BATTLESHIP COVE
AMERICA'S FLEET MUSEUM

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Battleship Cove

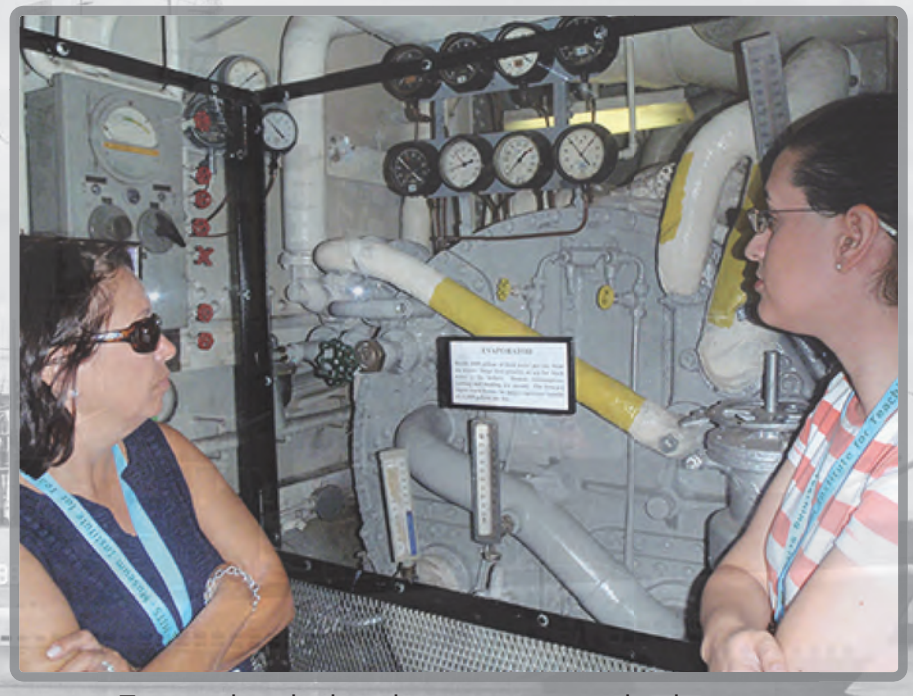
# Water, Water, Everywhere

On a ship, surrounded by salty ocean, how did sailors get fresh water?

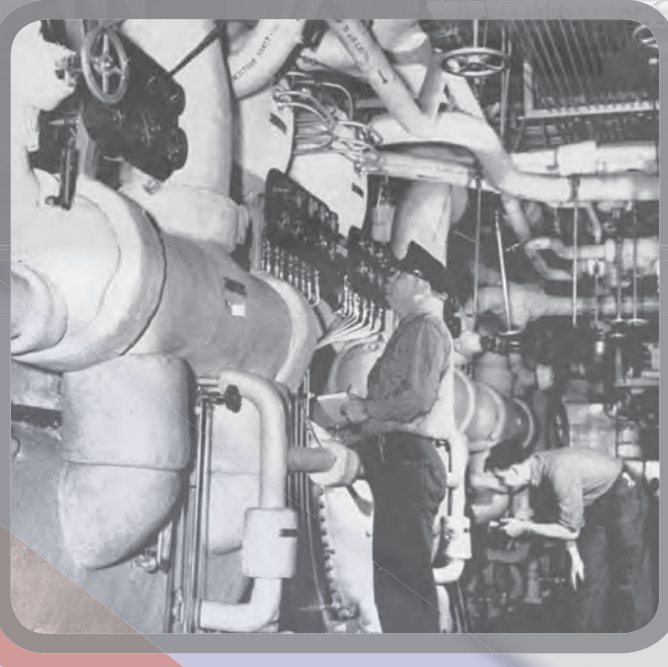
They made their own.

Ships carried **evaporators** and **distilling plants**--equipment took salt water and turned it into fresh water. This process is called **desalinization**. It was done by boiling the salt water so that it became steam, which then cooled and turned back into droplets of pure water, with all the salt now removed. This technology was inspired by nature, since it mimics the natural water cycle of evaporation, condensation and precipitation.

The battleship USS *Massachusetts* could make 52,000 gallons of fresh water a day. Yet most of it was used in the boilers, which needed the purest water. The boilers powered the ship, making steam that turned the ship's propellers and moved her through the water. Using saltwater or unpurified water in the boiler pumps meant disaster—the salt and impurities could build up or rust out the equipment. If the ship's boilers broke, the ship could not move and instead became an easy target for enemy ships and planes during World War II.

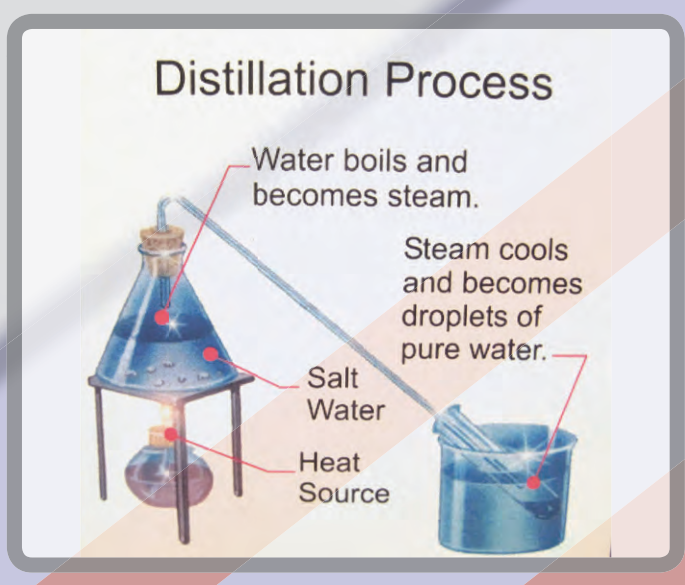


Two teachers look at the evaporator on the destroyer USS *Joseph P. Kennedy Jr.* at Battleship Cove.

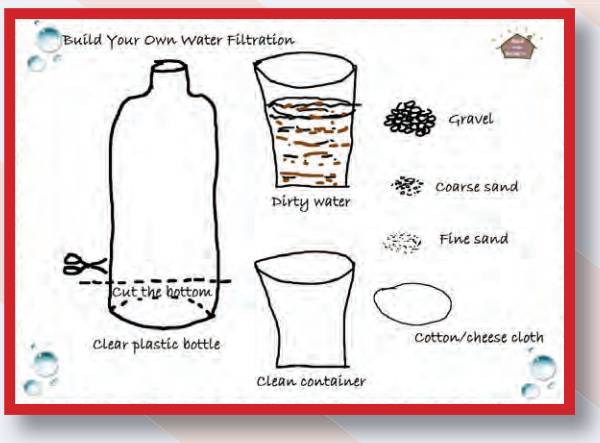


Since the first priority for fresh water usage on a ship was the boilers, the second priority was food prep and drinking, and the last priority was hygiene. If the distilling plant was broken and water needed to be conserved, a ship might set "water hours." In this case, taking a shower became an extremely fast affair: sailors soaped up dry, rinsed for two seconds, and then got out. Punishments were given to sailors who stayed in the shower too long during water hours.

Because fresh and purified water was so important on a warship, there were jobs devoted just to this task. Water Tenders and Machinist's Mates were responsible for efficient boiler operation, and had to know how to repair all water-related equipment. There was also a sailor called the "Oil King" whose job it was to test the water and fuel oil multiple times a day. He made sure that the water going into the boiler was clean and pure; if not, he'd have to add compounds to fix it.




There was one more reason why filtering and purifying water was important on a ship: preventing disease outbreak. Ships in World War II pumped out their wastewater in the sea. This dirty water, pumped out by one ship, could be sucked up into a nearby ship's evaporator. See the problem? Water always had to be filtered and disinfected for the health of the crew, or else the ship's sick bay would be a very busy place.




## CLASSROOM ACTIVITY:
## Design a Water Filter

Students design a water filter out of various materials and test it, tracking what each material is able to filter out. After each test, they improve their filter by using different combinations of materials until they are able to make the "dirty" water as clean as they can, visually.

(This lesson is adapted from Earth Day: http://www.earthday.org/sites/default/files/Filtering%20Water%205-8_Lesson%20Plan.pdf)

### SCIENCE STANDARDS

ENGINEERING DESIGN (WITH WATER FILTER ACTIVITY):

**3-5-ETS1-1;** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

**3-5-ETS1-2;** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

**3-5-ETS1-3;** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

EARTH'S SYSTEMS

**MS-ESS2-4;** Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

## DID YOU KNOW?

**On a Navy ship, the drinking fountain is called the scuttlebutt.**