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 Amine systems within the Oil and Gas industry, fouling in process equipment can form very hard scale. This scale can be dangerously dissolved using commodity chemicals, which results in the production of lethal gases, such as H_2S.

Alfa Laval provides the Alfa Laval Safe CIP [Cleaning In Place] concept, with innovative chemistries, that eliminates the formation of H2S.

The Safe CIP process was evaluated at several locations, (the Alfa Laval Service Center in Middle East and Edmonton Canada and at a customer's plant site in Alberta, Canada), on different types of plate heat exchangers, (one CPK 75/500, two MA30-W, one T20-MFG and an AX30HA), all in amine/sour gas service and all of which were successfully cleaned using the newly developed **Safe CIP** process.

Using conventional CIP techniques, iron sulfides deposit within a PHE cannot be removed without generating highly toxic H_2S gas. The **Safe CIP project** evaluations, done in collaboration with CTI our Canadian affiliate and using the new, innovative CIP chemicals, introduced within the Alfa Laval line, proved that the PHEs were effectively cleaned without the generation of H_2S.

Safe CIP is a two-step reaction process that completely remove all fouling from the internal surfaces of the rich amine and/or the lean amine sides of a heat exchanger as a part of its performance optimization program in a safe way.

1. The main component of the first step cleaning solution, Alfa Amine SC 1 is designed to oxidize iron sulfides and not to engage hydrogen ions, (as in the case of an acid like Alfa Phos), to remove the fouling. Instead iron sulfides is transformed to iron oxides/hydroxides and sulfur get released in its elemental form without formation of hazardous H_2S.

2. The second cleaning solution, Alfa Amine SC 2, complexes the iron oxides/hydroxides to a chelate that is easily removed.

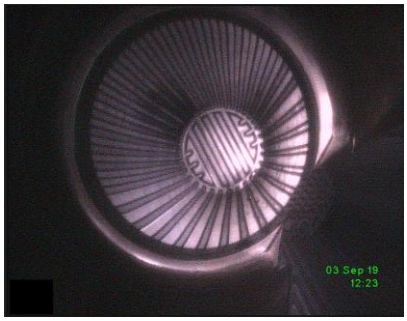
Case 1 - Site Safe CIP Cleaning of AX30-HA Interchanger at Canlin Energy, Canada

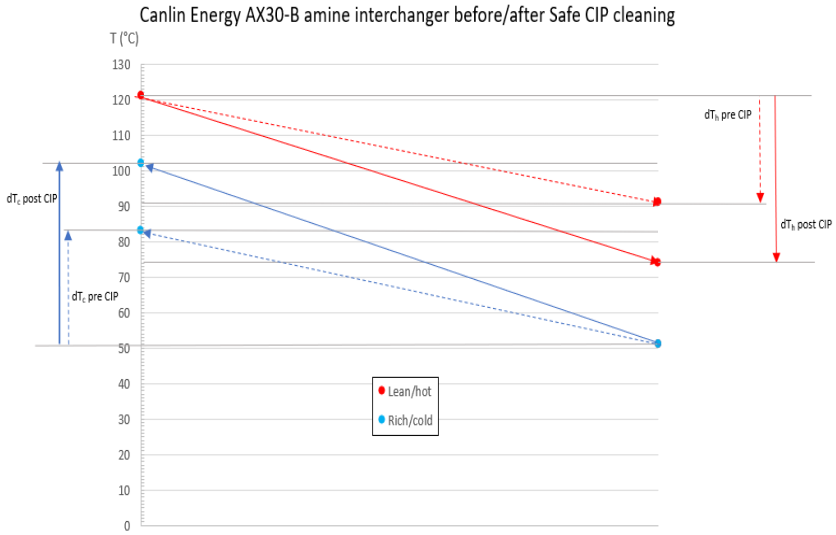
> ***Three words to describe the [cleaning] process - Great Success Story***
>
> ***- the results we got from your exchanger cleaning process certainly met our high expectations.”***

Michel Boilard, Process Specialist, Canllin Energy

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

Lean Inlet after Safe CIP cleaning

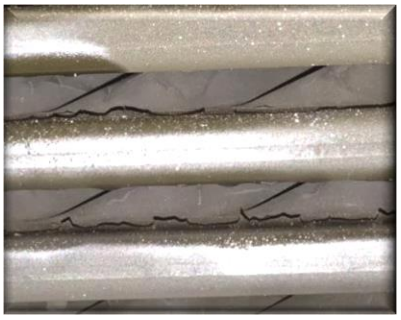




Annual cost due to energy loss of *one* train if interchanger not cleaned is up to 400 000 CAD = 280 000 €, (New gaskets not included, 76 000€)

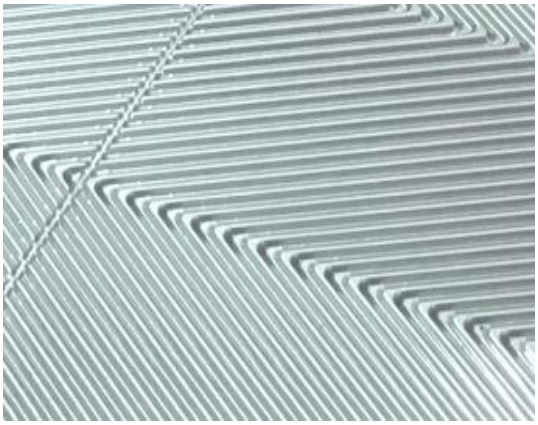
Case 2 – Middle East Safe CIP Service Center Cleaning of CP75/500 - interchanger

A full size CP75/500 amine interchanger from a major Middle East O&G producer was successfully cleaned on both the Rich and Lean sides without any generation of H_2S.
Results from the onsite analysis are used to maintain cleaning efficiency and determination of the end point of the cleaning process.
Top pictures showing outside and inside of channel before cleaning, bottom pictures after 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_2S generated.