Crude Oil Quality Group (COQG)

CRUDE OIL QUALITY

What it is

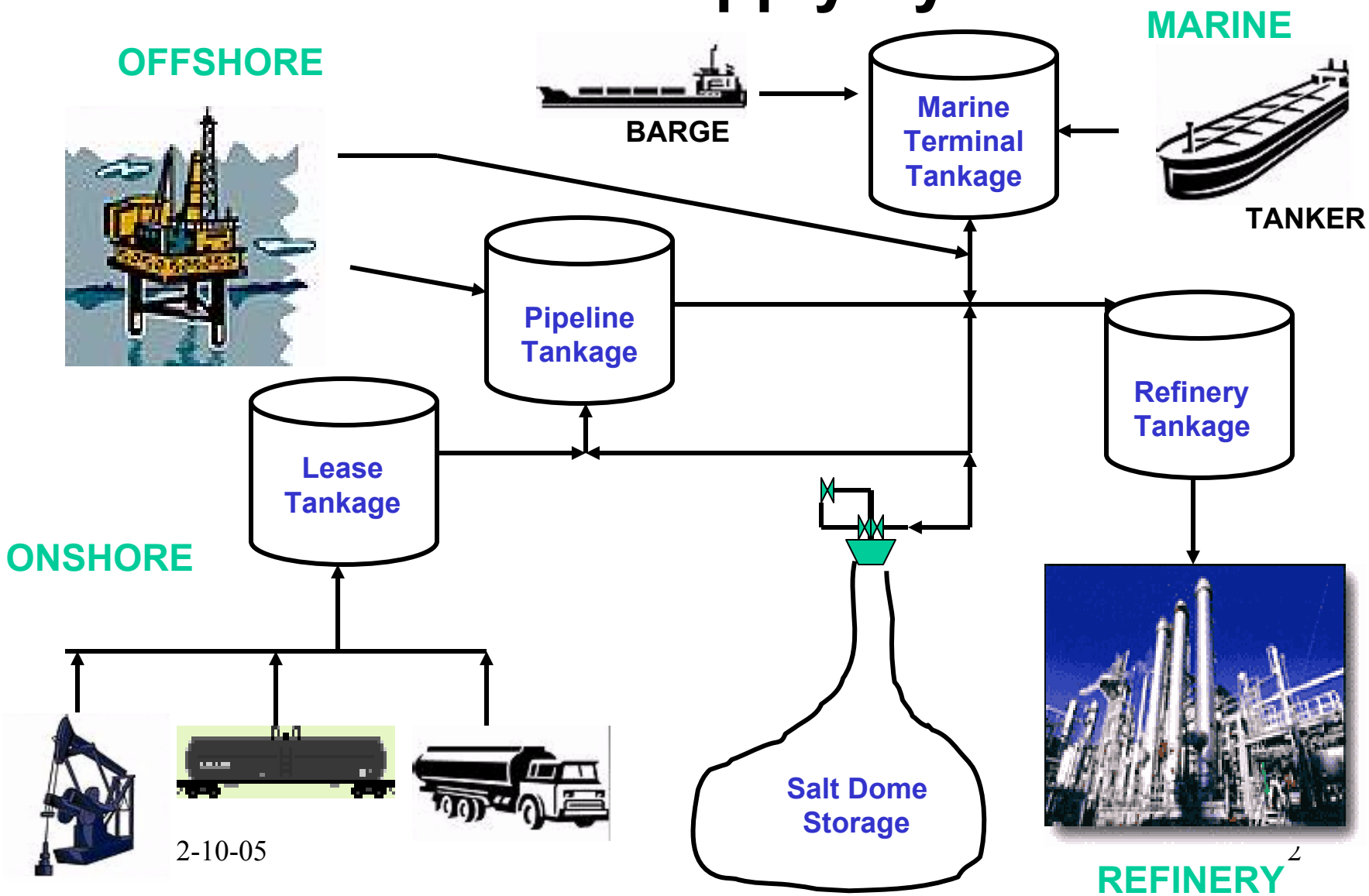
Why it is important

What we can do to make it better

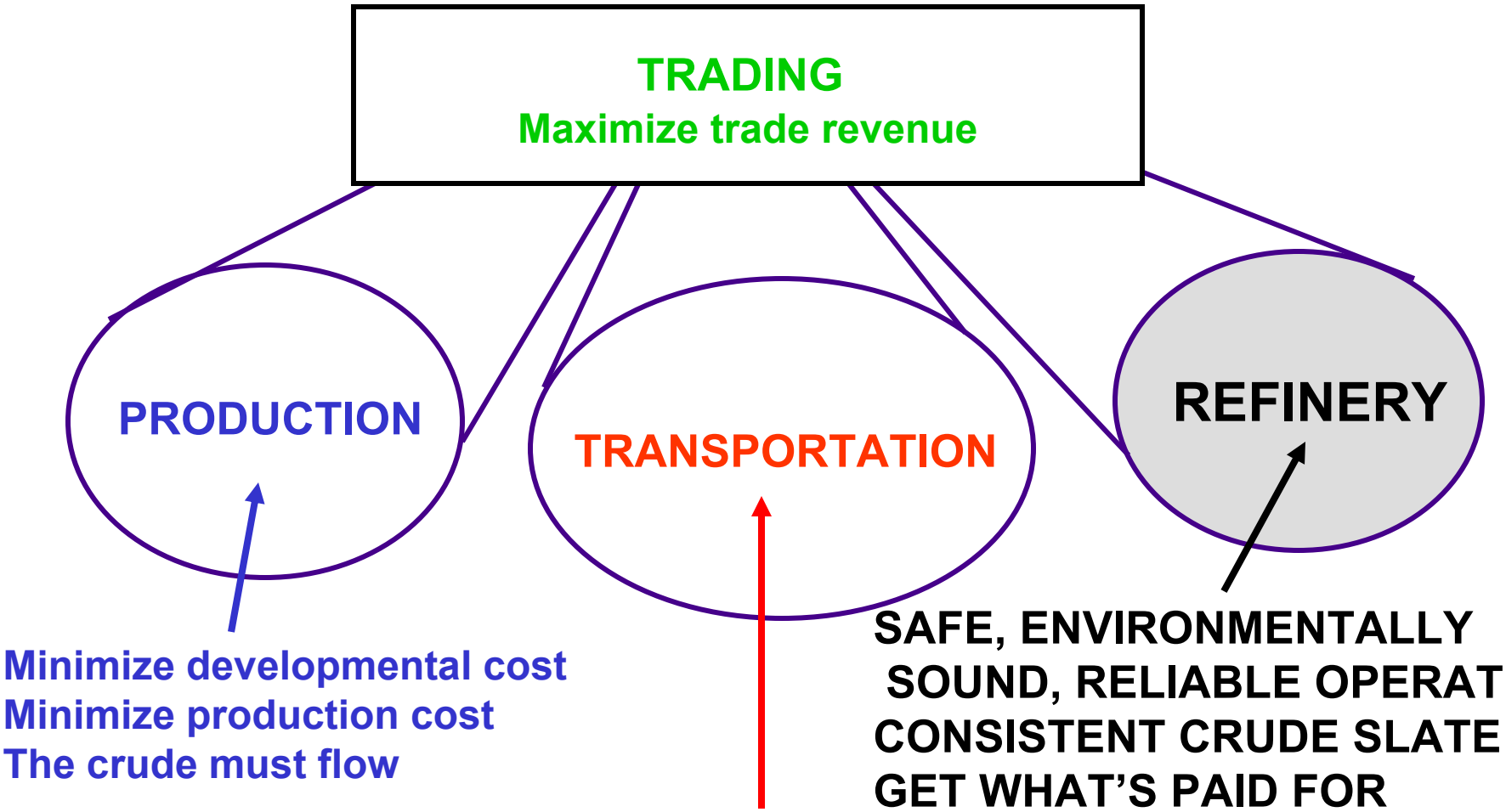
Who needs to act

Crude Oil Quality Group

Crude Oil Supply System



Driving Forces By Industry Segment



What Is Crude Oil Quality?

- Maintaining the integrity and consistency of the refining characteristics of a crude oil stream
- The commonly used industry standards of gravity and sulfur, while important, do not adequately define a crude oil
- Crude oil quality is achieved through identification of a crude's important characteristics and by protection of those parameters

What Is Crude Oil Quality?

- It's about getting what you paid for
  - Consistent hydrocarbon distribution
  - No surprises (atypical metals, sulfur, acidity, etc.)
  - No contamination (chemical wastes, production wastes, transportation wastes)
- Our definition of QUALITY does NOT mean light vs. heavy or sweet vs. sour – it refers to the expected vs. the unexpected and the typical vs. the inconsistent

What Can Happen to Crude Oil to Change its Quality?

- DEGRADATION - Normal operations
- CONTAMINATION - Outside ingredient NOT normally used
- ALTERATION - Outside ingredient, but used in normal operations
- BLENDING - Mixing of different crude streams, particularly streams with very different properties or values.

What Happens to Crude Oil Before it Arrives at the Refinery?

DEGRADATION (*normal operations*)

- **Tank Bottoms, Interfaces, Line Fill**, **Tank Cleaning Sludge,** etc. are normal operations that are managed by the Pipelines

What Happens to Crude Oil Before it Arrives at the Refinery?

CONTAMINATION *(NOT normal)*

- **Cleaning Chemicals and Wastes, Chlorinated Solvents** can be introduced in the production and transportation systems. These substances, as well as others, are **NOT** normal operations and must be communicated to the end-user.

What Happens to Crude Oil Before it Arrives at the Refinery?

ALTERATION *(normal)*

- **Cavern Brine, Ship Ballast, Slops, and Production Chemicals such as Methanol and Anti-foams** are routinely added to crude oil in the production system and need to be communicated to the end user
- **Drag Reducing Agents, Corrosion Inhibitors, Pour Point Depressants** are routinely added to crude oil in the transportation system and need to be communicated to the end user

Let's Talk About Blending...

- Crude oil is intrinsically a complex mixture of hydrocarbons
- Sometimes, two or more crudes (each a complex mixture) are deliberately blended to form a new variety of crude
  - Some of these blends are transparent
    - Well head driven
    - Logistics driven
    - Refinery charge driven
  - Some of these blends are NOT transparent
    - Dumbbell crudes (blended to meet a target such as gravity)
    - Economically driven blends (spiking sour into sweet to take advantage of a price spread)
- Heavy crudes can be blended with a density / viscosity reducer (natural gasoline, synthetic and processed crudes, butane)
  - The Canadian and Venezuelan oil industries have extensive experience in bitumen dilution

What Can be Done to Improve the Quality of Crude Oil?

- **MANAGE** degradation
- **CONTROL** contamination
- **UNDERSTAND** alteration
- **MITIGATE** the effects of blending

Who Needs to Act to Improve the Quality of Crude Oil?

- **PIPELINES**
  - do a good job of managing degradation
  - are being educated on the dangers of contamination
  - communication is key
- **PRODUCERS**

  We are asking the producers:
  - to be forthcoming about what is being added
  - to be forthcoming when significant differences to established parameters are expected
  - for more frequent assay updates

Who Needs to Act to Improve the Quality of Crude Oil?

- **TRADERS**
  - be a part of the solution - specify what you are buying
  - follow up on changing crude parameters
  - understand crude oil quality terms
  - know what you are receiving and how it matches your requirements
- **REFINERS**
  - up to date crude evaluations are a must
  - mitigation of degradation and alteration usually fall on the refiners' shoulders
  - know how <u>your</u> supply system works

What's a Refiner to Do?

- **UP TO DATE CRUDE EVALUATIONS ARE A MUST**
  - Account for differences between produced-crude assays and as-received crude
  - Don't be afraid to ask for the latest information from producers - you may be pleasantly surprised on the data they are willing to share
  - Monitor received crude and use the data
  - Periodic updating of LP modeling
    - seasonal variation
    - LP modeling software is constantly being upgraded

What's a Refiner to Do?

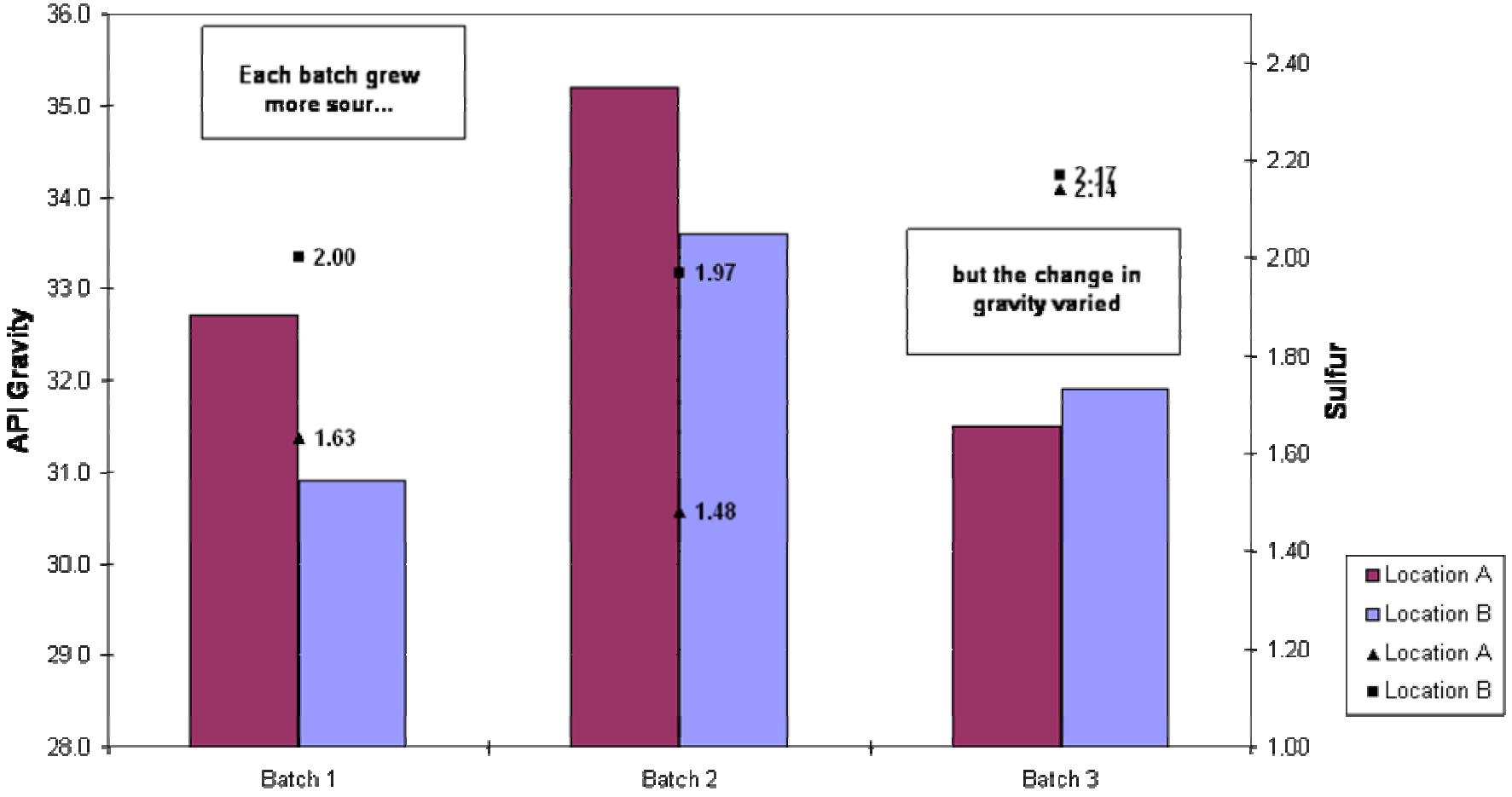
- **MITIGATION FALLS ON YOUR SHOULDERS**
  - Prompt notification of problems
    - We can't solve it if we don't know about it
  - Quantification of the effects of a not-as-expected crude
    - Money talks
  - Don't create the problem
    - Reasonable scheduling requirements
    - Feed the crudes in the manner intended
    - Refinery-blended crudes can create a whole new set of issues
  - Intra-refinery communications
    - Just as important as outside refinery gate notification

What's a Refiner to Do?

- **KNOW YOUR SUPPLY SYSTEM**
  - Crude changes as it moves through the system
    - Pipelines try to utilize similar tank bottoms and linefills but "similar" can still have substantial differences
    - Your batching choices can add to those substantial differences
  - Market fluctuations can lead to local crude changes
    - Be aware of "common knowledge"

      market-driven variations
  - Test runs on a given crude as received in your specific refinery can be very advantageous
    - Use the information garnered to update your LP models

Crude Oil can Change as it Moves through ANY Transportation System



Crude Oil Quality Monitoring

- **CHOOSE YOUR SAMPLING WISELY**
  - Location, location, location
- **SPEND YOUR MONEY WISELY**
  - Sampling, packaging and shipping must be done correctly (API, ASTM procedures 8.1, 8.2)
  - Random testing of the right parameters is more important than every sample tested for the wrong parameters
  - Gravity, sulfur and BSW, while important, do NOT adequately define a crude oil's quality
  - Different parameters are critical depending on refinery configuration, crude type, etc.
- **USE YOUR DATA WISELY**
  - Many programs are available to interpolate monitoring data into LP friendly format
  - Update your LP routinely
  - Linking the LP to a scheduling module via a simulator program can be very useful

Remember :

It is up to you, the refiner, to tell your trader and your supply system what is important to you.

What Next?

1. Education for producers, traders, transporters and refiners
2. Easily accessible characteristics for all grades of crude oil
    * Not just gravity and sulfur *
3. What do you need to know to better manage crude oil quality?

EDUCATION WORKS

Crude Oil Quality Group (COQG)
Mission Statement

The Crude Oil Quality Group (COQG) is dedicated to the belief that maintaining the integrity and consistency of the refining characteristics of crude oil streams is of importance to all parties involved in crude oil activity, from production locations to the refinery. The COQG believes the commonly used industry standards of gravity and sulfur do not adequately define crude oil quality, and should be expanded to include other characteristics. The COQG is opposed to the alteration of crude oil streams, such as through the injection of processed gas liquids, without the knowledge and consent of the parties involved.

To promote these beliefs, the COQG will strive to:

- Communicate our beliefs to the oil industry at large;
- Create and sponsor forums for open communications and the sharing of information and ideas to better educate the crude oil industry;
- Be pro-active in the advancement of our beliefs with all areas for the crude oil arena, including production, transportation, trading, and refining sectors;
- Improve the overall quality of crude streams through the promotion of crude quality programs on common carrier transportation systems; and
- Be closely involved with various industry associations to further promote our beliefs.