

MEMORANDUM

To: Saqib Shirazi, P.E., Innovative Water Technologies, Texas Water Development Board (TWDB)

FROM: Lianfa Song and Ken Rainwater, Texas Tech

SUBJECT: Demonstration of High Recovery and Energy Efficient RO System for Small-Scale Brackish Water Desalination – November 2010

DATE: November 05, 2010

CONTRACT: 1004831107

Recent Project Activities:

Recently, the Water Resources group at Texas Tech University has focused on the following activities related to the demonstration of the subject RO system:

1. To ensure the accuracy of the data obtained, calibration and verification of flow meters, conductivity meters and pressure transducers/transmitters was performed.
2. As part of TWDB Proposal Task 1, tests were performed to determine the energy requirement to produce permeate at various salt concentrations, feed flow rates and permeate production rates. In addition, the effect of varying the concentrate recirculation rate on energy efficiency was studied.

Issues Encountered:

The following operating issues were observed during the testing:

1. Higher operating pressure at higher recoveries (85 to 90%) than expected.
2. Determination of best ratio of recirculation rate to feed flow rate in order to obtain best energy efficiency.
3. Efficiency of holding tank flushing during discharge mode.

Items to be Addressed and Anticipated Project Activities:

The following items will be addressed in the next phase of the study:

1. Causes of high pressure at the highest recoveries will be examined. Actual operating pressures will be compared with expected values based on membrane characteristics, permeate flux and conductivities of feed and

recirculated concentrate. Attempts to modify process to lower these pressures will be made.

2. The effect(s) of changing the ratio of recirculation flow to feed flow on energy efficiency will be studied.