CCQTA Project Activities
Update for the COQG

September 29th, 2005
Projects List

• Heavy Oil BS&W
• Phosphorus in Crude
• TAN Project
• NGL Contamination
• Heavy Oil Emulsion Viscosity
• Heavy Oil Methods Manual
• Additive Impact - proposed
• Olefins Test Method
Heavy Oil BS&W Project Status Report

September 21st 2005

Project Manager: Jack Suggett
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Heavy Oil BS&W
Participants - 21/09/05

- Baker Petrolite
- Champion Technologies
- Conoco Phillips
- Encana Corporation
- GE Betz
- Maxxam Analytics
- NCUT
- Suncor Energy

BP
CITGO
Enbridge
ExxonMobil
Husky Oil
Nalco Canada
Petro-Canada

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Heavy Oil BS&W Project Status

• Phases 1 & 2
  – No clear correlation between the abundance/composition of filterable solids and heavy oil processability

• Phase 3
  – Exploring the possible role of other factors:
    • Role of organic sediment (additives, natural chemicals) on desalter interface stability/fouling
    • Impact of blended crude/crude incompatibility on asphaltene precipitation at interfaces
    • Possible role of foulant precursors (eg. metals) on above

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Heavy Oil BS&W Project Status

• Phase 3 - extended
  • Extensive work undertaken to finalize the development of the “organic” extraction procedure
  • Identified the presence of surface active materials in raw crude samples & desalter interfaces
  • Scheduled to test “problematic” crudes to determine role of “organics”
  • Investigating a possible role for iron induced sludge formation in desalters
Phosphorus in Crude Participants - 21/04/05

- B.J. Services
- Chevron Canada Resources
- Clearwater Inc.
- Enerchem
- Halliburton Energy Services
- Imperial Oil Limited
- Maxxam Analytics
- Nalco Canada
- New Alta Corporation
- Petro-Canada
- United Refining

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September 27, 2005
Phosphorus in Crude
Project Status

- Project participants have developed alternative “low-volatile” chemistries, and field treatment options.
- CAPP Crude Oil Quality Committee has reviewed CCQTA work and imposed a phosphorus in crude spec of 0.5 wppm in the distillate fraction effective July 2005.
- Enforcement of spec scheduled to begin July 2006.
Phosphorus in Crude Project Status

- Preliminary CAPP testing indicates phosphorus volatilities much greater than anticipated from frac fluids
- Ongoing activities include:
  - Confirm volatility of frac gellants
  - Determine if new high volatile additives are being used
  - Evaluate pilot plant fouling tendencies of “low volatile” alternatives
TAN Project- Phase 2
Status Report
September 21st 2005

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TAN Project
Participants - 21/09/05

- Alberta Research Council
- BP
- Enbridge Pipelines
- GE Betz
- Marathon Petroleum
- Nalco Canada
- Petro-Canada
- Suncor Energy
- Total

- Baker Petrolite
- Conoco Phillips
- Encana Corporation
- JACOS
- Maxxam Analytics
- NCUT
- Shell
- Terasen Pipelines

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TAN Method Modifications

- Agreement reached between labs on appropriate method modifications
- Modifications do not alter the solvent ratios use in ASTM D664
- Mini-round robin completed with Lloyd Blend (pipeline spec) and Athabasca bitumen
- Method modifications to be published

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September 27, 2005
## Mini Round Robin TAN Results

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<th>Run</th>
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Corrosivity testing

- Corrosivity testing completed on MacKay River (MKH pipeline blend) gas oil, SJV (low TAN) gas oil, and SJV (high TAN) gas oil
- Approval has been received for provision of samples from the Albian gas-oil cut for corrosivity testing
- Results support hypothesis that Athabasca oilsands product is not as corrosive as the TAN would suggest
- Potential exists for testing a fifth gas oil sample

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NGL Contamination
Participants - 20/09/05

- ARC
- BP
- Keyera
- Maxxam
- Pall Filters
- Provident Energy
- Alberta Envirofuels
- Dow Chemical
- Imperial Oil
- Nova Corporation
- Petro-Canada

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NGL Contamination
Project Objectives

– Confirm the existence of a “common cause” contamination at multiple locations.
– Track contamination from affected plant(s) to source.
– Identify critical activity/process responsible for foulant generation.
– Develop management process to help reduce/eliminate contamination at source.

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NGL Contamination Activities

– Determined that fC₄ delivered to end users contain sediment, polar organics & asphaltene

– Preliminary results suggest that contamination during pipeline transport (batched with condensate) has minimal impact

– Evidence to suggest that NGL contamination is carried through to fC₄ during distillation

– Conformational work to be completed by the end of November
Heavy Oil Emulsion Viscosity Project Status Report

September 21st 2005

Project Manager: Graham Derby
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Heavy Oil Emulsion Viscosity Project - Phase II - Design Concept

- Phase I findings indicated that current viscosity models take into consideration only the amount of water present in an emulsion
- Other factors are likely significant
- Propose to gather the following field data;
  - pressure drop in existing gathering system piping
  - operating and configuration information
- Compare measured pressure drop against calculated pressure drop provided for the tested facilities
- Establish adequacy of current modeling software

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Phase II – Activities

• Gather information from participants on available facilities for measurement

Step 1
• At each facility:
  – Gather information on gathering system
  – Select wells to be tested

Step 2
  – Measure pressure drop on selected wells
  – Gather production and configuration information on tested wells – data to remain confidential

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Phase II - Activities

Step 3
• Calculate pressure drop for each measured well, using measured test conditions as input
• Compare output results to measured test data
• Establish whether current commercial models are adequate for pressure drop calculations

Cost per site – Step 1: Estimated at $2000 per site
• Steps 2 & 3: To be determined based on input from step 1, i.e., number of wells to be tested, etc.

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Objective

• Provide a document to assist users of heavy oil methods with an understanding of their capabilities and limitations and allow users to make informed decisions on method selection
  – Users include: analytical chemists, researchers, site engineers and marketing personnel

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Scope

- Density
- Viscosity
- Sulphur
- BS&W

- Asphaltene
- TAN
- Distillation
- Chloride Testing

- Water & solids cleanup techniques

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September 27, 2005
Deliverables

• PDF document outlining heavy oil and bitumen methods, their pros and cons, applicability and limitations, helpful hints and reference to round robin results
• Manual to be updated & maintained as required
• Manual provided to Project/CCQTA membership (to be determined by funding protocol)
• Manual made available to interested third parties, at a cost
Additive Impact
Proposed Project

September 20th 2005

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September 27, 2005
Objective

- Improve awareness of commercially used chemistries used in all up-stream activities in the petroleum industry.
- Share information with refinery technical staff in order to improve their awareness of chemistries used in petroleum production.
- In return, obtain from refinery technical staff information regarding sensitive products, processes, and chemistries
- Assist in future product development activities and possible testing of pre-commercialized additives.

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Scope

Phase 1 – Complete a thorough literature review and focus follow up work.

• Review/summary of books and publications on additive usage.
• Identify additives/applications for follow-up work.

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September 27, 2005
Scope

Phase 2 – Compile information specific to additives/applications.

- Summarize Additive Supplier in-house knowledge related to target additive/application.
- Review patent literature on additive/application if required.
- Undertake group discussions on expected additive fate of additive/applications.
Next Steps

- Phase 1 costs estimated at $20K
- Identify interested participants
  - Key participation required from Additive suppliers & Refiners sectors
  - Interest has been expressed by other parties (e.g. pipelines)
- Scope out third party activities
  - Conduct literature review
  - Communication between project participants

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Olefins Method Development

Project Status

Goal: To develop a new method for measurement of olefins in crude oil and condensate by H¹-NMR

• Method has been developed, tested and reviewed by CAPP COQC

• Test method to be posted on CCQTA website shortly