

Minimizing Concentrate Disposal Costs for the City of Signal Hill's Well No. 9

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The City of Signal Hill(City), located near Long Beach, California recently implemented a 1,200 gpm water treatment project that uses Nanofiltration (NF) to treat a local groundwater that is high in color. The City is located in an area that would typically consider the ocean for concentrate disposal from such a facility. The City however, is not in a position to go through the immense and overwhelming permitting and implementation process of developing an ocean outfall for disposing of concentrate. They were therefore left with the only available option to pay connection fees and treatment fees for connecting to the local sewer system. The cost of connection, typically much lower than inland desalination facilities would pay is still prohibitively expensive and therefore, the City looked to alternatives to avoid the impact on rates to their customers.

In 2008, the City drilled Well No. 9 to provide reliability and redundancy to their existing water supply. They have two other wells that supply water, but needed the additional capacity to replace lost capacity from the existing wells. This new water resource was anticipated to assist the City in meeting local demand while also reducing the dependence on imported water. Unfortunately, after the well was drilled, it was found to have color in the water at a level that could not be blended to acceptable levels and therefore the well would require treatment.

In 2014, the City determined they would need the added capacity from Well No. 9 sooner than expected and embarked on the water treatment project. The project used an alternative delivery process to select a Design-Build team of J.R. Filanc Construction Company, Hazen and Sawyer, and Harn RO Systems to design and construct a new 1,200 gallon per minute Nanofiltration(NF) wellhead treatment facility. The project was awarded in June of 2015 with design and construction completed in late 2016. The project required the equipping of the well with pumping capabilities and the installation of a NF membrane treatment facility to treat groundwater.

The treatment objective of the Well No. 9 Water Treatment Facility (WTF) is to treat the water to meet state and federal requirements and to remove high levels of color (approximately 50 to 60 color units) from the raw water. The treatment process was designed to produce a water with less than 5 color units. In addition, the treatment process was designed to minimize the reduction in Total Dissolved Solids (TDS) using

NF membranes. Most importantly, the system had to be designed to operate at or above 98% recovery to minimize waste from the system.

In order to achieve these challenging requirements, the NF system was designed with a hybrid membrane configuration using a combination of low rejection and high rejection NF membranes. The low rejection membranes would pass the salt but would reject the color for 90% of the flow. The remaining 10% with concentrated color and some salts would then be concentrated to achieve an additional 80% for a combined total of 98% recovery. The low rejection NF membranes would allow scaling salts such as calcium carbonate and silica to pass the membrane and thus the high rejection membranes are able to achieve the high recovery with minimal scaling.

The project started up and is currently treating water and meeting the challenging requirements. The Poster will highlight the project and will show how the treatment is achieved. Additionally, it will show the economics of how the reduced cost of concentrate allowed the project to move forward.