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Seminole Integrated Wind-Water Demonstration System

Progress Report for April-June 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;
6) Operation and characterization of the integrated wind-water purification system for a period of 12 months;

7) Documentation and reporting of project results and performance.

2.0 SUMMARY OF ACTIVITIES THIS PERIOD

2.1 Overview Activities this period included the following: 1) under a purchase order issued to Parkhill, Smith and Cooper (PSC) by Texas Tech, submittal of an application for FAA approval of two alternative wind turbine locations; 2) under a purchase order issued by TTU to West Texas Consultants (WTC) of Andrews, Texas, work continued on the layout and location of the facility components (wind turbine, RO building and other subsystems) and the associated infrastructure; 3) submittal of a grant proposal to the State Energy Conservation Office (SECO) for purchase of the wind turbine; 4) initiation of RO system procurement; and 5) changes in staff responsibilities within the Texas Tech team.

2.2 FAA Application PSC consultants prepared applications for two alternative sites on within the City of Seminole' target water rights area for FAA review. Concerns had been raised about the potential impact of the wind turbine on traffic at the nearby Seminole airport. Based on the likely turbine height (top of blade) of 127 ft, the south (32° 41' 4.68" N, 102° 39' 58.97"W) and north (32° 41' 30.72" N, 102° 39' 58.61W) alternate sites were both sent to the FAA for review. FAA response is expected early in the next quarter. It should be noted that this review caused delay of the planned well procurement.

2.3 Site Layout and Balance of System Design WTC and PSC both continued their work based on review from a meeting in the previous quarter.

2.4 Wind Turbine Grant Application After the planned low-cost lease of a 50-kW turbine from Entegrity Wind was no longer an option, the Texas Tech team assembled a grant proposal to SECO for funds for purchasing a 50-kW turbine. Estimates were obtained from Entegrity Wind and Henderson Wind Energy as part of the proposal. The grant request totaled $244,000. Response from SECO is expected in early July.

2.4 RO System Procurement The Texas Tech team initiated procurement of the RO system using DOE funds. PSC assisted in developing specifications for the bid. The RO system will include appropriate pretreatment and post-treatment devices. Procurement procedures were begun on June 25, and the bids are to be returned by July 20.

2.5 Changes in Texas Tech Team Dr. Jamie Chapman left Texas Tech for a position with Vestas in Houston in late June. At the same time Dr. Andrew Swift was replaced by Dr. John Schroeder as Director of the Wind Science and Engineering Center. Dr. Ken Rainwater, Director of the Water Resources Center, is now the lead Texas Tech representative for the Seminole wind-water project. Dr. Chapman's future involvement with the project has yet to be determined.

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