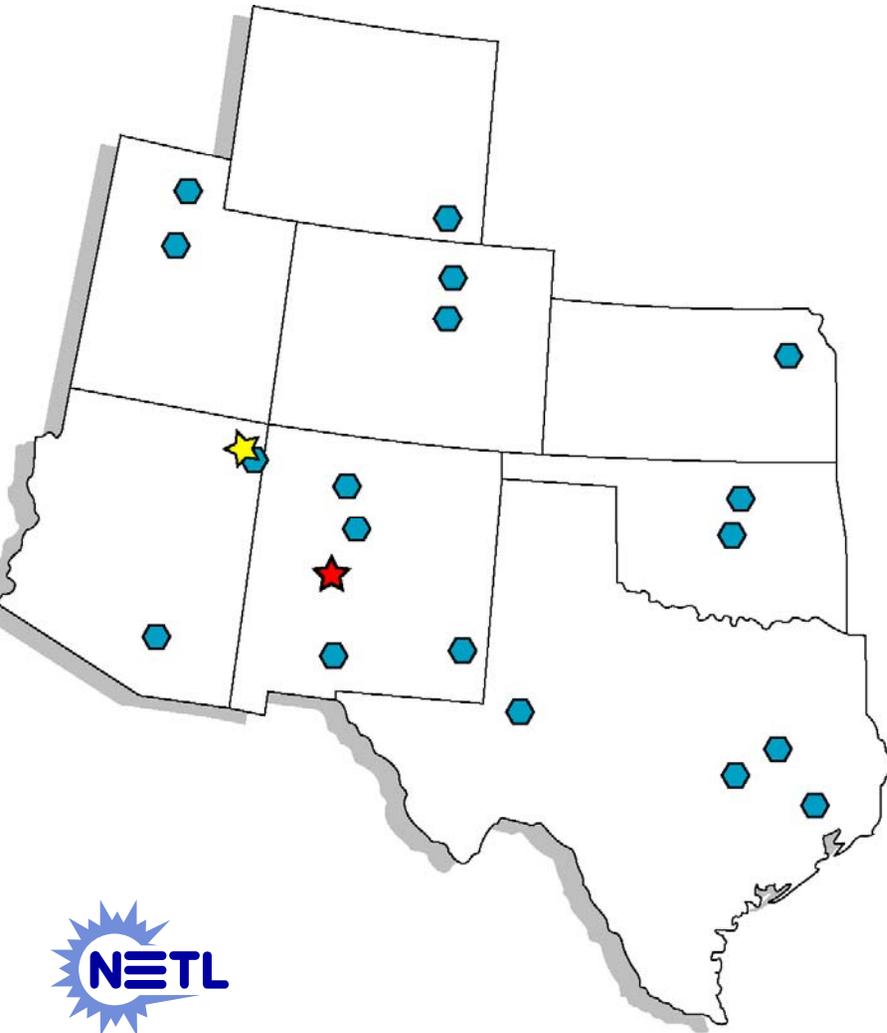


Southwest Regional Partnership on Carbon Sequestration



Aneth Project Overview

DE- FC26-05NT42591

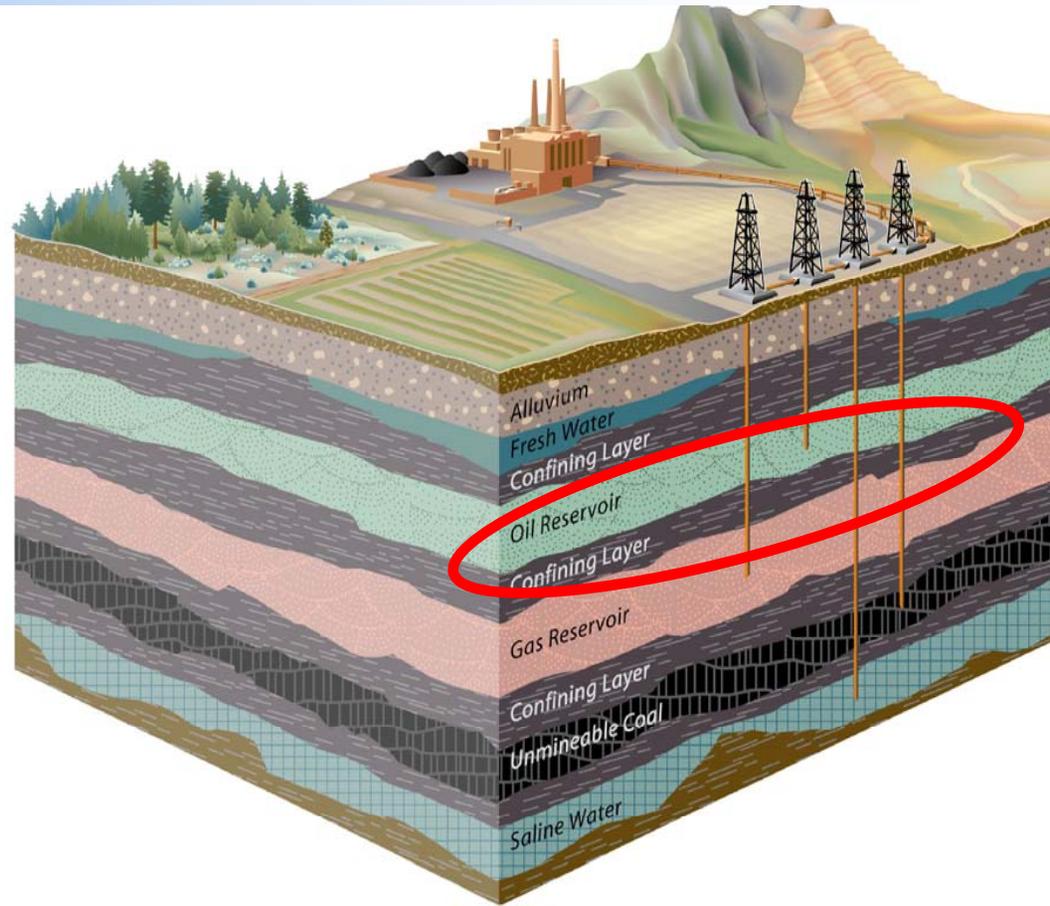
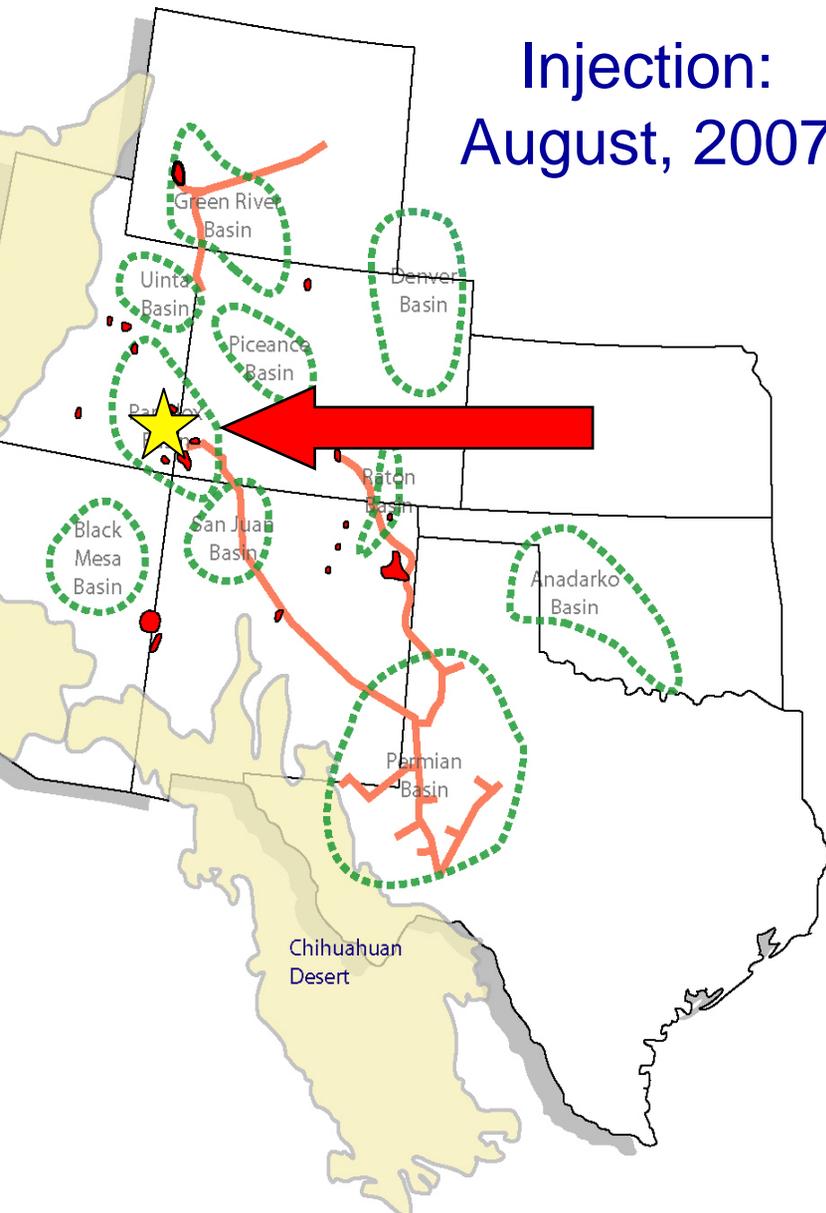
December 12, 2007

Pittsburgh, Pennsylvania



Southwest Phase II – Aneth Project

Injection:
August, 2007

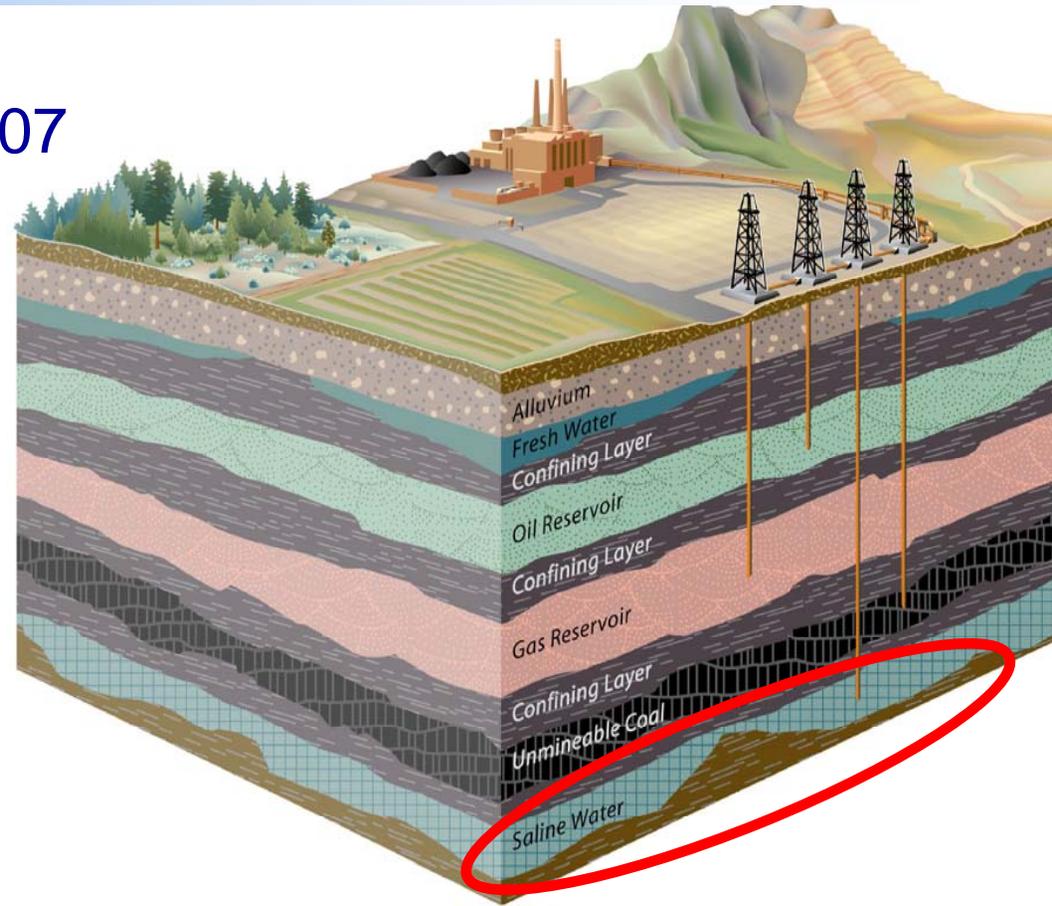
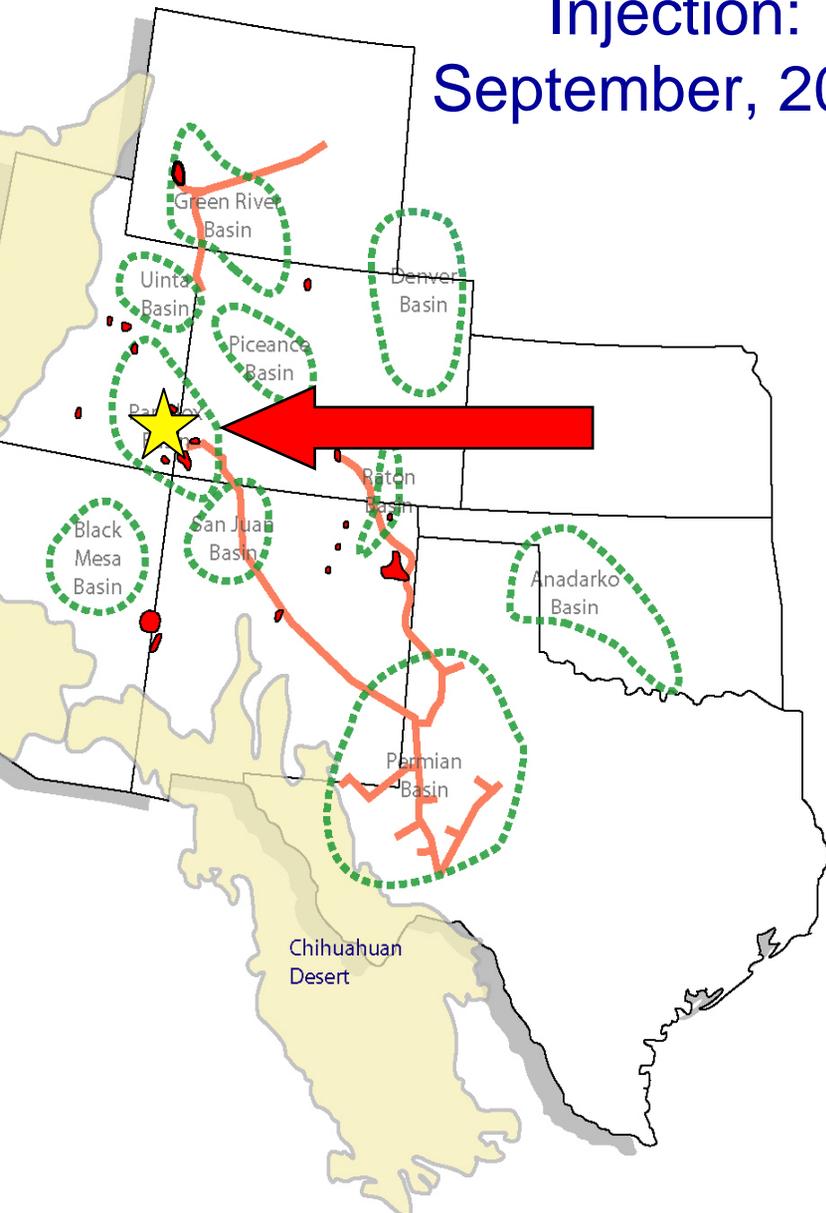


Paradox Basin, Utah: 150,000 tons/year

- **Combined enhanced oil recovery with sequestration and**
- **Deep brine reservoir sequestration testing**

Southwest Phase II – Aneth Project

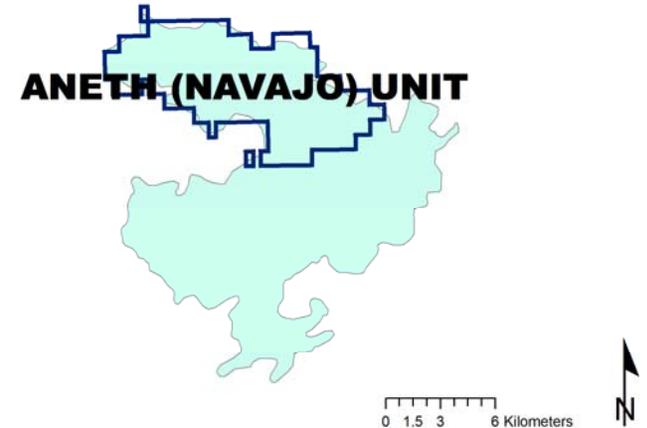
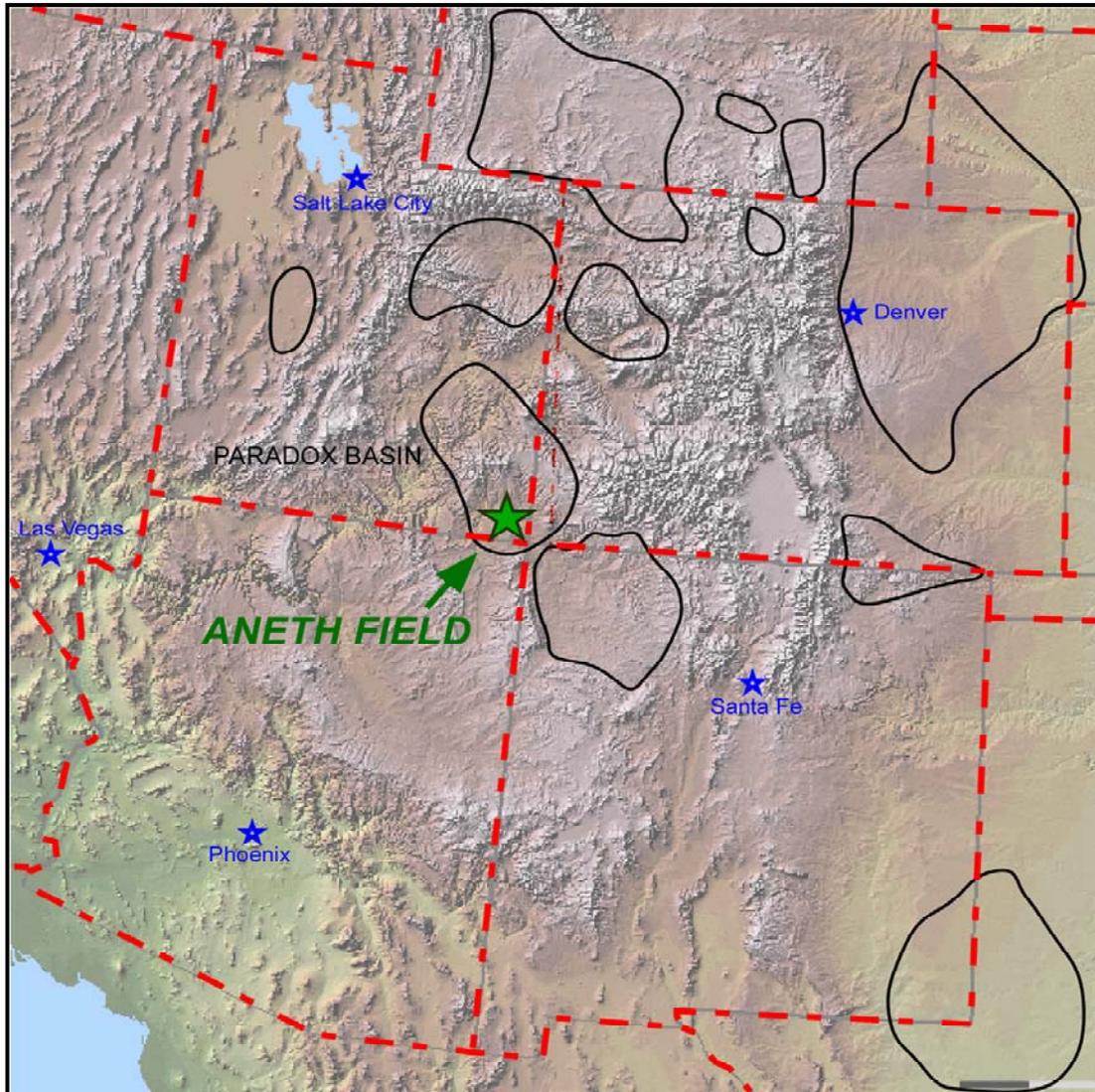
Injection:
September, 2007



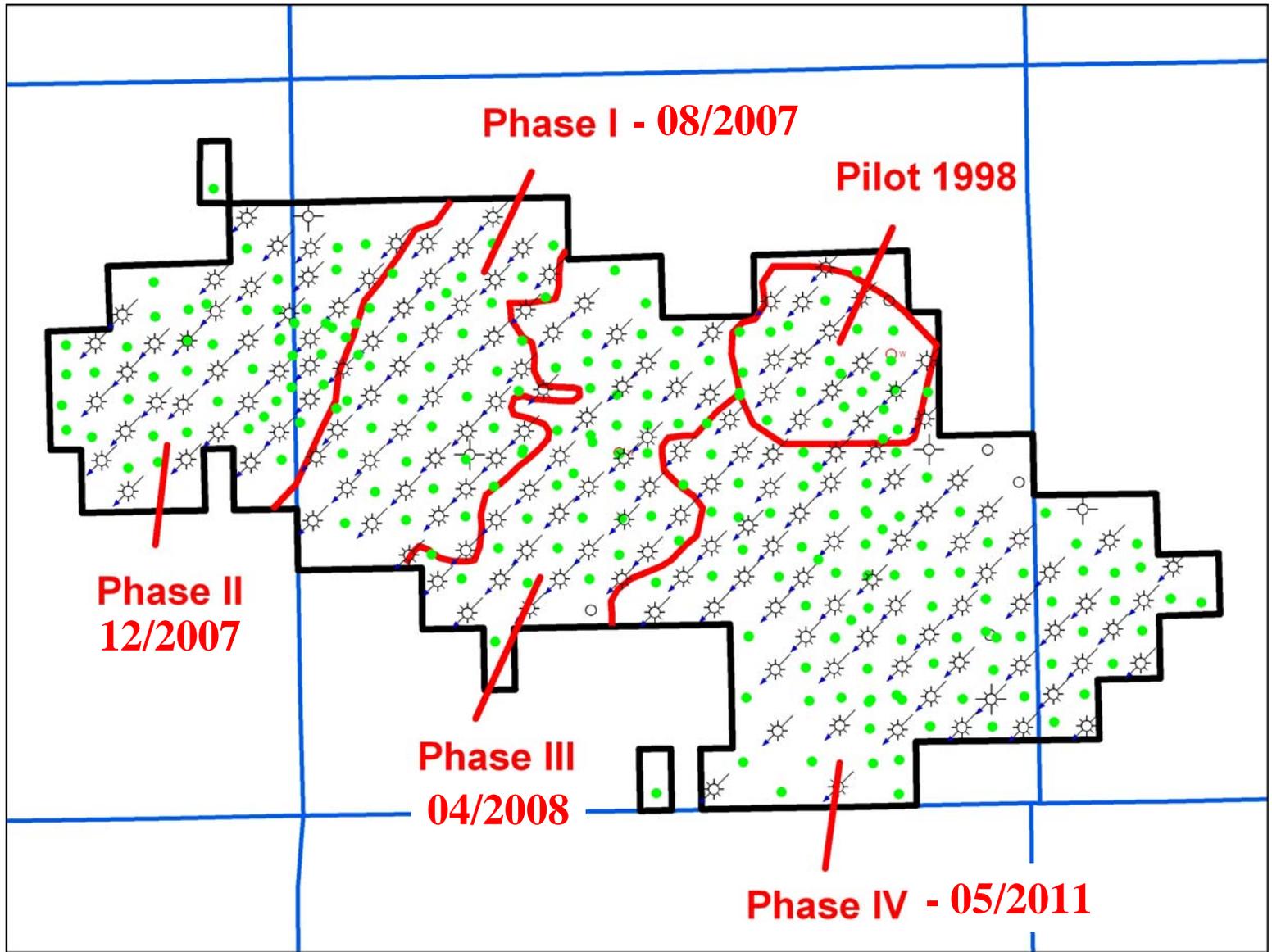
Paradox Basin, Utah: 150,000 tons/year

- Combined enhanced oil recovery with sequestration and
- **Deep brine reservoir sequestration testing**

Location Map



- Discovered in 1956
- Stratigraphic trap
- Fully delineated on 80-acres by 1961
- Peak rate ~100,000 BOPD in 1959
- Unitization in 1961
- Waterflood initiated in 1961
- Infilled to 40-acres in 1970s
- CO2 initiated in 1985
- Horizontal drilling initiated in 1994
- Current gross production rates
 - Aneth - 3,500 BOPD
 - McElmo Creek - 3,400 BOPD
 - Ratherford - 2,600 BOPD



Well type

- Oil Well
- Water injection well

— Phase Boundaries

- Aneth Unit
- Township



Resolute's Schedule for Phase II Injection

8 wells to be on-line by Dec 28,
2007

Remaining wells to start injection
by Feb 29, 2008



RESOL

LITE

Geophone cable deployment







RJ



CONSULTING
Cortez, CO

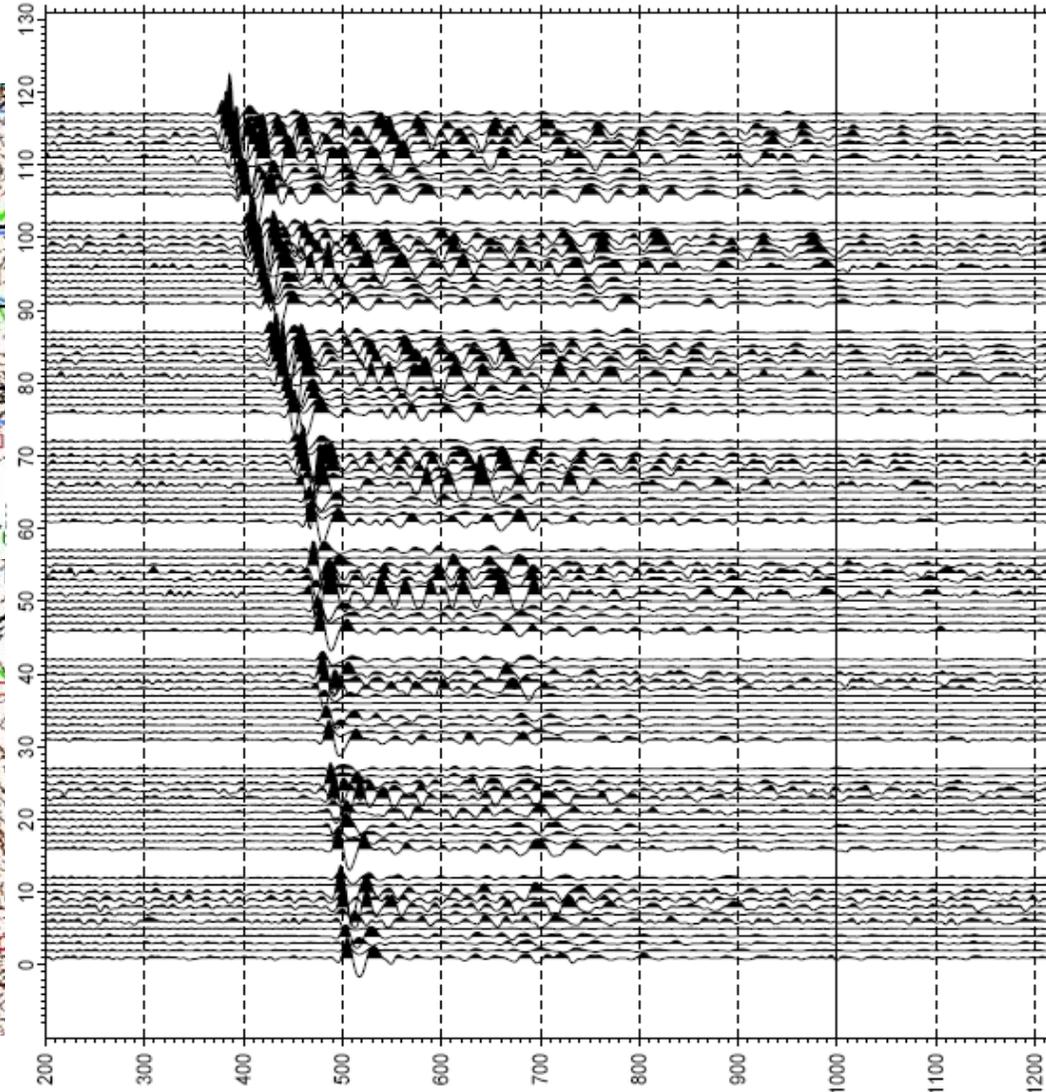
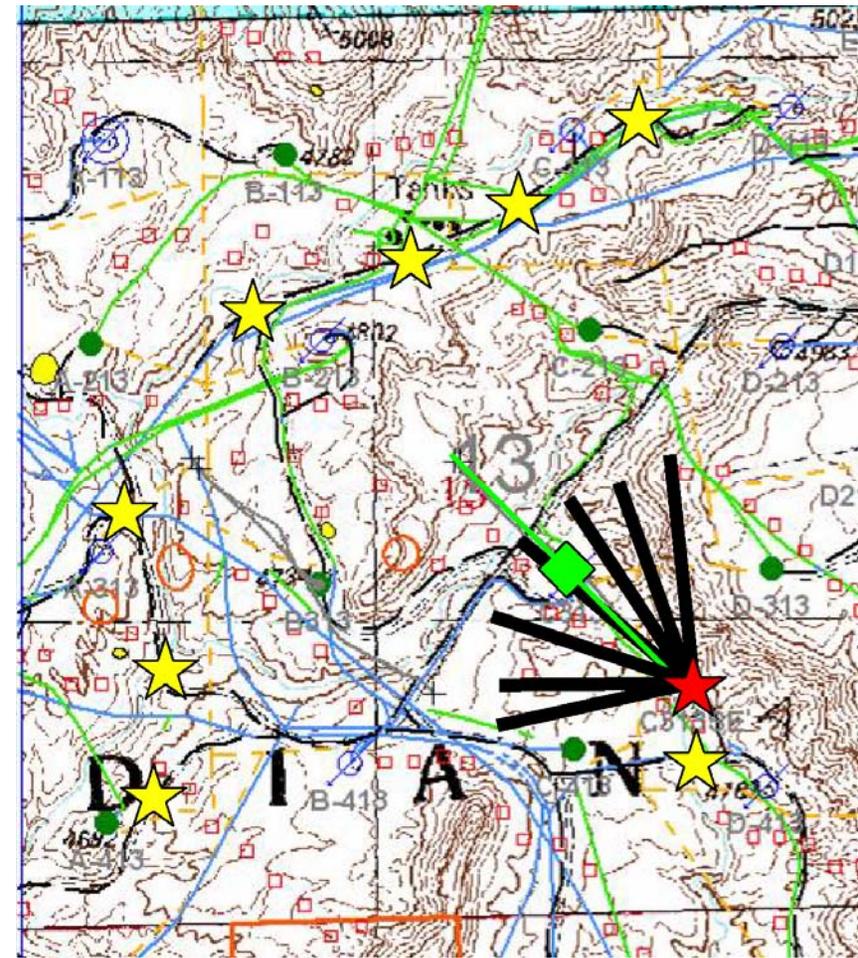




E-21626

EO 108
E-21626
VALVE

Baseline VSP Acquired October 21, 2007



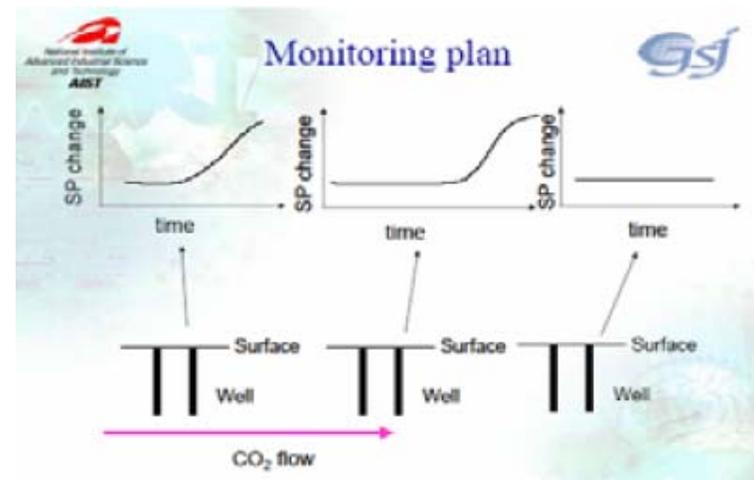
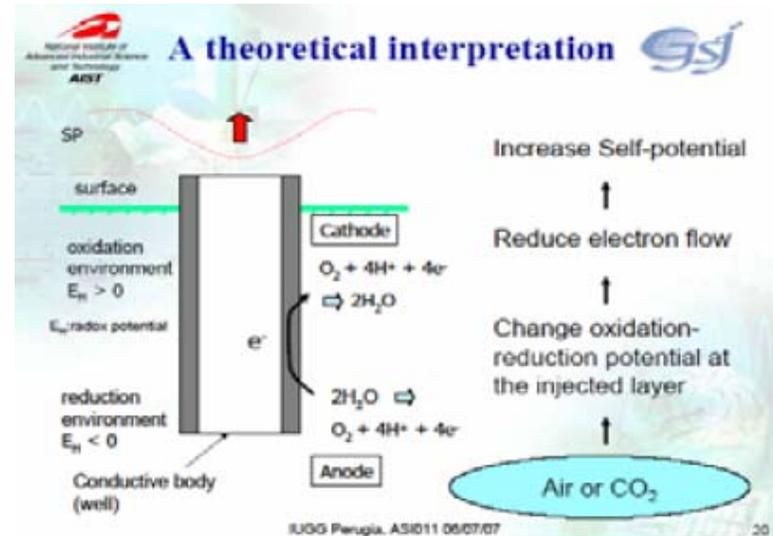
Time (ms)



Microseismic Acquisition System was installed Nov 5, 2007

60 channels over a 1350 ft length of the geophone array are being monitored.

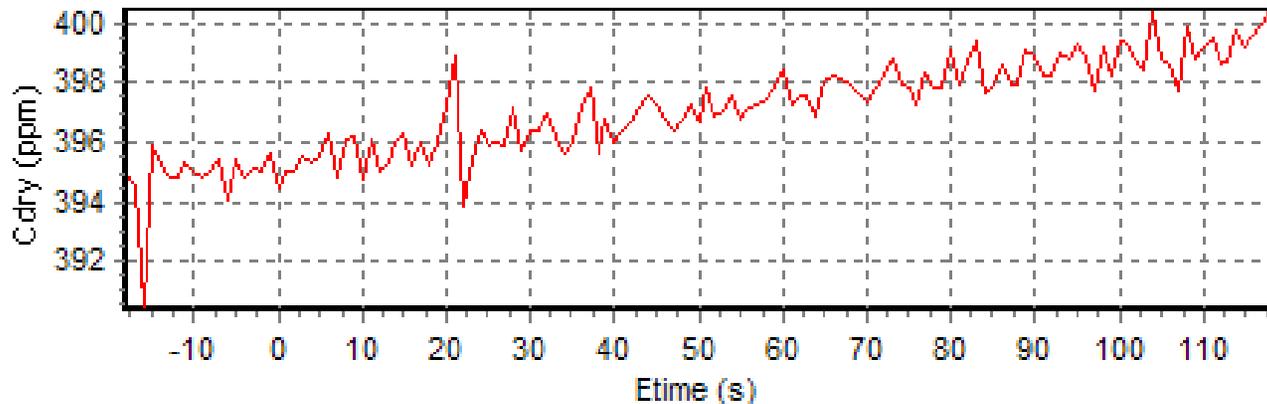
Self-Potential monitoring deployed mid-November by Institute of Advanced Industrial Science and Technology, Japan



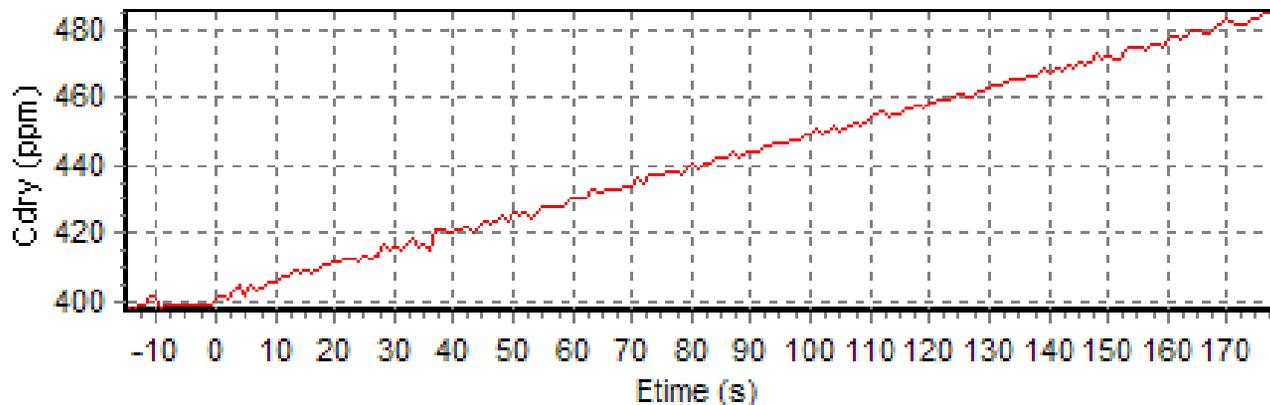
Baseline CO₂ Flux Measurements

Two Measurements from Station 4:

- Extremely dry soil – July 21, 2006
- Small change in CO₂ concentration with time



- Wet soil conditions – August 2, 2007
- 10x larger change in CO₂ concentration with time



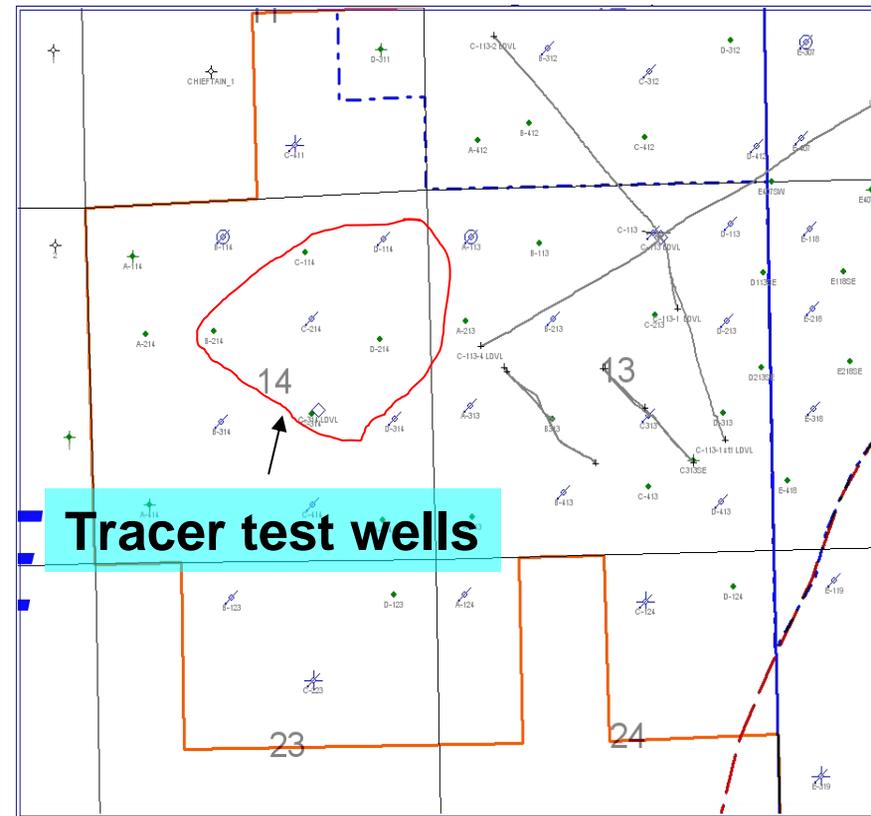
Interwell Tracer Test – University of Utah – EGI

Tracer 1 - 100 kg of 1,3,5-naphthalene trisulfonate

Tracer 2 - 100 kg of 2,6-naphthalene disulfonate

Injected July 19 - Sampling through end of November

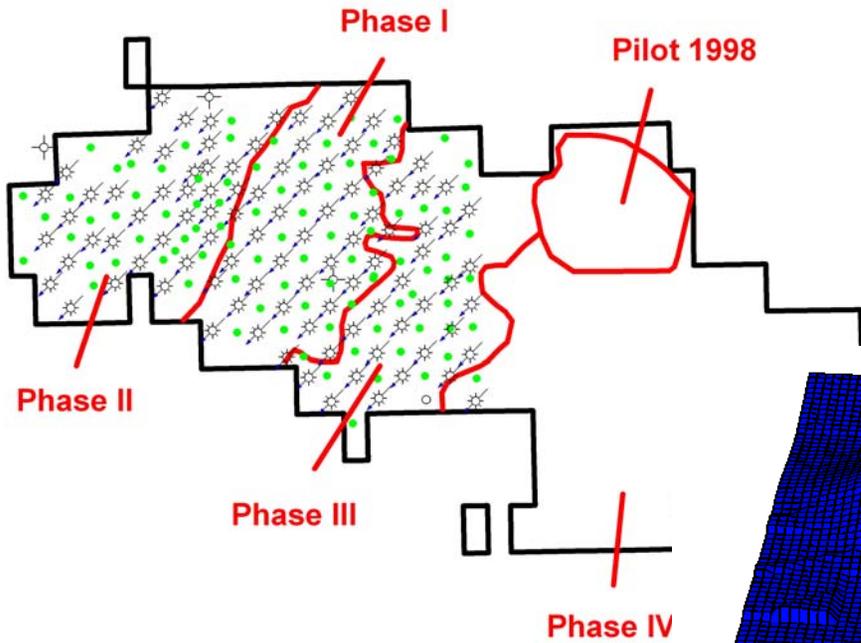
- First-moment analysis of the return-curve data
- Calculate the mean residence time and the volume of water flowing at any time between the injection and production wells
- Provide guidance on frequency of MMV



Produced water sampling

- 1) look for timing and amount of CO₂ breakthrough away from an injection well
- 2) explore the activities and diffusivities of the relevant aqueous sequestration species under representative reservoir conditions in the laboratory (ASU)
- 3) use the water chemistry in reactive transport modeling to understand the fate of CO₂ with respect to water-rock-oil interactions.

Wells used for building the reservoir grid



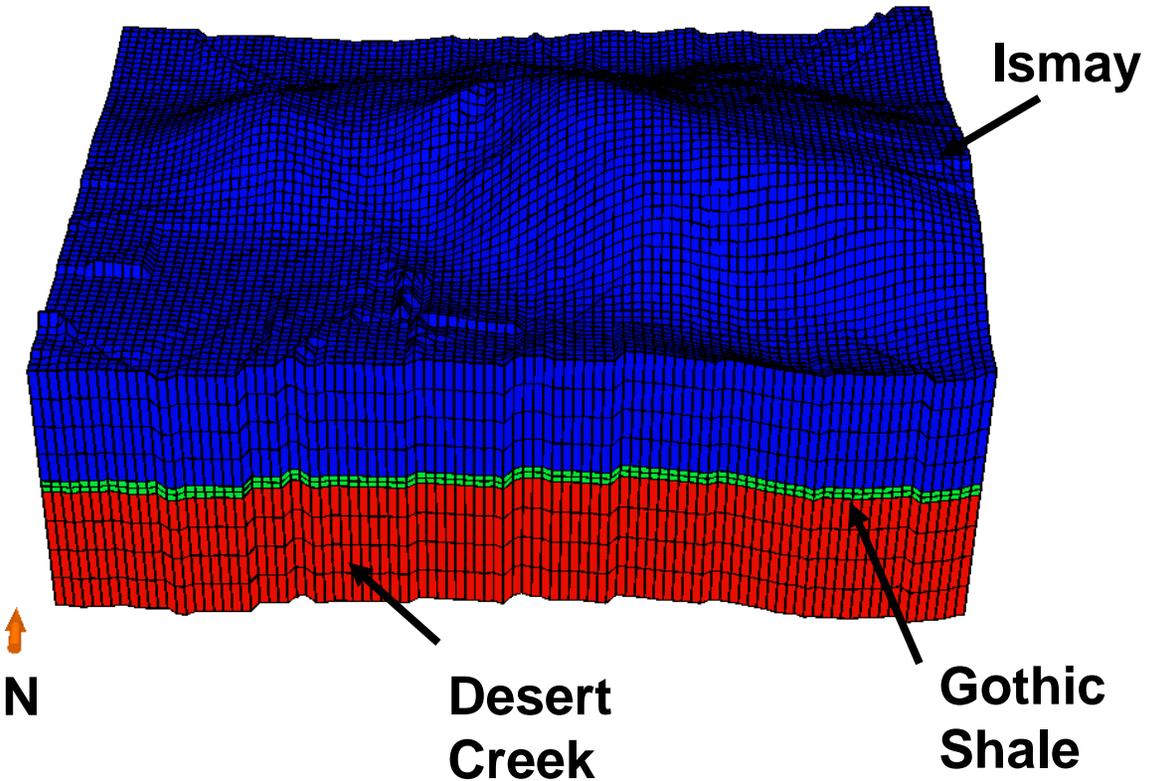
Grid built by Jason Heath - NMT

- Sandia is digitizing porosity logs
- Resolute provided pressure-transient derived permeability data

● Oil Well ⊕ Dry Hole — Phase Boundaries
* Water Inj ○ Unknown □ Aneth Unit

0 0.5

Formation tops provided by Utah Geological Survey and Resolute



Testing CO₂ Injection into a Saline Aquifer

- **Test initially proposed C-113SWD – Leadville Formation – Too Late**
 - Resolute needs the water disposal capacity
 - Originally planned vertical SWD to Leadville – Pressure falloff test difficult to conduct and interpret in long laterals
- **Alternate test proposed in Permian DeChelly Formation – Too Small**
 - Proposed using a well previously evaluated for injectivity as a salt water disposal well. The earlier test results would be used as a benchmark for calibrating and evaluating a CO₂ injectivity.
 - Proposed injecting CO₂ for seven days followed by a 3-day pressure fall-off test.
 - Based on the water injectivity results, the CO₂ injection rate was estimated to be about 20 tons of CO₂ per day. So, over the 7-day period, only about 140 tons of CO₂ would be injected.

Acknowledgements

- Many thanks to the U.S. Department of Energy and NETL for supporting this project
- We express our gratitude also to our many institutional and industry partners, who have contributed to this project:

- New Mexico Tech
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- Utah Geological Survey
- US EPA
- Colorado Geological Survey
- Baker Atlas
- Schlumberger
- AIST – Japan
- VCable, LLC
- DAQ Systems
- University of Utah – EGI
- Cambridge Geosciences
- Sandia National Labs
- Los Alamos National Laboratory