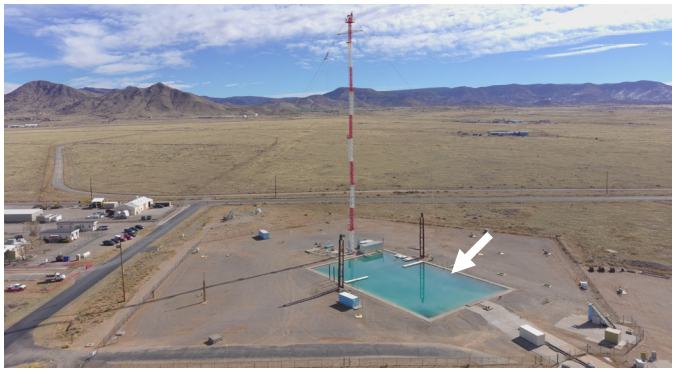
Sandia National Laboratories

Line Inspection and Guided Hardware Testing (LIGHT) Lab and Water Impact Facility Complex

LIGHT Lab is designed to test and validate the performance of marine energy mooring lines, belts and umbilicals before and after ocean deployment to validate designs and assess durability. The facility is scheduled to open in mid-2027 with the goal of making marine energy and infrastructure technologies more reliable and safer.

The LIGHT Lab's capabilities are built around these purpose-designed modules:

- **Mooring Line Tester:** The mooring tester can apply up to 1,000 kilonewton tension and 2-meter stroke on mooring lines for a breaking- and cyclical-loading test, simulating the forces exerted by waves, tides, and currents during ocean deployments.
- **Belt Tester:** The belt tester evaluates mooring belts that serve as part of the power take-off system for wave energy converters (WECs). The tester is designed to simulate the millions of wrap-unwrap cycles the belt will experience around the pulleys and drums, helping engineers understand how belts perform under cyclical loading in harsh ocean environments. The tester can accommodate multiple drums with various sizes up to one meter in diameter.
- **Future LIGHT capabilities:** Additional capabilities planned for future upgrades include device shakedown testing at the Water Impact Facility and an ocean umbilical cable tester. The shakedown testing capability will allow devices, such as WECs and buoys, to be actuated in water using the mooring line tester for system identification testing. The umbilical tester is designed to be able to apply bending, tension, and torsion on umbilical cables that often carry both electrical power and data through electrical and fiber-optic cables.



Arrow shows proposed location of LIGHT Lab Site at Sandia's Water Impact Facility.

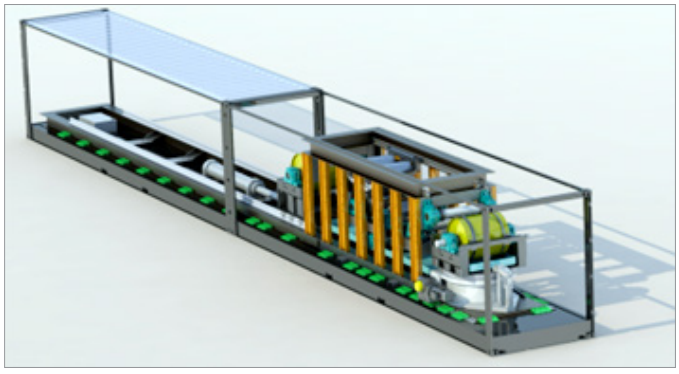
The Water Impact Facility, featuring a 300-foot drop tower and a large testing lake, provides a controlled environment for high-velocity water impact testing and underwater evaluations of marine technologies.

WATER IMPACT FACILITY

The Water Impact Facility provides a controlled environment for high-velocity water impact testing, gravity-assisted drop testing, and underwater testing, including for underwater, unmanned vehicles.

This facility features a 300-foot drop tower adjacent to a 120-foot-wide by 188-foot-long by 50-foot-deep lake, enabling comprehensive testing of objects weighing up to 3,000 pounds. A total depth of 80 feet for underwater testing can be obtained via a 6-foot-diameter, 30-foot-long steel pipe at the bottom of the lake. Such capabilities are essential for validating the performance of weapon systems and other technologies designed for maritime operations.

Towers and cable systems are available for drop-testing test specimens into the Water Impact Facility and a sand bed.



Rendering of Belt Tester designed for evaluating mooring belts, simulating millions of wrap-unwrap cycles to assess performance under cyclical loading in harsh ocean environments.

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U.S. DEPARTMENT of ENERGY | NNSA National Nuclear Security Administration

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