Appendix C

The Tampa Bay Desalination Plant

The Tampa Bay desalination plant has sparked tremendous public interest. Communities in the United States and abroad were intrigued by both the contract structure between Poseidon Resources and Tampa Bay Water, a public-private partnership, and the incredibly low cost of the product water. The Prime Minister of Singapore, for example, sent a delegation to Florida to examine the plant and learn about the project contract (Johnson 2001). Yet, nearly 10 years after the regional water authority initiated the project, the plant has produced very little water. The desalination plant has been plagued by problems and is not expected to be operational until 2008. The experiences in Tampa Bay should serve as a cautionary tale, warning advocates against excessive optimism on price; indeed, cost cutting is in part responsible for the project's difficulties.

History and Background

In the 1990s, Tampa Bay faced a range of regional water problems. Population forecasts concerned area leaders about their ability to meet future water demands. Local groundwater overdraft was adversely affecting natural wetlands and lakes in the area and leading to salinity intrusion (Wright 1999). When the regional water utility's (West Coast Regional Water Supply Authority) renewable water use permits expired in 1992, a long and difficult review period commenced. The permit finally came before an administrative judge in 1996. As part of the agreement, the West Coast Regional Water Supply Authority accepted legal obligations to dramatically reduce groundwater pumping from 158 MGD (598,000 m^3/d) to 121 MGD (458,000 m^3/d) by December 31, 2002 or face a serious economic penalty. The agreement imposed additional reductions to 90 MGD (340,000 m^3/d) by 2008. Conservation rules were also imposed on the regional water utility. In return, the agency responsible for issuing the permits, Southwest Florida Water Management District (SWFWMD), was required to provide $183 million in tax money to help develop new water supply sources (NOAA 2003).

The West Coast Regional Water Supply Authority (which later became Tampa Bay Water) examined a number of solutions to reduce groundwater pumping, including groundwater pumping in other areas, reuse, surface storage, and a seawater desalination plant. Additional groundwater pumping and reuse were rejected. Desalination[2] emerged as a winner, in part due to its reliability during droughts. In October 1996, West Coast Regional Water Supply Authority issued a Request for Proposal for a commercial developer to design, build, operate, and own a desalination plant. The plant would provide 25 MGD (95,000 m^3/d) of the mandated withdrawal reduction, or about 15% of the utility's water supply (Pittman 2003a).

Four vendors submitted initial proposals in December 1997, and binding offers in the competitive bidding process were received in October 1998. In early 1999, Tampa Bay Water (formerly the West Coast Regional Water Supply Authority) selected S&W Water, LLC, a consortium of Poseidon Water Resources and Stone & Webster. Their proposal called for construction of the plant to commence in January 2001 on the site of the Big Bend Power Plant on Tampa Bay.

[2] Additional surface storage was completed in 2005.

Operation was to begin in the second half of 2002 (Heller 1999, Hoffman 1999). A total of 44 MGD (167,000 m^3/d) of feed water would be required to produce around 25 MGD (95,000 m^3/d) of potable water and 19 MGD (72,000 m^3/d) of brine. The potable water would then be sent 22 kilometers by pipeline to the municipal water supply plant for distribution to customers. On completion, the privately owned and operated facility would supplement drinking water supplies for 1.8 million retail water customers in Hillsborough, Pasco, and Pinellas counties and the cities of New Port Richey, St. Petersburg, and Tampa (Wright 1999, U.S. Water News 1999).

Some local residents and community groups opposed construction of the plant because of concerns about impacts on local ecosystems due to water withdrawals and brine disposal (Karp 1999, Pittman 2003b). A group called Save Our Bay, Air and Canals (SOBAC), though not opposed to desalination plants in general, argued that the proposed location was inappropriate. SOBAC contended that flushing of Tampa Bay is too slow to dilute the effluent, which would have elevated salinity and temperature as well as chemicals introduced during the treatment process. In addition, they argued that the dissolved oxygen content of the discharge from the Big Bend Power Station already violates its permits, and that the brine from the desalination plant might exacerbate the oxygen problem (SOBAC 2005). While their opposition was not sufficient to delay or halt construction of the plant, it does indicate that the siting of the plant was a contentious issue.

Desalination advocates were excited by the project and by the apparent price breakthrough. S&W Water, LLC made a binding commitment to deliver desalinated water in the first year of operation at an unprecedented wholesale cost of $1.71/kgal ($0.45/m^3), with a 30-year average cost of $2.08/kgal ($0.55/m^3) (Heller 1999). Even the highest of the four bidders offered a price between $2.12 to $2.54/kgal ($0.56 and $0.67/$m^3$), well below the cost of water from other recent desalination plants. Southwest Florida Water Management District (SWFWMD) agreed to provide 90% of the projected $110 million in capital costs for construction of the plant and the pipeline needed to transport the water to the water supply system (Heller 1999).

By comparison, the same year, the Singapore Public Utility Board announced plans to build a 36 MGD (136,000 m^3/d) desalination plant, to produce water at an estimated cost of between $7.50 and $8.74/kgal ($1.98 and $2.31/$m^3$) (U.S. Water News 1999). Around the same time, new plants in Cyprus and Trinidad were projected to produce water for under $7.57/kgal ($2.00/m^3).

Unique conditions, difficult to reproduce elsewhere, contributed to low produced water costs. Energy costs in the region are low (around $0.04 per kWh) compared to other coastal urban areas. Co-location also lowered the cost because the power plant provided infrastructure, supporting operations, and maintenance functions. Salinity of the source water from Tampa Bay is substantially lower than typical seawater: only about 26,000 parts per million (ppm) instead of 33,000 to 40,000 ppm typical for most seawater. In addition, financing was to be spread out over 30 years and the interest rate was only 5.2 percent (Wright 1999).

Status of Tampa Bay (Mid 2006)

The Tampa Bay project has been plagued with problems. In 2000, Stone & Webster declared bankruptcy and Poseidon became full owner of S&W Water, LLC. Poseidon Water Resources then hired Covanta Energy to construct the plant, and the partnership became Tampa Bay Desal.

Because Covanta Energy had such a poor bond rating and was unable to secure financing for construction bonds, Tampa Bay Water (the regional water authority), which had an AA bond rating, decided to purchase Tampa Bay Desal. As owner of the plant, Tampa Bay Water contracted with Covanta Construction (a subsidiary of Covanta Energy) to finish building the plant and Covanta Tampa Bay, Inc. (a subsidiary of Covanta Energy) to operate the facility. Before Covanta Tampa Bay could commence the separate 30-year operation and maintenance contract, however, Covanta Construction was required to meet certain test standards. The operation and maintenance contract was worth $300-360 million and was Covanta Tampa Bay's only asset (Wright 2003).

The Tampa Bay plant began the first tests of potable water production in March 2003, nearly a year behind schedule. Two months later, serious and unanticipated membrane fouling became apparent, decreasing the life of the membranes and raising costs considerably. Covanta officials blamed the problems on Asian green mussels growing on the power plant intake pipes and large intake water temperature variations from the power plant (Wright 2003). Tampa Bay Water officials blamed the problems on Covanta's pretreatment system, which did not effectively remove sediment and organisms from the intake water that caused fouling of the membranes (Heller 2004).

Disposing of the cleaning solution also became problematic: the membrane fouling required additional chemical use, and disposal of the additional cleaning solution would have violated the sewer discharge permit issued by Hillsborough County. Covanta Construction was unable to meet the test standards after repeated attempts and declared bankruptcy in 2003, followed rapidly by the bankruptcy of Covanta Tampa Bay, Inc. In 2004, the parties agreed to a settlement by which Tampa Bay Water retained full control of the facilities and operating contract for less than the cost of the construction contract.

On November 15, 2004, Tampa Bay Water agreed to a $29 million, two-year contract with American Water/Pridesa (both owned by Thames Water Aqua Holdings, a wholly owned subsidiary of RWE) to fix the plant. The money will not be paid until the plant is running. As part of the agreement, all the first-pass membranes are to be redesigned and replaced at a cost of over $6 million (Tampa Bay Water 2005). In February 2005, American Water/Pridesa began new test operations to check for undetected equipment problems. Fouling of the membranes with sediment and organic material remains a problem. In addition, many of the water pumps developed rust and corrosion problems because of cost cutting that led to the use of inappropriate materials (Pittman 2005).

The plant is expected to re-open in late 2006 for another assessment period after the $29 million in repairs are finished and is currently scheduled to be fully operational in January 2008, six years behind schedule. In a press release issued in early 2004, the new cost was described as $2.54/kgal ($0.67/m^3), up from an initial expected cost of between $1.71 and $2.08/kgal ($0.45 to $0.55/$m^3$) (Business Wire 2004). If this cost were accurate, it would still be a relatively inexpensive desalination plant.

To further complicate matters (and increase costs), Tampa Bay Water announced that they intend to operate the plant at less than full capacity because of concerns about exorbitant increases in customer rates. Because the cost of the desalinated water was higher than other options in the

area, blending with cheaper supply options would lower customer rates. In response, SWFWMD threatened to withhold financing for the plant because they believed that they were misled. The dispute went into mediation. In January 2006, the water authorities agreed that the plant could be operated at less than full capacity as long as groundwater pumping was reduced.

Environmentalists and activists strongly opposed the deal because they were concerned about the damage caused by additional pumping needed to meet demand if the plant operated at less than full capacity, particularly during droughts (Skerritt 2006). Operating the desalination plant at less than full capacity will also increase the cost of the water produced.

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