ALBEMARLE®

UNIT PERFORMANCE EVALUATION

Albemarle strongly advises the refinery to monitor the unit closely. In order to make accurate judgment of the unit performance, the following information is required:

- Actual loading diagram of the reactor with the actual weights and volumes of the catalysts loaded into the reactor.
- Presulfiding and start up report (will be prepared by Albemarle when the start up is witnessed by Albemarle)

To be able to follow the performance of the unit on a daily basis, there are a minimum number of parameters that needs to be tracked. These are given in the table below:

DAILY DATA

Minimum information required	<u>Conditions:</u> • Feed rate • Origin of all feed components • Reactor temperatures • Pressures • Make up, quench and recycle gas rates • Purge rate • H_2 purity of make up and recycle gas <u>Feed and product quality:</u> • Feed/product sulfur • Feed density • Feed Distillation(D86, D1160 for VGO)
Additional information	<u>Feed and product quality:</u> • Crude source(s) • Density • Nitrogen • Distillation Simulated distillation (D2887) • Aromatics • Bromine number • Cetane number • Metals • Con carbon (for VGO only) • Asphalthenes (for VGO only) <u>Other</u> • Full GC analyses of make up and recycle gas • Product yields (wild naphtha, …)

However good and accurate unit monitoring can only be done with good and complete unit data and feed/product analyses. Albemarle realises that it is not always possible on a daily basis. Therefore, we strongly recommend performing testruns on the unit on a regular basis to collect as complete a set of data as possible.

TESTRUN (DATA & SAMPLES TAKEN WHEN OPERATING STEADILY)

Minimum information required	<u>Conditions:</u> • Feed rate • Origin of all feed components • Reactor temperatures • Pressures • Make up, quench and recycle gas rates • Purge rate • H_2 purity of make up and recycle gas <u>Feed and product quality:</u> • Feed/product sulfur • Feed/product nitrogen • Feed/product density • Feed distillation (D86, D1160 for VGO) • Feed bromine number • Feed aromatics • Feed con carbon (for VGO only) • Feed asphalthenes (for VGO only)

Additional helpful information	<u>Feed quality:</u> • Cetane number • Metals • Analyses indicated above for all feed components having a different origin • Simulated distillation (D2887) <u>Product quality:</u> • Distillation (D86, D2887; D1160 for VGO) • Aromatics • Cetane number • Con carbon (for VGO only) <u>Other</u> • Full GC analyses of make up and recycle gas • Material Balance with product yields (gas, wild naphtha etc …)

In cases where the unit is not performing satisfactorily, Albemarle will request for additional data and/or feed/product analyses.