AAPG Annual Meeting
March 10-13, 2002
Houston, Texas

J. Richard Jones[1], Donald K. Harrison[1], Curt White[1], Kenneth A. LaSota[2] (1) U.S. Department of Energy, Pittsburgh, PA (2) Robert Morris College, Pittsburgh, PA

An Assessment of the Potential of North American Brine Aquifers to Sequester Anthropogenic CO_2 through Carbonate Mineral Formation

CO_2 sequestration can involve injection into underground formations such as deep saline aquifers, with permanent sequestration resulting through the *in situ* formation of carbon bearing minerals i.e., mineral trapping. Other geologic mechanisms include hydrodynamic and solubility trapping. Sequestration in saline aquifers is appealing because brines contain high concentrations of Group I and II metals, and the formation of metal carbonates from reactions between brine and CO_2 is possible. However, limited experimental and simulation data are available to determine optimal reaction conditions for carbonate mineralization.

For this evaluation, a brine database tabulated by the Texas Bureau of Economic Geology under a DOE contract was analyzed. These data are from 250 wells from 21 formations in the United States. NETL has added an additional 700 wells to the database. Data were compiled and sorted for variables most common among the formations, including Na^{+}, Cl^{-}, Ca^{++}, Mg^{++}, $SO_4^{=}$, HCO_3^{-}, Fe^{++}, pH, temperature and depth. Because reservoir pressures were not denoted for the wells, hydrostatic pressures were estimated for the wells.

Statistical methods used to test relationships between the brine variables and the formations included a variety of regression models. Both intraformational and interformational well chemistries were significantly different. However, predictive relationships emerged between pressure, temperature and many of the chemical variables on an intraformational basis. Statistical associations found from this study will provide insight for future field collection of brines, experimental and simulation evaluations, and of the potential of CO_2 sequestration in deep saline aquifers.