

Drought-protection: Augmenting Existing Groundwater Supplies for Water-short Region

Challenge

Barbados has been identified as one of the most water scarce nations in the world, according to a United Nations assessment. During 1994-1995 a “One in One Hundred and Fifty Year” drought caused over 3,000 households to be without water. At one point, virtually the entire town of Bridgetown had no water for a prolonged period. The rainfall was insufficient to replenish the main water supply leaving the Government of Barbados looking for alternative potable water supplies.

Solution

In November 1998, the Barbados Water Authority (BWA) signed a 15-year agreement with GE Water Process & Technologies to build, own and operate a desalination facility at Spring Garden to produce 7.9 MGD of potable water from a brackish water source.



Figure 1: Spring Garden, Barbados

The heart of the plant is GE’s brackish water reverse osmosis (BWRO) system, utilizing advanced membranes operating at low pressure with a sin-

gle array design to reduce the plant’s overall energy requirements and provide high quality drinking water. Water from the desalination plant passes all WHO and other international health water quality standards.

The desalination plant has operated trouble-free since its initial performance test. The plant is considered a source of pride on the island with regular public tours of the facility. Providing drought-protection for the island’s water supply, the plant is the most secure source of potable water for the island nation. (Figure 1 shows the installation at the Spring Garden, Barbados facility.)

End-user:	Barbados Water Authority
Location:	Spring Garden, Barbados
Commissioned:	February 2000
Application:	Drinking water
Feedwater source:	Brackish wells
Feedwater quality:	1,000 - 5,000 mg/l TDS
Product quality:	less than 200 mg/l TDS
Capacity:	7.9 MGD (30,000 m ³ /day)
Technology:	Brackish water reverse osmosis (BWRO)

Desalination Process

BWRO System Description

The desalination plant includes two (2) BWRO trains. Each train is a single array with four banks of sixteen (16) pressure vessels, a total of 128 vessels. Each pressure vessel has six (6) 8” x 40” membrane elements.

The plant utilizes Toray ultra low pressure brackish membrane elements that achieve 99.5% salt rejection at 7.6 bar (110 psi). Three high



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CS1059EN 0601

pressure feed pumps drive the brackish water through the two trains.

Up to 75% of the pressurized feedwater is converted into product. The remaining concentrate stream for each train is passed through an energy recovery turbine (ERT) to minimize electrical consumption before it is returned to the sea via deep well injection. The ERT works in conjunction with the BWRO feed pumps.

Post-treatment

The desalinated water is further treated for public consumption in a lime dosing step, which adds back some mineral content to the water and ensures good taste. The water is then chlorinated by dosing with a small amount of sodium hypochlorite.

Distribution

The potable water, after post-treatment, is transferred to the site storage tank where it is monitored to ensure consistent water quality. The water is then delivered to the BWA reservoir for distribution. (See Figure 2 for the desalination process.)

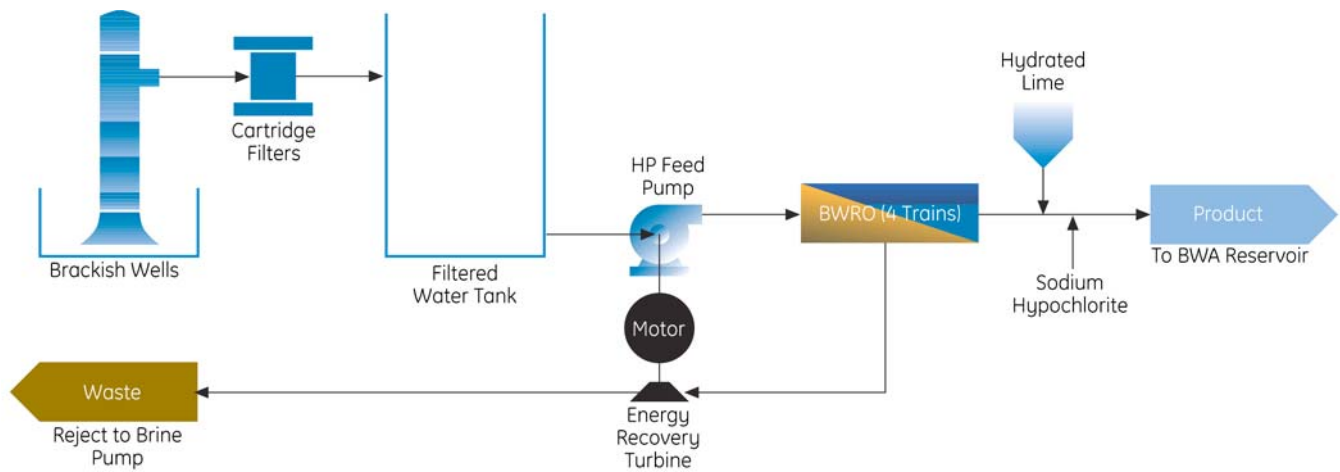


Figure 2: Desalination Process