Using a Petroleum System Approach for Evaluation of CO_2 Sequestration Potential in Saline Reservoirs, H.E. Leetaru, D.G. Morse, S.M. Frailey, Midwest Geological Carbon Sequestration Consortium, Illinois State Geological Survey, 615 E. Peabody Dr, Champaign, IL 61820-6964, leetaru@isgs.uiuc.edu, morse@isgs.uiuc.edu, frailey@isgs.uiuc.edu; and J. McBride, Department of Geological Sciences, Brigham Young University, P.O. Box 24606, Provo, UT 84602, john_mcbride@byu.edu

Evaluation of the CO_2 sequestration potential of a saline reservoir would benefit from methodologies developed to analyze a petroleum system. Petroleum system analysis emphasizes the importance of the: 1) seal, 2) trapping mechanism, 3) overburden, 4) reservoir rock, 5) source, 6) preservation, and 7) critical moment. This type of systematic approach is readily modified for analysis of the sequestration potential of a formation or region. The key differences in analytical methodologies are that: the source would refer to the surface potential of the site, preservation is the length of time CO_2 would be sequestered, and critical moment is the time sequestration starts.

The Cambrian Mount Simon sandstone of the Illinois Basin is used to illustrate how this approach could be used to define the sequestration fairway. For example, Mount Simon reservoir suitability is constrained by amount of overburden, depositional system, and the Precambrian topography. Sequestration traps may not necessarily be defined by structural or stratigraphic traps, but instead may also be found in areas of low structural dip and high reservoir preservation potential. The preservation potential of the reservoir is controlled by water salinity, reservoir heterogeneity, and lithology. The critical moment or first injection of CO_2 may become important when multiple injection sites in a basin become operational. Finally, the surface conditions, such as urban areas and water bodies may limit the location of CO_2 sources. These examples from the Mount Simon demonstrate an orderly approach to examining all pertinent data that should be considered when evaluating an individual site or a formation for its sequestration potential.