Crude Oil Sweetening

S M Kumar
Process Design Consultant

I wish to have feed back from operating plants that employ sweet gas or nitrogen as stripping gas to remove H2S from (a) light oil and (b) heavy oil.

1. Do you get predicted H2S level in product.
2. As oil brings in well mud, muck, dirt from earth, how often you need to clean the stripper column and or the reboiler/ feed heater if any
3. Stripping is considered better than reboiled stabilizer in terms of operations. Is it true

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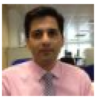

Saeid Rahimi Mofrad
Senior Specialty Process Engineer at Fluor
Top Contributor

Kumar,

I have worked on few projects where fuel gas was used for stripping crude oil. In the recent one which has been already commissioned and operating fine, the crude oil API gravity was 35-40 at 60C.

1. H2S level of 50 ppmw in stripper bottom product was met before storing the liquid in the atmospheric tanks. In fact, meeting the True Vapor Pressure (if it is product spec) can be a challenge with this process.

'2. The stripper was downstream of slug catcher, 1st and 2nd stage separators and desalters. There was no design provision for presence of dirt in stripper. The slug catcher was designed to handle them. As far as I remember, the crude oil was filtered at least once in desalter feed pump suction strainer. I don't know about your process scheme.

3. I guess sometime the choice between reboiler and striping gas is driven by other parameters like availability of utility. In the plant I mentioned, there was a hot water system at 140C but the temperature needed for boiling the crude oil was much higher (may be hot oil or steam was required for single user). Furthermore there was a facility near by to process stripper off gas. In general, I tend to agree with you that fuel gas stripping is much simpler in terms of operation.

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Suresh

Suresh Venkatesh
Senior Lead Engineer - Process

Kumar, with regard to item 3 of your posting..

Simple to operate; you don't have to deal with reboiler & associated controls – these perhaps are the reasons for operators to prefer stabilization with sweet gas over a reboiled stab column.

But as you know, hot vapors - as in reboiled stab column, are a more effective stripping agent. They possess heat/ energy momentum to effect better mass transfer.

If H2S content in inlet separator liquid phase is high (say 500 ppmw) and you are looking to reduce it to 10 ppmw H2S level, it's better to cook H2S off using a stab column/ reboiler than relying on packing/ contact area and also the availability of a separate lean gas stream. In other words the criteria for selection in my view, should depend primarily on the H2S load!

The operating problems that I've came across were mainly related to salt caking/ deposition in the stab column (due to inefficient desalting upstream)...

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Priyanka

Priyanka Ferrao

at

Useful and interesting information posted above.
A few questions related to this:

1. If we are talking about an offshore facility - what is the general H2S in crude oil specification clients usually ask for? One example mentioned by Suresh was 10 ppmw of H2S. I assume this is a function of region, operators, clients, etc.

2. Apart from H2S content in the crude oil are we also concerned with sulphur and mercaptan content in the crude oil?

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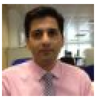

Saeid Rahimi Mofrad

Senior Specialty Process Engineer at Fluor

Top Contributor

As a general rule, there is a tendency to minimize the extent of processing facilities on the offshore platform unless it is really necessary.
The offshore platform I have worked on, did not have oil/condensate stabilization unit. This is mainly because it is most probably more economic to send the liquid to the onshore facility for further processing than treating it offshore.
However, gas sweetening is sometimes used offshore to remove H2S especially if the saving on the cost of sub-sea pipeline material can justify the investment.

There are FPSOs which are enable to process gas and liquid to the product spec but I guess they are used in very special situations.

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