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Quest Carbon Capture and Storage (CCS) Project

Quest CO2 Dehydration Performance

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Date	Role	Name	Signature or electronic reference (email)

Summary

This document summarizes the CO2 dehydration performance in the TEG unit for the reporting period.

Keywords

Quest, CCS, TEG, dehydration

DCAF Authorities

Date	Role	Name	Signature or electronic reference (email)

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1. DEHYDRATION PERFORMANCE SINCE COMISSIONING

The triethylene glycol (TEG) unit performance has exceeded design expectations. The system requirement was to meet the winter water content specification for the pipeline of 84 ppmv (4 lb/MMscf) to mitigate hydrate formation potential during normal operation. Corrosion of the pipeline is not expected at this level of dryness since it is well within the solubility limit of the CO_2 stream. Actual water content was on average 46 ppmv for 2015, 55 ppmv for 2016, 46 ppmv for 2017, 44 ppmv for 2018, and 42 ppmv for 2019. The figure below depicts the actual water content in the CO_2 stream to the pipeline from August 23rd, 2015 up to and including December 31st, 2019. There were only two days in 2019 above the 84 ppmv winter spec, which occurred on April 9th and July 8th. On April 9th, high water content observed due to the compressor trip with failed analog card. On July 8th, high water content was observed due to the compressor trip that was caused by the 138kV main transmission line trip.

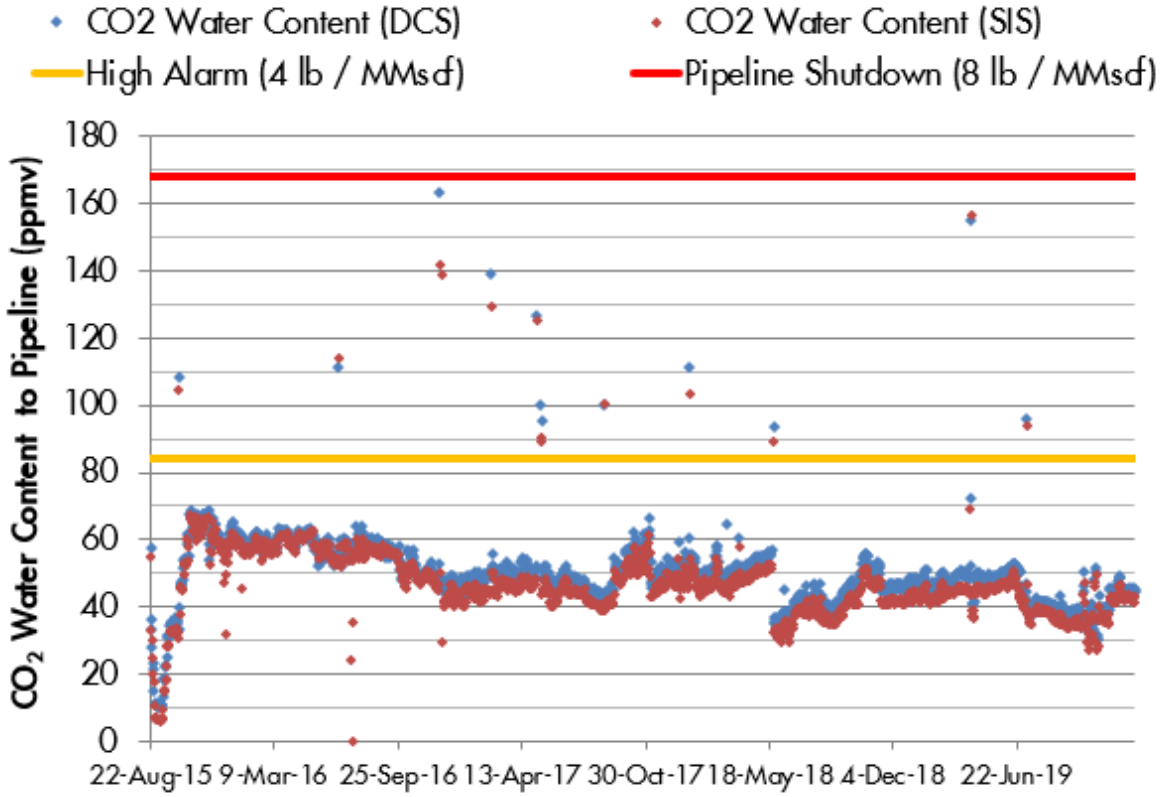

Figure 1: Water content in CO_2 to pipeline (ppmv)

2. LESSONS LEARNED SINCE COMISSIONING

The following points summarize the lessons learned from the TEG startup:

- Carryover of TEG into the CO_2 stream to the pipeline was very low when compared with design. The estimated losses for 2016, 2017, 2018 and 2019 were roughly 6,900 kg, 5,800 kg, 8,700 kg and 11,100 kg annually vs the design makeup rate of 46,000 kg annually. The losses are < 10 ppmw of the total CO_2 injection stream for 2019, compared to the 27 ppmw expected in design.
- When running at design process conditions for temperature, stripping gas and TEG flows, the CO_2 moisture content was below 20ppm. This allowed an optimization on stripping gas to reduce N_2 usage for the unit from design of 37.7 sm^3/m^3 TEG to ~3 sm^3/m^3 TEG. After making this adjustment, the average for moisture content of the outlet remains below spec.
- One of the CO_2 moisture content analyzers on the outlet of the TEG unit experienced some reliability issues in December 2015 (seen in Figure 1, red line deviating from blue). The issues were associated with scale buildup on the highly polished stainless steel reflective mirror. Scale buildup was found to be related to low temperatures on the mirror and the issues were rectified via improving heat containment in the enclosure. Operation of the device has been stable ever since.

REFERENCES

Refer to the BDEP (basic design and engineering package) for more info regarding the dehydration unit. No physical design modifications were made to the dehydration unit post startup.