AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS (AAPG)
ANNUAL CONVENTION & EXHIBITION

ABSTRACT

A comprehensive monitoring, verification, and accounting (MVA) plan is critical to the success of any geological carbon storage project utilized as a method of reducing CO_2 emissions to the atmosphere. From October 2005 through September 2009, the Zama Oil Field in northwestern Alberta, Canada, has been the site of acid gas (approximately 70% CO_2 and 30% H_2S) injection for the purpose of enhanced oil recovery (EOR), H_2S disposal, and storage of CO_2. The Plains CO_2 Reduction Partnership has conducted MVA activities at the site throughout this period while Apache Canada Ltd. has undertaken the injection and hydrocarbon recovery processes. This project has been conducted as part of the U.S. Department of Energy National Energy Technology Laboratory Regional Partnership Program and has been recognized by the Carbon Sequestration Leadership Forum as being uniquely able to fill technological gaps with regard to geological storage of CO_2.

Acid gas is obtained as a by-product of oil production in the Zama Field and subsequent fluid separation process at the on-site facilities. During the separation process, oil and gas are sent to market while acid gas is redirected back to the field for utilization in EOR operations. Previously, CO_2 was vented to the atmosphere and sulfur was separated from the H_2S and stockpiled in solid form on-site. This project has enabled the simultaneous beneficial use of each of these “waste” products and effective mitigation of two environmental concerns.

This project addresses the issue of monitoring CO_2 storage at EOR sites in a cost-effective and reliable manner. The primary issues that were addressed include 1) determination of leakage, or lack thereof, from the pinnacle; 2) determination of the long-term fate of injected acid gas; and 3) generation of carbon credits associated with the geologic storage of CO_2 at the Zama oil field. To address these issues, a variety of research activities have been conducted at multiple scales of investigation including geological, geomechanical, geochemical, and engineering work. These activities will provide the necessary confidence in the long-term containment of injected gas and validate stored volumes over the life of the project.. While this project has been focused on one of the hundreds of pinnacles that exist in the Zama Field, many of the results obtained can be applied not only to additional pinnacles in the Alberta Basin but to similar structures throughout the world.