

PROBLEMSOLVER

By Paul Schuler



RECYCLING & REUSING

The problem

The U.S. Army's Schofield Barracks in Oahu, Hawaii, was operating a 3.2-million gal per day (mgd) wastewater treatment plant (WWTP) that served approximately 28,000 military personnel and their families at the base. The treatment process needed to be upgraded to provide higher capacity, meet increasingly stringent regulatory requirements and supply R-1 quality recycled water. Hawaii defines R-1 water as the highest quality recycled water that has undergone filtration and disinfection to make it safe for use on lawns, golf courses, parks and other areas used by people.

The U.S. Army and Aqua Engineers team up to establish an award-winning wastewater reuse system on a Hawaiian Army base

Although surrounded by ocean, Hawaii suffers extreme droughts. Hawaiians depend on aquifers and surface water for potable water supply; however, more than 70% of this water is used to irrigate farm crops, golf courses and residential and commercial landscaping. For this reason, it is important that technologies be utilized to recycle water for irrigation purposes in order to preserve Hawaii's natural supply of drinking water.

The solution

In 2004, the Army awarded a 50-year contract to Aqua Engineers, a leading water and wastewater operations and management company, to own, operate and upgrade the Schofield Barracks WWTP.

The Aqua Engineers and U.S. Army team worked with design engineers and GE Water & Process Technologies to determine the optimal method for increasing the treatment capacity of the facility while maximizing the use of the existing infrastructure. The team recommended that the plant be retrofitted with GE's ZeeWeed membrane bioreactor (MBR) to replace the existing secondary treatment process and enable the production of R-1 reuse water. A ZeeWeed MBR is a biological and physical process that combines the biological

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treatment of wastewater contaminants in aeration basins with physical solid-liquid separation using ultrafiltration membranes.

The MBR system allowed for easy expansion of the treatment plant and provided premium recycled water to irrigate lawns, golf courses, parks and other sites on the base. This helped the nearly 28,000 military personnel and their families and ensured the Army's ability to expand its family housing and support facilities. The MBR system was commissioned in the Schofield Barracks WWTP after only eight months of construction. The system was completed on time and within its budget and will allow the military base to significantly reduce the consumption of municipal drinking water.

The process

After fine screening, raw sewage flows to equalization and primary clarification, then to one of four anoxic zones for denitrification and finally to the corresponding aerobic zones for nitrification. Pretreated water is distributed among four ZeeWeed ultrafiltration trains, where permeate pumps draw the settled water through the membrane fiber. With a nominal pore size of 0.04 microns, the membrane acts as a physical barrier to turbidity, producing an effluent with less than 0.2 NTU 95% of the time and less than 0.5 NTU 100% of the time. This meets Hawaiian R-1 water reuse requirements.



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Membrane fibers are automatically cleaned with a clean-in-place backpulsing process that forces permeate water back through the membranes. This dislodges any particles that may adhere to the membranes. Aeration of the membranes is also used to scour debris from the fibers, provide mixing within the process tank and supply oxygen for the microorganisms.

Treated effluent is further treated with UV disinfection and then discharged or reused on base. The MBR is configured to use four of the six existing aeration basins. When future expansion is required, the remaining two aeration basins can be used to provide an additional 50% capacity, increasing the plant capacity to 6.3 mgd within the existing space.

The results

By converting to an MBR system, the military base was able to save up to 4.2 mgd (15,900 cu meters) of potable water while eliminating the discharge of excessive nutrient concentrations in the effluent. GE awarded the Aqua Engineers and U.S. Army Partnership with a 2007 Ecomagination award for outstanding environmental leadership. The award honors the partnership for its use of an innovative wastewater treatment and reuse system to reduce demand for potable water supplies and preserve the environment.

"We're committed to doing the right thing for the right reason," said Col. Howard J. Killian, commander, USASG-HI. "Everything has value, even wastewater; it's just a matter of figuring out how to use that value. The wastewater treatment facility is just one example of how we're trying to capture that lost value. The Army and the world around us are changing. We can't wait to take action twenty years down the road. We need to anticipate and constantly reevaluate our actions with sustainability as our end goal." **WWD**

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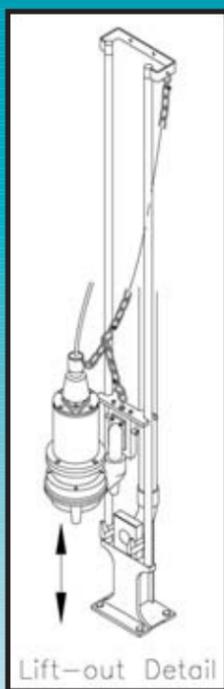
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