

Seminole Integrated Wind-Water Demonstration System

Progress Report for October-December 2010

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 is expected to run for two years.

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 are 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,

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- 6) Operation and characterization of the integrated wind-water purification system for a period of 12 month, and
- 7) Documentation and reporting of project results and performance.

2.0 SUMMARY OF ACTIVITIES THIS PERIOD

2.1 Overview During the last quarter, collaboration between the City of Seminole, WRC and WiSE researchers, and engineering/management consultants continued, and capitol purchases moved forward.

2.2 Site Layout and Balance of System Design West Texas Consultants (WTC) continued work on the infrastructure for the demonstration project, including concentrate management through discharge to the City's wastewater treatment plant, which will require a sewer line and lift station to move the flow, and the building and associated amenities at the site.

2.3 Wind Turbine Procurement The procurement of the 50-kW wind turbine was completed, and Entegrity Wind was the successful vendor with a total bid of \$250,000 for the turbine equipment, site engineering, and assembly/commissioning of the turbine. The WRC and WiSE grant of \$162,000 from the State Energy Conservation Office (SECO) is being combined with \$88,000 from the City's Texas Department of Rural Affairs (TDRA) grant. The turbine nacelle and blades were received in Seminole. The lattice tower materials will arrive in the next quarter.

2.5 RO System Procurement The RO system and spare parts from Crane Environmental were received in Seminole in late December. The equipment will remain in storage at the City warehouse until the RO building is built, later in 2011. 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.

2.6 Santa Rosa Well Procurement Parkhill Smith and Cooper (PSC) engineers, working with grant writer Kay Howard, completed the paperwork for the request for bids for the Santa Rosa well. The request for bids should go public in the first week of January, with bid opening in early February, and drilling to follow.

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