New Mexico Produced Water Research Consortium

2020
Goals & Objectives

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Background

Over the past decade, New Mexico has been recognized as one of the leaders in the U.S. in pursuing the reuse of produced water to supplement fresh water supplies and reduce or eliminate the use of fresh water in oil and gas development. Past research studies have looked at treatment for flow augmentation of the Pecos River, rangeland rehabilitation, agricultural irrigation, algal biofuels production, and even beer making. These efforts were all focused on supporting a more sustainable fresh water management approach in New Mexico, a state with limited fresh water resources that has seen significant reductions in average annual precipitation over the past century.

In passing the 2019 Produced Water Act, the New Mexico legislature established a straight forward regulatory and policy framework for the ownership, management, and reuse of produced water inside and outside of the oil and gas sector. Through this act, statutory control and regulatory authority for the reuse of produced water outside the oil and gas industry was designated to the NM Environment Department (NMED), while reuse of produced water within the oil and gas sector remained under the jurisdiction of the Oil Conservation Division (OCD) of the NM Energy Minerals and Natural Resources Department.

Through the new Produced Water Act, New Mexico is encouraging produced water reuse to enhance fresh water sustainability and the use of produced water to support and spur additional economic development opportunities, while being protective of the environment and public health and safety.

Produced Water Research Consortium Goals and Objectives

In order to establish science-based regulations and policies for the reuse of produced water outside the oil and gas sector, the NMED entered into a Memorandum of Understanding with New Mexico State University (NMSU) in September 2019 to create the **New Mexico Produced Water Research Consortium** (NMPWRC or Consortium). The goal of the Consortium is to establish and coordinate a focused research and development program in collaboration with state and federal environmental and natural resource agencies, academia, industry, and non-governmental organizations (NGO's) to: 1) fill scientific and technical knowledge gaps necessary to establish regulations and policies for fit-for-purpose treatment and reuse of produced water, and 2) accelerate technology and process research, development, and implementation for environmentally sound, safe, and cost-effective reuse of produced water for industrial, construction, agricultural, rangeland, livestock, municipal, aquifer storage, surface water, and/or other applications.

The NMPWRC was organized to encourage broad stakeholder participation in the overall science and technology evaluation, assessment, and demonstration process. General

membership is open to all stakeholders including industry, associations, academia, municipalities, and NGO's at a very nominal annual cost. This gives all interested groups the opportunity to provide input and follow progress on the research and development program and specific project results several times a year.

Collaboration with EPA's Water Reuse Program and Other States

While the NMPWRC was organized to focus on New Mexico regulatory and permitting issues and challenges, it is obvious that produced water issues in Southeast New Mexico in the Delaware and Permian Basins and in Northwest and Northeast New Mexico in the San Juan Basin and Raton Basins are transboundary basins with Texas and Colorado respectively. Therefore, the Consortium has reached out to include representation from other states, including Oklahoma, Colorado, and Texas.

Because of the transboundary nature of the oil and gas fields in New Mexico, the US EPA recently identified the NMPWRC to lead their Water Reuse Action Plan (WRAP) efforts for the reuse of produced water. The NMPWRC is one of just four water research organizations specifically selected by the US EPA to lead a water reuse initiative. The US EPA expects the Consortium to coordinate produced water research to establish regulations and policies for uses such as construction, agriculture and rangeland, industrial, environmental, and municipal uses and supplies. This significantly increases the regional and national visibility and impact of the NMPWRC research efforts.

Research and Funding Cooperation and Collaboration

The Consortium research program will be funded through a range of mechanisms including memberships, Sponsorships from individual companies, joint industry association or program grants, NGO grants, as well as from state and federal agency proposal and grants. Sponsorships provide companies, industry, associations, etc. a chance to use the extensive academic and technical expertise, facilities, and analytical equipment represented by the membership to leverage, enhance, and accelerate their own activities and efforts. Additionally, Sponsorships provide companies and organizations the opportunity to participate in the development and improvement of cutting-edge characterization, monitoring, analysis, and treatment technology research, development, and test data that they can apply to their individual needs or initiatives in other states. Sponsorships also provide access to technical and regulatory expertise and insight to support company initiatives.

Oversight of Consortium operations is coordinated by a **Government Advisory Board** made up of federal and state land and resource management agencies, and a **Technical Steering Committee** (TSC) has been established to provide technical guidance and direction on the science and technology research priorities, portfolio needs, project schedules, and feedback to NMED to accelerate science-based regulations and policies. Participation on the TSC is gained by nominations from the general membership of individuals having specific technical expertise in produced water reuse science and technology challenges including specific applications, fit-

for-purpose treatment, reuse engineering design and operations, produced water quality monitoring and characterization, produced water quantity analysis and characterization, and public and environmental safety and toxicity assessment. For fairness, the TSC has balanced participation from midstream, oil and gas, academia, NGO, and government agency members and meets quarterly to evaluate technical progress and results.

Research Directions and Priorities

In June 2019, the Ground Water Protection Council completed a comprehensive report on oil and gas produced water issues and challenges that highlighted that most research needs pertain to treatment and reuse of produced water outside of the oil and gas industry that better define "fit for purpose" treatment and quality goals to support permitting and reuse applications. The Consortium will utilize the GWPC produced water research roadmap recommendations, and applicable studies from New Mexico and other states, to help focus and accelerate produced water characterization and treatment research and development. The NMPWRC's trans-disciplinary research and development efforts will be focused to fill the following data and knowledge gaps:

- Quantify and characterize produced water generated from conventional and unconventional methods in New Mexico, including identification of all constituents in produced water unique to respective basins and formations, as well as chemical additives used for fracking and directional drilling;
- Cost and effectiveness of emerging treatment approaches for using produced water from conventional and unconventional methods for applications such as road construction, rangeland rehabilitation, agriculture, livestock production, industrial applications, municipal applications, aquifer storage and recovery, surface water discharge, mining, or other uses;
- Quantify and characterize cost and effectiveness of emerging mineral recovery approaches for produced waters ranging from strategic minerals, such a lithium, rare earths, acids, bases, salts, etc.;
- Quantify and characterize cost and effectiveness of brine management and disposal;
- Establish or develop analytic sampling methods for constituents of concern and sensitivity to appropriate levels of concern in treated produced water; and
- Assess the impact of the use of treated produced water on public health and safety, bioaccumulation and toxicity in soils, flora and fauna, surface water and associated biota, and ground water resources;

The NMPWRC research program is structured as a 3-year, $2M per year effort, focused on 4-5 major research projects and 4-5 smaller evaluation projects per year. The program will require major in-kind support from oil and gas and midstream facilities for produced water characterization and conduct of pilot-scale testing. Funding will be leveraged from Sponsorships, grants, etc. in order to accelerate Consortium research, evaluations, and progress. The program structure is flexible so that future expansion is possible if needed.