

At a Glance

What is it?

■ The Advanced Shipboard Water Desalination program focuses on expanding existing deep blue water desalination capabilities to enable the rapid generation of large quantities of potable water in turbid littoral environments as efficiently as possible while maintaining a compact and economically operable system design.

How does it work?

■ Advanced shipboard systems will use improved desalination technologies in combination with enhanced pre-treatment and ultrafiltration systems to remove contaminants and filter saline or brackish sources.

What will it accomplish?

■ The Advanced Shipboard Water Desalination program will increase the operational availability of potable water generation systems in all naval theatres while reducing maintenance and energy costs of these systems. Additionally, it will reduce the logistics burden and costs of providing external potable water sources.

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Maintaining a sufficient potable water supply is essential to the sustainment of naval operations and is a critical factor in the ability to achieve almost any operational missions. Current and foreseeable military operations will require entrance into and continuous operations in the littorals, where water production is encumbered by the existing source water conditions.



Existing shipboard desalination systems were not designed to handle the abundance of particulate and marine biological matter entrained in these waters resulting in increased cost, limited availability and increased risk. Operational availability of desalination systems can fall from more than 99 percent measured in deep blue water to 50 percent in littoral and near-shore environments. Increased system maintenance time may be required as a result of the decreased lifetime of the cartridge filters that protect the reverse osmosis membranes. Sustainment of operations is then dependent on the ability of usable water to be produced and shipped from off-site locations.

The Office of Naval Research is developing technologies for advanced shipboard desalination systems in an effort to provide 95 percent operational availability in the littorals while reducing size and weight by 40 percent, energy consumption by 65 percent and maintenance by about 75 percent. A major program focus is the advancement of desalination pretreatment membranes to increase filtration potential and component lifetime. Two generation I systems and one generation II system were created under the Expeditionary Unit Water Purification (EUWP) program, showcasing many viable enabling technologies that will be leveraged in this program. One of these EUWP systems was able to purify 250,000 gallons of water in three days for a Coast Guard base in Alaska. Additionally, this technology can be applied to humanitarian needs, as was shown with EUWP deployment to the Gulf Coast following Hurricane Katrina.

The Advanced Shipboard Water Desalination program is being developed through the Future Naval Capabilities program with full prototype demonstrations in the 2014 time frame.

Research Challenges and Opportunities:

- Development of advanced desalination techniques and advanced membranes
- Evaluation of alternative technologies for ion removal and ultrapure water
- Evaluation and development of micro/ultra-filtration membranes with antifouling pre-treatments
- Evaluation and development of automated chemically enhanced membrane cleaning processes subject to shipboard constraints.