

Cost Effective Solution for the Efficient Cleaning and Decontamination of a Coker Unit

Calgary, Alberta, Canada

Today's Agenda

ULI Overview

Coker Decontamination Project Overview

- ULI Product Applications
- Coker Decontamination
- Blowdown Heat Exchanger Efficiency Recovery

Other Applications

- Visbreaker decontamination
- Pre-heat exchangers

Advantages Over Conventional Decontamination Methods

Conclusions and Recommendations



What is Decontamination?

... Process of making equipment ready for personnel entry.



Involves...

Removal of all hydrocarbons, gases and pyrophoric compounds that can cause danger to personnel and the unit itself


Decontamination Project, Louisiana (Jan. 2009)


- **Pyrophoric Iron Sulfide**
- **Heavy Asphaltenes**
- **Hydrogen Sulfide**
- **Phenols**
- **Benzene**
- **Clogged heat exchangers and bottoms lines**



Louisiana Coker Planning

- Preparation is the key
- On-site planning
 - T-6 months or sooner
 - Typically on-site 5 days
- Training
 - Booklets
 - Procedures
- Walk-down immediately prior to TA start


ULI
United Laboratories International, LLC


**Zyme
Flow**

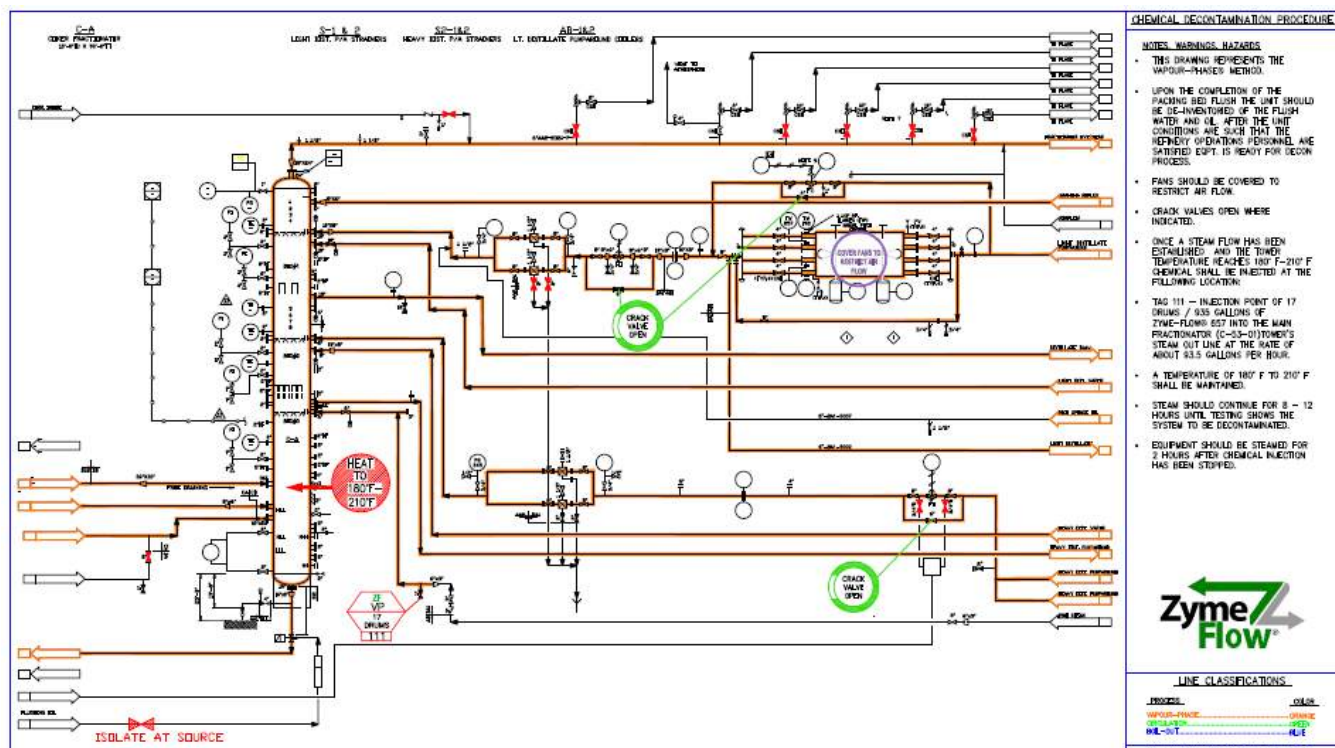
Date _____

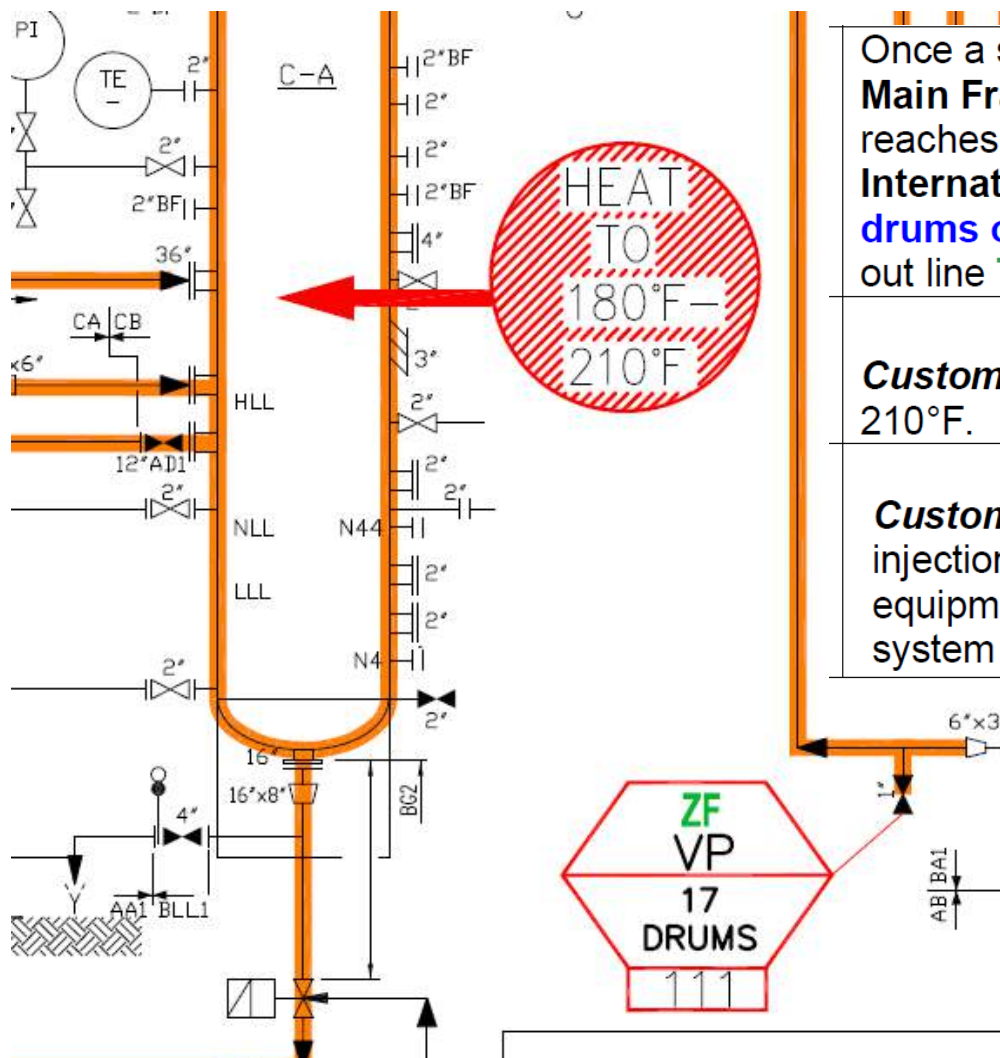
Coker Unit
Decontamination Procedure
MAJOR REFINERY, SOUTHERN USA

Coker Unit Decontamination	MAJOR REFINERY, SOUTHERN USA Decontamination of the Coker Unit and associated equipment and piping.	
Normal Procedure	Approval: _____ Date: _____	
Purpose:	Procedure to decontaminate the Coker Unit and associated equipment and piping; which allows access for mechanical work.	
Safety and Environmental Precautions:	Wearing of standard PPE is required. Hazard of Personnel injury if condensate levels are allowed to build and flanges are opened for blinding.	
References:	<ul style="list-style-type: none"> ULI Decontamination Job Prerequisites: Ensure the HOB® K-61 viscosity wash has been completed prior to starting the Vapour-Phase® procedure. Ensure packing bed wash procedure has been completed prior to starting this procedure. 	

Step	Task	Sign Off
Main Fractionator C-A Vapour Phase® Decontamination	<p style="text-align: center;"><u>Note:</u></p> <p><i>It is important during the cleaning process that flow paths remain open to keep the chemicals flowing. Operations personnel shall alternate spare equipment and all by-pass valves to ensure adequate contact with the chemical. <u>Caution should be taken to ensure that equipment is not over pressured while opening and closing by-pass valves.</u></i></p>	

Detailed Piping and Instrumentation Diagram





Once a steam flow has been established thru the **Main Fractionator C-A** and the tower temperature reaches 180°F – 210°F **United Laboratories International, LLC** shall inject **935 gallons / 17 drums of Zymeflow® UN-657** into the tower steam out line **Tag111**

Note:

Customer shall maintain a temperature of 180° - 210°F.

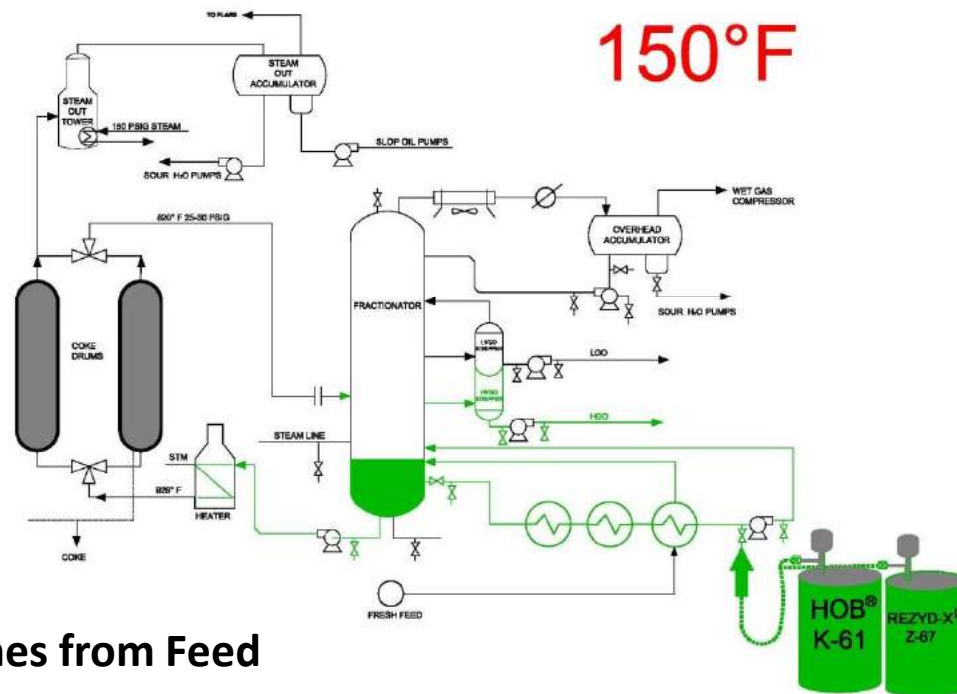
Note:

Customer shall continue the steam/chemical injection to the **Main Fractionator Tower C-A** and equipment for 8 – 12 hours until testing shows the system to be decontaminated.

Coker Decontamination Project Louisiana (Jan. 2009)

Procedure

- Coker Unit Viscosity Flush

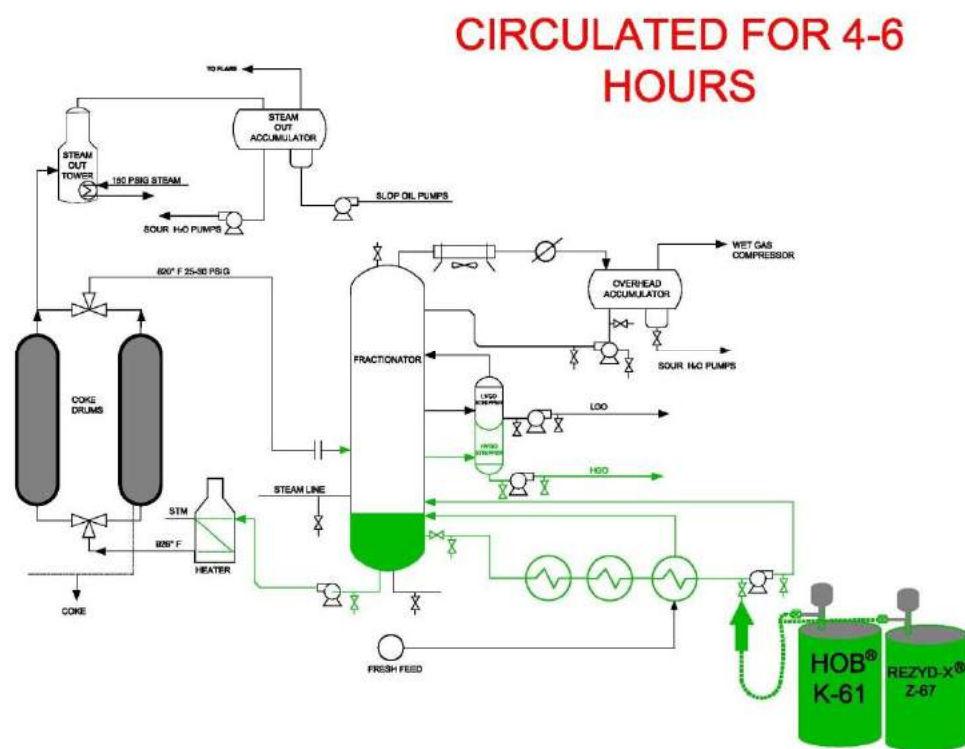


**Removal of Heavy Asphaltenes from Feed
and Heavy Ends Equipment**

Coker Decontamination Project Louisiana (Jan. 2009)

Procedure

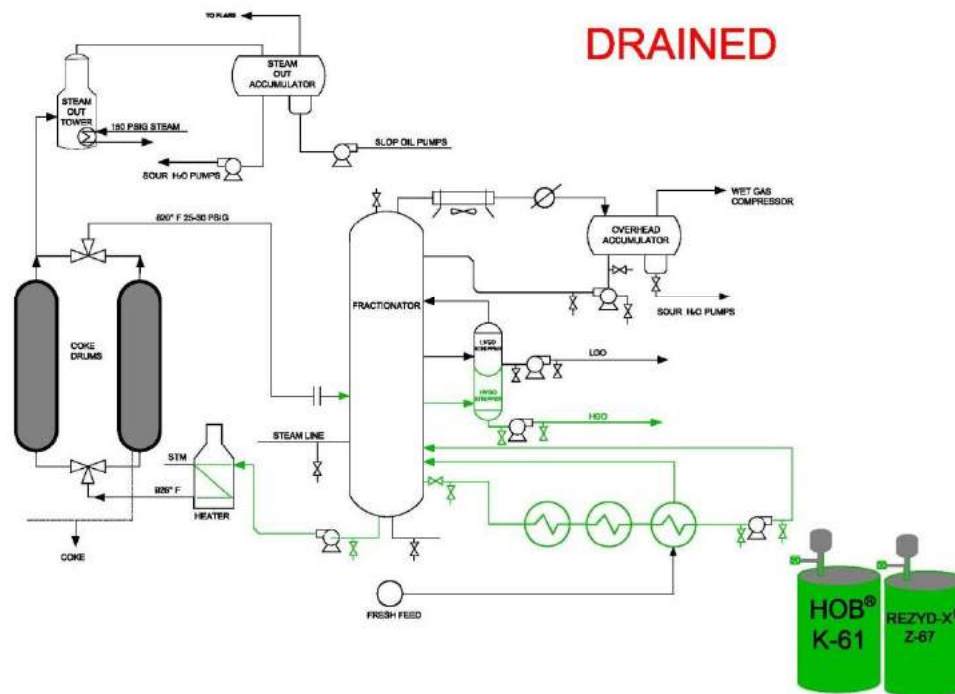
- Coker Unit Viscosity Flush



Coker Decontamination Project Louisiana (Jan. 2009)

Procedure

- Coker Unit Viscosity Flush



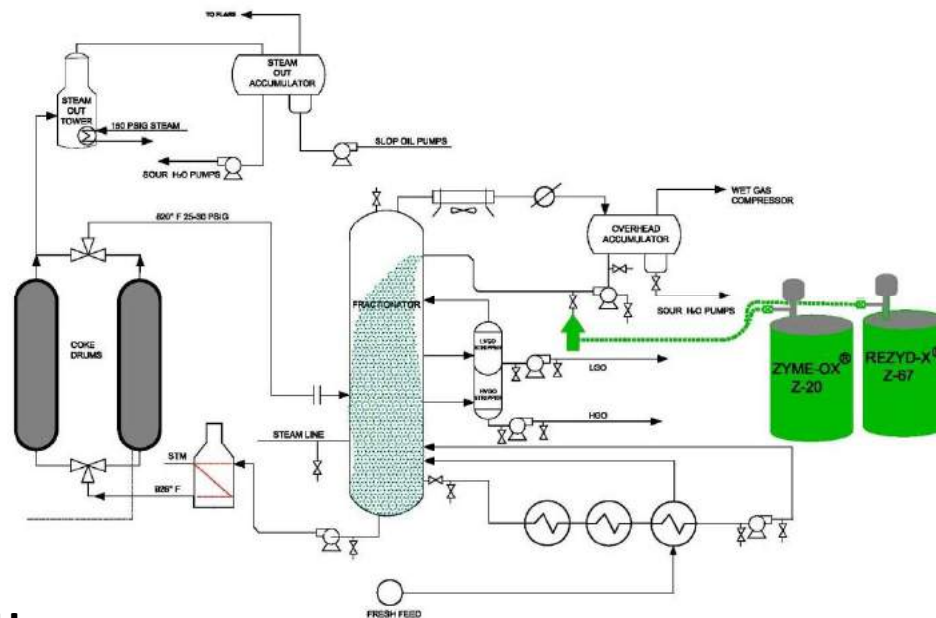
4.

Coker Decontamination Project Louisiana (Jan. 2009)

Procedure

- Coker Unit Viscosity Flush
- Fractionation Unit Pre-Treatment

H₂O FLUSH

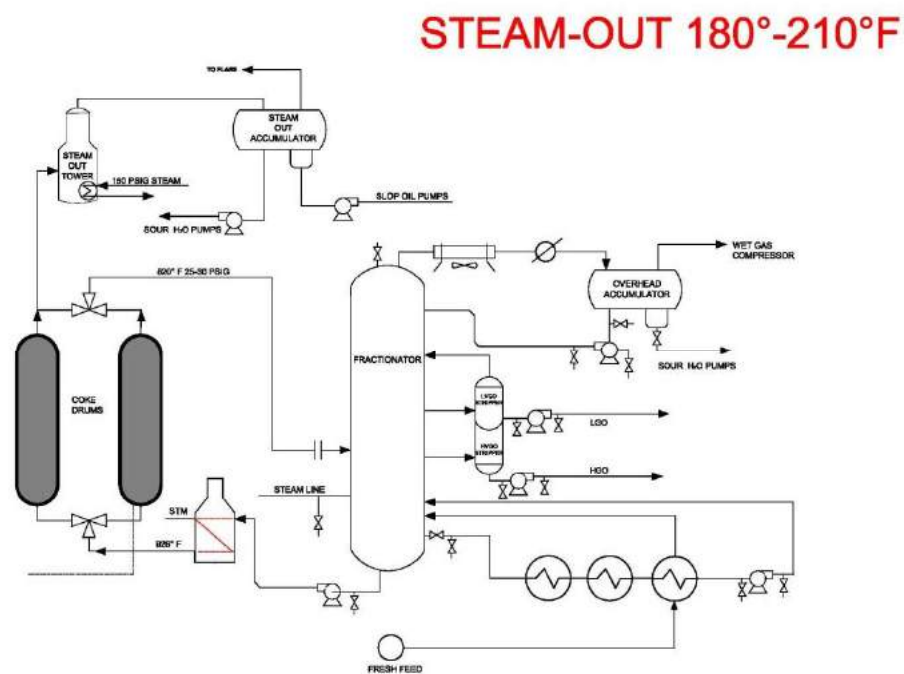


**Removal of Pyrophoric Iron and Heavy
Asphaltenes in Packing Beds**

Coker Decontamination Project Louisiana (Jan. 2009)

Procedure

- Coker Unit Viscosity Flush
- Fractionation Unit Pre-Treatment
- Coker Unit Decontamination



6.

Coker Decontamination Project Louisiana (Jan. 2009)

Procedure

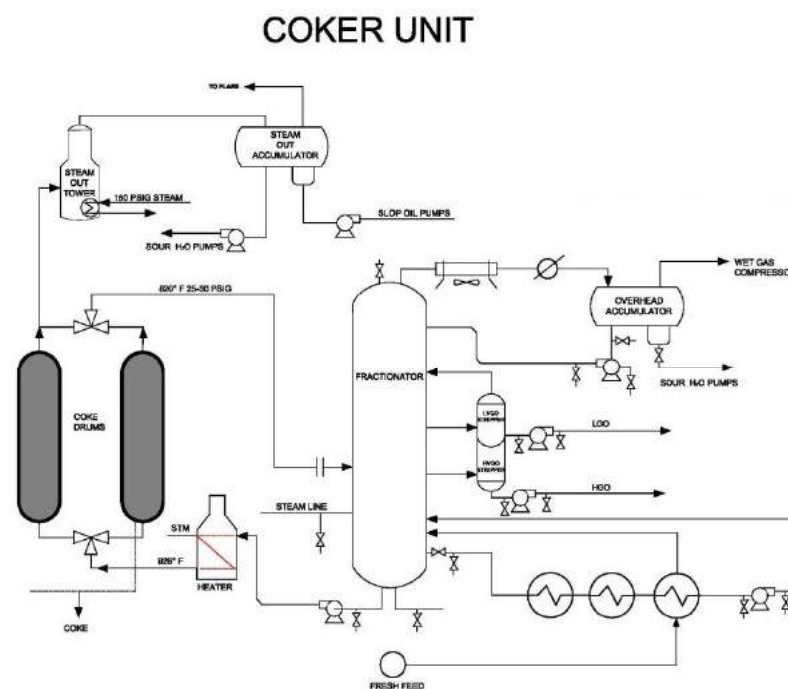
- Coker Unit Viscosity Flush
- Fractionation Unit Pre-Treatment
- Coker Unit Decontamination

All low points drained.

Readings of H₂S = 0 ppm

Benzene = 0 ppm, LEL, VOC = 0%

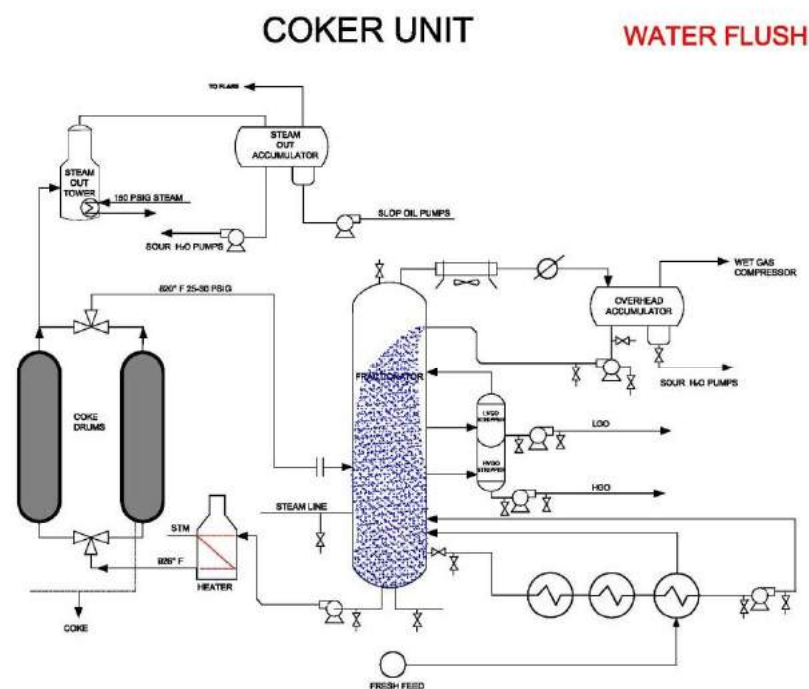
Zyme-Flow[®] = 300-400 ppm



Coker Decontamination Project Louisiana (Jan. 2009)

Procedure

- Coker Unit Viscosity Flush
- Fractionation Unit Pre-Treatment
- Coker Unit Decontamination
- Fractionation Tower Post-Rinse



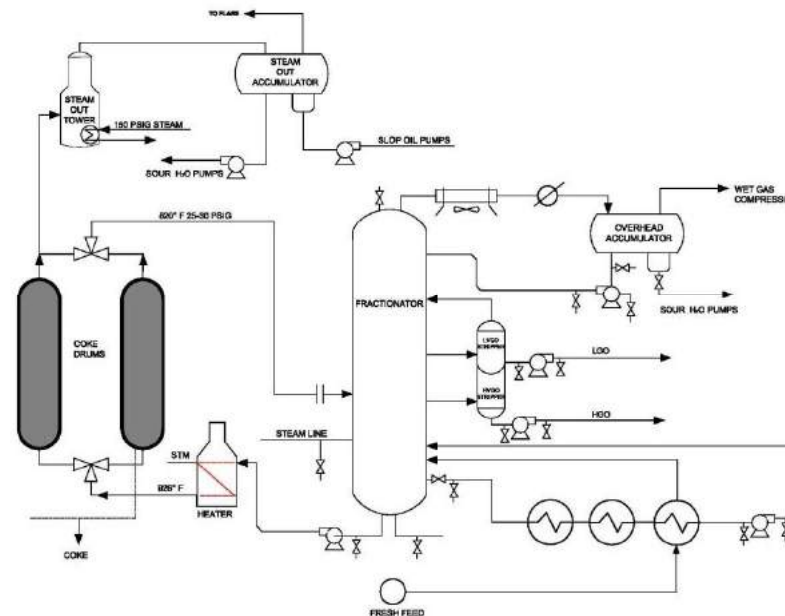
**Targeting Any Remaining Pyrophoric Iron Scale,
Solids and Chemical Residue**

Coker Decontamination Project Louisiana (Jan. 2009)

Procedure

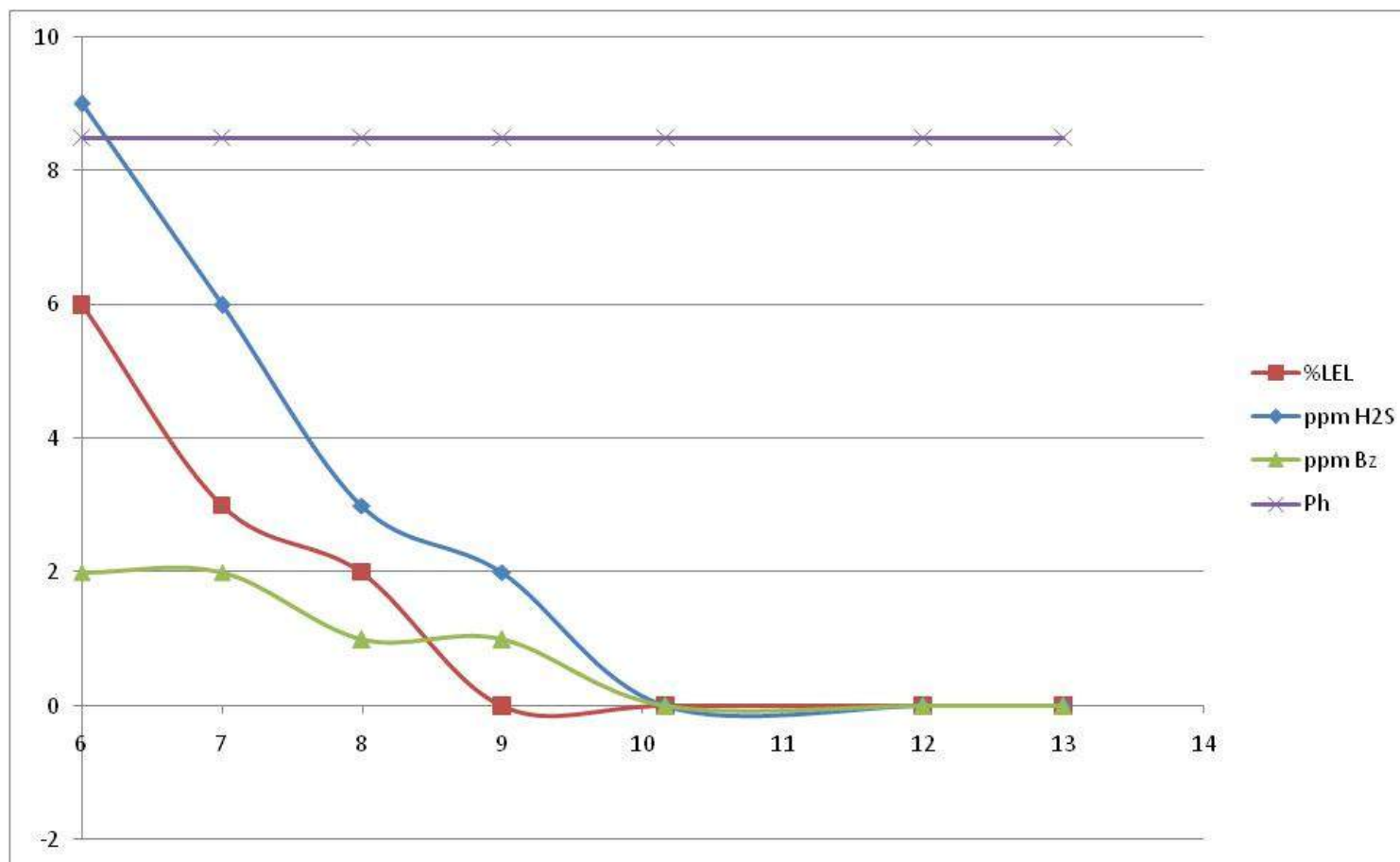
READY FOR ENTRY

- Coker Unit Viscosity Flush
- Fractionation Unit Pre-Treatment
- Coker Unit Decontamination
- Fractionation Tower Post-Rinse

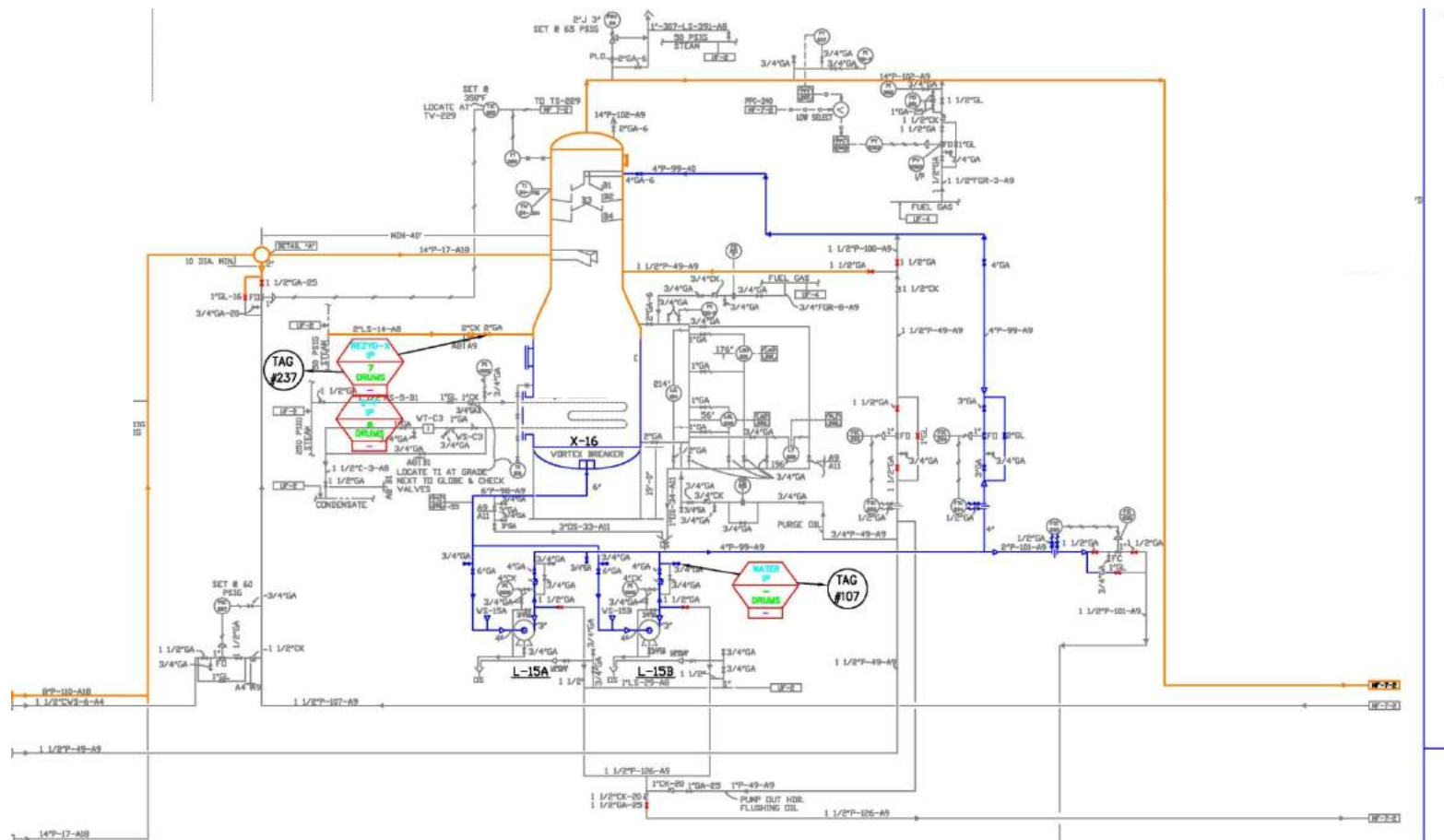


Customer very satisfied with the results and with the time frame in which the decontamination was completed.

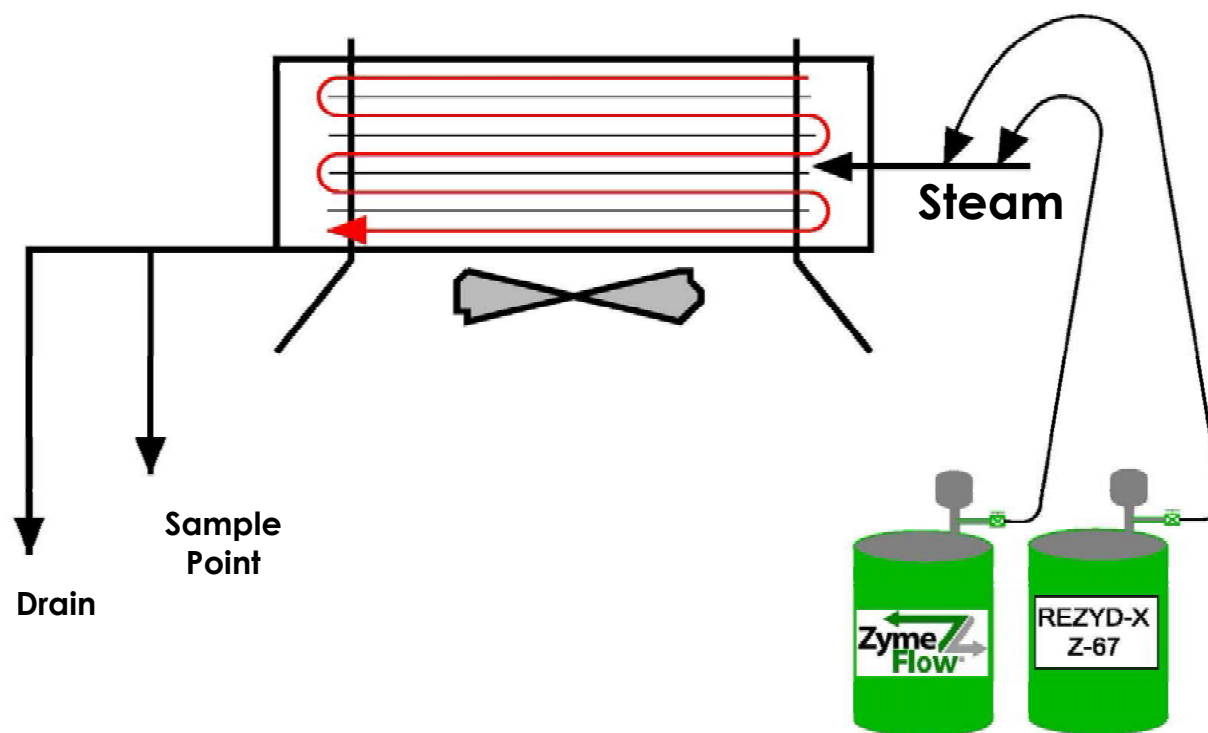
Actual Coker Fractionation Decontamination Results



January 2009 Coker Decontamination Project

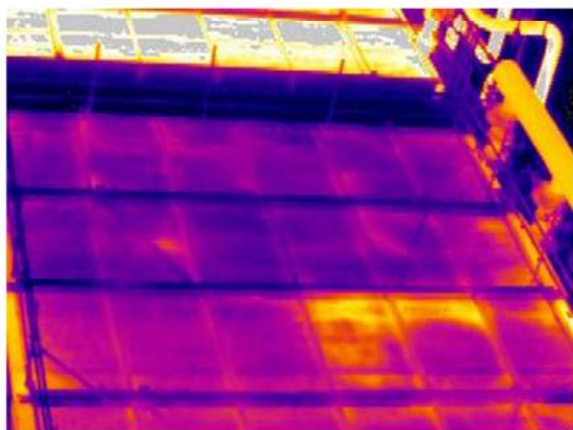


Fin Fan Heat Exchanger Efficiency Recovery at Port Arthur Texas

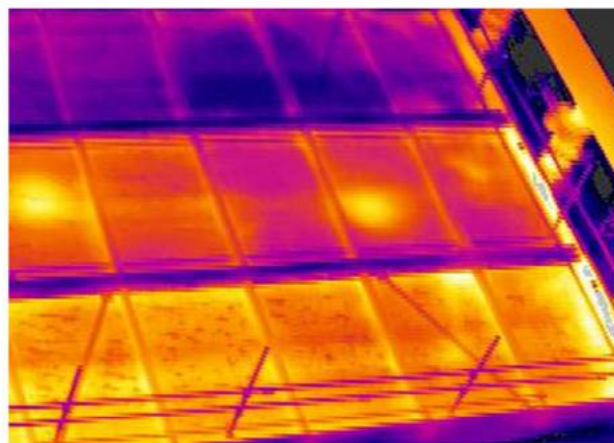


Simple problems can mean simple applications

Vapour-Phase[®] With Rezyd-X[®] and Zyme-Flow[®] Quickly Recovered Blowdown Heat Exchanger



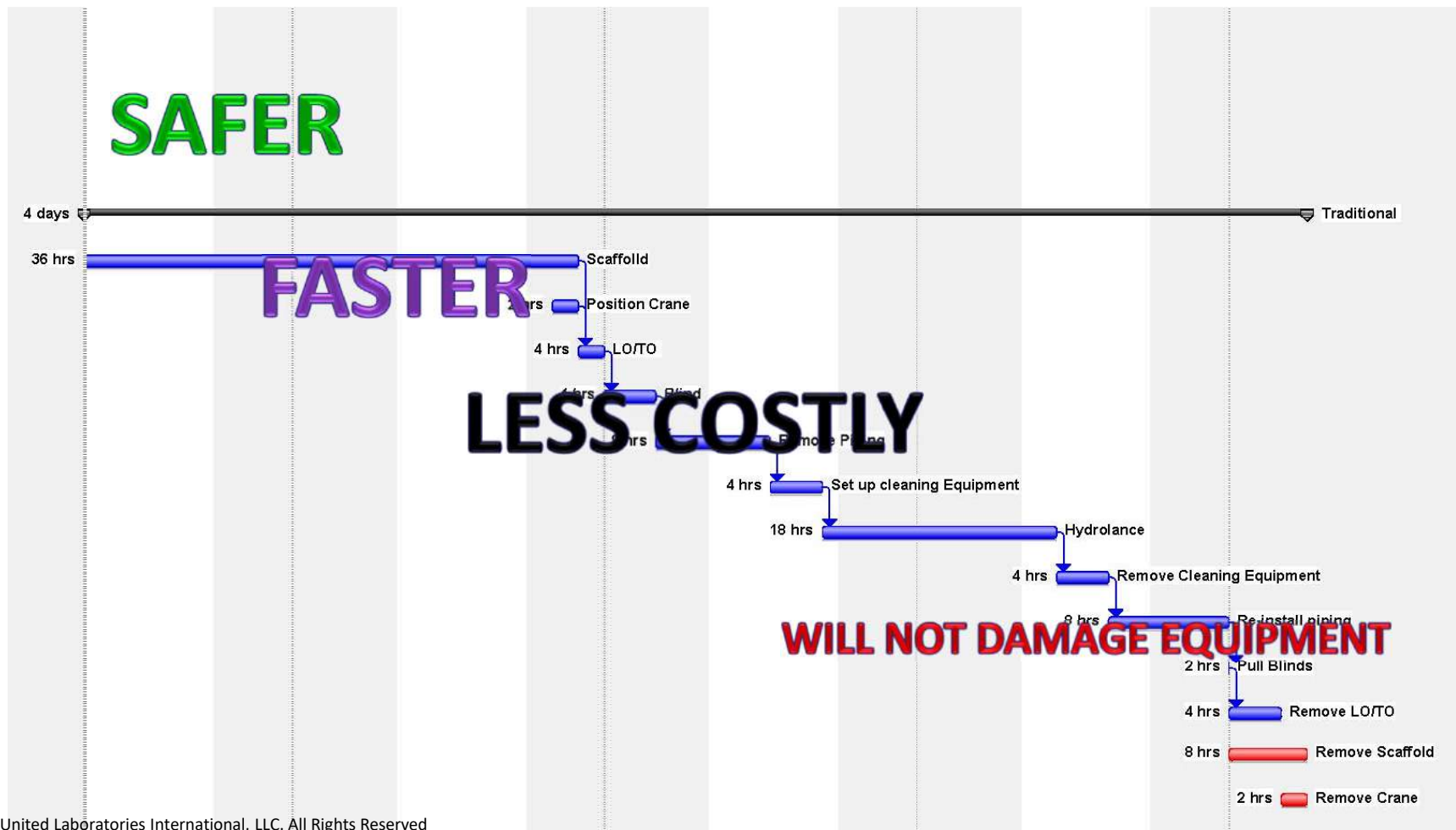
Before



After

ZYME-FLOW® PROCESS

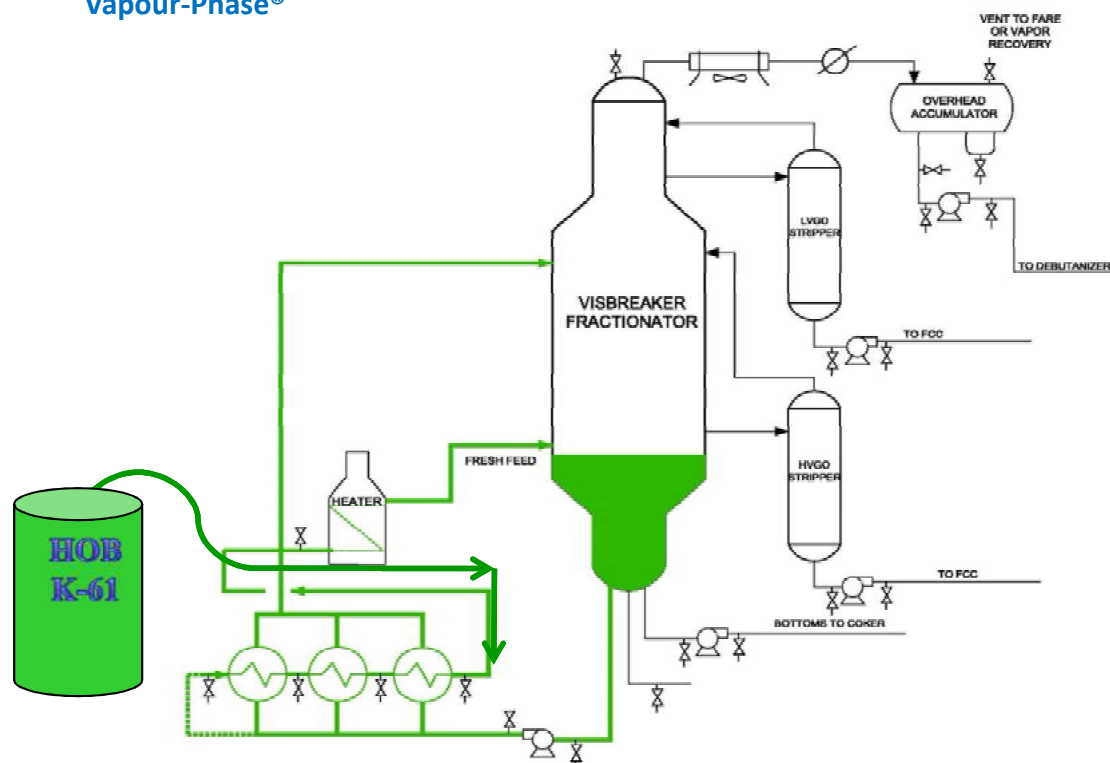
Completed in 1/3 the time!



Visbreaker Unit Decontamination

Circulate 4-6 hours

HOB™/ LIGHT OIL VISCOSITY WASH
Vapour-Phase®

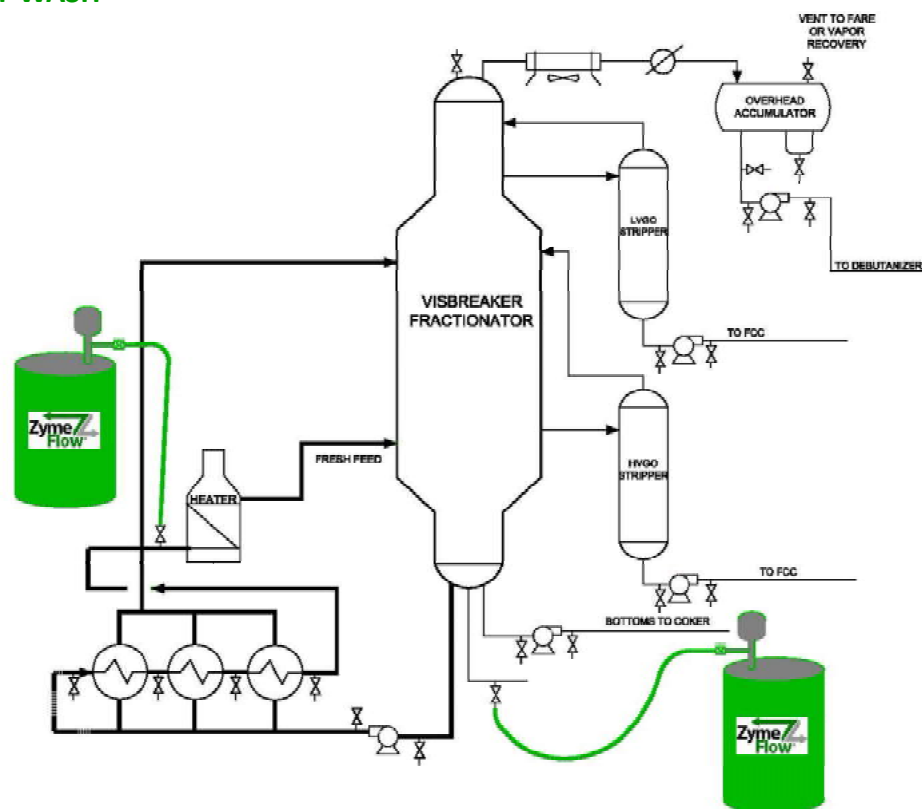


3.

Visbreaker Unit Decontamination

Vapour-Phase® 10 Hours

HOB™/ LIGHT OIL VISCOSITY WASH
Vapour-Phase®



5.

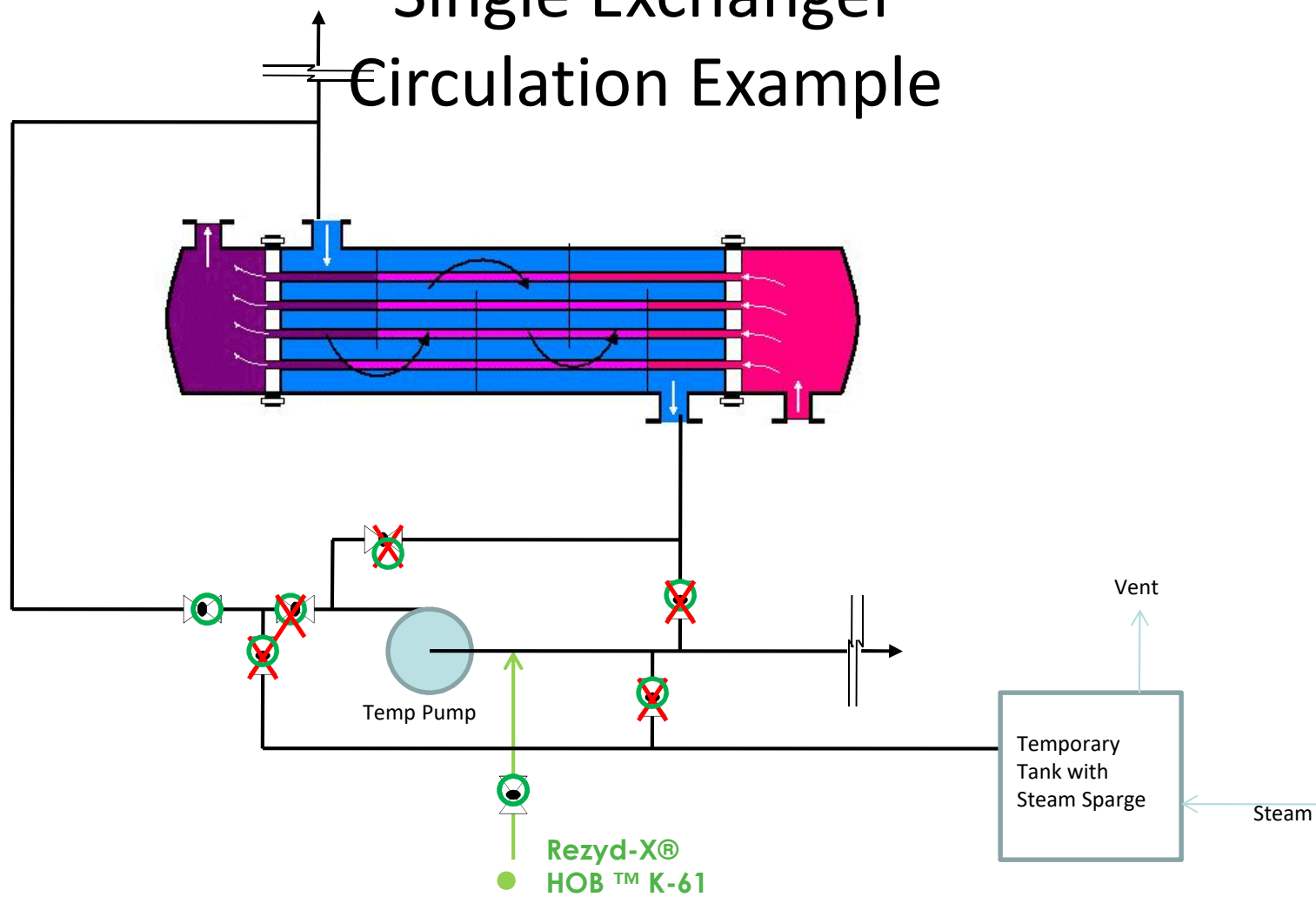
Visbreaker Tower, Stripper, Soaker, Exchanger and Overhead

- Combination of Vapour-Phase[®] and Circulation
- 9 ½ hours to decontaminate
- Results:
 - H₂S, LEL free
 - Beds and trays were oil free
 - Exchangers were easily pulled

Feed Pre-Heat Exchangers

- Treat heavy asphaltenes
- LCO stock with Rezyd-X®
- Softens and breaks up hydrocarbon deposits
- Makes it easier to clean and pull bundle

Single Exchanger Circulation Example



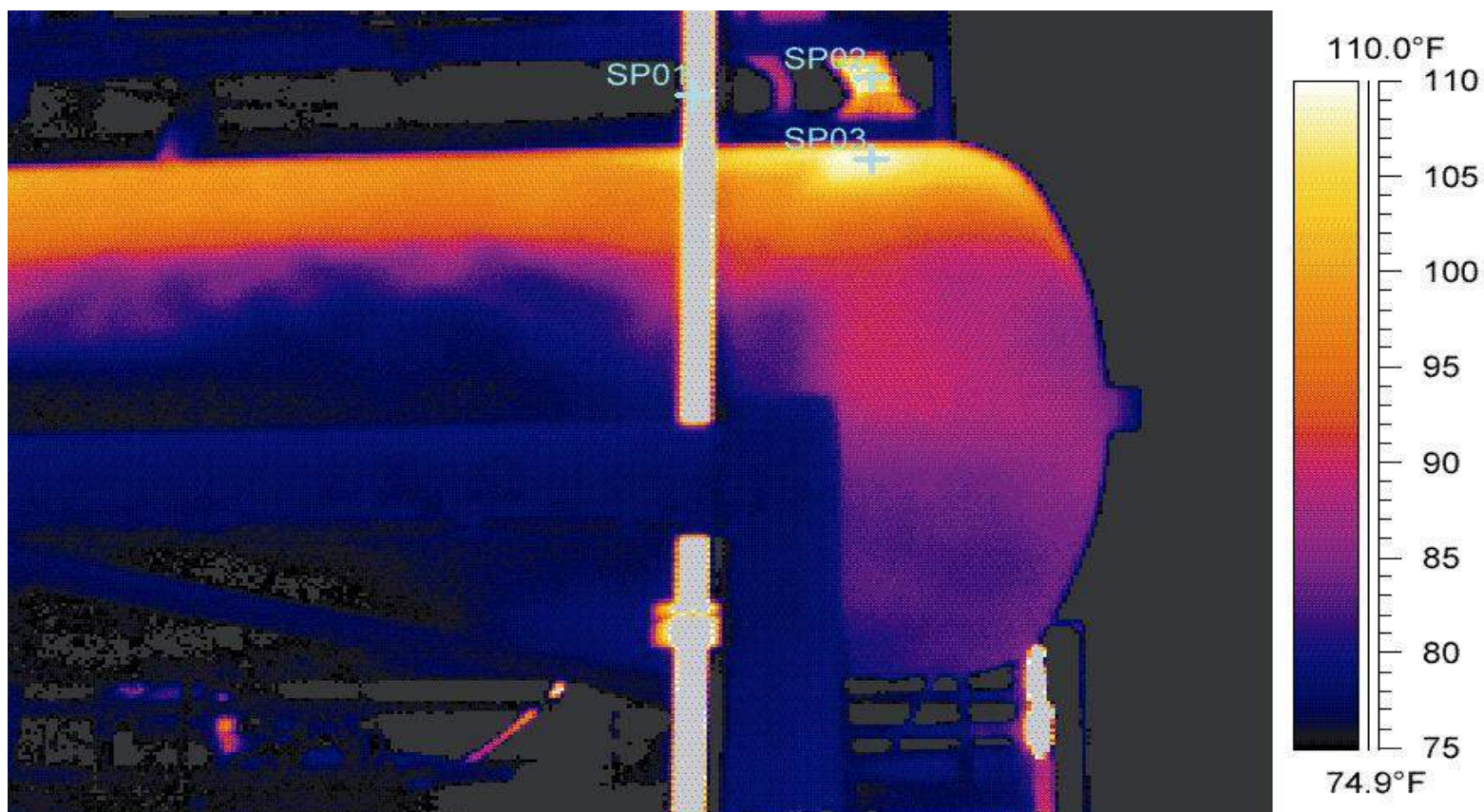
RESULTS PROVEN
Pre-Hydro-blasted—Rezyd-X® and HOB™



Coker Preheat Train Exchangers

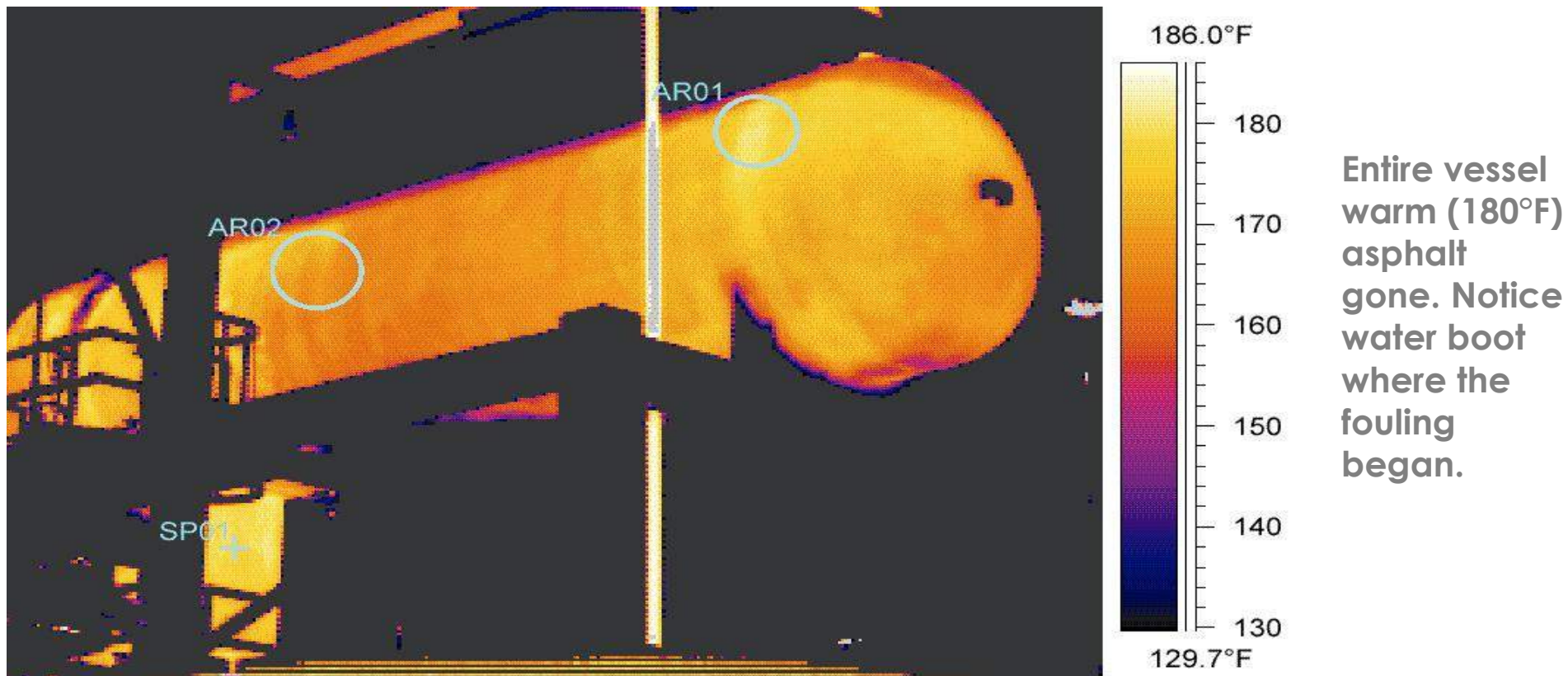
“The exchanger bundles were **much easier to pull out of the shells than they have ever been before** using this cleaning technique. The carbon buildup that was left in the bundles was also easier to clean with water blasting than it had ever been before.”

Asphalt Build-Up in Pre-Heat Train



Before: Thermal Imaging Shows “Cold” Areas Where Heat Transfer is Impeded by Asphalt Deposits

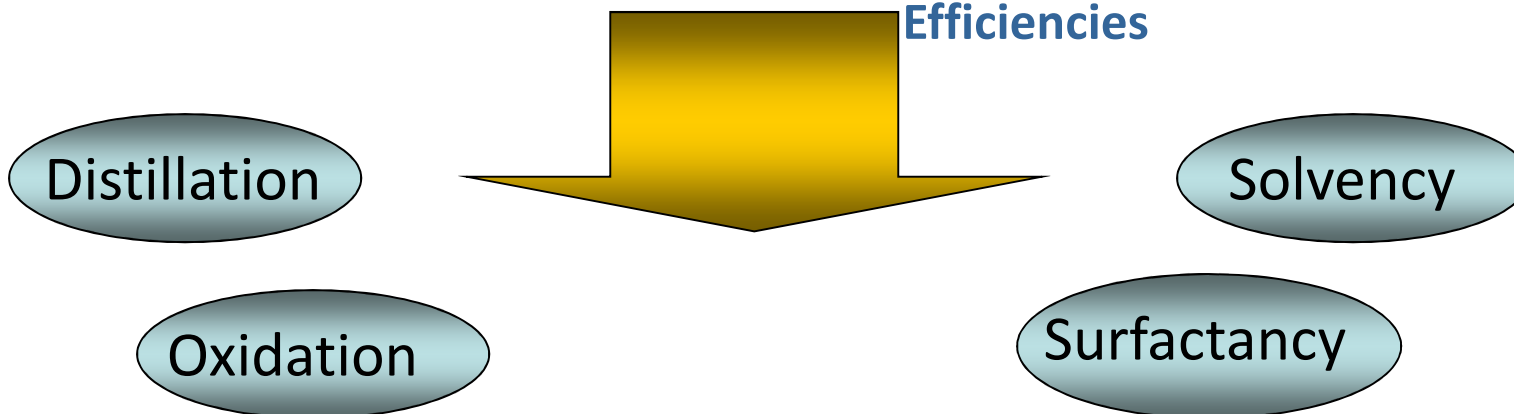
After 12 Hours Flushing with Rezyd-X® and HOB™ K-61



After: Thermal Imaging shows uniform heat transfer and recovered efficiency.

Results of Zyme-Flow[®] Decontamination Process

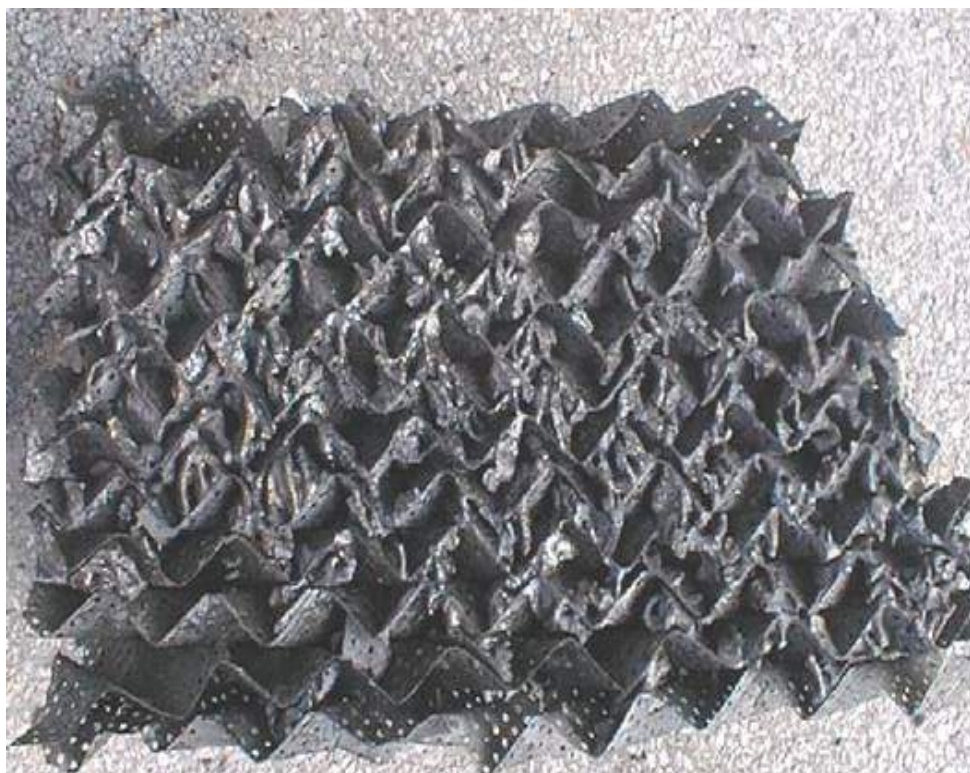
- Benzene Removed
- Hydrocarbons (LEL's) removed
- H₂S Oxidized
- Pyrophorics Oxidized
- Reduced Mech. Cleaning
- Ammonia removed
- WWTP Friendly Wastewater Stream
- Recovered Heat Exchanger Efficiencies



Decontamination performed within 12 Hours

Prevent Pyrophoric Iron Sulfide Fires

- Tight packing traps small particles of FeS, polymer, and heavy oil
- Oil & Polymer protects FeS from common oxidizer solutions
- When dry and in contact with air—a fire!

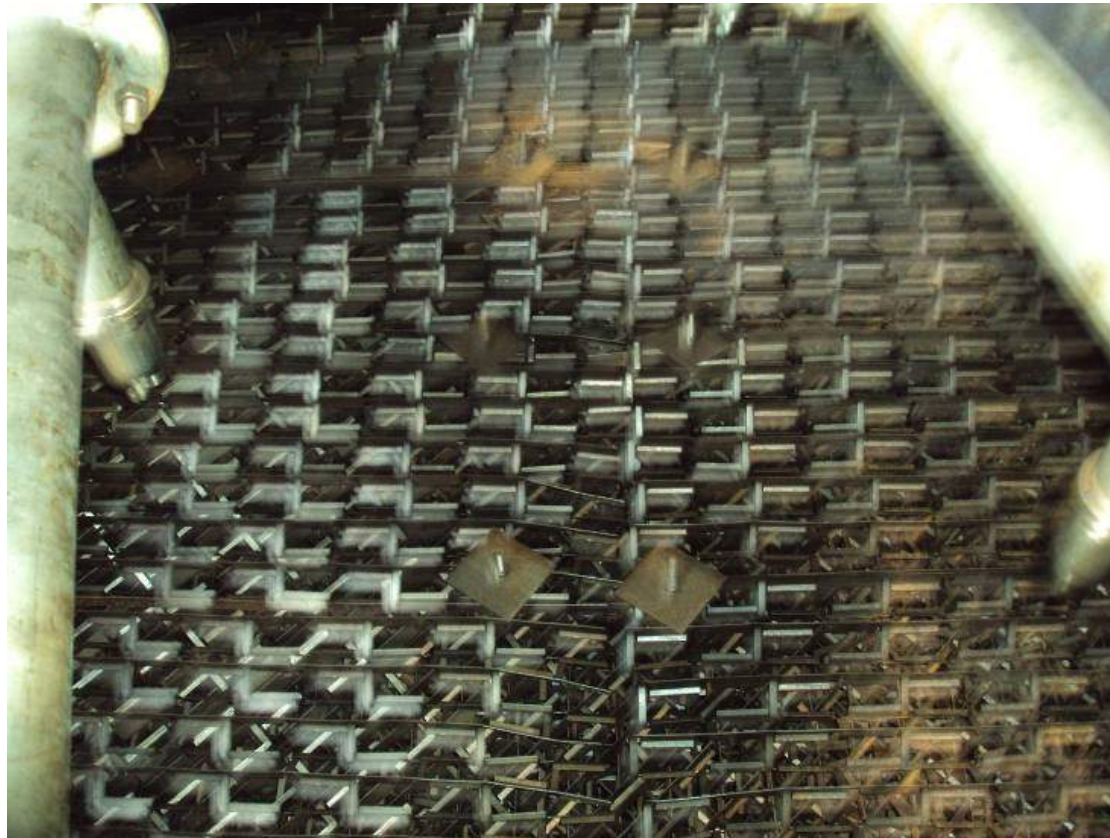


Safety from Pyrophoric Iron Sulfide

- **Pre-Conditioning Flush over Packing using Rezyd-X®/Zyme-Flow®**
- **Zyme-Flow® + Water + Steam to finish the oxidation during normal decontamination**
- **Post-rinse with Zyme-Ox® and water; Thermal Shocking Contaminate Scale**



Visbreaking Unit – Bed 3



Visbreaking Unit – Bed 4



Visbreaking Unit – Bed 4 Distributor



This could be you . . .

Northern USA Apr, 2009

“... The TA has gone extremely well and we are moving into start-ups. The **Zymeflow™** chemicals worked very well on all units.”

South American Customer, Feb, 2009

“...The decontamination was successful. Equipment was clean. There was no hydrocarbon residue and no *Little Devils* (Pyrophorics) “

Europe, Jun, 2001

“...The decontamination project was successful in eliminating the toxic compounds from the column within 12 hours of Zyme-Flow application. Also much better cleaning was encountered in this column compared with other methods.”

Contact Information

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Conclusion