Critical Challenges. Practical Solutions.

Energy & Environmental Research Center (EERC)

PERSPECTIVES FROM RECENTLY PERMITTED ONSHORE CCS PROJECTS

U.S. Department of Energy
Carbon Management Project Review Meeting

Pittsburgh, Pennsylvania
Wednesday, August 17, 2022

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PCOR Partnership PARTNERSHIP MEMBERS

U.S. DEPARTMENT OF ENERGY | NETL NATIONAL ENERGY TECHNOLOGY LABORATORY | EERC UNIVERSITY OF NORTH DAKOTA | North Dakota Industrial Commission | UAF Institute of Northern Engineering, University of Alaska Fairbanks | University of Wyoming School of Energy Resources

08/22

CO_2 Point Sources

- Ethanol Production
- Coal-Fired Power Generation
- Gasification
- Fertilizer Production
- Natural Gas Processing
- Natural Gas Power Generation
- Industrial Processes

Capture/Storage Models

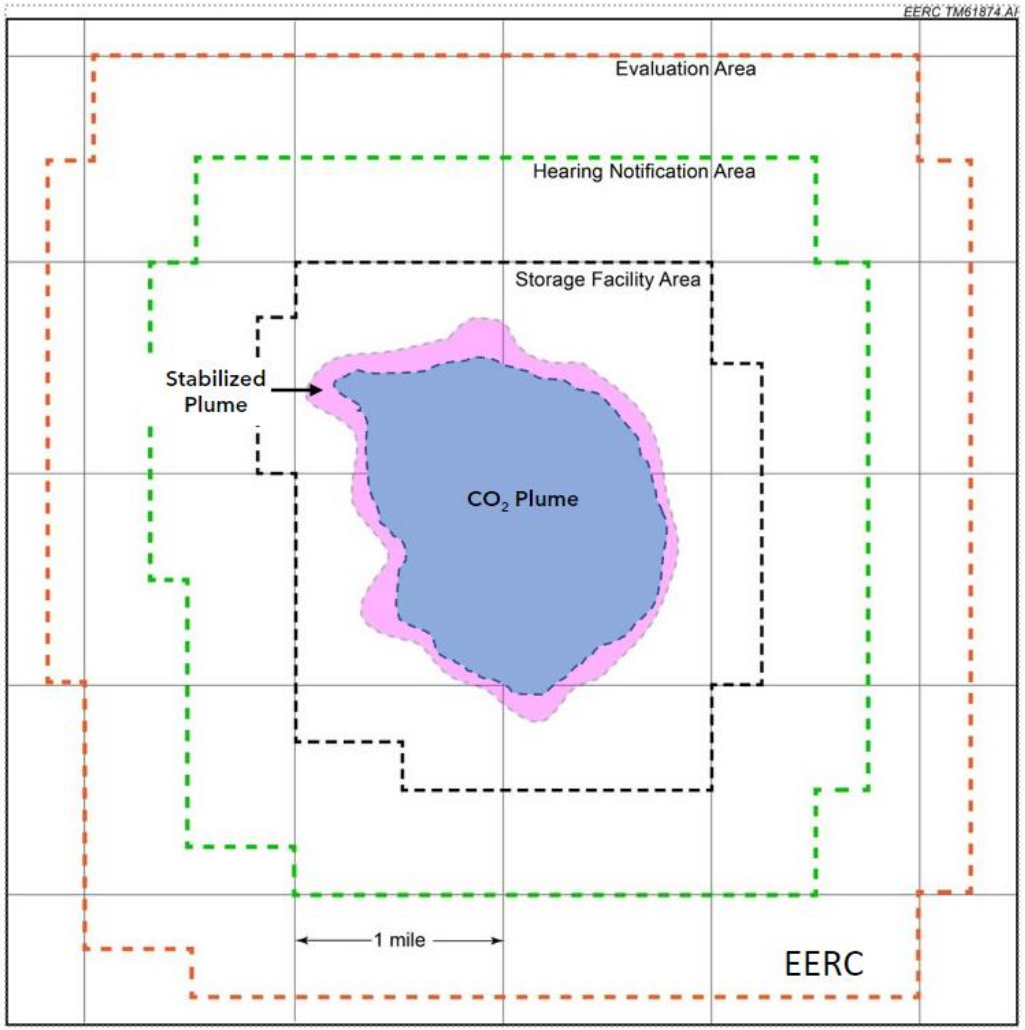
- Source/Sink-Matched
- Source Aggregation and Storage Hub
- Capture Hub with Distributed Storage
- Hybrid storage with Enhanced Oil Recovery, Minerals Recovery and/or other Utilization

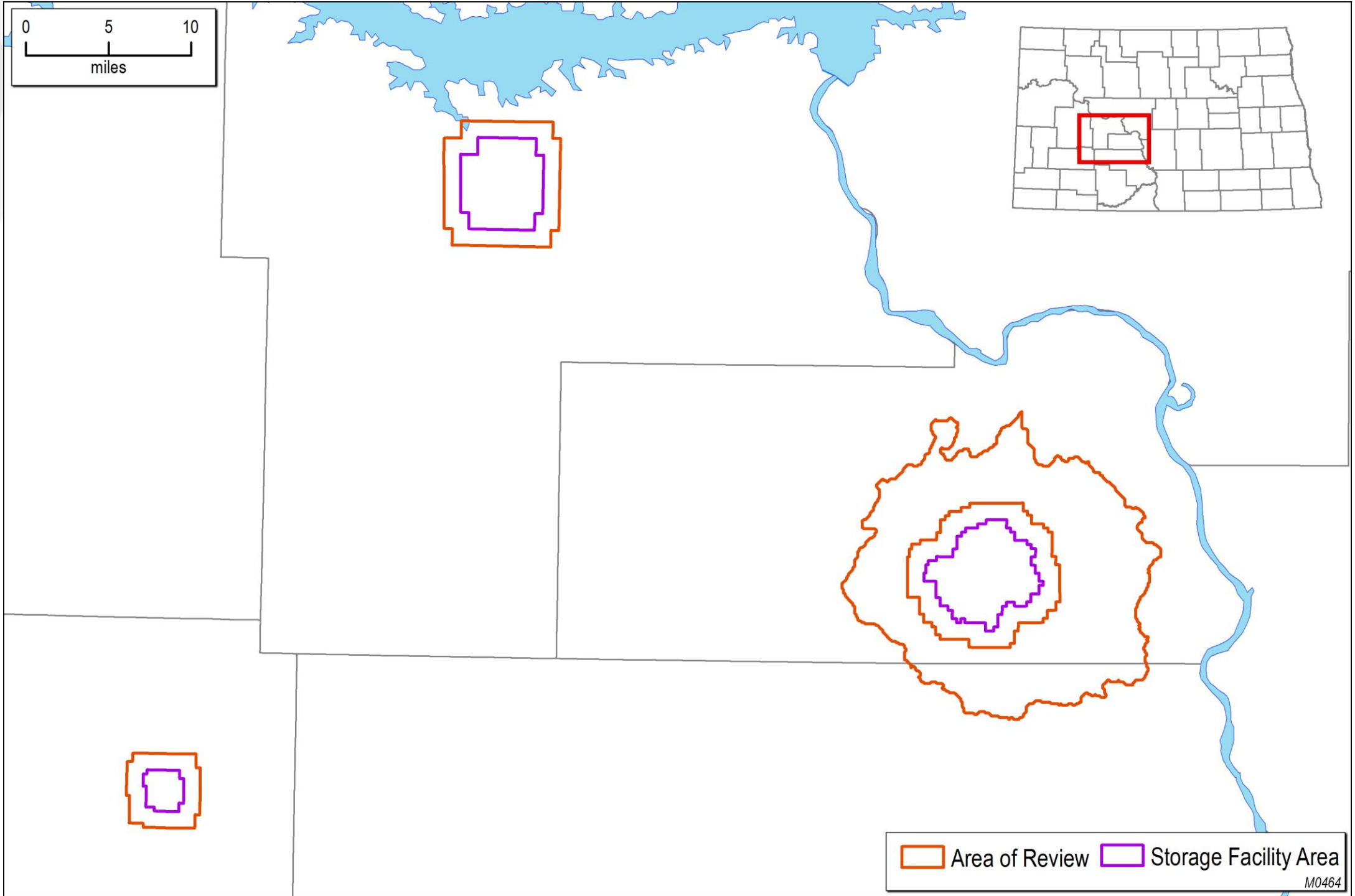
STORAGE FACILITY PROJECT BOUNDARIES

North Dakota UIC Class VI

- **CO_2 Plume** – Simulated boundary at end of injection.
- **Stabilized Plume** – Simulated boundary at post-injection stabilization.
- **Storage Facility Area** – Boundary + Buffer

  [Pore Space Lease and Amalgamation Area]
- **Hearing Notification Area** – ½ mile from the storage facility area boundary (mineral estate and surface estate).
- **Area of Review (AOR)** – Not shown; calculated with simulation.
- **Evaluation Area** – 1 mile from the storage facility area boundary (default minimum AOR).

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miles
Area of Review
Storage Facility Area
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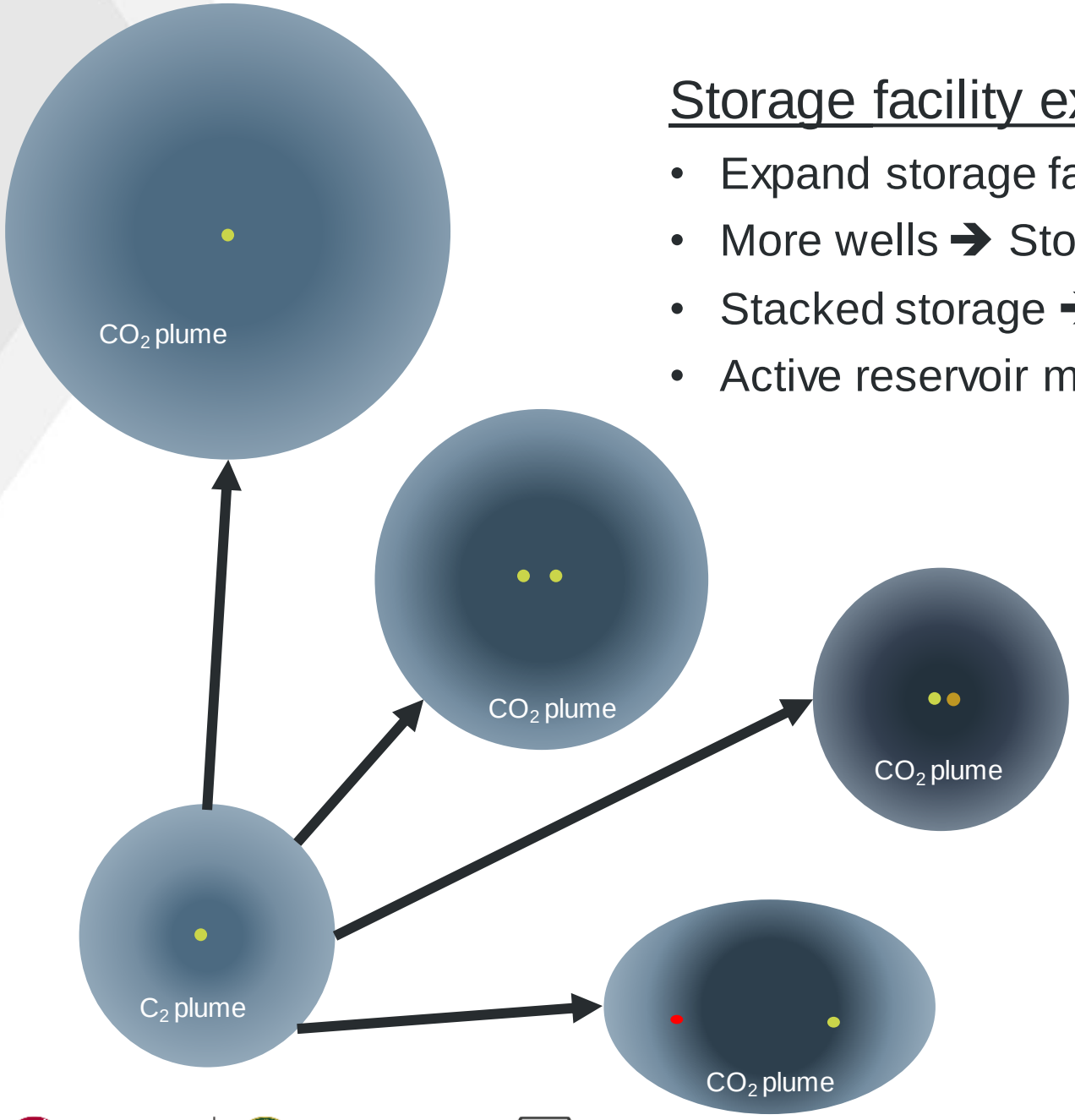
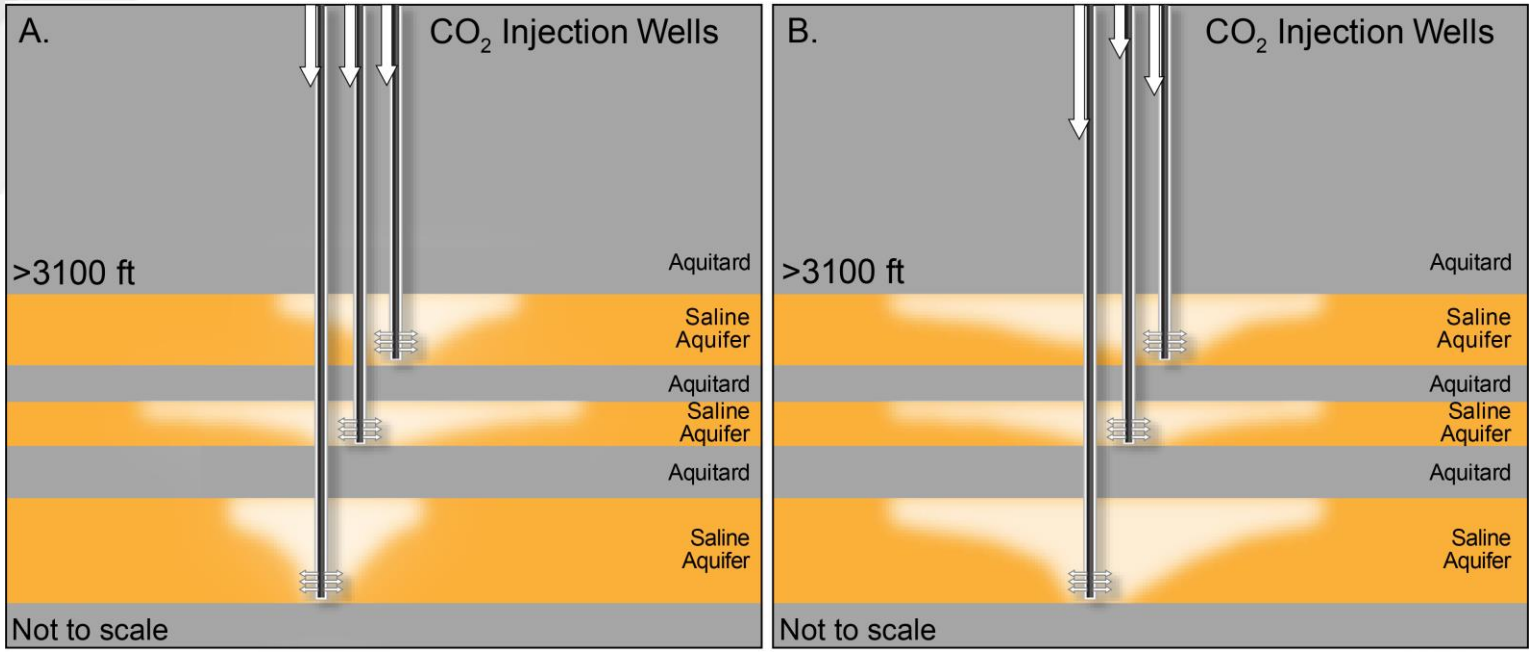


Storage facility expansion to accommodate additional CO_2

- Expand storage facility area ➔ More capacity
- More wells ➔ Storage efficiency ➔ More capacity
- Stacked storage ➔ More capacity
- Active reservoir management ➔ Storage efficiency ➔ More capacity

STACKED STORAGE



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Conceptual Scenario

Complex geology, lower capacity, and moderate development cost

Simple geology, great capacity, and low development cost

Moderate geology, moderate capacity, and high development cost

Great capacity, simple geology, and high development cost

ACTIVE RESERVOIR MANAGEMENT

Active Reservoir Management

- Mitigate pressure interference between neighboring CCS projects.
- Improved storage efficiency / increase capacity of a permitted CO_2 storage site.
- Reduce stress on sealing formation.
- Geosteer injected fluids (injection and extraction of brine).
- Divert pressure from potential leakage pathways.
- Improve injectivity, capacity, and storage efficiency.
- Reduce area of review (AOR).
- Accelerated pressure dissipation after injection.

Brine Treatment

- Alternate source of water.
- Reduced disposal volumes.
- Salable products for beneficial use.

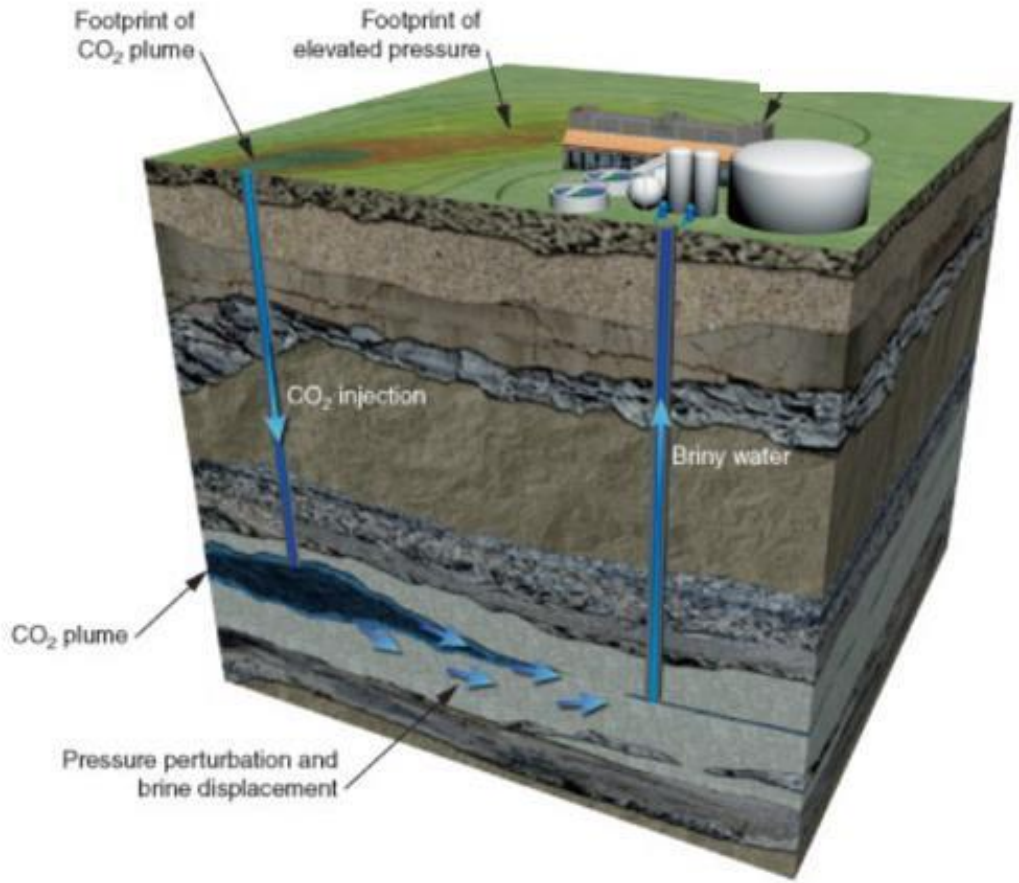

Illustration modified from Lawrence Livermore National Laboratory https://str.llnl.gov/Dec10/aines.html

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THANK YOU

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