

# Tularosa Basin National Desalination Research Facility Study

## Background

Access to fresh water is an increasingly critical national and international issue. Demand for fresh water in many regions of the world has already outstripped supply. Saline and brackish waters constitute over 97% of the water in the world. Supplementing fresh water supplies through cost-effective “revolutionary” brine and saline waters desalination technologies would provide significant relief to the limited fresh water resources in many parts of the world.

To address the development of the “next generation” of desalination technologies needed to realistically impact future fresh water supplies, a federal *partnership* between Sandia National Laboratories and the Bureau of Reclamation was established to evaluate the development of a new desalination research facility in the Tularosa Basin of New Mexico to test and evaluate novel technologies for brackish ground water desalination and concentrate reuse and disposal. The partnership leveraged the unique energy efficiency and renewable energy expertise as well as salt and brine engineering and research capabilities at Sandia with the well-established desalination research and testing capabilities and expertise of the Bureau of Reclamation. The technical expertise of these two organizations in salt and brine chemistry, geology, engineering, desalination testing and evaluation, renewable energy, environmental technology, and materials science provided valuable expertise to this effort.

## Advantages of the Tularosa Basin

The ground water resources of the Tularosa Basin have been extensively studied. The basin has extensive brackish ground water resources and has over 100 million acre-feet of recoverable brackish ground water. Within a 5-mile radius, water with salinity from 1000 ppm total dissolved solids (TDS), almost fresh water, to over 60,000 ppm TDS, almost twice as salty as sea water, is available. A wide range of water chemistries including sodium chloride, carbonate, and sulfate-based brackish waters also exist in the basin. The water resources of the basin provide an opportunity to evaluate new desalination technologies over a wide range of water chemistry and quality in one location. Additionally, the Tularosa Basin is one of the world’s leading areas of wind, solar, and geothermal energy enabling the assessment of renewable energies to help reduce future desalination costs.

## Facility Study Results

An Executive Committee of water resource and desalination experts from around the country and large municipal water agencies from the southwest was formed in 2002 to help guide in the evaluation of potential facility sites and identify the research attributes of the proposed facility. The facility design and location were developed to effectively conduct activities to support national and international research on inland brackish ground water

desalination, concentrate management and reuse, and renewable energy research related to inland desalination.

Based on several evaluation criteria, a site in Alamogordo, New Mexico near the intersections of US Highway 70 to Las Cruces and US Highway 54 to El Paso was selected for the research facility.



### **Facility Location Features**

- Within Alamogordo city limits and near existing utilities,
- Site location for easy access to saline and brackish waters of 2000, 4000, and 6000 ppm TDS,
- 40-acre site to allow for future expansion and concentrate and renewable energy applications, and
- Good access and visibility from major highways.

### **Facility Design Features**

- About 15,000 square feet for desalination research, that includes:
  - Six research bays for pilot-scale desalination testing at up to 30 gpm each,
  - Office and meeting space for operations staff and visiting researchers,
  - Areas for bench-scale system testing,
  - Water laboratory, shop, and chemical storage,
  - A resource and learning area for visitors
  - Desalination demo system
- Three large outdoor research pads for larger-scale desalination testing,
- Five water supply wells for different water quality with over 400 gpm total capacity,
- Five acres for evaluation of renewable energy desalination applications,
- Five acres for concentrate disposal and minimization,
- Five acres of concentrate reuse for agricultural applications, and
- Site layout for self-guided visitor tours of all research areas.

### **Facility Construction and Operational Schedule**

Final facility design was initiated in June of 2003. Construction started in October 2003 with drilling and completion of the water supply wells. Facility design was completed in April 2004, and groundbreaking for the facility was held in June 2004. Phase I of construction, including the evaporation ponds, water storage, water supply piping, and outdoor research pads will be completed in December 2004. Phase II of construction, including the indoor research and office areas, is expected to be completed by May 2005.

Initial operational capability of the facility will occur in January 2005, when a new desalination system being developed by the Navy for expeditionary applications will be tested at the facility. The Navy system, designed for remote applications, will use two of the large outdoor research pads and operate for several months at a water treatment rate of over 300 gpm. The facility is expected to be fully operational by December 2005. Initial facility operation will be conducted as part of the design/build/operate contract currently in place. A long-term facility operations and management contractor will be selected in July 2005.

Facility operation will be funded through a combination of federal and state appropriations and users fees. Facility operations and research oversight and direction is expected to be provided by an Executive Board consisting of federal and state water resource agencies and research institutions, and by a Program Advisory Board consisting of industry, water utility, and water resource managers. Both boards should be established by May 2005.

### **For Additional Information Contact:**

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