

The background features a dark blue field with a complex, abstract pattern of curved, overlapping lines. On the right side, there is a prominent, glowing blue structure that resembles a tunnel or a series of concentric, curved layers, creating a sense of depth and movement. The overall aesthetic is modern and technical.

Domestic Sweet Crude Quality Monitoring

PRESENTATION TO INTERESTED PARTIES
REVISED: JUNE 10, 2016

Agenda

- Background
- The Plan
- The People
- Penalties and Punishments
- Outcomes and Deliverables
- The Future
- The Commitment

Background

- The Crude Oil Quality Association (COQA) has been advocating for revision of Section 200 of CME Domestic Sweet contract
 - Includes additional quality parameters with specified limits and ranges
 - Limits and ranges derived from 2010 test program of Domestic Sweet quality (values are inclusive and not arbitrary)
- COQA believes in:
 - Expanding the definition of quality beyond API gravity and sulfur
 - Opposing indiscriminate alteration in quality, e.g. blending
 - Promoting communication between all sectors of industry
- Enbridge and Plains AA Pipelines started testing approximately two years ago per COQA recommendations

Averages DO NOT Capture the Variability

- 2015 annual averages indicate “It’s all good”

OR

- One in ten deliveries was off-spec on API Gravity
- One in twenty deliveries was off-spec on sulfur
- One in four deliveries would have been off-spec on Vanadium
- One in twenty deliveries would have been off-spec of bottoms

NYMEX Light Sweet Quality Results

WTI Delivery Data - Jan 2015 YTD

Current Tests

Test Parameter	Sulfur	Gravity	S&W	Viscosity @ 100F	RVP	Pour Point
Limit	<0.42 wt%	37 to 42 API	<1.0 %	<10.32 cSt	<9.5 psia	<50F
AVG	0.39	41.17	0.09	2.90	7.32	-5.7
Overall On Spec (%)	90.7	94.1	99.9	100.0	100.0	100.0

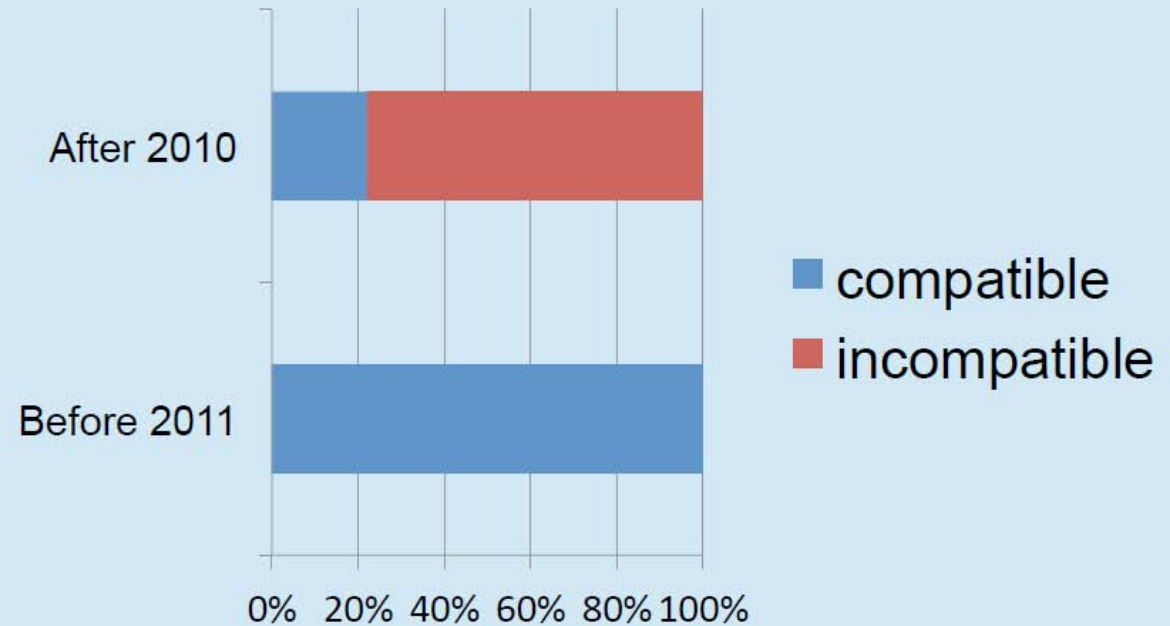
Proposed Tests

Test Parameter	MCR	TAN	Nickel	Vanadium	Light Ends <220F	50% Point	Resid >1020F
Limit	<2.40 wt%	<0.28 mgKOH/g	<8 ppm	<15 ppm	<19 mass%	470F to 570F	<16 mass%
AVG	1.71	0.12	4.97	13.39	16.56	514.7	12.07
Overall On Spec (%)	99.2	100.0	100.0	77.3	100.0	100.0	95.8

Ashok Anand, “Enbridge Cushing WTI Quality COQA March 2016”

Test Results indicate that, since 2010, something “unusual” is getting into Domestic Sweet and destabilizing it (causing asphaltene precipitation)

West Texas Intermediate Frequency of Self-Incompatibility Increased



Attributed to Contamination or Blending?

Irv Wiehe, "Crude Oil Compatibility and Self-Incompatibility"
COQA March 2016

Other Comments/Observations

- Light Sweet Crude out of Cushing (much more so than west Texas) is causing refinery fouling
- Bifurcated WTI market: While Canadian and shale crudes are blended into domestic light sweet (DSW) at Cushing to meet the WTI spec, it is in other ways distinct from traditional WTI from the fields of the Permian basin
- “The prevalence of blending makes it more difficult to ascertain the value of light sweet crude at Cushing”
- Transparent quality -> Improved refining value (downstream), reduced price attrition (upstream) and higher demand



“Argus Petroleum Transportation North America – Survey:
Precipitating changes” Argus Media, April 2016

The Plan

- Manage a quality testing program for crude marketed as “Domestic Sweet”
 - Complete turn-key package includes sampling, shipping, analysis, support
 - Tests to include Gravity, Sulfur, MicroCarbon Residue, TAN, Metals, SIMDIS
 - Includes data compilation, validation, trends
- Provide full access to results online
 - Includes website development, maintenance, updates
 - More detail on crude properties from D7900/7169 SIMDIS can add value
 - Incorporate past data from Enbridge and Plains to establish historical baselines
- Provide communication to stakeholders and interested parties
 - crudemonitor.com (registered) or crudemonitor.us (available)

The People

- Oversight Committee
 - Include 6-10 representatives from different companies in different industry)
- Crude Quality Inc.
 - Developed and maintains crudemonitor.ca
 - Fastest to market solution
 - 15 years experience
 - Third party credibility
- Funding Companies
 - Support funding for defined period (2 year) startup only

The screenshot shows the website crudemonitor.ca. The header includes the site name and navigation links: Home, Monthly Reports, Tools, Library, Industry Resources, and Contact Us. A tagline reads "bringing the crude oil industry together with data". Below the header is a search bar labeled "Find a crude..." and a list of crude oil types with their density and gravity ranges:

Crude Type	Density (kg/m ³)	Gravity (°API)
Condensate	670 - 759	55 - 80
MSW Feeder	820 - 829	39 - 41
Light Sweet	821 - 827	39 - 41
Light Sour	823 - 848	35 - 41
Pooled Crudes - ex Superior	833 - 932	20 - 39
Sweet Synthetic	835 - 868	31 - 38
Medium Sour	844 - 876	29 - 36
Heavy Sour - Conventional	916 - 933	19 - 23
Heavy Sour - Unconventional	922 - 927	20 - 22
Heavy Sour - Synbit	931 - 937	19 - 21
Heavy Low Resid	937 - 938	19 - 20
Heavy Sour - Dilsynbit	938 - 939	19 - 20

The right side of the page features a "Welcome to crudemonitor.ca" section with a paragraph of text and a row of six small images. Below this are sections for "Data Reports", "Monthly Reports", and "Tools", each with a brief description of the content available. At the bottom, a "Library" section states that reports for samples taken prior to January 1, 2010 are included.

Penalty and Punishment System

- Can the Domestic Sweet Quality Monitoring Project act as a “Patrolman” on duty 24/7?
 - No
- Industry will pay attention and self-correct
 - Outcomes are not immediate and directly punitive, rather are managed quietly
 - System improves over time
 - Adjustments are seen in the public eye

Outcomes and Deliverables

- Industry gains instant accessibility to quality data for “Domestic Sweet” market streams
 - Public domain results increase transparency, increase attention, and increase corrective activities
 - Number of “off-spec” incidences will decrease, Domestic Sweet quality will become more consistent and predictable
- Comprehensive database of streams and quality characteristics comparable to crude assays
 - Improved marketing potential for the stream
- System will provide commentaries on stream by stream basis
- System will respond to corporate requests for specialized services

The Future

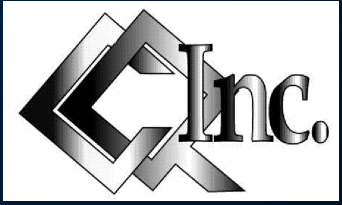
- Project should morph over time from a refinery compliant system to a producer netback retention system
 - Valuation more commonly associated with variability (reliability) than annual averages
- Will become a self funding system when upstream sees the value
- Seed money is needed from industry “partners” in the beginning
 - Benefits of transparency will lead others to join
- LLS on Capline, Mars, Poseidon Assays provide historical precedents

The Commitment

- Year 1: \$20,000, Subsequent years: \$15,000
 - Based upon minimum of 10 Funding Companies (per participant pro rata costs could be reduced)

The Ask

- To financially participate in a \$35,000, two year plan
- Optional – To commit to a position on the Oversight Committee



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Questions?
Let us know

Thank you for your
consideration!