SULFIX scavenger helped avoid multi-million dollar amine unit investment

Sulfur oxides (SOx) are emitted when refineries send hydrogen sulfide (H2S)-laden gases to the flare. The US Environmental Protection Agency (EPA), through regulation subpart J, mandates that SOx emissions be less than 162 ppm.

In order to comply with this regulation, a refiner contacted Baker Hughes, a GE company (BHGE) and requested a solution to confirm the flaring emissions stayed in compliance. The BHGE Downstream Chemicals team has a proven track record of finding and implementing chemical solutions for the operational needs of the refiner.

While H2S can be removed from flare lines with the use of amine units, this requires a multi-million dollar equipment investment. To avoid this high cost, the refiner decided on a direct injection approach using SULFIX™ H2S scavengers, a more cost-effective solution.

The BHGE team began by thoroughly inspecting the flare system to determine the ideal injection points and equipment requirements, then worked closely with refinery personnel to determine the H2S levels, gas flow rates, and the amount of H2S scavenger that would be needed to certify compliance. The team determined that a direct injection setup using steam, at multiple locations on the flare line, with the SULFIX SX9252 H2S scavenger would be the ideal solution.

Through direct injection via steam, the SULFIX SX9252 scavenger program helped to reduce the H2S in the flare line from approximately 2,000 ppm to less than 150 ppm over a period of several months. The program is continually monitored by the BHGE team to confirm the H2S levels remain low and in compliance with EPA SOx emissions regulations.

Challenges
- Design a robust H2S scavenger program to rapidly adjust to fluctuating operating conditions and maintain regulatory compliance
- Variable H2S load in the flare line, with concentrations exceeding 2,000 ppm and flow rates surpassing 1 MMSCFD

Results
- A accurately addressed the fluctuating H2S concentrations in the flare gas line, avoiding a multi-million dollar investment in amine units
- Reduced H2S concentrations from approximately 2,000 ppm to less than 150 ppm, enabling the refiner to meet US EPA requirements
Refinery process data illustrates the H₂S levels and corresponding SULFIX scavenger performance.