



# Battelle

*The Business of Innovation*

*Managing Climate Change and Securing a  
Future for the Midwest's Industrial Base*



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# Synopsis

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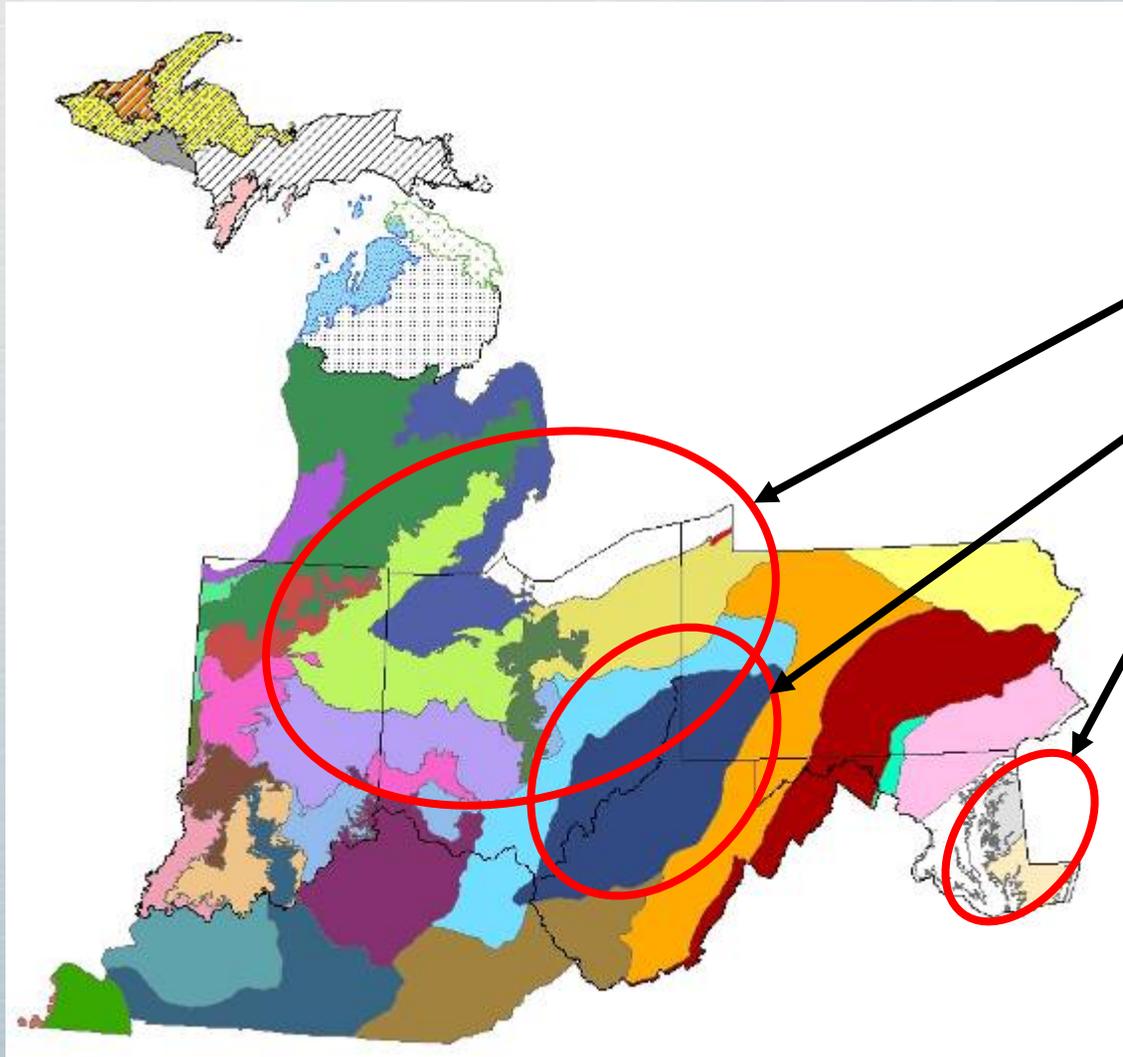
- Phase I Results

- For a complete description of our Phase I results see our detailed final report on our web site at [www.mrcsp.org](http://www.mrcsp.org).

- Phase II

- Three terrestrial field validation projects.
- Three geologic characterization and injection projects.
- Comprehensive outreach program, especially for the geologic demonstration projects
- Extensive interaction with permitting and regulatory bodies
- Integration of all results into our regional GIS framework and economic models.
- Plans to expand the MRCSP membership

# Terrestrial Sequestration - Three projects being pursued



Croplands

Reclaimed Minelands

Wetlands

# Quantifying the effectiveness of no till and reduced tillage practices on croplands

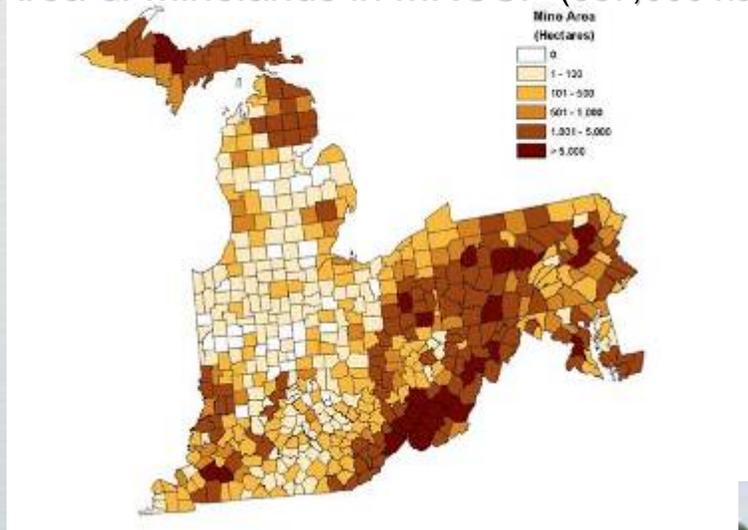
## Protocol

- Thirteen test sites in three states representing all the pertinent MLRAs in the region
- Each test site has three plots 150m square:
  - ✓ Woodlot,
  - ✓ Conventional till,
  - ✓ No till
- Each plot has four sampling locations, 100m apart, with samples taken at five depths
  - ✓ About 780 soil samples total
- Soil analysis includes carbon, nitrogen, bulk density and others.



# Investigating the effectiveness mineland reclamation practices on sequestration

Area of Minelands in MRCSP (587,000 ha)



- Four surface mined sites selected for analysis
- Mine sites reclaimed at different points in time (1990 to 2005)
- Sampling protocol coordinated with that for croplands
- 459 samples collected thus far
- Analyzed for total organic carbon, total organic matter, extractable nitrate and ammonia

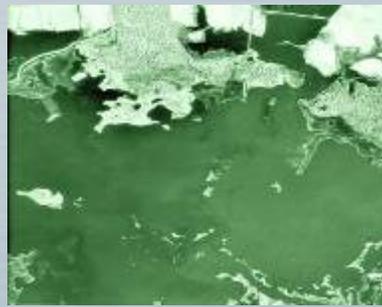


# Evaluating the potential of reclaimed wetlands for sequestration

Blackwater Area (Eastern Maryland)



Crop Planting



1938

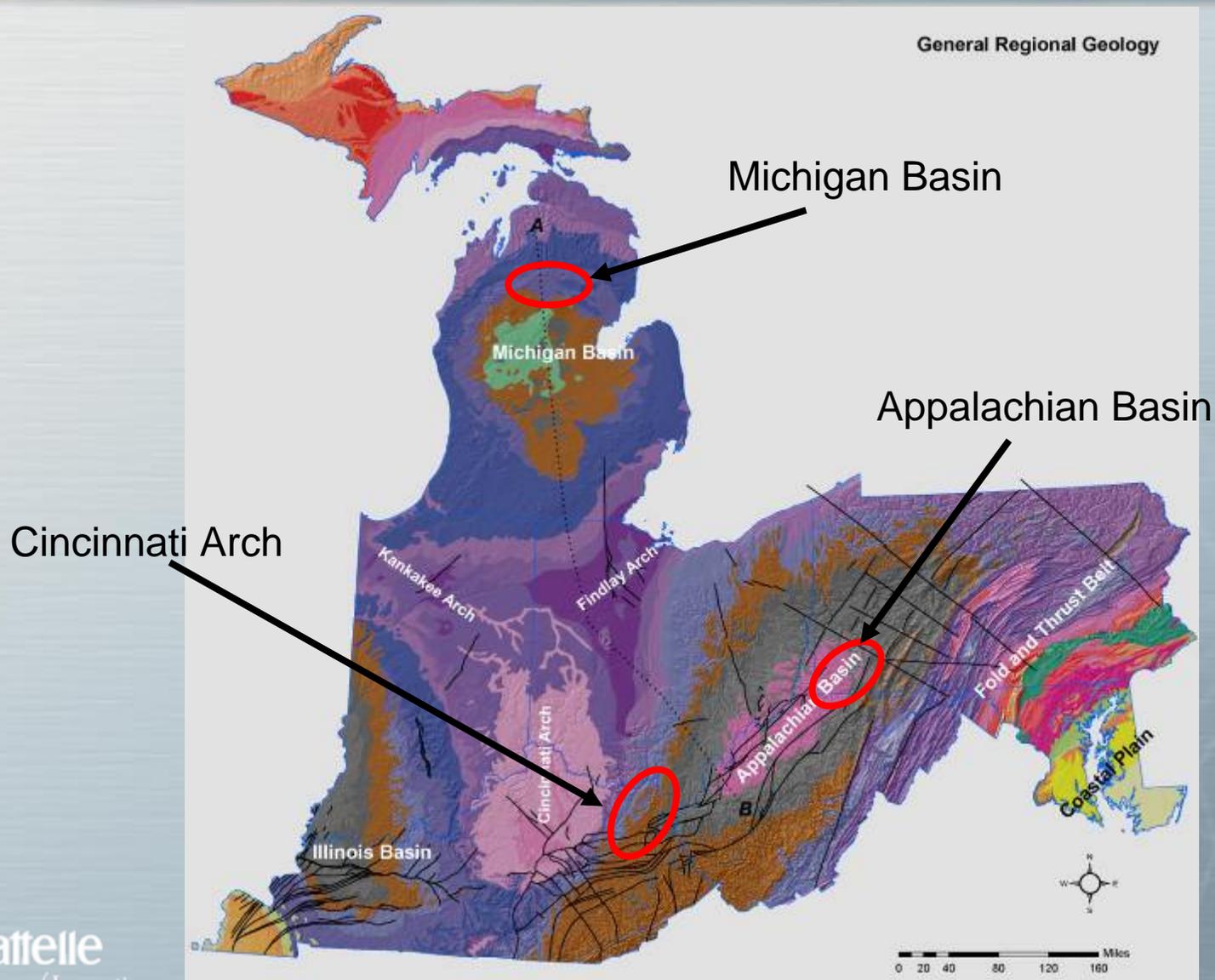
1989

The Disappearing Marsh

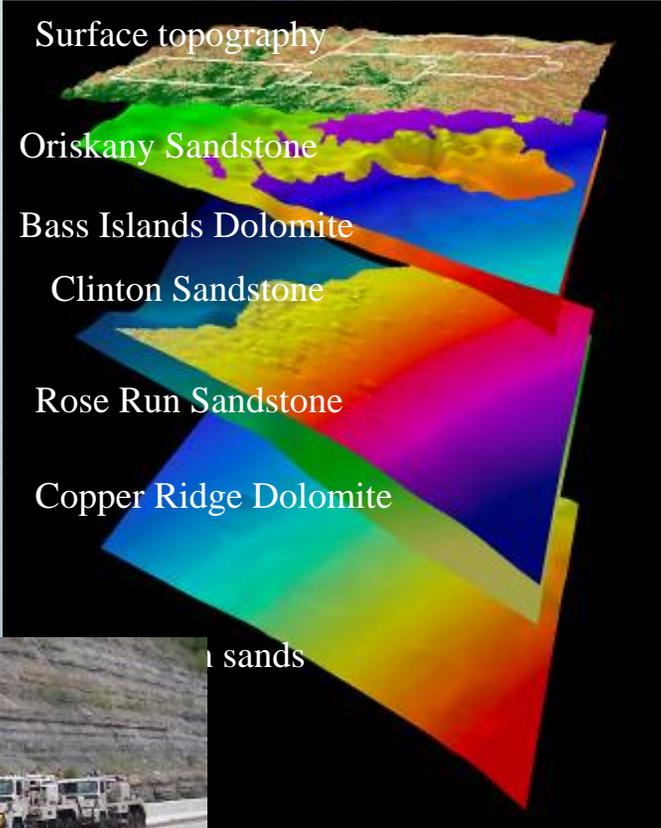


Surface Elevation Measuring Device

# Geologic Storage – three sites are being characterized for possible injection tests

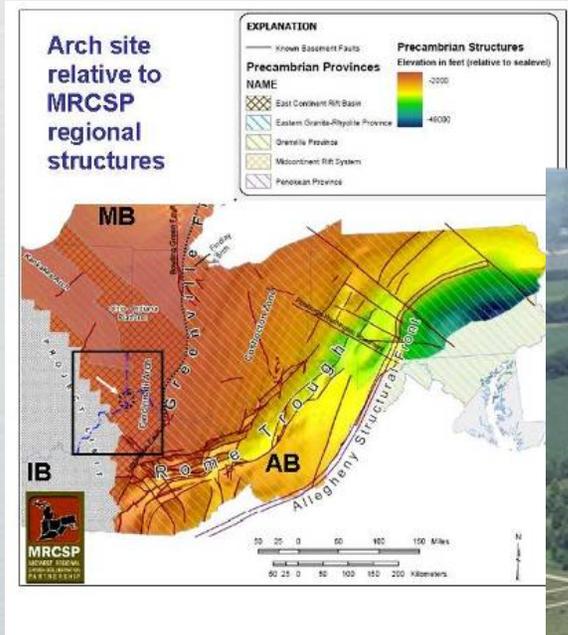


# Appalachian Basin Site – FirstEnergy



Geologic Mapping of  
Appalachian Site

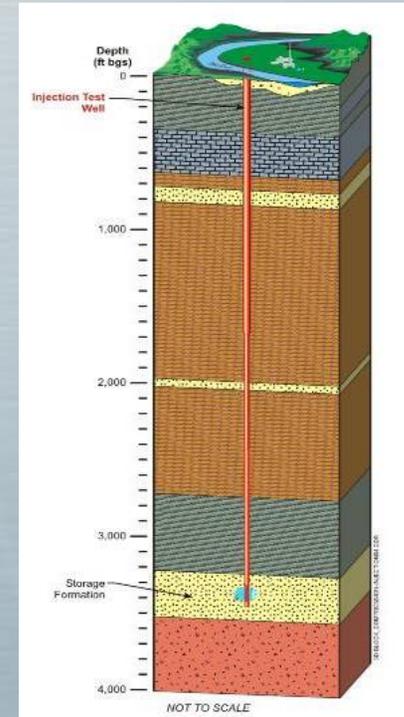
# Cincinnati Arch Site – Duke Energy



**Site Geologic Overview**



**East Bend Station**



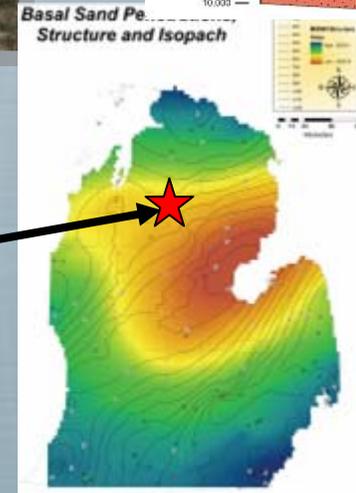
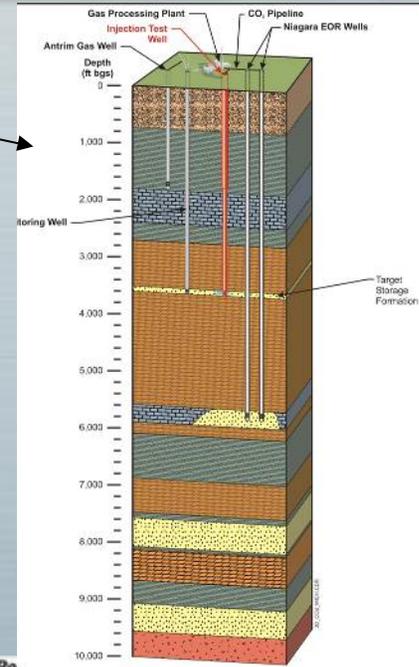
**Well Concept**

# Michigan Basin Site – DTE Energy

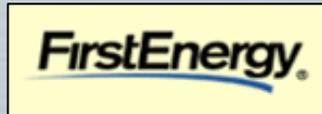
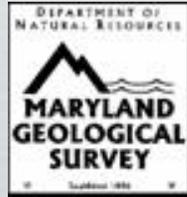


Existing well infrastructure can be used

CO<sub>2</sub> Pipeline (Currently used for EOR)



# Current MRCSP Partners



U.S. Department of Energy/NETL

# We have proposed to DOE to add the state of New York to the MRCSP

