Case History

H_2S Scavenger Optimization Treatment in Colombian Natural Gas Field

Introduction

A northern Colombian field with several natural gas production wells has a total production of almost 15 MSCFD with an H_2S presence in the 10–190 ppm range. In addition to H_2S scavenger treatment, the field requires corrosion inhibitor, scale inhibitor, and biocide for water associated with gas.

Treatment Optimization with Lipesa 512BR

Currently, H_2S scavenger (Lipesa 512BR) use has been high, ranging from 4 to 10 times above its theoretical dose.

The Lipesa team performed a mass balance and evaluated the location of the injection points in each of the wells in relation to the H_2S content and Lipesa 512BR consumption. They determined the associated high water content in the wells is causing high scavenger consumption, since the product is diverted to the water instead of reacting with the H_2S in the gas phase. Table 1 shows the volumes of water associated per well and actual versus theoretical consumption.

Table 1. Volume of Associated Water vs. Lipesa 512BR Consumption

Well	*bbl H2O/day*	*Consumption Real (gpd)*	*Consumption theoretical (gpd)*	*R Real/ theoretical*
1	1,195	11	1.1	10.4
2	1,719	13	5.2	2.5
3	1,560	40	3.7	10.8
4	1,390	13	1.5	8.6
5	436	11	2.2	5.1
6	1,929	40	10.1	4.0
Total	**8,229**	**128**	**24**	**5.4**

Although the deviation from real versus theoretical consumption is not linear with the production of water, the team noticed that as wells produce more water, Lipesa 512BR consumption increases.

Preliminary Field Test

Based on the hypothesis that the associated water is the cause of the high Lipesa 512BR consumption, a point was located within the natural gas processing plant where there was no associated water. Lipesa 512BR was injected at this point (at the exit of the glycol dehydration plant) for three days, and consumption decreased in the wells with an associated presence of free water. The net result was a reduction of 9 gpd of product used.

Final Field Test

Despite the reduction, the injection point located downstream of the glycol plant was not efficient enough because of the short path (10 meters) between this injection point and the measurement of H_2S in the plant's chromatograph. A new point was established between the compressors and the glycol plant in a section of pipe over 100 meters long, ensuring very low water flow and excellent mixing and reaction times.

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Final Field Test (Continued)

This test lasted one month and consisted of progressively moving consumption towards the point of discharge of the compressors (point without water) and cutting consumption at the wells (points with the presence of associated free water). Table 2 shows the consumption of Lipesa 512BR per well before this field test, and Table 3 shows the new consumption of Lipesa 512BR per well after the change and at the point additional to the discharge of the compressors.

Table 2. Consumption of Lipesa 512BR per Well Before Testing

Well	*H2S Concentration (ppm)*	*Consumption (gdp)*
1	16	15
2	27	18
3	130	40
4	9	18
5	7	17
6	160	47
Total Consumption:		**155**

Note: H_2S gas content for sale: <3 ppm

Table 3. Lipesa 512BR Consumption per Well after Injection Point Change

Well	*H2S Concentration (ppm)*	*Consumption (gdp)*
1	8	6
2	24	9
3	100	26
4	14	12
5	4.5	6
6	150	20
Plant	10	4
Total Consumption:		**85**

Note: H_2S gas content for sale: <3 ppm

The reduction in Lipesa 512BR consumption was substantial, from 155 gpd to 85 gpd (45 percent). By simply adding an injection point where there was only gas, the customer saved more than $25,000 per month in expenses. Since the new injection point was before the glycol dehydrating plant, variables such as glycol pH and replacement rate needed to be monitored to avoid foaming and efficiency loss in the glycol regenerator unit reboiler.

Table 4. Glycol Replacement Volume During the Test

Month	*Date*	*Gallons Added*	*Total*
July	July 5	30	150
	July 10	30	
	July 16	30	
	July 21	30	
	July 30	30	
August (Test Month)	Aug 4	30	175
	Aug 9	30	
	Aug 15	30	
	Aug 20	30	
	Aug 25	30	
	Aug 29	25	

Conclusions & Recommendations

1. The high consumption of Lipesa 512BR was caused by losses in the free water associated with gas.
2. With the relocation of the injection point at the outlet of the compressors, the actual injection vs. overall theoretical injection ratio was reduce from 5.4 to 2.5.
3. When undertaking this optimization test, special attention had to be paid to the glycol pH, since the scavenger may affect it. This customer was able to manage a pH of 9.3, avoiding any problems associated with scale, foam, or glycol losses in the glycol regeneration unit.

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