



REFINERIA ISLA (CURAZAO) S.A.

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Application of Foxboro Invensys Magnetic Resonance Analyzer at Refinería Isla (Curacao) S.A

By

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COMPANY

Refineria Isla is a subsidiary of

Petróleos
De
Venezuela
Sociedad
Anónima

Objectives

Safety
Productivity
Refinery profitability
Increase client satisfaction
Improve implementation &
Completion of projects
Productivity
People
Total quality



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COMPANY

REFINING CAPACITY

335 MBD

DISTILLATION UNITS:

3 Atmospheric
5 High Vacuum

335
186

CONVERSION UNITS:

1 Cat Cracker
2 Thermal Crackers
1 Platformer
1 Alkylation
Polymerization

50
80
18
9
4

SPECIALTIES UNITS:

1 Naphthenic lubes
1 Paraffinic Lubes
Asphalts: Penetration / Roofers

2
5
15 - 20



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COMPANY OBJECTIVES

KEY REFINERY OBJECTIVE

Refinery Profitability

Maximize opportunities in incremental crude processing.



IMPLEMENTATION OF CRUDE MANAGEMENT PROJECT

- **Maximize yields of more valuable products**
- **Maximum utilization of crude potential and minimize loss during crude switch**
- **Platformer operating condition are based on the naphtha specs at the Crude Distiller**



INSTALLATION & INIT. TARGETS

EQUIPMENT TO BE INSTALLED **ON A TRIAL BASIS**

Foxboro Invensys to supply:

- **MRA Analyzer & required analyzer data**
- **Required sample conditioning system**
- **Initial models for prediction of all required parameters**

Isla to provide:

- **Sample transport lines for the crude, kerosene & naphtha samples**
- **Utilities**
- **Power requirements**
- **Lab analysis for validation**



INSTALLATION & INIT. TARGETS

CRUDE UNIT 3

Rate capacity	30.000 tons/day
Crude handled	26 – 29 API
Modes of operation	Paraffinic crude General Purpose crude
Mode switch frequency	Every 2-3 days



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INSTALLATION & INIT. TARGETS



MRA
Multi Purpose Single
Schedular
Software version 3.0
D- magnet



**INSTALLMENT MRA AT ATMOSPHERIC
DISTILLING UNIT CD-3**

- Analyzer shelter with all required utilities available
- Sample take-off and return points for crude at a short distance (60 m) from the analyzer shelter.
- Crude sample can be transported at ambient condition
- Existing naphtha supply & return line available at analyzer shelter
- Kerosene take-off & return point at a distance of 150 m.



**SAMPLE CONDITIONING POINTS OF
ATTENTION**

- **Thermal stress to ceramic part MRA sample probe:**
Crude temperature @ 35
Naphtha temperature @ 130
Kerosene temperature @ 130
- **Cross contamination of sample in MRA probe**
- **Stream sequence: Kerosene – Naphtha - Crude**
- **Sample return during flushing through the probe**



INSTALLATION & INIT. TARGETS

TARGETS

Measurement	Achieved
Crude analysis	No
Kero analysis	Yes
Naphtha analysis	Yes



INSTALLATION & INIT. TARGETS

ISLA MRA PERFORMANCE vs LAB MEASUREMENT

<u>Stream Parameter</u>	<u>Kero Flash</u>	<u>Kero Freezing</u>	<u>Naphtha End Point</u>
Avg diff.	-2	-1	4
Avg diff. Std Dev	2	2	3



INITIAL MRA CRUDE ANALYSIS
UNSUCCESSFULL

- **Stability of the Crude sample temperature dependent**
- **Crude sample phase separate along the sample line**
- **Initial chosen stream sequence Kerosene – Naphtha - Crude**
- **Wax deposition within the MRA sample loop & probe while processing paraffinic crude**



RE-DESIGN MRA SAMPLE SYSTEM

- **Bring crude sample temperature to minimum 60 C & maximum of 70 C at take-off through MRA probe**
- **While flushing through MRA probe kerosene & naphtha**
- **Sample must be brought to the same temperature of 60 C**
- **Flushing through SSC & MRA probe must be routed to sample return**
- **Prevent sample cross contamination in SSC & MRA probe**



MRA SAMPLE TEMPERATURE **CONTROL**

- **Crude Fast Loop heater at sample take-off**
- **Sample Heater with PID control at MRA for temperature control sample through MRA probe**



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RE-DESIGN & ACH. RESULTS



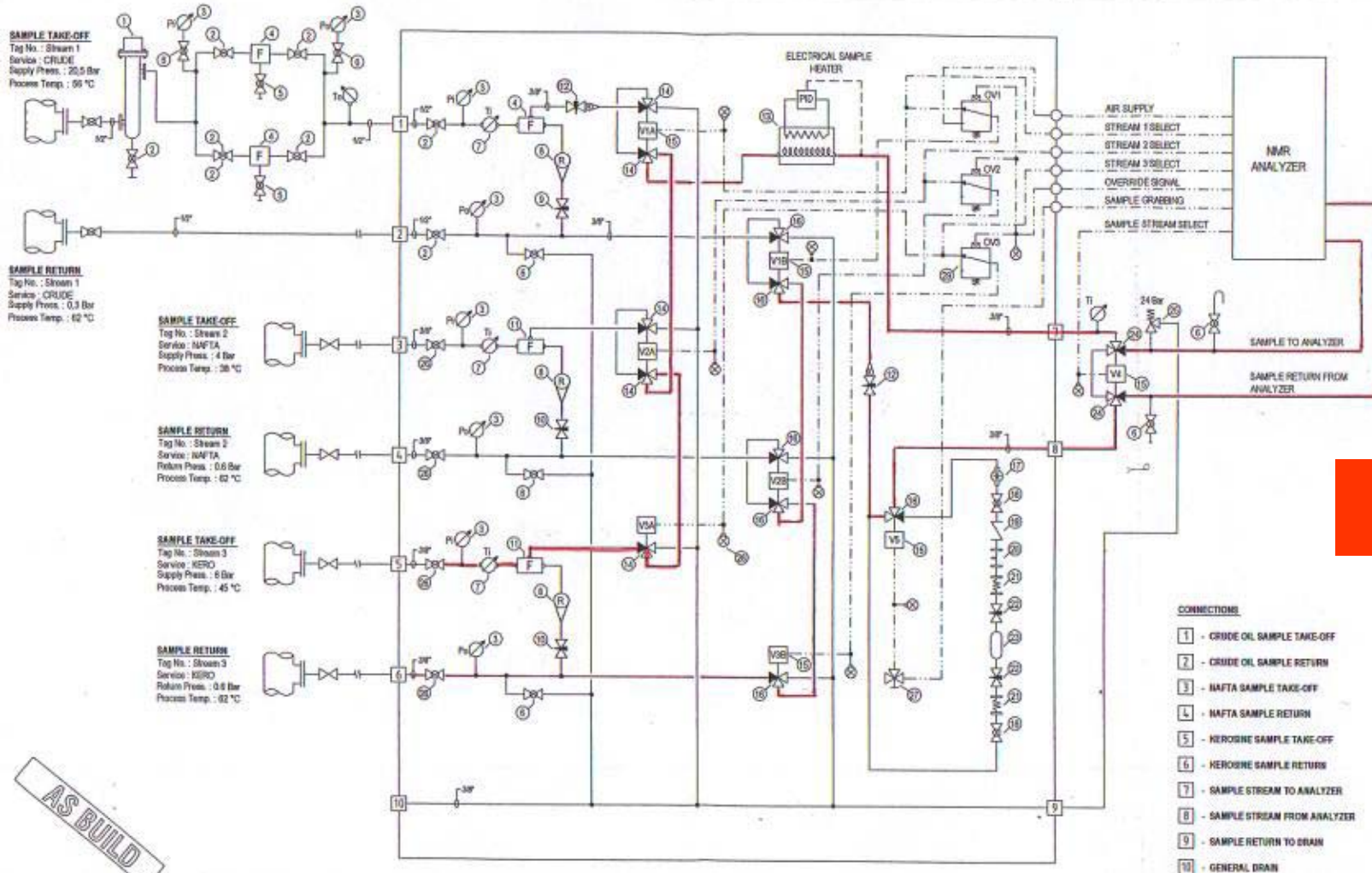
Crude Fast Loop Heater



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RE-DESIGN & ACH. RESULTS



SSC dwg

AS BUILT



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SSC inside



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RE-DESIGN & ACH. RESULTS



SSC
&
MRA



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RE-DESIGN & ACH. RESULTS

ISLA MRA MEASURING RESULTS
POST RE-DESIGN OF SSC

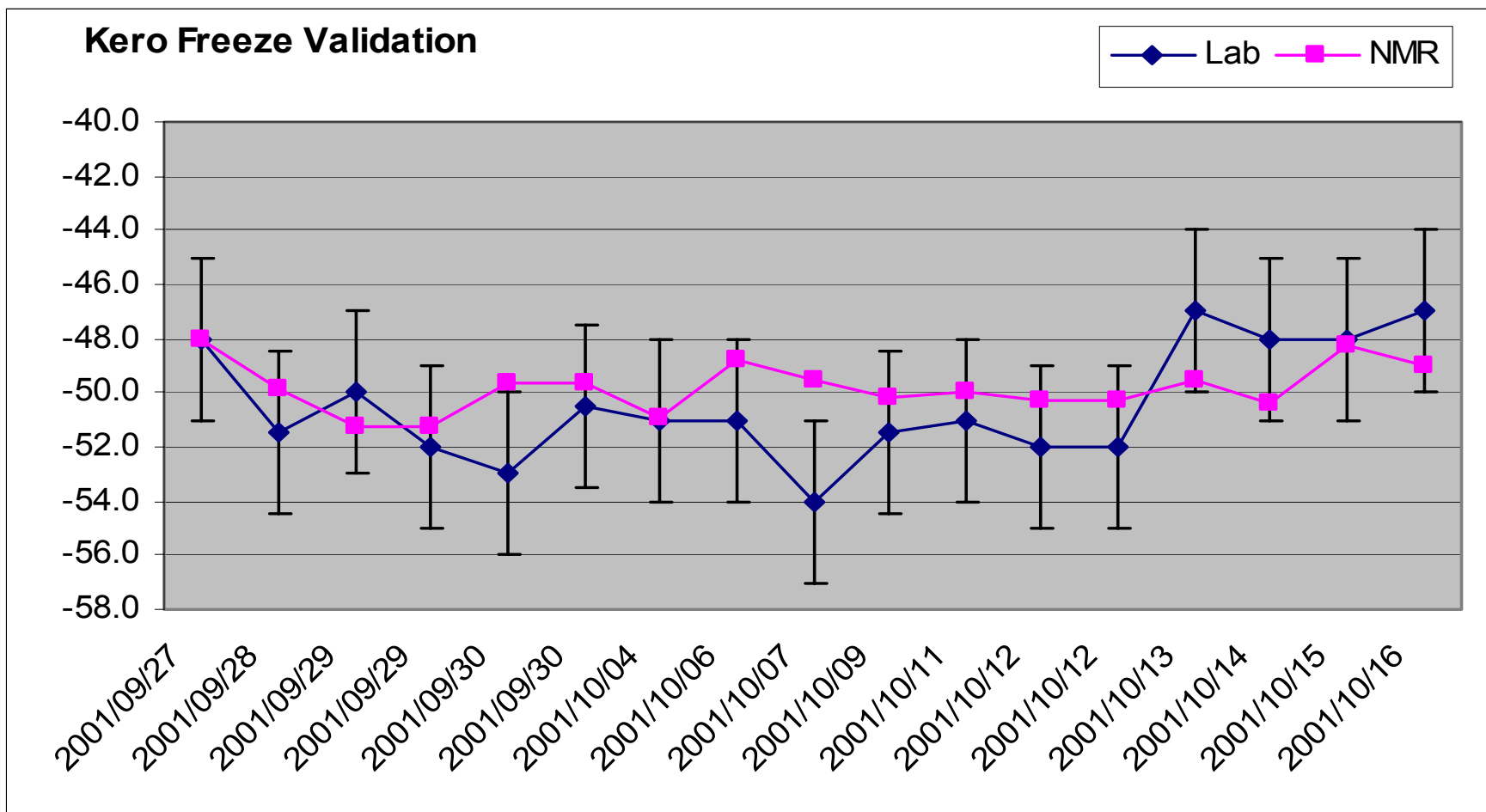
MRA Parameters with Corresponding Lab Data

Kero Freeze & Flash

Naphtha T10, T50, T90, FBP



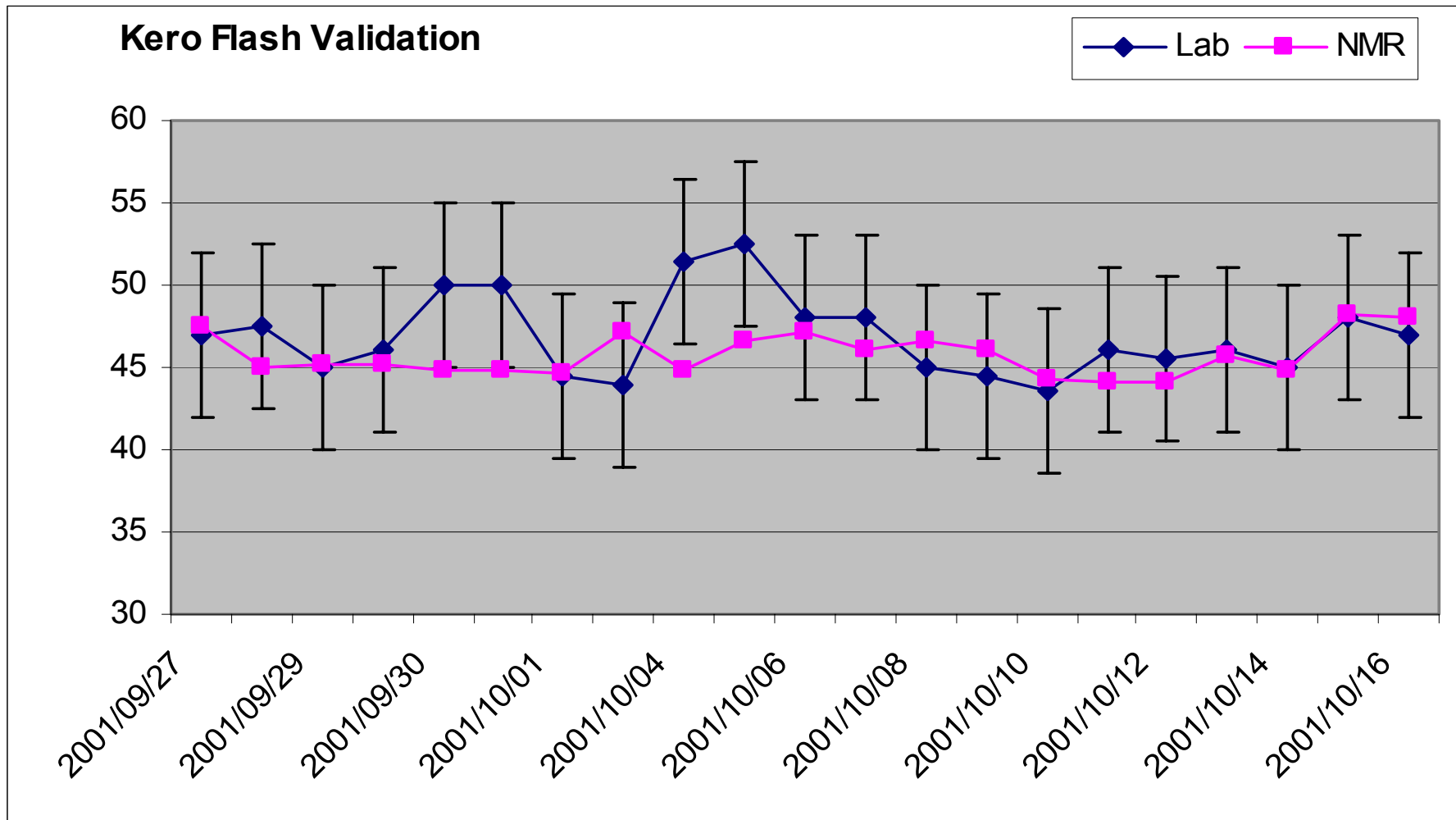
RE-DESIGN & ACH. RESULTS



Kero Frz. val.



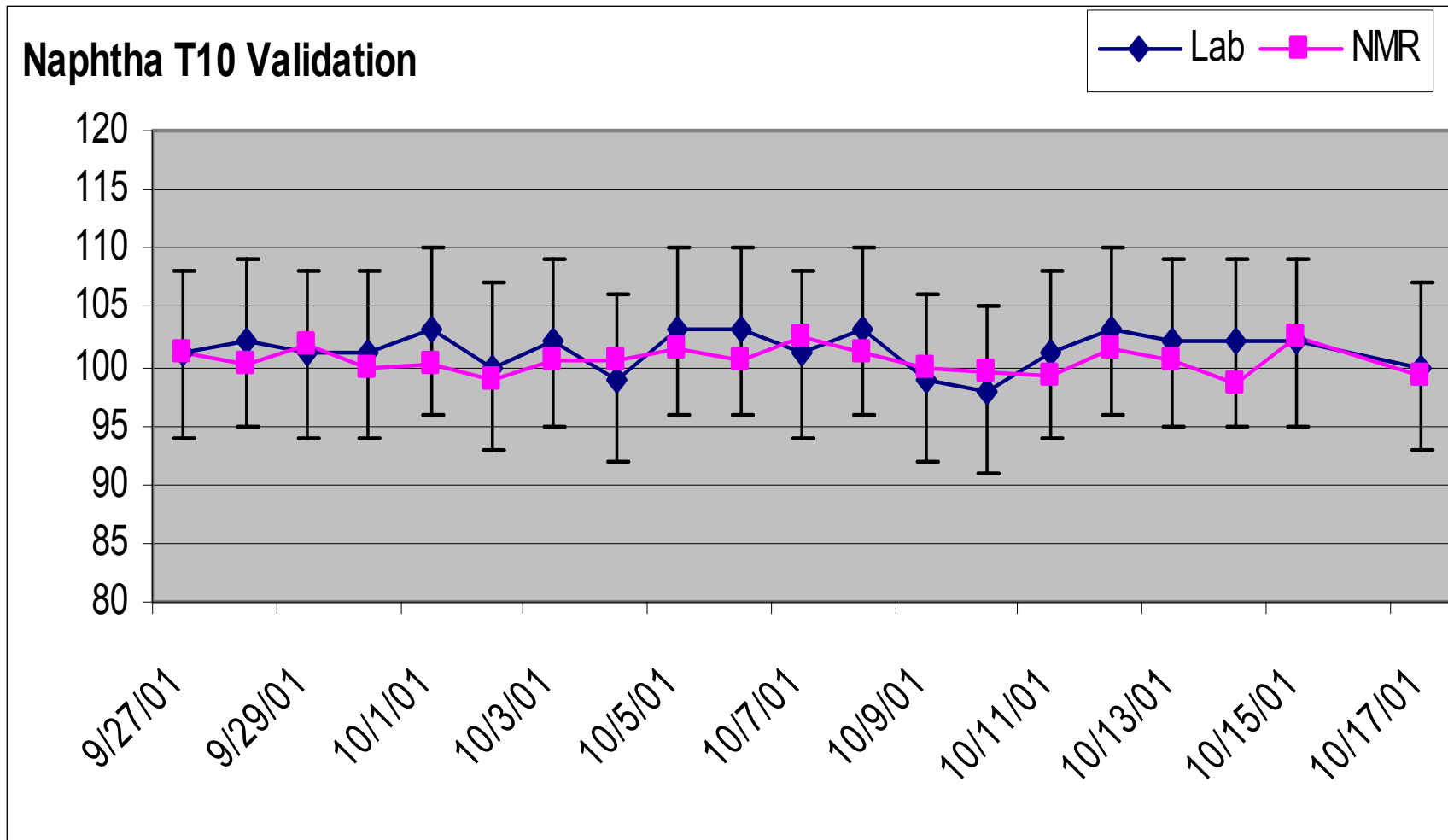
RE-DESIGN & ACH. RESULTS



Kero Frz. val.



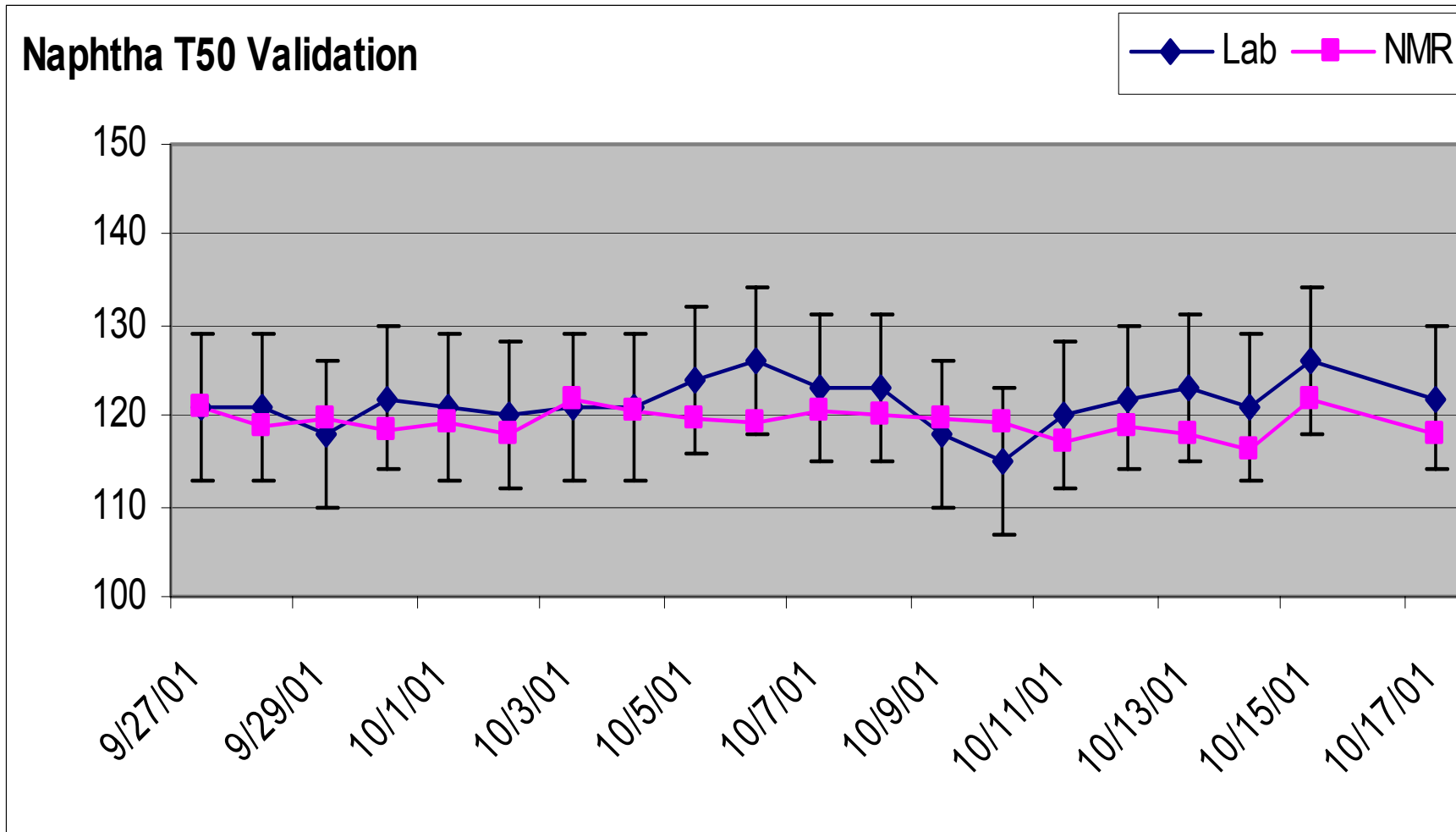
RE-DESIGN & ACH. RESULTS



Naphtha T10 val.



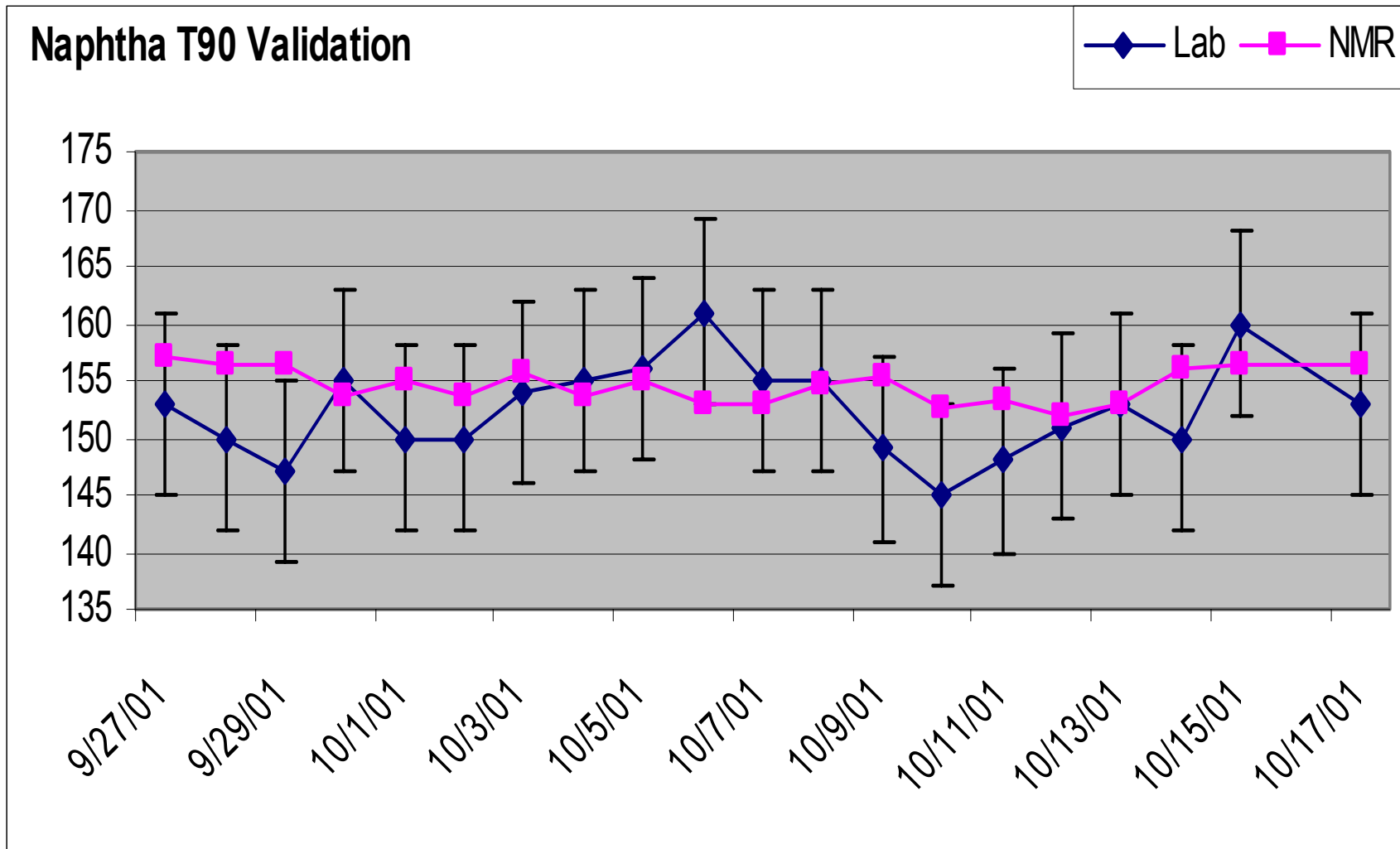
RE-DESIGN & ACH. RESULTS



Naphtha T50 val



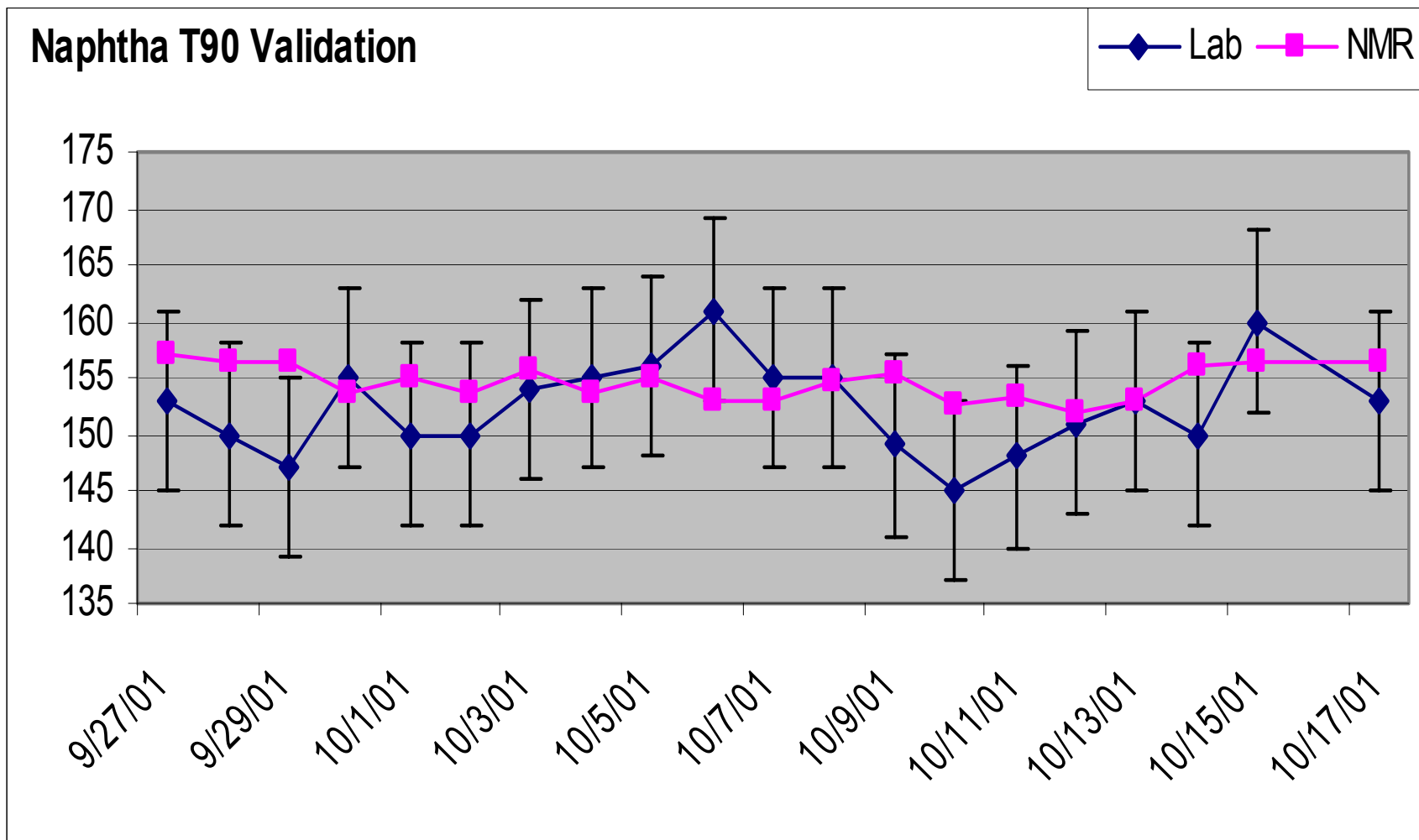
RE-DESIGN & ACH. RESULTS



Naphtha Endpoint



RE-DESIGN & ACH. RESULTS



Naphtha T90



MRA PARAMETERS WITHOUT
CORRESPONDING LAB DATA

Naphtha

PIONA

Kero

FBP

Crude

**API, sulfur, n-parafins, cumulative
cutpoints & yields**



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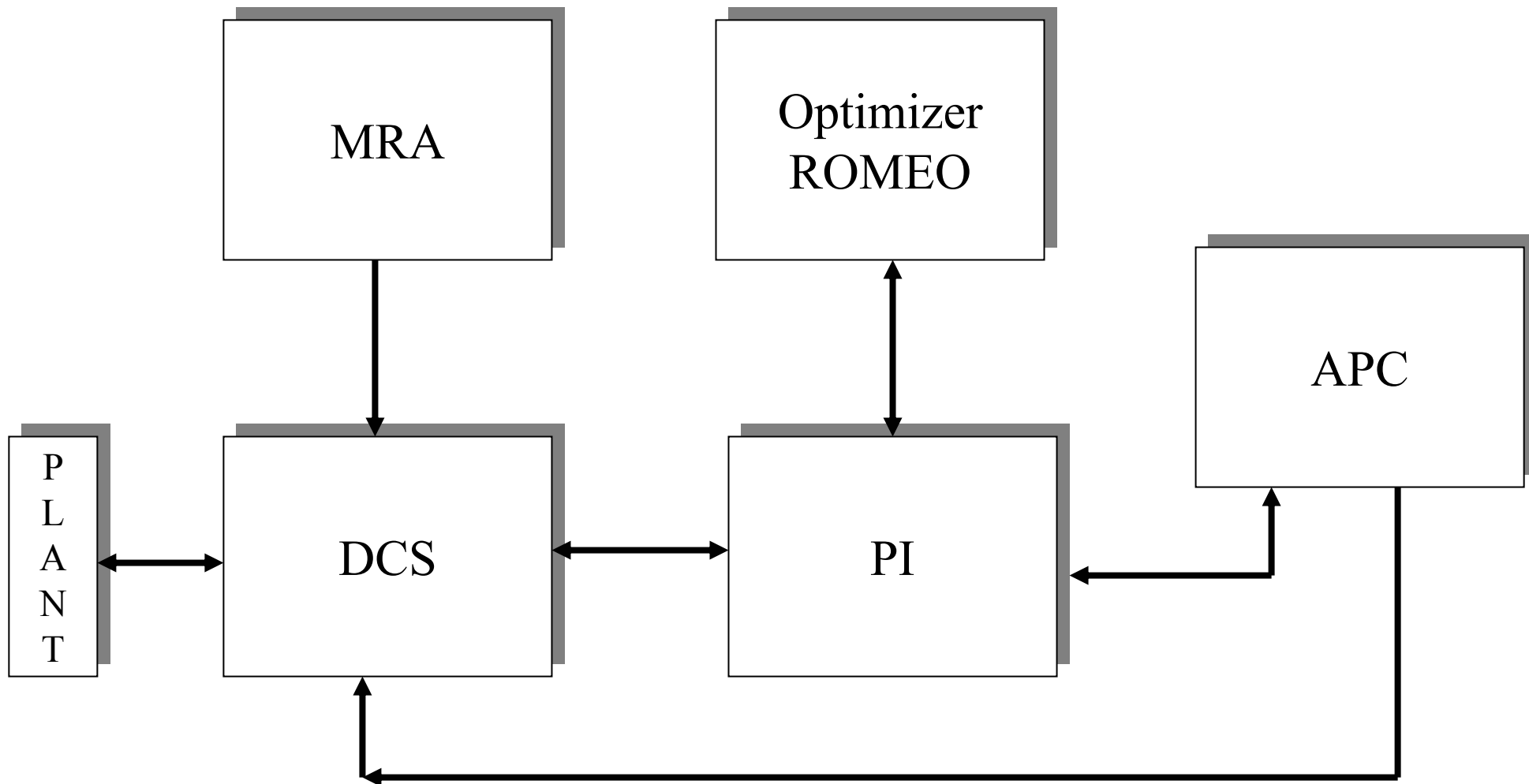
RE-DESIGN & ACH. RESULTS

AVAILABILITY & UTILIZATION

	Availability	Utilization
January 02	98%	98%
February 02	64%	64%
March 02	98%	98%

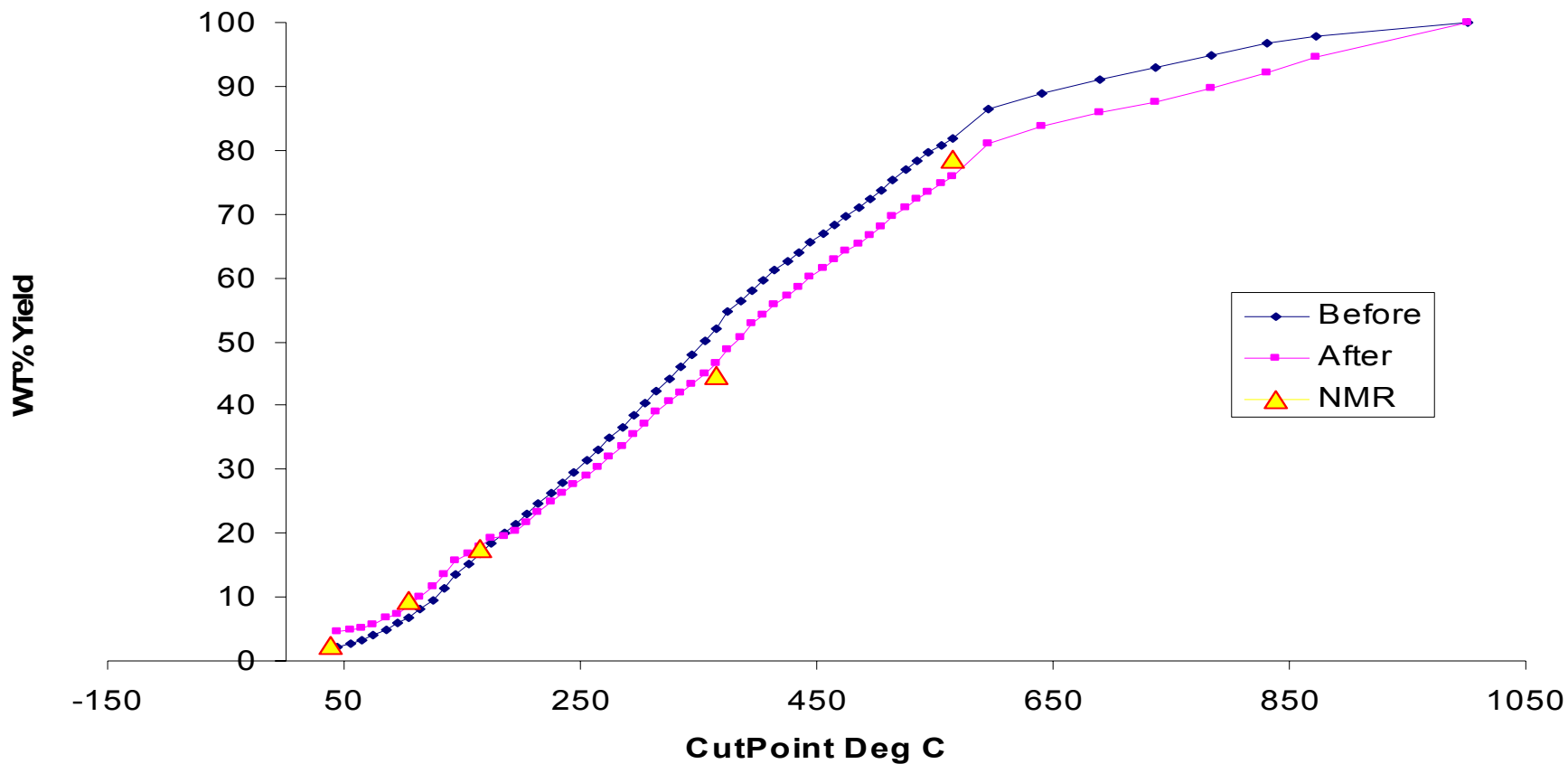


RE-DESIGN & ACH. RESULTS





Crude Adjustment



Crude Reconciliation



PREVENTIVE MAINTENANCE MRA

- Cleaning sample loop filters
- Cleaning air conditioning filters
- Checking gas detector magnet compartment
- Replace switching valves



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MAINT. PERSP.

CORRECTIVE MAINTENANCE

August '01 – March '02

Still waiting for the first one