New Mexico Produced Water Research Consortium
2022 Annual Program Plan

Background

In passing the 2019 Produced Water Act, the New Mexico legislature established a framework for the ownership, management, and reuse of produced water inside and outside of the oil and gas sector moving forward. 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 remains under the jurisdiction of the Oil Conservation Division (OCD) of the NM Energy Minerals and Natural Resources Department.

Through the 2019 Produced Water Act, New Mexico is acknowledging the potential for treated produced water reuse to enhance freshwater sustainability and the use of treated produced water to support and spur additional economic development opportunities, while ensuring protection of the environment and public health and safety.

Consortium Goals and Objectives

To help establish science-based regulations and policies for the reuse of produced water outside the oil and gas sector, 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** (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 (NGOs) 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 use of treated produced water for industrial, construction, agricultural, rangeland, livestock, municipal, aquifer storage, surface water, and/or other applications.

Research Coordination and Organization

The Consortium was intentionally 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 NGOs at a 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.

The technical efforts and activities of the Consortium are coordinated through a Technical Steering Committee (TSC) made up of technical experts from Consortium members. TSC participation is balanced to include representatives from midstream, oil and gas, academia, NGO, consultants and technology vendors, and government agency members. The TSC is divided into six Working Groups, with each working group developed to be trans-disciplinary to encourage collaborative interactions and integrated solutions with broad support. Each Working Group has a different primary technical focus. The Six Working Groups and their areas of technical focus include:

1) **Water Quantity** – focused on availability of produced water over time and location;
2) **Water Quality** – focused on measuring the constituents in treated produced water and what needs to be removed to meet regulatory requirements and location;
3) **Risk and Toxicology** – focused on public and environmental health and safety risks of using treated produced water, which drives water treatment for various fit-for-purpose applications;
4) **Treatment** – focus on cost-effective, pre-treatment, treatment, post treatment, mineral recovery, and waste minimization technologies to meet regulatory needs of different uses;
5) **Infrastructure Engineering** – focus on infrastructure deficiencies and needs required to best support the cost-effective treatment and delivery of treated produced water to different locations; and
6) **Applications** – focused on identifying opportunities and locations for the use of treated produced water and the potential socio-economic, environmental, ecological, energy and water costs and benefits.

The Working Groups efforts are integrated, with many representatives sitting on more than one Working Group, to ensure that technical, economic, and public and environmental health and safety risks are all reduced to levels that facilitate the safe use of treated produced water, support water and natural resource sustainability, and encourage new economic development.

The annual TSC recommendations on Consortium technical operations, research directions, research development and testing, and public outreach are overseen by a Government Advisory Board (GAB) made up of federal and state land and resource management agencies.

Consortium Research Program Plan

As noted in the Consortium's **Produced Water Reuse Research Plan**, efforts to establish the Consortium and to develop the proper organizational and documentation framework to support the research and Working Groups, technical efforts in 2020 focused on pre-planning and technical assessments. The expected efforts in 2021 through 2023 are intended to transition from predominately assessment and planning to significantly more research, development, and demonstration testing and evaluation. It is expected that efforts in 2023 will

be to focus on completing technology treatment and risk and toxicology evaluations. With additional funding Consortium efforts could be expanded through 2025. The different efforts by year are noted in the figure below, as indicated by the shading intensity for each activity.

	Assessment	Research	Development	Demonstration	Testing	Evaluation
2020						
2021						
2022						
2023						

As a reminder, the Consortium's **2021 Program Plan** identified eight major analysis and research efforts which included:

1. Develop and Submit a 2021 Research Program RFP and select 4-8 technologies for testing in 2021;
2. Identify produced water interim treatment standards for use by NMED;
3. Implement a New Mexico produced water data portal in a GIS-based system that contains all produced water quantity and quality data;
4. Collect additional produced water quality data from producers to expand the produced water quality data base in the data portal;
5. Work with EPA and industry to expand effort to develop state-of-the-science of risk and toxicology evaluations of fit-for-purpose reuse of treated produced water;
6. Create a quantitative socio-economic, environment, ecological cost/benefit analysis tool to help model impacts of fit-for-purpose reuse of treated produced water;
7. Conduct a Scenario Analysis of potential produced water supply availability based on emerging oil and gas development trends; and
8. Develop a produced water public education and outreach program and conduct education and outreach workshops at several locations in New Mexico.

Proposed Consortium 2022 Tasks

The major tasks identified for 2022 take into consideration the progress accomplished in the 2021 tasks outlined above, lessons learned from 2021, and current gaps and additional progress needed in 2022. The tasks proposed below also align with the overall research plan and schedule identified in the Consortium's **Research Plan for the Reuse of Produced Water**.

1. Develop and Submit a 2022 Research Program RFP

- Coordinate with NM Water Resources Research Institute (WRRI) at NMSU to advertise another RFP in spring 2022 as needed to expand research options for produced water treatment/socio-economic analysis/scenario planning/data portal upgrades/specific application evaluations.

- Utilize the same RFP technical review committee approach used in 2021 and use the committee to rank projects and funding. The size, scope, and number of projects selected will depend on available funding.
- Begin testing with approved test plan and Consortium Project Evaluation Teams by summer of 2022.
- Require technical cost and performance reports of projects by March 2023.

2. NM Produced Water Data Portal upgrade

- Work with the GWPC to obtain funding to initiate efforts to add additional capabilities, Tier 2 (detailed public), Tier 3 (application), and Tier 4 (regulatory) data that recognizes proprietary data protection requirements and capabilities to the existing NM Produced Water Data Portal.
- While Tier 2 is enhanced public access capabilities, Tier 3 and 4 will require improvements to interact with data mining vendors and security protocols for Tier 4 data. This will require some significant interactions to enable the Tier 3 and 4 capabilities that could require efforts through 2023.

3. Produced Water Quality Data Collection to Improve PW Data Portal Usefulness

- Work with producers and midstream companies to collect common untreated produced water quality operational data at saltwater disposal wells (SWDs).
- Establish water data collection protocol and format for ease in updating the Data Portal water quality data.
- Establish a data validation protocol.
- Coordinate efforts with the NMT Petroleum Recovery Research Center to integrate efforts and coordinate effort oversight.

4. Quantification of Risk and Toxicology Assessments

- Utilize data from WET testing at NMSU, green house studies at NSMU, genomic/cell-line impacts from the US EPA on exposure/health impacts to support Hazards Identification.
- Utilize NMSU unique analytic capabilities to analyze for produced water and treated produced water “unknowns’.
- Identify NM pilot test beds with NM Ag Research Centers for application testing.
- Identify and select appropriate analysis and extrapolation methods to estimate human and ecological Dose-Response estimates based on treated produced water quality data.
- Identify appropriate fate and transport modeling and analysis approaches to use with several application-specific Conceptual Models.
- Utilize fit-for-purpose treated produced water reuse Conceptual Models and treated produced water quantity and quality data to estimate human and ecological exposures for Exposure Assessments.
- Based on treated produced water hazards, exposures, and applications, utilize state-of-the-science human and ecological risk assessment models to characterize overall public and ecological risks.

- Based on the modeling and analysis conducted, assess the socio-economic, and public and ecological health and safety tradeoffs for various treatment and application options of treated produced water to support regulatory and industry risk management of cost/ benefit, liability, impact of various regulatory/policy/operation options.

5. Socio-Economic, Environment, Ecological Cost-Benefit Analysis (CBA)

- Establish a QA/QC review group to evaluate test problems based on information from testing projects, assumptions, embedded calculations, and information presentations.
- Work with other state Consortia to expand modeling approach to other basins in NM and other oil and gas basins in other states.
- Coordinate with Risk and Toxicology Working group to assess improved risk modeling approaches and opportunities to integrate into the CBA model.

6. Produced Water Infrastructure Planning and Scenario Analysis

- Based on industry and regulatory agency input, conduct a scenario analysis to assess the likely availability of treated produced water for reuse and industrial/other development over the next 5-15 years including directions in produced water development, potential fracking limitations, and potential SWD limitations.
- Identify various applications for treated produced water reuse and quantify the volumes of treated produced water that could be used.
- Focus scenario analysis on the Permian Basin, which could enable cooperative analysis and funding with Texas, but also consider the San Juan Basin.

7. Produced Water Education and Public Outreach

- Continue upgrades and functionality of the Consortium website to enhance education and public information opportunities. This would include podcasts, on-line workshops, training sessions, etc.
- Conduct at least four public outreach workshops in 2022 at local community colleges in New Mexico to provide a presence around the state on produced water treatment and potential reuse applications.
- Provide technical presentations on Consortium efforts and progress at state and national conferences.

8. Establish Produced Water Coordinating Council

- Work with Texas, Oklahoma, Wyoming, Arizona, Utah, Colorado, and Kansas and Pennsylvania to establish a coordinated produced water reuse research and development program that could include coordinated funding and analysis within the western region from state, federal, and national agencies and associations.
- Coordinate additional efforts with the EPA WRAP program and other identified interested parties including GWPC and WateReuse Association.
- Establish a Consortium Coordinating Council made up of task leads and co-leads to meet quarterly to discuss directions and accomplishments.

Consortium 2022 Task Schedule

The Consortium task schedule was developed to maintain frequent interactions between members of Working Groups, integration of Working Group efforts and appropriate input and oversight and suggestions from the Government Advisory Board. The proposed 2022 Consortium schedule is presented below.