

Seminole Integrated Wind-Water Demonstration System

Progress Report for April 2011

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

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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 was recently extended to 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 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,
- 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 capitol purchases moved forward. The project pace will start to pick up this summer as the Santa Rosa well construction occurs.

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. Ken Rainwater and Tommy Phillips met with Chad Tompkins on April 12, 2011 in Seminole to confirm these details and those associated with the wind turbine site preparation.

2.3 Wind Turbine Procurement and Site Preparation

The turbine nacelle and blades were previously received in Seminole. WTC is now performing the geotechnical work for the foundation design and construction at the site. As soon as that work is complete, the lattice tower will be ordered from the manufacturer.

2.4 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.

2.5 Santa Rosa Well Procurement

On March 28, 2011, the Seminole City Council accepted the well drilling and completion bid of \$419,720 from West Texas Water Well Service (WTWWS) in Midland, Texas. The Council clearly stated that the well costs must be met with grant funds, such as combination of the \$300,000 TWDB grant with TDRA grant funds and other contribution from the TTU DOE grant. Ken Rainwater of the TTUWRC assured the Council that their requirement will be followed. Parkhill Smith and Cooper (PSC) engineers, working with grant writer Kay Howard, prepared the contract documents. As soon as all contracts are signed, WTWWS will be given the notice to proceed during the month of May. It is likely that WTWWS will mobilize to the job site at the end of May or early June.

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, PS&C

Leonard Nail, PS&C

Jay McMillen, TTU

Ken Rainwater, TTU

Phil Nash, TTU

John Schroeder, TTU

sanjeev.kalaswad@twdb.state.tx.us

Travis.Brown@tdra.state.tx.us

tphillips@mywdo.com

kay@howco.net

pam.groce@cpa.state.tx.us

jreeves@cirrusassociates.com

chadt@wtcengineering.com

zedwards@TEAM-PSC.com

LNail@team-psc.com

Jay.McMillen@ttu.edu

ken.rainwater@ttu.edu

phil.nash@ttu.edu

john.schroeder@ttu.edu