



## Safe CIP removal of FeS-fouling from PHEs in Amine systems safely with great savings.

Canlin Energy Corporation Canada, Middle East O&G companies

Case file

*In the Amine Process within Oil and Gas industry, corrosion in pipes and columns form a very hard scaling. This scaling is dangerous to dissolve with regular chemistry, lethal gases will be released.*

**Alfa Laval provide the Alfa Laval Safe CIP [Cleaning In Place] concept with an alternative chemistry that do not allow H<sub>2</sub>S formation.**

At several locations Alfa Laval Service Center in Middle East and Edmonton and at customer site in Canada, plate different heat exchangers one CPK 75/500, two MA30-W, a T20-MFG and an AX30HA used in amine gas treatment were cleaned with the newly developed **Safe CIP** method. With ordinary cleaning, iron sulfides deposit within the PHE and cannot be removed with ordinary CIP techniques without generating highly toxic hydrogen sulfide (H<sub>2</sub>S). As a part of the project **Safe CIP**, trials and customer site cleanings were performed with our collaboration partner CTI (Concept Technology Inc., Canada). A high-competence two-step process using new CIP chemicals introduced within the AlfaLaval range that effectively clean the plates without generation of H<sub>2</sub>S.



Safe CIP is a twostep reaction process that completely remove all fouling from the internal surfaces of the Rich Amine side and/or the Lean Amine side of a Heat Exchanger as a part of its performance optimization program in a safe way:

1. The main component of the first step chemical solution, Alfa Amine SC 1 for scavenging iron sulfides is not engaging hydrogen ions (as in an acid like Alfa Phos) to remove the fouling. Instead iron sulfides is transformed to iron oxides/hydroxides and sulfur get released in elemental form without formation of hazardous H<sub>2</sub>S.

2. The second chemical solution (Alfa Amine SC 2) is complex binding the iron oxides/hydroxides to a chelate that is removable

## Case 1 - Site Safe CIP Cleaning of AX30-HA Interchanger at Canlin Energy, Canada

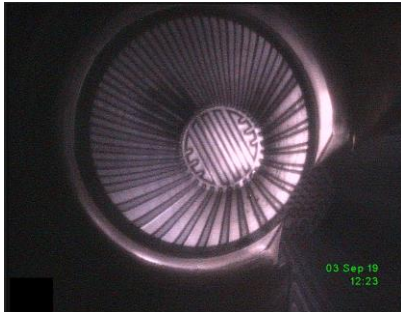


**Three words to describe the [cleaning] process - Great Success Story**

**- the results we got from your exchanger cleaning process certainly met our high expectations."**

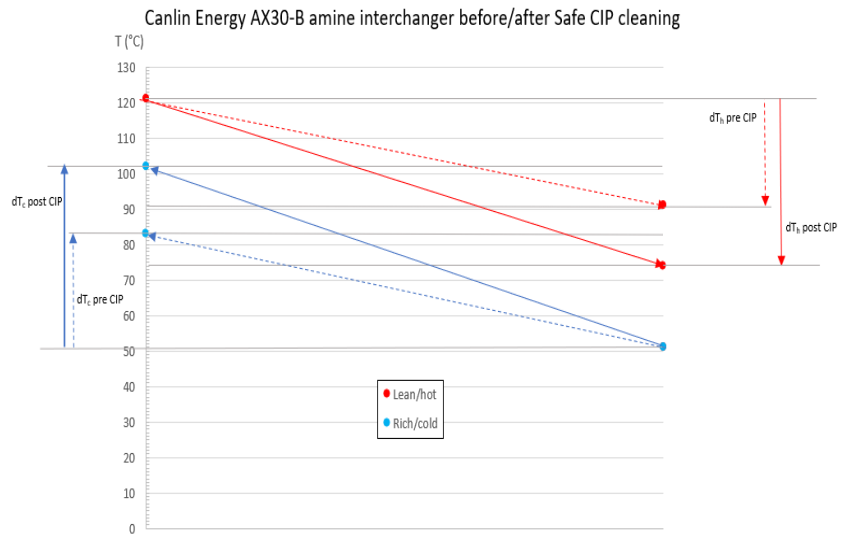
Michel Boilard, Process Specialist, Canlin Energy

Lean Inlet after Safe CIP cleaning



Annual cost due to energy loss of one train if interchanger not cleaned is up to 400 000 CAD = 280 000 €, (New gaskets not included, 76 000€)

Savings	VALUE	HOW?
Energy	€ 280 000	Reducing steam consumption
Bi-annual Safe CIP cleaning	€ -52 000	Safe chemical removal of FeS-fouling
Total annual savings	€ 228 000	Alfa Laval Safe CIP

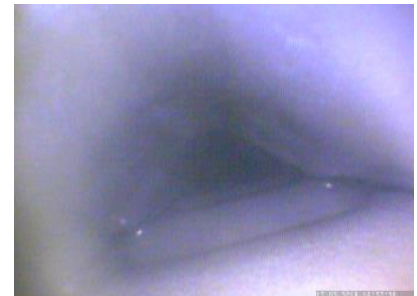


## Case 2 – Middle East Safe CIP Service Center Cleaning of CP75/500 - interchanger

A full size CP57/500 interchanger from a main Middle East O&G producer was successfully cleaned on both Rich and Lean side Without any generation of H<sub>2</sub>S.

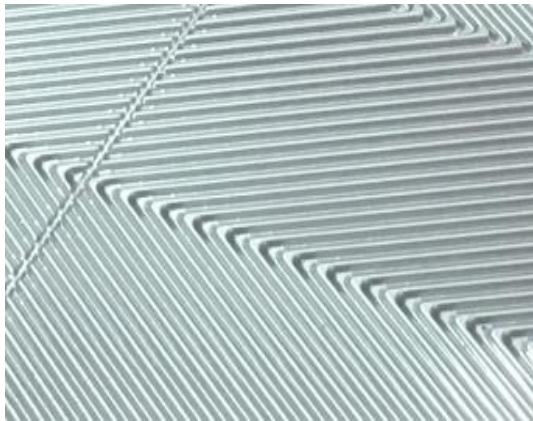
Levels were continuously measured as well as monitoring the progress of the cleaning to ensure safe end point determination.

Top pictures showing out- and inside of before (top) and after (bottom) Safe CIP cleaning.



### Case 3 – Middle East Safe CIP Service Center Cleaning of MA30-W – lean cooler

Pictures of opened cassettes of a MA30-W before and after Safe CIP cleaning.



### Case 4 – T20 Crude Oil Lean Cooler Safe CIP cleaning in Edmonton, Canada

Hydrocarbons burned into the plate during operation process caused the discoloration. FeS-fouling is removed – without any H<sub>2</sub>S generated.

