API MPMS Chapter 8.1 *Standard Practice for Manual Sampling of Petroleum and Petroleum Products*:

9.3.2 Deck Composites—Periodically field “deck composite samples” are requested. A deck composite is typically made by compositing a portion of each sample obtained from all vessel compartments containing a particular product or crude oil grade. The samples are not normally homogenized before compositing and are typically not volumetrically composited based on the quantity in each vessel compartment. It is for these reasons that deck composite samples are typically not considered representative of the product sampled. The sample label shall clearly read “deck composite sample.” Deck composite samples are not recommended for volatility testing, such as Vapor Pressure, as described in the applicable test methods.

Expanding on the above, there are four primary concerns associated with compositing samples in a non-laboratory environment.

1. To be representative, composite samples must be volumetrically proportional to the source material. Marine vessel tanks can vary considerably in size and a composite sample must accurately reflect this variability. In most cases the capability to do this with the required accuracy is not available outside of a laboratory. Even the accuracy in preparation of equal volume composites such as a composite of upper, middle and lower samples may not be acceptable under field conditions.
2. Whenever composite samples are made, the transfer of material from one container to another increases the risk of loss of representation from such issues as the loss of light ends or due to suspended material, including water, cat fines, heavy metals, etc., adhering to the sides of the original container. Laboratories have the capability to reduce these risks by chilling samples, using mechanical mixers or other techniques that are not available in field environments.
3. In field environments contamination of the composite sample from rain, snow, and dust, along with limited capabilities to clean transfer equipment such as funnels, cylinders, etc. can lead to contaminated or, again, unrepresentative samples.
4. Additional handling of samples increases safety and environmental risks relating to spillage, personal exposure, etc. These risks are mitigated when handled in a laboratory.

Revisions/Reaffirmations

Rev. 0 October 2018
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While Section 9.3.2 of ASTM D4057 specifically refers to “Deck Composites”, the limitations highlighted above are applicable to any composite made under similar circumstances.

Noting the above issues, TIC Council recommends that composite samples prepared in non-laboratory environments should be avoided and that its members’ clients review their current sampling instructions and explore alternatives to this type of sample. Reference could be made to EI HM 92 for model sampling plans.

The reason most frequently given for preparing deck composites is to provide a sample to be retained on board after a ship has loaded. However, the issues noted above, coupled with uncertain sample storage conditions on board, generally lead to these samples being rejected in the case of a dispute.

TIC Council Petroleum and Petrochemical Committee

Rue du Commerce 20-22 B-1000 Brussels Belgium

Tel: +32 2880 21 38

secretariat@tic-council.org

www.tic-council.org