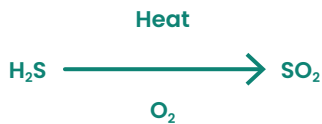


Case study: United States

Flare gas treatment system reduced refinery emissions

Exceeding emission limits

When refineries flare H₂S-laden gases, they produce SO_x emissions, because flaring converts H₂S to SO_x. Government regulations require refineries to reduce SO_x emissions to levels that require significant changes in refinery operations.



H₂S can be removed from flare gas streams by conditioning the gas through an amine unit before it is flared. This process requires a multimillion-dollar equipment investment and is cost prohibitive for refineries that remove less than 67,000 lb/d (30,000 kg/d) of sulfur.

Exceeding the regulated emissions limit, however, can force a refinery to shut down and cost millions of dollars per day.

A US refinery in this position needed a custom H₂S scavenging program that could be used when the H₂S content of the flare gas threatened to exceed acceptable levels.

Managing SO_x emissions

The Baker Hughes flare gas treatment system helps refiners avoid the costly installation of an amine unit while managing their SO_x emissions, and complying with emission regulations. The treatment system uses the Baker Hughes SULFIX™ H₂S scavengers to remove hydrogen sulfide from flare gas streams.

The program includes Baker Hughes design and application expertise in addition to effective scavengers.

Baker Hughes begins by thoroughly surveying the process flare systems in order to determine equipment and additive requirements; Baker Hughes also works with the customer to define project expectations / key deliverables.

This refinery wanted to reduce SO_x rates to less than 200 lb/d and H₂S levels to less than 4,000 ppm. Based on survey findings, this particular application used a four-nozzle injection system in the existing flare gas process lines to inject the SULFIX scavenger. Field trials verified that all the refinery SO_x emission requirements could be met.

The flare gas treatment system reduced SO_x emissions from more than 500 lb/d to less than 70 lb/d. The refinery's H₂S levels were reduced from more than 18,000 ppm to 900 ppm.

Baker Hughes met both of these specifications while reducing additive injection flow to 25% of capacity and using only half of the available injection equipment. With the Baker Hughes system in place, the refiner has the capability to handle a variety of conditions and still maintain compliance with emission requirements.

Challenges

- Refinery not compliant with sulfur oxide (SO_x) emission limits
- Reduce SO_x rates to less than 200 lb/d (91 kg/d) and H₂S levels to less than 4,000 ppm
- Installation of flare gas H₂S removal unit is cost prohibitive
- Avoid downtime

Results

- Baker Hughes flare gas treatment system designed and installed
- Baker Hughes SULFIX H₂S scavenger selected
- Reduced flare gas H₂S levels from 18,000 ppm to 900 ppm
- Reduced SO_x emissions from 500 to 70 lb/d (227 to 32 kg/d)

Flare gas treatment with SULFIX hydrogen sulfide scavenger

