

September 25, 2023

Stephen H. Lee, Director
Louisiana Department of Natural Resources
Injection and Mining Division
617 N. 3rd Street
Baton Rouge, Louisiana 70802

**Re: Proposed Snubbing & Cleanout Plan for Sulphur Mines Cavern No. 6
Westlake US 2, LLC – Well PPG 6X (SN 57788)**

Dear Mr. Lee,

This letter is submitted on behalf of Westlake US 2, LLC (“Westlake”) to propose the snubbing and cleanout of Cavern Well No. 6X at the Sulphur Mines facility. This letter outlines the basis for the snubbing activity, execution plan, active monitoring, and long-term plan for Cavern Well No. 6X.

Basis of Proposed Plan & Request

Cavern No. 6 with entry well PPG No. 6X underwent an inspection workover in July of 2023 in preparation for the design of a microseismic geophone array. One aspect of the inspection workover was to complete a sonar survey of the cavern. This was not possible due to an obstruction that was identified within the salt cavern neck (between the 7 5/8” cemented production casing shoe and the cavern roof). A coiled tubing remedial workover was attempted but not successful at removing the obstruction.

As Cavern No. 6 has a pressure relationship with Cavern No. 7, the current operating strategy for Cavern No. 6 is to observe and maintain a constant cavern pressure, which has generally been measured between 180 to 190 psig (surface casing pressure – saturated brine filled) since December of 2022. To remediate the cavern neck obstruction efficiently and safely, a snubbing unit will be utilized to conduct a milling operation without significantly altering the cavern pressure. Once the obstruction is cleared, a sonar survey of the cavern and a 6-arm caliper of the salt cavern neck will be obtained.

Proposed Schedule and Plan

The current wellhead pressure of PPG 6X is approximately 180 psi which equates to a pressure gradient at the 7 5/8” cemented casing shoe (2,505’) of 0.60 psi/ft. Prior to mobilizing the snubbing unit, recent average pressures on PPG 6X will be recorded and set as the target pressure to maintain throughout the milling operation. The following are some of the operational considerations that will be incorporated to minimize cavern pressure change of Cavern No. 6.

- The snubbing stack will be pre-filled with brine, prior to opening the well to the snubbing stack.
- When running in the drill string, the associated displacement volume of brine will be removed from the wellbore; when pulling out the drill string, the associated displacement volume of brine will be added to the wellbore.
- During the milling, fully saturated brine will be circulated through the drill string to aid in removing cuttings. Flowback will be managed through a manifold to maintain barrel in-barrel out circulation volume control.
- After the obstruction is cleared, freshwater will be circulated down the drill string while reciprocating the mill across the previously restricted interval of the borehole. The volume of freshwater pumped will be monitored to calculate the freshwater fluid column interface depth. Before pulling out of the hole, saturated brine will be circulated to surface to achieve a similar pressure on the well as prior to the operation.

Brine injection operations and tubing surface pressure maintenance of PPG 7B will continue as normal. It is not expected that the wellhead or cavern pressure of Cavern No. 7 would be impacted by the operation executed on Cavern No. 6.

The instrumentation that would be continuously monitored would be:

- PPG 6X Casing Pressure Gauge at Wellhead Wing Valve
- PPG 6X Drill String Pressure Gauge at Snubbing Unit Control Board
- PPG 6X Returns Flow Rate & Cumulative Volume
- PPG 6X Injection Flow Rate & Cumulative Volume
- PPG 7B Casing Pressure Gauge at Wellhead
- PPG 7B Tubing Pressure Gauge at Wellhead
- PPG 7B Downhole Pressure Gauge

Two surface seismic detection arrays will be operational during the snubbing and cleanout operation. Seismicity monitoring using 1) the existing seven-station 4.5 Hz geophone array which has been in operation since late January 2023 and 2) a new, co-located broadband five station array has been operational since September 20. The current seismic array has detection capability of about magnitude -0.25 to 0.2, depending on the background noise levels. The detection threshold of the broadband array will likely have similar detection levels as the 4.5 Hz array. In addition, seismometers can resolve lower-frequency seismic activity. All anomalous seismic activity of an event magnitude >2 will be reported to IMD immediately upon identification, and additional communication with IMD about the event will be provided as available or at 24-hour intervals, whichever comes first. If an anomalous event is detected, operations on PPG 6X will be halted. Lower magnitude events are reported to Lonquist/Westlake approximately within 24 hours. Updates to IMD regarding seismicity during the snubbing operations are expected to occur no later than 48 hours following event identification.

Concluding Remarks

Westlake believes, based upon the presented plan, that the operation on Cavern Well PPG 6X will safely and effectively clear the obstruction in the borehole while maintaining the “status quo” cavern pressure conditions in PPG 6X and PPG 7B. The operation is planned to be completed over an estimated nine consecutive calendar days (including mobilizing and rigging up).

Upon approval from the Injection and Mining Division, Westlake plans to begin execution of the operation as soon as possible. Upon completion, Cavern No. 6 will then continue to be monitored until the custom geophone arrays are delivered to site (anticipated for February/March 2024).

If there are any questions, please contact Josh Bradley (Westlake US 2, LLC), Coleman Hale (Lonquist & Co., LLC) or Ben Bergman (Lonquist & Co., LLC).

Sincerely,



R. Coleman Hale
Vice President / Sr. Petroleum Engineer
Lonquist & Co, LLC



Certified By:
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