

# RECLAMATION

*Managing Water in the West*

## Bureau of Reclamation Concentrate Management

Yuliana Porras-Mendoza

Texas Desal – September 11, 2014



U.S. Department of the Interior  
Bureau of Reclamation

# Agenda

- Introduction
- Background
- Overview of Research Programs
- Final Published Reports
- Current on-going work
- Future work
- Conclusion



# Advanced Water Treatment Program

- **Vision**
  - Reclamation is a leader in facilitating the development and application of advanced water treatment (AWT) to
    - increase water supply from non-traditional sources
    - reduce costs of AWT
      - attractive option relative to other supplies
    - understand and minimize the environmental impacts of AWT relative to other supplies
    - maintain and develop the capacity to be a leader in AWT



- Increase water supply
- Reduce cost
- Reduce environmental impacts
- Identify institutional barriers

# Advanced Water Treatment Program

## Internal Program

- **Science & Technology Program**
- **Funds Reclamation researchers**
  - Partner with external entities
- **~ \$1 million/year**

## External Program

- **Desalination & Water Purification Research Program (DWPR)**
- **Funds private sector, individuals, academia, state/local entities**
  - Partner with Reclamation
- **~ \$1 – \$2 million/year**

# Funded Research since 1996

TITLE	PRINCIPAL INVESTIGATOR	DATE
Eastern Municipal Water District RO Treatment/Saline Vegetated Wetlands Pilot Study	Bureau of Reclamation and Eastern Municipal Water District	1996
Brackish Groundwater Treatment and Concentrate Disposal for the Homestead Colonia El Paso, Texas	University of Texas at El Paso	1999
Halophyte Crops and a Sand-Bed Solar Concentrator to Reduce and Recycle Industrial, Desalination and Agricultural Brines	University of Arizona	1998
Evaluation of Two Concentrate Disposal Alternatives for the Phoenix Metropolitan Area: Evaporation Ponds and Discharge to the Gulf of California	Bureau of Reclamation and Arizona Municipal Water Users Association	2000

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# Funded Research since 1996

TITLE	PRINCIPAL INVESTIGATOR	DATE
Membrane Concentrate Disposal: Practices and Regulations Concentrate database	Mickley & Associates	2001
Thermal Desalination Using MEMS & Salinity-Gradient Solar Pond Technology	University of Texas at El Paso	2002
Evaluation of Precipitate Fouling for Colorado River Water Desalination using RO	Metropolitan Water District of Southern California	2002
Zero Waste Brine Management for Desalination Plant	University of Texas at El Paso	2002
Systems Development for Environmental Impact Assessment of Concentrate Disposal	Oregon Health and Science University	2003

# Funded Research since 1996

TITLE	PRINCIPAL INVESTIGATOR	DATE
Volume Reduction of High-Silica RO Concentrate Using Membranes and Lime Treatment	University of Texas at El Paso	2004
Zero-Discharge Seawater Desalination: Integrating the Production of Fresh Water, Salt, Magnesium, and Bromine	University of South Carolina	2006
Using Oil Fields for the Disposal of Concentrate from Desalination Plants: Please Pass the Salt	Texas Water Development Board	2005
Reverse Osmosis Recovery Maximization	Carollo Engineers	2008
Membrane Concentrate Disposal: Practices and Regulation	Mickley & Associates	2006



# Funded Research since 1996

TITLE	PRINCIPAL INVESTIGATOR	DATE
Cost-Effective Volume Reduction of Silica-Saturated RO Concentrate	University of Texas at El Paso	2008
Systems Development for Environmental Impact Assessment of Concentrate Disposal - Development of Density Current Simulation Models, Rule Base, and Graphic User Interface	Portland State University	2007
Evaluation and Selection of Available Processes for a Zero-Liquid Discharge System for the Perris, California, Ground Water Basin	Eastern Municipal Water District	2008
Treatment of Concentrate	Mickley & Associates	2009

# Funded Research since 2011 (pending final reports)

TITLE	PRINCIPAL INVESTIGATOR	DATE
High-Volume Water Recovery from Silica-Saturated RO Concentrate using a Batch-Treatment Seawater RO System	University of Texas at El Paso	2011
Combining Electrodialysis Reversal and Slurry Precipitation and Recycle Reverse Osmosis Technologies to Increase Recovery at Inland Desalters	Carollo Engineers	2012
Demonstration of Zero Discharge Desalination at the Brackish Groundwater National Desalination Research Facility at Alamogordo, New Mexico:	University of Texas at El Paso, Veolia Water Solutions, and City of Alamogordo, NM	2012

# On-going and New Funded Research

TITLE	PRINCIPAL INVESTIGATOR	DATE
Evaluation of a Small Rural Community Zero Liquid Discharge Desalination System	Trussell Technologies, Inc	2014
Reverse Osmosis Concentrate Management through Halophyte Farming	University of Arizona	2014
Pilot Scale Groundwater Desalter Brine Concentrator Study	Eastern Municipal Water District	2015
Concentrate Management Toolbox and Selected Case Studies	Bureau of Reclamation, Eastern Municipal Water District and North Texas Metropolitan Water District	2015
Oxnard Saline Demonstration Wetland	Bureau of Reclamation and City of Oxnard	2015


# Remarks

- **Bureau of Reclamation continues to look at funding research, pilot, and demonstration projects in the area of concentrate management**
  - **Reduce cost of desalination**
  - **New technologies**
  - **Focusing on coastal and inland areas**
  - **Concentrate from all water types (seawater, groundwater, surface water, wastewater)**

# AWT Research Coordinator

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**Advanced Water Treatment Research**

Advanced water treatment is one of our few opportunities to create new water supplies for both inland and coastal areas. Research and innovation are needed to bring these new water supplies to the American West to help fulfill Reclamation's mission. Research and Development is part of Reclamation's overall activities for advanced water treatment.

**News:**

Yuliana Porras-Mendoza is Reclamation's new Advanced Water Treatment Research Coordinator in the Office of Research. Yuliana has been with Reclamation for 12 years. She has a Bachelors of Science in Chemical Engineering and Masters in Environmental Science and Engineering from the Colorado School of Mines, as well as a Masters in Technology Commercialization from the University of Texas. Yuliana is Reclamation's technical lead on Chlorine Resistant Reverse Osmosis Membrane. She also serves on the Board of Directors of the Society of Hispanic Professional Engineers.

**Meeting the Nation's Need for Water**



Our Advanced Water Treatment research focuses on meeting the National Academy of Sciences' (NAS) challenges for desalination. The NAS found that

**Our Research Program**

[Desalination and Water Purification Research Program](#)

The Desalination and Water Purification Research program was established to facilitate partnerships with academia, private industry, and local communities to develop more cost-effective, technologically efficient means to desalinate water.

Reclamation's AWT research, development, and implementation is providing innovative solutions: our nation needs to help address droughts, uncertainty, and water needs for increasing population. AWT allows communities to develop a diverse portfolio of water supplies from non-traditional sources.

Our [research priorities](#) are based on our collaborations with the National Research Council, the NWRI, and others:

- [National Research Council Final Desalination: A National Perspective](#) (15 mb pdf)
- [Desalination Roadmap](#) (1 mb pdf)
- [Desalination Implementation Roadmap](#) (1 mb pdf)

**Videos for Desalination in Reclamation:**

- [Water for our Future: Reclamation's Brackish Groundwater National Desalination Research Facility](#)
- [Yakima River Basin Water Enhancement Project](#)
- [Completion of Successful Pilot Run of the Yuma Desalting Plant](#)
- [Colorado River Basin Study Overview](#)

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