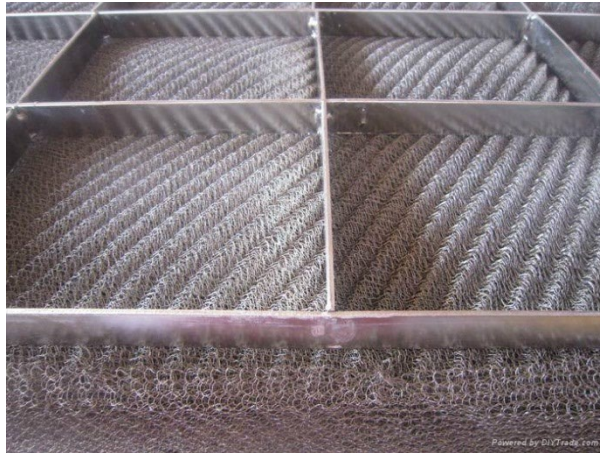


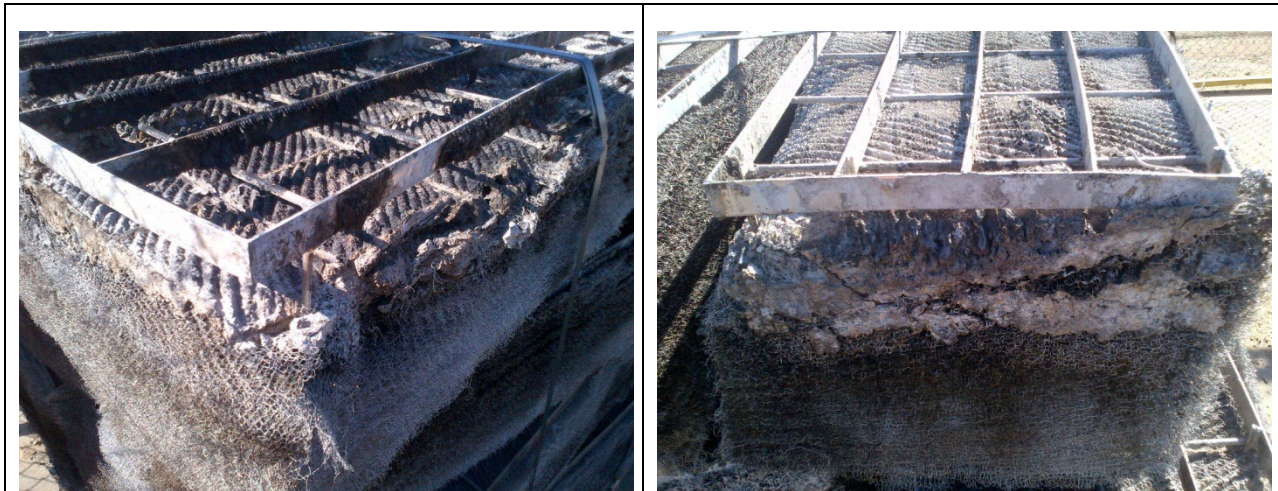
## CASE HISTORY – DEMISTER PAD CLEANING



Demister pads are an important part of vapour liquid separators. They are typically constructed out of a wire mesh and packed into sections often 3 – 6 feet in depth. The clean pads have relatively high permeability but because of the nature of the liquids coalescing inside them, fouling can occur rapidly. The nature of the fouling depends on the solids carried in the liquid phase as well the precipitates that form because of evaporation. Each system is different but the case described below the solids were silicates in nature

### SYSTEM DESCRIPTION

The system to be cleaned in this case was the demister pads at the top of a forced circulation evaporator. The deposits present are shown in the pictures below

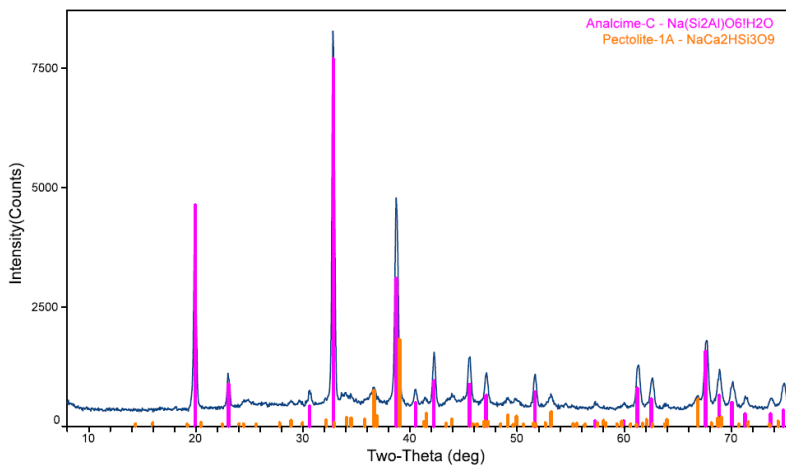


Demister pad prior to cleaning



Close up of the deposits

The deposits were analyzed and determined to be 20% hydrocarbon and 80% inorganic. The inorganic portion was further analyzed to determine its composition:



The XRD patterns measured showed the standard patterns for analcime and pectolite – the relative abundance of each is given from the intensity of the various patterns.

Mineral	Formula	Relative abundance
Analcime	$\text{NaSi}_2\text{AlO}_6 \cdot \text{H}_2\text{O}$	75-80%
Pectolite	$\text{NaCa}_2\text{HSi}_3\text{O}_9$	15-25%

The best cleaning solution was designed as a combination of a strong alkaline solution with chelants to prevent the recombination of the released silicate with the calcium and aluminum ions. Finally a caustic stable wetting agent was added to improve the contact of the cleaning solution with the deposits as well as to allow the solution to flow into the packed pads. This final blend was given the name Paratene<sup>®</sup> S701.

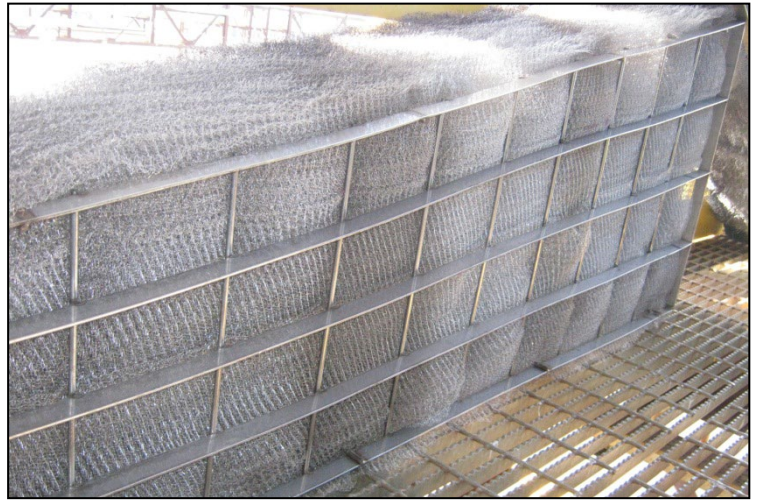
## CAPACITY AND LIMITATIONS OF SOLUTIONS

Silicate deposits can be reacted with sodium or potassium hydroxide to form sodium or potassium silicates, these compounds are water soluble. The ratio of caustic to silicate is variable and can run from ratios 0.5:1 to 3:1. The resulting compound is sensitive to recombination with cations such as calcium – so the presence of a chelating agent is necessary to ensure that the results are dissolution of the silicate. The reaction is very slow at room temperature but is accelerated substantially at temperatures over 70°C. This chemistry is typically used to dissolve silica in industrial applications to deliberately make the silicate salts but reaction can be exploited to remove silica in cleaning. Because of the range of substances that CAN form in a system, the amount of silicate that can be dissolved by S701 is between 76 – 230 g of silicate per litre of Paratene® S701.

To improve the reaction we added a caustic stable surfactant. The surfactant lowers surface tension and allows the caustic solution to better wet the solids as well as aid in the removal of hydrocarbons that may be coating the deposits.

## RESULTS OF CLEANING

The demister pads of the evaporator were cleaned using Paratene® S701. The results were the complete removal of both hydrocarbon and solids as shown in the inspection photos below. The customer was extremely pleased with the results and plans on repeating the wash in the near future.



**Evaporator Demister Pads**

September 18, 2014

