

**Project Proposal:
Economic analysis of proposed seawater desalination facility in
Brownsville, TX**

Focus Category:

ECONOMICS;
WATER SUPPLY;
PLANNING & MANAGEMENT;

Keywords: seawater desalination, water supply project economics,

Duration: March 1, 2009 to February 28, 2010

Federal Funds Requested: \$5,000

Non-Federal Matching Funds Pledged: \$10,866

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Congressional District(s) where project will occur: 27; with implications for 15 and 28 (i.e., districts 27, 15 and 28 comprise the Region M water planning group); and with implications for 14, 22 and 2 (because these districts are located along the Gulf coast; i.e., Freeport and Corpus Christi already have considered seawater desalination projects)

Abstract:

Seawater desalination project is being actively pursued by the Brownsville Public Utilities Board, municipal power and water supplier to the City of Brownsville located in the Texas Lower Rio Grande Valley. Seawater desalination provides a means to expand the region's water supply and diversify the region's water supply portfolio against water delivery shortfalls and periodic drought. This research will compile economic cost data from desalination facilities similar to the facility being proposed for Brownsville (to be located on the Port of Brownsville). The analysis will compare the projected costs of

water production via desalination at the Port of Brownsville with the costs of alternative potable water supplies, including conventional surface water treatment, brackish groundwater desalination, and seawater desalination at other locations, controlling for water quality, energy costs, time value of money, etc. Cost analysis will use DESAL ECONOMICS©, a cost model developed by Texas A&M AgriLife Research and AgriLife Extension Service economists, along with cost models used in the industry, e.g., Reverse Osmosis Desalination Cost Model (RODCM) published by Water Resource Associates, and WTCost© II published by I. Moch and Associates.

Statement of Critical Regional Water Problems:

From 1970 to 2000, the Texas Lower Rio Grande Valley has experienced some of the highest population growth rates in the country with McAllen, Laredo, and Brownsville, Texas posting annual growth rates equal to, or higher than, many other water scarce regions such as Atlanta, Georgia, and Albuquerque, New Mexico. The cities of the Texas Lower Rio Grande Valley (along with the cities of northern Mexico) share the Rio Grande as the primary water source for the entire region. In the drought of the early 2000s, the Rio Grande famously and unfortunately failed to flow into the Gulf of Mexico. The WWF places the Rio Grande in their list of “World’s top ten rivers at risk”, citing over extraction as the river’s greatest threat.

Nature, Scope, and Objectives of Research:

The recently completed Brownsville Seawater Desalination Pilot Project concluded that seawater desalination, as a means to supply freshwater to citizens of Texas Lower Rio Grande Valley, was technically feasible from a raw water intake point located on the Brownsville Ship Channel on the eastern point of the Port of Brownsville. The question remains whether a small, medium, or large seawater desalination facility is economically feasible for the region, and whether such projects would be feasible elsewhere along the Texas Gulf Coast. The Texas Water Development Board has been and continues to actively investigate seawater desalination with feasibility studies in Freeport, Corpus Christi and Brownsville; and pilot studies in Brownsville and in South Padre Island.

The costs and benefits of implementing seawater desalination facilities vary at every location. At the Port of Brownsville, pretreatment costs are projected to be higher due to the challenging source water from the Brownsville ship channel. Ship traffic in the channel, in particular that of tankers and cargo vessels, disturb the channel floor and allow highly turbid water to enter the desalination facility. Site location along the ship channel also brings benefits, however, such as proximity to power infrastructure and access to the finished water distribution system (NRS Consulting Engineers 2008).

Since 2004, Texas A&M AgriLife Research and AgriLife Extension Service economists have been studying the water supply alternatives for the Texas Lower Rio Grande Valley. They have already completed cost analysis on the more traditional methods of water supply in the area, such as conventional surface water treatment and brackish groundwater desalination and studies are ongoing for rainwater harvesting. The lifecycle

cost analysis of a seawater desalination facility remains unstudied as an additional component in the set of water supply alternatives. When analysis of all water supply alternatives is complete, water planners in the region will have valuable information with which to evaluate future water supply infrastructure investments.

This study will utilize the existing DESAL ECONOMICS[®] Excel[®] spreadsheet model, which was developed during recent studies of brackish groundwater desalination plants in the Lower Rio Grande Valley of Texas (Sturdivant et al. 2008; Boyer et al. 2008). The research will focus on identifying the life-cycle costs for constructing and operating the proposed Brownsville seawater desalination facility over its expected useful life, identifying the relative importance of the several major segments comprising the facility (e.g., source water acquisition, RO treatment, storage, etc.) and the relative importance of major individual variable cost items (e.g., energy, labor, and chemical).

Results Expected from this Project:

Existing literature suggests that water produced for municipal consumption from seawater desalination will exceed other alternative water supply options in a strict cost per unit of water metric. This study is intended to test this hypothesis.

References:

Boyer, C.N., M.E. Rister, A.W. Sturdivant, R.D. Lacewell, C.S. Rogers, and B.L. Harris. "Identifying Economies of Size in Conventional Surface Water Treatment and Brackish-Groundwater Desalination: Case Study in the Rio Grande Valley of Texas." *Proceedings of the 2008 Southern Agricultural Economics Association Annual Meeting*. Adams Mark Hotel. Dallas, TX. February 2-6, 2008.

NRS Consulting Engineers. "Final Pilot Study Report: Texas Seawater Desalination Project." *Brownsville Seawater Desalination Pilot Project*. October 2008.

Sturdivant, Allen, Callie S. Rogers, M. Edward Rister, Ronald D. Lacewell, Joseph W. "Bill" Norris, Jesús Leal, Jose A. Garza, and Judy Adams. "Economic Costs of Desalination in South Texas: A Case Study," *Journal of Contemporary Water Research and Education*. 137(September 2007):21-39.