CCS Monitoring Plan Development

ARB Technical Discussions in Support of CCS QM Development

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Drawing on Experience

- WRI CCS Guidelines
- DOE Regional Carbon Sequestration Partnership Initiative and Best Practice Manuals
- Carbon Sequestration Council joint comments on UIC Class VI and GHG Reporting Rules
- Initial work on Elk Hills monitoring plan
- Oxy Denver Unit MRV Plan
- ISO 265 for CO2 Capture, Transportation, and Geological Storage
Starting Observations

• This process is in support of ARB development of a CCS Quantification Methodology (QM) not a UIC permitting program
• CCS refers to the full chain of capture, transport, and storage however the focus of the technical discussion is on the storage component
• ARB questions also raise the issue of CCUS in the form of EOR
Main Points Regarding CCS/CCUS Monitoring Plans

- Base monitoring plans on site conditions
  - Site characteristics
  - Operational history
  - Operational plans / procedures
- Focus on cost-effective approaches
  - Impacts CO2 purchase price
  - Impacts economic drivers for capture projects
- Retain flexibility to adopt/encourage monitoring improvements
1. Assess Site Conditions

- Determine site specific potential leakage pathways as well as existing infrastructure and procedures to monitor them.

- Elements of review include:
  - Site Characteristics – Questions
    - How well is the site characterized?
    - Any characteristics of importance (e.g., existing traps, extensive confining layer(s), faults, fractures, history of seismicity, non oil/gas wellbores)?
    - Boundaries?
    - Other reservoir constituents of interest (e.g., H2S)?
Site Conditions (cont.)

• Operational History - Questions
  • Nature of operations?
  • Level of documentation?
  • Potential for unknown wells, induced fractures, or other issues?

• Operational Plans and Procedures - Questions
  • How will reservoir pressure be managed?
  • Procedures for modeling, monitoring and maintenance?
2. Develop Tailored Monitoring Program

- Determine the cost-effective suite of monitoring tools and approaches to provide data for quantifying storage and detecting potential leaks
- Site assessment allows focus on site specific concerns rather than generic concerns
- Site assessment may favor or rule out different technologies (e.g., surface flux, 4-d seismic)
- Generally, higher degree of certainty at sites with “good bones” and extensive operational history means more finely tuned monitoring
3. Build on Existing Infrastructure and Procedures

- In cases of CCUS, existing infrastructure/procedures may also be utilized to provide monitoring data regarding storage
  - Injection pressures
  - Routine facilities inspection and maintenance
  - HSE monitoring for constituent gases such as H2S
- Focus shifts to ensure data collection and storage integrity rather than new monitoring wells
4. Anticipate Tech Improvements

• Significant improvements in CCS/CCUS technical knowledge and technology are on the horizon (from CCS/CCUS R&D and other areas of subsurface activity)

• For example:
  • Katherine Romanak’s presentation on attribution efforts at Weyburn
  • LDAR programs in oil and gas industry
  • More to come from DOE RCSP and NRAP programs, the oil and gas industry

• Don’t stifle innovation by locking in or excluding specific technologies
EPA GHG Reporting as Example

• Subpart RR monitoring plans include the following elements:
  • Delineation of maximum and active monitoring area
  • Evaluation of potential surface leakage pathways
  • Strategy for detecting and quantifying leaks
  • Strategy for developing baselines
  • Site specific considerations for quantifying stored CO2
  • Well identification
  • Commencement date
Oxy’s Denver Unit MRV Plan As Example

Site assessment showed good bones and strong history

Ongoing operations provided foundation for monitoring

Interaction with EPA was invaluable learning experience for EPA and Oxy

Source:
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Questions?

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