

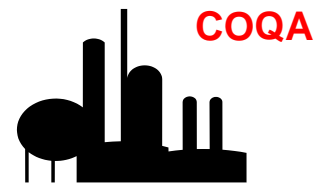
What is the Quality of WTI/Domestic Sweet?



Dennis Sutton, Executive Director, COQA
February 2015

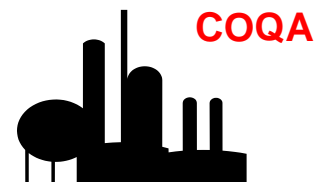
Background

- The quality of WTI/ Domestic Sweet crude oil has been vitally important to refiners for decades.
- Refiners were and continue to be concerned about blending of incompatible crudes into the Domestic sweet stream and the detrimental effect this has on refinery economics and operations.
- Beginning in about 2005, the COQA began in earnest developing more comprehensive specs for WTI/Domestic Sweet than just API Gravity and Sulfur.
- Details of this work can be found in the Archives section of the coqa website.



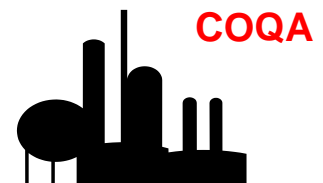
Background

- After years of diligent testing and data evaluation, in 2010, the COQA recommended more comprehensive specifications for WTI/Domestic Sweet.
- Recall, the COQA is not a legislative body.
- Our recommendations were provided to all parties operating around Cushing, OK.
- We actively met with NYMEX and encouraged them to incorporate the specs in their light sweet crude oil rules.



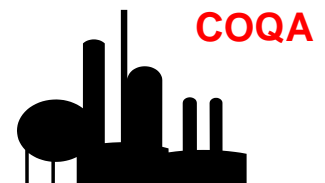
Current NYMEX specs

- NYMEX (CME Group) Chapter 200.12 Light Sweet Crude Oil Futures states Crude and Quality Specifications as:
 - **Sulfur - $\leq 0.42\%$ by wt.**
 - **API Gravity- ≥ 37 and ≤ 42**
- There are also published specs for Viscosity, Reid Vapor Pressure (RVP), BS&W, and Pour Point but these do not constrain the stream.
- These limited specs provide little confidence to the refiner of what they are receiving.



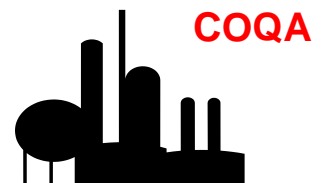
COQA Recommended Specifications

- In order to better define the quality of WTI, in a letter dated 10 August 2010, the COQA recommended the following specs be added:
 - MCRT: 2.4% wt. or less
 - TAN: 0.28 or less
 - Nickel: 8 ppm or less
 - Vanadium: 15 ppm or less
 - Light Ends <220°F by HTSD: Not more than 19% by mass
 - 50% Point by HTSD: 470°F- 570°F
 - Vacuum Resid > 1020°F by HTSD: Not more than 16%



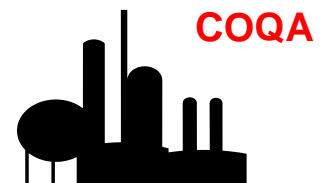
Subsequently

- While NYMEX has met with Cushing operators, attended COQA meetings, and voiced support for the COQA specs, they have yet to formally adopt and publish them.
- Despite this, various shippers and operators have reported (see COQA Archives) that the additional specs are being followed in practice.



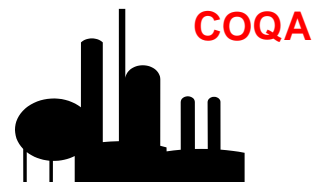
The question was raised at the last meeting:

In light of increased production in west Texas, what is the current quality of WTI/Domestic Sweet at Cushing?



To answer the question

- Multiple operators at Cushing agreed to provide data to the COQA under the provision that the sources of the data would remain anonymous.
- I thank them for their willingness to share the data.
- I personally do not know exactly where all of the samples were taken or what lab(s) performed the analyses.
- The summary information reflects hundreds of samples taken in the 2013 and 2014 time period.

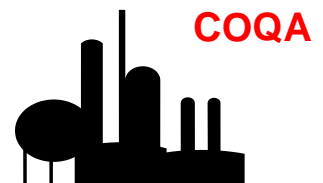


Current specs



- **Sulfur - $\leq 0.42\%$ by wt.**

- Average has been 0.40%. Occasional values over 0.42%. Some results in the 0.20% range.
- Blenders obviously monitor sulfur closely, blending right to the 0.42% limit

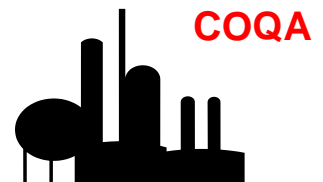
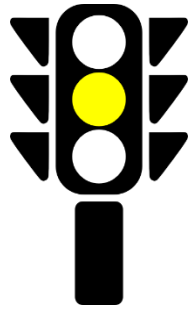


Current specs

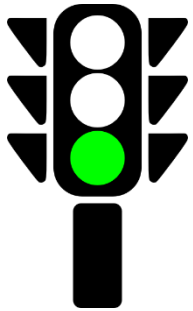


- **API Gravity- ≥ 37 and ≤ 42**

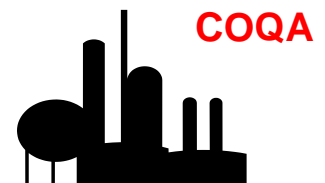
- Monthly averages in 40 to 42 range. Occasional values above 42.
- Seasonal variation with winter being slightly higher.
- December 2014 average was 41.6.
- If your assay does not reflect ~ 41 API, it probably warrants review.



Current specs



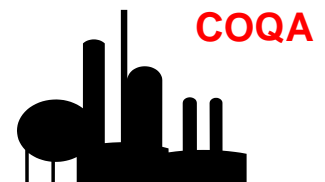
- **RVP <9 psi as measured by D5191**
 - All values in the 6.5 – 9 range.
 - Some seasonal variability- higher in winter.
 - No concern
 - Seasonal variation with winter being slightly higher.



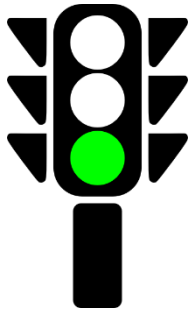
COQA Recommended Specs



- **MicroCarbon Residue (MCRT) 2.4 % or less**
 - Average of 1.6%.
 - Highest month was 1.8%.
 - No concern.

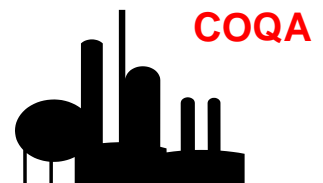


COQA Recommended Specs



- **TAN 0.28 or less**

- All values in the 0.12 range.
- No concern.
- The new production must be low TAN.

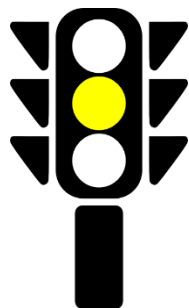


COQA Recommended Specs



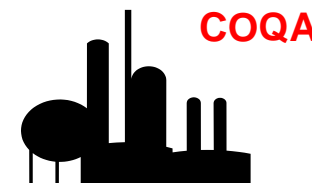
- **Nickel 8 ppm or less**

- All values in the 4 – 6 ppm range.
- No concern.

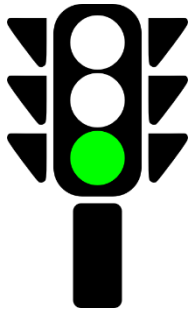


- **Vanadium 15 ppm or less**

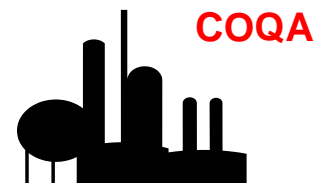
- In the past two years, the values have risen from the <10 range to 10-15 ppm.
- Recent values have been right around 15 ppm with frequent excursions above 15 ppm.
- Review assays.



COQA Recommended Specs

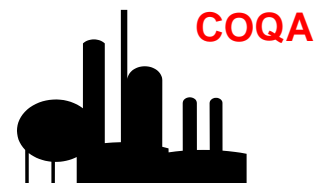


- **HTSD specs for light ends, 50% point, and Vacuum resid**
 - All values have been consistent and well within the defined specification range.
 - No concern.



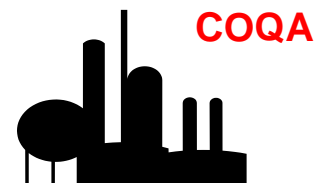
Conclusions

- Multiple parties are testing and evaluating data for the COQA recommended specs.
- While NYMEX has not yet formally adopted the specs, the data shows the COQA specs are consistently being met.
- The rising vanadium levels are interesting and should be monitored by shippers.



Conclusions

- The COQA specs were chosen and the values set to be:
 - Meaningful to refiners
 - Practical to implement
 - Routinely achievable
 - No hindrance to the market liquidity of the stream
- The 2013- 2014 data indicates these criteria have been achieved!



Thank You

