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### New Water Purifier Prevents Drinking Water Shortage at Remote Coast Guard Station

By Nancy McGuire

A high-volume water purification system developed by the Office of Naval Research has proved itself in a real-world emergency situation, providing a remote U.S. Coast Guard station with enough potable water to last through an Alaska winter. The Expeditionary Unit Water Purification Unit (EUWP) was designed to be energy-efficient and transportable—just what was needed for this type of situation.



The EUWP ultrafiltration unit and two water tanks at Port Clarence, Alaska.

In October 2004, a series of storm surges dumped seawater into the lakes that supply water to the 23 Coast Guard personnel who maintain the LORAN (Long Range Aids to Navigation) transmitter at Port Clarence, Alaska. This tiny outpost, the world's northernmost U.S. Coast Guard station, sits on the tip of Point Spencer, a 12-mile gravel spit on the western coast of the Seward Peninsula, just 60 miles south of the Arctic Circle.

After the storms, the water in the two lakes was too salty to be purified using the station's own water treatment system, and the frigid October weather made it impractical to ship fresh water to the station. Fortunately, the reserve tanks had already been filled with enough purified water to last the winter, but the problem remained: where would Port Clarence find fresh water when the reserves ran out? Given the remote location and the limited shipping season (essentially, just the summer months), it was impractical to ship in a large water supply. Lt. Cesar Acosta of the Coast Guard Civil Engineering Unit in Juneau, Alaska, sent out a request for potential solutions. The EUWP fit the bill.

A first-generation technology demonstrator EUWP system had been unveiled at a ceremony on April 2, 2005, at the Tularosa Basin National Desalination Research Facility in southern New Mexico. At the first available opportunity, the Naval Facilities Engineering Service Center at Port Hueneme, California, arranged to ship an advanced spin-off demonstrator model to Alaska. After a three-week trip by truck, train, and plane, the EUWP arrived at Port Clarence on July 19, 2005. In just three days,

generated 250,000 gallons of purified water.



U.S. Coast Guard Station at Port Clarence, where temperatures in the wintertime can reach down to -40° F.

The EUWP consists of ultrafiltration and reverse osmosis units that can produce up to 100,000 gallons of drinking-quality water per day. The two units, powered by a 100 kW generator, each weigh approximately 15,000 pounds and are mounted on skids measuring 20 feet long, 8 feet wide, and 4 feet high. With a focus on expeditionary needs, the units were designed to operate in most environments, including blowing sand, dust, rain, and air temperatures ranging from 32° F to 120° F (0°–50° C).

Program manager Maj. Alan Stocks, USMC, of ONR's Expeditionary Warfare

Operations Technology Division emphasized the collaborative nature of the EUWP development effort, with participation from Navy, Army, Bureau of Reclamation, Environmental Protection Agency, and NASA personnel, as well as from universities and U.S. and European commercial firms.

The EUWP system combines for the first time several technological advances, including new reverse osmosis membrane materials, energy recovery technology, and an assortment of other components specifically designed to increase efficiency of operation. It is intended to showcase technological innovations that can be used to provide clean, affordable drinking water to military units in the field, civilians in disaster recovery areas, and other groups of people who are faced with water shortages or contaminated water supplies.

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