CCQTA Project Activities
Update for the COQG

May 26, 2005

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Active Projects List

• Heavy Oil BS&W – Phase III
• Phosphorus in Crude
• TAN Project – Phase II
• NGL Contamination
• Heavy Oil Emulsion Viscosity - Phase I/II
• Heavy Oil Methods Manual – in development
• Proton NMR Olefins Method Development
Heavy Oil BS&W Project Status Report

April 21st 2005

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Heavy Oil BS&W
Participants - 21/04/05

- Baker Petrolite
- BP
- Champion Technologies
- CITGO
- Enbridge Pipelines
- Encana Corporation
- ExxonMobil
- GE Betz
- Husky Oil Operations Ltd.
- Maxxam Analytics
- Nalco Canada
- NCUT
- Petro-Canada
- Suncor Energy

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Heavy Oil BS&W Project Objectives

• Quantify the impact of individual solids and water components of BS&W on various sectors.
  – Phase 1
    • Detailed analysis of solids at production facilities
  – Phase 2
    • “Cradle to grave” tracking of BS&W components from production facilities to refineries
  – Phase 3
    • Investigation of the impact of other variables
      – Organic sediment, compatibility, foulant promoters

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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
Heavy Oil BS&W Project Status

• Phase 3 - extended
  • Desalter testing modified to include multiple plant sites
    – BP Toledo – testing completed
    – BP Whiting – awaiting samples
    – Exxon Mobil Joliet – under consideration
    – CITGO Lemont – awaiting samples
Heavy Oil BS&W
Next steps

• Optimize filtration/extraction procedure
• Complete refinery testing program
• Review results at next meeting ~ June/July 2005
Phosphorus in Crude Project Status Report

April 21st 2005

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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
Phosphorus in Crude Project Objectives

- Identify the source of tower fouling in affected refineries
- Understand the fouling mechanism
- Develop alternative chemistries/applications designed to alleviate fouling

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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 agreed to impose a phosphorus in crude spec of 0.5 wppm in the distillate fraction.
Phosphorus in Crude Project Status

• Spec implementation date and enforcement policy awaiting approval by the Crude Oil Committee.

• Information to be posted on CCQTA Website, which will serve as technical resource for interested parties.
TAN Project- Phase 2
Status Report

April 21st 2005

Project Manager: John Van Heyst
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TAN Project
Participants - 21/04/05

- Alberta Research Council
- Baker Petrolite
- BP
- Conoco Phillips
- Enbridge Pipelines
- Encana Corporation
- GE Betz
- JACOS
- Marathon Ashland Petroleum LLC
- Maxxam Analytics
- Nalco Canada
- NCUT
- Petro-Canada
- Shell
- Suncor Energy
- Terasen Pipelines
- Total

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TAN & NAN Follow-Up

• Planned TAN & NAN follow-up activities nearing completion
• ASTM D665 (TAN) method can be made reliable for oil sands bitumen
• Proposed UOP-565 (NAN) sample wash step modifications not sufficient, further work proposed on this method
Corrosivity Testing

• MacKay gas-oil corrosivity test complete
• SJV gas-oil corrosivity test underway
• BCF sample in lab for distillation

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Additional Properties Testing

• Whole crude and gas-oil physical properties testing to be done once final sample distillation is complete

• Samples of whole crude and gas-oil cut collected for mass spec testing
  – NCUT paper shows that mass spec testing may not need to be done on distillation cut to provide gas-oil data
Project Status

• Concepts for Phase III under discussion
• Next project meeting to be upon completion of Phase II activities, anticipated for June

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NGL Contamination Project Status Report

April 21st 2005

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NGL Contamination Participants - 21/04/05

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

– Testing of foulant from multiple sites to establish “common cause” source.
– Review of NGL supply system to:
  • Determine supply source(s) to individual plants
  • Determine contaminant variability within supply system.

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Heavy Oil Viscosity Project
Status Report

April 21st 2005

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Heavy Oil Viscosity Participants - 21/04/05

- Champion
- Conoco
- Encana
- Maxxam
- Suncor
- Total

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Heavy Oil Emulsion Viscosity
Project Scope

• Literature search of available publications
• Review & summary of relevant publications
• Interview experts in the field
• Summarize existing state of knowledge in the area
• Propose potential Phase II activities to further the goal of accurate prediction of emulsion viscosities, specifically SAGD typical emulsions
Heavy Oil Emulsion Viscosity Project Status

• Literature review completed
  – 92 examined
  – 24 reviewed in detail

• Phase II conceptual proposal under consideration

• Phase II costs not yet developed
Heavy Oil Emulsion Viscosity
Potential Next Steps – Phase II

• Confirm whether rheometers are accurate for viscosity measurement of pipe flow
• Verify that study findings apply to oil sands bitumen
• Compare viscosity via pressure drop (onsite measurements) with predicted data from current models
• Interested parties should contact Project manager

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CCQTA Heavy Oil Methods Manual Project

Update for the COQG – May 26, 2005
Issues with Heavy oil Methods

• Most methods were developed for light crude oil or even for refined products
• Extension of method scope to medium crudes usually can be done without significant problems
• Methods frequently have problems when applied to heavy oils
  – e.g. sulfur content in heavy oil by XRF, method has an upper limit of 5 wt % due to quenching
Project Concepts Proposed

1. Produce revised ASTM methods
2. Produce a list of analysis methods used for heavy oils, with a discussion of the application issues and suggestions on how to work around them

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Revised ASTM Methods

1. Produce revised ASTM methods
   • Obtain permission to reproduce sections of ASTM methods
   • Revise to correct problems with heavy oil analysis
   • Distribute to interested parties
   • Quite costly for ASTM reproductions, also costly in terms of creation of ASTM type documentation

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Heavy Oil Method Issues

• Provide a list of ASTM, UOP, IP methods that are commonly applied to crude oils
• Study methods for potential issues in their application to heavy crudes & bitumens
• Review previously published materials to avoid covering old ground
• Decide on any studies or research necessary to delineate application issues and remediation

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Heavy Oil Method Issues

• Two significant sources were published on the topic of heavy oil analysis and related issues (no longer in print)
  • Syncrude Analytical Methods, Bulmer & Starr, 1979
  • Review of Analytical Methods for Bitumens and Heavy Oils, Wallace, 1988

• Also two relevant round robins were conducted
  • Alberta Committee on Oil Sands Analysis (ACOSA) round robin study, 1980 – 1988
  • United Nations Centre for Heavy Crude and Tar Sands, 1990 - 1995

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Path Forward

• Group consensus was to follow the approach of issues identification
• Publication of results to be done via new website page(s)
• Funding formula to be determined, potential for funding at a CCQTA level rather than a project level
• Results to be publicly available, not membership limited