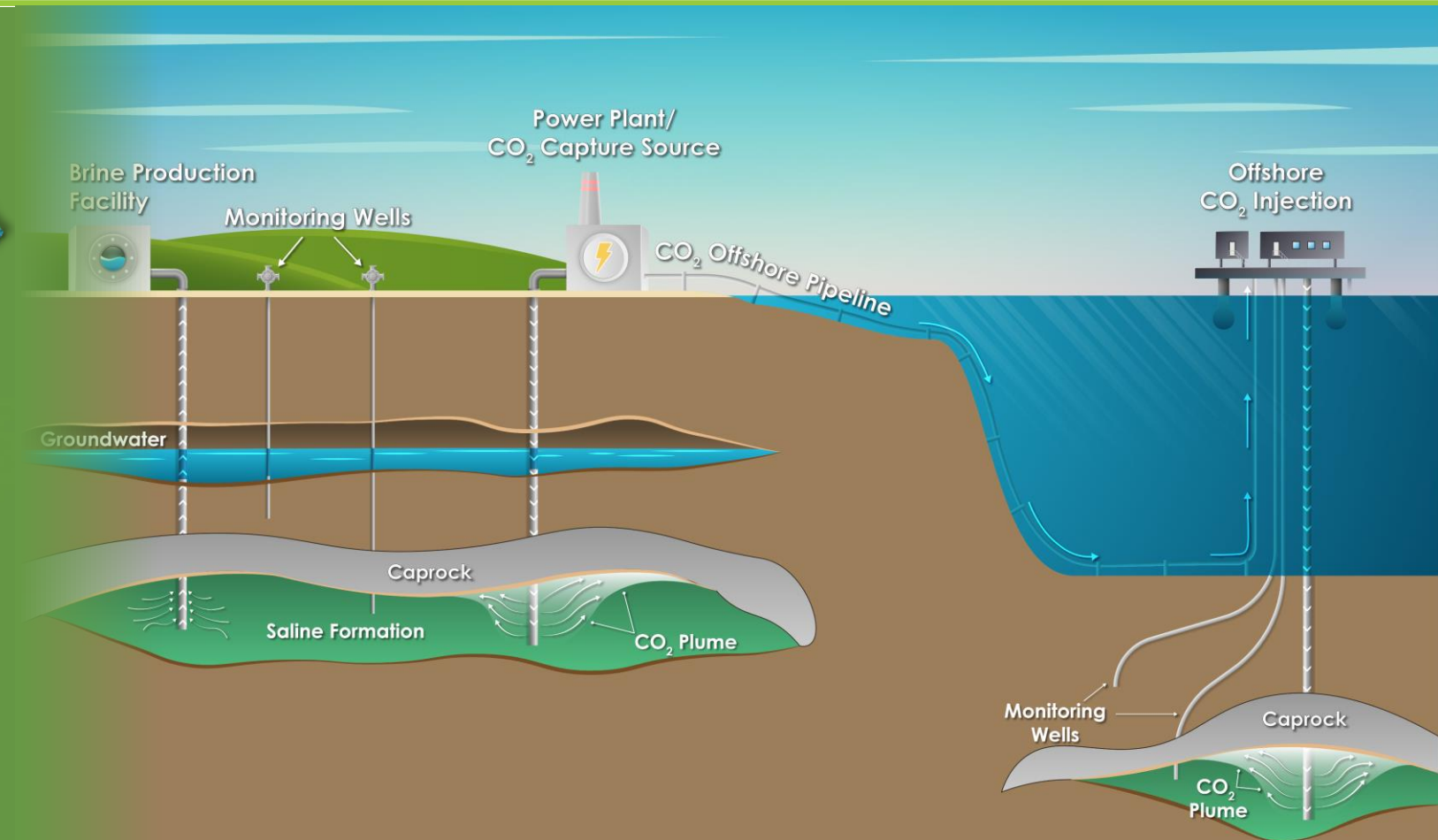


Carbon Storage Site Mapping Inquiry Tool (MapIT)

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Geological Society of America Connects 2024

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Disclaimer



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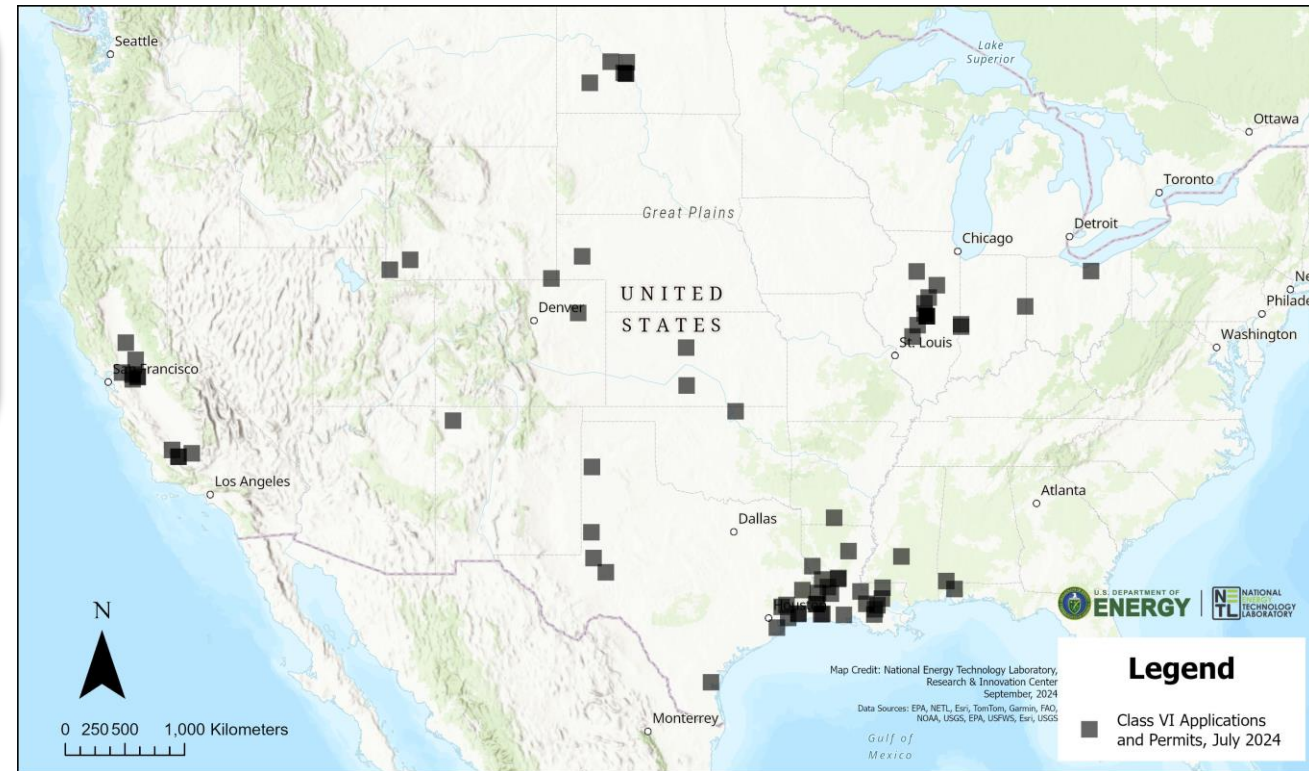
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Purpose

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

Objective: Develop a 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 to support Class VI permitting processes.



Locations of Submitted and Granted EPA Class VI permits as of July, 2024

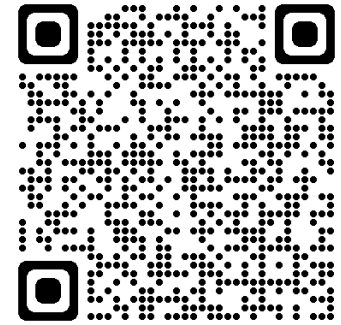
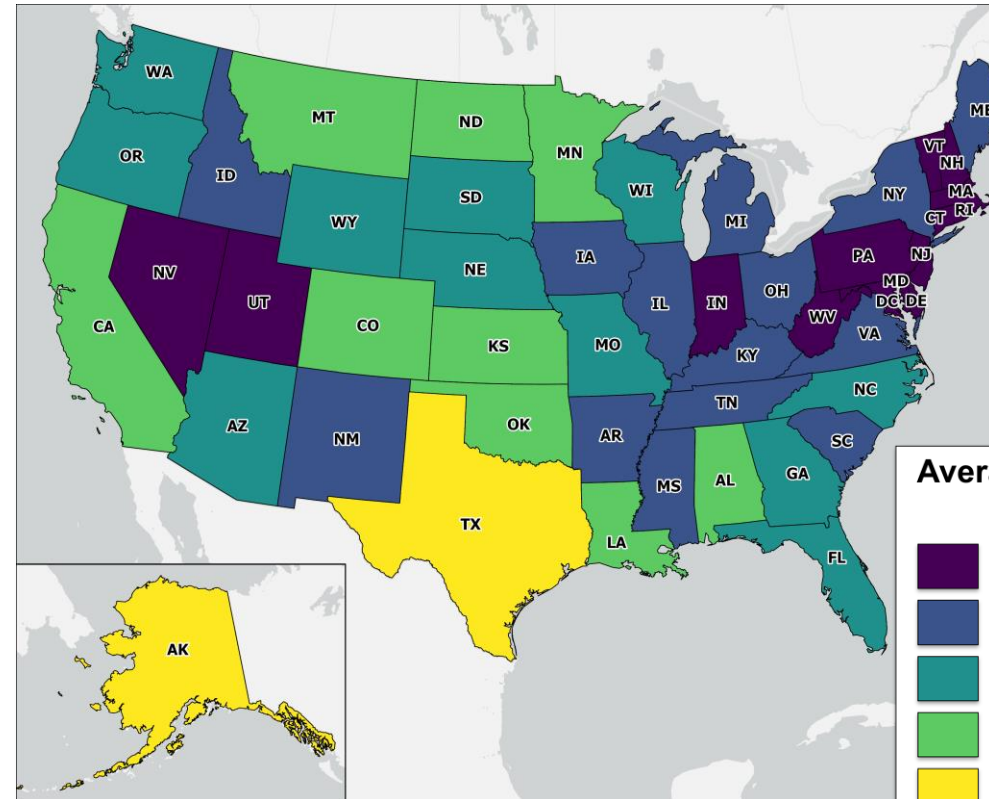
EDX SPATIAL

Building a **Data Catalog** and **Database** was the First Step in Creating MapIT

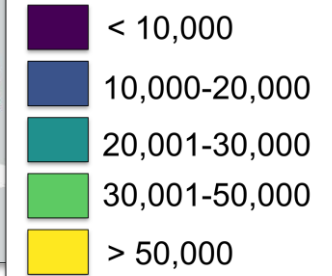
- Data needs were determined through **review of the EPA Class VI Permit Guidance**
- Data sources were chosen based on **authority, completeness, and credibility**
- Consists of over **600 data resources** with description and **links to original data sources**
- **Covering the whole of the US:**
 - Hydrology, Wetlands, Lakes, Rivers, groundwater wells
 - Elevation maps
 - Geologic Maps
 - Faults and structural data
 - Sedimentary basins
 - Class VI applications submitted to EPA
 - Current CCS injection well and project locations
- **Formation level:**
 - Major saline formation property data
 - Aerial extent, depth contours, thickness contours, top seal formation, temperature, pressure, mineralogy



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

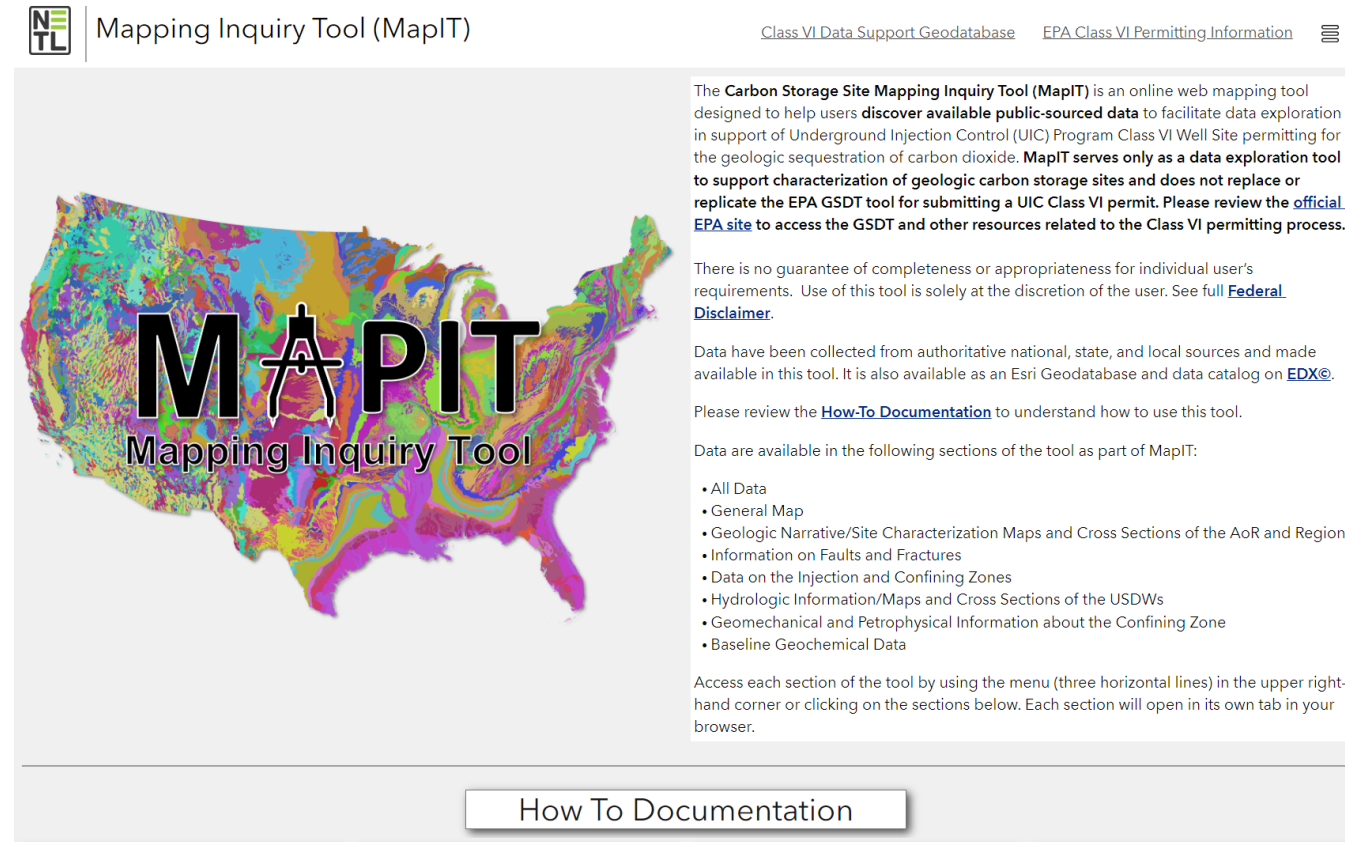


Average Number of Individual Features



The Carbon Storage Mapping Inquiry Tool (MapIT)

- **Tool allow users to:**
 - Explore data in mapping application
 - View links to additional data and resources
 - Understand what data is publicly available and how to access for further use
 - User Documentation also available as a “Start Here”
- **Data is pulled in dynamically** from the source for anything externally published
 - In some cases, users need to download from the original published source



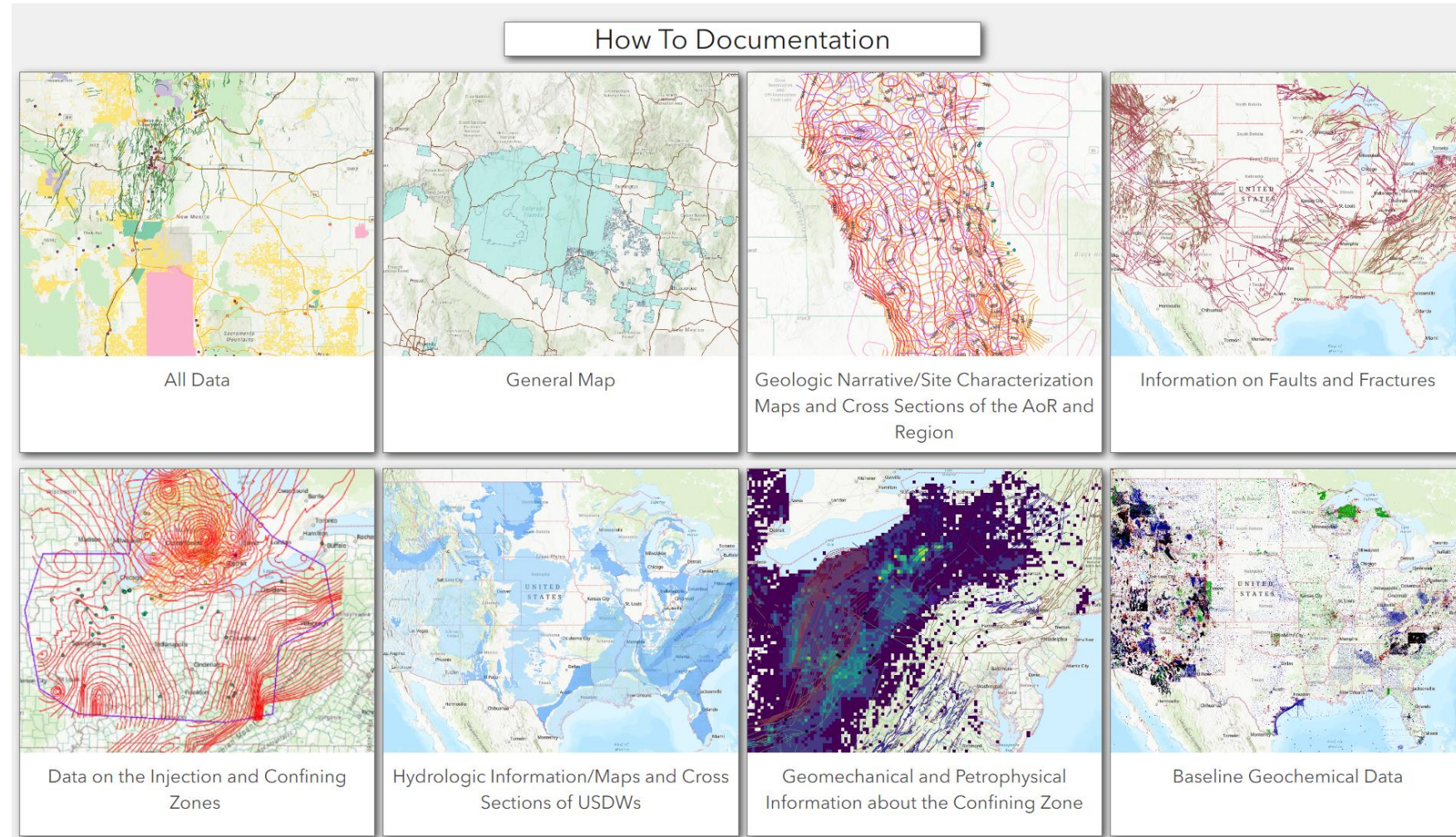
Data Catalog and Tool are Organized into Groups for Improved Comprehensibility and Exploration



Categories	Data Examples	Authoritative Data Sources
General	Roads, Wells, EJSJ, Boundaries	DOE, FEMA, DOE, HIFLD
Geologic Site Characterization Maps and Cross Sections	Depth, Salinity, Pressure	NETL, USGS
Information on Faults and Fractures	Faults, Fractures, Geologic Structure	States, USGS
Data on the Injection and Confining Zones	Depth to top, Geologic Contours	States, USGS
Hydrologic Information/Maps and Cross Sections of the USDWs	Aquifers, Surface Hydrology, Water Wells	USGS, States
Geomechanical and Petrophysical Information about the Confining Zone	Well Locations, Well Logs, Well Density	NETL, States
Baseline Geochemical Data	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 UIC program documentation**
- Breaks data up into **logical categories**
- **Improves performance**



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

The screenshot displays the NETL Energy Data eXchange (EDX) MapIT interface. The interface is divided into several sections, each highlighted with a colored box and a label:

- About:** Located in the top-left sidebar, it contains information about the Carbon Storage Site Mapping Inquiry Tool (MapIT) and its purpose.
- Map:** The central map area, showing a map of the United States with various geographical features and state boundaries.
- Near Me:** Located in the bottom-left sidebar, it includes a search bar for finding an address or location on the map and a slider to show results within a specified distance (0 to 20 miles).
- Legend and Additional Data:** Located in the top-right sidebar, it contains a legend and links to additional data sources.
- Data Search and Filter:** Located in the middle-right sidebar, it includes a search bar and filters for data.
- Export:** Located in the bottom-right sidebar, it includes options to export the map, report, or data, with a 'Print' button.

The **Near Me Widget** enables exploration of data within an area of interest

The screenshot displays the 'General Map Beta' interface. On the left, the 'Near Me' widget is active, showing a search for 'Welcome, Louisiana' and a list of data layers: Public Oil and Gas Wells (100), EPA Class VI Permits (4), Sand and Gravel Operations (1), USA Structures (100), Secondary Roads (6), and Primary Roads (6). The main map area shows a map of Louisiana with a yellow circle highlighting a search area. Two orange arrows, labeled '1' and '2', point to the search area and a specific data point within it, respectively. A large orange bracket on the left side of the map points to the highlighted area, with the text 'All quarriable data within search area' overlaid. The right side of the interface shows a legend for 'Public Oil and Gas Wells' with various status categories (Active, Producing, etc.) and a section for 'Sand and Gravel Operations' and 'Secondary Roads'. At the bottom right, there are options to export the map as a PDF or print it.

Custom Widgets Connect Users with Additional USGS Resources – PDFs, seismic data, etc.



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

Yolo

California

United States

North America

Land

Map quadrangles, from US

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

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:

U.S. DEPARTMENT OF
ENERGY

BIL★

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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

Export 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

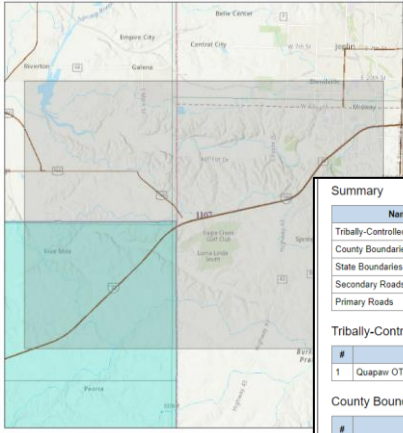
☒ Use current

Run Anal

Area of Interest (AOI) Information

Area : 3,139,081,745.62 ft²

Sep 19 2023 15:25:37 Pacific Daylight Time



Secondary Roads
Primary Roads
Tribally-Controlled Lands
County Boundaries
State Boundaries

Export Map

Export Report

Extract Data

Map title:

ArcGIS Web Map

Layout:

Letter ANSI A Landscape

Format:

PDF

Advanced

Print

Report includes map and tables

Summary

	Name	Count	Area(ft ²)	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 ²)
1	Quapaw OTSA	631,823,248.95

County Boundaries

#	Name	State	2020 Total Population Estimate	Area(ft ²)
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 ²)
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 Tpke	S1100	68,910.58
3	State Hwy 43	S1100	27,670.12

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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**



Acknowledgments



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