ACID GAS INJECTION FOR ENHANCED OIL RECOVERY AND LONG-TERM STORAGE IN ZAMA PINNACLE REEFS

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ABSTRACT

An acid gas disposal and enhanced oil recovery (EOR) site in northwestern Alberta, operated by Apache Canada Ltd., has been the subject of simulation work performed by the Energy & Environmental Research Center at the University of North Dakota. The purpose of the simulations performed was to increase our understanding of the reservoir in order to test the efficacy of monitoring, verification, and accounting techniques for carbon capture and storage.

The hundreds of pinnacle reefs throughout the world hold in excess of 1 million barrels of oil each. These pinnacles represent an excellent opportunity to recover incremental oil through EOR and have a large potential to store CO_2. This research is to investigate the potential of conducting tertiary oil recovery in pinnacle reefs in the Zama area and the potential for long-term CO_2 storage. Furthermore, the research provides a robust methodology for the evaluation of similar projects in other Zama pinnacle reefs.

A detailed review was carried out which evaluated the historic data for all of the targeted pinnacles. As a part of this evaluation, fluid behavior was studied for both EOR efficiency and long-term storage purposes. A high-resolution heterogeneous geocellular model was constructed for each of the three pinnacles under investigation. Each of these models was run through a high-resolution history match and long-term predictions for EOR and scenarios to investigate using pinnacle reefs for CO_2 storage. Based on this workflow, the CO_2 sweep efficiency, storage capacity for each pinnacle, and the potential injection programs were estimated.