Batielle The Business of Innovation

Carbon Dioxide Storage in Deep Saline Formations – MRCSP and Mountaineer Update

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Battelle's operation of major energy labs provides insights into energy challenges



Battelle Plays a Key Role in Several Carbon Sequestration Initiatives



The Bastaces of Incornetion

Mountaineer Plant, West Virginia, USA – Funded by DOE-AEP-BP-Battelle-OCDO-Schlumberger etc.

- 1300 MW pulverized coal plant with NOx and SOx control
- An area of intense power production and future expansion
- AEP has announced a major scaleup and a multi-pronged CCS deployment at this and other sites.





ohio

Site-Specific Characterization Essential for Safe and Effective Operations



untaineer Site - Seismic Survey Demonstrated bact of Plant Noise and Lack of Faulting



₂ Injectivity in the Mountaineer Area

number of geologic formations have been evaluated for CO₂ storage otential in the Ohio River Valley region through Mountaineer project



lating Geologic Sequestration to support permitting, outreach, , and Facility Design



untaineer CO₂ Storage Assessment Project - A ique Public Private Collaboration

Since 2002, a number of organizations and experts have contributed inancially (>\$7M) and technically in evaluating geologic sequestration easibility at the Mountaineer Plant:

- Battelle Memorial Institute Lead performer and co-sponsor
- DOE/NETL Primary financial support
- AEP Host site and co-sponsor
- Ohio Coal Development Office
- BP
- Schlumberger
- Ohio Geological Survey
- Regional Geologists
- Stanford's GCEP Program
- CO₂ Capture and handling Companies
- Regional Oil and Gas Companies
- CRIEPI (Japan)
- Midwestern Regional Carbon Sequestration Partnership (MRCSP)





Schlumberger

dwestern Regional Carbon equestration Partnership (MRCSP) bp Battelle UCC nrr The Business of Innovation WestVirginiaUniversity. wmme@Greatness.isLearned Michigan Basin Core Keystone D. **Research Laboratory** CONSOL ENERGY VERGY West **PRAXAIR** Virginia Geological MAKING OHIO COAL THE CLEAN CHOICE Survey DTE Energy **FirstEnergy** BAARD Chicago Climate Exchange Duke berger Energy U.S. Department of Energy/NETL O H I O ENVIRONMENTAL Dominion REFP WATCH TANT ACTION, MANT CHANGE OHIO HO NYSER0/ AEP Kentucky, OHIO **Geological Survey** UNIVERSITY OF KENTUCKY

Pacific Northwest

Mational Laborato

Pro-

CORE ENERGY, LLC

AJW

MRCSP's mission is to be the premier resource for estration knowledge in its region



rrestrial Sequestration – ree field projects being pursued





ologic Storage – three sites are being aracterized for injection tests by MRCSP



r Phase II geologic field efforts are underway

Michigan Basin Site



hio Deep Well



Appalachian Basin Site



Cincinnati Arch Site

The second

2 **Storage Modeling Process** ceptualize-characterize-Design-Monitor-Calibratedate

- perience with MRCSP and other projects has monstrated the value of site specific data from test wells.
- Example- MRCSP Michigan Basin State-Charlton 30/31 Field Test Site
- ninary Modeling on Regional Data
- Site Drilling and Testing
- **Site Specific Modeling**



oposed Phase III Geologic Test Sites



na IGCC



- Primary site
 - Injection starts in early FY2010
 - Plans are to inject 1 million tons of CO₂ over a four-year period
 - Target is the Mt. Simon reservoir, the largest deep saline target in our region.
- Optional site
 - Injection starts in FY 2012
 - Possible 2 million tons of injection over four-year injection period
 - Multiple injection zones and

stitutional/Regulatory Aspects

- regulatory framework is emerging for deep well ection through extensive interactions with federal of state authorities under ongoing projects. owever, the agencies need the resources and andate to expedite regulatory framework.
- blic utility commissions and policymakers are coming increasingly aware of the technical and conomic issues related to CCS.
- nrough Regional Partnerships and FutureGen ocess several states have considered long-term bility and ownership issues
- nere is a strong need for faster progress on these sues as we move towards large-scale testing

The second

mmary of Trends – We are Now in a tical Phase for Future Success of CCS

- uring last few years, CCS has attracted growing erest and support from regional industry and plicymakers, this momentum must continue
- nerging Issues:
- A major effort to expedite capture technology development and integrated capture and storage demonstrations
- Regional planning for transport and storage networks
- Developing regulatory, policy, and risk management framework in parallel with large-scale testing
- Building public acceptance as we proceed to deployment



ank you!

Drilling at AEP Mountaineer Plant, West Virginia

