ChemTreat
Case History

Treating Hydrogen Sulfide Corrosion in a Mexico Oil Field

BACKGROUND

A field with several 23° API crude oil production wells located near the Gulf of Mexico has a total production of almost 7 MBPD of crude with high water cut (20:80). This crude oil normally contains hydrogen sulfide (H_2S) in the 50–12,000 ppm range. In addition to H_2S scavenger treatment, the field requires corrosion inhibitor, scale inhibitor, and biocide for the water associated with the crude oil.

This field was experiencing severe corrosion caused by wet H_2S on the roof of the gun barrel (GB), which justifies the use of an H_2S sequestrant to stop the existing corrosion process.

The field operating company initiated a trial to mitigate this corrosion, giving ChemTreat seven days to meet their key performance indicators (KPIs): less than 10 ppm H_2S in the GB with total consumption at less than 100 LPD.

Field flow diagram and mass balance

Figure 1 shows the field configuration from heads 1 to 4 to GB:

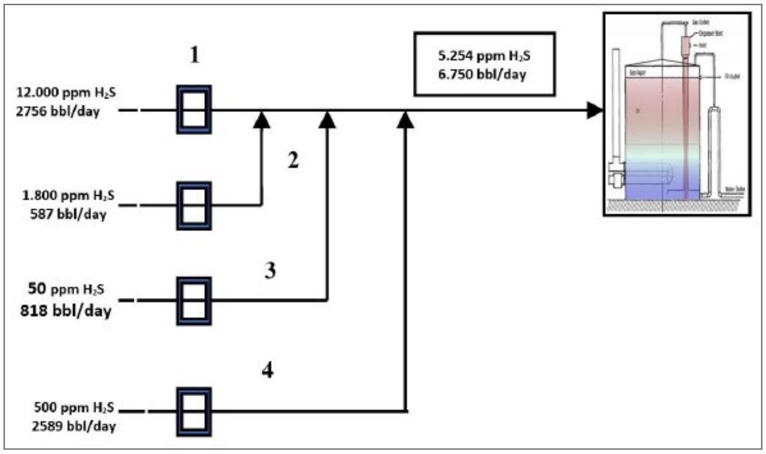


Fig. 1. PFD and mass balance of the system

As shown in figure 1, the four heads that group the producing wells converge in a single line that goes to the GB, where the barrels of crude oil add up to 6,750 bpd and the average H_2S level reaches 5,254 ppm.

Lipesa 522 injection point location

After analyzing the configuration of the field and the H_2S levels, the ChemTreat team decided to place an injection with quill-type nozzles in head 1 (CB-1) and another one reaching the GB. Consumption of 130 lpd and 120 LPD was made, respectively.

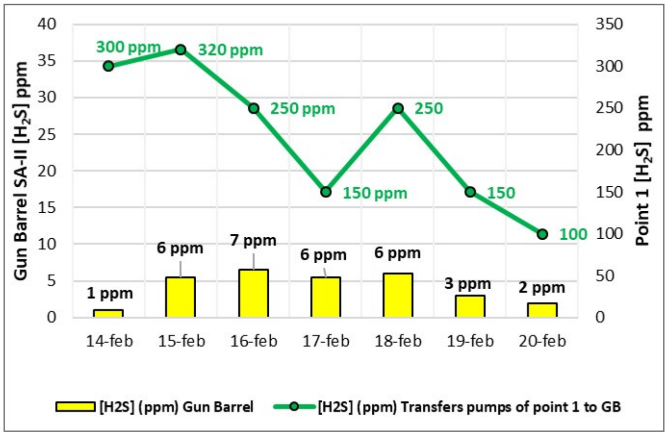
CH10-123 EN-OG
May 2020

5640 Cox Road / Glen Allen, Virginia 23060
www.chemtreat.com

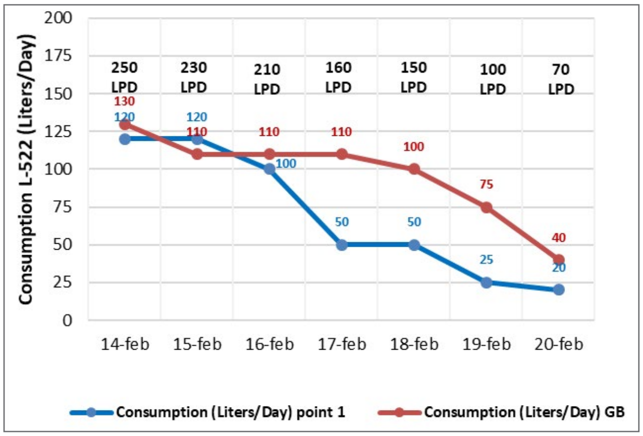
FIELD TRIAL

The treatment was started with 130 LPD at point 1 and with 120 LPD reaching the GB. H_2S levels were measured in the GB once a day at 5 p.m. and when the goal of <10 ppm was reached, Lipesa 522 consumption was reduced.

At the beginning of the Head 2 well test, unusual wells with levels of up to 80,000 ppm of H_2S were reopened, increasing the baseline with respect to the values in Figure 1. Once the system was stabilized, the measurement routine began at point 1 in the GB and, depending on the result, the consumption was reduced.
The results obtained are shown in graphs 1 and 2.



Graph 1. H_2S levels downstream of point 1 and in GB.



Graph 2. LPD L-522 at injection points 1 and GB.

As shown in graph 1, H_2S values measured in both point 1 and the GB decreased as inter-day measurements were made, which allowed consumption to decrease at both points. Intermediate consumption is shown in graph 2.

Graph 2 shows how consumption decreased as the <10 ppm H_2S specification was met (see graph 1) until the optimum level of 60 LPD was reached on day 7 of the test, also complying with this KPI.

It is more difficult to treat H_2S levels below 20 ppm than at levels greater than 100 ppm. For this reason, the relative proportion of product injected in the GB was increased compared to the injection into battery 1, allowing the team to lower consumption from 210 to just 60 LPD.

CONCLUSIONS & RECOMMENDATIONS

1. The approval of the baseline before the test by the customer and ChemTreat allowed us to detect and correct the introduction situation of the wells with 80,000 ppm (the test would have been unfeasible otherwise).
2. On day 6 of a total of 7, ChemTreat had already met the test KPIs (<10 ppm H_2S in the GB and consumption <100 LPD of the Lipesa 522).
3. With the dosing strategy explained above, the consumption of Lipesa 522 was reduced from 210 to 60 LPD.
4. The 23° API crude had a high water content (crude 20% vs. water 80%). The injection nozzles at point 1 and reaching the GB were placed in the upper part of the pipe to achieve the reaction between Lipesa 522 and H_2S in the gas phase, between the top of the pipe and the crude phase, since the order of reactivity of the scavenger with H_2S goes in the following direction: gas phase > crude phase > water phase.

ChemTreat was awarded the business at this customer site based on the results of the field test.

CH10-123 EN-OG
May 2020

5640 Cox Road / Glen Allen, Virginia 23060
www.chemtreat.com