



Produced Water Fit-for Purpose Reuse Research

Produced Water Treatment Projects

NM State University Carlsbad
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BE BOLD. Shape the Future.

Produced Water Treatment Projects Session Presenter

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Partnership with NMSU

Investing in Science and Innovation

- MOU with New Mexico State University Sept. 2019 launched the **New Mexico Produced Water Research Consortium** to fill science and technology gaps for off-field reuse of treated produced water (details available at <https://nmpwrc.nmsu.edu/>).
- Examples of NMED's broad research questions:
 - What contaminants are in the produced water generated in NM?
 - How can the produced water be treated to be safe?
 - What changes are needed to our state water quality standards to protect water resources and human health?
- NMED will look to results of Consortium efforts to inform future science-based regulations for treatment and reuse of produced water while protecting our most precious natural resource, fresh water.

Purposed: potential uses of treated produced water

Water may be treated to fit-for-purpose specifications for possible uses including:

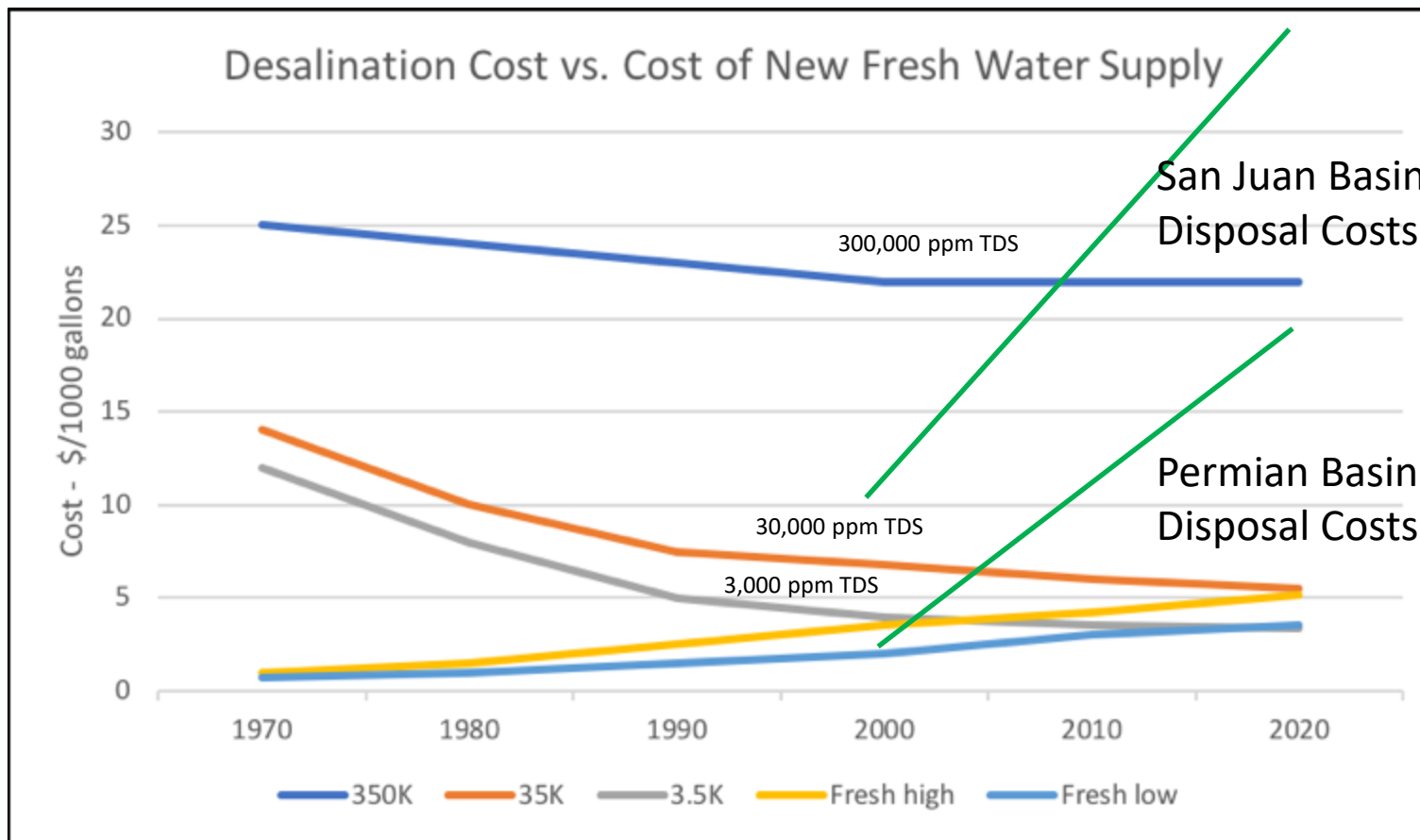
- Road construction;
- Rangeland rehabilitation;
- Agriculture;
- Industrial applications;
- Municipal landscaping (parks, golf courses);
- Mining;
- Surface water augmentation



Common TDS Water Quality Requirements for Various Applications

Produced Water Quality (ppm) TDS	Application	Common Water Quality Requirements (ppm) TDS	Typical Treatment Process
Conventional 10K to 50K 50%<35K 50%>35K	Water Supply Augmentation	300-3,000	Chemical/membrane
	Agriculture	Class 1 <700, <60% Na, B<0.5 Class 2 2000, 60-75% Na, B<2.0 Class 3 >2000, 75% Na, B~2	membrane
Unconv. 60K to 300K 25%<100K	Rangeland	4,000 – 10,000	membrane
	Rangeland	4,000 – 10,000	thermal
	Surface Flow	600-2000	thermal
	Mineral Recovery	>100K (no discharge)	pretreatment/thermal
	Road Construction	Up to 100,000	pretreatment/thermal

Increasing Produced Water Disposal Costs vs Treatment

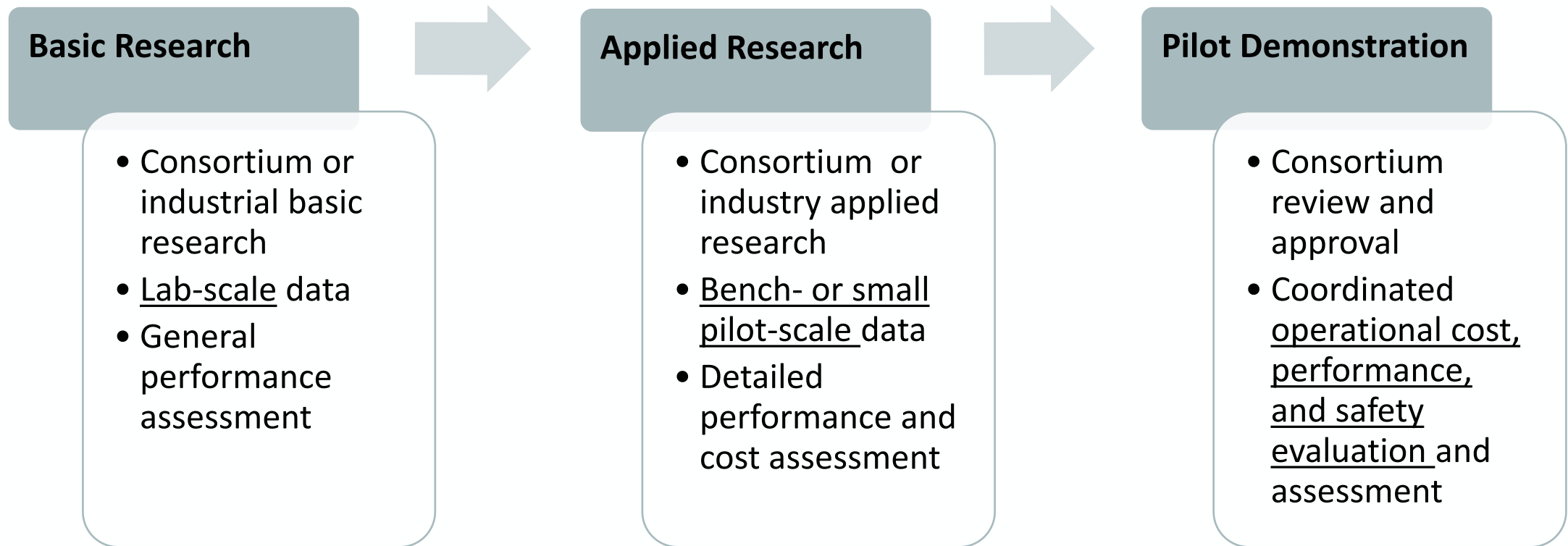


(EWRI Hightower 2018)

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

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

Laboratory, Bench, and Pilot-scale Treatment Technology Research and Demonstration Efforts



NMED 2021 Treatment Research Projects

New Mexico Produced Water Research Consortium

GUIDANCE ON PRODUCED WATER
TREATMENT RESEARCH, DEVELOPMENT, AND
PILOT-SCALE DEMONSTRATION TESTING AND
EVALUATION

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Consortium + NMED Guidance

https://nmpwrc.nmsu.edu/wp-content/uploads/sites/83/2021/06/Pilot-Testing-Guide_November2020_6.10.2021.pdf

Upcoming Treatment Studies

Company	Project	Projected Date	Status
Kanalis Resources	RO treatment of 10,000 ppm TDS San Juan Basin produced water for ag applications	April through October 2021. Treat 20 bbls of water at BGNDRF and conduct greenhouse studies	Treatment completed in April, water at 200-500 ppm TDS, greenhouse studies by October.
zNano Membranes	Polymeric-based ceramic membrane for pretreatment of produced water to “clean brine”	June - August 2021 At BGNDRF, 100 bbls per week	Completed testing in early August. Test report underway.
Crystal Clearwater Resources	Low-temperature distillation of produced water	Pilot-testing in October-November in Permian Basin	System to be moved to NM from Canada in early October 2021
Katz Water Technologies	Thermal treatment of produced water	Pilot-testing in October - November in Permian Basin	System to be moved to NM from WY in early October
Hydrozonix	Ozone pre-treatment of produced water to “clean brine” standard	Pilot-testing in October-November in Permian Basin	Negotiating site
Hilcorp	Membrane distillation of produced water	Pilot-testing in October-November in San Juan Basin	System under construction
Marah Water Services	Electro-coagulation/cavitation treatment of produced water	Pilot-testing in October - November in Permian Basin	Negotiating site
Bechtel	Thermal desalination of produced water	Bench testing in November - December in Houston	At Bechtel test facility in Houston
Eureka	Thermal desalination and mineral recovery of produced water	November - December	At Eureka test facility in PA

Greenhouse Evaluation for Soil and Plant Toxicity of Treated Produced Water

- Greenhouses at NMSU, Texas Tech, and Texas A&M agricultural extension services locations are being used.
- Alfalfa, Chile, Cotton, ranges grasses and other crops are being studied.
- Analysis for toxins in roots, stems, leaves, fruit, or soils are being obtained over growing seasons to assess for acute toxicity or bioaccumulation over time.
- Also Evaluating for emerging contaminants of concern.



CONSORTIUM GOALS AND EFFORTS

- Conduct focused research, development, testing, and evaluation of innovative analysis, pre-treatment, 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.



What's Next

2021 - 2022 Workshops and Events:

- Workshop - November 9, 2021 at former NMSU branch college in Carlsbad
- End-of-year Program Review December 1-2, 2021
New Mexico State University – Las Cruces, NM
- On-going Posting of Presentations and Research Results on Website
- Additional Public Education Workshops in 2022
- Phase 2 Research to Further Conduct Pilot Projects

Questions? Where to get more info

Access our resources and learn more at:

<https://nmpwrc.nmsu.edu/> (or search NMPWRC)

Email: NMPWRC@nmsu.edu

Want more info about produced water topics? Search – EPA WRAP, or GWPC

We want your feedback!

Please compete and return the session questionnaire