

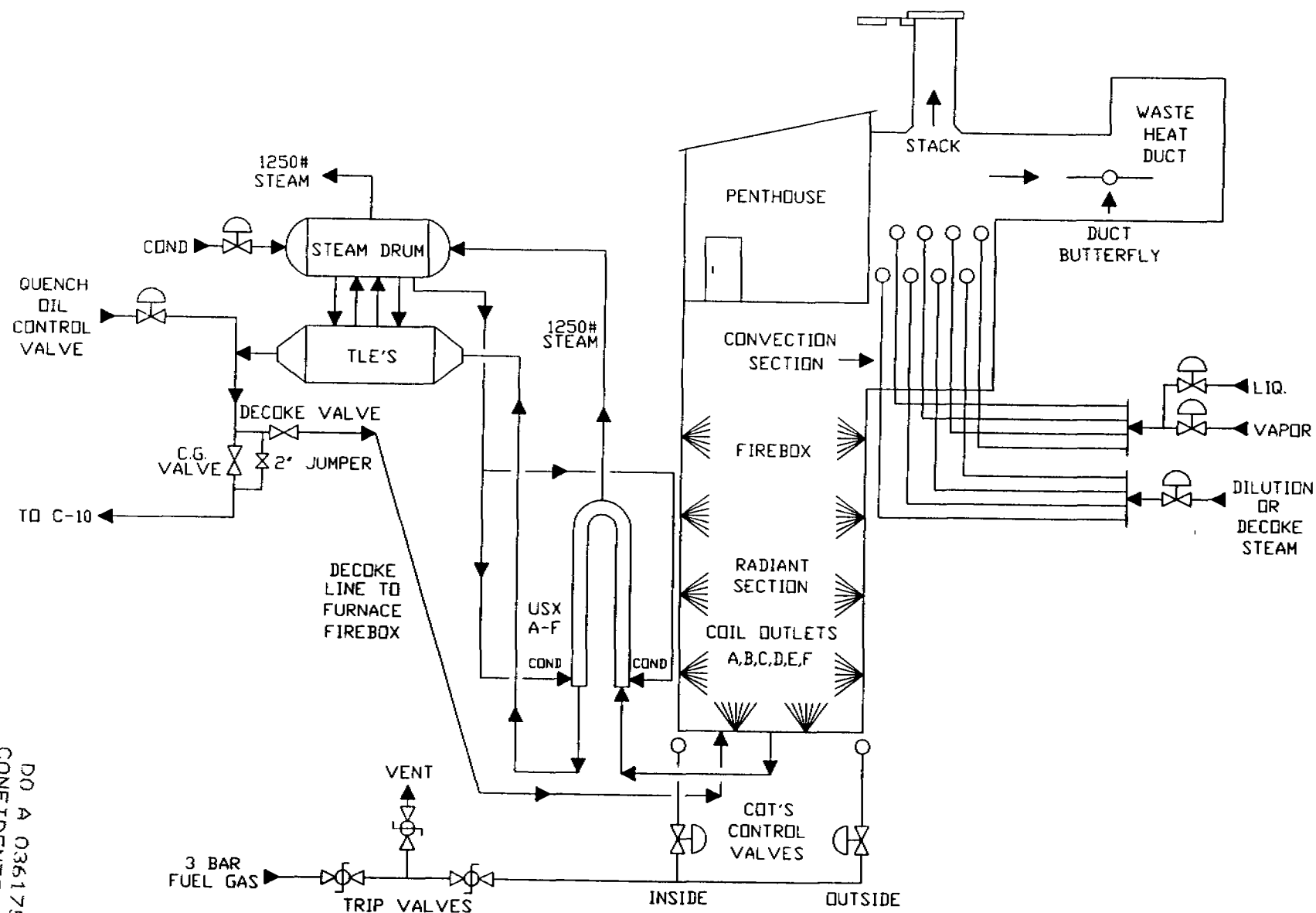
Modified Furnace Operations

Problems and Experiences

Chris Reed
July 15, 1991

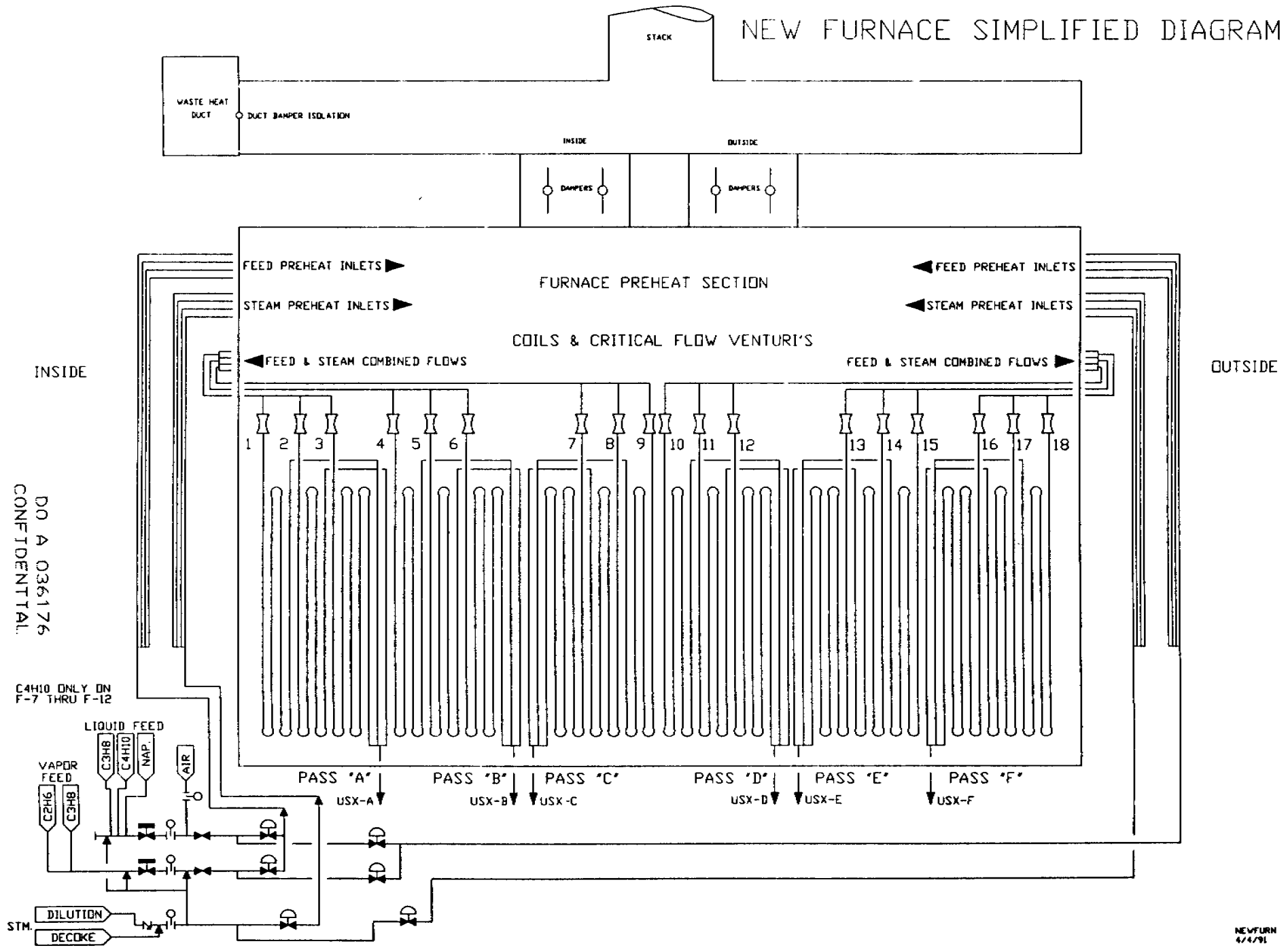
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SIMPLIFIED (SELAS) C.G. FURNACE AT LHC 3
MODIFIED

NEW FURNACE SIMPLIFIED DIAGRAM



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C4H10 ONLY ON
F-7 THRU F-12

Modified Furnace Operations

Problems

- Runtimes Less Than Predicted
- Instrumentation Reliability
- Coil Outlet Temperature Spreads
- Feed Rates Different From Predicted

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Furnace Runtimes

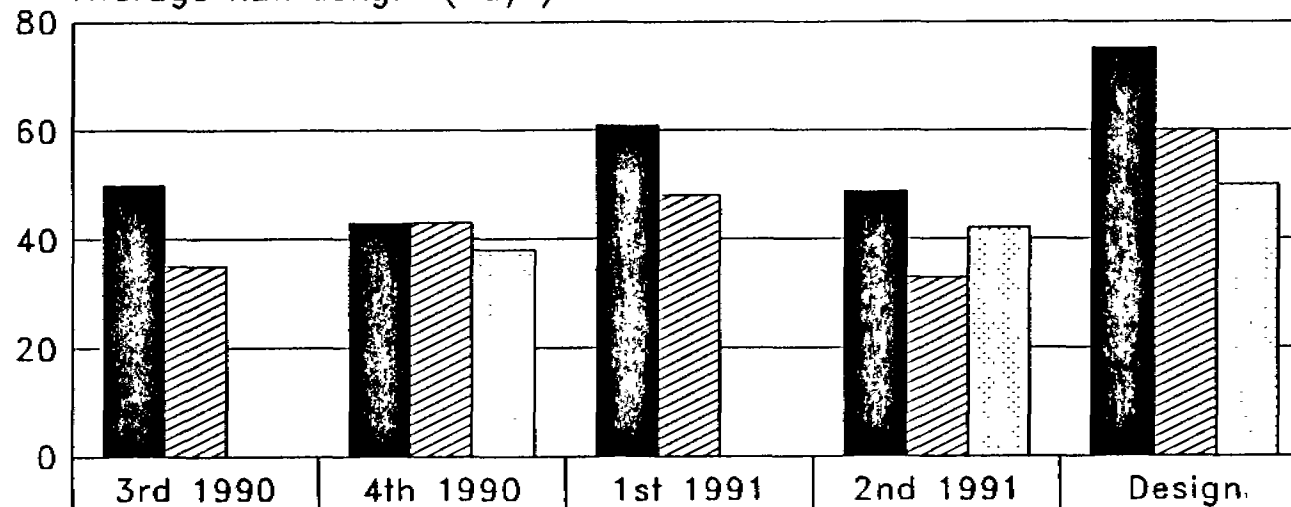
- Inadequate Furnace Decoking
 - Higher Flow Rates
 - Longer Decoke Times
 - CO2 Sampling for Completion
- DMS Injection Problems
 - Use on All Feed Types
 - One Injection Point

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Modified Furnace Runtimes

Average Run Length (Days)



	3rd 1990	4th 1990	1st 1991	2nd 1991	Design
Propane	50	43	61	49	75
Naphtha	35	43	48	33	60
Ethane		38		42	50

Feed Type

Propane
 Naphtha
 Ethane

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Instrumentation

- Venturi Pressure Ratios
 - Trouble Getting Good Readings
 - Plugging Made System Unreliable
 - Nitrogen Purge Added

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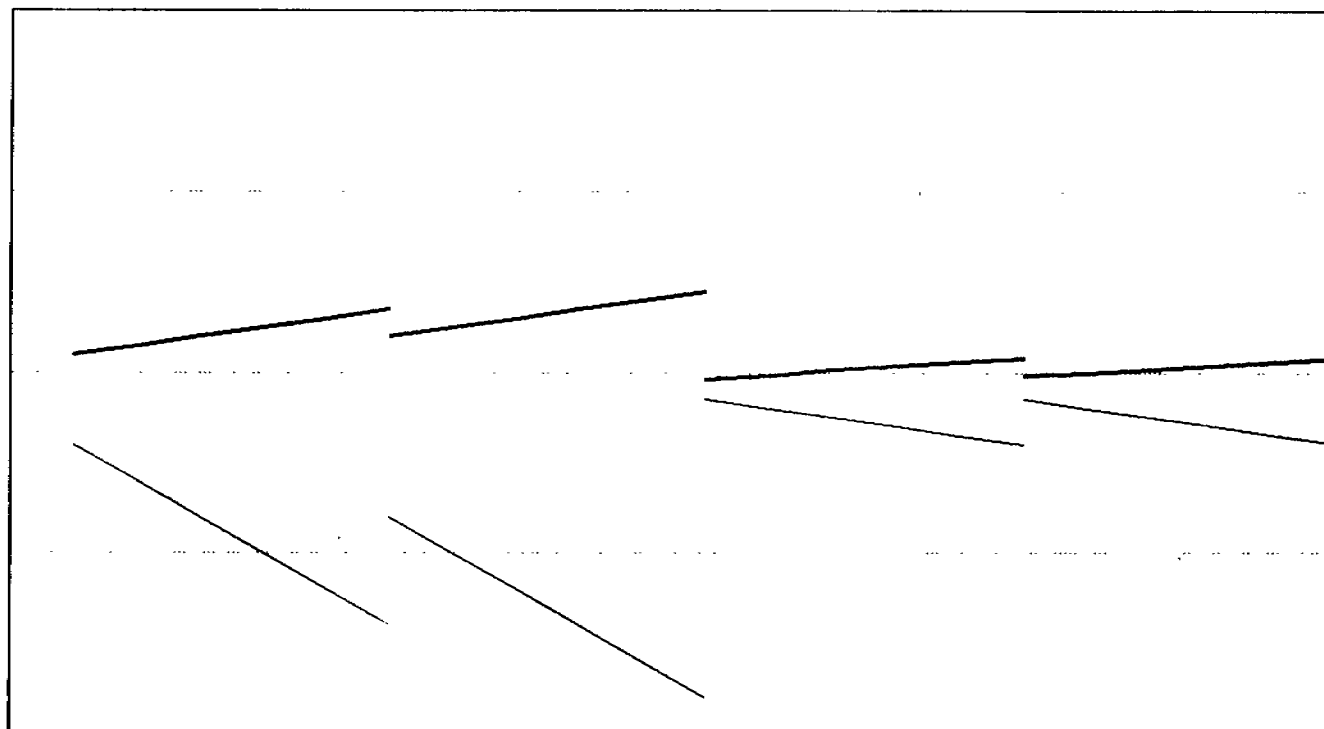
Coil Outlet Temperatures

- COT Spread Increases Through Run
- COT Spread Not Reduced by Decoke
- Possible Causes Include
 - Uneven Flow Distribution
 - Uneven Coking
 - Instrumentation Problems
 - Uneven Heating of Coils

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Coil Outlet Temperature Spreads

Coil Outlet Temperature



Decoke

Decoke

New Decoke

New Decoke

— Max COT — Min COT

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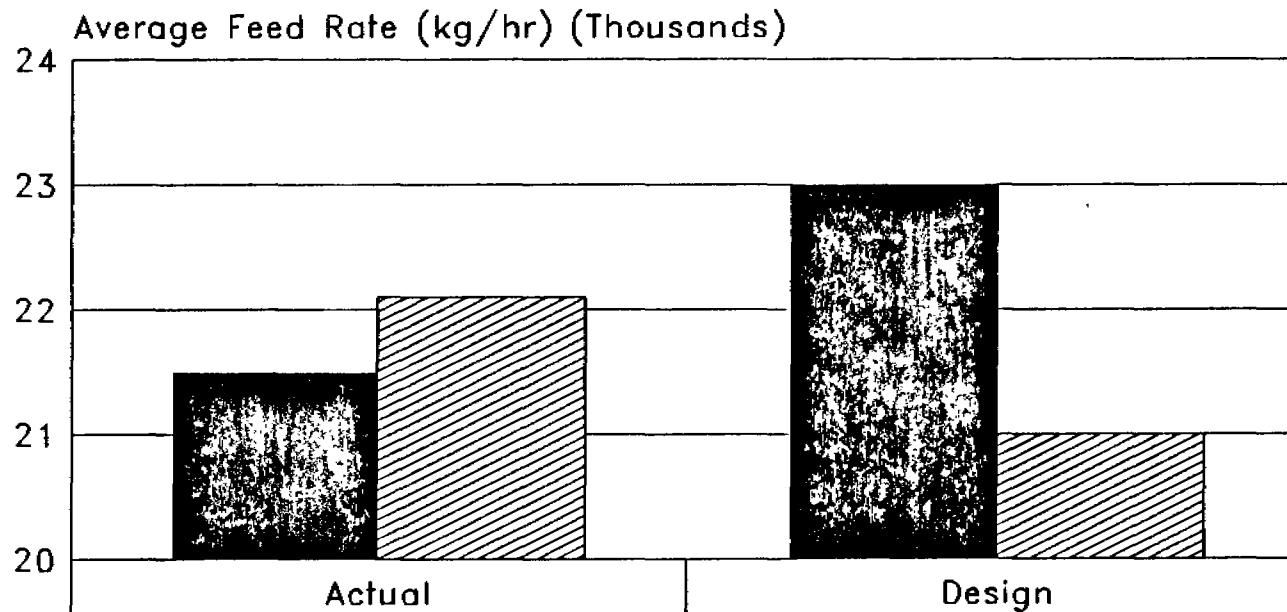
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Modified Furnace Feed Rates

- Propane Rates Below Design Values
- Naphtha Rates Above Design Values
- Often Constrained By Fuel Gas

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Modified Furnace Feed Rates



Propane	21.5	23
Naphtha	22.1	21

Feed Type

Propane
 Naphtha

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Future Plans

- Venturi Replacement
 - Better Flow Distribution
 - More Stability at Low Rates
 - No Longer "End of Run" Criteria
- Skin Thermocouples on Coil Outlets
- Oxygen Control
- Load Swing Furnace

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Future Plans

- Burner Replacement
 - Lower NO_x Formation
 - Less Impingement on Tubes
 - More Even Heat Distribution
 - Less Susceptible to Plugging
- Control of DMS Injection
- Mod 5 Control of Furnaces

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