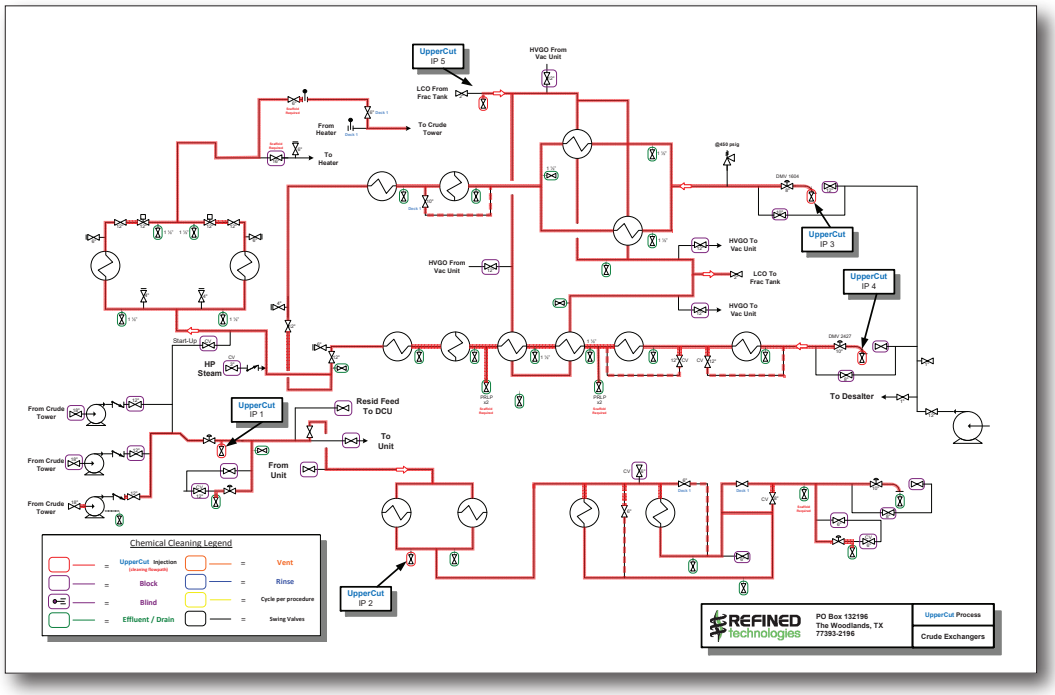
UpperCut® Application

Crude Pre-heat Exchanger Train

The Challenge

The client was looking for a better way to manage energy efficiency and improve performance on a large pre-heat crude exchanger train. Historically, the exchangers were pulled and hydroblasted once per turnaround cycle, which led to major heat exchanger inefficiencies between cycles, and caused the train to become heat limited at the furnace. Additionally, the exchangers were constructed from a combination of stainless steel and 5-chrome, so taking them off line and cleaning with steam or water was undesirable due to the risk of stress cracking and corrosion.

The client contacted RTI for assistance in cleaning the entire crude pre-heat train. RTI recommended using UpperCut as an additive with light cycle oil (LCO) to flush and circulate the exchangers so fouling could be removed without pulling the bundles or exposing them to water. UpperCut is an additive that helps cutter stock fluid like diesel or LCO dissolve and remove 50% more hydrocarbon foulants than cutter stock alone.



Set Up

The exchangers were filled on both sides with a mixture of 98% LCO / 2% UpperCut and circulated at an average temperature of 150°F for 24 hours. Afterwards, the used solution of UpperCut and LCO was sent to the refinery slop system for reprocessing. The diagram to the right is a process overview of the heat exchanger train:

Results

The exchanger train was returned to service following the UpperCut application and monitored for energy efficiency. The table details results:

Exchanger Bank	Duty (Q) Improvement	U-Value Improvement (from mechanical clean)	Energy Savings per Day
1	5 MMBTU/HR	From 50% to 90%	$390
2	3 MMBTU/Hr	From 60% to 75%	$234
3	2 MMBTU/HR	From 50% to 90%	$156
4	10 MMBTU/HR	From 60% to 80%	$780
5	5 MMBTU/HR	From 50% to 78%	$390
Total Energy Efficiency Improvement	**25 MMBTU/HR**		**$1,950/Day**

UpperCut provided a tremendous improvement in heat exchanger efficiency for the entire train. The heat exchanger train gained 25 MMBTU/HR to the furnace and the furnace is no longer the limiting factor on the unit. Under current operating conditions, the heat exchanger train is saving $1,950 of energy per day, which provided enough financial benefit for the client to justify installing bypasses around specific sets of exchangers so they can be cleaned with UpperCut on the run quickly to improve energy efficiency performance.

Conclusion

UpperCut can significantly improve heat exchanger energy efficiency in a short amount of time. Contact RTI to learn more about this revolutionary new process.