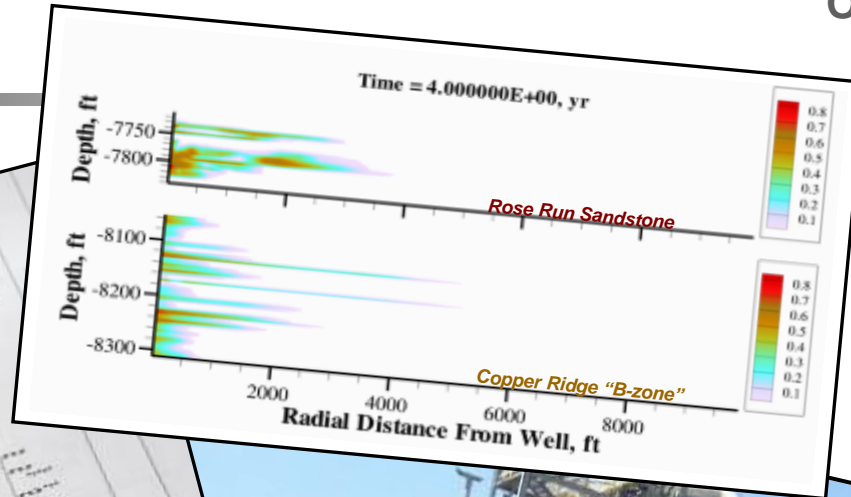
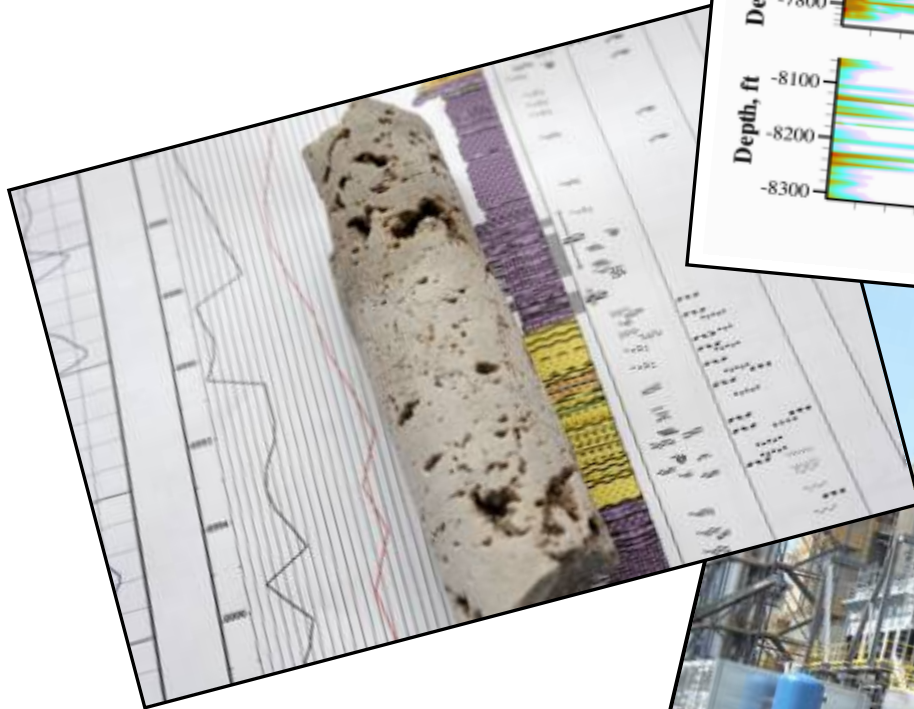


AEP CCS Program Overview

Gary O. Spitznogle

Director – New Tech Development & Policy Support

October 13, 2010



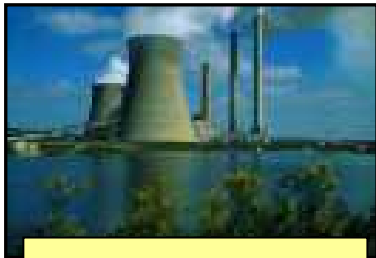
Characterization...

Simulation...

Validation...



Company Overview



Coal/Lignite
66%



Nat. Gas/Oil
22%



Nuclear
6%



**Pumped Storage/
Hydro/Wind**
6%

AEP's Generation Fleet
>38,000 MW Capacity



5.2 million customers in 11 states
Industry-leading size and scale of assets:

<u>Asset</u>	<u>Size</u>	<u>Industry Rank</u>
Domestic Generation	~ 38,300 MW	# 2
Transmission	~ 39,000 miles	# 1
Distribution	~ 213,000 miles	# 1

Site Characterization and Feasibility Study

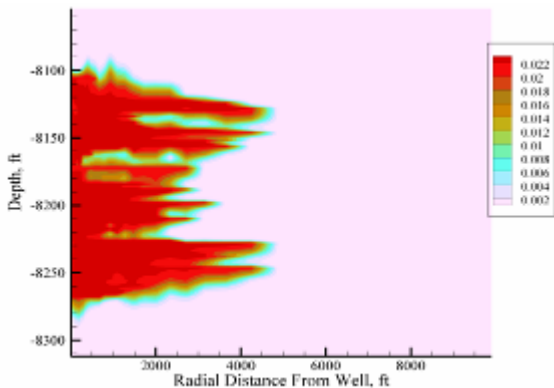
The foundational work for AEP's CCS program began in 2003



**Seismic Survey
Summer 2003**

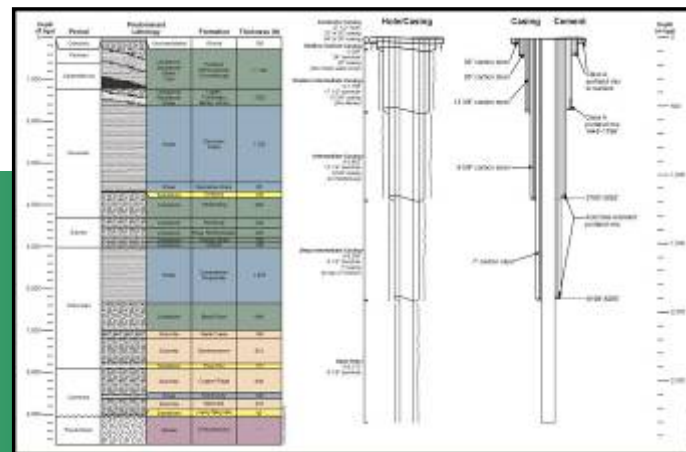


**Drilling and Testing
2003 - 2005**



**Modeling and Analysis
2006 - 2007**

More than \$7.5 million for site characterization and feasibility assessment conducted by Battelle under funding by DOE and others





Rose Run Sandstone Core Analysis

Rose Run Sandstone - 116 ft total thickness, ~30 ft porous sandstone.



Full Rock Core 7762-7772



Full Rock Core 7772-7782

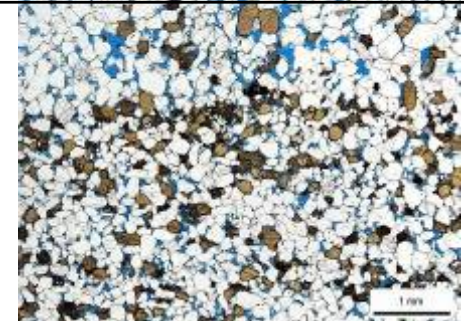
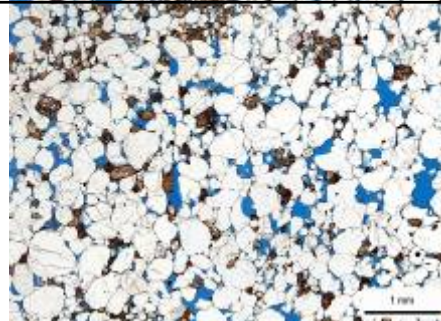
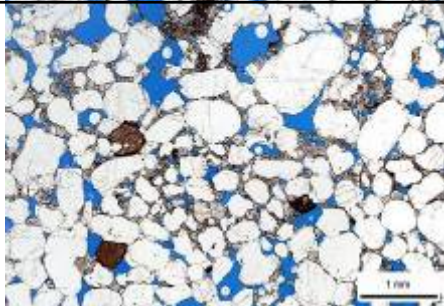


Full Rock Core 7818-7828

Hydraulic Core Tests 7763.5 ft
Lithology = Sandstone
Density = 2.68 g/mL
Porosity = 9.1%
Permeability ~ 36 mD

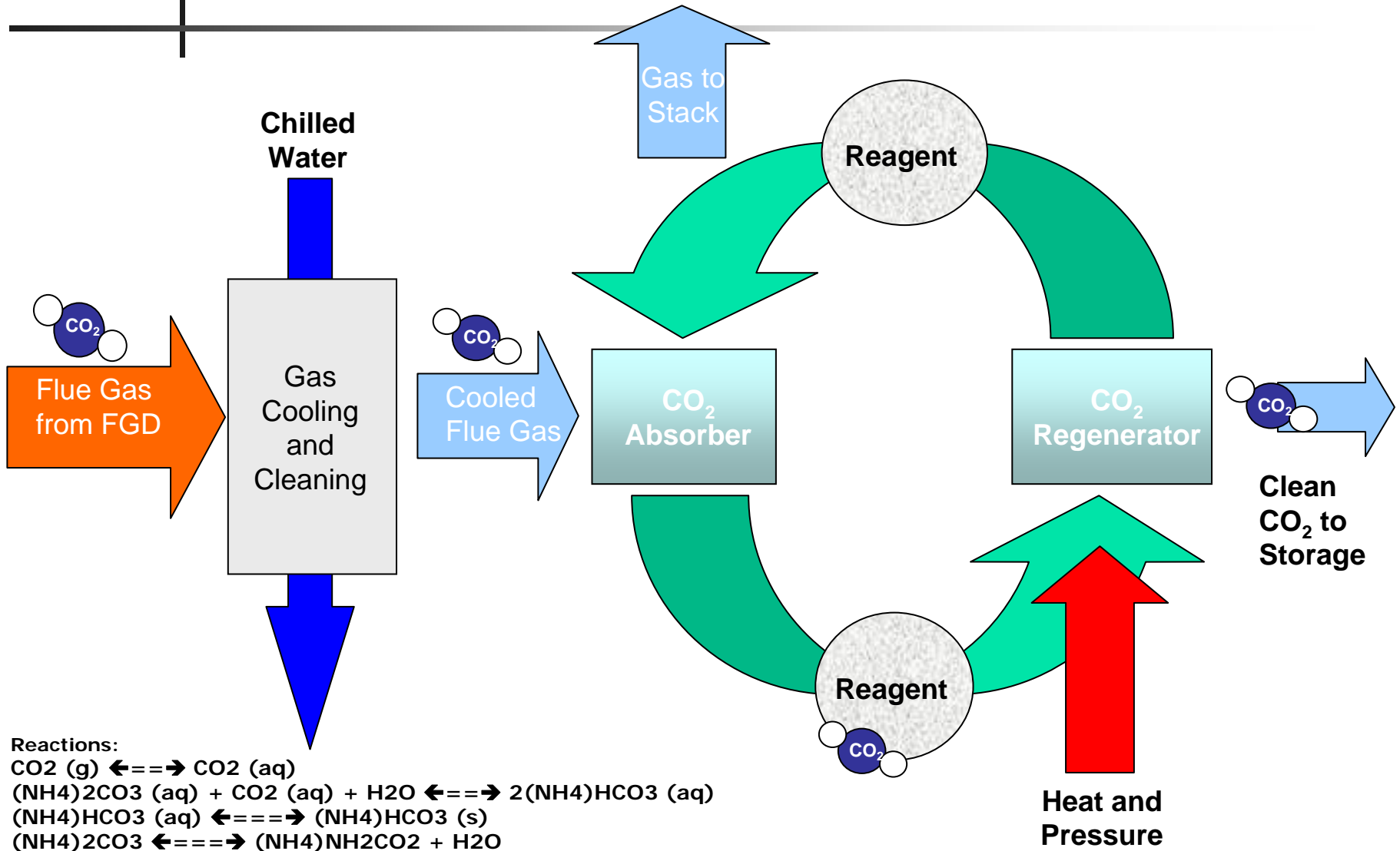
Hydraulic Core Tests 7775 ft
Lithology = Sandstone
Density = 2.64 g/mL
Porosity = 10.4%
Permeability ~ 49 mD

Hydraulic Core Tests 7819 ft
Lithology = Sandstone
Density = 2.63 g/mL
Porosity = 11.5%
Permeability ~ 36 mD

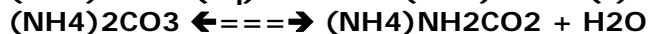
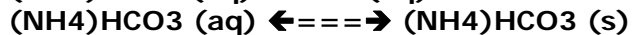
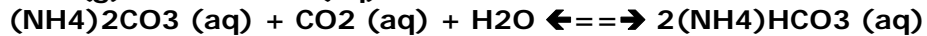
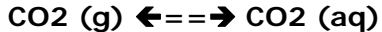




Alstom's Chilled Ammonia Process *Post-Combustion Capture*



Reactions:





AEP CCS Validation Facility

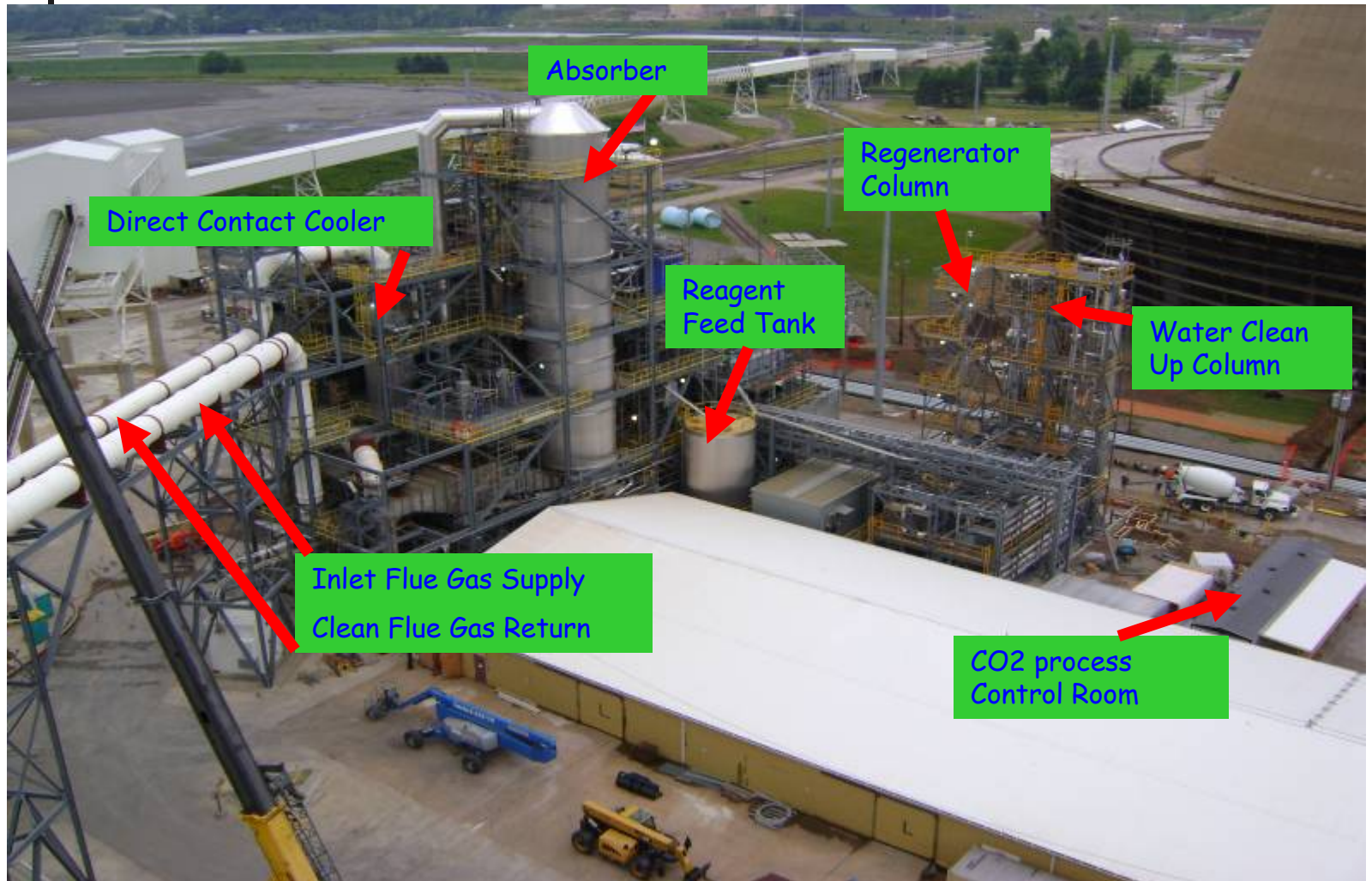
1,300 MWe Mountaineer Plant, New Haven, WV



- **Scale: 20 MWe slipstream**
 - ~1.5% of power plant flue gas
- **Cost: >\$100M**
 - Project initiated in September 2007
 - Funding by AEP, Alstom, RWE, & EPRI
- **Capture: Alstom Chilled Ammonia Process**
 - Ammonium Carbonate/Bicarbonate Reaction
 - >85% CO₂ capture rate
- **Sequestration: Deep saline formation storage**
 - ~100,000 tons CO₂ per year
 - ~1.5 miles below the plant surface
- **First CO₂ Capture: September 1, 2009**
- **First CO₂ Storage: October 1, 2009**
- **Planned operation: 1 to 5 years**



Alstom's Chilled Ammonia - CO₂ Capture Process (20 MWe Equivalent or Approximately 1.5% of Unit Flue Gas)





CO₂ Sequestration at Mountaineer Plant Site



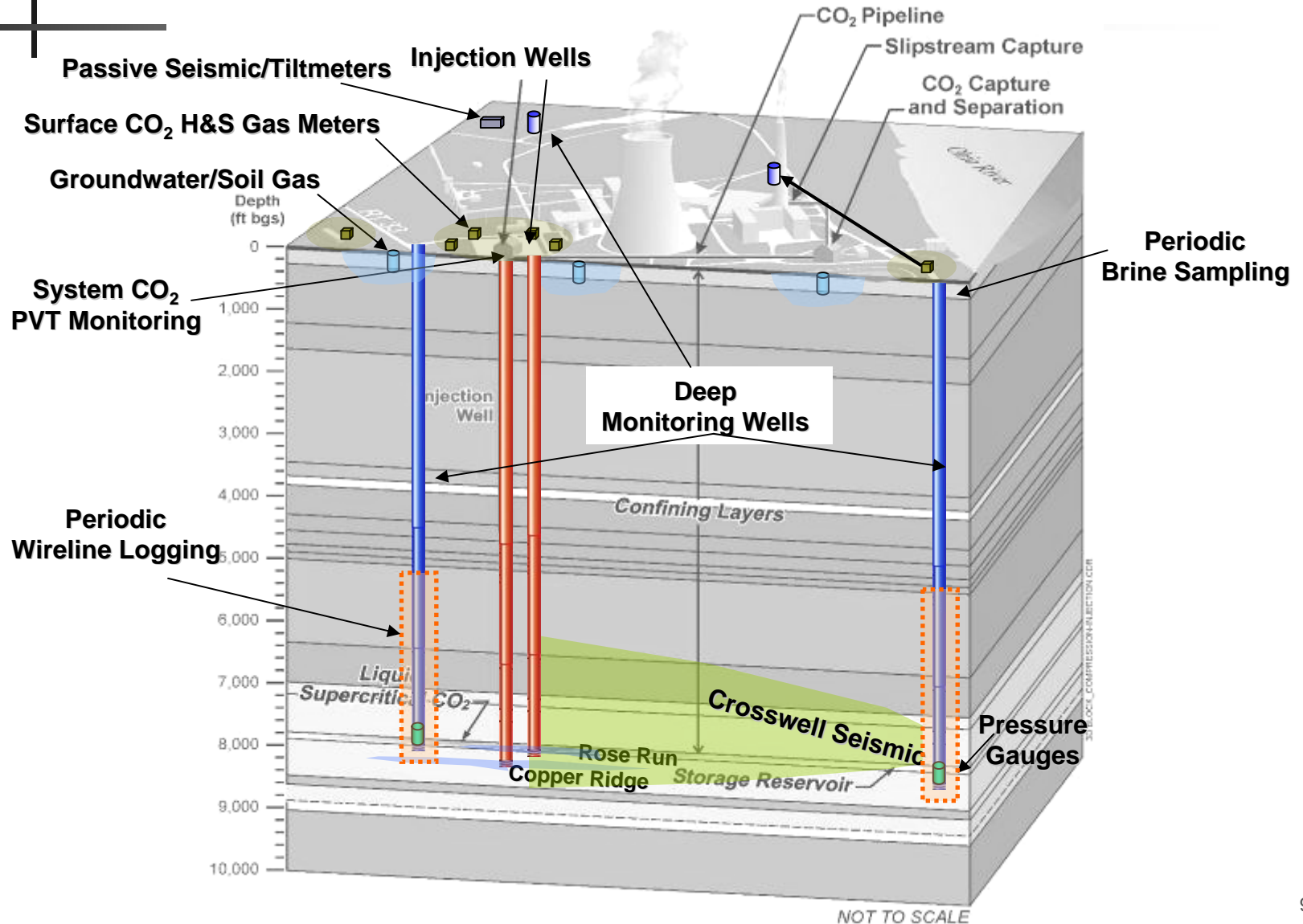
WMMS (Well Monitoring & Maintenance System) Building

Well Field AEP-1, AEP-2, & MW-3

CO₂ Booster Pump House and Flow Metering



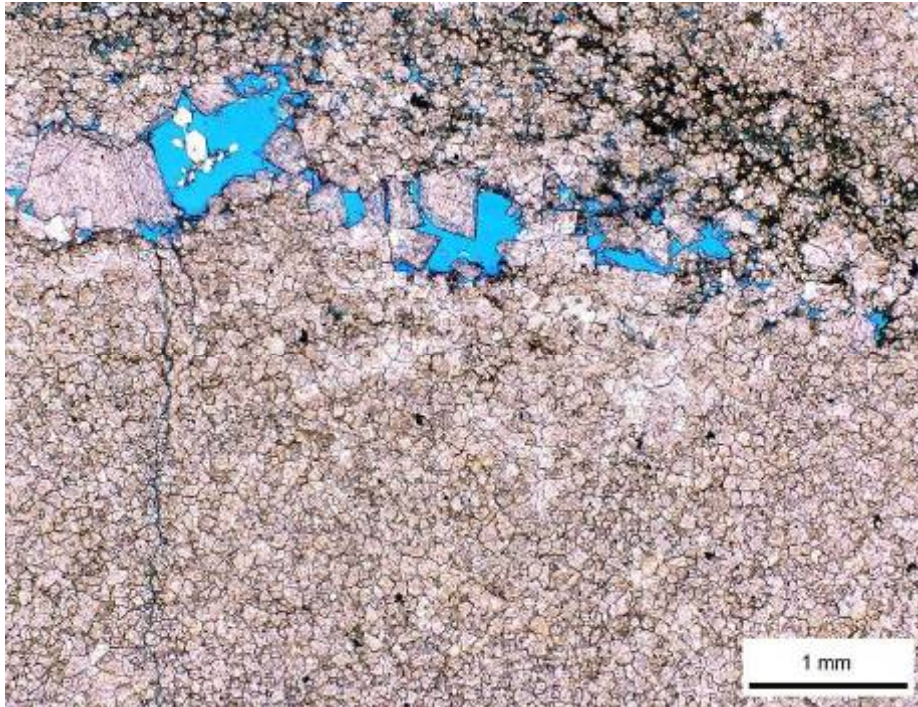
Monitoring System Design At Mountaineer Plant



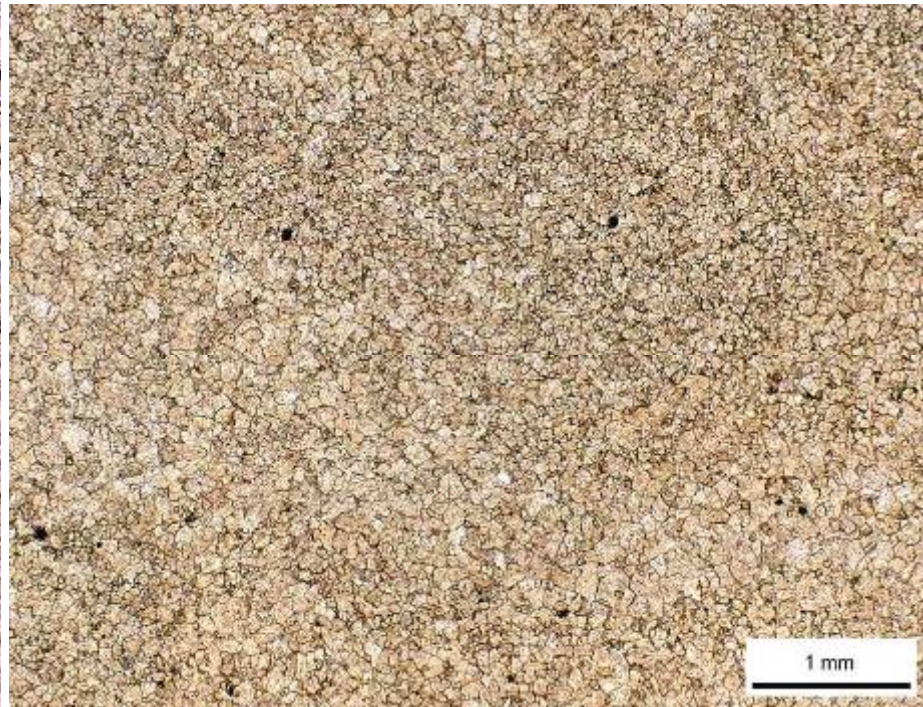


Copper Ridge Thin Sections

Vugular Porosity vs. Crystalline Dolomite



Sidewall core from depth of 8,177 feet just below a proposed perforation interval



Sidewall core from depth of 8,178 feet in non-perforated interval



Validation Facility Progress Update

As of July 31, 2010

- **~18,400 metric tons captured**

- **~13,100 metric tons stored**
 - **~11,800 into AEP-1**
 - Copper Ridge
 - **~1,300 into AEP-2**
 - Rose Run

- **Process availability approaching 100%**
 - **Both capture and storage**

- **>90% CO₂ capture rate**





AEP CCS Commercialization Project

1,300 MWe Mountaineer Plant, New Haven, WV

- **Scale:** Full commercial demonstration
 - 235 MWe Slipstream
- **Cost:** ~\$668M
- **Funding:** CCPI Round III Selection
 - DOE awarded 50% cost share, up to \$334M
 - Cooperative agreement signed in January, 2010
- **Capture:** Alstom Chilled Ammonia Process
 - ~90% CO₂ capture rate
- **Sequestration:** Battelle is Storage Contractor
 - Deep saline reservoirs
 - ~1,500,000 tons CO₂ per year
 - ~1.5 miles below the surface
 - Pipeline system with off-site wellheads
- **NEPA Process Underway**
- **Geologic Experts Advisory Group:** Actively Meeting
 - Battelle, Schlumberger, CONSOL, MIT, Univ. of Texas, Ohio State, WVU, Virginia Tech, LLNL, WV Geo. Survey, OH Geo. Survey, WV DOE, & NETL
- **Planned Operation:** Startup in second half of 2015

