

# **Seminole Integrated Wind-Water Demonstration System**

## **Progress Report for May 2012**

### **Submitted to**

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## **1.0 INTRODUCTION AND OVERVIEW**

**1.1 Scope and Content** This progress report is submitted jointly to the Texas Department of Rural Affairs (TDRA) and to the Texas Water Development Board (TWDB). TDRA formerly was called the Office of Rural and Community Affairs (ORCA). The report is submitted as part of TDRA contract number 728082 and TWDB contract number 0804830832. In addition to project funding from the TDRA and the TWDB, major participants include the City of Seminole, Texas Tech University and the US Department of Energy through Texas Tech University. The project was initiated in April 2009, and the completion date is currently set at March 2013.

**1.2 Project Description** This project addresses the continuing depletion of the Ogallala aquifer, the current principal source of potable groundwater for much of west Texas and northward through Kansas. The approach is to access, lift, and purify brackish, much deeper water-bearing formations in the Santa Rosa of the Dockum group. On the basis of preliminary evidence, these formations were believed to occur in Gaines County at depths ranging from 1500 to 2000 ft. There may also be water-bearing strata between 600 and 800 ft.

The purification will be accomplished using reverse osmosis (RO). The electrical energy required for the well lift pumps and those of the RO system will be supplied principally by a grid-connected wind turbine. The purified water is to be utilized as part of the municipal water supply of Seminole, Texas, a community with a population of about 7,000. Seminole is located in Gaines County in the southern panhandle of West Texas bordering New Mexico. The results are expected to be applicable to many other arid and semi-arid regions as well.

The project encompasses the following broad tasks:

- 1) The siting, permitting, drilling and characterization of a well drilled into the Santa Rosa, including site acquisition, pre-drilling hydro-geological investigations, permitting, logging, well completion and test,
- 2) The design and construction of required infrastructure, including well completion, site preparation, foundations and civil works to support the wind turbine, RO system and other system elements,
- 3) Installation and commissioning of a wind turbine including the foundation, electrical infrastructure, and liaison with the local utility,
- 4) The procurement, installation and commissioning of a commercial reverse osmosis system, including necessary permits, civil structures, electrical work and piping,
- 5) The design, permitting and construction of an evaporation pond or other means for dealing with the concentrate from the RO system,
- 6) Operation and characterization of the integrated wind-water purification system for a period of 12 months, and
- 7) Documentation and reporting of project results and performance.

## **2.0 SUMMARY OF ACTIVITIES THIS PERIOD**

**2.1 Overview** Collaboration between the City of Seminole, WRC and WiSE researchers, and engineering/management consultants continued, and construction at the site continued. The work schedule has been impacted by the movement of the oversight of the Texas Department of Rural

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Affairs to the Texas Department of Agriculture, which has led in increased scrutiny of the management documentation and procedures. Kay Howard of AJ Howco is handling the interactions with the various funding agencies. Some photos of the site taken on June 4 are included in this report.

**2.2 Site Construction** West Texas Consultants (WTC) reported much progress by Tejas Partners by the start of June. The building that houses the RO system was completed, and the RO system was moved into the building. Plumbing and electrical completion will happen in the next month. The lift station for the water leaving the building was placed, and its installation will be completed in June. The force main from the lift station was 70 percent complete.

**2.3 Wind Turbine Procurement and Site Preparation** The turbine nacelle and blades were previously received in Seminole, and the lattice tower members were delivered in December. Construction began in late January with the installation of the foundation. The major parts of the tower were assembled in the laydown position. Final installation of the tower, nacelle, and blades was completed on March 13. Completion of the electrical connections and controls will take place during June and July.

**2.4 RO System Procurement** The RO system was moved to the RO. We are currently in communication with representatives from Crane about the logistical details of start-up of the RO system after installation. PSC will work with the City and WRC to get Texas Commission for Environmental Quality (TCEQ) approval for the demonstration project after the water sample results are determined from the Santa Rosa well.

**2.5 Santa Rosa Well Procurement** West Texas Water Well Service (WTWWS), from Midland, Texas, completed most of the major components of the well installation by December. The final construction of the well pad and plumbing was completed in May. Final electrical connections of the well pump and downhole pressure transducer/conductivity sensor/temperature sensor with datalogger to monitor water levels and gross water quality should be completed in June or early July.

**2.6 Local Outreach** Thanks to the Llano Estacado Underground Water Conservation District and the WRC and WiSE staff, we continue to collecting photos of the construction of the wind turbine and site improvements. The photos will be used in a kickoff workshop and website media we are developing to explain the different aspects of the project for the local public and other interested parties.



Figure 1. RO Building



Figure 2. RO system inside RO building



Figure 3. Lift station north of RO building



Figure 4. Well pad