

Are all crudes worth the same?

To value-adjust or not?

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To value-adjust or not?

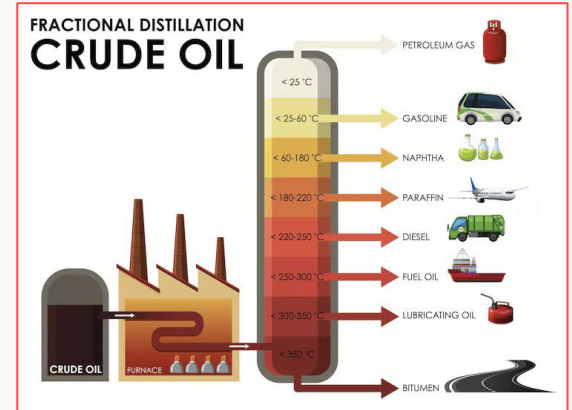
Agenda

- Are all crudes worth the same?
- What is a Value Adjustment Mechanism?
- The commercial impact of value adjustment?
- How assay-based value adjustment systems work
- The importance of sampling and testing
- Common pitfalls of value adjustment systems
- Questions?



To value-adjust or not?

- Are all crudes worth the same?
 - Chemically **X**
 - Physically **X**
 - Products obtained from refining **X**
 - No, all crudes are not worth the same
- Why is this important?
 - Commingled oil systems process a cocktail of hydrocarbons to obtain sales products
 - Quality of individual input streams $\neq$ Output blend quality
 - Must recognise quality by applying a Value Adjustment Mechanism (VAM)



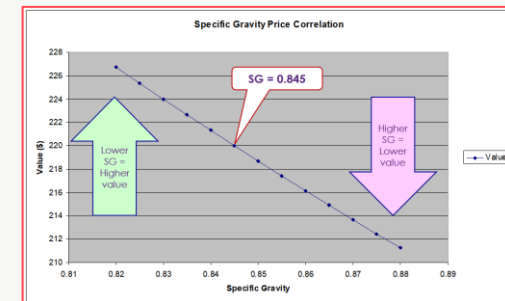
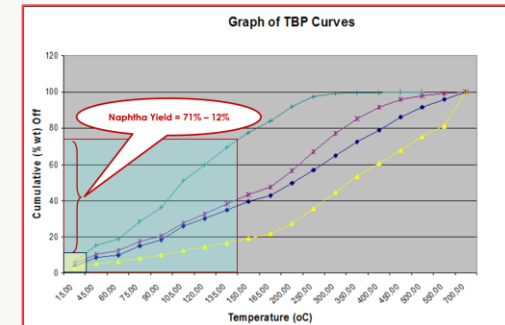
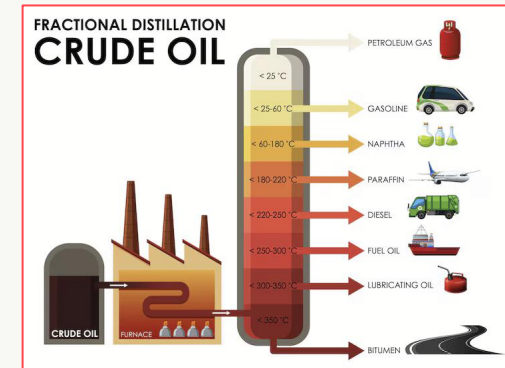
What is a Value Adjustment Mechanisms?

- A key part of a complex hydrocarbon allocation system
- Methodology used to obtain the relative value of a crude oil
 - Based on refinery simulation methods
 - Refinery netback approach
 - Product yields
 - Product quality
 - Product prices
 - Additional factors
- Are all VAM the same?
 - Products – 3-6
 - Product quality parameters
 - Application with hydrocarbon accounting systems



Examples of VAM in use

	Fraction	Forties 1	Forties 2	Brent	BTC	Åsgard Area	Norpipe
Products	Gas	X	X		X	X	
	LPG				X	X	
	Naphtha	X	X	X	X	X	X
	Kerosene		X				
	Gasoil	X	X	X	X	X	X
	VGO		X				
	Fuel Oil	X	X	X	X	X	X
Quality Parameters	Kerosene		SG			SG	
	Gasoil	SG		SG	S,SG	SG	SG
	VGO		S				
	Fuel Oil	S,KV	S,KV	S,KV	S,KV	S,KV	S



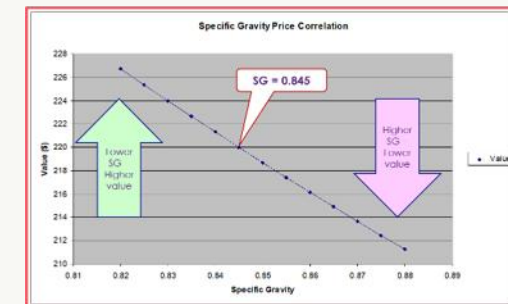
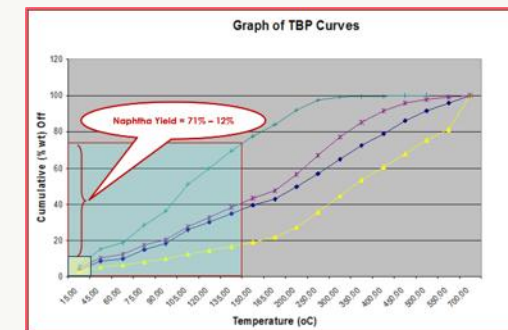
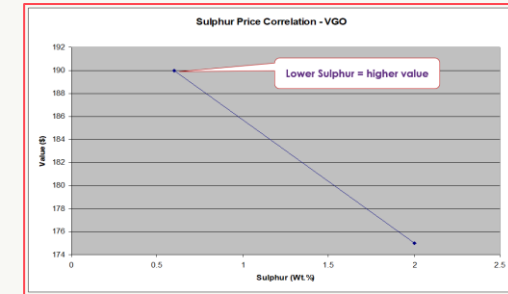
What is the commercial impact of Value Adjustment?

- How big a deal is Value Adjustment?
 - As great as $\pm 20\%$ swings on entitlement to crude oil for individual fields have been observed
 - Influenced by:
 - Diversity of fluids handled by the system
 - How the product yields are used
 - Complexity of the VAM
 - Whether there is a dominant crude
 - In most cases application of a VAM results a revised entitlement to crude oil available for sale or lifting from a system
 - Exception: Norpipe where application of the COVA results in a financial settlement payable or receivable



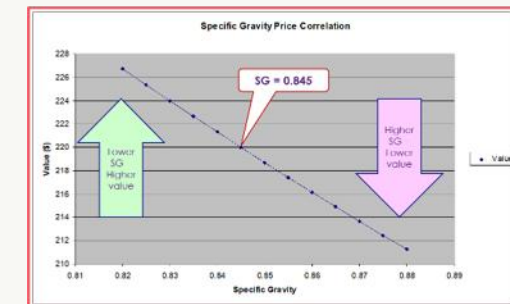
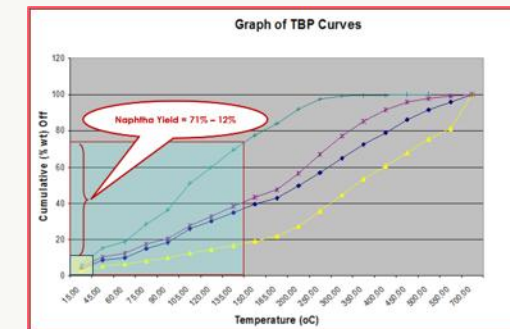
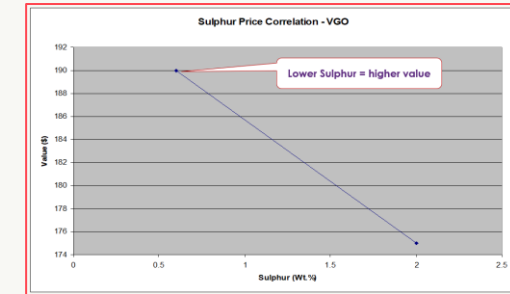
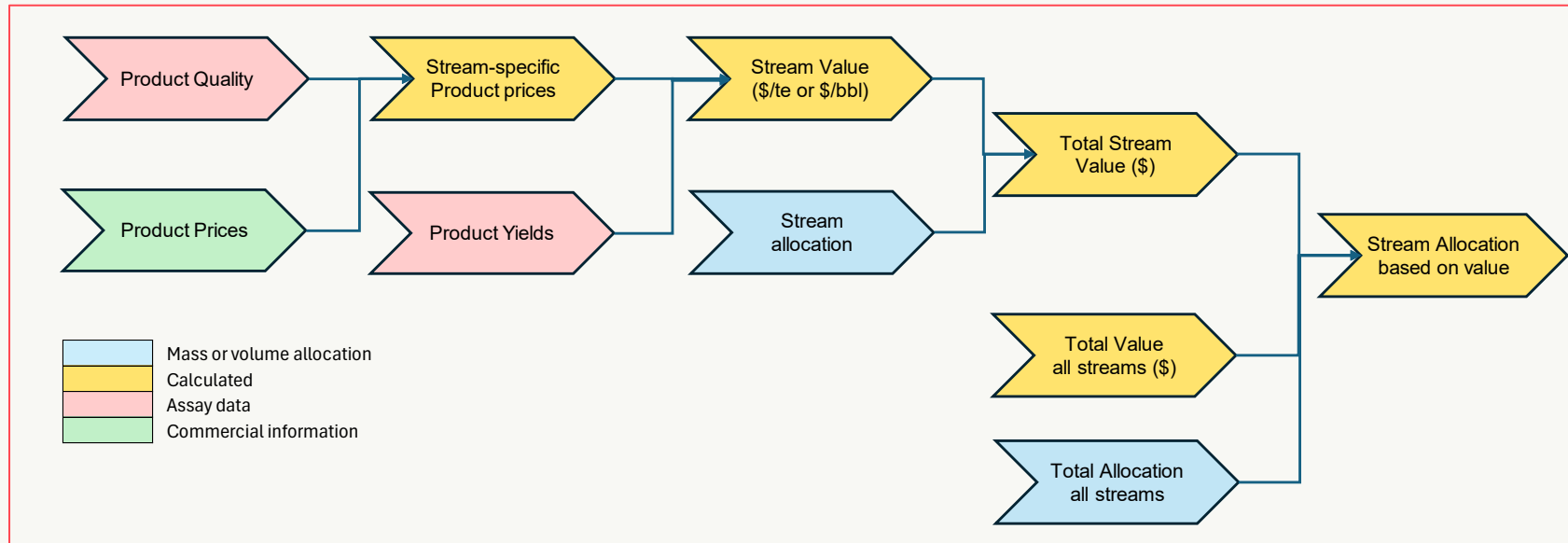
How do assay-based VAM operate?

- Key inputs:
 - Stream allocated quantities
 - Stream assay test results – product yields and product quality
 - Product Prices – including market price of sales crude
- VA process:
 - Obtain monthly average product prices
 - Compute stream-specific product prices
 - Based on stream product properties and product specifications
 - Derive stream value from the product yields and stream-specific product prices
 - Sum the values of all streams to obtain the total value
 - Allocate the output blend in proportion to a stream's contribution to total value



How do assay-based VAM operate?

- Product price modifiers:
 - Based on product specifications
 - Kerosene (SG); Gasoil (S,SG); Vac Gasoil (S); Fuel Oil (S,KV)
- VA process:



The importance of sampling and testing

- Why sampling is important
 - Representivity - stream sampled may comprised of multiple wells or fields
 - Sample period
 - Sample size
 - Availability of sampling points for individual fields in commingled systems
 - Preparation of composite samples
- Why testing is important
 - Distillation analysis is fundamental to obtaining accurate product yields and product quality
 - Gasoil/VGO yield change of $\pm 0.5\%$ affects stream value by $\pm 20-60$ cents
 - Gasoil/Kerosene SG change of ± 0.001 affects stream value by $\pm 4-10$ cents
 - VGO/Fuel Oil Sulfur of $\pm 0.05\%$ affects stream value by $\pm 5-15$ cents



Common pit-falls of such systems

- **Sampling**
 - Insufficient sample for distillation analysis
 - Incomplete coverage of contributory streams
 - Reliance on periodic spot samples
- **Analysis**
 - Insufficient sample to complete distillation
 - Insufficient product to enable tests to be completed
- **Procedure**
 - Handling of incomplete data sets
 - Misalignment of analysis data sets
- **Data quality**
 - Product price revisions



Concluding remarks

Agenda

- Are all crudes worth the same?
- What is a Value Adjustment Mechanism?
- The commercial impact of value adjustment?
- How assay-based value adjustment systems work?
- The importance of sampling and testing
- The potential pitfalls of value adjustment systems

Value Adjustment Mechanisms are a common feature of many hydrocarbon allocation systems.



Questions?

