Introduction to CO_2 Storage

Carbon dioxide storage in subsurface geologic formations is one option to reduce significant levels of CO_2 emitted to the atmosphere. Fundamental science and engineering principles indicate that such systems should be feasible and safe: the energy cost of preparing CO_2 for injection can be as low as a few percent of the heating value of the original fuel; and the very existence of oil and gas reservoirs is proof that buoyant fluids can be contained in the subsurface for millions of years. Carbon dioxide has been injected safely into subsurface reservoirs for many years for enhanced oil recovery or coalbed methane. However, long-term CO_2 storage does carry a risk of possible leaks to the atmosphere. The costs and risks are not insurmountable, but research is required to make these concepts economically and technologically feasible.

GCEP-funded scientists are investigating a range of research concepts in CO_2 storage, from rock characterization in the presence of CO_2 to simulations, models and theory that predict and monitor fluid flow. The largest GCEP program in CO_2 storage focuses on coalbeds, and the progress to date has advanced the understanding of CO_2 and coal interactions for what is otherwise a poorly understood area. Another area of ongoing research covers CO_2 storage in saline aquifers. The following ongoing GCEP research activities are taking place in the area of CO_2 Storage.

A team led by Professor Jerry Harris, with members from both Geophysics and Energy Resources Engineering, is investigating carbon dioxide sequestration in geological porous media, particularly unmineable coal seams. Their fundamental work is interdisciplinary with the tasks divided into site assessment, prediction and monitoring activities.

Professor Sally Benson's team continues to study the fundamental science behind long-term fate and trapping of CO_2 storage in saline aquifers. They develop experimental investigations and numerical simulations to address important questions and assess which, if any, modifications to currently accepted multiphase flow theory are needed and develop approaches for reliably predicting field-scale performance.