

# **MODELING AND SIMULATION OF ACID GAS INJECTION FOR ENHANCED OIL RECOVERY AND LONG-TERM STORAGE IN ZAMA PINNACLE REEFS**

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## **ABSTRACT**

One of the PCOR Partnership's key demonstration activities is working with Apache Canada on the Zama Acid Gas Project. Apache is currently injecting acid gas ( $\text{CO}_2$  and  $\text{H}_2\text{S}$ ) into six pinnacle reefs in the Zama Field in northwestern Alberta, Canada. In addition, there are more than 600 carbonate pinnacle reefs in the Zama Field, with documented estimates of original oil in place exceeding 1 million barrels each. This project aims to better understand the injection and long-term storage of acid gas and the EOR potential in the active acid gas injection pinnacles and to better understand and predict the EOR and storage potential in the Zama Field and other pinnacles worldwide.

A rigorous methodology of characterizing the six pinnacle reservoirs with the aim of better understanding the potential for acid gas injection for EOR and  $\text{CO}_2$  storage potential was developed. A detailed fluid model was constructed that accounted for the effects of  $\text{H}_2\text{S}$  and gas liberation on minimum miscibility pressure. Reservoir simulation models were constructed to investigate optimization of EOR potential and estimate  $\text{CO}_2$  storage capacity under various scenarios. The models were history-matched, and several predictive scenarios were run, focusing on both oil recovery and  $\text{CO}_2$  storage.

These efforts show promise to successfully conduct tertiary oil recovery at pinnacle reefs of the Zama area and store greenhouse gas in pinnacle structures. Furthermore, the research demonstrates a robust evaluation methodology for similar projects in pinnacle reefs and demonstrates the global potential for these types of reservoirs for EOR and  $\text{CO}_2$  storage.