Enabling States to Adapt to Emerging Industry Technologies & Challenges

www.rbdms.org
What is RBDMS?

- A suite of integrated software products that assists state agencies in the effective regulation, oversight and management of oil, natural gas and underground injection control (UIC) facilities and activities.
- Developed by the GWPC and members states, in partnership with the U.S. Department of Energy.
- More than 25 years developing and improving new versions of RBDMS and related products.
- A System that is designed to meet the unique and evolving needs of each state’s regulatory and statutory requirements.
RBDMS provides solutions that allow state programs to more efficiently manage their mission critical activities and responsibilities. RBDMS products increase efficiency for state programs thereby increasing production (faster permitting etc.), reduce data errors, and ensure environmental protection.

### State Mission Critical Responsibilities

<table>
<thead>
<tr>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permitting</td>
</tr>
<tr>
<td>Drilling &amp; Completion</td>
</tr>
<tr>
<td>Production</td>
</tr>
<tr>
<td>Plugging &amp; Abandonment</td>
</tr>
<tr>
<td>Inspection &amp; Compliance</td>
</tr>
<tr>
<td>Facilities</td>
</tr>
<tr>
<td>Environmental Protection Through Well Life Cycle</td>
</tr>
</tbody>
</table>

### RBDMS Capabilities

- Permitting
- Drilling & Completion
- Production
- Plugging & Abandonment
- Inspection & Compliance
- Facilities
- Environmental Protection Through Well Life Cycle
RBDMS Product Benefits

- Streamlines permitting processes, reporting, and oversight; thereby facilitating energy development and economic growth
- Increases efficiency and accuracy of industry data reported to the states
- Facilitates access to state-held industry and regulatory data, thereby increasing transparency
- Facilitates exchange of ideas, technology advances, and innovative data management solutions from state to state
- Helps agencies reduce operating expenses while increasing efficiency
State-Driven Solutions: The Products

Core
Primary information storage system for agency oil, gas & UIC data

Produced Water Tracker
Manages field observations and water sampling data

Seismic Monitoring
Queries extensive data from multiple databases about specific underground injection wells and earthquakes

eForms
eForm allows for electronic permitting and reporting

WellFinder Application
Free, publicly-available mobile application (iOS & Android) displaying nearby oil, gas, and injection well information

Field Inspection
(Coming Soon) – Allows agency field inspectors to make real-time critical decisions while performing a field inspection

Data Explorer
Provides an interactive mapping interface and robust data exploration options

WellBore Analysis
A visual add-on that generates cross-section diagrams of a well

Produced Water Tracker

Seismic Monitoring

WellFinder Application

Field Inspection

Data Explorer

WellBore Analysis
Latest Updates
RBDMS Core

- Primary information storage system for agency oil, gas and UIC data.
- Provides reliable and time-tested storage for the data needed to make informed decisions.
- RBDMS 3.0, a major upgrade to RBDMS Core will be web-enabled once complete and mobile friendly.

Business to Government – RBDMS WellStar

- Web-based allows industry systems to talk to state systems directly
- Reduces personnel time and errors
- Increases efficiency of permitting and reporting
- Cyber security upgrades
- Faster permitting & reporting allows for more efficient production, directly impacting the economy.
WellFinder Mobile Application

Purpose

• Displays nearby oil, gas, and injection wells.
• Used by members of the public, inspectors, emergency responders and others who must locate wells in their area and understand basic information about the well.
• Powered by the same data as the Oil and Gas Data Gateway which is a central location for public oil and gas data displayed in both map and tabular formats.

Features

Search wells to display valuable data:

• API (permit) numbers
• Well type (oil, gas, injection, etc.)
• Well status (active or plugged)
• Operator contact information
• Recent & historical production data
• Regulatory agency contacts

Usage

To date, WellFinder contains data for Oklahoma, Nebraska, New York, Arkansas, and Mississippi.
Seismic Application

Purpose

The Seismic Application queries data from multiple databases about specific underground injection wells and earthquakes. Agency staff enter search parameters to visualize well and earthquake data on a map, allowing for quick analysis and regulatory action.

A Success Story: Seismic Application in Oklahoma

• In 2013, the state of Oklahoma experienced 109 magnitude 3+ earthquakes. In 2015, that number had increased by 732 percent to 907 magnitude 3+ earthquakes. In September 2014, Oklahoma Governor Mary Fallin formed the Coordinating Council on Seismic Activity. The Council asked the GWPC to lead development of an application that would visualize data from injection wells and earthquakes on a map as well as isolate target wells and locations for analysis.

• With the Seismic Application, Oklahoma Corporation Commission (OCC) staff have access to real-time data. Work formerly taking 3 days now takes one staff member minutes, and serves as an essential tool for initial analysis of seismic concerns.

• By reducing the amount of staff time necessary to analyze data, the OCC now has additional time for deeper analysis of present-day and historical seismic/production data, which helps to shape proactive and sound regulatory action if necessary, as well as to more easily verify operator compliance.

• As part of the RBDMS suite of products, the Seismic App is expanding its impact nationally. State regulatory agencies nationwide now have the opportunity to piggyback on Oklahoma’s success by implementing the application in their programs.
OK Seismic Application: Dashboard Features

Summary: Last 60 days
547 Seismic Events

Graduated Symbols: Blue markers – Wells: Avg Daily Volume (60 days)
Red markers – EQ Events: Magnitude

Well Volume Detail

Volume Curve Comparison Charts: Custom Well Sets

EQ Event Detail
OK Seismic Application: Search Filters

Earthquakes listed in red text happened within 24 hours.

Data Feed
UIC Data is from OCC via once a week report.
Seismic Data is from the Oklahoma Geological Survey and is updated every 20 minutes.

Each module has a long list of filters for narrowing the list based on location, type, size, etc.
Purpose

RBDMS Field Inspection is a web-enabled product designed to assist field inspectors in managing their inspections by minimizing data entry and maximizing their ability to document site details and problems.

Features

• Offline capabilities
• Secure login
• Available for use in the field on laptops and tablets
• Communicates directly with RBDMS giving supervisors instant results
• Includes a risk matrix to help inspectors prioritize high risk wells
• Access to multilateral and FracFocus data

Usage

Pilot tested in Utah, Michigan and California
National Oil & Gas Gateway
### FracFocus Disclosure Form Example

**Hydraulic Fracturing Fluid Product Component Information Disclosure**

<table>
<thead>
<tr>
<th>Operator Name</th>
<th>Yelu Oil &amp; Gas LP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Name and Number</td>
<td>Blakemore Minerals 35-229-G1</td>
</tr>
<tr>
<td>Latitude</td>
<td>32.140349</td>
</tr>
<tr>
<td>Longitude</td>
<td>-89.360970</td>
</tr>
<tr>
<td>Depth</td>
<td>30,414.84</td>
</tr>
<tr>
<td>Total Horizontal Volume (gal)</td>
<td>12,430</td>
</tr>
<tr>
<td>Total Vertical Volume (gal)</td>
<td>61,215</td>
</tr>
</tbody>
</table>

**Hydraulic Fracturing Fluid Composition**

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Supplier</th>
<th>Purpose</th>
<th>Ingredients</th>
<th>Maximum Concentration by Volume</th>
<th>Maximum Concentration by Weight</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Yelu Oil &amp; Gas LP</td>
<td>Base Fluid</td>
<td>7320-19-5</td>
<td>81,000.00</td>
<td>0.0177</td>
<td></td>
</tr>
<tr>
<td>PRO-300</td>
<td>Yelu Oil &amp; Gas LP</td>
<td>Fractin Antecedent</td>
<td>7320-18-2</td>
<td>60,000.00</td>
<td>0.0063</td>
<td></td>
</tr>
<tr>
<td>TCO-3</td>
<td>Yelu Oil &amp; Gas LP</td>
<td>Cell Wetter</td>
<td>7320-18-5</td>
<td>50,000.00</td>
<td>0.0099</td>
<td></td>
</tr>
</tbody>
</table>

**Additives**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propylene Glycol</td>
<td>0.0006</td>
<td></td>
</tr>
<tr>
<td>Potassium carbonate</td>
<td>0.0007</td>
<td></td>
</tr>
<tr>
<td>Diethylamine</td>
<td>0.0007</td>
<td></td>
</tr>
<tr>
<td>Ethanol (C12-C18)</td>
<td>0.0007</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

1. All water sources should be included. Types of water include: natural, treated water, produced water, recycled water, and injected water.
2. Concentration in volume or weight by the total volume of the fluid stream for the entire well.
3. Information is based on the maximum applied to be concentrated and not the total amount used.
4. The data for hydraulic fracturing products that begin with C12-C18, means the aromatic has been provided to us by the supplier.Additional data that was obtained from the supplier's Safety Data Sheets (SDS).
FracFocus (Coming Soon)

- New Design
- Live statistical information
- Easy to navigate
- Responsive to smart phones and tablets
- Each search to pull well information directly into site
- Ability to download more detailed PDF report on each well
Produced Water As A Resource

Identifying Opportunities & Challenges
GWPC’s Interest in Produced Water

• By identifying opportunities and challenges of using produced water and offering options for addressing them, the GWPC hopes to facilitate the development of produced water as a supplement to freshwater resources and fulfill a part of our mission “to promote the protection and conservation of groundwater resources for all beneficial uses.”
Produced Water Working Group

• Multi-stakeholder

• Goals:
  • To identify opportunities and challenges associated with utilizing produced water as a resource
  • To provide suggestions that policy makers, researchers, regulators and others can use to address these opportunities and challenges

• Timeline:
  • Project began mid 2017
  • Draft report to GWPC Board of Directors by early spring 2019
A Unique Collaboration

• State Oil & Gas Regulatory Officials
• State Water Quality Regulatory Officials
• Environmental NGOs
• Industry
• Academics
• Others
Developing Solutions: Modular Approach

**MODULE 01**

**Regulatory & Legal Frameworks**

This module describes the current legal and regulatory frameworks that address produced water. It also addresses changes that may need to occur to facilitate the use of produced water.

**Leadership:**

John Baza, Utah Division of Oil, Gas & Mining Shellie Chard: Oklahoma DEQ, Water Quality

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**MODULE 02**

**Produced Water Use in the Oilfield**

This module describes the current uses and potential future uses of produced water inside the oilfield. It defines the existing constraints of use and identifies the opportunities and challenges of expanded use.

**Leadership:**

Tom Krapatsch, Wyoming Oil & Gas Commission Scott Kell, Ohio Department of Natural Resources

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**MODULE 03**

**Produced Water Use & Research Needs Outside the Oilfield**

This module describes current and potential use of produced water outside the oilfield and identifies the research needs that will need to be addressed to facilitate expanded use.

**Leadership:**

Ken Harris: California Department of Conservation Nichole Saunders: Environmental Defense Fund
Module 1

• Regulatory Oversight – oil and gas activities for the most part are regulated at the state level either through state law or cooperative federalism based on state implementation of CWA, UIC, NPDES etc
  • E&P wastes are exempted from RCRA – Resource Conservation and Recovery Act
  • Regulatory Framework – 2 regulatory programs most often historically associated with management of produced water are the NPDES and UIC permit programs

• Regulatory Involvement throughout the Oil and Gas Water Cycle
  • Ownership of water – state water rights
  • Transportation of water – trucks, pipelines, etc
  • Water storage
  • Hydraulic fracturing
  • Disposition of produced water
  • Beneficial use of produced water

• State Regulations Relating to Produced Water Management vary from state to state as does data availability

• Legal and Policy Challenges to Beneficial Use
  • Surface discharges under NPDES
  • Subsurface injection under UIC
  • Ownership when going from waste to resource
  • Water rights laws – what does/doesn’t apply to produced water?
    • Riparian vs prior appropriation
Module 2

- Current water management practices – processing, storage, transportation, UIC disposal, treatment, reuse, solids management
- Challenges and opportunities related to water management – storage and ponds, transport (truck, pipe, right of way), water compatibility for various uses, water ownership and liability, regulatory hurdles, residuals management
- Current and evolving business models and trends – water management choices / decision tree, trend toward multi-company sharing, emergence of mid-stream companies for water, access to local and mobile treatment options and/or centralized treatment
- Research needs to facilitate faster growth of use – current tech, emerging tech, next gen tech for recycling; treatment and pre-treatment technologies, potential products: lithium, iodine, etc that can be pulled out of produced water
- Policy initiatives that have or can facilitate faster growth of use – regulatory improvement, public data gaps, research needs
Module 3

- The most complicated and forward looking piece
- Some small scale efforts exist
- Moving with caution
- Research needs on all fronts – environmental impact
Questions?


- Produced Water Track – Three sessions focusing on legal & regulatory frameworks and use inside AND outside the oilfield
- Federal updates
- Water quality/quantity monitoring and “big data”
- Emerging groundwater contaminants
- Preliminary agenda now online
- Registration coming soon!