Risk Management for Development of a Regional CO_2 Storage Hub

Ken Hnottavange-Telleen (GHG Underground LLC)**, Richard Esposito** (Southern Company Research and Development), **David Riestenberg** (Advanced Resources International, Inc.)

In order to successfully develop and execute a large-scale CO_2 injection and storage project, it is vital to identify and evaluate all important risk factors – and then to control and to otherwise manage the identified risks. Areas of risk to project success include geologic uncertainties, project management and planning, outreach, permitting and site access agreements, infrastructure development, contractual and regulatory pathways, and the field development plan. Identifying and evaluating every important source of risk is of key interest to future owners/operators of such a project. Project success – the central entity "at risk" – consists of project goals and objectives (e.g. contractual pathways) and preclusions and avoidances (e.g. injury, damage to environment or reputation, etc.).

A workshop conducted by GHG Underground LLC was designed to identify and evaluate the principal risks to a potential large-scale CO_2 injection project. The *Project ECO$_2$S* storage site, encompassing 12,000 hectares adjacent to Mississippi Power Company's (MPC) Kemper County energy facility in Mississippi, U.S.A. has been the focus of considerable geologic, operational, and commercial development analysis, and appears to have the potential to act as a safe, large-volume CO_2 storage hub in the southeastern U.S.A.

One hundred and two (102) unique risk scenarios were developed from staff input and presented at the workshop. The scenarios encompassed five specific topic groups: 1) Geologic; 2) Monitor-Model; 3) Operations; 4) Project-Program Management; and 5) Public Acceptance. Each participant identified the topic groups with which he/she was most familiar (expert), and results were differentiated according to participants' familiarity with the topic groups.

Eighteen (18) project team members and stakeholders initiated the workshop by sharing current project information, incorporating all technical disciplines and operational areas. Discussion centered on known risks as well as unknowns that could potentially impede the achievement of project goals. Participants then provided semi-quantitative risk-evaluation data for analysis and reporting, comprising 'Likelihood' and 'Severity' values measured on categorical 5-point scales. Aggregated values were displayed in real time during the workshop, providing focus for further discussion in cases of large divergence. Scenarios not evaluated during the workshop were later completed through emailed correspondence.

The 102 scenarios were ranked by risk. Strong group consensus identified five to seven program-management scenarios related to CO_2 supply as the main sources of project risk. The concept of operating the geological storage facility as a regional hub (as a backup source plan) was identified as bearing important risks related to transportation, institutional support, and legal access to surface operational area and pore space.

Technical risks ranked lower, with concerns about seal (caprock) continuity ranking highest (#23 out of 102, in the "most familiar with the topic" ranking). Induced seismicity risks were ranked low. The highest monitoring-modeling risks (ranked around #30) focused on the prospect that the plume of injected CO_2 would not be confidently observable using available monitoring techniques. Overall, risk rankings differed little among project staff regardless of familiarity with the subject matter of specific scenarios.

Following risk evaluation and ranking, project staff developed specific risk treatments for the highest-ranked (i.e. the riskiest) third of the risked scenarios. Several moderate-risk scenarios of low likelihood but exceptionally severe consequences were added to the treatment roster. Risk treatments were designed to lower a scenario's likelihood of occurrence and/or its impact severity should it occur. Risk treatments developed for the most-risky scenarios are expected to reduce risks among many of the moderate-risk scenarios as well. The lowest risk scenarios are deemed to not require treatment.

Risk treatments were assigned for execution among project staff according to their individual areas of technical expertise and activity within the project. The project plans periodic reviews of progress in risk treatment, and of the status of previously identified and emergent risks. Reviews will be driven by schedule (e.g. annually) and by significant changes in project status or acquisition of information such as completion of a new well, acquisition of a new seismic survey, or a substantial change in injection rate.

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