Mechanical solution for gas sweetening challenge yields significant efficiency gains in the Piceance Basin

Innovative retention loop design helped a major natural gas producer meet sales specifications and reduce chemical costs by 70%

CHALLENGE

- Inconsistent H_2S scavenging to meet sales specifications of 4 ppm or less
- High scavenger dose rates averaging 47.5 gallons per day
- Insufficient contact time due to infrastructure limitations

SOLUTION

- Conducted a comprehensive review of operations, including pads, gas systems, and transfer points
- Designed a cost-effective retention loop to improve scavenger efficiency
- Implemented a 6-in., 500-foot pipeline with two atomized injection points
- Built the retention loop above ground for easier access and cost control

RESULT

- Achieved sales gas specifications with optimized contact time
- Reduced scavenger volumes to 13.75 gallons per day, a 70% reduction

Challenge

A large natural gas producer in Colorado was struggling to effectively and consistently scavenge enough H_2S from its produced gas to meet the sales specifications of 4 ppm or less. With the existing infrastructure and operations, dose rates for the scavenger were averaging 47.5 gallons per day to compensate for the lack of contact time. The challenge was to develop a solution to meet sales specifications and reduce scavenger chemical spend with minimal capital investment.

Solution

After conducting a full review of the customer's operations, which included several pads, gas gathering systems, and transfer points, Multi-Chem offered several mechanical solutions to remedy the problem. A retention loop was identified as the most cost-effective solution. Multi-Chem took all aspects of the operation into account – pad layout, gas production volumes, pressures, and temperatures, among other data points – to design a retention loop that provides sufficient conditions for the H_2S scavenger to sweeten the gas. A key factor to consider was the velocity of the gas, which needs to be high enough to move the chemical through the system but also low enough to give the scavenger time to work. After calculating various scenarios, the team decided on a 6-in., 500-foot pipeline to run along the pad's heater treaters before reaching the custody transfer point. Two atomized injection points that split the application to improve efficiency were included in the design. The retention loop was built above ground, which helped control construction costs and made it easier to access for treatment and monitoring.

Result

Upon completion of the project, Multi-Chem monitored the operations, which delivered the expected contact time and achieved sales gas specifications. The operator was able to reduce the scavenger volumes enough that only one injection point was needed. The scavenger feed rate optimization brought the

average down to 13.75 gallons per day, a reduction of almost 70 percent compared to before implementation. The cost savings meant the project paid for itself in four months. Since the installation of the retention loop, the operator has requested Multi-Chem review several other pads in the field and recommend similar designs. Construction on the second loop has begun, and design recommendations have been submitted for three other pads.
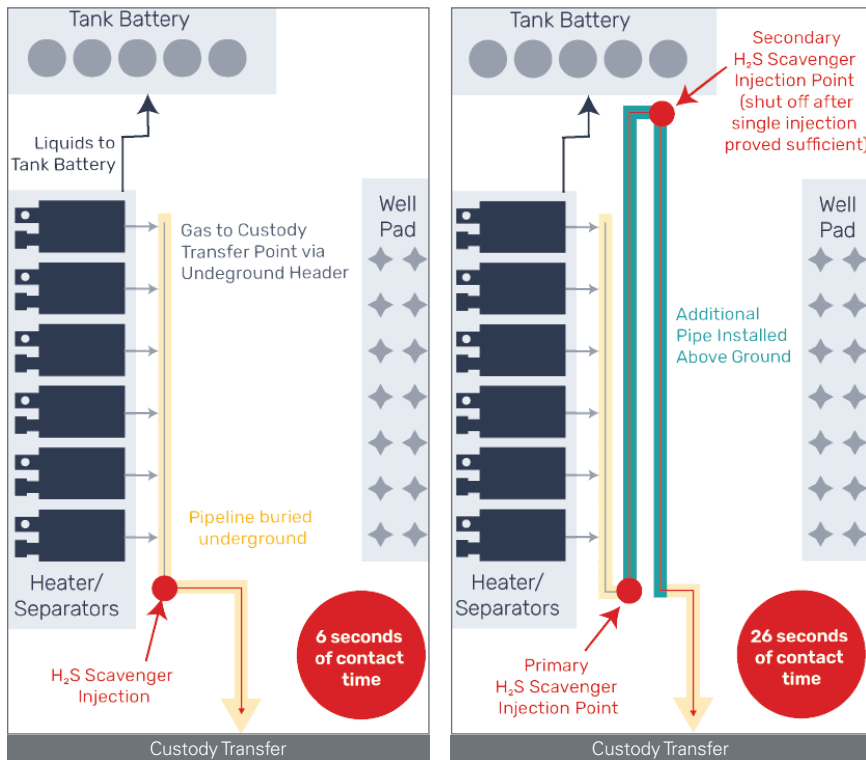
Left: Original pad layout
Right: Layout with new retention loop

The retention loop added 500 feet of pipe for the chemical treatment to sweeten the gas. The design of the system allowed Multi-Chem to reduce H_2S scavenger volumes by almost 70 percent.

The loop was built above ground to limit construction costs and make it easier to inject chemicals and monitor gas flow.

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