REINHOLD ENVIRONMENTAL ®

2023 Reinhold/PCUG Round Table Presentation

Cohosted by Duke Energy and Vistra in The Westin Hotel, Cincinnati, OH on June 26-27, 2023

Reinhold Conference:

CO2 Capture
CO2 Transportation &
CO2 Storage

June 27, 2023

Legal Disclaimer:

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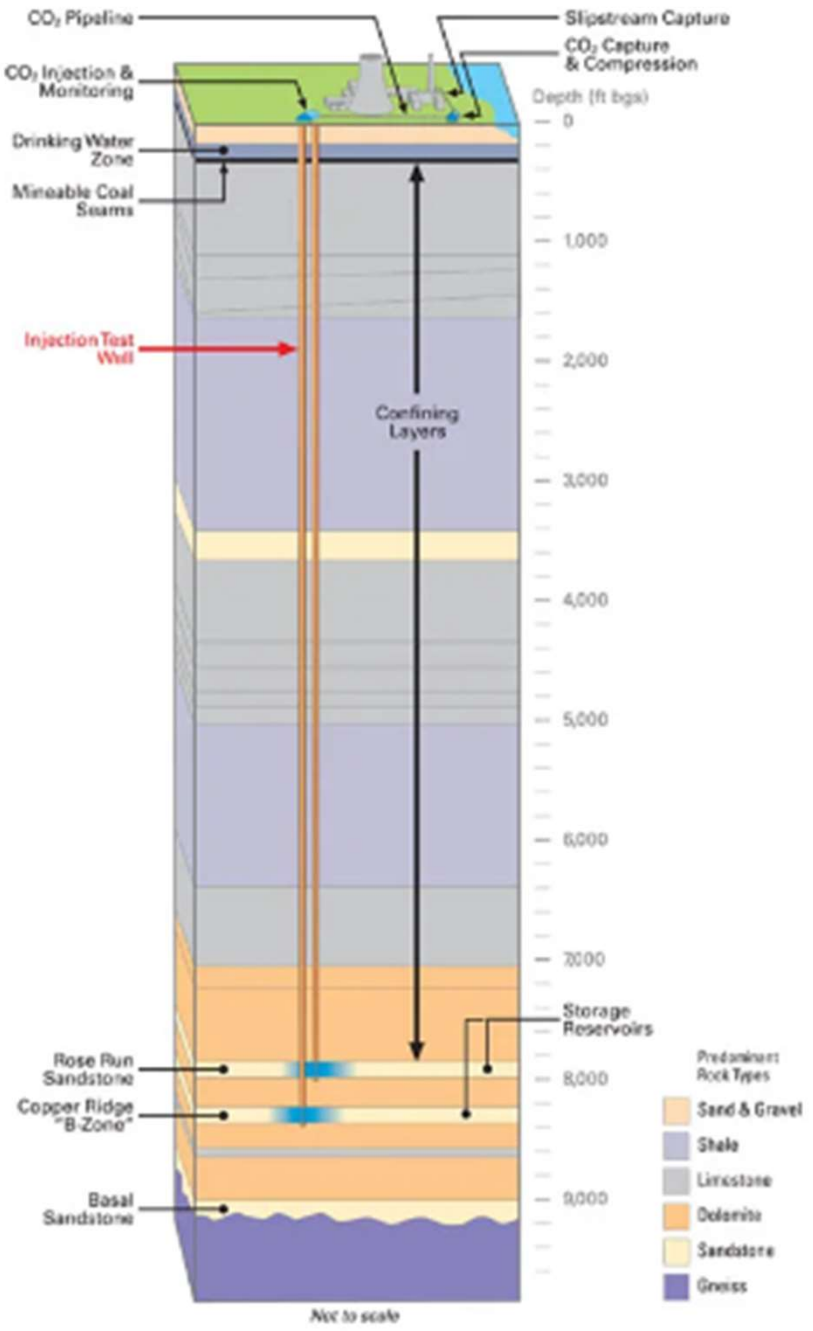
Background: Plant Demonstration

- Plant Demonstration in 2012
  - 1300 MWn Unit: High S Coal/SCR/ Cold ESP/ WFGD Limestone
  - Slip Stream Scale; successfully captured & sequestered CO2
  - CO2 sequestered on or near the site.
  - Could not get larger scale (235 MW) demonstration funded.
  - Chilled Ammonia technology, up to 90% CO2 capture
  - Although the geology may have been sufficient for a slip stream scale demonstration, this geology is not conducive to handling the full volume of CO2.
    - Perhaps multiple wells could suffice but multiple exploratory wells would be needed to determine this.

Background:
Plant Demonstration



Coal Plant
CCS Demonstration

Absorber Tower

Carbon Capture, Transportation & Storage:

- AEP is attempting to re-engage in the CCS arena since its coal plant demonstration.
- AEP is working with EPRI and is a member of the CO2DA Program.
  - CO2DA = CO2 Demonstration Acceleration Program
  - Evaluating geology on a fleet-wide scale
  - EPRI will provide indicative pricing for transportation and sequestration based on the geological and other data evaluated
- Amine based technology replaces the chilled ammonia technology.

CO2 Capture

- Amine based
- Absorption Tower coupled to a Regeneration (Stripper) Tower
- The release of CO2 from the amine requires heat input.
- New proprietary formulas require less heat to release the CO2, and therefore, less parasitic load
- Target CO2 removal rate of 95%

Request for Information: CO2 Transportation and Storage

- 13 Initial companies contacted.
- RFI responses from 4 companies
- Transportation vs. Sequestration Costs
  - Geology determines the number and location of wells.
  - Poor geology can drive longer transportation lines and/or multiple wells.
- Risk mitigation includes
  - Safety risks of pipeline
  - Economic risks of not being able to sequester the CO2

CO_2 Pipeline Rupture
(From public sources)

- Denbury Pipeline Rupture in MS, in February 2020
- Pipeline was buried in rugged terrain.
- A period of heavy rains over many weeks resulted in a landslide that ruptured the pipeline.
- The loss in pressure was identified by the transport line control room.
- The line was isolated within 8 minutes of the rupture by remotely closing valves upstream and downstream of the rupture.
- There were no deaths. People were taken to the hospital for observation.
- There were claims that the modeling of the CO_2 plume was not as accurate as it should have been.

CO2 Pipeline Rupture
Denbury Pipeline

Pic. From Alabama Bugle 2020, website

Hundreds Evacuated, Dozens Hospitalized After Gas Pipe Rupture in Mississippi - AL Bugle

Site Selection Considerations

- 45Q tax credits favor selecting a coal plant (higher emissions of CO2). $85/tonne CO2 sequestered.
- Scheduled retirement age of plant
- Geographic needs for dispatchable power
- Real estate limits (is there enough room for the equipment?)
- Costs for transportation and sequestration of CO2

Questions?