RBDMS WaterSTAR

GWPC 2020 Virtual Annual Forum

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www.rbdms.org

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AGENDA

- Why This Application is Needed
- What are the Capabilities of WaterSTAR
- Who are the Current Users of WaterSTAR
- Cross-Agency Benefits
- Phase 1 Application Overview
- Technology
- Phase 1 Production Applications

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The Need for RBDMS WaterSTAR

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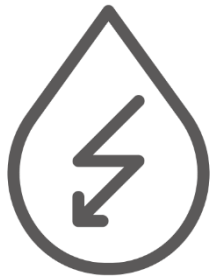
Why develop RBDMS WaterSTAR?

Need for water quality tracking and reporting continues to grow.



Opportunity to change the historically disjointed systems used for water data.

Foster cross-agency and state collaboration and reduce agency effort and cost.

Database structured to accommodate the needs of any agency.

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What is WaterSTAR?

High-level Functionality	Agency	Industry	Public
Manages laboratory analytical and field data for all environmental matrices.	✓		
Electronically receives validated data from laboratories and industry users, eliminating data entry.	✓		
Manage sample result submissions.	✓		
Alerting agency users when labs submit sample result reports that exceed limits flagged as acceptable for specific parameters.	✓		
Manage access to confidential data.	✓		
Ability to securely submit Electronic Data Deliverables (EDD) with front-end validation checks.	✓	✓	
View and analyze validated data through various statistical, charting outputs, and integrated GIS from multiple sources and agencies.	✓	✓	✓
View high-level aggregate data both visualized and in reports.	✓	✓	✓
Download validated data.	✓	✓	✓

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States using all or portions of WaterSTAR

- ✓ Alabama Geological Survey
- ✓ California DOGGR
- ✓ Colorado COGCC
- ✓ Nebraska DEE
- ✓ Ohio Division of Mineral Resource Management
- ✓ Wyoming DEQ
- ✓ Wyoming Oil and Gas

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Cross-Agency Benefits

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How it Benefits You

View multiple organization and agency datasets from a single application.

Intuitive User Interface drives user satisfaction and adoption.

Electronic data submission, validation, and workflows reduce staff effort and cost.

Configurable roles and security maintain confidential data.

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Phase 1 Application Overview

Phase 1 Development

The RBDMS WaterSTAR application is:

- Designed to be integrated into any agency data system.
- Configurable to meet an agency's UI/UX needs.
- Part of the RBDMS suite of products. All RBDMS states will have access to developed functionality and future functionality.
- Currently being updated and implemented with the Nebraska Department of Environment and Energy and Wyoming Department of Environmental Quality.

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Good Life. Great Resources.
DEPT. OF ENVIRONMENT AND ENERGY

DEQ
WYOMING DEPARTMENT OF
ENVIRONMENTAL
QUALITY

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Nebraska Groundwater Quality Clearinghouse

Before

1. Select Search Criteria:
- (•) County
- ( ) NRD
- ( ) Well Location
- ( ) Agency Code
- ( ) Clearinghouse Number
- ( ) Registration Number

2. **Select the Analyte(s) from the following list:** The pesticide analytes are listed by chemical ingredient (e.g., atrazine, 2,4-D, acetochlor). If you know only the trade name (e.g., Roundup, Harness, Bladex**), please exit to the **National Pesticide Information Retrieval System** to find the chemical ingredient.

**Use of trade names on this site is for example only and does not constitute an endorsement.

To learn more about drinking water standards and regulations for these compounds, exit to the USEPA's **Drinking Water Health Advisories website.**

Select Analyte(s) : Number of Analyses - 460405
(Number) = number of analyses in database.

All
1,1,1-trichloroethane (34)
1,2,4-trichlorobenzene (35)
1,2-dibromo-3-chloropropane (236)

(Use CTRL or SHIFT and Left Mouse button to select multiple list items)

Additional pesticide data are available at Pesticide Data Using Enzyme-Linked Immunosorbent Assay **ELISA** for Nebraska Ground Water.

3. **Clearinghouse Quality Flag:**(To learn more about how these data are ranked, refer to Tables 1 and 2 in the metadata link at the top of this page)
(Use CTRL or SHIFT and Left Mouse button to select multiple items or deselect items.)

All
1
2
3
4
5

4. **Sample Data (as m/d/yyyy - Default is full period):**
Specify Beginning Date **Specify End Date**

5. **Well Depth (Default is all records):**

Specify Minimum Well Depth:
Specify Maximum Well Depth:

6. **Select the Well Type from the following list:**
(Use CTRL or SHIFT and Left Mouse button to select multiple list items)

Select Well Use

All
Commercial/Industrial
Domestic
Heat Pump (Ground Water Source)

7. **Select the projection (if you want to use the data in a GIS system).**
- (•) None
- ( ) UTM (Zone 14, Nad 83, Meters)
- ( ) Lat/Long (Decimal Degrees)

8. **Output Format:**
- (•) **Import results to spreadsheet** Directions
- ( ) Web Page Table : (a subset of the spreadsheet.)

9. Sorted By:**NRD**,**County**,**Legal Description**,**Clearinghouse #**.
User Optional Sort Choices.
- [ ] Sample Date
- [ ] Contaminant Name
- [ ] Agency Code

Submit Clear

Ground Water Quality Data Query Results

Selected By County:

Counties Selected :'Antelope'
Analytes Selected: All
QualityFlag Selected: All
Minimum Depth Selected: All
Maximum Depth Selected: All
Well Use Selected: All
Projection of Location Points: None
Output Format: Spreadsheet
Sort Order: NRD, County, Legal Description, Clearinghouse#
Number of Records: 10062

```
Clearinghouse#|Township|Range|Direction|Section|SubSection|NRD|County|WellDepth|ScreenDepth|WellType|Contaminant|DateSampled|Concentration|ReportingLimit|QualityFlag|SampleID|AgencyCode
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|acetochlor|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|alachlor|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|atrazine|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|butylate|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|cyanazine|07/15/1997|0|0.1|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|deethylatrazine|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|deisopropylatrazine|07/15/1997|0|0.1|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|EPTC|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|metolachlor|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|metribuzin|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|07/01/1990|3.0|0.1|2||UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|07/01/1991|3.3|0.1|2|49|UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|07/03/1996|2.9|0.1|4||UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|07/15/1997|3.2|0.1|2||UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|07/12/1999|4.5|0.1|2||UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|08/15/2000|3.9|0.1|3||UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|08/19/2002|4.1|0.1|3||UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|08/03/2004|5.7|0.1|3||UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|07/14/2005|6.2|0.1|3|2005813|UENRD|G48831|56299||01/06/1976||||||
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3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|08/19/2008|5.6|0.1|3|2008438|UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|08/19/2010|6.9|0.1|3||UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|07/26/2011|5.5|0.1|3||UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|06/15/2012|5.7|0.1|2|2012914|UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|08/12/2013|5.4|0.1|2|2013597|UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|07/21/2014|5.5|0.1|4|2014846|UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|07/30/2015|3.7|0.1|4|2015190|UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|07/14/2016|4.5|0.1|4|2016602|UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|nitrate-N|07/05/2017|3.9|0.1|4|2017625|UENRD|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|pendimethalin|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|permethrin|07/15/1997|0|0.1|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|prometon|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|propachlor|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|propazine|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|simazine|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3216|23|5|W|4|DO|Upper Elkhorn|Antelope|228|152-227|I|trifluralin|07/15/1997|0|0.05|2||UN|G48831|56299||01/06/1976||||||
3095|23|5|W|5|BB|Upper Elkhorn|Antelope|216|144-216|I|nitrate-N|07/18/1995|1.5|0.1|3||UENRD|G45049|52405||10/16/1975||||||
3095|23|5|W|5|BB|Upper Elkhorn|Antelope|216|144-216|I|nitrate-N|08/12/1998|1.9|0.1|2||UENRD|G45049|52405||10/16/1975||||||
```

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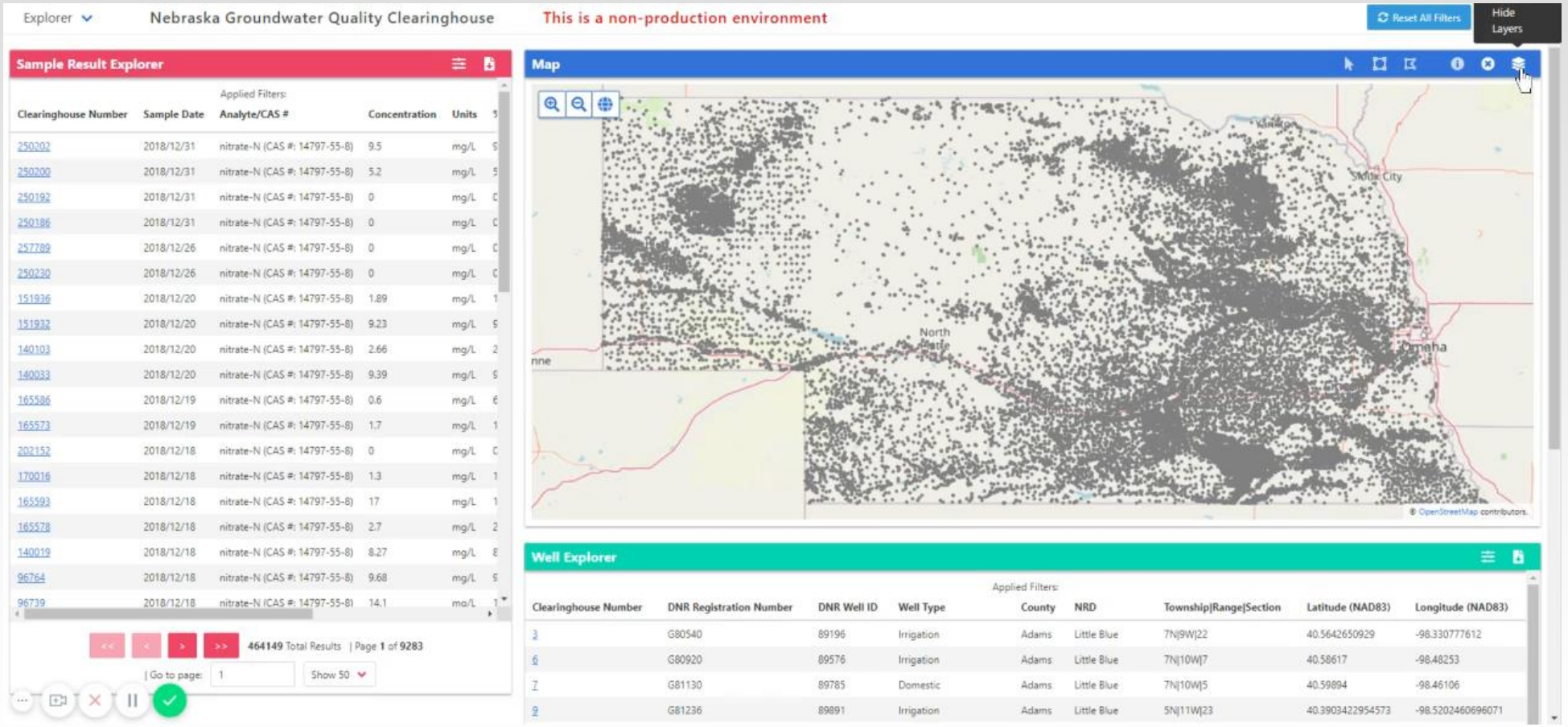
Nebraska Groundwater Quality Clearinghouse

Now



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Nebraska Groundwater Quality Clearinghouse

Before

- Microsoft Access database
- Antiquated User Interface
- No data visualization
- Manual data quality assurance
- Manual posting of approved data to website
- Not structured for USGS Groundwater Monitoring Network participation

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Nebraska Groundwater Quality Clearinghouse

Now

- SQL Server database
- View, download, and interact with sampled wells and sample results
- GIS component
- Electronic data submission with front-end validation checks
- Manage Sample Result submissions
- Manage access to confidential data
- Structured to participate in the USGS NGWMN

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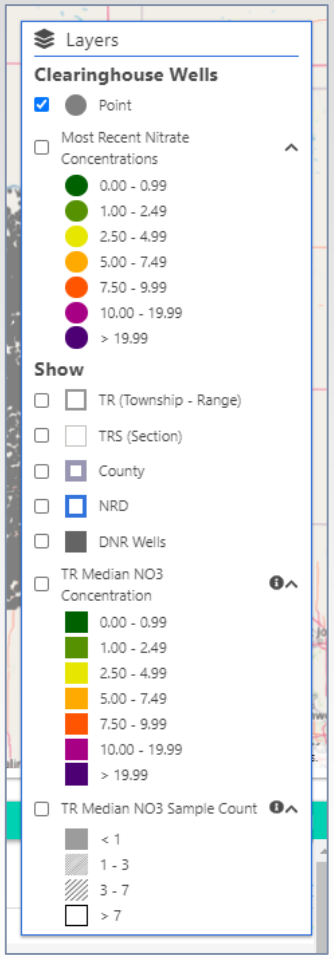
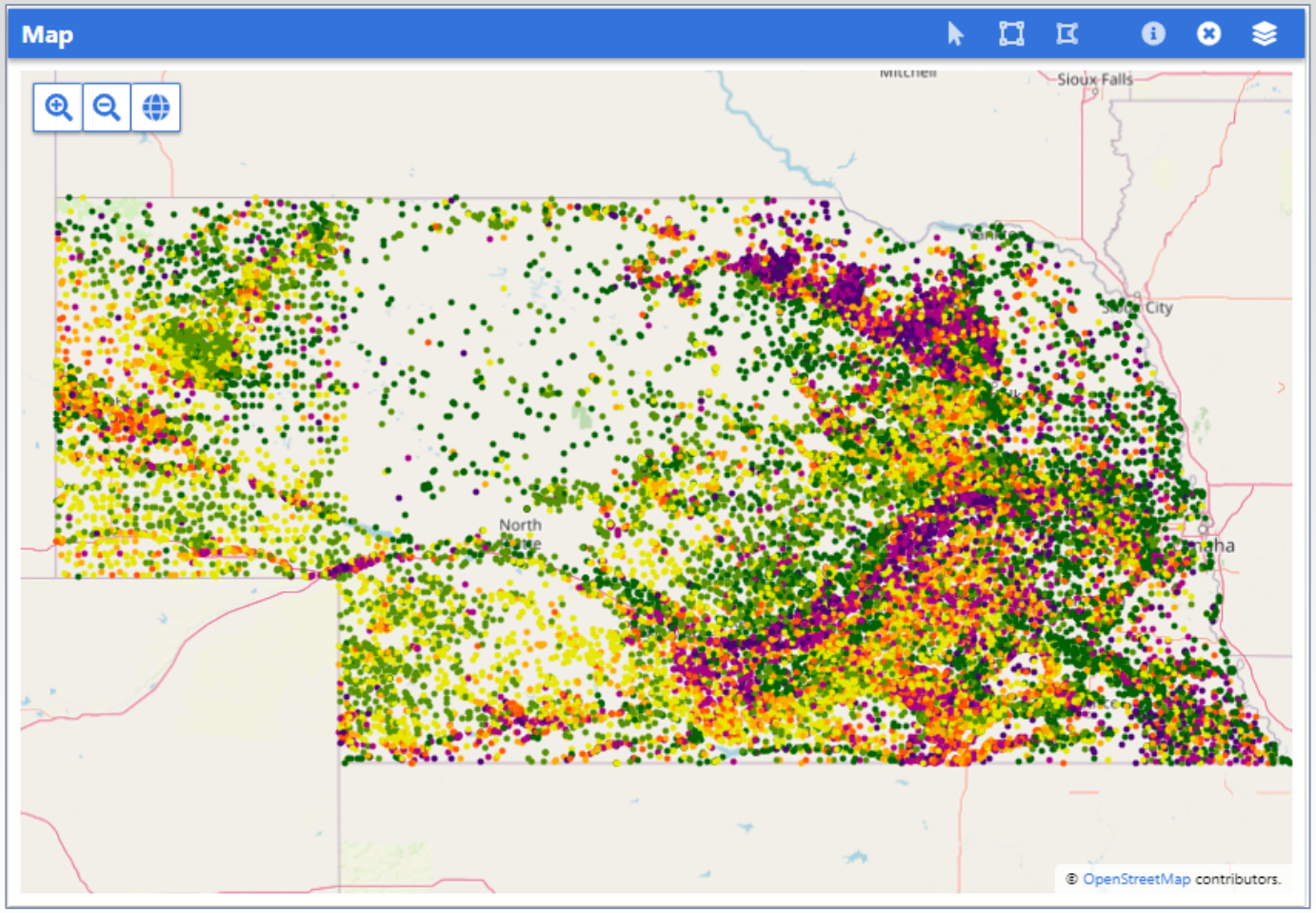
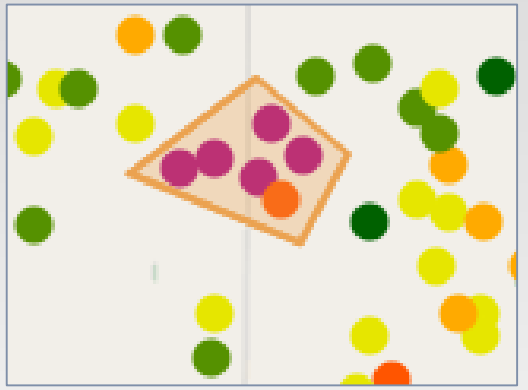
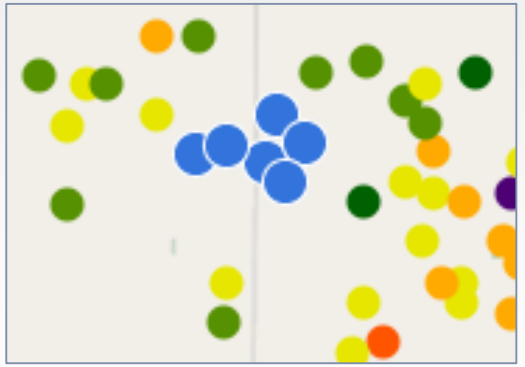
Map









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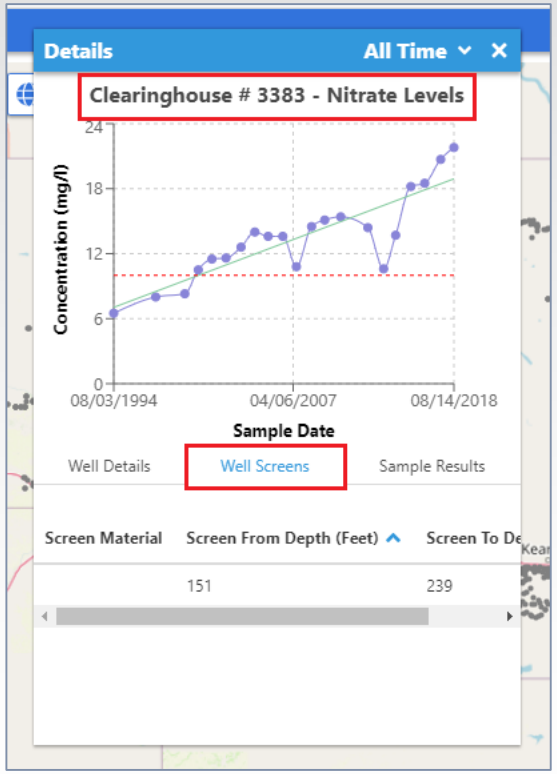
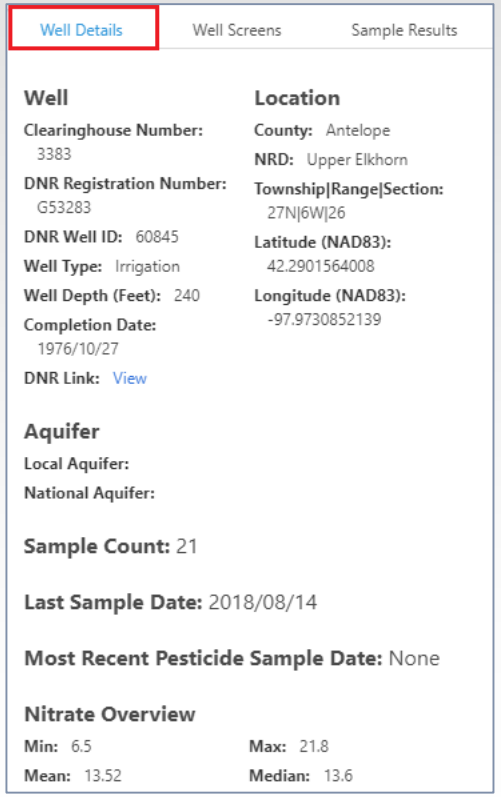
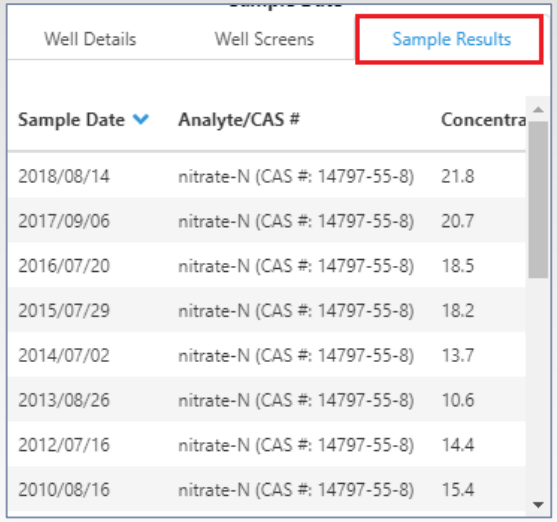
Details

- Pop-up menu for viewing individual well and sample result details
- NE specific requirements for:
  - Nitrate Chart
  - Wells Screens







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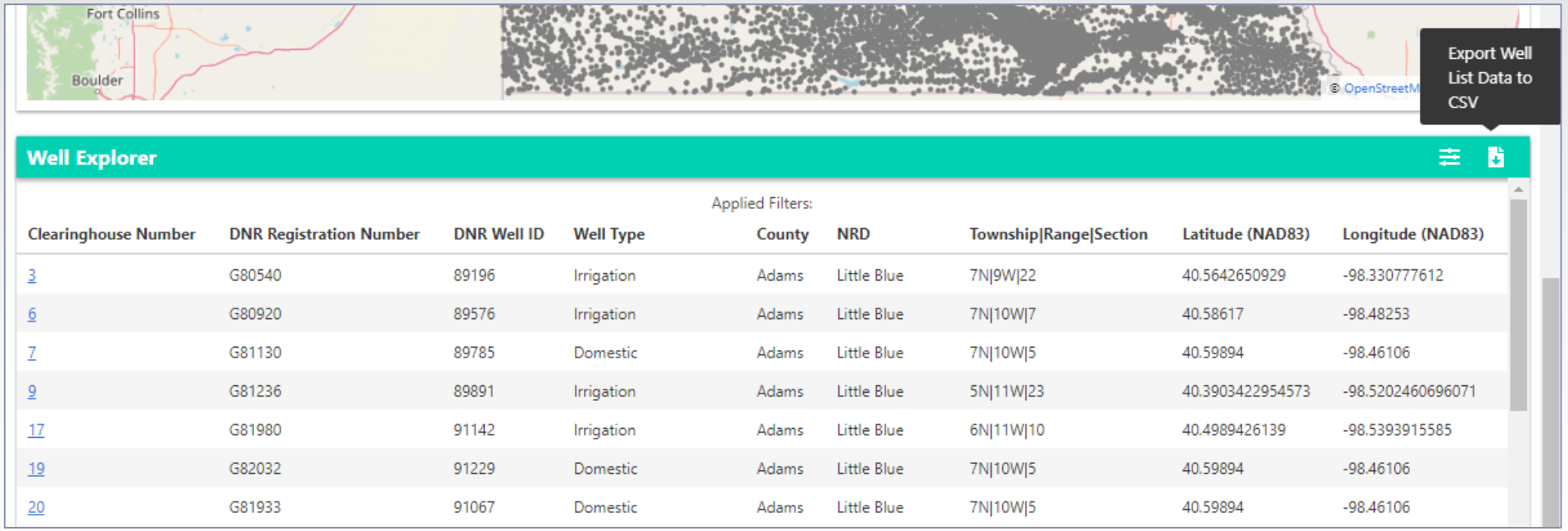
Well Explorer

- Dual-component menu for Well records
  - Well List
  - Well Filter: Well Detail, Location, and Lat/Long



Clearinghouse Number	DNR Registration Number	DNR Well ID	Well Type	County	NRD	Township|Range|Section	Latitude (NAD83)	Longitude (NAD83)
3	G80540	89196	Irrigation	Adams	Little Blue	7N|9W|22	40.5642650929	-98.330777612
6	G80920	89576	Irrigation	Adams	Little Blue	7N|10W|7	40.58617	-98.48253
7	G81130	89785	Domestic	Adams	Little Blue	7N|10W|5	40.59894	-98.46106
9	G81236	89891	Irrigation	Adams	Little Blue	5N|11W|23	40.3903422954573	-98.5202460696071
17	G81980	91142	Irrigation	Adams	Little Blue	6N|11W|10	40.4989426139	-98.5393915585
19	G82032	91229	Domestic	Adams	Little Blue	7N|10W|5	40.59894	-98.46106
20	G81933	91067	Domestic	Adams	Little Blue	7N|10W|5	40.59894	-98.46106

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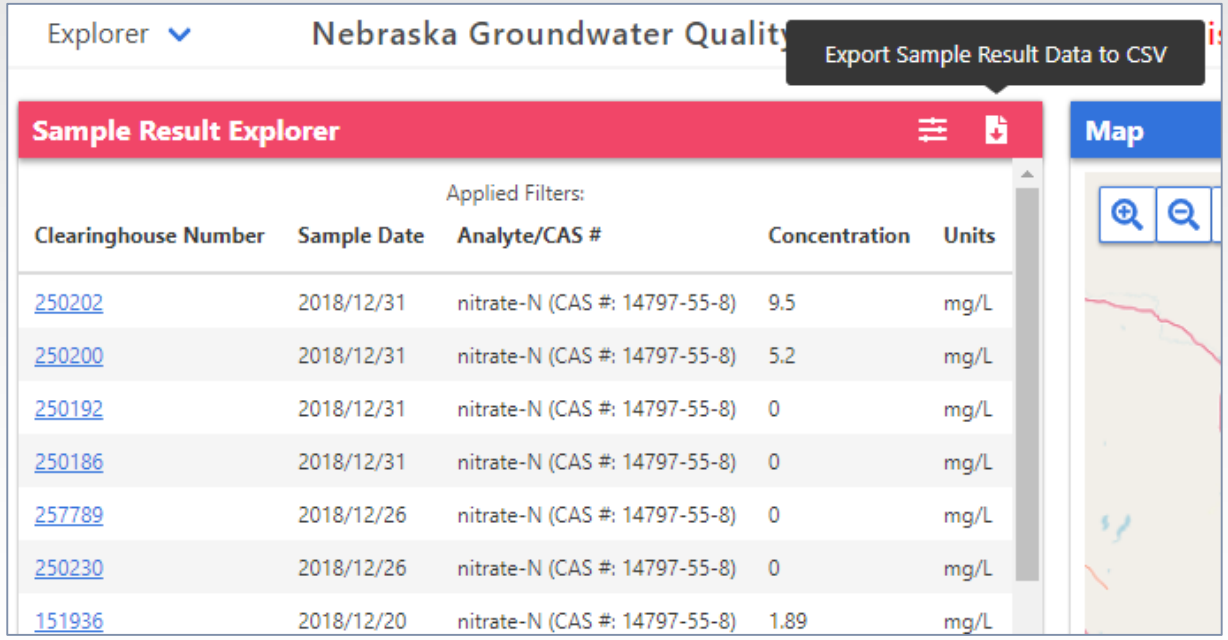
Sample Result Explorer

- Dual-component menu for Sample Result records
  - Sample Result List
  - Sample Result Filter: Analyte, Sample Detail, Analytical Methods, and Maximum Contaminant Level (MCL)



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Phase 2 Enhancements

Module	What	Description
GIS	Thematic Maps	Animated maps showing parameter results over time
GIS	Measure Distance & Area	Tools to measure distance and area on the map
UI	Well Construction	Incorporate the well construction diagram
UI	Resize App Components	Ability for users to resize the view of app components
Submission	Alerts	Automated alerts to agency users for flagged results (e.g. exceeds limit)
Submission	Machine-Compiled EDDs	Assist in creation of machine compiled Electronic Data Deliverables
Reporting	Compare Functionality	Select a set of records to compare across components
Reporting	Dashboard	High-level, aggregate data visually represented
Data	Download	Allow users to select specific datasets for download
Data	Public Water Supply Data	Add public water supply data, but omit/obscure location data in map

Technology

Frontend

- Javascript React App

API

- ASP.NET core (C#)

Database

- SQL Server

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Phase 1 Production Applications

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Wyoming DEQ RBDMS Environmental

The RBDMS Environmental application:

- Is currently being updated to reflect the new WaterSTAR development in NE.
- Is used to view multiple internal and intra-agency datasets.
- Can accept EDD uploads and validate data.
- Has a robust reporting menu.
- Has administrator menus for managing roles, data, and application menus.

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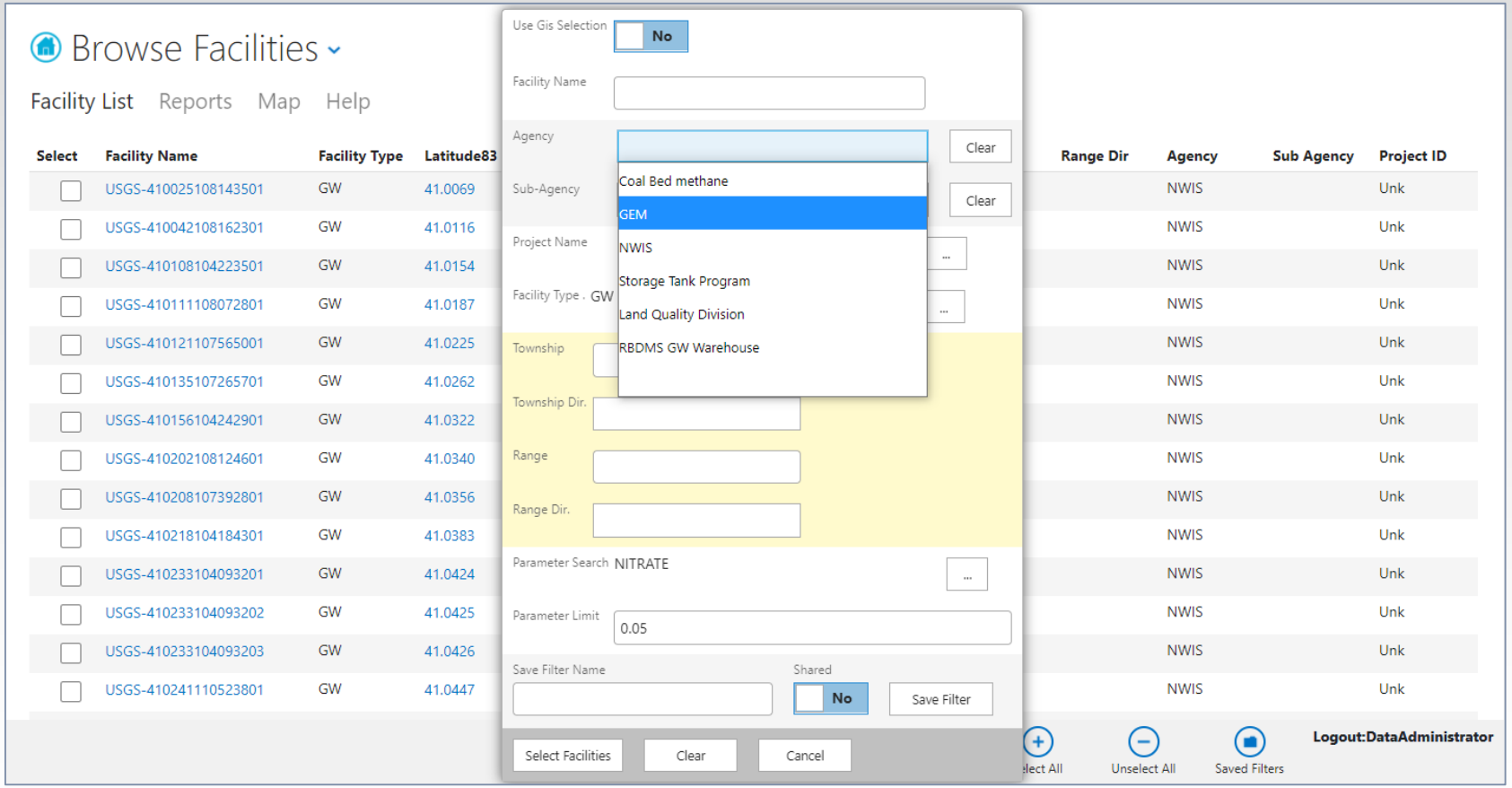
Facility Explorer

- With multiple datasets for searching and data analysis.



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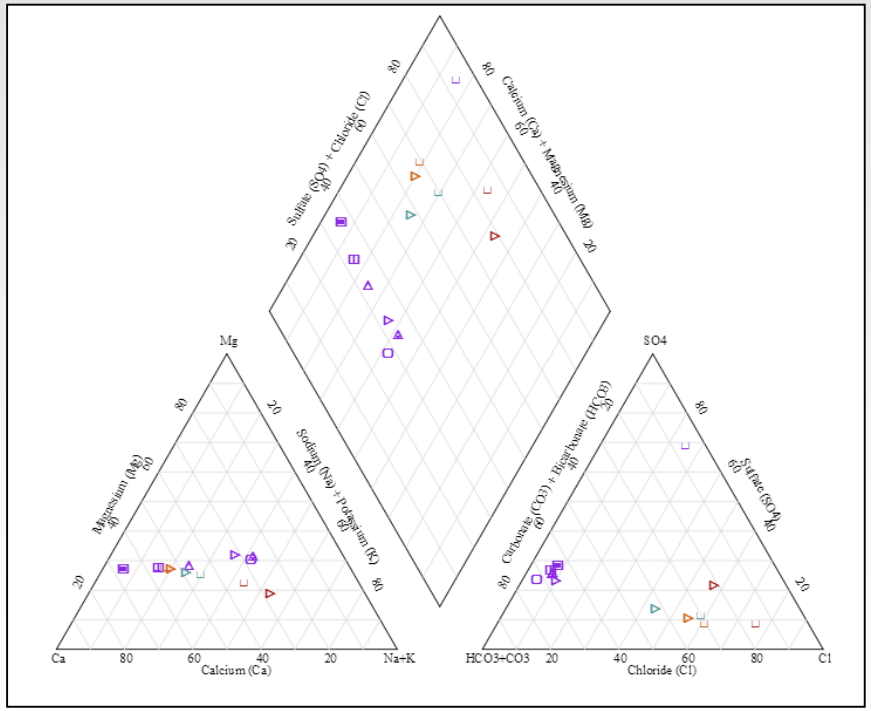
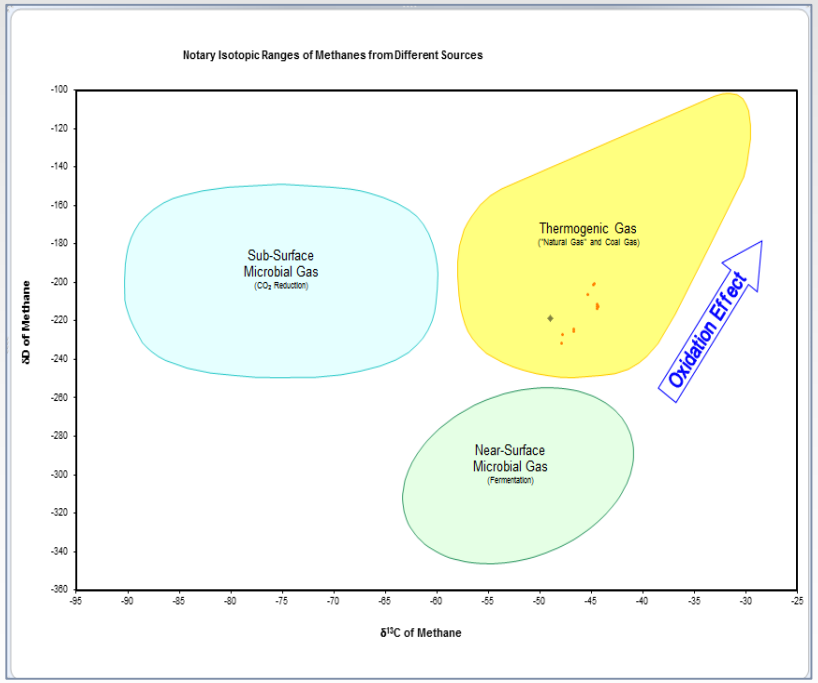
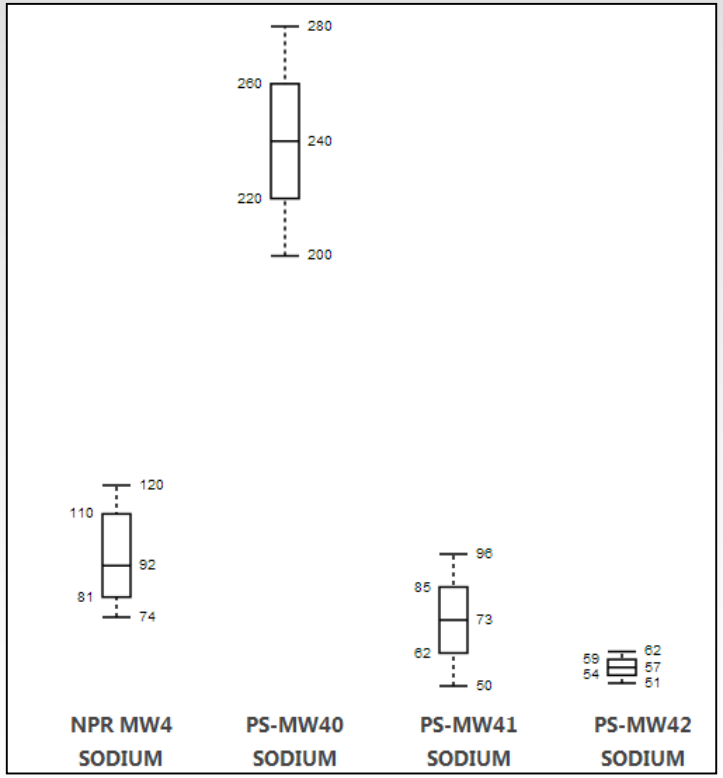
Reporting Output Examples

Piper diagram





Box-whisker



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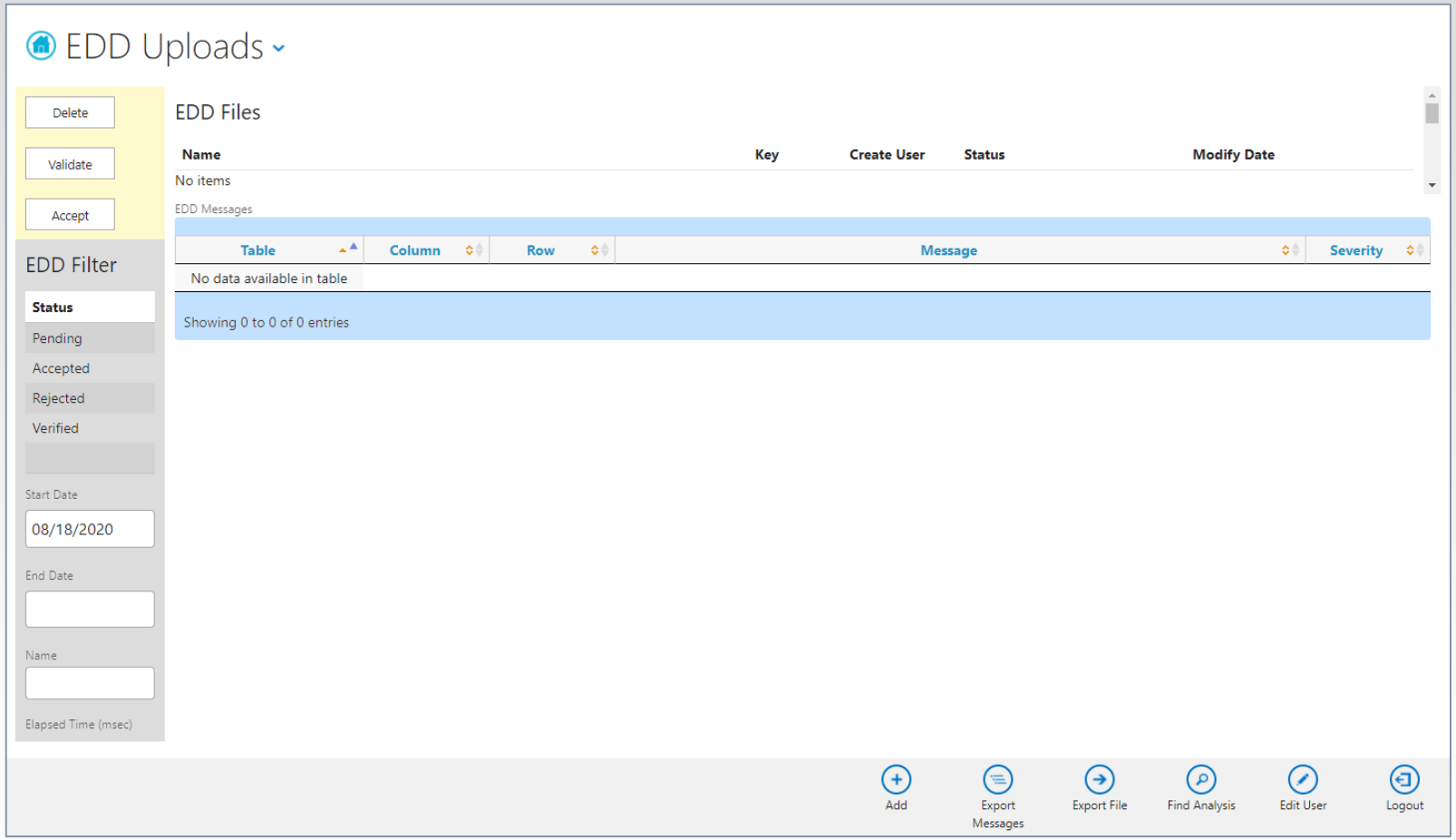
EDD Upload Menu



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Geological Survey of Alabama RBDMS Environmental

The RBDMS Environmental application serves the GSA goal of evaluating ground water development and the impacts of current production by determining:

- Where the water exists.
- How much water is in storage.
- How much active recharge is occurring.
- How much water is being used.
- What the impacts of the usage are.

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Colorado OGCC RBDMS Environmental

The RBDMS Environmental application:

- Is used to track pre and post hydraulic fracturing water quality monitoring.
- Can accept EDD uploads and validate data.
- Has administrator menus for managing roles, data, and application menus.

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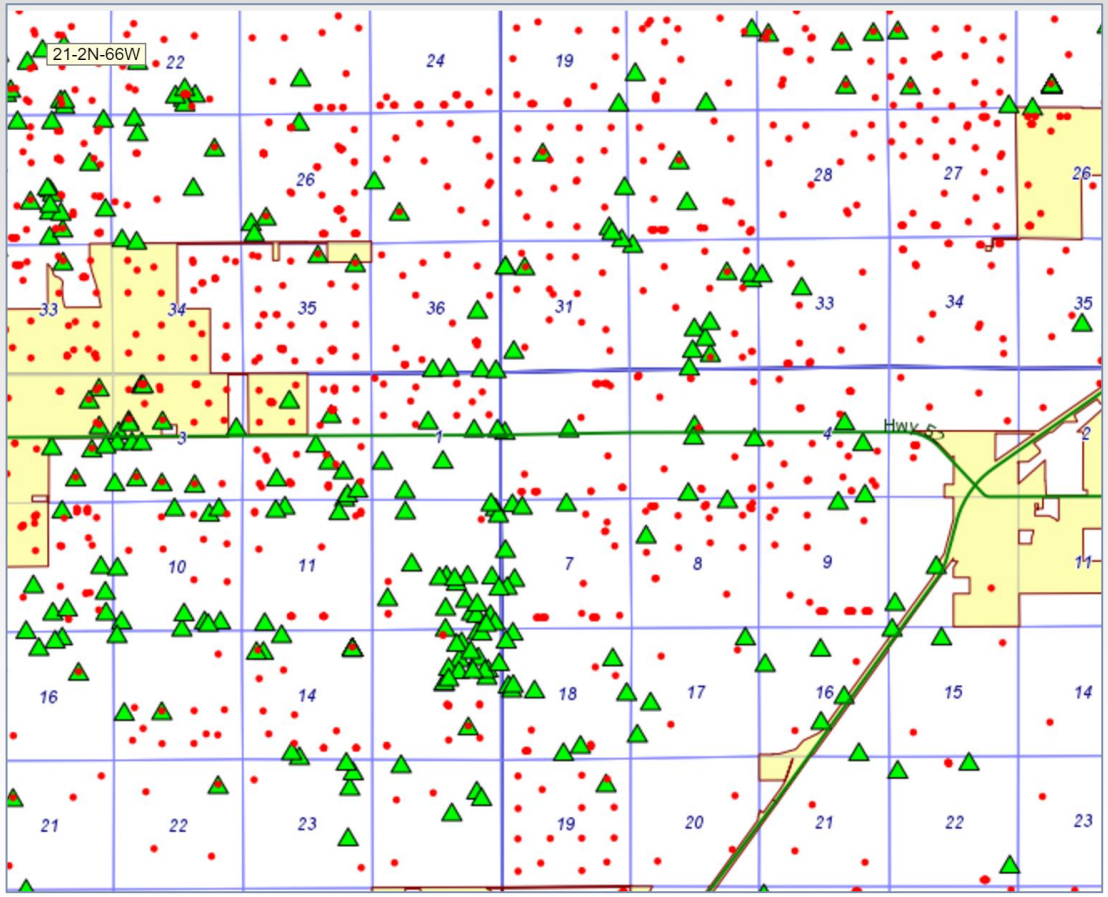

COGIS - Environmental Sample Site Information

Doc GIS

#705573 Information

Sample Site ID:	705573		
FacilityType:	DOM	ProjNumber:	
County:	WELD - #123	Location:	NWSW 25 2N 66W
Elevation:	0	Lat/Long:	40.109/-104.73442
DWR Receipt #:		WellDepth:	700

COGCC Water Quality Database Disclaimer:
The analytical data and other information in this database are a compilation of data collected by COGCC staff, data submitted to COGCC from a variety of third parties, and historical data. All analytical data collected by or submitted to the COGCC is public information and COGCC posts the data to this database as a public service. The data is provided for informational purposes only. COGCC does not conduct a detailed review of quality control/quality assurance protocols, chain of custody procedures, or field or laboratory methodologies on data received from third parties. The level of review performed on historical data is unknown. COGCC does not regularly perform formal data validation for any of the data posted to this database. **The COGCC makes no warranties or representations of any kind, express or implied, regarding the quality, accuracy, reliability, merchantability, or fitness for a particular purpose of the data provided herein.**

Sample(s)

All Export to CSV

Sample ID:	535901	Sample Date:	11/6/2013	Matrix:	GAS	Collection Point:	Dom	Type:	dom	Lab:	Dolan Integration Group
Sample ID:	535790	Sample Date:	11/6/2013	Matrix:	WATER	Collection Point:	Dom	Type:	Dom	Lab:	ALS Lab Group (formerly Paragon)
Sample ID:	535792	Sample Date:	11/6/2013	Matrix:	WATER	Collection Point:	Dom	Type:	Dom	Lab:	ALS Lab Group (formerly Paragon)
Sample ID:	464275	Sample Date:	11/10/2008	Matrix:	GAS	Collection Point:		Type:		Lab:	Isotech Laboratories
Sample ID:	464276	Sample Date:	11/10/2008	Matrix:	WATER	Collection Point:		Type:		Lab:	Evergreen Analytical, Inc.

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Sample(s)

All Export to CSV

Sample ID: 535901 Sample Date: 11/6/2013 Matrix: GAS Collection Point: Dom Type: dom Lab: Dolan Integratio

Sample Results for Sample # 535901 Dolan Integration Group ID: DIG-004237 - Minimize

Methodcode	ParamDescription	ResultValue	Units	DetectionLimit	Qualifier
SOP	BUTANE	0.01	MOL %	0.005	
SOP	C6+ (hexanes +)	ND	MOL %	0.005	ND
SOP	CARBON DIOXIDE	0.16	MOL %	0.005	
SOP	DELTA 13C C1	-71	per mil VPDB		
SOP	DELTA D C1	-269	per mil		
SOP	ETHANE	0.2	MOL %	0.005	
SOP	Helium	22.33	MOL %	0.01	
SOP	HYDROGEN	ND	MOL %	0.01	ND
SOP	ISOBUTANE	0.01	MOL %	0.005	
SOP	ISOPENTANE	ND	MOL %	0.005	ND
SOP	METHANE	34.1	MOL %	0.005	
SOP	NITROGEN (N2)	36.49	MOL %	0.005	
SOP	OXYGEN + ARGON	6.6	MOL %	0.005	
SOP	PENTANE	ND	MOL %	0.005	ND
SOP	PROPANE	0.09	MOL %	0.005	

Sample ID:	535790	Sample Date:	11/6/2013	Matrix:	WATER	Collection Point:	Dom	Type:	Dom	Lab:	ALS Lab Group (
Sample ID:	535792	Sample Date:	11/6/2013	Matrix:	WATER	Collection Point:	Dom	Type:	Dom	Lab:	ALS Lab Group (
Sample ID:	464275	Sample Date:	11/10/2008	Matrix:	GAS	Collection Point:		Type:		Lab:	Isotech Laborato
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