Desalination and Water Purification Program Research Awards, Fiscal Year 2010

Under the Desalination and Water Purification Research Program (DWPR), Reclamation made seven new awards for Fiscal Year 2010. These include 5 Research and Laboratory Studies, one pilot test and one demonstration project. The total of government funding is $1,349,580. The total cost share provided by the recipients is $684,161, for a grand total of $2,033,741.

University of Texas at El Paso; Demonstration of Zero Discharge Desalination at the Brackish Groundwater National Desalination Research Facility at Alamogordo, New Mexico

Reclamation Funding: $300,000

This demonstration project is a partnership with Veolia Water Solutions and the City of Alamogordo. The Zero Discharge Desalination process offers the potential to maximize the volume of product water from a brackish source while minimizing the amount of waste to be disposed. Recovery is progressively increased to very high values (~97%) by removal of gypsum (calcium sulfate) and silica. This work will build on pilot tests at various locations. The primary goal is to move towards commercialization and regulatory acceptance of this process.

University of Nevada, Reno; Osmotically Assisted Desalination: A Low Energy Reverse Osmosis Hybrid Desalination System

Reclamation Funding: $186,492

This will be a pilot-scale test of a hybrid system combining reverse osmosis with pressure retarded osmosis. The system will be used as a proof-of concept investigation to verify the bench-scale results and optimize the operating parameters necessary for developing a highly efficient reverse osmosis desalination system. The system will be field tested at the Brackish Groundwater National Desalination Research Facility in Alamogordo, New Mexico.

University of Houston; Aluminum Electrocoagulation and Electroflotation Pretreatment for Microfiltration: Fouling Reduction and Improvements in Filtered Water Quality

Reclamation Funding: $150,000

In the process under study, aluminum ion (Al^{+++}) will be generated by electrolytic oxidation of an aluminum anode ahead of microfiltration membranes as an alternative to conventional coagulation using addition of aluminum sulfate. Electrocoagulation would be advantageous since it consumes no alkalinity, does not change the pH, eliminates importation of corrosive chemicals, lowers overall energy usage and can be easily adapted for portable water treatment units.

University of Texas at El Paso; High-Volume Water Recovery from Silica-Saturated RO Concentrate using a Batch-Treatment Seawater RO System
Reclamation Funding: $149,999

Attempts to desalinate water at high recovery are frequently limited by silica, commonly found in inland brackish water. A procedure developed under funding from Reclamation, the Texas Water Development Board and others was successful in reaching recoveries of over 90% from the concentrate at the Kay Bailey Hutchison Desalting Plant. By spiking KBH water with various compounds, one can generalize these results to locations where the water to be treated has different compositions. Tests will be carried out at Brackish Groundwater National Desalination Research Facility in Alamogordo, New Mexico, to test this generalization.

Virginia Polytechnic Institute; Zwitterion-Functionalized Carbon Nanotube Membranes for Desalination Applications
Reclamation Funding: $147,650

This project is aimed at the fabrication and characterization of carbon nanotube ultra-thin nanocomposite RO membranes for desalination applications. Zwitterion functional groups at ends of the carbon nanotubes will prevent ion transport through the RO membrane and prevent biofouling.

North Carolina State University; Production and Characterization of Inexpensive Renewable Based material for Water Desalination and Heavy Metal Removal Applications
Reclamation Funding: $121,992

The goal of the project is to develop a high value product with unique ion removal properties from renewable and very inexpensive materials such as hemicellulose, citric acid and chitosan. When combined in a certain manner, these materials produce hydrogels that have been shown to adsorb salts and heavy metals from water. Applications include water processing plants of a certain size and specific removal of heavy metals.

University of Toledo; Static Mixing Spacers for Spiral Wound Desalination Modules
Reclamation Funding: $93,454

A novel design for spacers within spiral wound elements will be investigated. The proposed design mixes fluid within the feed channel without the generation of fluid vorticity or eddies, functioning in a manner similar to static mixers used industrially. Such a design has the potential to increase mass transfer rates dramatically in the feed channel without significant pressure losses. This would potentially reduce fouling rates and decrease concentration polarization at the membrane surfaces.