

Seminole Integrated Wind-Water Demonstration System

Progress Report for July 2012

Submitted to

Texas Department of Rural Affairs
Att: Travis Brown
Tel 512-936-7878
PO Box 13231
Austin, TX 78711

Contract No. 728082

Texas Water Development Board
Att: Sanjeev Kalaswad
Tel 512-936-0838
PO Box 13231
Austin, TX 78711-3231

Contract No. 0804830832

Submitted by

City of Seminole
Att: Tommy Phillips, City Administrator
Tel 432-758-3676
302 South Main Street
Seminole, Texas 79360

August 10, 2012

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. Our drilling and geophysical investigation found potentially productive zones at 540-650 ft, 890-920 ft, and 1610-1770 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.

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Construction activities are nearing completion, with startup now tentatively planned for September. Some photos of the site taken on July 6 are included in this report.

2.2 Site Construction West Texas Consultants (WTC) reported Tejas Partners construction work was nearing completion by the end of July, with final electrical connections as the last major effort. The building that houses the RO system now has lights and grid-based electricity. On-site plumbing and the lift station for the water leaving the building were completed, with input from Crane Environmental representative Jim Almond on the RO system effluent plumbing connections.

2.3 Wind Turbine Procurement and Site Preparation The final installation of the tower, nacelle, and blades was completed on March 13. Completion of the electrical connections and controls is planned for August.

2.4 RO System Procurement The RO system was moved to the RO building in May. We are currently in communication with representatives from Crane Environmental about the logistical details of start-up of the RO system after installation. An on-site visit with Jim Almond of Crane Environmental, Daniel Albus of PSC, and Ken Rainwater took place on July 6. As of this report, system startup is now planned in September. PSC will work with the City and WRC to get Texas Commission for Environmental Quality (TCEQ) approval for the 90-day demonstration after the water sample results are determined from the Santa Rosa well. It should be noted that it is possible to operate the system prior to the TCEQ demonstration period as long as the water is not used for potable purposes.

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 were completed in June. Final electrical connections were made in July. Collection of a water sample for laboratory analysis was scheduled for August 1.

2.6 Local Outreach Thanks to the Llano Estacado Underground Water Conservation District and the WRC and WiSE staff, we continue to collect 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. The workshop had been tentatively planned for late August, but is now postponed until late September. The WRC and WiSE staff will be contacting all contributing organizations for their interest and availability as the final date is confirmed.

Distribution:

Sanjeev Kalaswad, TWDB
Travis Brown, TDRA
Tommy Phillips, City of Seminole
Kay Howard, Howco
Pam Groce, SECO

Judy Reeves, Cirrus
Chad Tompkins, WTC
Zane Edwards, PSC
Leonard Nail, PSC
Jay McMillen, TTU