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Heavy Oil

Controlled Document

Quest CCS Project

Quest Process Design Changes 2015

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Signatures for this revision

Date	Role	Name	Signature or electronic reference (email)

Summary

This document summarizes the significant process design changes that occurred during the reporting period.

Keywords

Quest, CCS, process design

DCAF Authorities

Date	Role	Name	Signature or electronic reference (email)
		Add name	Actual signature
		Add name	Actual signature
		Add name	Actual signature

None

TABLE OF CONTENTS

None

1. SUMMARY OF CAPTURE UNIT CHANGES

- Addition of orifice plates on P-24610A/B (demin water booster pumps) discharge piping (MOC 25629)
    - Due to design issues with the demin water system for Quest, the suction pressure delivered to the demin booster pumps is 250 kPa higher than expected. This resulted in high demin water flows through the pumps when they are offline, creating a process safety issue in the case of high level in the de-aerator, and with the pumps online, the flow was too high for everyday operation of the system. This change allowed the system to operate within the designed control parameters by increasing the system pressure.
- Reconfiguration of CO2 stripper reflux drum control (MOC 25759)
    - This change provided the operators with a more successful means to manage the amine unit water balance with fewer interventions required, controlling reflux drum level via reflux flow instead of the purge water stream to the wastewater treatment plant.
- Addition of amine flow ratio control (MOC 25776)
    - This change provided the operator with the means to maintain a settable, constant, CO2 capture ratio while the hydrogen plant rates changed, by automatically modifying amine flow to each individual absorber on ratio control with the inlet raw hydrogen gas feed rate. The ratio control provided the benefits of constant CO2 capture, which were witnessed via fewer disturbances of the HMU's tail gas flow/composition and to the Quest stripper V-24601 overhead temperature.
- Amine absorber flooding prevention controls (MOC 26033, 26335)
    - Due to absorber flooding/foaming issues, two independent changes were made to the absorber control system to protect the PSA adsorbent from harm due to amine carryover and to mitigate the impact of absorber foaming/flooding on hydrogen plant stability. The outcome was a series of modifications to controls/trip settings, and using the absorber bypass valve to partially bypass the absorbers when foaming/flooding were detected via pressure drop on the absorber trays.

2. SUMMARY OF COMPRESSION UNIT CHANGES

- CO2 compressor C-24701 resolution to compressor reverse issue (CP 511)
    - Due to reverse rotation of the compressor during the initial shutdown, a detailed engineering study was conducted resulting in the addition of additional compressor blow-off capacity. Additional blow-off lines were added to the compressor's 4^{th}, 5^{th}, and 6^{th} stages that open automatically on a compressor shutdown to quickly reduce the volume of compressed CO2 in the compressor interstage piping and knockout vessels, reducing

None

the braking force applied on the compressor and decreasing the chances of reverse rotation of the impellars/motor.

- Compressor discharge pressure de-rate and control changes (MOC 26109)
    - Testing of the compressor after the blow-off modifications were completed revealed that reverse rotation of the compressor was still possible when the discharge pressure was above 12 MPag. This change reduced the high discharge pressure trip on the compressor from 14 MPag to 12 MPag to mitigate the reverse rotation issue, and reduced the automatic blow-off point of the compressor 8th stage from 13.5 MPag to 11.5 MPag.
- Re-route V-24702 knock-out water to V-24701 (MOC 26168)
    - Knockout water from the compressor second stage knockout drum V-24702 was intended to be routed to the stripper reflux drum, but due to hydraulic limitations, was re-routed to the first stage knockout drum (V-24701) en-route to the amine drain drum (path of less resistance). This change necessitated more frequent makeup of water from the amine drain drum back to the CO2 stripper.

3. SUMMARY OF DEHYDRATION UNIT CHANGES

None to note for the reporting period.

4. SUMMARY OF PIPELINE AND WELLSITE CHANGES

None to note for the reporting period.

5. REFERENCES

The remainder of the process design is largely the same as indicated in the BDEP Appendix 12 P&ID listing.