2014

# NATCARB Viewer

## User Guide

PREPARED BY: WEST VIRGINA GIS TECHNICAL CENTER AND WEST VIRGINIA UNIVERSITY DEPARTMENT OF GEOGRAPHY AND GEOLOGY

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## General Information

The U.S. Department of Energy (DOE) has selected seven partnerships, through its Regional Carbon Sequestration Partnership (RCSP) initiative, to determine the best approaches for capturing and permanently storing carbon dioxide ($CO_2$), a greenhouse gas (GHG) which can contribute to global climate change. The RCSPs are made up of state and local agencies, coal, oil and gas, and other private companies, electric utilities, universities, , and nonprofit organizations. These partnerships form the core of a nationwide network helping to establish the most suitable technologies, regulations, and infrastructure needs for carbon sequestration. The partnerships include more than 400 organizations, spanning 43 states and four Canadian provinces. The RCSPs are developing the framework needed to validate and deploy carbon sequestration technologies. The RCSPs will determine which of the numerous sequestration approaches are best suited for their specific regions of the country and identify regulatory and infrastructure requirements that will be needed should policy and economics indicate that sequestration be deployed on a wide scale.[1]

The online mapping application and documentation can be accessed at the following link: http://natcarbviewer.org/

## Features

The application allows users to search for, identify and determine the location of Carbon Sequestration Partnerships, their associated Terrestrial and Geologic storage projects, $CO_2$ Sources, and Sedimentary Basins.

- Six maps represent partnerships, sources and field and world-wide projects.
- Displays and queries carbon sequestration facility locations, including links to the associated website to obtain more information.
- Provides access to 9 background map services.
- Provides multiple ways to locate sources and storage.
- 3D Viewer by CartoVis.com

[1] U.S. Department of Energy National Energy Technology Lab Project Fact Sheet Background; Information also can be found at: http://www.netl.doe.gov/technologies/carbon_seq/infrastructure/rcsp.html

## About This Guide

This guide contains information on features and functions of the NATCARB Viewer. If you should have additional questions, or require information not contained within this manual, please contact the U.S. Department of Energy National Energy Technology Lab [NETL] at one of the following:


**U.S. Department of Energy**
**National Energy Technology Laboratory**
3610 Collins Ferry Road
PO Box 880
Morgantown, WV 26507-0880
Ph: 304-285-4764
Fax: 304-285-4403

**U.S. Department of Energy**
**National Energy Technology Laboratory**
626 Cochrans Mill Road
PO Box 10940
Pittsburgh, PA 15236-0940
Ph: 412-386-4984
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**U.S. Department of Energy**
**National Energy Technology Laboratory**
13131 Dairy Ashford Road, Suite 225
Sugar Land, TX 77478
Ph: 281-494-2516
Fax: 281-494-2549

**U.S. Department of Energy**
**National Energy Technology Laboratory**
2175 University Avenue South, Suite 201
Fairbanks, AK 99709
Ph: 907-452-2559
Fax: 907-452-3345

**U.S. Department of Energy**
**National Energy Technology Laboratory**
1450 Queen Avenue SW
Albany, OR 97321-2198
Ph: 541-967-5892
Fax: 541-967-5936


## Browser Specifications and Other Related Software

*Requirements:* The online mapping application requires a broadband connection, a modern browser, and Adobe Flash Player. To use all of the features and functions of the online application, please ensure you are using a modern browser. Adobe Flash Player must be installed for the application to work properly.

*Trouble Viewing Application during Start-Up:* If you are experiencing trouble viewing the application, then make sure you have the latest version of a modern browser or choose an alternative browser. Also if you are attempting to use any of the Brine tools make sure the Adobe Flash Player plug-in or add-on to your browser is the most recent version and correctly installed. The most recent version of Adobe Flash Player can be downloaded from http://www.flash.com.

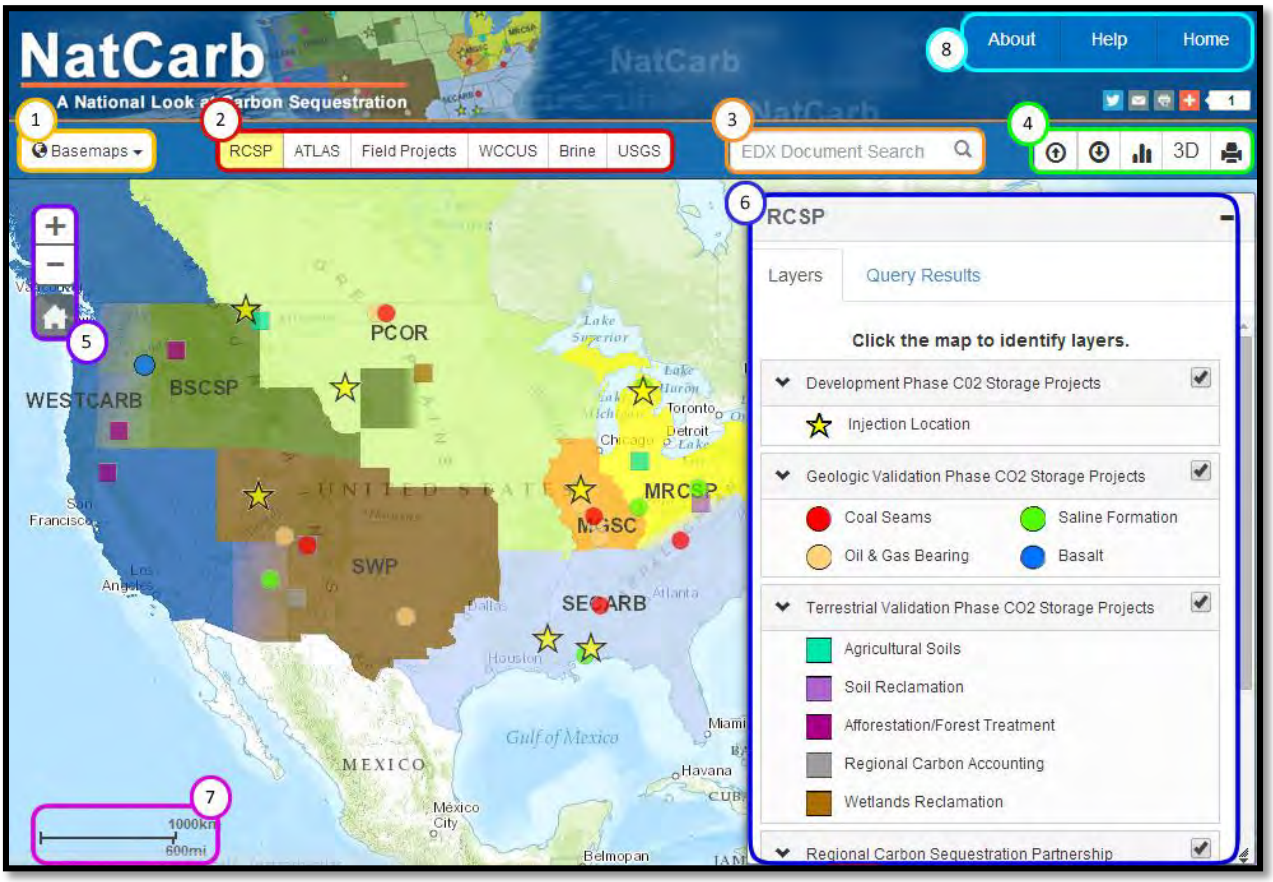
*Application Stops Working:* If the application stops working, restart the application by pressing the refresh button on the browser or re-launch the application. If problems still exist, then contact the WV GIS Technical Center for system administrative support. Refer to the contact information below.

## Contact Information

**WV GIS Technical Center**
Email: natcarb@mail.wvu.edu

WV GIS Technical Center
WVU Department of Geology & Geography
330 Brooks Hall
P.O. Box 6300 Morgantown, WV 26506
Phone: (304) 293-0557
Website: http://wvgis.wvu.edu/

## Natcarb Viewer Application Layout Overview




*Overview of basic Natcarb Viewer features*

1) **Background Layers :** Navigate background layers (9 options)
2) **Application Themes:** Select application theme (RCSP, ATLAS, Field Projects, WCCS, Brine, USGS)
3) **EDX Document Search:** Search EDX documents based upon user query
4) **Toolbox:** Upload/download data, Well Log Viewer, 3D Viewer, Print
5) **Navigation Tools:** *Click to* Zoom in and Zoom out or *select the house icon* to return to full extent
6) **Primary Layers & Query Results:** Display layers in application theme
7) **Map Display:** Scale in Kilometers and Miles
8) **About:** Detailed information about different themes in the application
   **Help:** Launch help screen and links for help documents and user guide
   **Home:** Return to NETL launch page

## Application Themes

# RCSP [Regional Carbon Sequestration Partnerships]

1) **RCSP:** Information on RCSP and other $CO_2$ storage projects
2) **Primary Layers:** Enables user to navigate primary RCSP layers *(for detailed information on each layer see text under help)*
   a. **Development Phase $CO_2$ Storage Projects:** Locates all $CO_2$ projects in the Development Phase. According to NETL, the Development Phase (2008-2018) activities "continue the validation process to determine that $CO_2$ capture, transportation, injection, and storage can be achieved safely, permanently, and economically at a large scale"

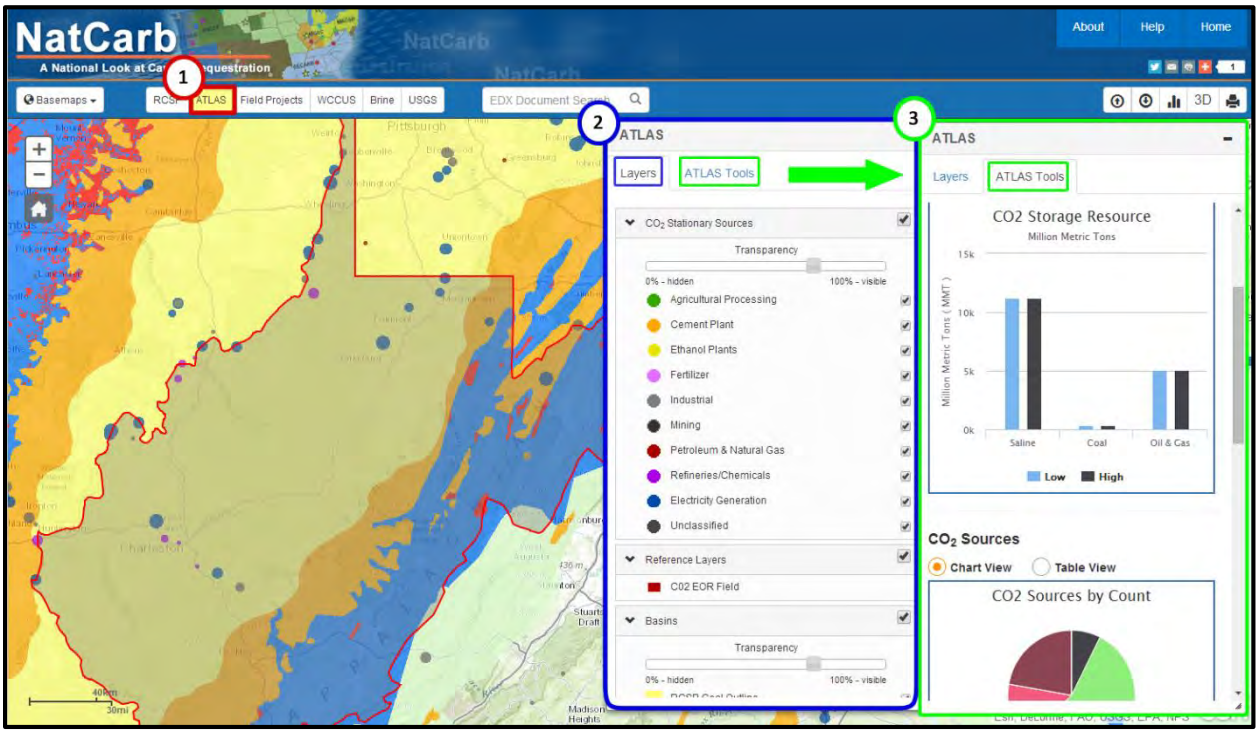
b. **Terrestrial Validation Phase $CO_2$ Storage Projects:** Locates all validation phase $CO_2$ projects associated with land sources. According to NETL, the Validation Phase of the RCSP effort is "focused on evaluating promising $CO_2$ sequestration opportunities through a series of small scale field tests in the seven partnership regions"

c. **Geologic Validation Phase $CO_2$ Projects:** Locates all validation phase $CO_2$ projects associated with geologic sources. According to NETL, the Validation Phase of the RCSP effort is "focused on evaluating promising $CO_2$ sequestration opportunities through a series of small scale field tests in the seven partnership regions"

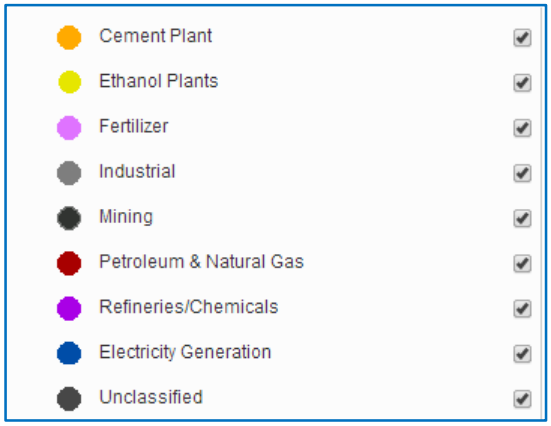
d. **Regional Carbon Sequestration Partnership:** Locates the extent of the 7 Regional Carbon Sequestration Partnerships with the Department of Energy National Energy Technology Laboratory [NETL]

    i. Midwest Regional Carbon Sequestration Partnership [MRCSP] http://216.109.210.162/
    ii. Southeast Regional Carbon Sequestration Partnership [SECARB] http://www.secarbon.org/
    iii. Midwest Geological Sequestration Consortium [MGSC] http://www.sequestration.org/
    iv. Plains $CO_2$ Reduction Partnership [PCOR] http://www.undeerc.org/pcor/
    v. Big Sky Carbon Sequestration Partnership [BSCSP] http://www.bigsky$CO_2$.org/
    vi. West Coast Regional Carbon Sequestration Partnership [WESTCARB] http://www.westcarb.org/
    vii. Southwest Partnership $CO_2$ Sequestration [SWP] http://southwestcarbonpartnership.org/

# ATLAS [$CO_2$ Sources, Reference Layers and Basins]




1) **ATLAS:** Information on $CO_2$ emitting sources and carbon sequestration resources across the United States and northwestern Canada
2) **Primary Layer Categories:** Enables user to navigate primary ATLAS layers:
   a. **$CO_2$ Stationary Sources:** All stationary sources of Carbon Dioxide in the United States and northwestern Canada




      i. Agricultural Processing: Carbon Dioxide produced from all agricultural processing plant
      ii. Cement Plant: Carbon Dioxide produced from cement production plant
      iii. Ethanol Plant: Carbon Dioxide produced from ethanol production plant
      iv. Fertilizer: Carbon Dioxide produced from fertilizer production plant
      v. Industrial: Carbon Dioxide produced from industrial plants other than those specifically categorized
      vi. Mining: Carbon Dioxide from mining and associated facilities
      vii. Petroleum and Natural Gas: Carbon Dioxide from petroleum and natural gas production plant

viii. Refineries/Chemicals: Carbon Dioxide produced from refinery and chemical processes

ix. Electricity Generation: Carbon Dioxide produced from power plants

x. Unclassified: Those sources not classified under one of the above categories

b. **Reference Layers:** Location of existing and proposed Carbon Dioxide pipelines in the United States

i. $CO_2$ EOR [Enhanced Oil Recovery] Field

c. **Basins:** Indicates the extent of RCSP and USGS basins in the United States and Canada coal, oil & gas, and saline basins can be queried for carbon sequestration potential

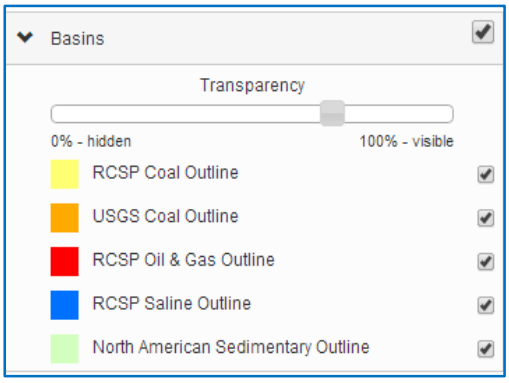
i. RCSP Coal Outline

ii. USGS Coal Outline

iii. RCSP Oil and Gas Outline

iv. RCSP Saline Outline

v. North American Sedimentary Outline



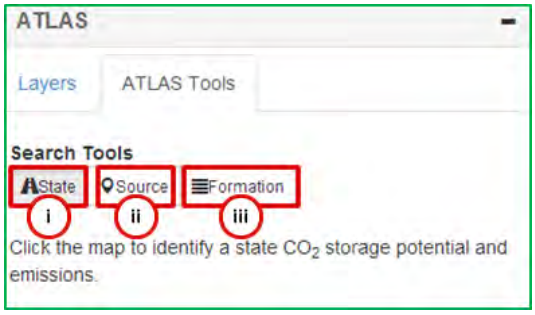

## 3) ATLAS Tools:

a. Search by state, source and formation to query information on $CO_2$ emissions and carbon storage potential

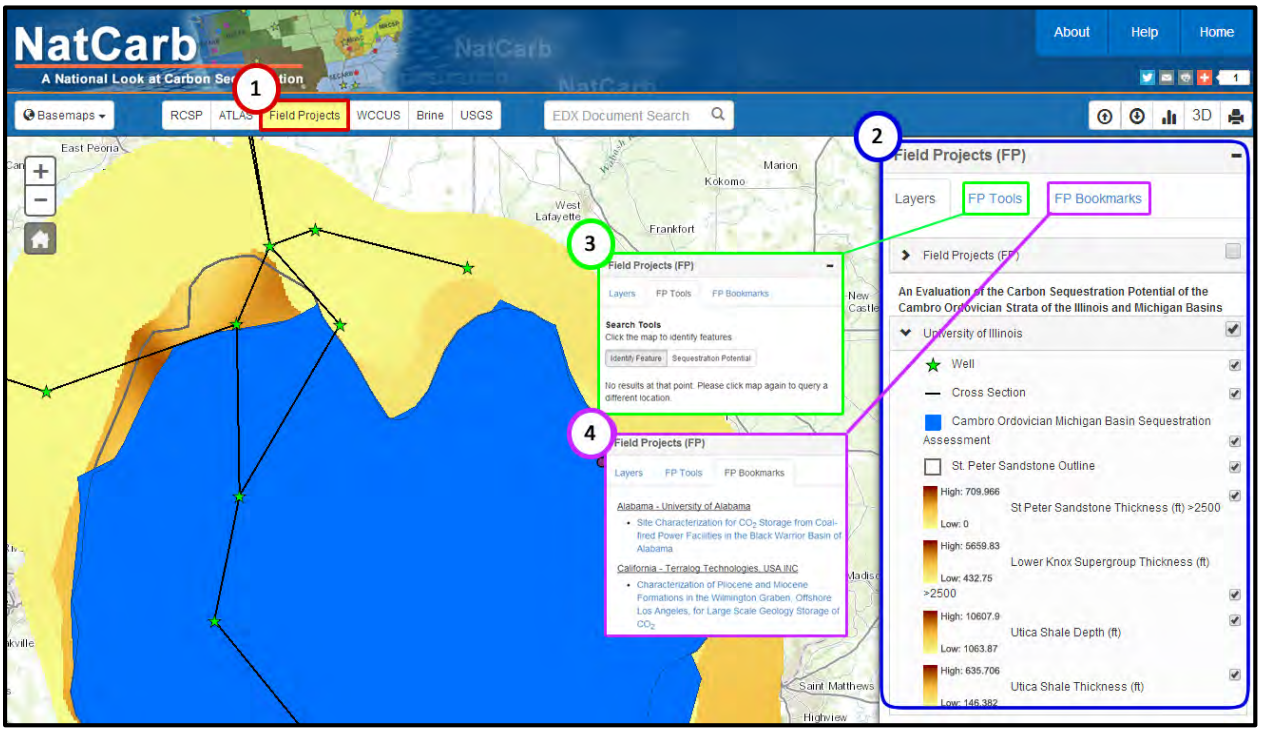
*i. Click on state to search sequestration potential and $CO_2$ emission by state*

*ii. Click on map to search by source*

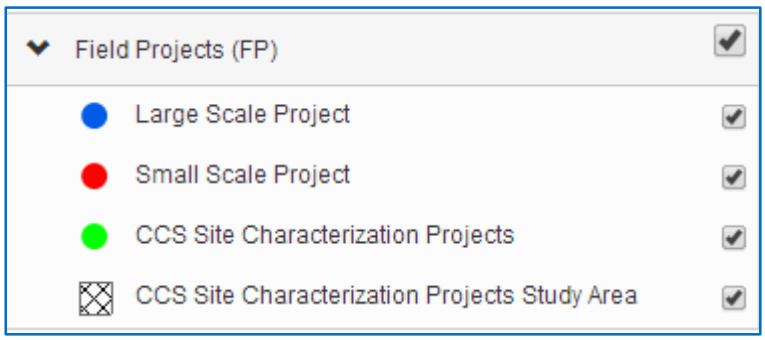
*iii. Select formation by drawing on map to search by formation*



# Field Projects

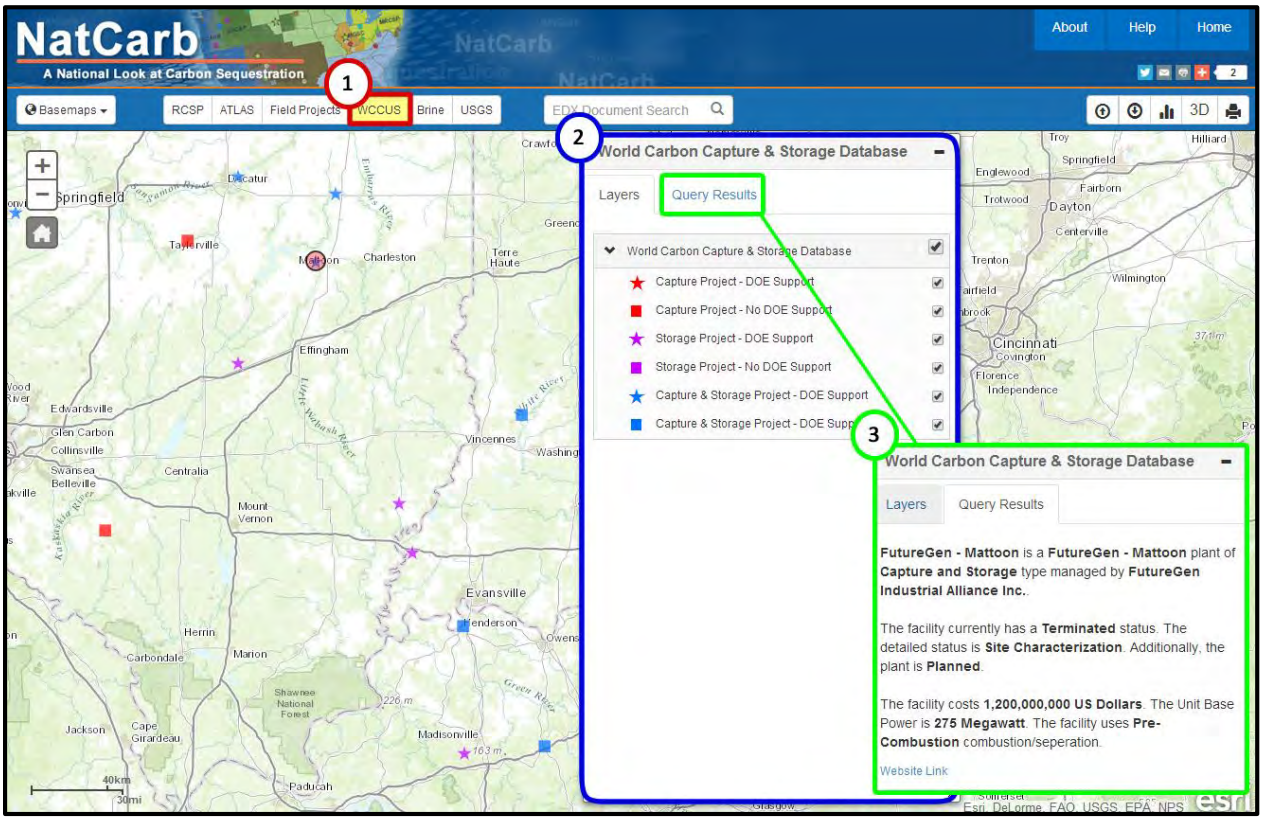



1) **Field Projects:** Enables user to navigate primary Field Projects layers
2) **Layers:**
   a. Large Scale Project
   b. Small Scale Project
   c. CCS Site Characterization Projects
   d. CCS Site Characterization Projects Study Area

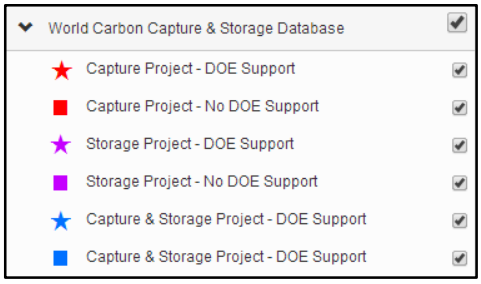



3) **Field Project Tools:**
   a. Click on map to identify features, get information on project, and fact sheet links
4) **Field Project Bookmarks:**
   a. Quick zoom and access to information on various field projects across the US

# WCCUS [World Carbon Capture and Storage Database]

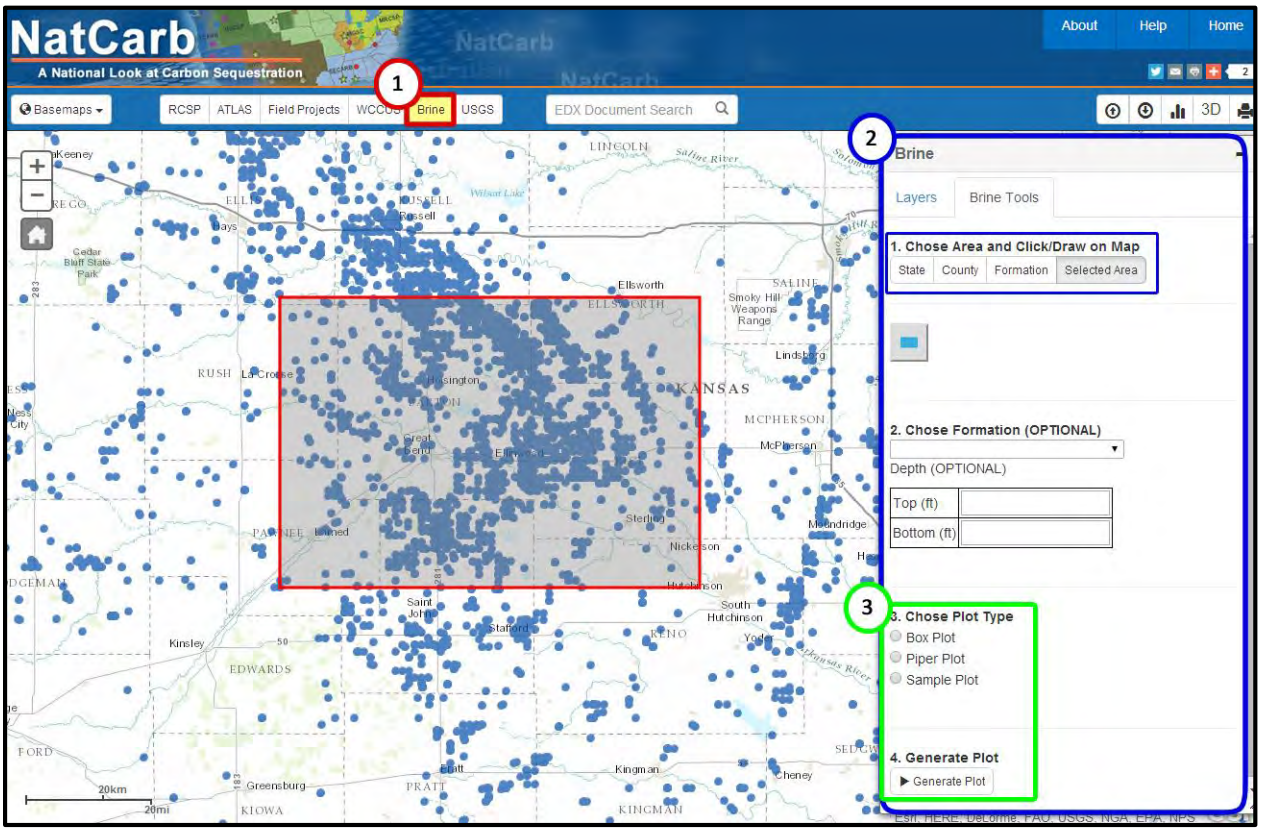


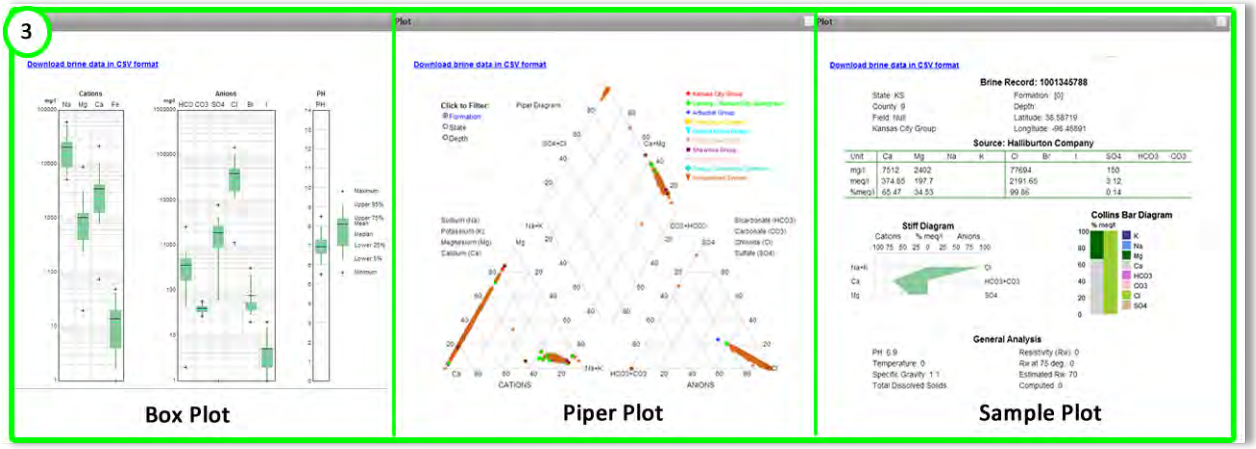

1) **WCCUS:** Query information on DOE and non-DOE supported capture and storage projects across the globe
2) **Primary Layers:** Enables user to navigate primary WCCS layers:
    a. Capture Project-DOE Support
    b. Capture Project-No DOE Support
    c. Storage Project – DOE Support
    d. Storage Project – No DOE Support
    e. Capture and Storage Project – DOE Support
    f. Capture and Storage Project – No DOE Support




3) **Query Results** :
    a. Click on project locations to access information on respective project and links to website projects

# Brine



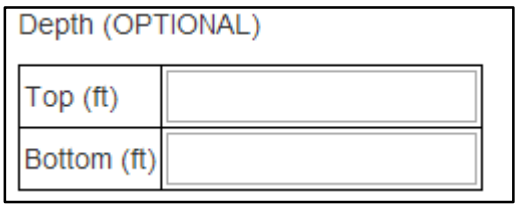

Brine geodatabase allows user to view available brine data from United States. User can also create different type of geochemical plots based on state, county, formation or selected area. Analysis can be done on box plot, piper plot or sample plot (Stiff diagram and Collins Bar diagram).

How-to use:

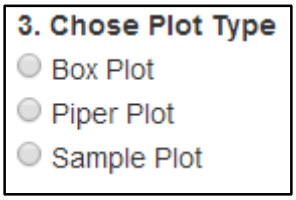
1. Choose the type of area or draw on the map

2. User can choose the desired formation. This is an optional feature. It should only be used if query needs to be restricted to a specific formation

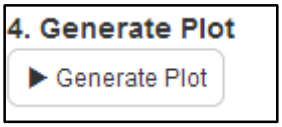
Depth is also optional. Query for depth can be restricted either by top or bottom or both top & bottom



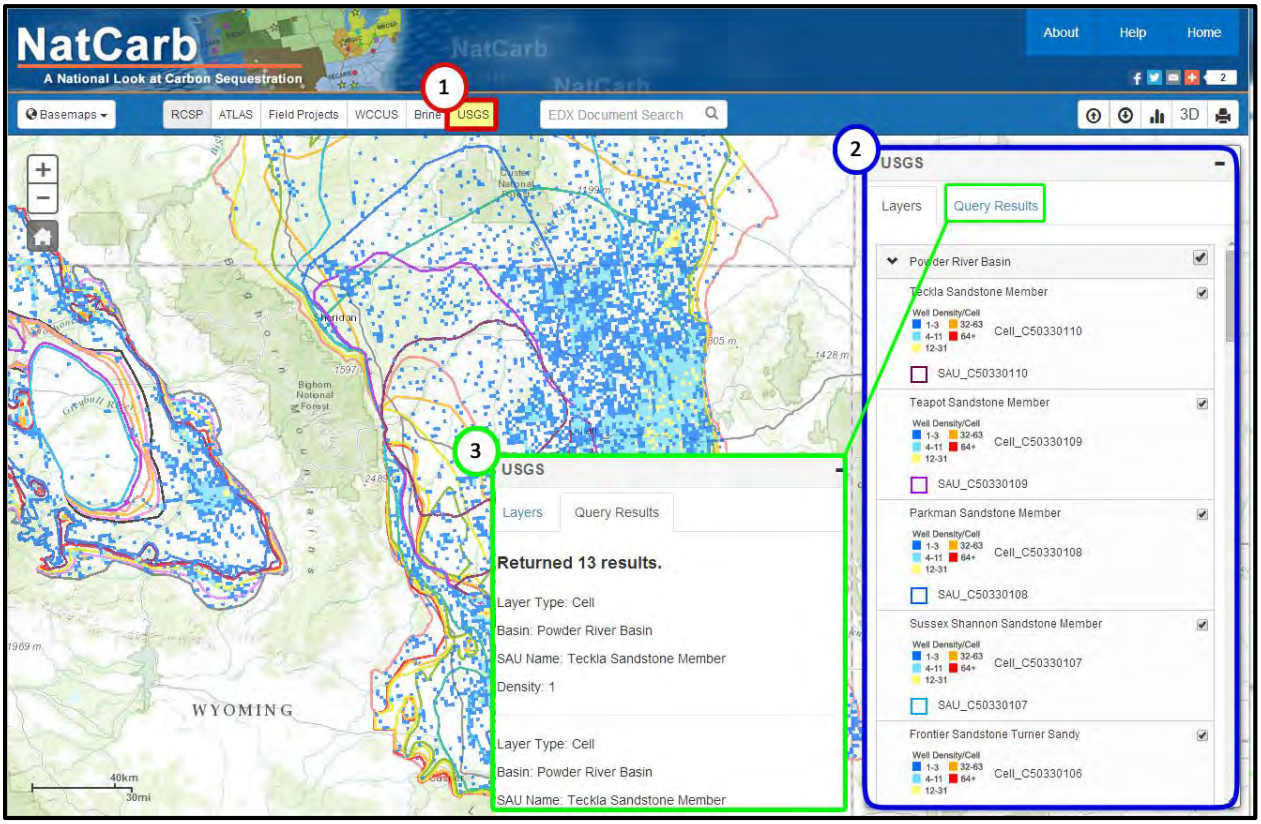

3. In the third step, choose the type of diagram for plotting geochemical data.




4. Finally, click generate plot to create the chosen plot



## USGS



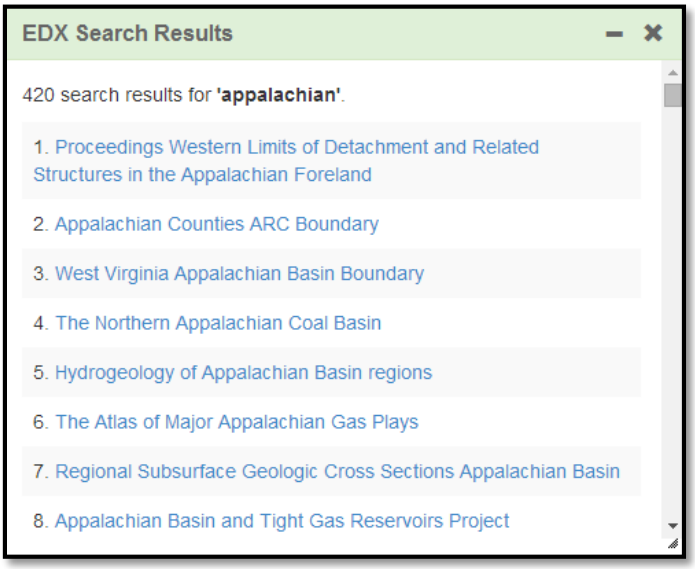

USGS theme shows the carbon sequestration assessment in different sedimentary basin that has been completed by USGS.

Clicking on the map gives information about storage assessment unit and well density per cell within a particular formation

# EDX Document Search

## EDX Document Search

Search Energy Data Exchange database for links to documents and publications.

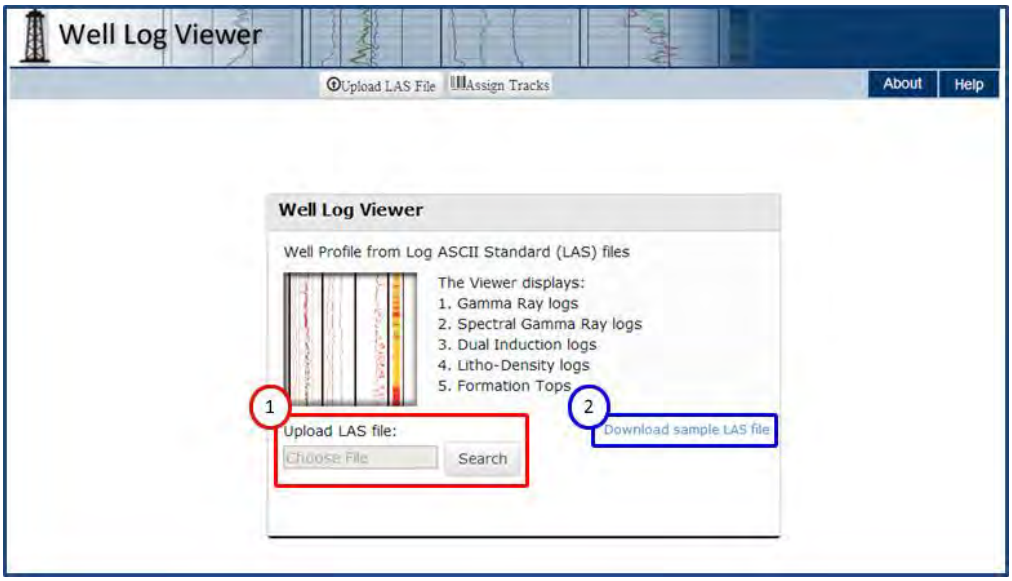



# Tool Box

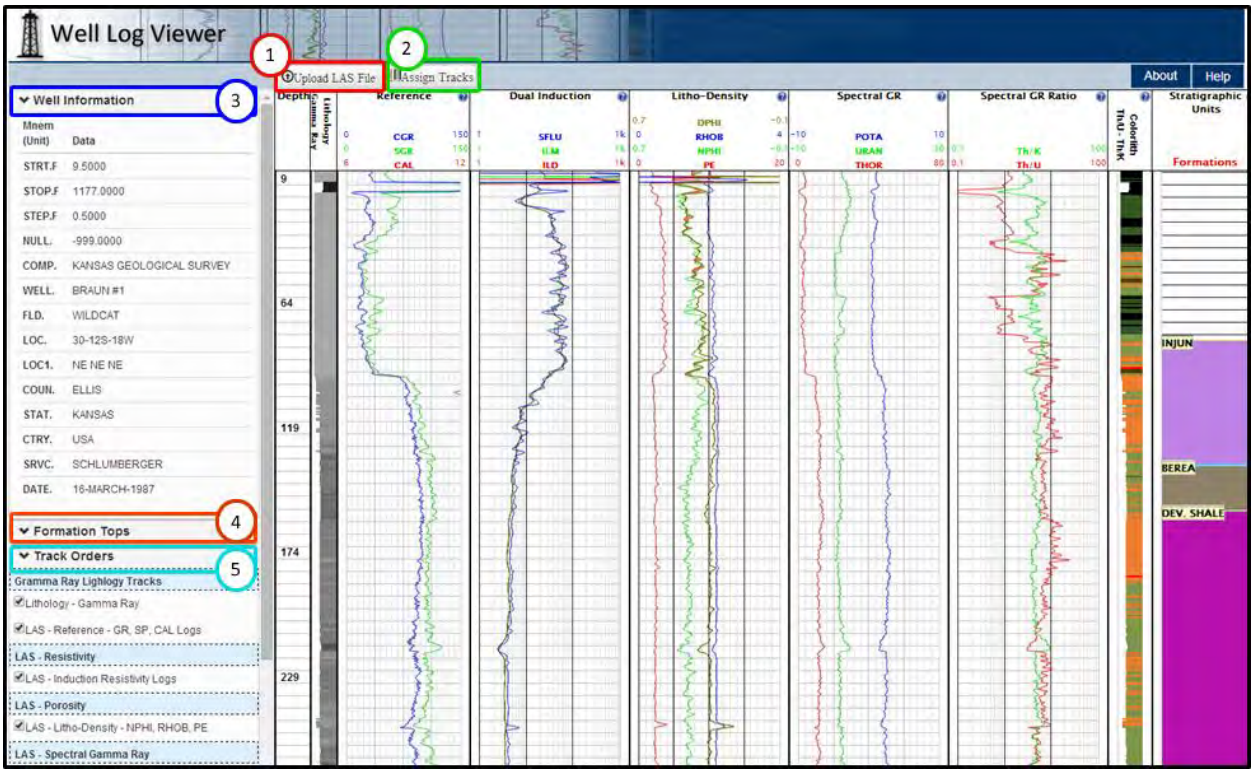
| Tool Box | | |
|---|---|---|
| **Upload** | | Upload shapefile or rest service |
| **Download** | | Download ATLAS data |
| **Well Log Viewer** | | Launch well log viewer |
| **3D Viewer** | 3D | Launch 3D viewer |
| **Print** | | Print to pdf |

## Log Viewer

WVU Well log viewer is an online tool to quickly visualize and interpret well log data. User can upload a las file to the log viewer and visualize logs in different tracks. At present, viewer can display Gamma Ray logs, Caliper logs, Spectral Gamma ray (Potassium, Uranium and Thorium) logs, Induction logs, Litho-Density (Density porosity, Neutron porosity, Bulk density and PE index) logs, and formation tops. Apart from this the user can also click on "Assign tracks" and choose different tracks for specific log. At present, a maximum of 5 logs can be plotted in a single track. Apart from this the viewer interprets the spectral gamma ray and plots colorlith for Th/U-Th/K which makes it visually easier to identify Leached-U and Fixed-U zones.




1) **Upload LAS file:** User can upload LAS file from their computer
2) **Download sample LAS file:** User can download sample LAS file to view in the Well Log Viewer




*Sample LAS file upload into the Well Log Viewer*

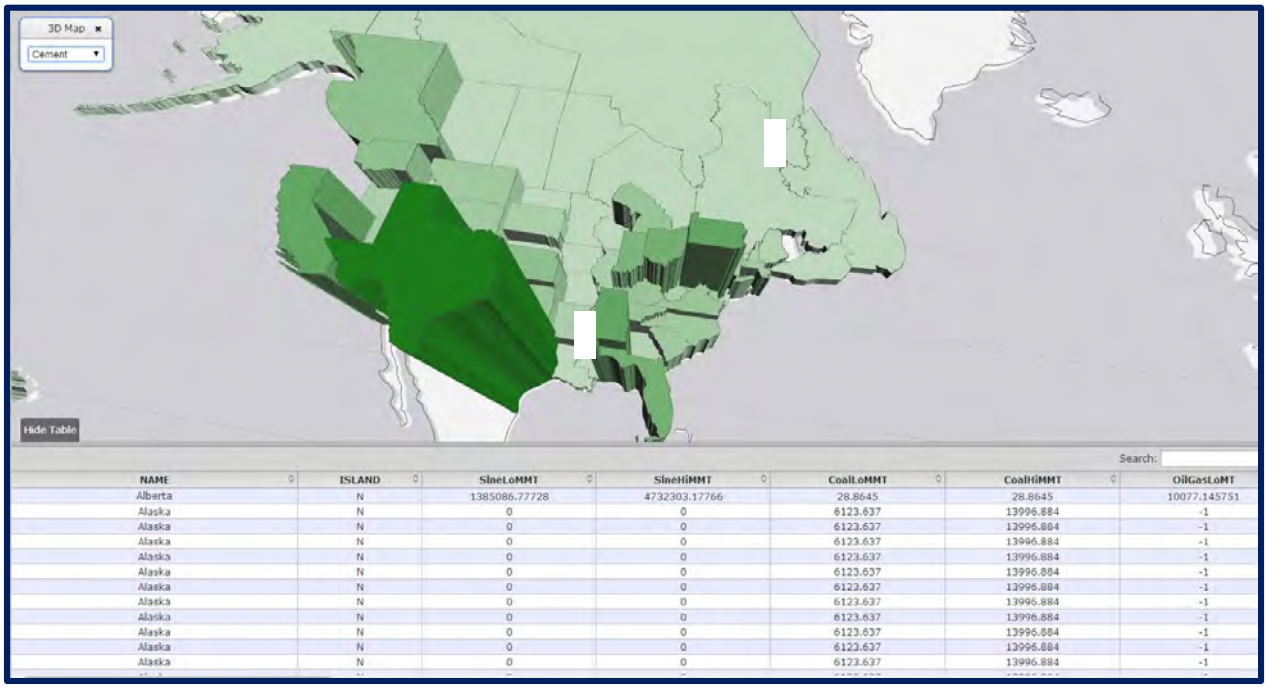
1) **Upload LAS file:** User can upload LAS file from their computer
2) **Assign Tracks:** User can click on assign tracks button and choose specific tracks for the logs
3) **Well Information:** User can view detailed well information
4) **Formation Tops:** User can view formation information or upload formation information if it is not part of the LAS file
5) **Track Order:** User can turn on/off track order by clicking on check box

## 3D Viewer

*By CartoVis.com*

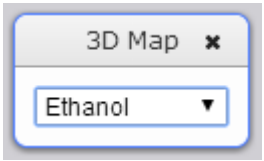
3D

Users can visualize $CO_2$ emissions and storage potential of different states in 3D view




| NAME | ISLAND | SlneLoMMT | SlneHiMMT | CoalLoMMT | CoalHiMMT | OilGasLoMT |
|---|---|---|---|---|---|---|
| Alberta | N | 1385086.77728 | 4732303.17766 | 28.8645 | 28.8645 | 10077.145751 |
| Alaska | N | 0 | 0 | 6123.637 | 13996.884 | -1 |
| Alaska | N | 0 | 0 | 6123.637 | 13996.884 | -1 |
| Alaska | N | 0 | 0 | 6123.637 | 13996.884 | -1 |
| Alaska | N | 0 | 0 | 6123.637 | 13996.884 | -1 |
| Alaska | N | 0 | 0 | 6123.637 | 13996.884 | -1 |
| Alaska | N | 0 | 0 | 6123.637 | 13996.884 | -1 |
| Alaska | N | 0 | 0 | 6123.637 | 13996.884 | -1 |
| Alaska | N | 0 | 0 | 6123.637 | 13996.884 | -1 |
| Alaska | N | 0 | 0 | 6123.637 | 13996.884 | -1 |
| Alaska | N | 0 | 0 | 6123.637 | 13996.884 | -1 |
| Alaska | N | 0 | 0 | 6123.637 | 13996.884 | -1 |

Visualization themes can be changed by choosing theme in drop-down menu




| 3D Viewer Mouse Operations: | |
|---|---|
| **Left Click** | Rotate 3D model |
| **Right Click** | Hold and move 3D model |
| **Scroll Button** | Zoom 3D model |