Project Summary:

As part of the Integrated CCS Pre-Feasibility phase of the Carbon Storage Assurance Facility Enterprise (CarbonSAFE) initiative, Battelle Memorial Institute carried out studies to establish the feasibility of developing an integrated commercial-scale carbon capture and storage (CCS) site that will utilize deep geologic strata in the Northern Michigan Basin (Figure 1). The project identified major sources of carbon dioxide (CO₂), conducted a sub-basinal geologic storage assessment, and determined the parameters for the proposed storage facility. Testing of National Risk Assessment Program (NRAP) tools was incorporated into several steps of the project. A major emphasis of the work was to develop an effective team capable of addressing the technical, economic, legal, engineering, surface, and public acceptance issues related to implementation of a real-world storage project in the Northern Michigan Basin.

Project Outcomes:

This project concept represents a highly viable opportunity that could be advanced and brought closer to realization with additional support. The study found that two saline reservoirs, the Saint Peter Sandstone (SPSS) and the Bass Island Dolomite, are both present across the entire study area and are both strong candidates for hosting a 50 million metric ton storage complex. Of the two, the SPSS is preferred because it occurs at greater depths below the primary zones of oil and gas production. In addition to the two saline reservoirs, the Northern Michigan Basin region hosts the Northern Pinnacle Reef Trend, a collection of more than 800 Niagara-age pinnacle reefs, that provide a low-risk, value-added CO₂ storage option that can be used in conjunction with saline storage in the storage complex. The Michigan Department of Natural Resources, which manages large tracts of land where the project can be located, has indicated interest in allowing state-owned land to be used for a geologic CO₂ storage site. Legal analysis of Michigan policies, regulations, and practices found that Michigan has a regulatory climate that is generally favorable for CO₂ storage. Results of a focused outreach program conducted with key stakeholders demonstrate a high level of support for the storage complex concept. At least nine existing and three potential new CO₂ sources were determined to be attractive candidates for the establishment of a regional CCS hub. The economic analysis indicated that the availability of the recently enacted tax credits will go a long-way toward closing the cost and revenue gaps, especially when combined with value-added options such as CO₂-enhanced oil recovery.

Presentations, Papers, and Publications