



# Produced Water Fit-for Purpose Reuse Research Public Education and Outreach Workshop



**San Juan Community College  
College of Energy  
November 3, 2021**



**BE BOLD.** Shape the Future.

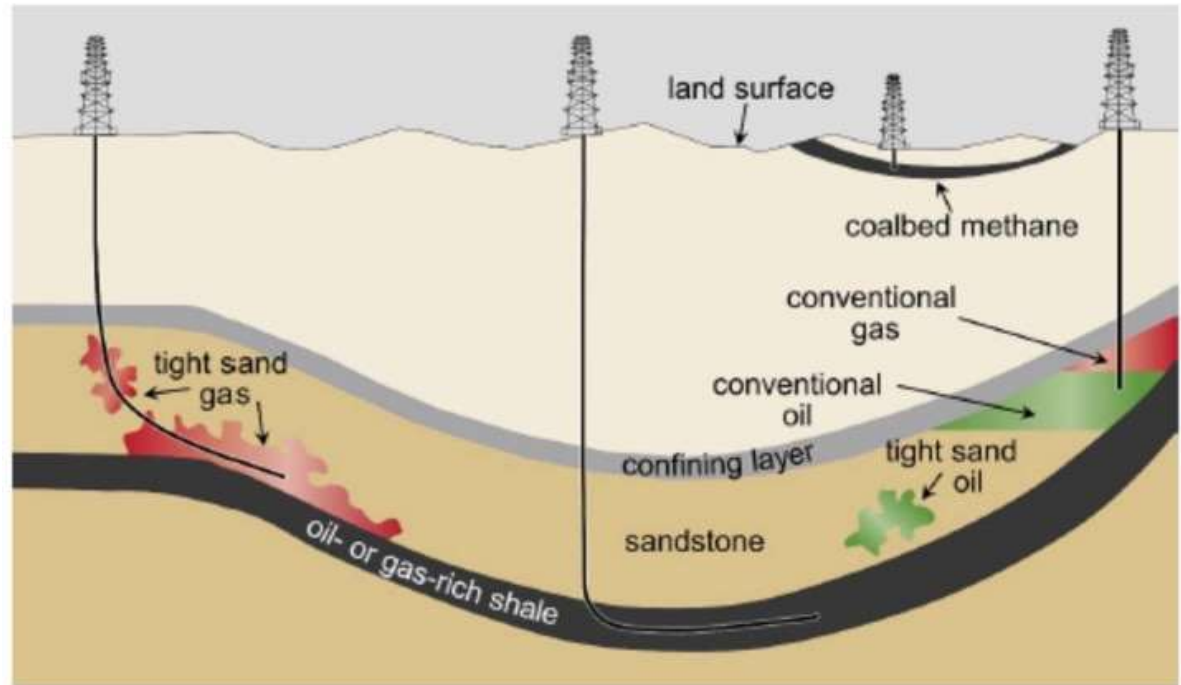
**NEW MEXICO PRODUCED WATER RESEARCH CONSORTIUM**

## Consortium Public Education and Outreach

- Provide the information on Consortium efforts in a workshop format – technical/public dialogue, fact sheets, and handouts
- Address oil and gas terminology related to produced water and produced water reuse
- Provide information on Consortium efforts in
  - produced water chemical analysis, treatment, and monitoring
  - Training on the use of produced water use tools and models
- Collect information from the public on our efforts to address public health and safety concerns about chemicals, toxicology, and risk reduction in produced water reuse

## What is Produced Water

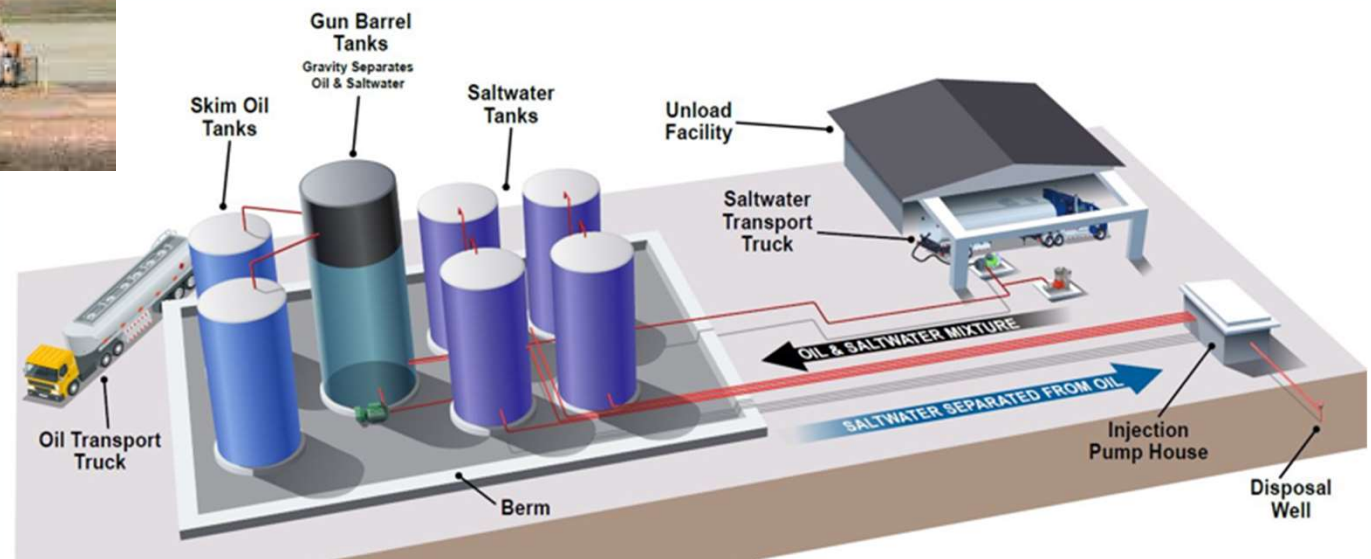
- Produced water is water produced in conjunction with oil and gas operations - drilling, development, pumping, and fracking
- Water can be 4-10 times the volume of oil produced (1 bbl oil = 4-10 bbls of water)
- Produced water often contains high levels of minerals and organic compounds due to geology and hydrocarbon contact



### Oil and Gas Production

All oil and gas production includes water because production is from deep ancient seas, shallow plays, or adds water

# Collection and Separation of Produced Water



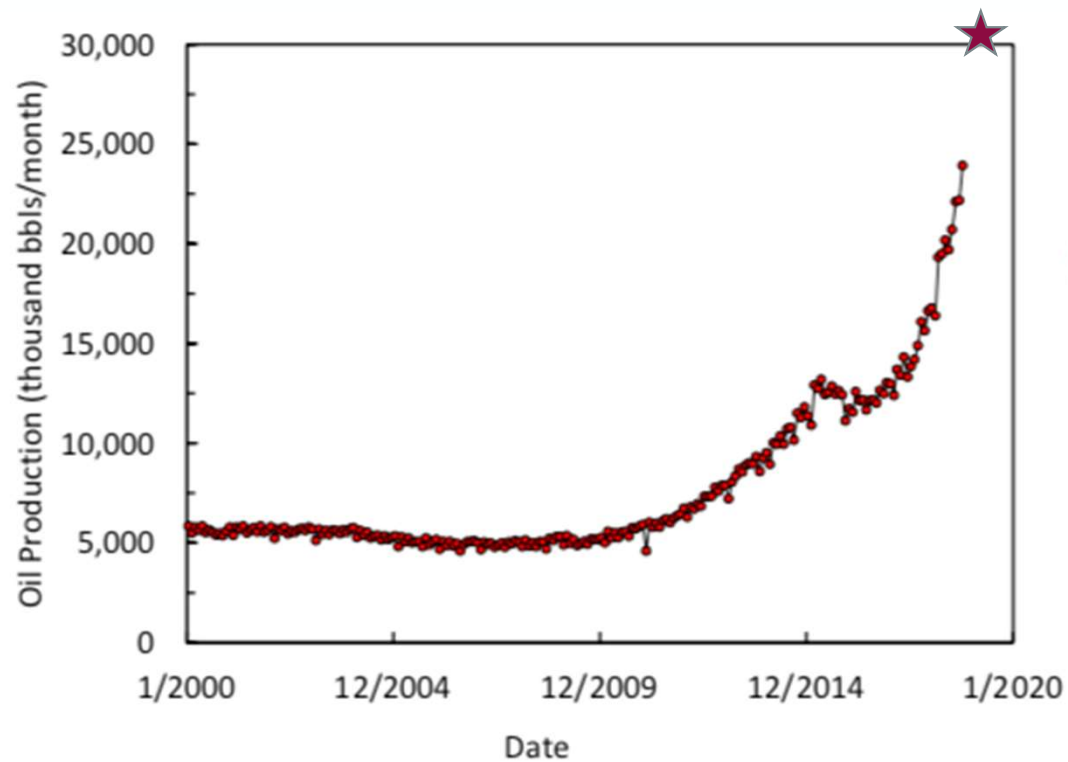


## Long History in NM on Produced Water Reuse Research

- Sandia and Los Alamos conference on CBM produced water reuse in Denver for DOE – 2002 (20 oil companies)
- Permian Produced Water Reuse Workshop at NMJC in Hobbs with NM WRRI - 2003 (140 attendees, eight projects ongoing- Reed & Stevens, Yates, Devon, Chevron, Conoco, Sandia, LANL)
- NM Tech PRRC Produced Water Treatment Effort – 2003 -2007
- Significant industry, national lab, and university efforts - 2004-2015
- NM EMNRD working group on streamlining produced water reuse - 2015
- EPA signs MOU with NM to explore produced water reuse options - 2018
- NM Desal Association Workshop on Produced Water Reuse – 2018 (160 attendees)
- DOE and BOR expand desalination research funding to include produced water 2019
- EPA National Water Reuse Action Plan (WRAP) includes produced water

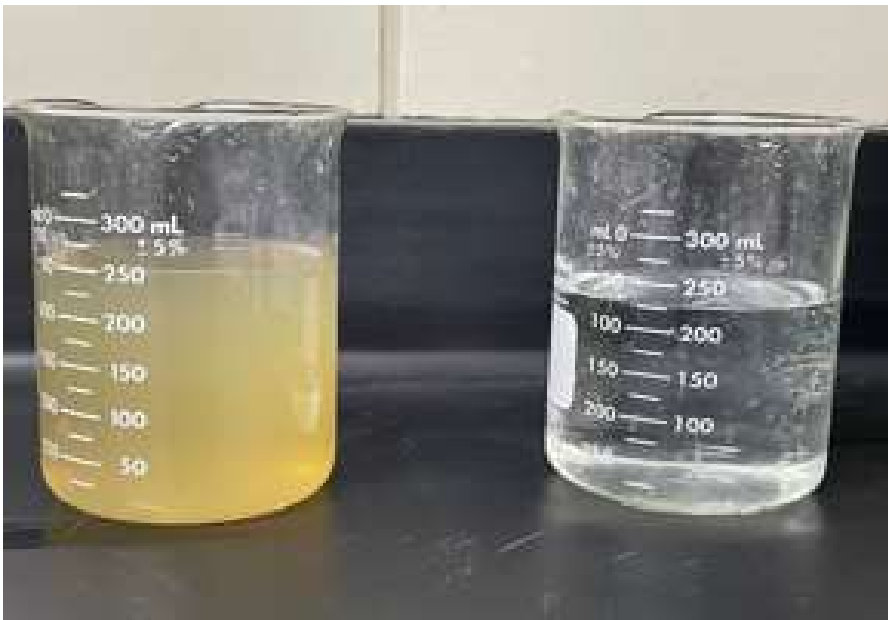


## Produced Water Volumes are Significant

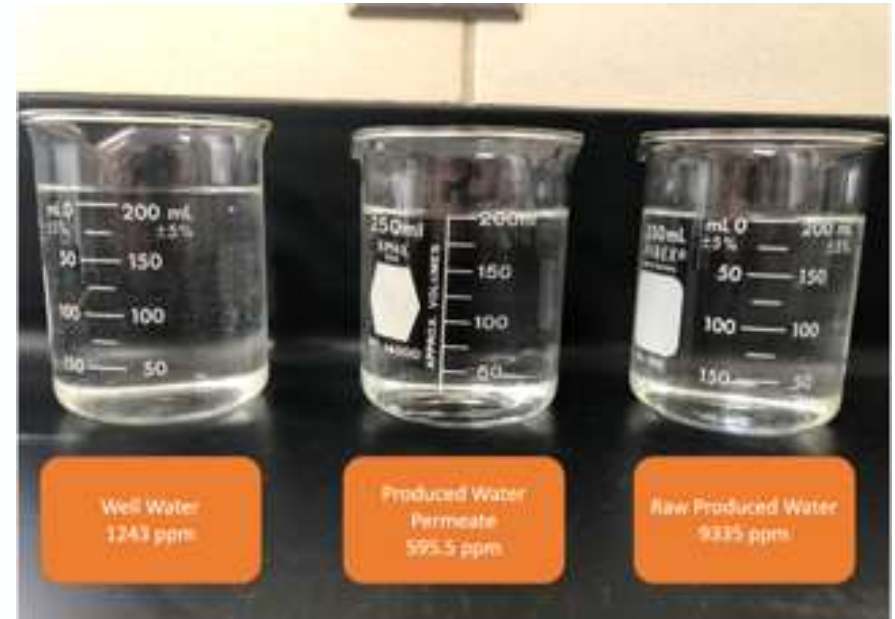


Average ~4 million bbls produced water/day (3 ABQ's worth of produced water availability)

## Examples of Raw and Treated NM Produced Water



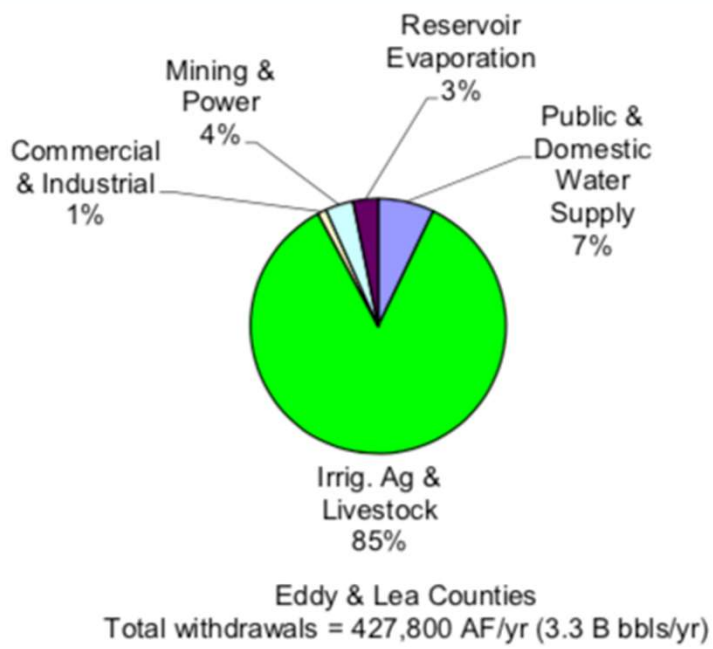
Permian Basin -100,000 TDS PW (left)  
w/pre-treatment to remove oil, grease,  
suspended solids (right)



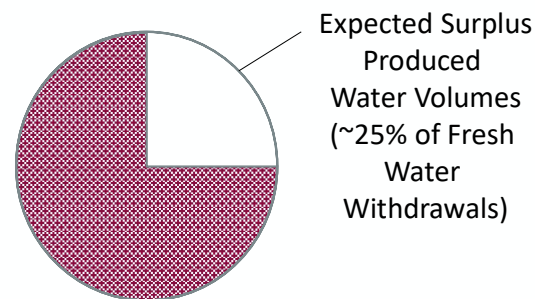
San Juan Basin -10,000 TDS PW (right)  
w/RO treatment to remove TDS (middle)  
Alamogordo Groundwater (left)

# Water Supply Impact Of Produced Water Reuse

Potential NM Economic Impact – \$2-3 Billion per year



Annual Fresh Water Withdrawal



Surplus expected to be ~1 B bbls/yr (2-3 M bbls/day)

Projected Produced Water Surplus



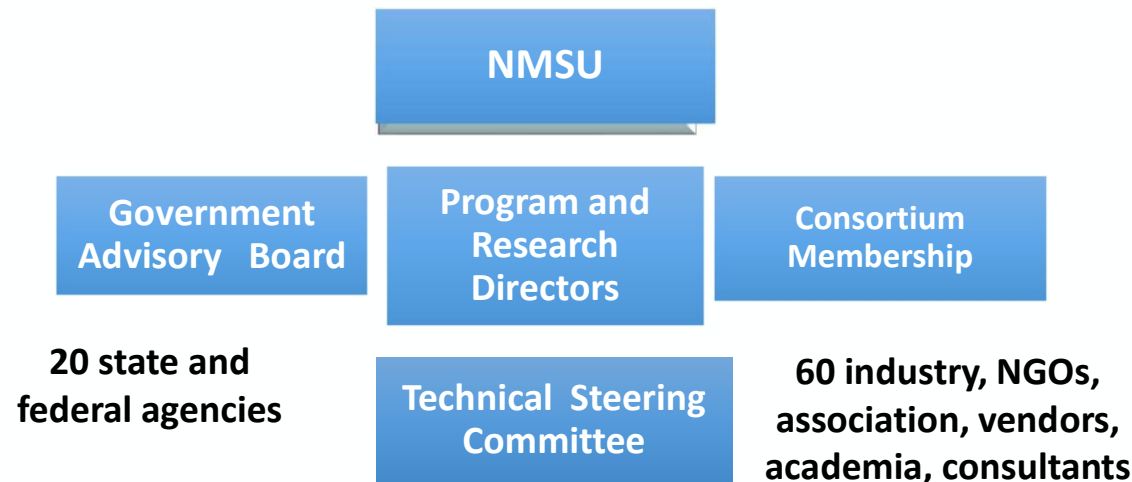
## NM 2019 Produced Water Act

- 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.

**Emerging trend in the oil and gas sector – PA, WY, OK, TX, AZ, UT, CA**

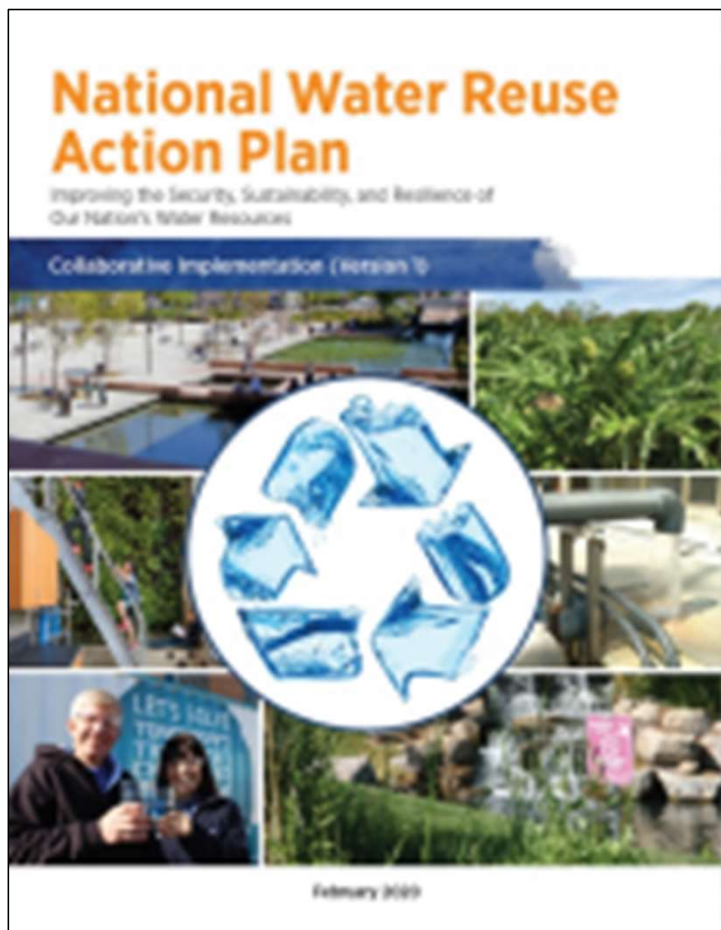
## NM Produced Water Research Consortium Overview

- Formed through an MOU between the NMED and NMSU
  - Support NMED and other state agencies in assessing produced water
  - Coordinate research and development of fit-for-purpose reuse of produced water outside oil and gas
- Fill science and technology gaps
  - Use collaborative process of government, industry, public
  - **Assure reuse is protective of public and environmental health and safety**
- Initial 3-year program, 2020-2022, funded by sponsorships
- Currently 80 organizations with 150 participants



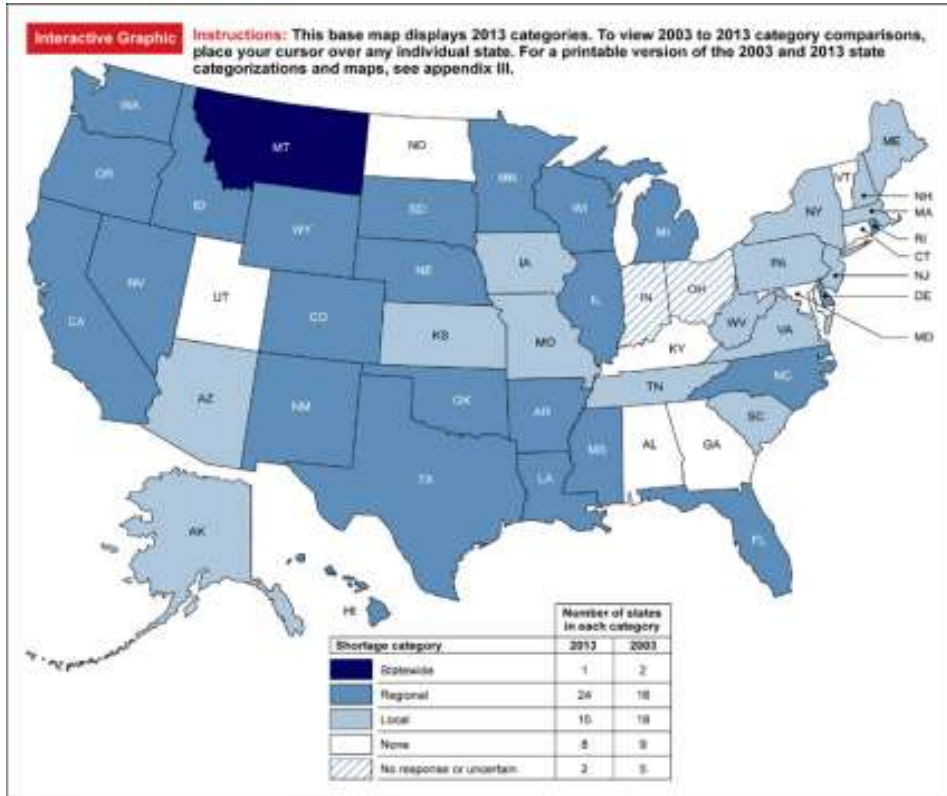
Modeled after DOE and EPA  
Environmental Treatment Technology  
Verification Programs

## EPA National Water Reuse Action Plan – Feb 29, 2020



- Focus on fit-for-purpose treatment and reuse of waste water
- In five major areas:
  - Thermo-electric cooling water
  - Agricultural waste water
  - Municipal waste water
  - Produced water
  - Storm water
- EPA selected NMPWRC and GWPC to lead the national program in produced water reuse

# State Water Stress Driving Produced Water Reuse



Sources: GAO analysis of state water managers' responses to GAO survey; Map Resources (map).



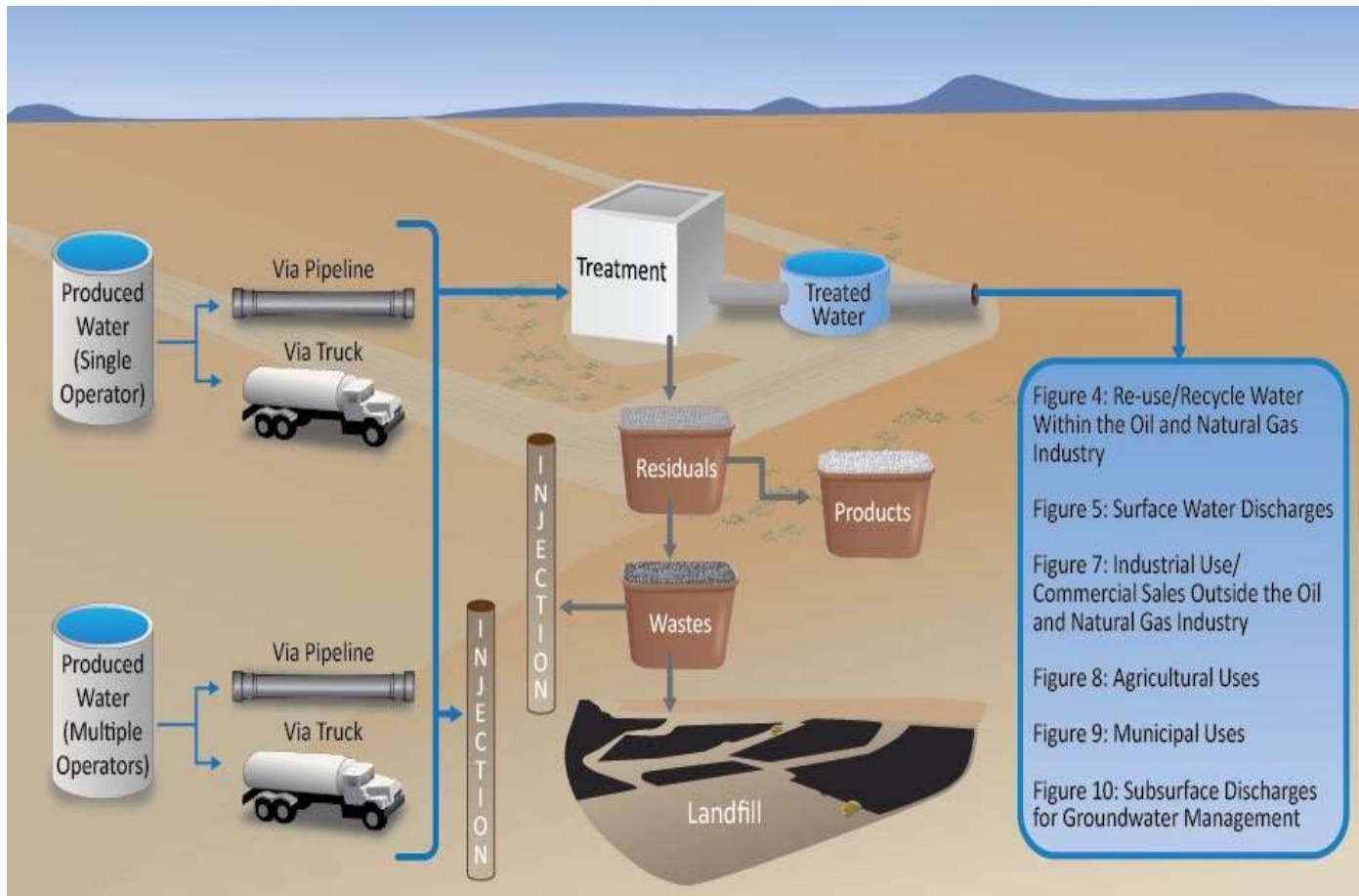
## Fit-for-Purpose Reuse Matches Treated Produced Water Quality to Site-specific Application Requirements

Produced Water Quality (ppm) TDS	Application	Common Water Quality Requirements (ppm) TDS	Typical Treatment Process
Coal-bed Methane 1500 to 20K	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
Conventional 10K to 50K 50%<35K 50%>35K	Rangeland	4,000 – 10,000	membrane
	Rangeland	4,000 – 10,000	thermal
Unconventional 60K to 300K 25%<100K	Surface Flow	600-2000	thermal
	Mineral Recovery	>100K (no discharge)	pretreatment/thermal
	Road Construction	Up to 100,000	pretreatment/thermal



# Use of Produced Water – Today and Tomorrow

Today  
➔



Tomorrow  
←