Surveillance of a Geologic Sequestration Project: Monitoring, Validation, Accounting

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Surveillance of a Geologic Sequestration Project: Monitoring Validation Accounting

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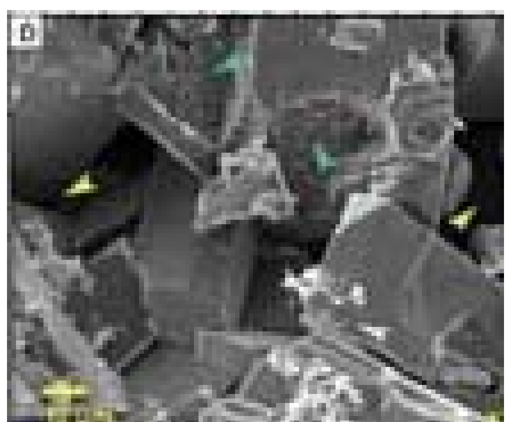
Other SECARB tests

SECARB coal seam
Geological Survey of Alabama
Virginia Tech

SECARB Plant Daniels
EPRI
Southern Co
ARI

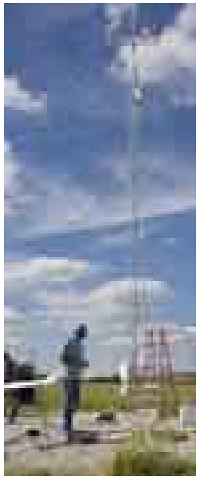
Questions

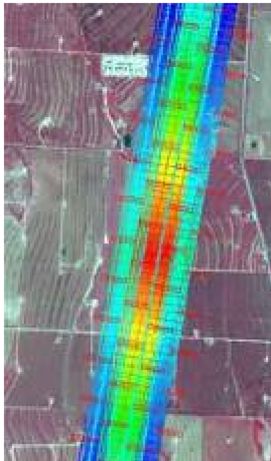
- Techniques for MVA
  - techniques that ensure project integrity
  - techniques purely (or mostly) research oriented.
- Do we have MVA techniques that can be used today to ensure the integrity of GS projects and detect leaks if they are occurring?
- What else do we need to learn about MVA?



Role of Monitoring

- Site has been selected, risk assessment favorable, permits received injection started.
- How do we determine that the project in performing correctly?
- Monitor events and thresholds to measure:
  - What is expected is happening
  - What is not expected is not happening
- Correct performance
  - allows injection to continue
  - Receive credits





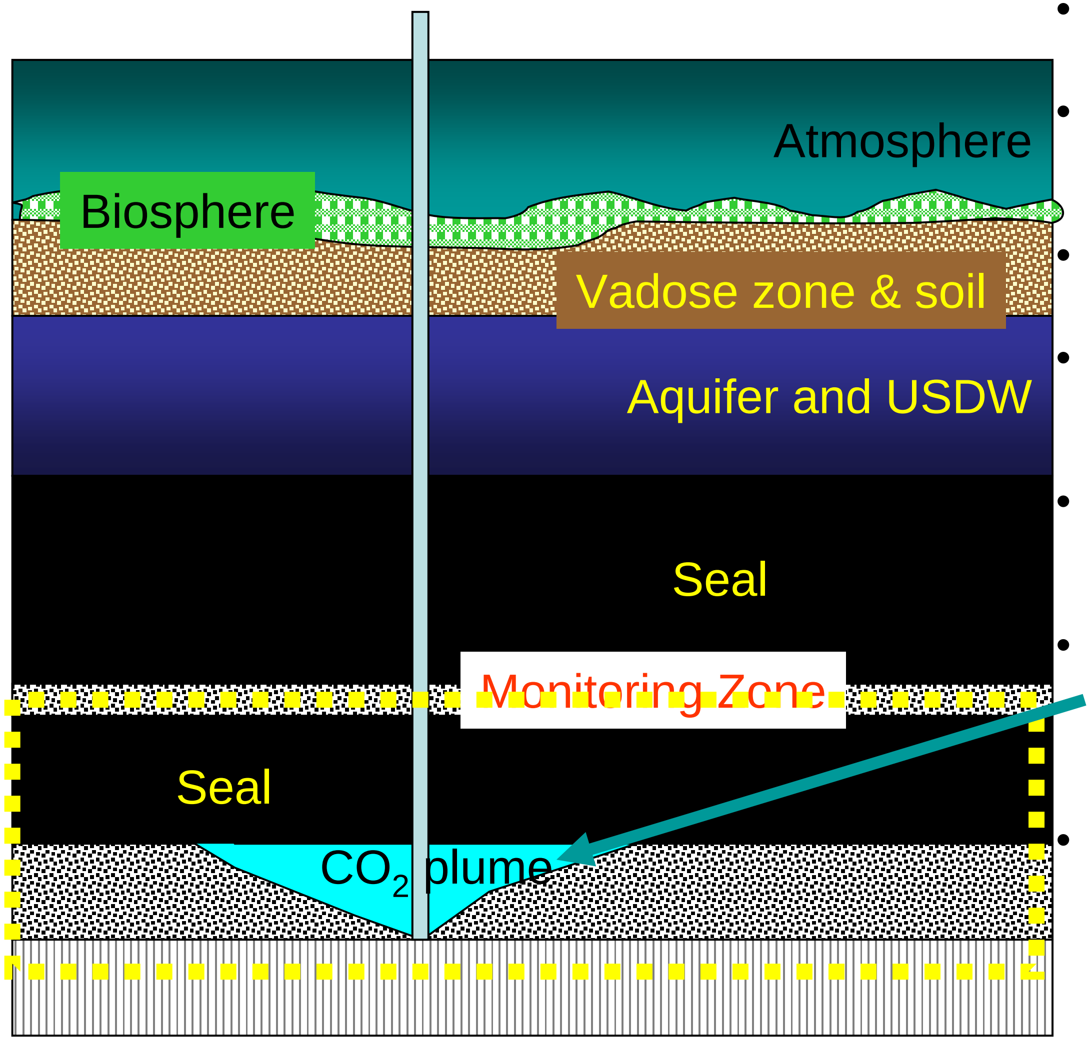
Monitoring Goals For Commercial Sequestration

Show that:

- Storage capacity and injectivity are sufficient for the volume via history match between observed and modeled
- CO_2 will be contained in the target formation not damage drinking water or be released to the atmosphere
- Know aerial extent of the plume elevated pressure effects compatible with other uses minimal risk to resources, humans, & ecosystem
- Advance warning of hazard to allow mitigation if needed
- Public acceptance provide confidence in safe operation

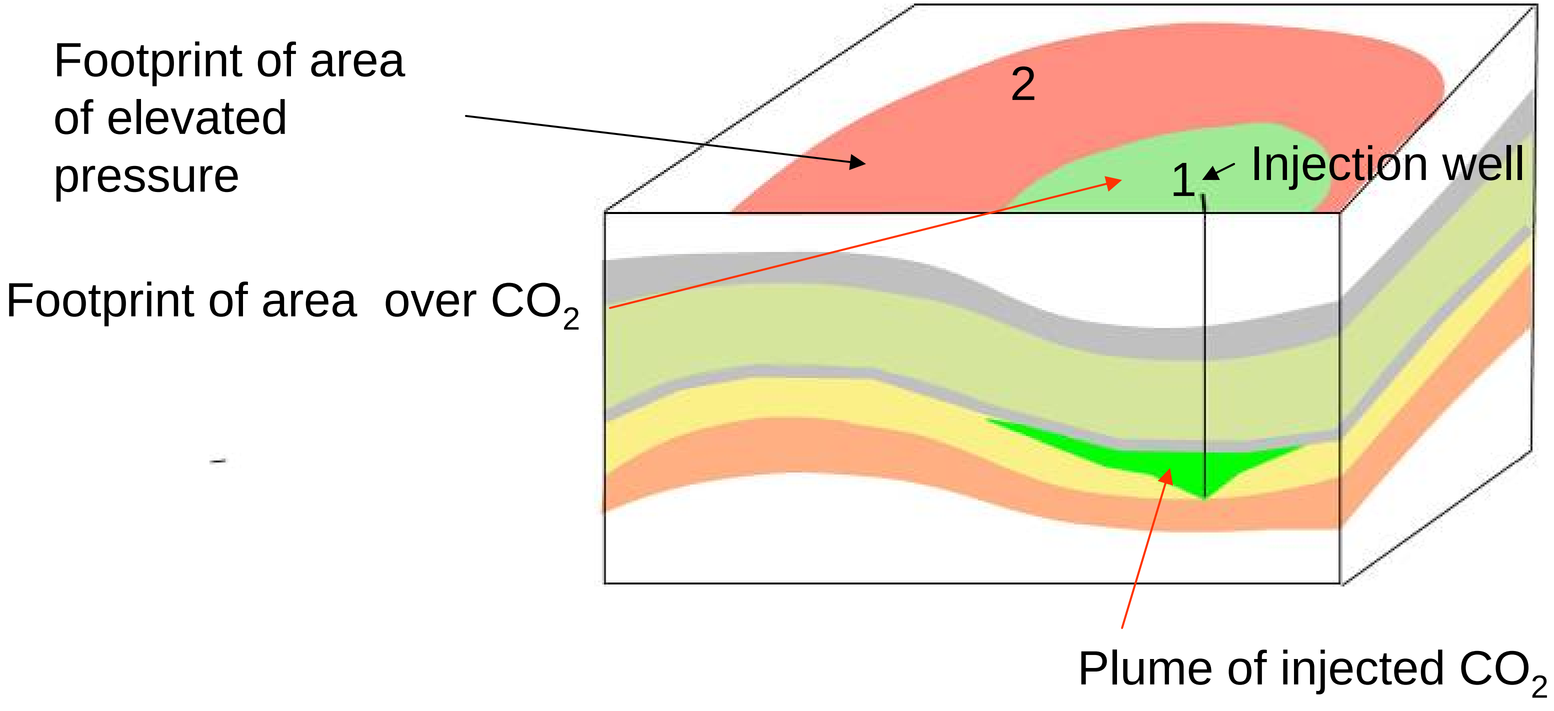
Modified from J. Litynski, DOE-NETL

Where to Monitor?



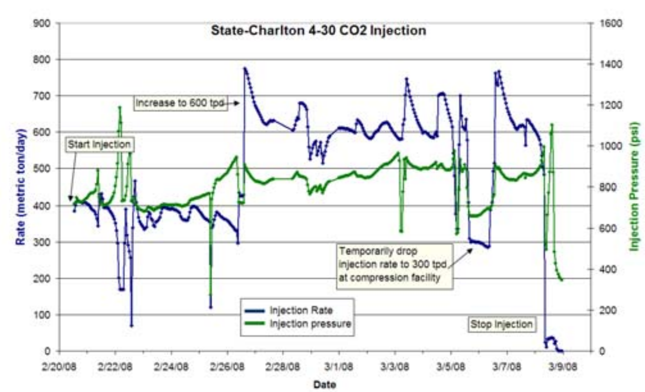
- Atmosphere
  - Ultimate receptor but dynamic
- Biosphere
  - Assurance of no damage but dynamic
- Soil and Vadose Zone
  - Integrator but dynamic
- Aquifer and USDW
  - Integrator, slightly isolated from ecological effects
- Above injection monitoring zone
  - First indicator, monitor small signals, stable.
- In injection zone - plume
  - Oil-field type technologies. Will not identify small leaks
- In injection zone - outside plume
  - Assure lateral migration of CO_2 and brine is acceptable

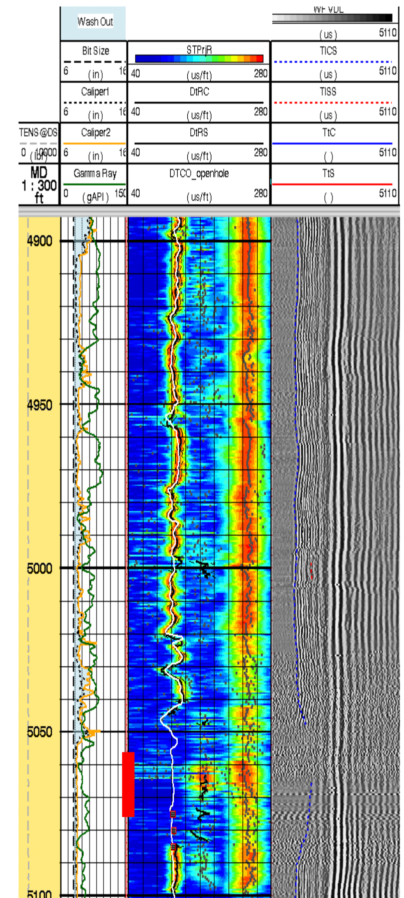
Two Parameters to Monitor - CO_2 and Elevated Pressure



Monitoring Tools

- Detection of CO_2
  - Acoustic, gravity, conductivity, geochemical techniques
  - In injection zone, above injection zone, in water at surface, in atmosphere
- Detection of pressure
  - In injection zone, above injection zone, at surface





CO_2

A balanced and phased approach to permitting and monitoring

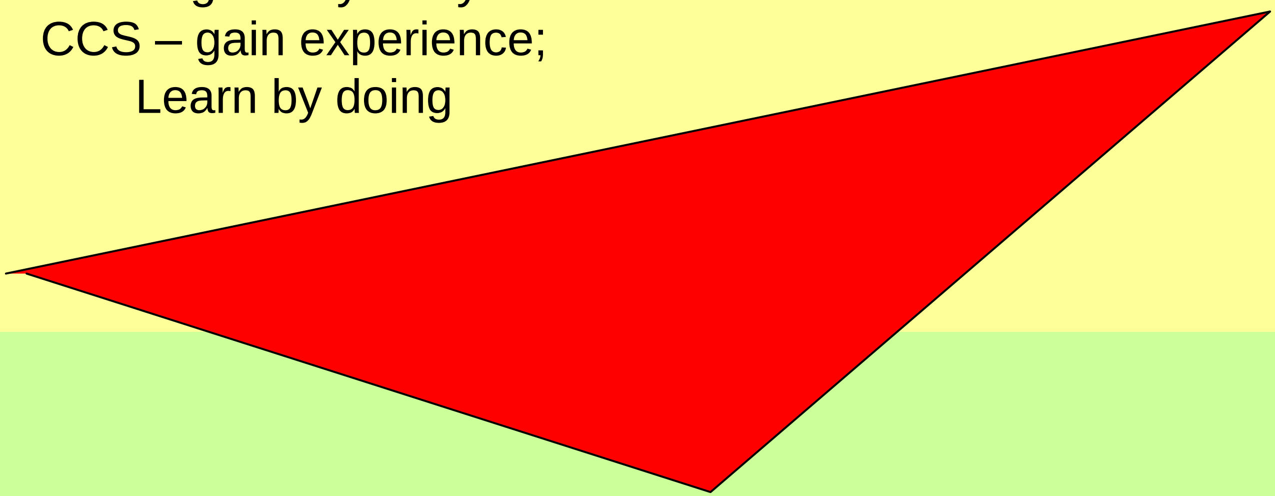
Phased

Balanced

Early (now)

Not too restrictive: encourage early entry into CCS – gain experience; Learn by doing

Adequate rigor to assure that early programs do not fail



Mature (As defined by time? Or by injection volume?)

Standardized, parsimonious

Adequately rigorous to assure performance and public acceptance

Status of Progress on Testing Tools

What else do we need to learn?

- Sensitivity limits of each tool, especially under different geologic environments

Conclusion

- Diverse tools are available to determine if a site is performing correctly
- Most of these tools have been extensively tested in similar settings and have been or are now being tested at CO_2 sequestration sites
- However, the optimal tool combination for mature projects has not been determined