



# AN OVERVIEW OF THE MRCSP PETROLEUM FIELDS 2019 DATABASE





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## ABSTRACT

200 400 600 800 1,000 1,200 1,400 1,600

Phase III B.P. 4

West Virginia Oil fields

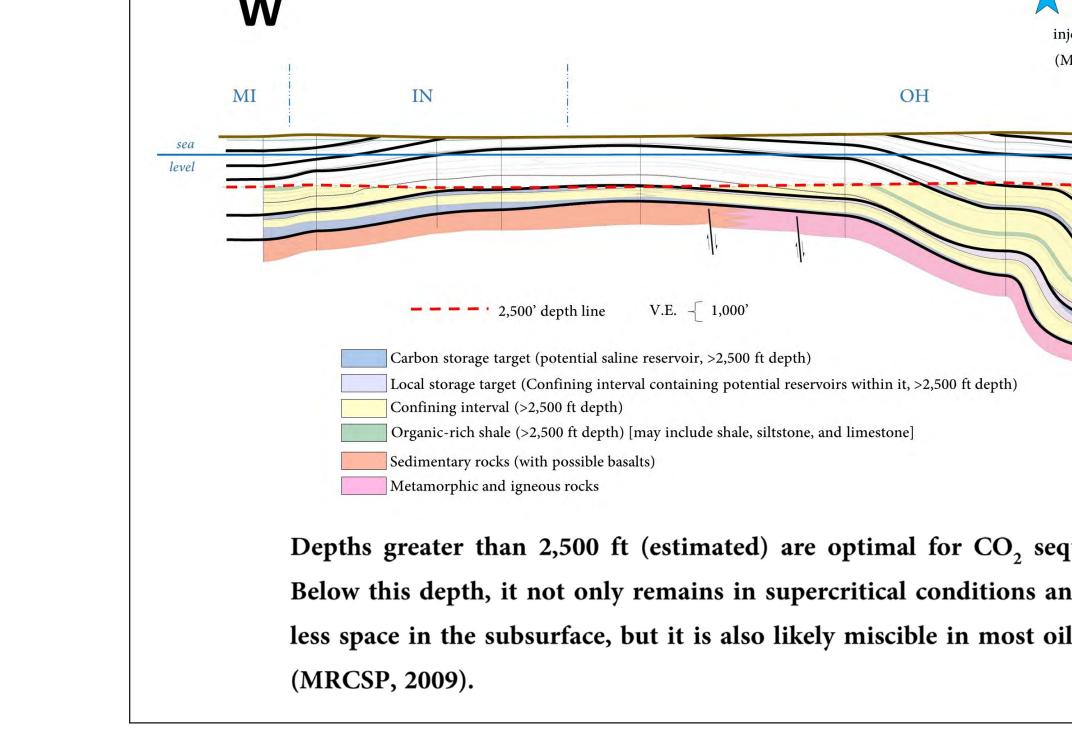
• PRESS (Reported Pressure)

For nearly 20 years, the Midwest Regional Carbon Sequestration Partnership (MRCSP) has collected geologic reservoir data throughout the Appalachian and Michigan basins to analyze and optimize the potential for carbon dioxide (CO<sub>2</sub>) storage. This process includes a new emphasis on enhanced oil recovery (EOR) using CO<sub>2</sub>, and the subsequent addition of attributes such as oil gravity and minimum miscibility pressure. To date, this massive compilation contains more than 4,000 petroleum fields. Multiple resources were used for data accumulation, quality control, and geospatial updates to fields across the region. These resources included the Tertiary Oil Recovery Information System (TORIS), historical oil and gas records, previously published information, and statistical analysis. The resulting work will enable stakeholders from various backgrounds to evaluate opportunities on a regional, and/or field-specific, basis.

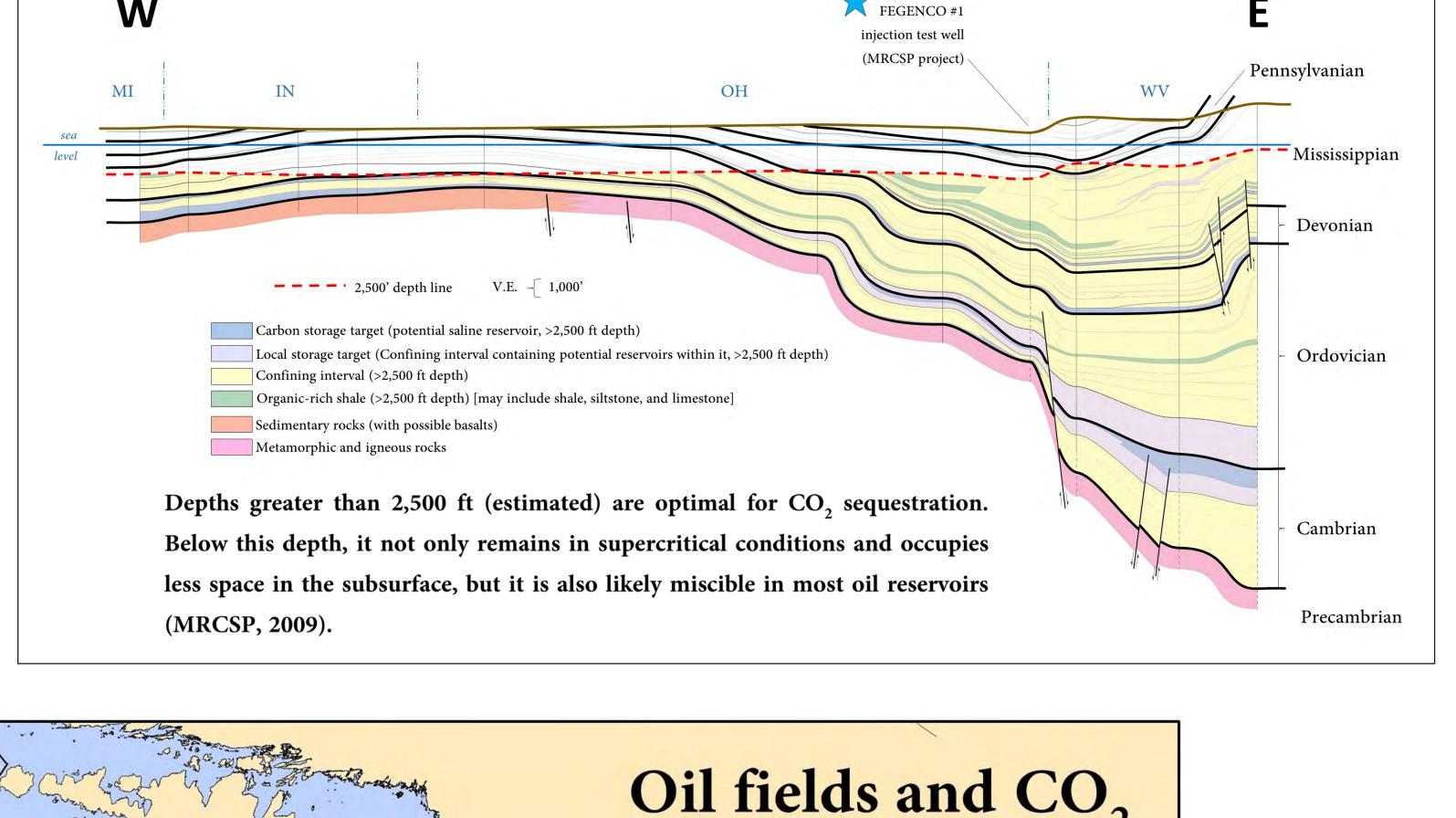
# **MRCSP Region**

Newly updated calculations in the MRCSP region estimate billions of tonnes (draft) of MODE storage capacity.

Annual U.S. electricity generating capacity



Lake Huron



Point Sources in

4 - 2,000,000

104,522,399 (East Canton)

Oil Field 2,000,001 - 10,000,000

**Mode Storage** 10,000,001 - 25,000,000

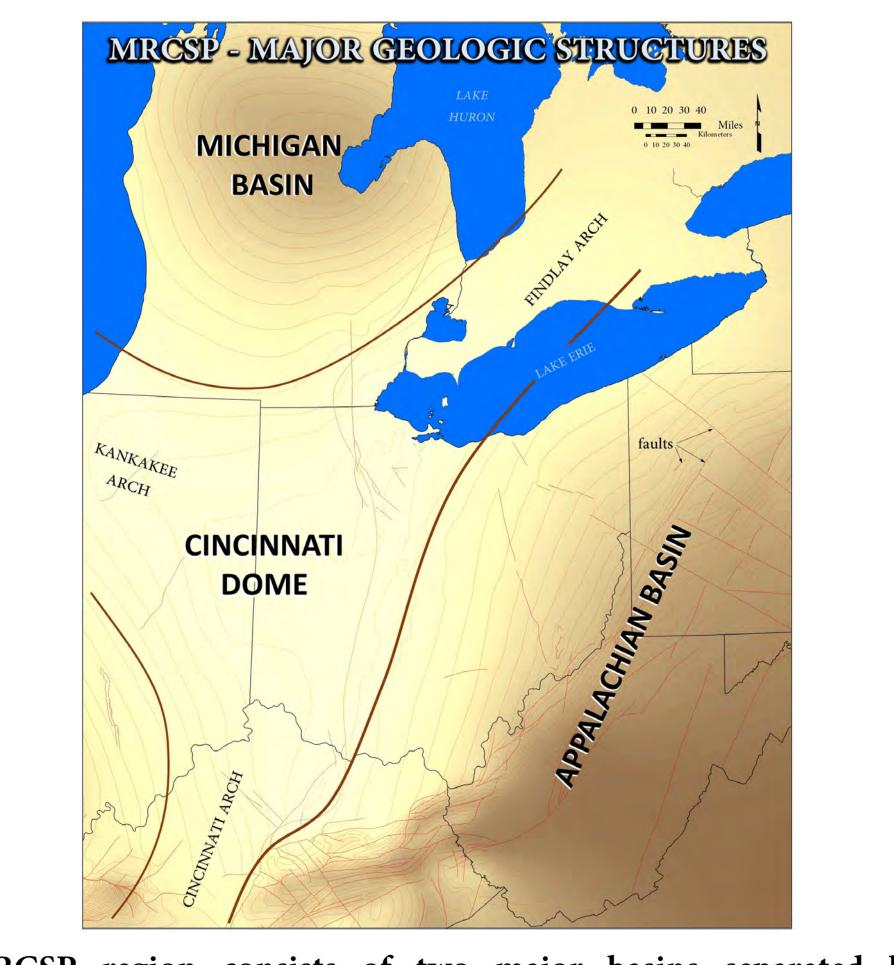
Capacity in tonnes 25,000,001 - 70,000,000

10,000,001 - 16,500,000

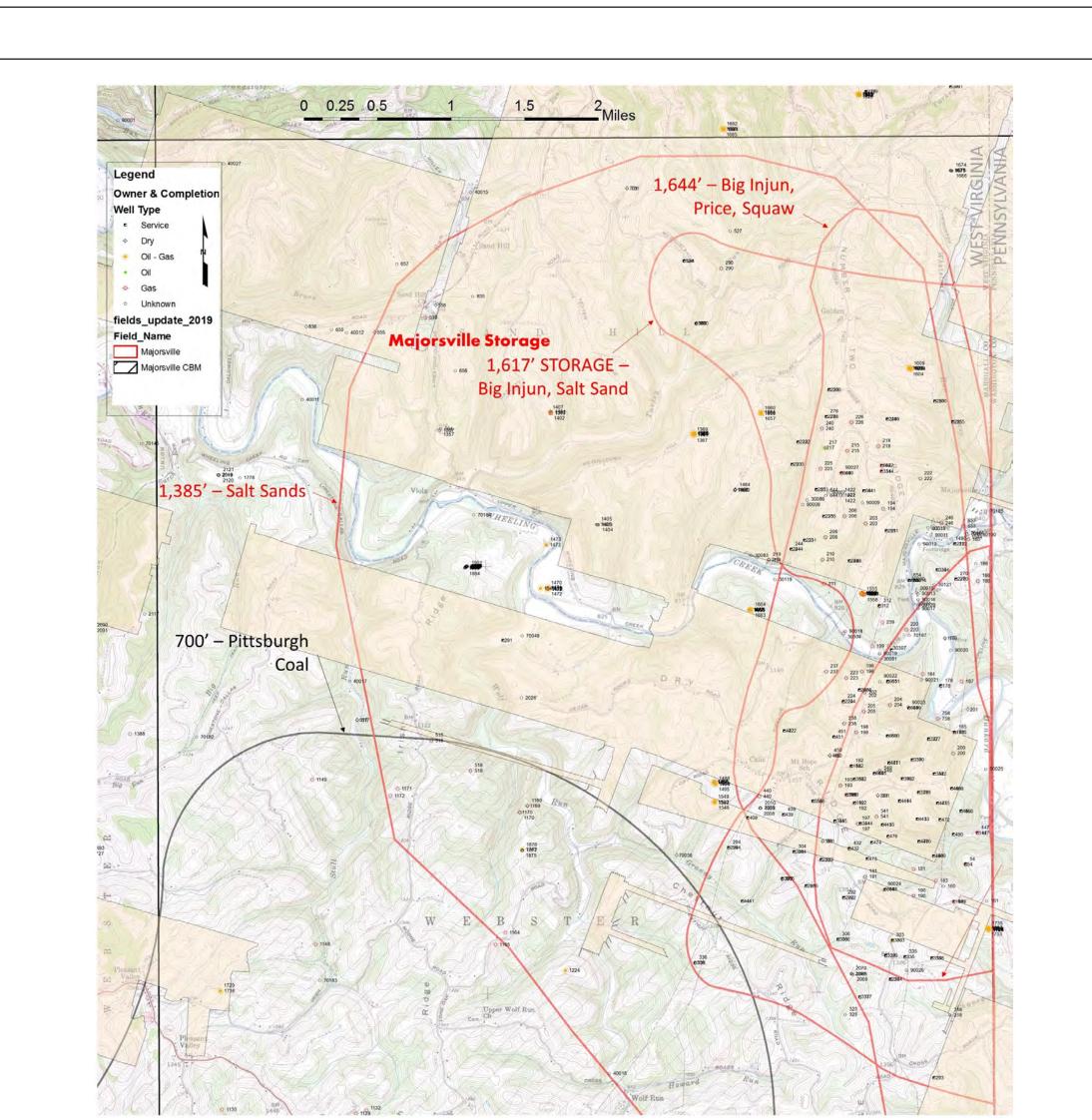
· 25,000 - 500,000

(EPA, 2017) 5,000,001 - 10,000,000

the MRCSP Region

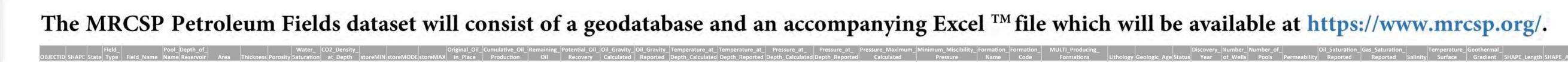


The MRCSP region consists of two major basins separated by the Cincinnati Dome, which is centered along the border of Indiana and Ohio (MRCSP, 2005).



The MRCSP fields file has already been used to efficiently respond to several inquiries at the regional level. This custom map was used to help identify petroleum wells in WV that intersect mining paths of the Pennsylvanian-aged Pittsburgh coal seam (wells and coal seams are separate file source - WVGES, 2019). The fields help to simplify the complex well dataset from WVGES and give an effective overview of what formations are targeted in the area of concern. Updated MRCSP fields data on this map include the Majorsville storage field and a portion of one of the newly added CBM fields in WV.





progressive shift toward natural gas-fired facilities.

 Newly updated storage capacities have been calculated to represent three scenarios, including a minimum, most likely, and maximum value, represented by storeMIN, storeMODE, and storeMAX, respectively

- (Goodman et al, 2011). More than 18,000 rows of data with 44 columns of attributes.
- Hundreds of millions of tonnes (draft) of MODE storage capacity in 2,595 oil fields.
- Billions of tonnes (draft) of MODE storage capacity in all petroleum fields deeper than 2,500 ft (the depth at which CO, remains
- **Ouality control measures**
- Newly introduced attributes include:
- oil volumetrics (OOIP, ROIP, etc.)
- Pressure data (including minimum miscibility pressure)
- Newly defined fields in WV, including Majorsville (storage) and 14 coalbed methane fields
- PA has introduced field analysis at the "pool" level, in addition to updating oil field data
- Formulaic and statistical analysis to increase data density
- Consolidation of oil fields (previous editions of the database featured 1 row of data, for each polygon, except for WV. The 2019 database follows WV model, focusing on merging oil polygons with identical attributes. This helps with quality control / mapping efficiency.)

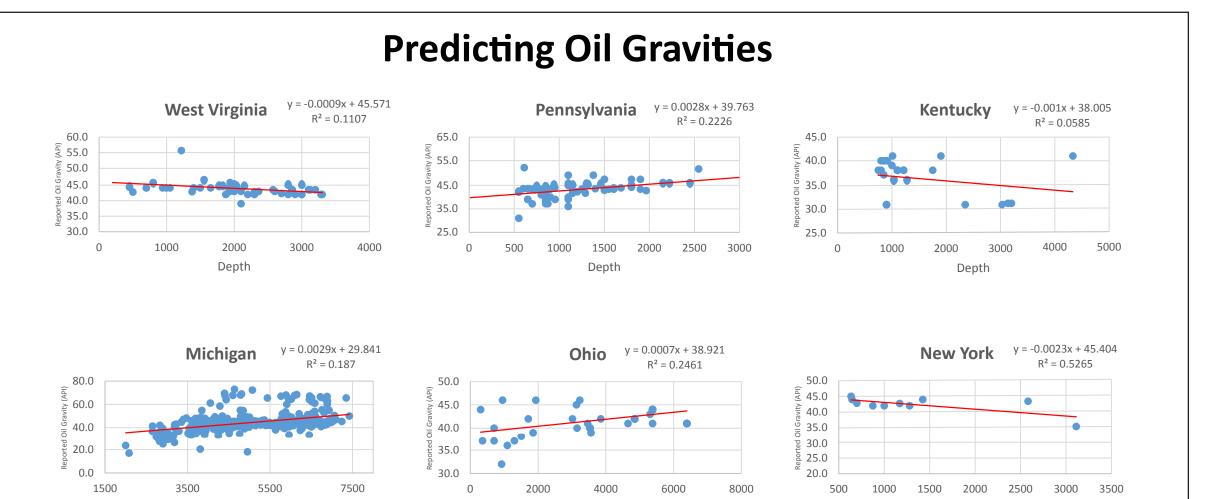
#### Storage Capacity = $\mathbf{A} \times \mathbf{h} \times \mathbf{\phi} \times (1-\mathbf{Sw}) \times \boldsymbol{\rho} \times \mathbf{Ef}/2200$



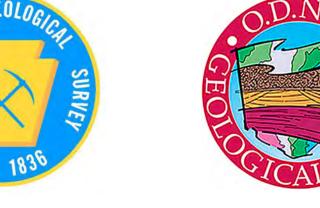
The United States energy sector is experiencing a transition from oil- and coal-based facilities to those

that utilize natural gas. This is a result of new technologies that enable production from organic-rich

shale formations (USEIA, 2019). Reduced CO, emissions in the U.S. are partially a result of this



Reported oil gravity values were analyzed as a function of depth. Lighter values may imply migration to shallower depths (Hohn, 2017, personal communication). The lack of recorded data is responsible for the low coefficients of determination (R<sup>2</sup>); therefore, calculated data should be









The MRCSP Petroleum Fields 2019 Database is designed to be a quick, user-friendly, tool used to examine cost-saving opportunities for energy producers in the eastern U.S.

0 25 50 75 100

#### REFERENCES

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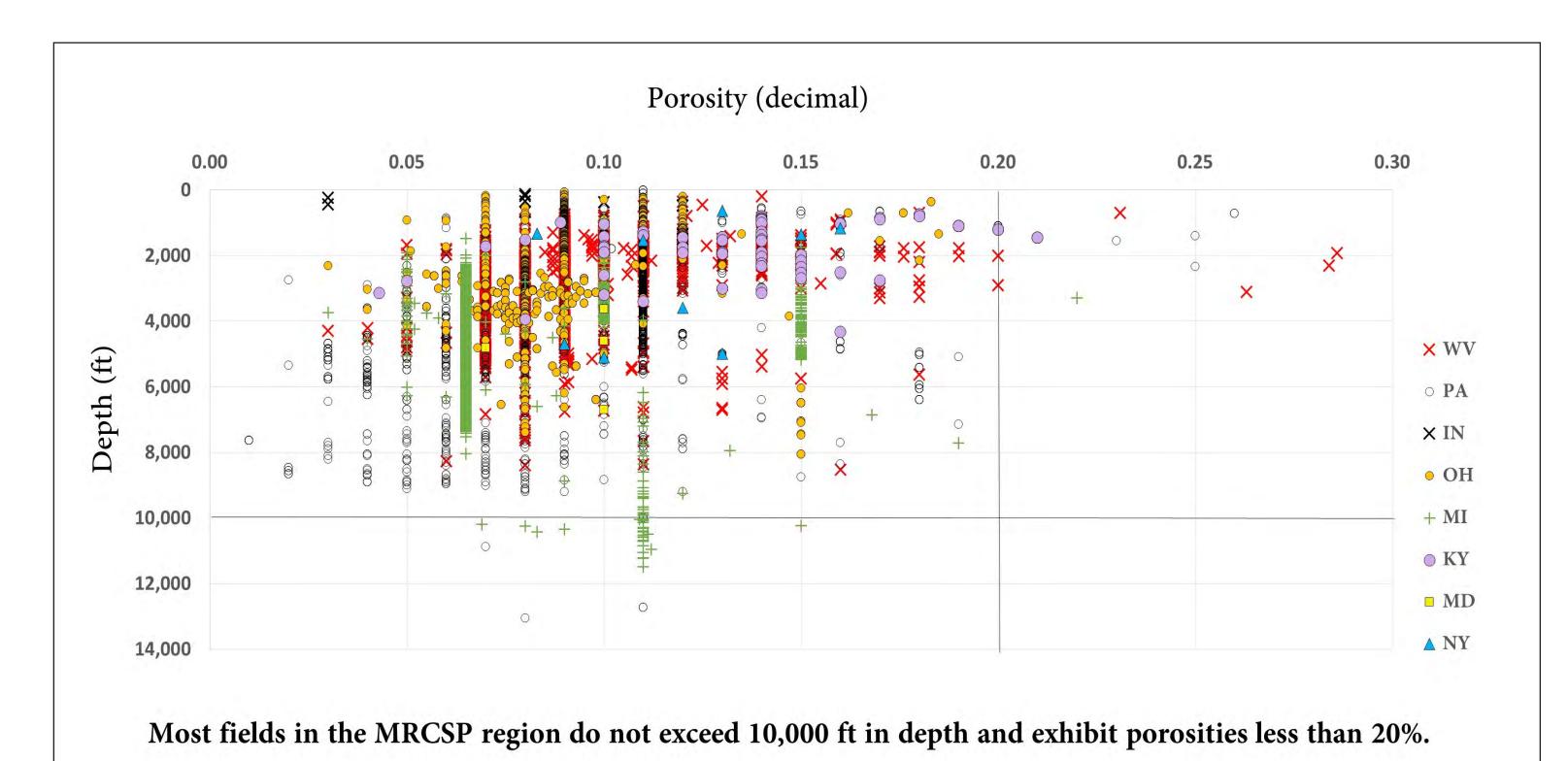
https://www.eia.gov/todayinenergy/detail.php?id=39012&src=email, accessed April 12, 2019.







# The potential miscibility of a reservoir can be determined using the oil gravity and temperature of the fluids in the formation and comparing it to the pressure of the reservoir (Takacs et al, 2010). This information often goes unreported at the field scale. In an effort to improve the accuracy of



the database, fields lacking data were calculated, as represented by the x-

axes (states separated by color). The graphs above, show where these

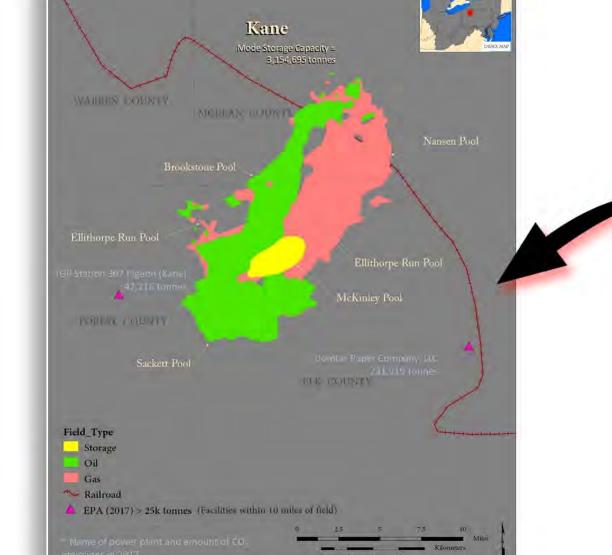
### DISCUSSION

methods were effective.

One of the objectives of the MRCSP Petroleum Fields 2019 Database is to focus attention on CO, sequestration and utilization potential in the region. Much effort has been taken to make this an efficient and effective tool for quickly analyzing a small region's subsurface with respect to its future energy contributions around the globe.

Utilization of CO, floods for EOR is a developing technology in the eastern U.S. While it may still be too early to predict its contribution to America's future energy balance, many opportunities for implementation exist within the region. A comprehensive assemblage and evaluation of petroleum data by the MRCSP Geo-Teams will enable stakeholders from diverse backgrounds to evaluate these opportunities on a regional, and/or field-specific basis.

A renewed focus on CO<sub>2</sub>-EOR also helps to identify information severely lacking in the MRCSP region, such as permeability and oil gravity. Where possible, steps have been taken to increase data density and enable reservoir characterization.



Storage 🦱