MAXIMIZING VALUE OF RESIDUAL FUELS THROUGH UNDERSTANDING OF FUEL QUALITY AND FUNCTIONS OF ADDITIVES

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DIVERGENCE OF NEEDS

Need to improver Refining Margin leads to increased cracking severity,

Need to protect the environment leads to reduction of S and emission standards,

Emerging trend of unconventional blending,

ISO 8217 introduction with additional controlled and specification items,

Is ISO 8217 adequate?

HOW RESIDUAL FUELS ARE MADE

Primary Refining Process:

- Distillation
  - Atmospheric [Component for Residual Fuel: Long Residue]
  - Vacuum Distillation [Short Residue]

Secondary Refining Processes

- Cracking
  - Thermal cracking [asphaltene molecules become less stable]
  - Vis breaking [asphaltene molecules become more unstable]
  - Hydrocracking [reduces S but makes fuel more paraffinic]
  - Catalytic cracking [introduces catalytic fines, Al + Si]
  - Coking [reduces residual fuel availability]

Blending

- Conventionally done by refineries E & S department
- Unconventional blends are common

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CONVENTIONAL BLENDING

Commonly done within the refinery's battery limits

Economic and Scheduling department nominates blends according to viscosity at 50 deg C and Sulphur

Pour Point and Stability are measured on nominated blends and if found off-specifications, additives could be added to improve these and allow maximum use of conventional components available in the refinery

Benefits of additives:

- Pour Point Depressant allows more paraffinic components
- Aspahltene dispersant allows inclusion of more cracked materials with higher severity
- No additive is currently available for correction of viscosity and S

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UNCONVENTIONAL BLENDING

Use of unconventional components:

- From the chemical industry [solvents of any kind, acids]
- Used Lube Oil [introduces Zn, Ca and P]
- Slurry oil [from petrochemical plant brings along Al and Si]
- Water [deliberate inclusion to reach 0.5%]

Associated issues:

- Oxidation unstable
- Formation of acid
- Chlorinated compound causes dioxin emission
- Sediment from Zn, Ca, Al and Si
- Higher density reduces water separation efficiency, and
- High CCAI leads to combustion difficulties

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SOLUTIONS TO ISSUES

Introduction of new specification items and limits

- Zn, Ca and P limits
- Al + Si limit
- Ash content
- CCAI
- Acid number & Strong acid number

Use of Catalytic Fine Settling Aid could allow more slurry oil to be included after settling out the fines

Ignition Aid and Combustion Improver can be used to assist combustion and help to put more aromatic-rich (high CCAI) component into the residual fuel

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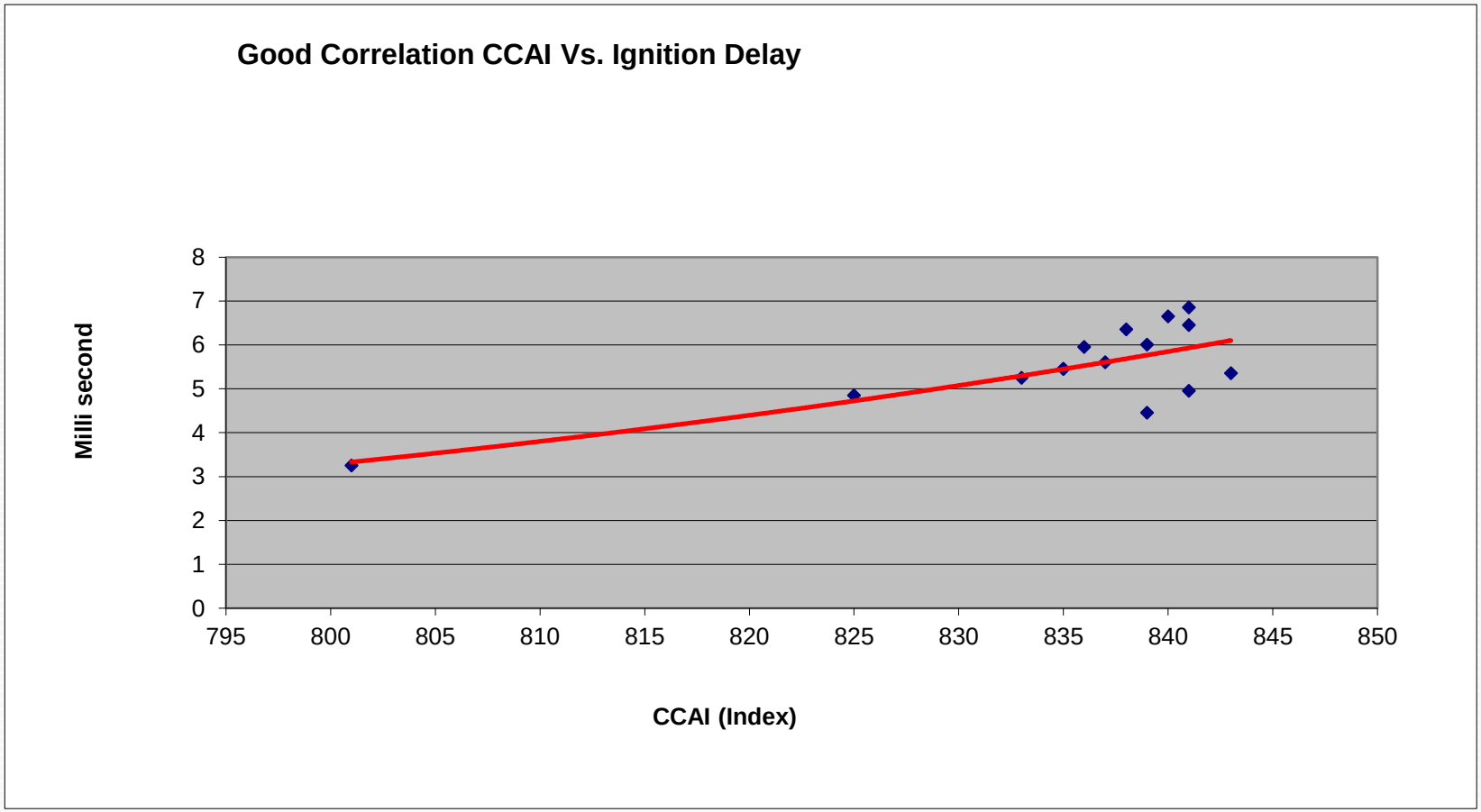
CCAI VS IGNITION DELAY



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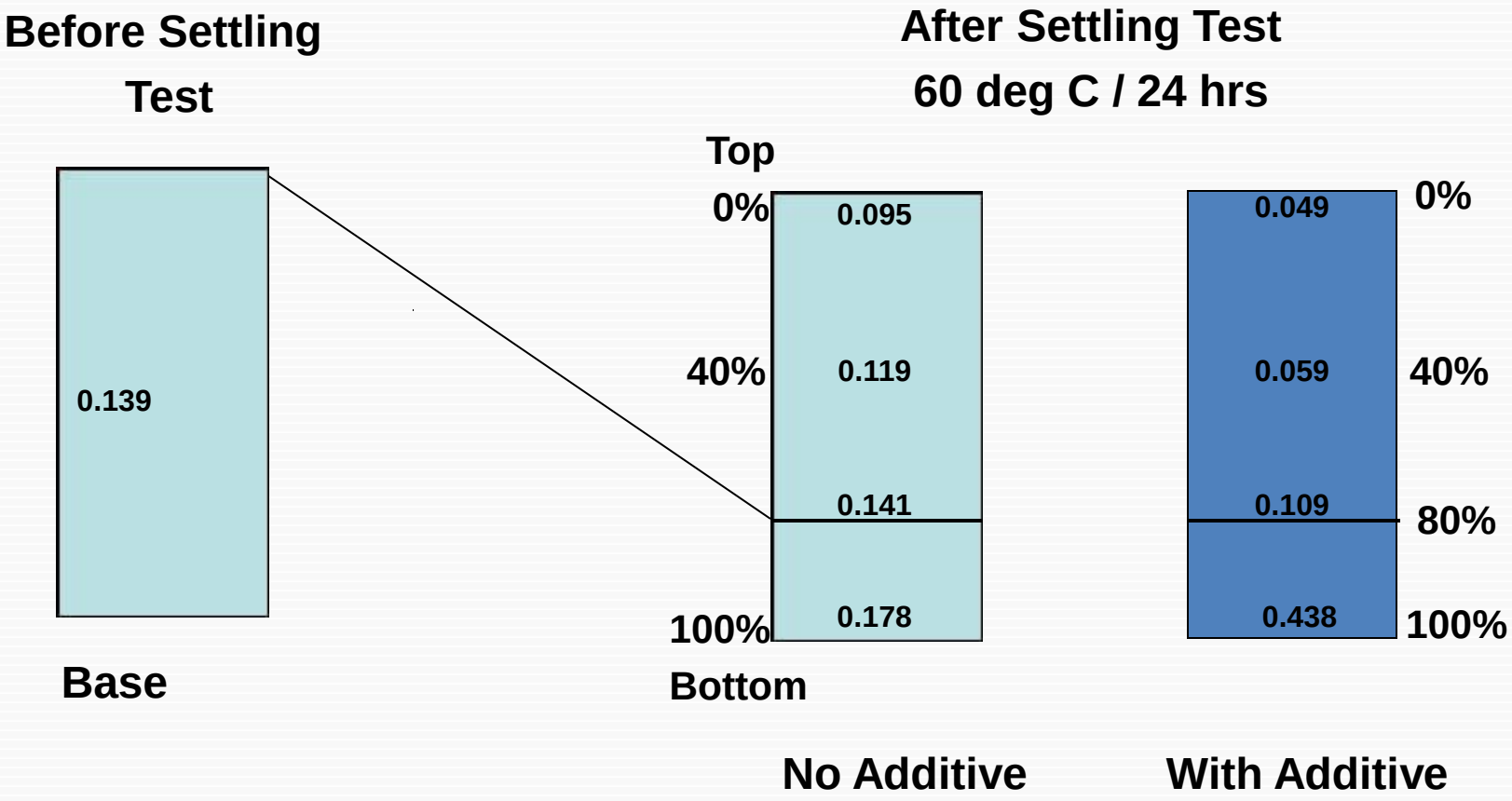
TEST RESULTS (ASH CONTENTS)



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ECONOMICS (LOW HFO)

	Per MT
	Price (USD)
HFO	250
80% Recovery	200
Additive	-10
Value of 80% HFO	190
Slurry Oil	160
Nett	30

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