

Petroleum and Petrochemical Bulletin

**Recirculation sampling
(also referred to as pump stack sampling)**

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Introduction

TIC Council member companies are, on occasion, asked to take “Recirculation Samples”, also referred to as “Pump-Stack samples”. This type of sampling is typically requested for cargoes which are highly hygroscopic¹ and/or when cargo tanks are nitrogen blanketed so as to avoid ingress of moisture or oxygen. It is also possible that this may be the only method available to obtain cargo samples, particularly on specialized chemical tankers where the construction characteristics of the vessel allow for no other method, or when the harmful properties of the product require personal exposure to be minimized.

On marine vessels, this process is usually limited to cargoes carried in tanks equipped with individual deep well pumps. Recirculation is achieved by pumping cargo back into the tank (after loading or before discharge), via a drop line or other suitable return line, and the material is sampled from a draw off valve close to the pump-stack (hence the name – pump-stack sample), located on deck, directly above the pump itself. While less common, some shore tanks also have a recirculation capability.

Sample Designation

TIC Council member companies are being asked to take these samples as alternatives to:

- Shore Tank samples
- First foot samples
- After loading samples
- Before discharge samples

A definition for, or a description of how to perform recirculation sampling is not currently provided in any internationally recognized petroleum standards, such as API, ASTM, EI GOST, ISO, etc., as used by the inspection industry. It is not known whether recirculation samples are the equivalent of the samples they are replacing.

Samples are taken while the cargo is being recirculated. How effective recirculation is in achieving homogeneity of the cargo to be sampled will depend upon many factors including the design of the recirculation system and the amount of time allowed for recirculation. Generally, it will not be possible for the inspector to determine if the cargo is homogeneous or if the sample was representative of the cargo.

According to API MPMS Chapter 8.1 / ASTM D4057 - Standard Practice for Manual Sampling of Petroleum and Petroleum Products, a sample obtained in this way is considered a spot sample. Section 3 of this standard defines a spot sample as, “*a sample taken at a specific location in a tank or from a flowing stream in a pipe at a specific time*”. **It should be noted that the representative nature of a spot sample always remains unknown.** Recirculation

¹ Recirculation samples are also commonly taken on LPG/Chemical Gas cargoes. In this case, open hatch sampling is not possible due to the nature of the cargo and spot sampling during recirculation remains one of the few options available; however, the limitations of this type of sampling remain, regardless of the material being sampled.

<u>Revisions/Reaffirmations</u>	
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Reaffirmed	August 2021

samples will only represent the part of the cargo present at the point of sampling and which was drawn by the pump at that specific date and time.

Precautions and recommendations

Recirculation/pump-stack samples should not be used in lieu of traditional manual samples without the express agreement of all parties.

Additionally, as recirculation/pump-stack samples are not defined in any international standards, the details of how they will be taken, length of recirculation time, etc., should be specified in either the client instructions and/or the order confirmation to the client.

Where defined samples, such as upper, middle, lower, etc., are specifically required, such as in a Letter of Credit, by contract or by regulation, it is likely that recirculation/pump-stack samples cannot be substituted for the defined samples without the customer obtaining the express agreement of the parties in question. TIC Council member companies are not in a position to assist in this.

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