

The strategic importance of placing a Process NMR system at the pipeline point of entry

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The strategic importance of placing a Process NMR system at the pipeline point of entry is to verify that the pipeline tender is fully intact and meets delivery specifications. Placement of the on-line analyzer at the point of entry verifies that the supplier's product tender is on specification. Thus, removing liability of the supplier should such product tender experience changes/contamination during pipeline transmission to the end user.

Placement at the point of entry also provides the supplier with an early warning should the product tender properties not meet the desired qualities due to issues such as:

- Stratification of product while in delivery storage tanks prior to shipment.
- Detrimental co-mingling with tank heels from previous tender.
- Asphaltene precipitation (plugging).
- Water Separation which typically causes corrosives.

With this early warning, the supplier can take early corrective actions (i.e. diverting tender to upstream holding tankage) such that improper delivery to the end user is avoided. Once the improper material is segregated, corrective measures can be applied (i.e. blending to specification, re-processing, etc.).

The properties measured rapidly and simultaneously, such as those listed below, fall into three types of information:

1. Quality/Value Measures:
 - a. Distillation Cut Point: IBP; Cumulative Yields at 150°C, 220°C, 350°C, 520°C
 - b. Density at 60°C
 - c. Simulated Distillation: T10, T30, T50, T70, T90.
 - d. % Sulfur
2. Performance Measures:
 - a. TAN (Total Acidity Number)
 - b. Asphaltenes
 - c. Water
3. Integrity Measures:
 - a. TAN (Total Acidity Number)
 - b. Asphaltenes
 - c. Water

Quality/Value Measures are typically set by the end user. The distinctiveness of crude oil is defined by the Distillation Cut Point. Any undesirable mixing between different types of crudes will appear immediately through these measurements. The fluidity of the crude oil is mainly defined by its density as the pipelines have restrictions on the level of crude density. Sulfur concentration is one of the major parameters of the crude product and indicates the propriety of the stream.

Performance Measures are used to ensure the proper operation of pipelines and process units. TAN is a measurement that is critical in defining the corrosive capacity of the crude oil for protecting the integrity of the pipeline. Asphaltenes are critical in defining and avoiding pipeline plugging and fouling.

Integrity Measures are used to ensure storage tank and pipeline tender integrity, as TAN, Asphaltenes and Water are immediate indicators of improper co-mingling (crude incompatibility and/or tank heel mixing) and tank stratification.

Best Regards,
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