TETRA TECH RPS ENERGY | TRAINING

# N549: Subsurface Characterization, Screening and Site Selection for Geologic CO2 Storage Sites

Instructor(s): Alex Bump and Susan Hovorka

**Format and Duration**

Classroom - 2 Days
Virtual - 3 Sessions

## Summary

Carbon Capture and Storage (CCS) is a key means of mitigating climate change and is the only option currently available to decarbonize industries such as cement, steel, petrochemicals and LNG. As opportunities in oil and gas decline, they are growing in CCS. Human activities now generate about 35Gt of CO2 (1 gigatonne=1 billion tonnes) per year. At ~$50/ton for sequestration, the potential opportunity is enormous, both in new business revenue and in repurposing old assets and delaying decommissioning costs. Mitigation of the worst effects of climate change will require storing billions of tons per year, with an industry to match. In the US alone, the National Petroleum Council estimates that CCS could employ ~230,000 people, similar to the current oil industry.

This course empowers attendees to develop and apply their skills to the growing industry of Carbon Capture Utilization and Storage. Attendees will be guided through the subsurface characterization and risk assessment of a storage site. Focus will be on the geologic needs for site definition, screening and development.

## Learning Outcomes

Participants will learn to:

1. Identify and describe key subsurface parameters
2. Assess static and dynamic capacity
3. Calculate injectivity and calibrate project requirements
4. Discuss the pros and cons of different storage schemes
5. Define and evaluate potential storage sites
6. Identify and address subsurface risks

## Training Method

This is a classroom or virtual classroom course comprising a mixture of lectures, discussion, quizzes and interactive exercises.

## Who Should Attend

This course is aimed at subsurface oil and gas professionals and first-level leaders who would like to develop their skills for the emerging industry of carbon capture and geologic storage (CCUS). It is recommended specifically for:

- Geologists, geophysicists, reservoir engineers and other technical subsurface O&G professionals interested in CCUS
- First-level leaders and others tasked with developing and/or assuring geologic storage for CCUS

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projects
- Recent graduates in petroleum geoscience and reservoir engineering who want to develop skills in CCUS

## Course Content

### Session 1: Characterization, Part 1

- Carbon storage sites: Goals, boundary conditions and needs
- Natural CO2 accumulations
  - Characteristics
  - Long-term retention
  - Leakage causes and pathways
- Trapping mechanisms for storage
  - buoyant, residual, local capillary, dissolution and mineralization

### Session 2: Characterization, Part 2

- Reservoir systems
  - Capacity
    - Key variables and requirements
    - Calculation of static and dynamic capacities
    - Controls on storage efficiency
  - Injectivity
    - Variables and requirements
    - Calculation and calibration
  - Characterization needs
    - Depositional architecture
    - Porosity and permeability structure
- Confining systems
  - Key variables and requirements
  - Calibration of seal capacity
  - Seals vs baffles
  - Characterization needs
- Risk assessment and mitigation
  - Area of review
  - Faults
  - Legacy wells

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## Session 3: Integration

- Rock-fluid interactions
- Pros, cons and evaluation of different storage schemes
  - Depleted fields
  - CO2-EOR
  - Saline storage
- Site screening and surface requirements
- Data requirements and novel solutions

## Exercises Included

This course integrates practical exercises to complement theoretical learning. You will:

- **Simulate $CO_2$ storage capacity** using EASiTool, a specialized software for analyzing and optimizing $CO_2$ storage in geological formations. You'll explore different boundary conditions and well configurations to assess optimal storage potential.
- **Conduct sensitivity analysis** to identify key reservoir parameters that impact storage efficiency, using EASiTool to test variations in conditions.
- **Determine the Area of Review (AoR)** for $CO_2$ storage projects by using EASiTool to analyze how factors like injection rates, reservoir properties, and boundary conditions influence the pressure front.
- **Perform scoping studies with EASiTool** to compare open and closed boundary conditions, evaluating their effects on $CO_2$ and pressure plume sizes.

These EASiTool exercises provide hands-on experience with real-world CCS project scenarios, enhancing your ability to evaluate and optimize $CO_2$ storage in geological formations.