

Deep and Near-Surface Monitoring for Enhanced CO₂ Storage Security

Hovorka, Susan D.¹ (1) Bureau of Economic Geology, University of Texas at Austin, Austin, TX.

Geologic storage is in a research and demonstration phase in preparation for commercialization. It is important that policy developers recognize that a monitoring program for a research project is intrinsically different from the monitoring program for a commercial site. A research project challenges hypotheses about the nature of the subsurface perturbation created by injection by comparison of response predicted by conceptual or numerical models to the response observed via monitoring. A demonstration also tests the performance and sensitivity of monitoring tools to determine the extent to which they are able to detect the perturbation, the conditions under which they are useful, and the reliability under field conditions.

Monitoring at a commercial site where CO₂ is being injected can serve three functions. Monitoring is used to confirm that the predictions of containment made based on site characterization at the time of permitting are valid. This is conceptualized as making observations of change over time that are reasonably close to model predictions. From this monitoring result, confidence is gained to continue the injection. Secondly, monitoring could be used to confirm that no unacceptable consequences result from injection. Lastly, monitoring during injection could be designed to prove-up confinement so that monitoring frequency could be diminished through the life of the project and eventually stop, allowing the project to be closed.

Monitoring to be conducted during a commercial project needs to be sufficiently standardized so that both operator and regulator know what is required. Dependability and durability is needed for repeat measurements to be made over decades. Measurements should be designed to be reportable to the stakeholders so that oversight is obtained. Commercial sites should plan and budget for the possibility of detections that are not compliant with expected results. Such an occurrence would likely require a follow-up testing program similar in some ways to a research program in that it would test hypothesis explaining non-compliance. Outcomes from this investigation could range from an improved model to documenting inadequacy of containment, requiring remediation of the project. To optimize commercial monitoring we should separate early research elements from activities that will be used over the life of a project so that research expectations do not cross into regulations for commercial projects.