NM Produced Water Research Consortium
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RADIOACTIVE AND HAZARDOUS MATERIALS COMMITTEE

Produced Water Issues In and Out of the Oil Field Panel
NMSU – Carlsbad - July 14, 2021
• Through the Act, statutory and regulatory authority for the reuse of produced water was modified:
  • Reuse inside oil and gas sector remains under the Oil Conservation Division (OCD) of the NM EMNRD,
  • **Reuse outside the oil and gas sector, was designated to the NM Environment Department (NMED).**

• The Act encourages produced water reuse outside oil and gas to:
  • enhance fresh water sustainability,
  • reduce or eliminate fresh water use in the oil and gas sector,
  • support new economic development opportunities,
  • maintain public and environmental health and safety.

This regulatory transition is an emerging trend in many western states – OK, TX, CA
NM Produced Water Research Consortium

- Established through an MOU to support NMED
- Modeled after DOE and EPA Technology Verification Programs
- Currently 80 organizations, 150 participants
• Collaborate with health and resource management agencies, academia, industry, and NGOs and their technical experts,

• Conduct focused research, development, testing, and evaluation of innovative analysis and treatment technologies,

• Fill the science and technology gaps needed to address fit-for-purpose reuse of produced water for various applications - industrial, municipal, construction, water supply augmentation, mineral recovery, etc.

• Assure public and environmental health and safety through state-of-the-science risk and toxicology analysis and testing,

• Create new water supplies to support regional economic development

• Establish Produced Water Data Portal of produced water quantity, quality, and temporal and spatial distribution

• Utilization of innovative water characterization and analysis technologies

• Independent 3rd party evaluation of the cost/performance of innovative pre-treatment, treatment, and disposal technologies

• Coordinate with EPA the development and use of innovative human and environmental risk and toxicology analysis and testing approaches

• Socio-economic and ecological modeling and analysis of produced water cost/benefits
NM PWRC Produced Water Data Portal

Disposal Water Quality and Quantity data by ¼ Township.

Data from OCD, USGS, NM Tech, NMSU, and NMPWRC

Four levels of data
Tier 1 - General Public
Tier 2 – Detailed Public
Tier 3 – Application
Tier 4 – Regulatory

Projected water available for reuse – 1-2 M bbl/day
Produced Water Quality Varies Widely

Produced Water Constituent Concentrations

Range of NM PW

mg/L (pCi/L for Radium)

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<tr>
<th>Constituent</th>
<th>Value 1</th>
<th>Value 2</th>
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<td>92</td>
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<td>MBAS</td>
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Example NM Produced Waters with Treatment

Permian Basin
100,000 TDS
SWD settling and filtration
Ultrafiltration for clean brine

Cuba Basin
10,000 TDS
SWD settling and fine filtration
RO treatment
NM Produced Water Radiological Issues

**Figure 7.**

**A**

Total dissolved solids (TDS), in milligrams per liter

EXPLANATION

- **Red** squares: Marcellus Shale Data
- **Blue** circles: Non-Marcellus Shale Data
- **Yellow** squares: Marcellus ND
- **Black** circles: Non-Marcellus ND

**NM PW Data**

Log total Ra = 1.55 x TDS – 5.26

Log total Ra = 1.55 x Log TDS – 4.86

**Log** activity of total radium (Ra-226 + Ra-228) in relation to log total dissolved solids and total dissolved solids (TDS), in milligrams per liter

**NORM**

- **Typical NM Surface Water Concentration**: 0.005-0.020
- **Typical NM Ground Water Concentration**: 0.005-1.0

**Uranium mg/L**

- **Ground Water**: 0.005-1.0

**Total Radium pCi/L**

- **Ground Water**: 0.5-1.5

NORM easily removed by both thermal and membrane desalination technologies, risk issue is generally the handling the concentrated NORM from these treatment processes.
Increasing Produced Water Disposal Costs vs Treatment

Desalination Cost vs. Cost of New Fresh Water Supply

San Juan Basin Disposal Costs

Permian Basin Disposal Costs

2000 NM
Produced Water Disposal costs $2-10/1000 gal

2020 NM
Produced Water Disposal costs $20-50/1000 gal

EWRI Hightower 2018
EPA National Water Reuse Action Plan

• Focuses on a national effort to treat and reuse waste waters to supplement fresh water supplies

• Focus areas are:
  • Thermo-electric cooling water
  • Agricultural waste water
  • Municipal waste water
  • Storm water
  • Produced water

• **NM Produced Water Research Consortium** and the Ground Water Protection Council selected to lead national efforts on produced water reuse research and implementation