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Colorado Midstream Company Uses Apura Membranes to Meet CO_2 Requirements

Gas separation membranes treat 8 MMcf/d of gas and lower CO_2 concentration from 3% to 2.3%

CHALLENGE

- Meet required CO_2 specifications to reduce plant upsets and maintain low-CO_2 fuel gas source.
- Increase CO_2 gas treatment efficiency.

SOLUTION

Replace one bank of existing spiral-wound membranes with Apura® gas separation membranes.

RESULTS

- Increased feed capacity by 25% using the same membrane surface area.
- Treated at a high 8-MMcf/d [227,000-m^3/d] flow rate while reliably lowering the CO_2 concentration from 3% to 2.3%.
- Achieved 20% better CO_2 removal from the outlet requirement for fuel gas.

"Schlumberger has provided an excellent solution by deploying Apura membranes for our gas plant. These membranes are outperforming beyond design specifications, allowing us to process much higher gas flow rates."

Operations Manager

Remedy nonperformance of membranes in meeting fuel gas CO_2 specifications

A midstream operator in Colorado, USA, has a gas processing facility to treat approximately 25 MMcf/d [708,000 m^3/d] of natural gas. The dry feed gas is first chilled for hydrocarbon dewpointing and later routed to a gas membrane system for CO_2 removal. The gas membrane system—a single-stage membrane skid comprising three banks operating at a pressure of 840 psi [5.8 MPa]—is designed to reduce CO_2 levels from 3% to 2.48% in the product gas. The majority of the product gas is delivered delivered to a third-party gas transmission pipeline and the remainder is used as fuel gas to drive compressors downstream of the membrane system.

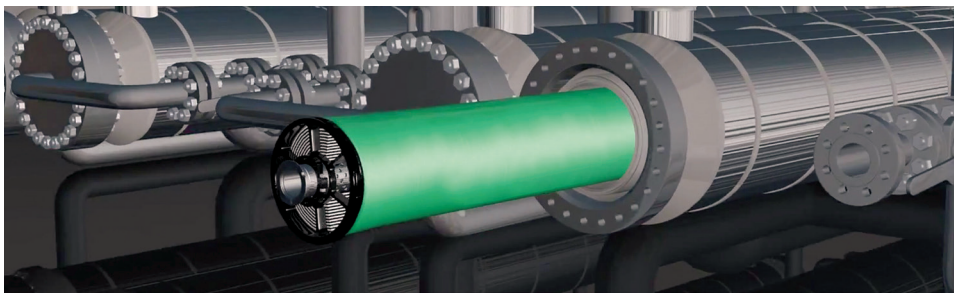
The existing cellulose acetate (CA) spiral-wound membranes used at the facility were experiencing accelerated degradation. Because they were not performing as intended, the operator was unable to meet the required pipeline specifications and fuel gas CO_2 specifications to power the compressor engines. The entire membrane skid was underperforming at 65% of the design capacity, forcing the operator to either recycle off-spec gas or shutdown the plant entirely.

The operator was looking for a robust membrane technology that could meet the CO_2 removal specification so it could stop resorting to a blended gas stream to meet turbine requirements. The solution required membrane technology that could retain higher hydrocarbons in the product gas and lower the membrane replacement rate.

Replace existing membranes with Apura membranes

Schlumberger provided Apura membranes to help meet product gas CO_2 specifications and minimize downtime and plant upsets. Apura membranes provide a multilayer composite membrane with higher CO_2 and hydrocarbon selectivity and longevity to manage variations in inlet feed gas conditions. Due to their composite nature and the inert substrate, these membranes have a longer operating life and recover more hydrocarbons. Apura membranes enable plug-and-play replacement of the incumbent membranes without any modifications to the existing skid.

The operator replaced one bank with Apura membranes to reduce 6.5 MMcf/d [184,000 m^3/d] of gas from an inlet CO_2 of 3% down to 2.48% in the product fuel gas.



The operator easily replaced one bank with plug-and-play Apura membranes to achieve both higher flow rates and CO_2 removal.

Increased feed capacity by treating at a higher flow rate

In the first three months of operation, the skid with the Apura membranes installed successfully treated a higher feed gas flow rate of 8 MMcf/d [227,000-m^3/d] with an inlet CO_2 concentration of 3% down to 2.3% at the outlet. This was a 25% increase in the feed gas capacity when using the same membrane surface area. Not only did the Apura membranes perform at a higher flow rate, but they consistently treated at 20% better than the outlet requirements for the fuel gas.

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