CCQTA Updates

COQA October 5, 2017
Long Beach, CA
Overview

• Project Overview

• Updates on
  – TVP/RVP
  – H2S PVT
  – Crude Flammability
  – VLE Gas Composition Screening Method
  – TIOM
  – Open Forum
## CCQTA PROJECTS

### Participant Funded
1. Condensate Quality (closed)
2. Organic Chlorides (suspended)
3. Phosphorus (suspended)
4. TAN (closed)
5. Emulsion Characterization (active)

### CCQTA Sponsored
1. Bitumen Volumetric Correction (closed)
2. Bitumen Blend Viscosity (closed)
3. TVP/RVP
4. H₂S PVT
5. Crude Oil Flammability
6. Crude Compatibility Method
7. VLE Method Development
8. TIOM
9. Properties of Thermally Processed Material
10. Organic Chlorides in Distillate (not active)
11. Pipeline Corrosion
12. Pipeline Sour Service

### Sub-Committees
1. Condensate Quality (new)
2. Education (pending)
• **Project Highlights**
  - Widespread adoption of D6377 for accurate vapor pressure measurement.
  - ASTM D7975 published Jan 2015 (Field VP Tester)
  - ASTM D8003 published June 2015 (HPLIS Method)
  - ASTM D8009 published Dec 2015 (MPC Practice)
  - Vapor Pressure Best Practice was released in June 2017
    • Planning a minor revision to incorporate feedback from members

  - **Project is effectively closed.**
    • Few minor actions remaining including:
      - Updates to D8009 from ballot comments
H$_2$S PVT
H₂S PVT

• Progress to Date
  – Develop/source a field measurement tool/method that can be used to assess H₂S evolution risk.
  – Developed prototype field tester
    • Single phase sampling protocol
    • Sealed vapor expansion chamber
  – Initial prototype too large and complex for field deployment.
  – Initiated development of a miniaturized version of field prototype began in 2015
H₂S PVT

• **Field Tester Requirements**
  
  – Replacement for ASTM D5705 for use specifically fit-for-purpose for live crude oils/condensates.
  
  – Must have a wide operating range.
    
    • 1ppm to 2%
  
  – Must be robust and simplistic for field operability.
  
  – Coupled with FPC or MPC sample method
  
  – Could be used to develop V/L vs. H₂S evolution curves for different conditions.
  
  – Could be used for scavenger evaluation
Field Tester - Progress

• Milestones - REVISED

                      ✓ Short list of two technologies.

12 Months (Sept 2016) ✓ Progress evaluation and decision on project continuation.

18 Months (Mar 2017) ✓ Final decisions on technologies, functions and layout.

24 Months (Sept 2017) ✗ Complete 5 prototype units for field evaluation.
                      § 1 available in Nov 2017
                      § Preliminary lab/field trials Nov/Dec 2017

36 Months (Mar 2018)  § Deliver updated prototypes x 3
                      § Continue field trials
                      § Begin ruggedness testing
                      § Draft ASTM method
CRUDE OIL
FLAMMABILITY
Project Status

• Project work is complete.

• Phase 1 (summary):
  – Diluent blends >3% are considered class 3 PG I flammable liquids.

• Phase 2 (summary):
  – 10% blends did not sustain combustion
  – >10% Sustained combustion
  – Average burn time was 30 minutes for most dilbit blends and conventional crudes. MSW was the exception at 19 min.

• Next Steps
  – Draft final report
VLE GAS COMPOSITION SCREENING METHOD
VLE Gas Composition Screening Method

• **Synopsis**
  
  – Utilizes the MPC as an expansion chamber to create a known vapor-liquid-equilibrium condition.
  
  – Equilibrium vapor is transferred isobarically to a standard refinery gas analyzer and the composition determined.
  
  – Provides hydrocarbon and fixed gas (CO, CO\textsubscript{2}, H\textsubscript{2}, H\textsubscript{2}S, N\textsubscript{2}, O\textsubscript{2}) composition of the vapor phase.
  
  – Intended for use in screening the bulk of gaseous components present in the vapor that may contribute to vapor pressure but not identified by D8003.
  
  – Gases may originate from production or may be the result of pad gas or other gas addition during handling or transport.
VLE Gas Composition Screening Method

• **Status**
  - ASTM Standard Practice has been drafted.
  - Intended to submit to both D02.08 and D02.02 (API COMQ) for review and comment prior to submitting for ballot.
  - Potential for ballot in 2017/2018
CRUDE OIL COMPATIBILITY METHOD
Crude Oil Compatibility Method

Bases of Development of the New Method
Petroleum containing asphaltenes

- Deliberately precipitate asphaltenes by having excess non-solvent oil in a mixture of Aromatic + Paraffinic

- Adjusting the amount of solvent oil in the mixture of Aromatic + Paraffinic solvents to dissolve asphaltenes
Crude Oil Compatibility Method

• **Status**
  – Methodology has been finalized
  – Ruggedness testing round robin is in progress

• **Next Steps**
  – Draft ASTM method
  – Target completion March 2018
Toluene Insoluble Organic Material (TIOM) Project
Update

• Preliminary Conclusions
  – Similar TIOM material appears throughout the industry
    • Production
    • Processing & Fractionation
    • Blending
    • Pipeline?
    • Refining?
  – Source material may be PAM based or other polymer type.
  – Cumulative type fouling effect on equipment. Low PPM levels slowing fouling over time.
  – May be part of BSW but would be atypical of the solids operators expect as BSW (salt, sand, asph…). BSW spec would not be sufficient to prevent.
  – Limited effectiveness by solvent wash or backflush cycles.
  – Other solids could be trapped in matrix (asph, inorg) compounding the problems.
Open Forum 2017 Attendees

- ADOE
- AGAT Laboratories
- ASTM D08.02 (chair)
- BP
- Calumet
- Canmet
- Cenovus
- CITGO
- CN Rail
- Co-op Refinery
- Crescent Point
- Crude Quality Inc.
- Enbridge Pipelines
- Exova
- Fractal
- GE Water
- Gibson Energy
- GWB Process Con.
- Husky Energy
- Imperial Oil
- Innotech Alberta
- Irving Oil
- Kinder Morgan
- Marathon
- Maxxam Analytics
- Omnicon Consultants
- Phillips 66
- Rhodey & Associates
- Shell
- Statoil
- Suncor Energy
- Tervita
- Tesoro
- TransCanada Pipelines
- Transport Canada
- United Refining
- VUV Analytics
Topics of Discussion

• Water Content Measurement
  – Compiling literature information summary
  – Potential for recommended referee method

• Project Proposal for Amine in Crude
  – Total nitrogen screening method on naphtha cut
  – Extended analysis on screening failure

• Introduction of Canapux Technology
  – Encapsulated bitumen technology for rail/sea
  – Taking advantage of coal handling infrastructure
Topics of Discussion (con’t)

• Olefin by NMR Test Method Deviations
  – Canmet & Maxxam method deviations producing differing results.
  – Neither following the method as written
  – Action to collaborate to determine best practices

• Processing Organic Chloride Contaminated Crudes
  – Seeking feedback from refiners interested in processing organic chloride contaminated crude and sharing their experience
Topics of Discussion (con’t)

• Deployment of new ASTM Methods
  – Discussion on deployment of CCQTA developed test methods.

• Vapor Pressure Best Practice Release
  – Summary of the recently published CCQTA vapor pressure best practices.
  – Intended to provide information for wide audience to learn about vapor pressure and potential pitfalls of sampling and measurement.
Topics of Discussion (con’t)

- Pipeline corrosion collaboration
  - Enbridge seeking to initiate a project with pipeline operators on corrosion issues specifically focused on diluent/finished product pipelines.
  - Discussion
    - Effect of $O_2$ and $H_2S$
    - Oxide vs. sulfide films and differences in their adherent properties
    - Operability issues observed to date
Topics of Discussion (con’t)

• Recent contaminates reported in Canadian crudes by US refiners
  – Increased amines in atmospheric tower overheads
  – Light organic acids in atmospheric tower overheads

• Amine scavenger project launch
  – Seeking feedback from refiners on acceptable scavengers for use
  – Potential for amine suitability test method development
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