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Quest CCS Project

Quest CO₂ Capture Ratio Performance

Summary

This document summarizes the CO₂ capture ratio performance of the Quest facility for the reporting period.

Keywords

Quest, CCS, CO₂ capture ratio, CO₂ recovery

1. CO₂ CAPTURE RATIO INTRODUCTION

This document provides the annual CO₂ capture ratio performance of the Quest CCS facility. The CO₂ capture ratio is defined as the percentage of CO₂ in the three HMU raw hydrogen streams that is removed in the amine absorbers (V-24118, V-24218, and V-44118), separated in the CO₂ stripper, compressed, and sent to the CO₂ pipeline for injection. The typical CO₂ content in the absorber feed gas (raw hydrogen stream) is between 16 and 18% by volume.

2. 2021 PERFORMANCE

The CO₂ capture ratio data has been provided on a daily basis, and reported as the combined CO₂ capture ratio for the three HMUs. The capture ratio is defined as the amount of CO₂ captured and injected over the summed amount of CO₂ available in the three syngas streams. The data for the reporting period was from January 1 through December 31, 2021. The average capture ratio for the reporting period was 78.2% excluding the turnaround from April 15th to May 15th. See Figure 1 below for the daily averaged data.

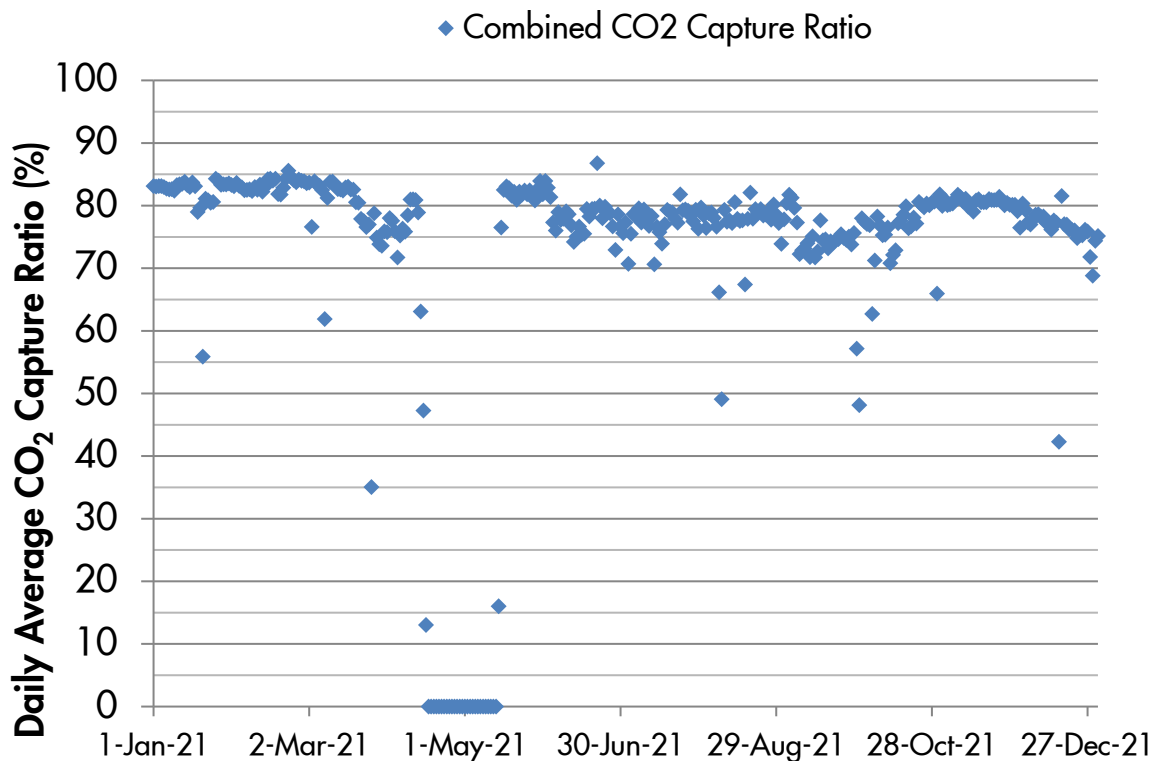


Figure 1: CO₂ Capture Ratio – Daily Averages

The data from Figure 1 shows that there were a few periods where performance on a daily basis was below the objective 80% capture ratio. The following events in 2021 contributed to these periods of reduced CO₂ capture ratio performance:

- March 23, 2021: HMU3 reduces capture from 80% to 78% for reformer management.
- April 15, 2021: Quest unit is taken offline for turnaround inspection and maintenance window. HMU1/2/3. The carbon capture unit resumed operation May 15, 2021.
- June 11, 2021: HMU3 reduces capture from 78% to 74%. HMU3 operated in this reduced capture mode for the remainder of the year.
- August 30, 2021: HMU1 and HMU2 reduce production and capture due to hydrogen demand. Normal production from HMU1 and HMU2 resumed to normal October 24, 2021.
- September 29, 2021: Pipeline trip stopping injection for 1 day.
- October 30, 2021: Pipeline trip stopping injection for 1 day.
- November 25, 2021: HMU2 carbon capture from 82% to 65% over the course of three weeks for reformer management. Capture remained at 65% for the remainder of the year.
- December 9: HMU2 operations result in reduced available CO₂ for capture.
- December 16, 2021: Pipeline trip stopping injection for 1 day.
- December 27, 2021: HMUs reduced production and resulted in less available CO₂ for capture.

Overall, capture ratio performance was relatively strong for the year, sustaining ratios near 80% for the majority of the year outside of the periods listed above. The main challenges resulting in capture reduction in 2021 were around HMU management. Although there were operational challenges that were faced in 2021, the installed Quest technology/capacity is capable of strong, sustained CO₂ capture ratios with reliable performance with stable hydrogen production.