



PBS-SEPM Technical Luncheon

Tuesday, September 20, 2022 – 11:30 AM

Ranchland Hills Golf Club and Virtual

\$25 Early Bird Rate - \$35 Walk-In - \$10 Student - \$5 Virtual

RSVP by 9/16/2022 to info@pbs-sepm.org or online at www.pbs-sepm.org/events



An Introduction to CCS, CO₂ EOR, and CCUS

Dr. Ian Duncan – Program Director, STARR Program, Bureau of Economic Geology

Note: Dr. Duncan will be presenting virtually



ABSTRACT:

An increasing price on carbon and tax breaks for removing CO₂ from the atmosphere, will likely result in Carbon Capture Utilization and Storage (CCUS), replacing CO₂ Enhanced Oil Recovery (CO₂ EOR) as the driver for oil recovery. Our CCUS group within the State of Texas Advanced Resource Recovery (STARR) Team was begun to aid Texas operators (at no cost to them), and to increase oil production by optimizing CO₂EOR operations. One of the largest untapped reserves of oil in Texas lies in the hydrocarbons remaining in mature oil fields. This oil could be accessed by employing a variety of improved oil recovery techniques including, CO₂ flooding, and CO₂ foam.

Our focus is on the Permian basin of Texas; however, we are also are developing projects in the Gulf Coast. Our work integrates careful geologic logging of core data with measurement of petrophysical properties, thin section studies, analysis of 3-D seismic data, interpretation of wireline logs to build three dimensional geological models, as well as injection/production data. Integrating this data based on a new core-based work flow we have developed, and using High Performance Computing (HPC) to model impact of a variety of strategies on oil production could facilitate planning by operators.

Oxy is leading the way forward on implementing CCUS through their Low Carbon Ventures (OLCV) subsidiary. Oxy suggests that “CCUS initiatives are helping us tackle the problem of atmospheric carbon head-on” and that this involves maximize “geologic CO₂ storage capacity utilizing existing infrastructure” and exploring “new capture ... technologies such as Direct Air Capture (DAC)”.

This talk will review the nature of CCUS, in comparison with CCS (carbon capture and storage) and CO₂EOR. It will also examine some of the engineering science that underly CCUS and the Oxy model for CCUS. The talk will outline our current research on the geology and isotopic geochemistry of Residual Oil Zones (ROZ) in the San Andres Formation in the Permian Basin, and their potential role in CCUS. We are using HPC to simulate CCUS models and their uncertainties. Operators interested in our STARR projects can contact me at ian.duncan@beg.utexas.edu.

BIOGRAPHY:

Ian is currently is currently a Program Director within the STARR program at BEG where he works with research teams to solve problems in CCUS (carbon capture, utilization and storage), CO₂EOR (enhanced oil recovery using CO₂) and hydrogen generation in depleted subsurface hydrocarbon reservoirs. His current research focuses on the scientific, and technical aspects of ROZ (residual oil zones) and the mechanisms of CO₂ storage associated with CCUS. He is also using machine learning to model CCUS issues. He has a particular interest in the mechanisms for CO₂ storage in oil reservoirs and the potential impact of diagenesis and mineralogy on rates of CO₂ storage in CCUS. He also is interested CO₂ transport, leaks, blowouts and risks. He works with operators of Texas oil fields (at no cost to the operator) to simulate oil production and CO₂ storage to maximize economic returns.

A former Associate Director of BEG, he has given testimony to the US Congress on CO₂EOR on three separate occasions. He has sat on seven national boards and chaired two (including 3 review panels for the US Department of Energy. He was chosen by President Obama as the only earth scientist to speak at his Energy Review Panel. Similarly, last year he was selected as the only earth scientist to speak at President Biden's Energy Shot nationwide Zoom meeting.