Diesel Hydrotreater Catalyst Fouling Investigation

Presented at Crude Oil Quality Association Meeting in Houston 22nd October 2009

Ryan Couzens
Time Line of Major Events

- Jan 2009 - routine feed samples indicate high levels of Silicon in Diesel Hydrotreater Feed
- April & May 2009 – Diesel hydrotreaters show rapid catalyst deactivation
- July & Aug 2009 – Spent catalyst samples indicate Silicon as the primary contaminant
Investigation

- Feb through October 2009 – undertake a significant investigative effort to understand source of catalyst deactivation
  - Multi-discipline team is formed to support investigation
  - Involved multiple laboratories testing many Refinery streams for potential catalyst poisons
  - Involved technical specialists from
    - Crude production
    - Refinery technologies
    - Laboratory analysis
Findings

- Reactor catalyst samples indicate significant concentrations of Silicon present, which is sufficient to explain rapid deactivation of catalyst.
- The amount of Silicon present on the catalyst cannot be explained by Coker antifoam injection – or other Refinery source.
- There is a high degree of confidence that the source is a single specific crude.
- Hypothesis:
  - Silicon based anti-foam (PDMS) added during crude oil production is breaking down in the Coker to cause high levels of Silicon in Coker products.
Path Forward

- Continue to investigate silicon levels in crudes recently processed
  - Until now testing has concentrated on refinery intermediate streams because of the suspicion that inorganic Silicon would lead to misleading analysis of Crude Oil.

- Continue to work with Trading and upstream to determine if any silicon based additives are used in the oil fields that supply the refinery.