



Sea Trials of the Articulated Wave Energy Conversion System (AWECS)

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The Articulated Wave Energy Conversion System (AWECS) is a three-barge floating system designed primarily to pump salt water at high pressures for various tasks. The primary task is that of salt-water desalination to produce potable water for coastal communities. A reverse-osmosis (RO) desalination sub-system is incorporated to accomplish the primary task. A sketch of the operation can be visualized from the sketch in Fig. 1. Energized by the pitching motions of the barge-pairs, high-pressure salt-water pumps mounted between the barges draw water in through a filter system and, then, pressurize the filtered salt water for the design task.

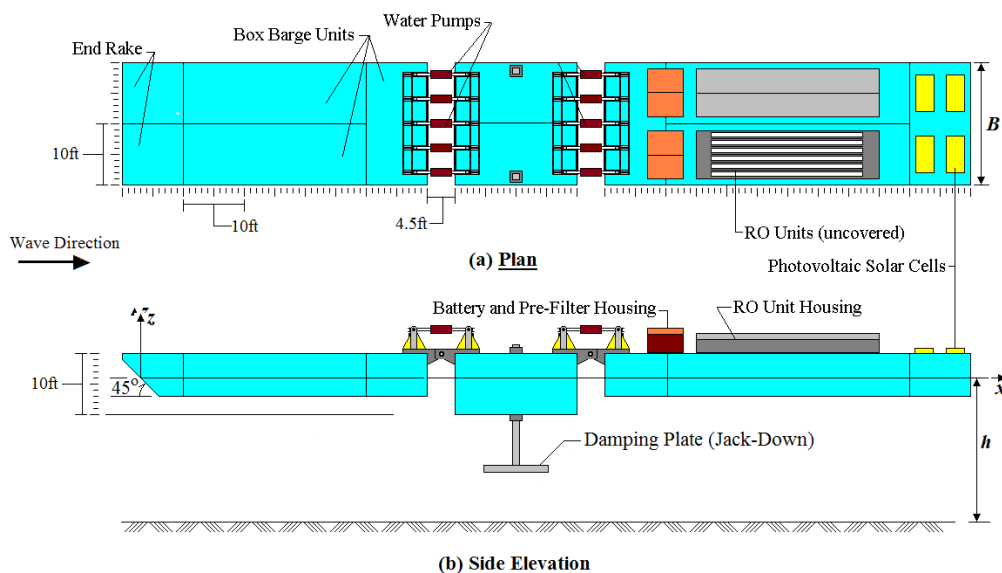


FIGURE 1. AWECS LAYOUT

A 40-meter long prototype of the AWECS was constructed and deployed off of the Delaware coast in the winter months of 2017 and 2018 to determine both the structural reliability and the seakeeping abilities of the floating system. Fig. 2 is a photograph of the AWECS prototype on site during the 2017 deployment. During both deployments, severe storms were encountered at the test site. The average wave heights during the storms were in excess of 2.5 meters. In both deployments, the structural damage was minimal (less than 5% of the structure), and was confined to the piping system. Furthermore, the moorings proved to be significantly over-designed in dealing with the storm-wave-induced AWECS motions. Desalination was not attempted during

the winter-month deployments since the water temperature was below what is considered to be the threshold temperature for reverse osmosis.

The next deployment of the AWECs at the site is planned for March of 2019. The water temperature during the planned deployment should exceed the threshold value, so that RO desalination can take place. For the 1.5-meter, 6.5-second average wave conditions at the site, it is estimated that the AWECs desalination system should produce in excess of 100,000 (U. S.) gallons per day of potable water.



FIGURE 2. DEPLOYED AWECs PROTOTYPE – THE GRACE MARIE – IN 2017.