



Diesel Hydrotreater Catalyst Fouling Investigation

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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.