INJECTION OF ACID GAS (CO_2/H_2S) INTO A DEVONIAN PINNACLE REEF AT ZAMA, ALBERTA, FOR ENHANCED OIL RECOVERY AND CARBON SEQUESTRATION

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ABSTRACT

Since December 2006, a stream of acid gas (approximately 70% CO_2 and 30% H_2S) has been injected into a Devonian pinnacle reef structure in the Zama oil field in northwestern Alberta, Canada. The injection has been conducted at an average rate of approximately 25,000 m^3 of acid gas per day, which includes approximately 50 tons of CO_2 per day. The project includes a variety of efforts focused on examining the effects that high concentrations of H_2S can have on enhanced oil recovery (EOR) and carbon sequestration operations, particularly with respect to monitoring, mitigation, and verification. Research activities are being conducted at multiple scales of investigation in an effort to predict and ultimately verify the fate of the injected gas. Geological, geomechanical, geochemical, and engineering data are being used to fully describe the injection zone, overlying seals, and other potentially affected strata. Validating the integrity of the anhydrite sealing formation and determining the nature of potential geochemical and geomechanical changes that may occur because of acid gas exposure are primary goals of the research. Challenges in dealing with acid gas as a miscible fluid for EOR and sequestration have been identified and examined. Lessons regarding the use of acid gas for EOR and sequestration may be widely applicable, as the exploitation of deeper sour gas pools increases throughout the world.

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