

## *Tertiary Treatment and Recycling of Wastewater*

### **Technology Description**

A constant and reliable supply of water is critical to mission success in every part of the world. However, in some parts of the western U.S., water supply is increasingly at risk. Underground aquifers—the largest ground water withdrawals—are not being replenished at rates that can support consumption. In addition, pumping water from aquifers is more costly than using surface water. If we continue to drain aquifers faster than they are replenished, they may become overdrawn and collapse, which permanently reduces their storage capacity.



To address the problems associated with water availability and accessibility, water districts are increasingly emphasizing conservation and recycling. On-site treatment and recycling of gray and black water is an increasingly attractive option.

The tertiary treatment and recycling of wastewater project will demonstrate and validate an innovative on-site tidal wetland-based wastewater treatment system that produces recyclable non-potable water from black water (includes gray water). The treated water can be used for sub-terrain irrigation, toilet flushing, industrial wash water, and groundwater recharge.

### **Value to the Warfighter**

One of the primary benefits of on-site water treatment and reuse is a reduction in potable water consumption and energy use. This translates into cost and water savings which help facilities provide the training and support that are at the core of the DOD mission.

Additional benefits of on-site water reclamation and reuse include:

- Contribute to DOD compliance with federal water conservation directives (Energy Policy Act of 1992 and Executive Order 13123).
- Contributes to a more consistent and reliable water supply.

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- Reduced discharge to the sewer is a de facto increase in sewage plant capacity, allowing for growth in DOD operations without incurring costly increases in sewage capacity.
  - Encourages comprehensive water planning that integrates water and wastewater management.
  - Reduced freshwater demand benefits ecosystems stressed by water withdrawals.
  - Supports sustainability at DOD facilities.

### **Economics of the Technology: ROI or Payback**

The capital cost of a basic system with a capacity of 10,000 gallons per day which would treat 3.5M gallons per year of black water is approximately \$350,000. Based on the most recent Marine Corps Recruit Depot (MCRD) San Diego water and sewer costs, the annual cost savings (water and sewer) for this system would be \$28,300 or a nominal payback of 12.5 years. This calculation assumed that operation and maintenance costs of the treatment system will be at least partially if not wholly offset by increases in water and sewer costs.

### **Technology Transition Documentation**

This is a Technology Transition Category 4 by providing technology improvements for internal use by the Navy with emphasis for forward operating and remote bases.

### **Site Implementation**

The tidal wetland-based system is installed and undergoing operational testing at MCRD San Diego, a facility that is almost entirely dependent on imported water. During the demonstration, long-term performance data will be generated based on data gathered by the system's computer (including pH, oxygen, flow rates, and power consumption). Effluent discharge samples are collected and analyzed at 5 to 6 week intervals. Effluent water quality goals will meet California regulatory standards for effluent reuse for sub-surface irrigation.

### **Specific Applications**

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