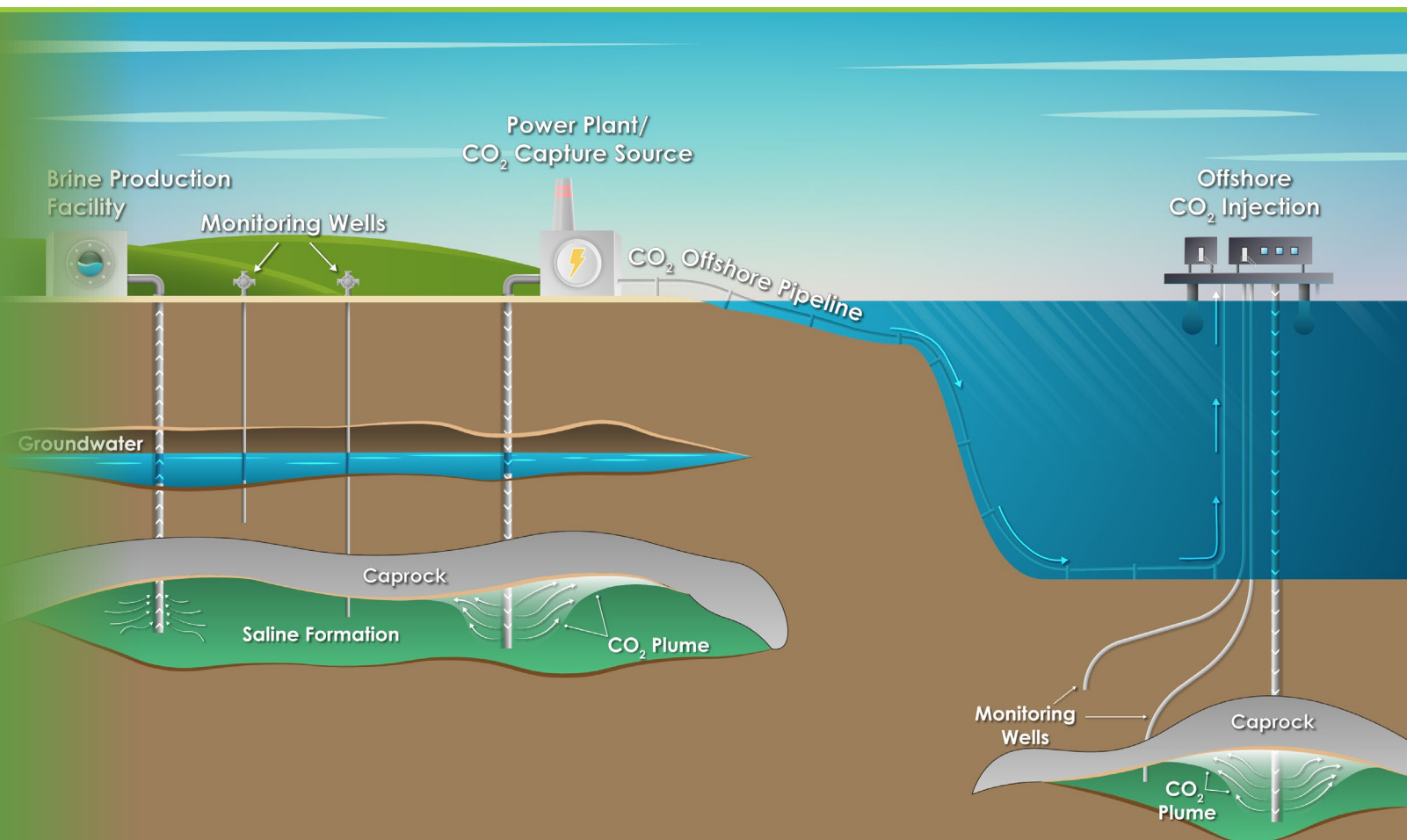
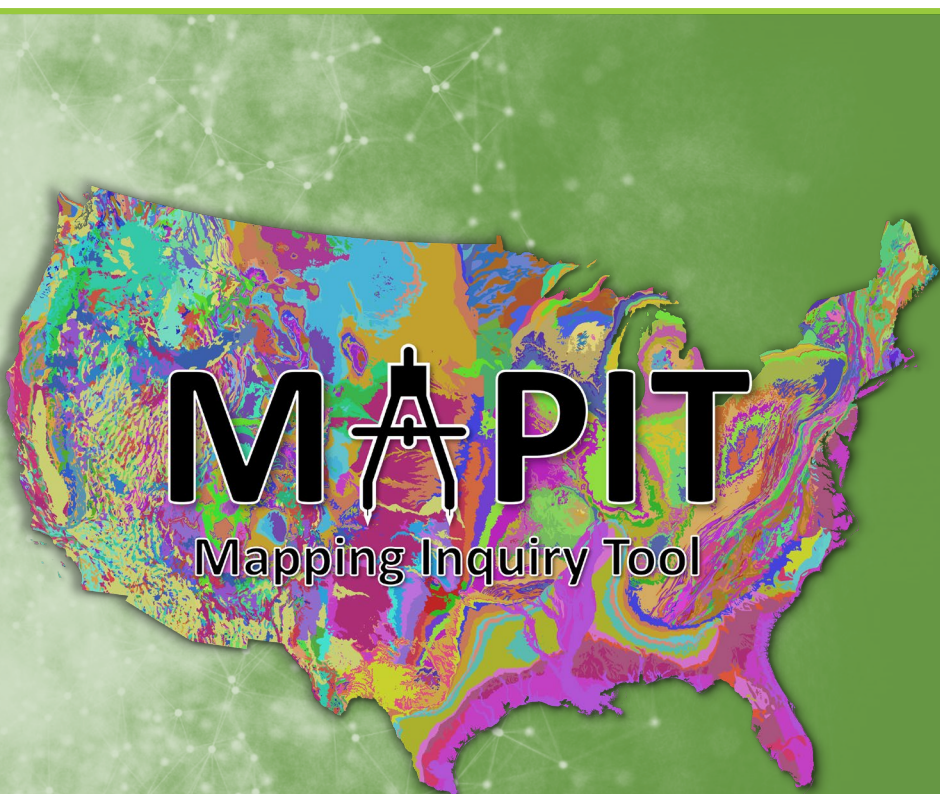


# Carbon Storage Site Mapping Inquiry Tool (MapIT)



Cat Schooley

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NETL/FECM Carbon Management Review Meeting

Aug. 5, 2024

# Disclaimer



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# Authors and Contact Information



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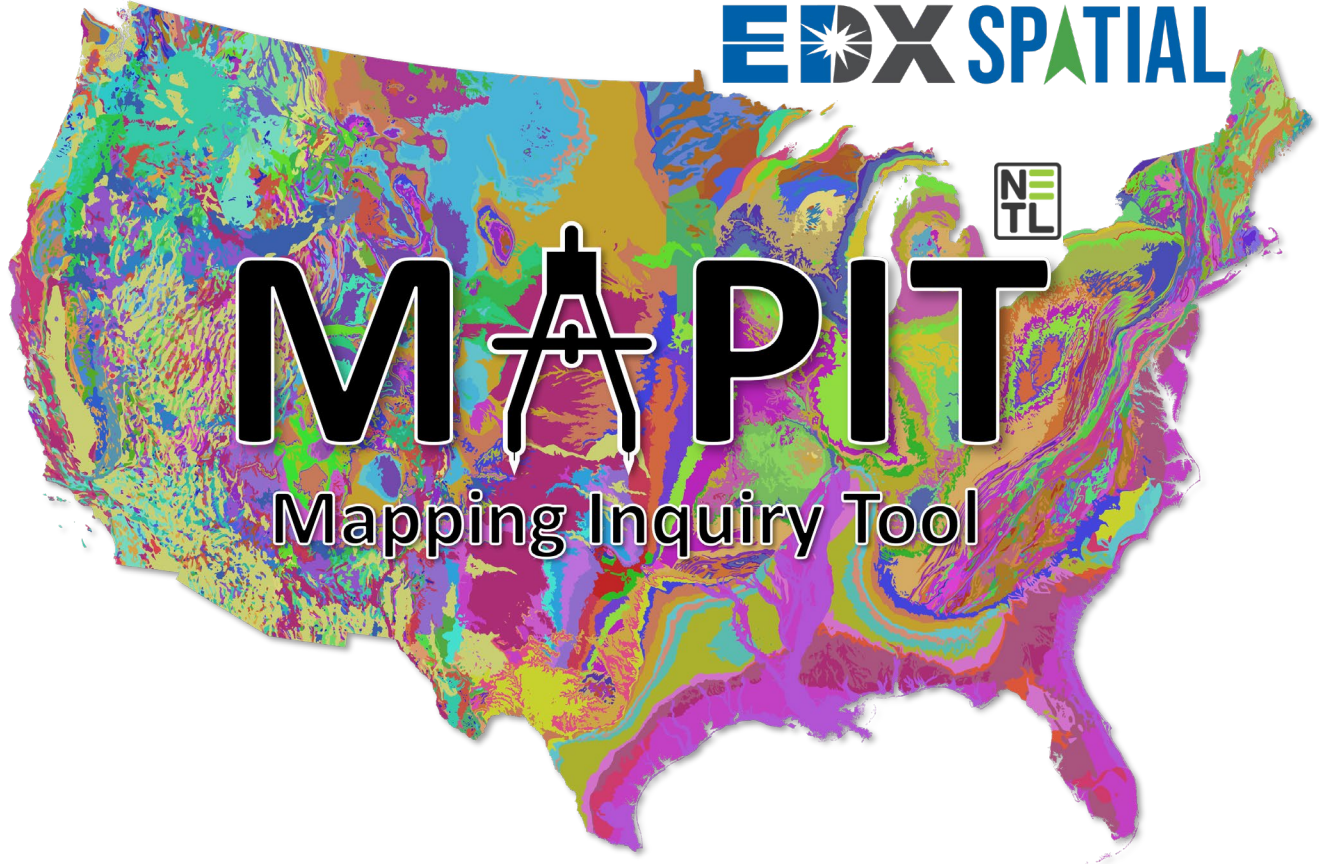


# MapIT Serves as a Powerful, Comprehensive Data Exploration Tool for Diverse Stakeholders



**Challenge:** Increasing CCS deployment in coming years will require application for Class VI permitting with the U.S. EPA or state regulators to drill injection wells, which requires vast amounts of data.

**Objective:** Develop comprehensive, user-friendly tool that provides a way for regulators, industry, researchers, and other stakeholders to find, query, and download relevant data related to carbon storage projects



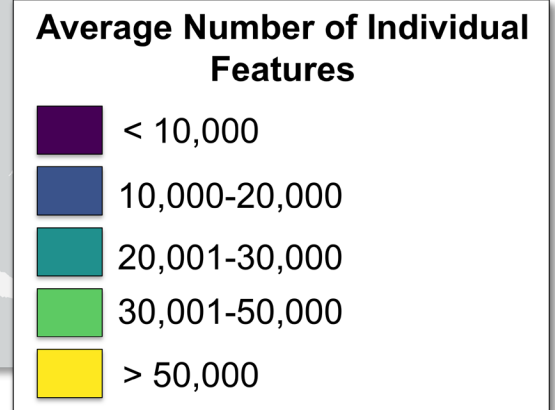
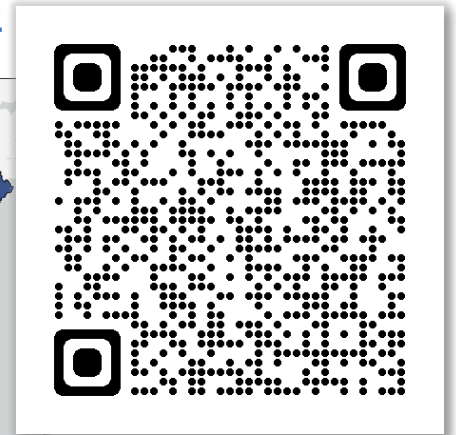
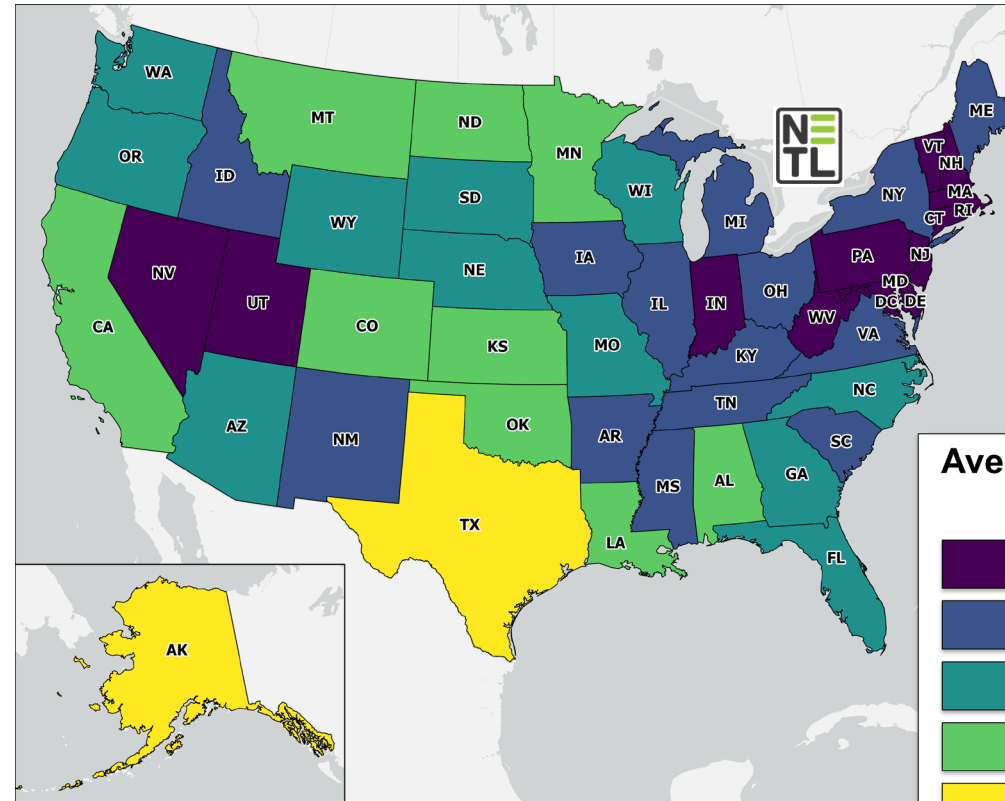
**CCS** - Carbon capture and storage  
**EPA** - U.S. Environmental Protection Agency

# Building a Data Catalog and Database was the First Step in Creating this Powerful Data Exploration Tool

- Data needs were determined through a **review of the U.S. EPA Class VI Permit Guidance**
- Data sources were chosen based on **authority, completeness, and credibility**
- Data Catalog consists of over **600 data resources** with description and **links to original data sources**
  - Database published on **EDX**
  - Data were integrated into **MapIT**



<https://edx.netl.doe.gov/dataset/mapit-database>



# Data Catalog and Tool are Organized into Groups for Improved Comprehensibility and Exploration



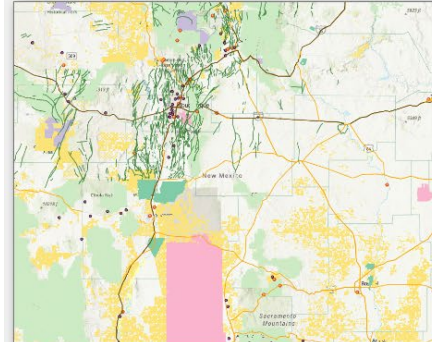
Categories	Data Examples	Authoritative Data Sources
General	Roads, Wells, Environmental and Social Justice, Boundaries	U.S. Department of Energy, U.S. Census Bureau
Geologic Narrative	Depth, Salinity, Pressure	National Energy Technology Lab (NETL)
Faults and Fractures	Faults, Fractures, Geologic Structure	U.S. Geologic Survey (USGS), States
Injection and Confining Zones	Depth to Top, Geologic Contours	USGS, States
Hydrology	Aquifers, Surface Hydrology, Water Wells	USGS, States
Geomechanical and Petrophysical	Well Locations, Well Logs, Well Density	NETL, States
Baseline Geochemical	Sample Locations	USGS



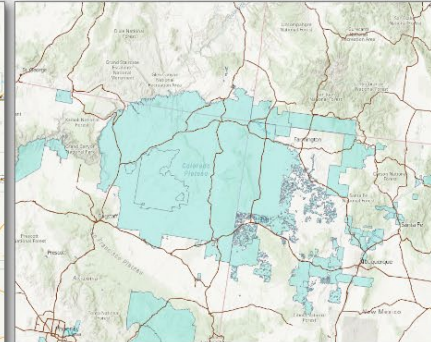
# Each Module within MapIT has its own Page to Improve Utility and Increase Accessibility

- Module themes were adapted from the **Class VI Underground Injection Control (UIC) program documentation**
- Breaks data up into **logical categories**
- **Improves performance**

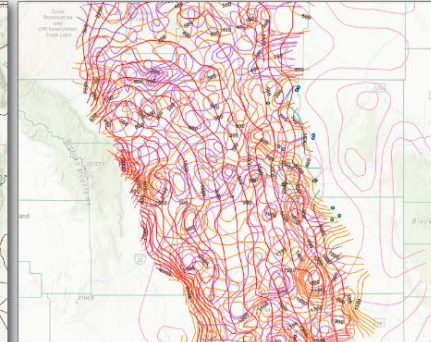
## How To Documentation



All Data



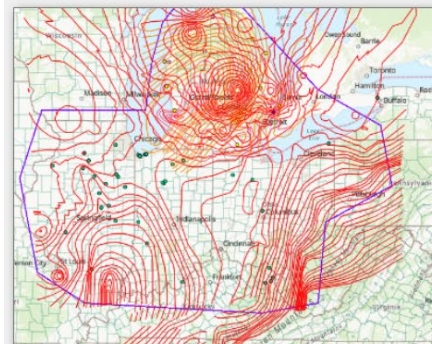
General Map



Geologic Narrative/Site Characterization  
Maps and Cross Sections of the AoR and  
Region



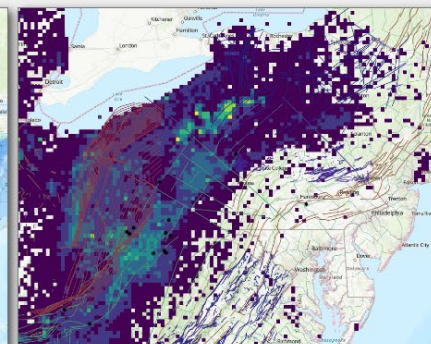
Information on Faults and Fractures



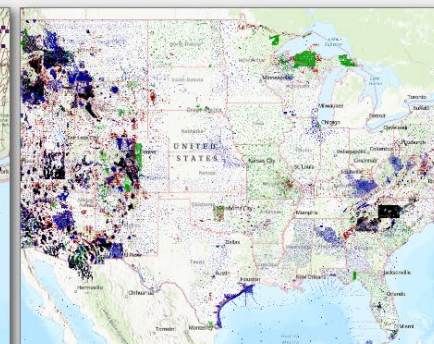
Data on the Injection and Confining  
Zones



Hydrologic Information/Maps and Cross  
Sections of USDWs



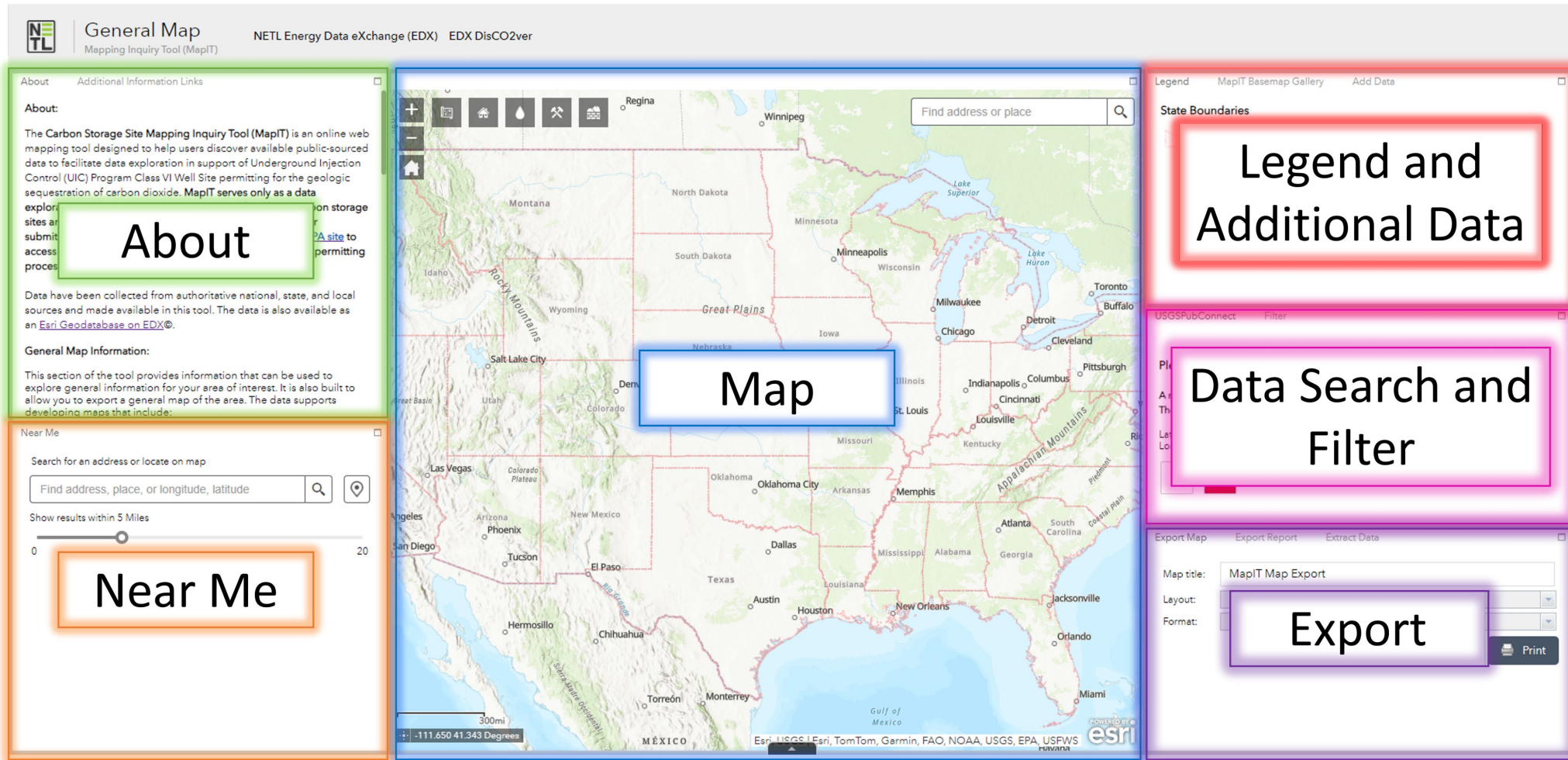
Geomechanical and Petrophysical  
Information about the Confining Zone



Baseline Geochemical Data



# Standardized Layout Across Sections Creates a User-Friendly Experience that is Easy to Navigate

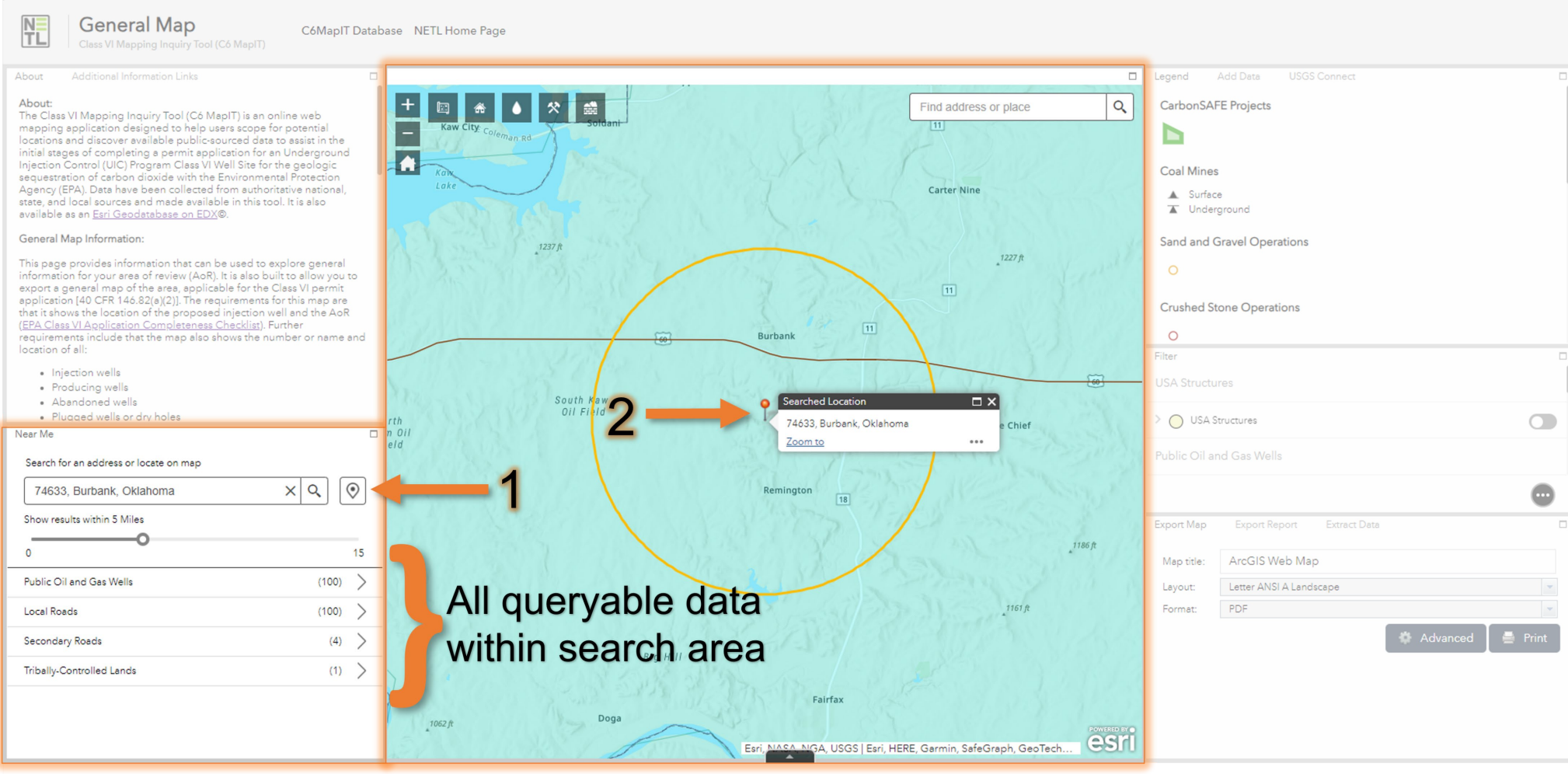


The screenshot displays the 'General Map' interface for the 'NETL Energy Data eXchange (EDX) EDX DisCO2ver' Mapping Inquiry Tool (MapIT). The interface is divided into several sections:

- About:** A sidebar on the left containing an 'About' section with descriptive text and a 'Near Me' section with a search bar and a distance slider.
- Map:** The central map area showing a geographical view of the United States with various data overlays.
- Legend and Additional Data:** A panel on the right titled 'Legend' and 'MapIT Basemap Gallery' with an 'Add Data' button.
- Data Search and Filter:** A panel on the right titled 'USGSPubConnect' and 'Filter' with a search bar and filter options.
- Export:** A panel on the right titled 'Export Map', 'Export Report', and 'Extract Data' with fields for 'Map title', 'Layout', and 'Format', and a 'Print' button.



# The Near Me Widget is a Powerful Tool that Allows you to Explore Data within your Area of Interest



The screenshot displays the 'General Map' interface with the following components:

- Left Panel:** Contains an 'About' section and 'General Map Information' which lists queryable data types: Injection wells, Producing wells, Abandoned wells, and Plugged wells or dry holes.
- Near Me Widget:** A search box (labeled '1') contains '74633, Burbank, Oklahoma'. Below it, a list of results is shown:

Public Oil and Gas Wells	(100)	>
Local Roads	(100)	>
Secondary Roads	(4)	>
Tribally-Controlled Lands	(1)	>
- Map:** A topographic map of the Burbank, Oklahoma area with a yellow circle (labeled '2') indicating the search radius. A 'Searched Location' popup shows '74633, Burbank, Oklahoma' with a 'Zoom to' link.
- Right Panel:** A legend and filter panel with categories like 'CarbonSAFE Projects', 'Coal Mines', and 'Sand and Gravel Operations'. It includes a 'Filter' section with 'USA Structures' and 'Public Oil and Gas Wells'.
- Bottom Panel:** Export options for 'Map title', 'Layout', and 'Format' (set to PDF), with 'Advanced' and 'Print' buttons.

All queryable data within search area

# Custom Widgets Connect Users with Additional USGS Resources – PDFs, Seismic Data, etc.



**USGS**  
science for a changing world

Mineral Resources / Online Spatial Data

## Scientific data near [38.63765,-121.71683]

Search area extends approximately 22.3 km east-west and 28.5 km north-south.

**Geographic context**

- Counties, states, countries, con
- Yolo
- California
- United States
- North America
- Land
- Map quadrangles, from USGS
- Grays Bend
- Sacramento



- Geology of US states
- Airborne geophysical surveys
- Estimates of undiscovered mineral resources
- The continental crust +
- National geochemical survey database +
- Geochemistry of stream sediments in the US from the NURE-HSSR database +

USGSPubConnect Filter

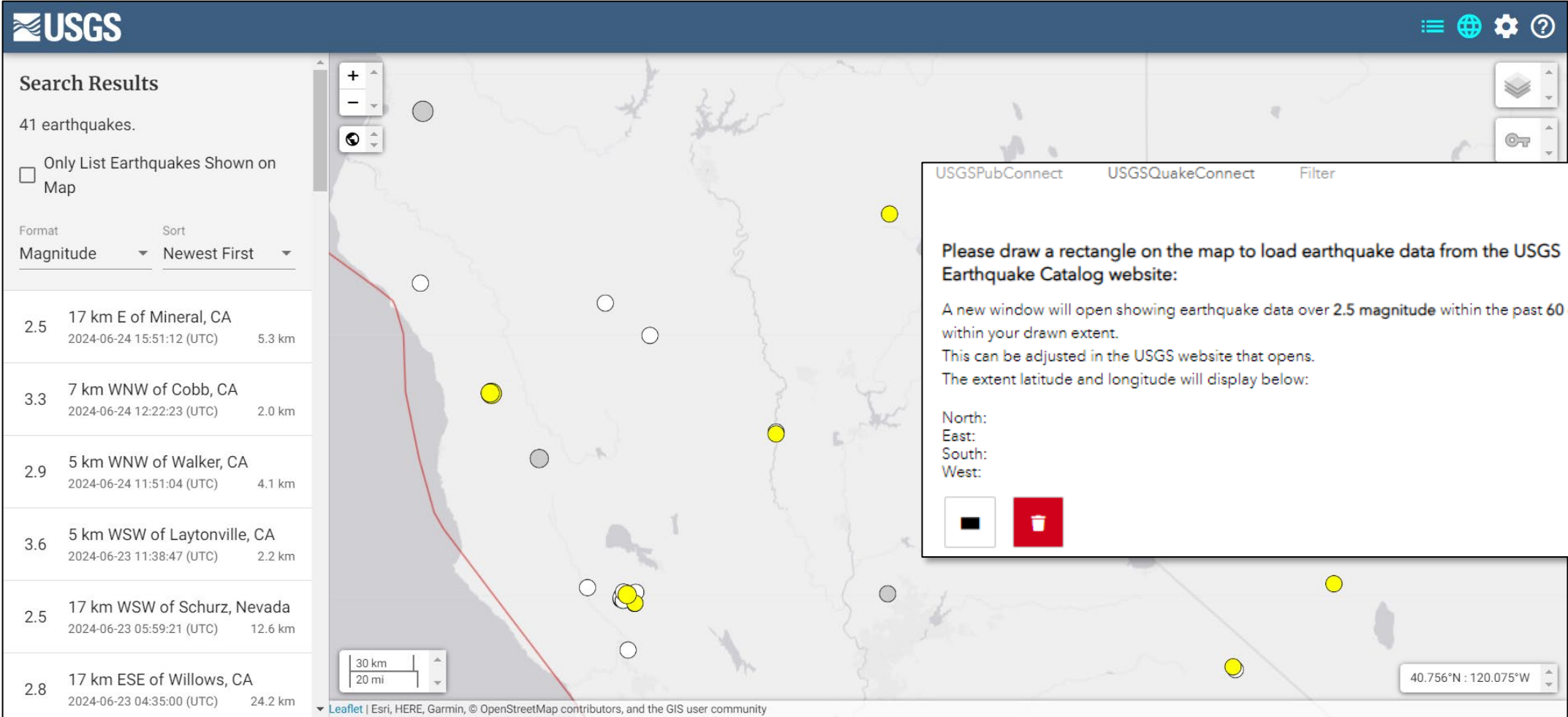
Please click on the map to load new data from USGS:

A new window will open showing any USGS data near your chosen location.  
The latitude and longitude for that point will display below:

Latitude:  
Longitude:

# Custom Widgets Connect Users with Additional USGS Resources – Earthquakes



The screenshot shows the USGS Earthquake Catalog interface. On the left, a 'Search Results' panel lists 41 earthquakes. The main map area displays several earthquake locations marked with yellow and grey circles. A custom widget titled 'USGSPubConnect USGSQuakeConnect Filter' is overlaid on the map, providing instructions on how to draw a rectangle to load earthquake data from the USGS Earthquake Catalog website. The widget includes a text area for instructions, a table for coordinates, and a red trash icon.

**Search Results**  
41 earthquakes.

Only List Earthquakes Shown on Map

Format: Magnitude | Sort: Newest First

2.5	17 km E of Mineral, CA	2024-06-24 15:51:12 (UTC)	5.3 km
3.3	7 km WNW of Cobb, CA	2024-06-24 12:22:23 (UTC)	2.0 km
2.9	5 km WNW of Walker, CA	2024-06-24 11:51:04 (UTC)	4.1 km
3.6	5 km WSW of Laytonville, CA	2024-06-23 11:38:47 (UTC)	2.2 km
2.5	17 km WSW of Schurz, Nevada	2024-06-23 05:59:21 (UTC)	12.6 km
2.8	17 km ESE of Willows, CA	2024-06-23 04:35:00 (UTC)	24.2 km

**USGSPubConnect USGSQuakeConnect Filter**

Please draw a rectangle on the map to load earthquake data from the USGS Earthquake Catalog website:

A new window will open showing earthquake data over 2.5 magnitude within the past 60 days within your drawn extent.

This can be adjusted in the USGS website that opens.

The extent latitude and longitude will display below:

North:  
East:  
South:  
West:

30 km / 20 mi

40.756°N : 120.075°W



# Three Export Options allow Users to Create Maps, Reports, and Extract Data

- **Data export** allows for users to **perform further analysis** in **their own systems**
- **Maps and reports** can be used to showcase project plans and **supports developing narratives** for an area of interest

Export Map   Export Report   Extract Data

**Extract Data**

1 Layers to extract

- Public Oil and Gas Wells
- Coal Mines
- Sand and Gravel Operations
- Crushed Stone Operations
- Prospect and Mine-Related Points - 24k scale

2 Study area

Same as Display

Select features  
 Clip features

3 Output data format

CSV

4 Output file name

Extract Data Sep 19, 2023, 3:25:53 PM

Save result in

Use current

**Run Anal**

**Area of Interest (AOI) Information**

Area: 3,139,081,745.62 ft<sup>2</sup>

Sep 19 2023 15:25:37 Pacific Daylight Time

## Report includes map and tables

Export Map   Export Report   Extract Data

Map title:

Layout:

Format:

**Summary**

Name	Count	Area(ft <sup>2</sup> )	Length(ft)
Tribally-Controlled Lands	1	631,823,248.95	N/A
County Boundaries	4	3,139,081,624.36	N/A
State Boundaries	3	3,139,081,785.10	N/A
Secondary Roads	7	N/A	74,903.41
Primary Roads	8	N/A	252,087.03

**Tribally-Controlled Lands**

#	NAME	Area(ft <sup>2</sup> )
1	Ouapaw OTSA	631,823,248.95

**County Boundaries**

#	Name	State	2020 Total Population Estimate	Area(ft <sup>2</sup> )
1	Newton County	Missouri	58648	1,716,150,985.50
2	Cherokee County	Kansas	19362	692,905,768.17
3	Ottawa County	Oklahoma	30285	602,919,443.37
4	Jasper County	Missouri	122761	127,105,427.31

**State Boundaries**

#	State	2020 Population Estimate	Area(ft <sup>2</sup> )
1	Missouri	6154913	1,807,537,793.99
2	Kansas	2937880	699,706,150.50
3	Oklahoma	3959353	631,837,840.61

**Secondary Roads**

#	Name	MAF/TIGER Feature Class Code	Length(ft)
1	US Hwy 400	S1200	37,597.94
2	US Hwy 166	S1200	32,415.34
3	I-44 Lp	S1200	4,890.12

**Primary Roads**

#	Name	MAF/TIGER Feature Class Code	Length(ft)
1	I-44	S1100	155,506.34
2	Will Rogers Tpk	S1100	68,910.58
3	State Hwy 43	S1100	27,670.12

The Class VI Mapping Inquiry Tool (CMIT) was funded by the United States Department of Energy, National Energy Technology Laboratory, in part, through a site support contract. Neither the United States Government nor any agency thereof, nor any of their employees, nor the support contractor, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed or represented herein. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

# MapIT Helps Solve Data Accessibility, Availability, and Utility Challenges

## Value to Stakeholders:

- **Aggregates disparate data** into a single, intuitive location
- **Enhances data discovery and data sharing**
- Directly **links users to original data sources**
- **Dynamic datasets** ensure the most recent data is available
- Enables users to **find, query, and export data**



# DEMO & POSTER SESSION

TUESDAY, AUGUST 6, 2024

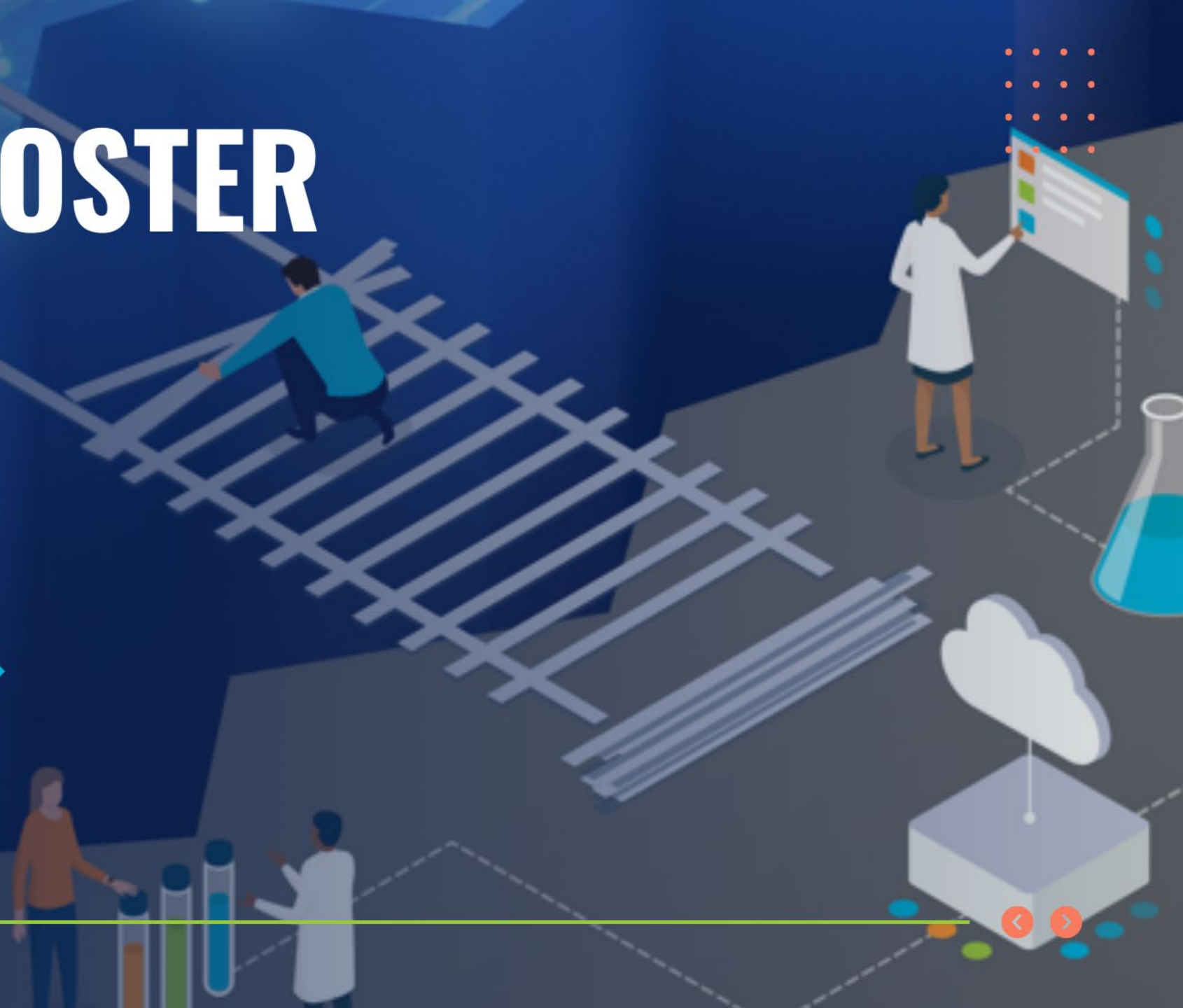
5:45 PM - 7:45PM

BALLROOM GALLERY

Carbon Storage Site  
Mapping Inquiry Tool  
(MapIT)



CARBON TRANSPORT & STORAGE DATA AND  
INNOVATION TO BRIDGE THE DIGITAL DIVIDE





# Acknowledgments

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# NETL RESOURCES

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