National Energy Water Treatment & Speciation (NEWTS): A Water & Critical Minerals Database and Dashboard

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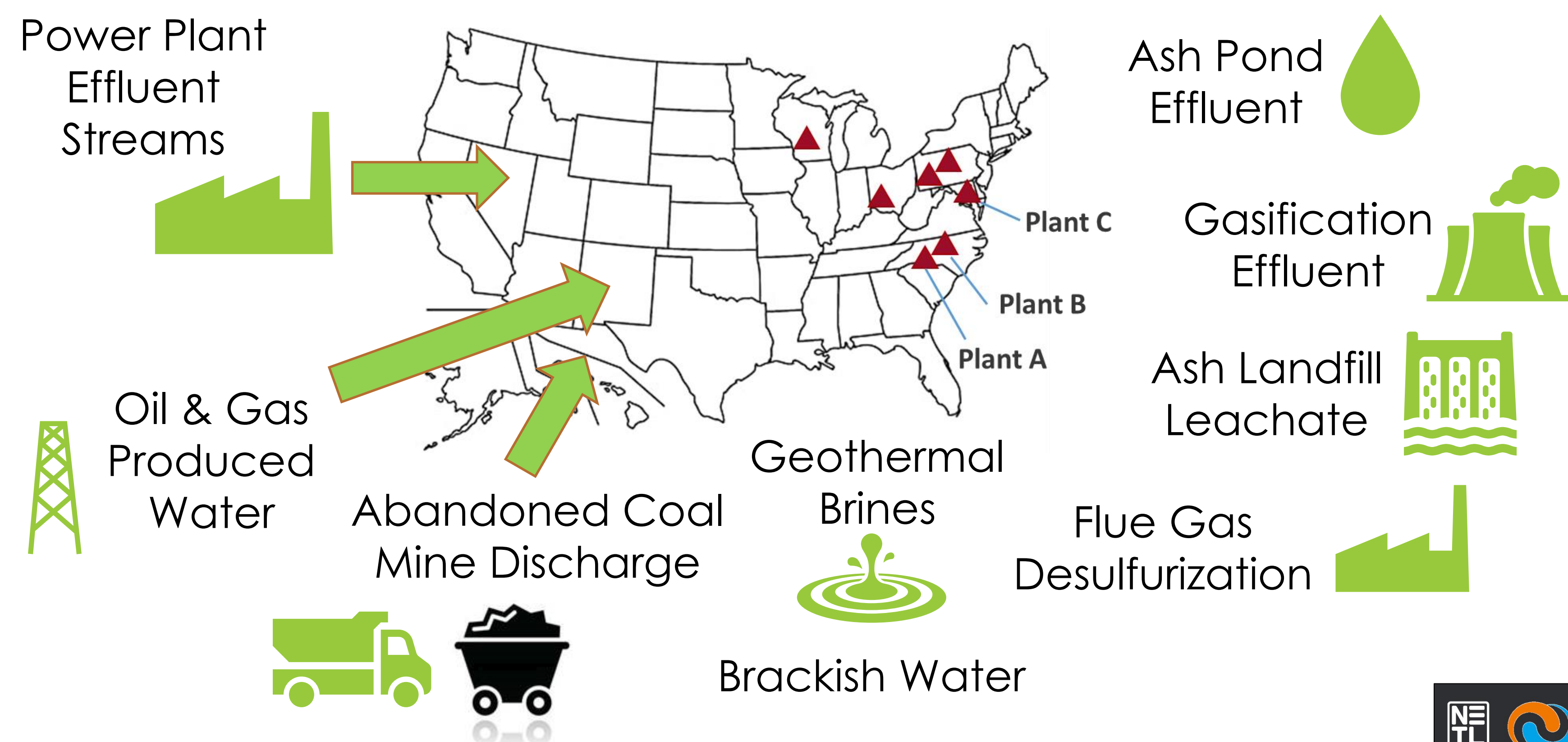
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Addressing challenges with *accessing* & *using* water data for water management decisions

Power Plant Effluent Streams
Oil & Gas Produced Water
Abandoned Coal Mine Discharge
Geothermal Brines
Brackish Water
Ash Pond Effluent
Gasification Effluent
Ash Landfill Leachate
Flue Gas Desulfurization

Plant C
Plant B
Plant A

The National Energy Technology Laboratory (NETL) launched the **National Energy Water Treatment and Speciation (NEWTS) Database and Dashboard**, which can be utilized by stakeholders, researchers, and communities for **improved access** to **aqueous chemistry data** on energy-related wastewaters. NEWTS contains **public data** aggregated from **federal and state-level resources** and proprietary resources, and provides information about the *major and minor ions, critical minerals, and levels of toxins* and other hazardous materials found in energy-related wastewater streams.

Problem
Energy process wastewater data are *disparate* and *incomplete*; these data are **necessary** to design **treatment** technologies and understand **wastewater re-use** opportunities

Solution
Develop an open-source *database and visualization platform* which can be utilized to better understand the **composition** of energy-related wastewater streams and enable informed **management decisions**.

NEWTS Database Dashboard
Provides easy, public access & visualization of resources for querying and investigation of trends

- 439,120 records
- 8 stream categories
- 24+ original resources
- >400 features

Water Data Acquisition Steps

Objectives:
- Develop **national, uniform, easy to model** data
- **Obtain** and **process** difficult-to-access datasets
- **Directly link** final product to original resources
- Provide processed data to reduce time and effort needed to use aqueous chemistry information
- Ensure integration with aqueous chemistry modeling software

Acquire
Data and **metadata** gathered from disparate, publicly available resources

Integrate
Compiled data into a uniform resource based on **Attribute Mapping Schema**

Transform
Data transformed into formats usable for aqueous chemistry modeling software to support decision making

Map & Visualize
Use spatial information to **visualize trends** on the **NEWTS Dashboard**, including summary data by stream type, and water production volumes
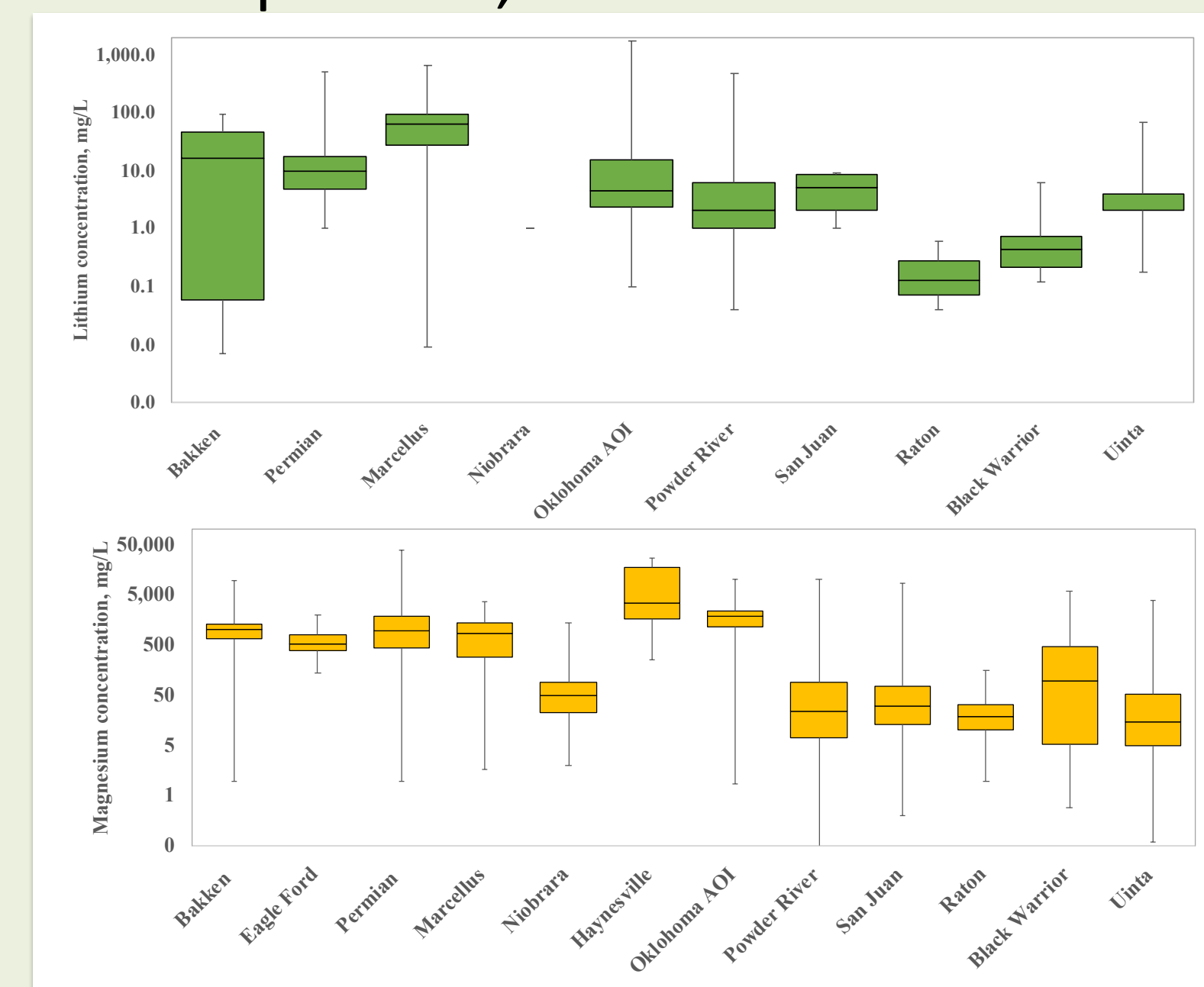
Publish
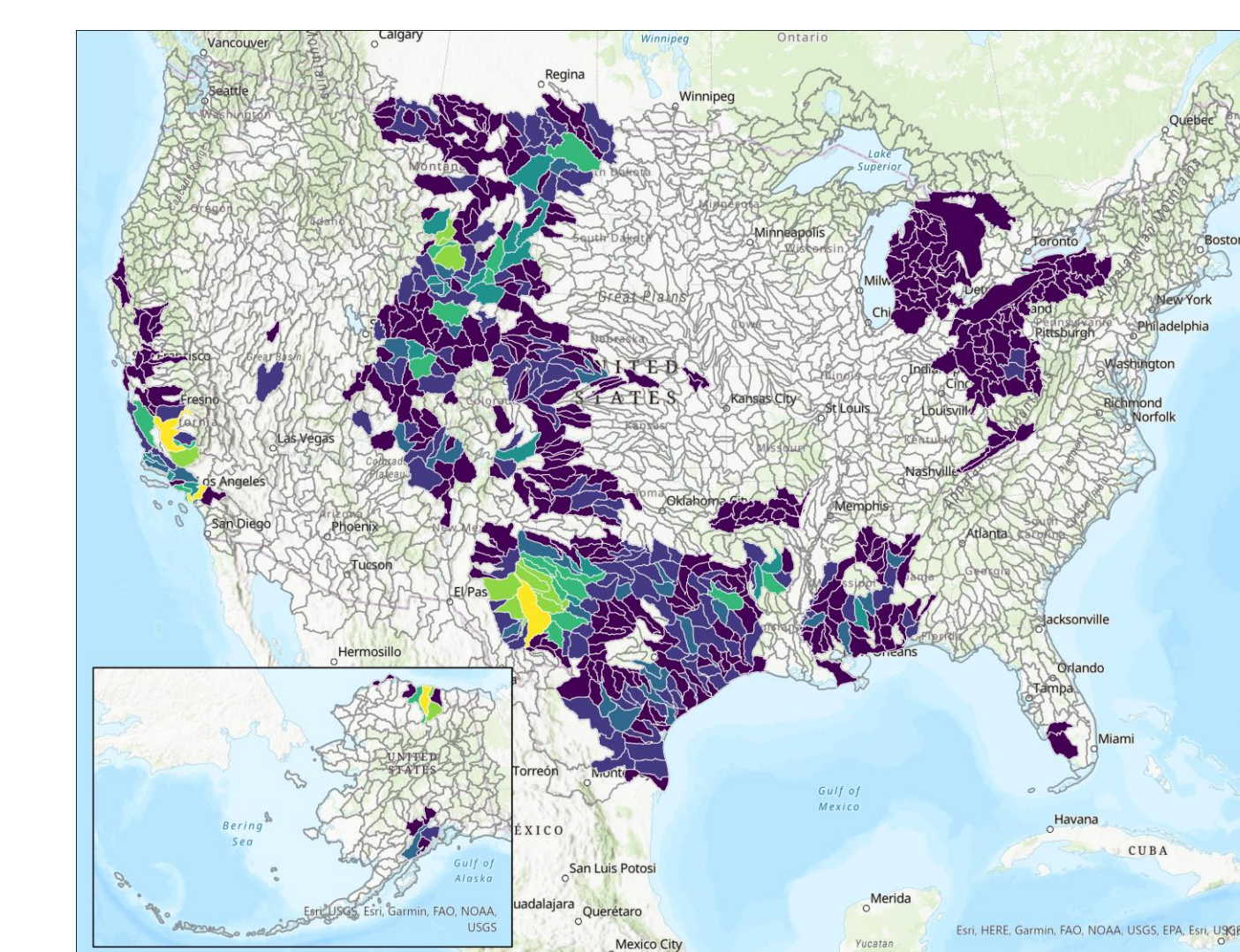**Publicly** released database through **NEWTS EDX Group & NEWTS Dashboard**

Water quality data available
Major and minor ions, critical mineral composition, and stream attributes
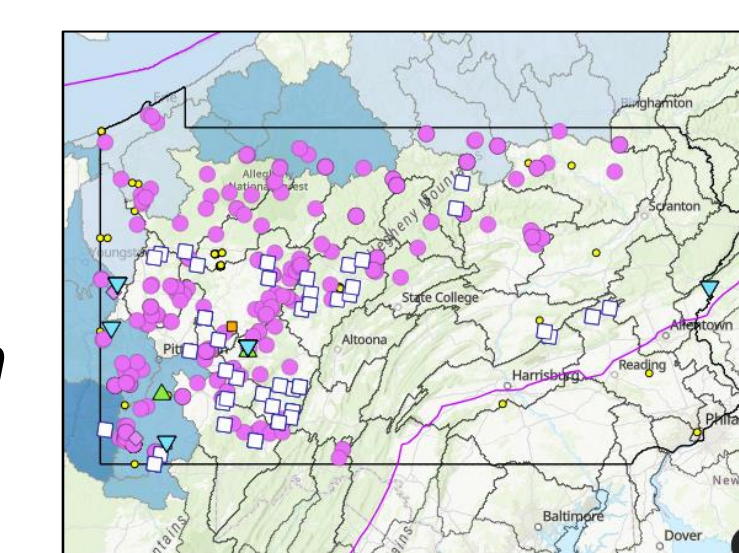
Critical minerals present include:
Li, Co, Mg, Mn, Ni, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Sc, Y

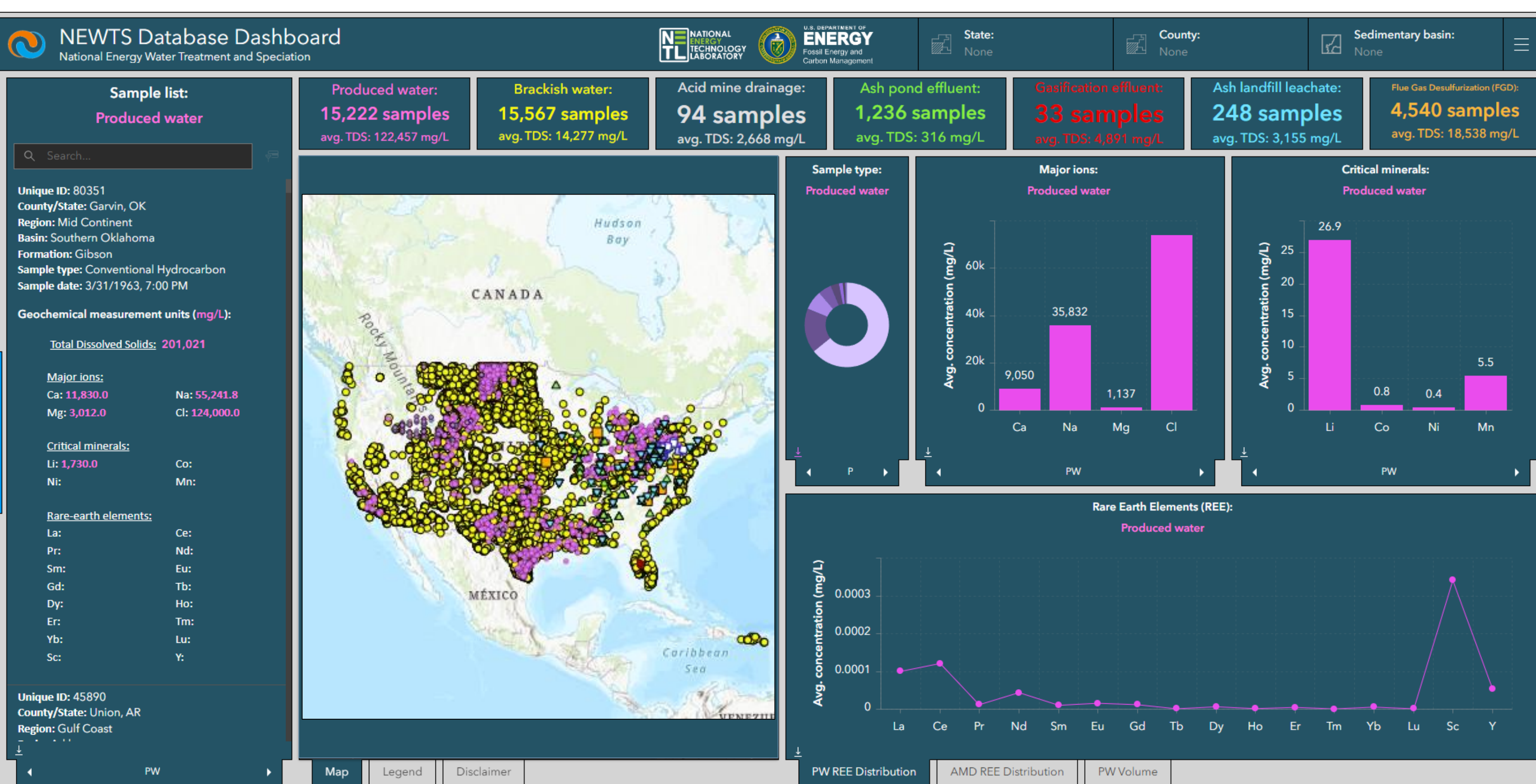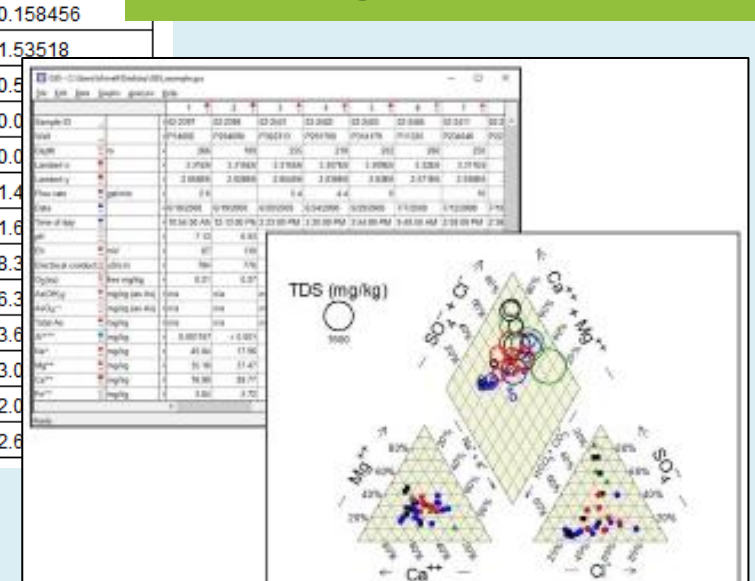*Produced water volumes* from oil and gas wells per hydrologic subbasin
(Data source: Enverus)

Integration with software formats to enable modeling

NEWTS National Energy Water Treatment and Speciation Database
Datasets from the National Energy Water Treatment and Speciation (NEWTS) Database, including water quality information on streams from energy processes. read more

EPA FGD Effluent Dataset
Raw data: one row per measurement

EPA FGD Effluent data in NEWTS Template
Processed data: One column per stream. Easy input into modeling software

Data processing for ease of use; supporting water management, treatment & beneficial reuse modeling

Sample NEWTS OLI Template
Modeling template: Enables straightforward entry of data including relevant species

Calculate thermodynamic properties & scaling tendencies

NAWI — National Alliance for Water Innovation
The Geochemist's WORKBENCH
OLI systems, inc.
WAVE Water Treatment Design Software

NEWTS Database Dashboard
National Energy Water Treatment and Speciation

Sample list: Produced water

Produced water: 15,222 samples avg. TDS: 122,457 mg/L
Brackish water: 15,567 samples avg. TDS: 14,277 mg/L
Acid mine drainage: 94 samples avg. TDS: 2,668 mg/L
Ash pond effluent: 1,236 samples avg. TDS: 316 mg/L
Desulfurization wastewater: 33 samples avg. TDS: 4,831 mg/L
Ash landfill leachate: 248 samples avg. TDS: 3,155 mg/L
Flue Gas Desulfurization (FGD): 4,540 samples avg. TDS: 18,538 mg/L

Unique ID: 80351
County/State: Garvin, OK
Region: Mid Continent
Basin: Southern Oklahoma
Formation: Gibson
Sample type: Conventional Hydrocarbon
Sample date: 3/31/1963, 7:00 PM

Geochemical measurement units (mg/L):
Total Dissolved Solids: 201,021
Major ions:
Ca: 12,800.0   Na: 55,241.0
Mg: 3,012.0   Cl: 124,000.0

Critical minerals:
Li: 1,730.0   Co:
Ni: Mn:

Rare-earth elements:
La: Ce:
Pr: Nd:
Sm: Eu:
Gd: Tb:
Dy: Ho:
Er: Tm:
Yb: Lu:
Sc: Y:

Unique ID: 45890
Region: Gulf Coast