Case study: Chile, South America

The ALCHEMIA solution for mercury removal restored well production, with potential to save $6.5 million USD

A customer based in Chile was producing crude containing high concentrations of mercury—up to 80,000 parts per billion (ppb). This concentration did not meet the customer's key performance indicator (KPI), prompting the customer to seek out a competitor's chemical program to reduce the mercury in the fresh crude. When this attempt failed, the customer shut in the problem wells, shrinking overall production by 34%.

The customer transferred the contaminated crude to a treatment plant for reprocessing. When another competitor's chemical regimen failed to remove mercury to the target ppb, the customer was required to store the out-of-spec crude in several tanks.

The continuous reprocessing of the crude and having to store the off-spec product dramatically increased operational expenditure (OPEX) costs through increased energy consumption and transportation, as well as unplanned capital expenditure (CAPEX) costs for storage tanks. The customer faced a potential loss of $6.5 million USD in revenue and turned to Baker Hughes for a solution.

The solution needed to achieve the following:

- Remove mercury in freshly produced crude to the target KPI, enabling the customer to achieve the maximum price in the marketplace
- Eliminate the need for reprocessing produced crude, reducing OPEX costs and speeding up time to market
- Treat the aged, off-spec crude to remove mercury and bring it back on specification, enabling the product to be sold without the risk of a discounted price or environmental penalty
- Eliminate current and future costs associated with tank storage

Collaborating with the customer on site, Baker Hughes examined the system parameters, the treatment plant operations, and sampled the produced and off-spec crude. By utilizing these inputs in combination with specialized chemical treatment experience, a synergistic treatment solution was proposed.

Extensive laboratory and field tests validated the success of the **ALCHEMIA™ solution for mercury removal.** A unique additive for mercury removal, combined with other specialty chemistries, consistently removed mercury to ppb levels well below the target KPI.

Baker Hughes engineers applied the customized chemical mixture first to the fresh produced crude with remarkable results. Within nine hours, mercury content in freshly produced crude fell by 90%, to below 1,500 ppb, reaching levels as low of 668 ppb. This on-spec crude could now be sold directly to the refinery, bypassing the prior need to store and reprocess it.

The mercury levels in the aged, stored crude were as high as 40,000 ppb prior to applying the ALCHEMIA system recommendations. The solution for the aged crude involved mixing fresh

Challenges

- Wells shut in due to high mercury content, reducing production by 34% with a potential annual loss of $6.5 million USD in revenue
- Reprocessing treatment failed to remove mercury to the required ppb KPI levels
- Spiraling OPEX costs associated with reprocessing and unsuccessful competitor treatments, and unplanned CAPEX costs due to tank storage of off-spec crude

Results

- Reduced mercury content by 90% in fresh crude within 9 hours of treatment with the ALCHEMIA solution for mercury removal, consistently achieving <1,500 ppb target KPI
- Restored production capacity, recovering a potential annual loss of $6.5 million USD in revenue
- Met KPI target for off-spec, competitor-treated crude within 12 hours
- Enabled customer to sell the product without penalties
- Eliminated tank storage costs

Oilfield treatment plant

and aged crude and then processing it to fix the out-of-spec aged crude. Within 12 hours of application, a significant reduction in mercury concentration was achieved as well as removing the competitor's chemical regimen, making the aged crude saleable.

By using the Baker Hughes solution featuring the customized mercury removal additive, the customer can now efficiently process quality fresh crude and bring it directly to the market, maximizing its value. Additionally, by effectively reducing the mercury levels in the crude, the customer eliminated the requirement to store the off-spec crude in tanks, reducing CAPEX cost, reprocessing OPEX costs, and avoiding legal and environmental penalties.

Chemical injection skid

Baker Hughes

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