



EXPLORATION GROUND SYSTEMS

H I G H L I G H T S

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A large Orion spacecraft is being hoisted by a yellow deck crane on the deck of a ship. The ship's deck is visible in the background with several crew members in safety gear. The water is turbulent, with white foam from the ship's wake surrounding the spacecraft. The spacecraft is silver with black and white markings and is suspended by red and yellow cables. A yellow buoy is attached to the crane's structure.

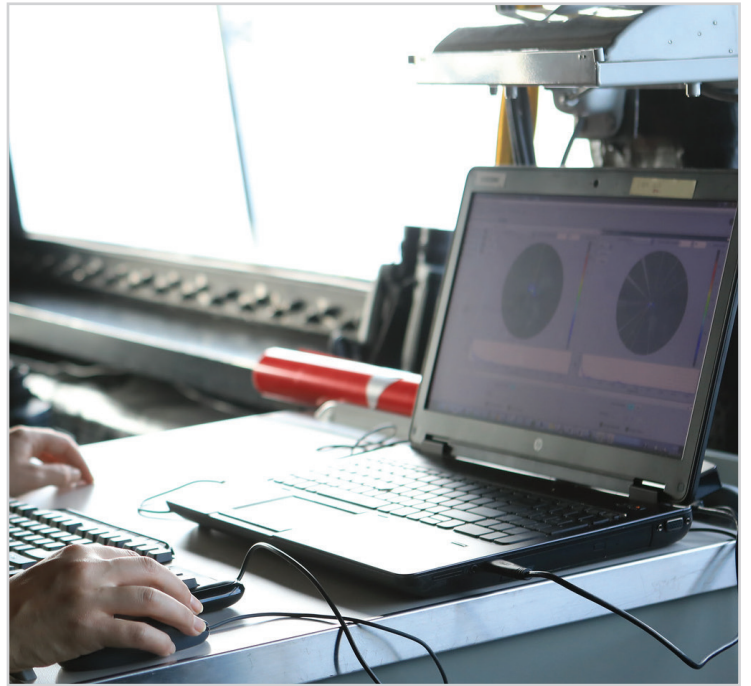
**EGS Completes Successful
Underway Recovery Test-7**

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ORION RECOVERY TEAM: READY TO 'ROCK AND ROLL'



A NASA and Department of Defense team returned from a week of training at sea to improve joint landing and recovering operations planned for crew aboard the agency's [Orion](#) spacecraft from future deep space [exploration missions](#). Departing from NASA's Kennedy Space Center in Florida, the [Exploration Ground Systems](#)' team embarked on the USS John P. Murtha, an amphibious U.S. Navy ship, in the Pacific Ocean with the main goal of ensuring all of their recovery equipment was up to the task. This round of testing was known as Underway Recovery Test-7, or URT-7. Recovery ground support equipment includes the Orion Recovery Cradle Assembly, or ORCA, the cradle in which the spacecraft will ultimately set down; winch and rigging lines lovingly referred to as LLAMAs, short for Line Load Attenuating Mechanism Assembly; and even seemingly small items, such as tow pins. But ensuring all of the equipment works as planned and without damage to the spacecraft is no small task. The entire Landing and Recovery Team is led by NASA's Melissa Jones. During URT-7, she was pleased to see all of the team's hard work pay off. "Testing this week has gone extremely well," she said. The team performed the first complete recovery at night, which lasted until the wee hours of the morning. Jones chocked that up to lessons learned on possible complications of night operations and working with the ship and divers out in the open water in less-than-optimal conditions.

U.S. Navy divers prepare to attach the "front porch" to a test version of the Orion capsule on Nov. 1, 2018, as part of Underway Recovery Test-7 (URT-7) in the open water of the Pacific Ocean. Nearby is the USS John P. Murtha. Orion will be towed into the ship's well deck. There are two large, orange mockup uprighting bags in this view, but when Orion actually splashes down there will be five. URT-7 is one in a series of tests that the Exploration Ground Systems Recovery Team, along with the U.S. Navy, are conducting to verify and validate procedures and hardware that will be used to recover the Orion spacecraft after it splashes down in the Pacific Ocean following deep space exploration missions. Orion will have emergency abort capability, sustain the crew during space travel and provide safe re-entry from deep space return velocities. Photo credit: NASA/Tony Gray

Read the complete story at <https://www.nasa.gov/feature/orion-recovery-team-ready-to-rock-and-roll>.



Valerie Vinciullo, a senior engineer with General Dynamics Applied Physical Sciences, monitors wave movement from the bridge of the USS John P. Murtha during Underway Recovery Test-7 (URT-7) on Oct. 30, 2018, in the Pacific Ocean. Photo credit: NASA/ Kim Shiflett

WAVE TRACKERS AID NASA WITH ORION RECOVERY

When NASA astronauts aboard the [Orion](#) crew capsule splash down in the Pacific Ocean after a trip beyond the Moon, their journey isn't over just yet. As the capsule bobs up and down in the ocean waves, the astronauts will experience gravity for the first time in weeks after their 25,000-mile-per-hour journey in space while they await the recovery team.

To ensure the astronauts have the smoothest ride possible from the splashdown site to the recovery ship, NASA's [Landing and Recovery Team](#) has enlisted the help of a small consulting firm named General Dynamics Applied Physical Sciences (APS). The company studies marine hydrodynamics, or the movement of water in the ocean, and is charged with helping NASA and the U.S. Navy chart the best course to minimize wave impact to the capsule – and the crew.

According to APS scientist Bill Milewski, the company started developing a system to measure and forecast waves back in 2012 for the U.S. Navy's Office of Naval Research. Back then, the Navy was looking for a system that did just that and account for corresponding motions between two ships sailing side by side. Using this data, sailors could safely use a ramp to drive vehicles between the two vessels to transfer materials from one ship to the other. Fast forward a few years. NASA started looking for someone who could do wave analysis to help with operations to recover Orion, which will weigh about 22,000 pounds at splashdown, or about five times the weight of an SUV. The recovery team was looking to minimize waves as it secures the Orion capsule to attaching lines and pulls it into the well deck of a U.S. Navy ship. The ship has a gate that lowers so the well deck can open to the ocean, allowing water to flow in and fill it like a swimming pool.

The ocean's wave conditions are present in the well deck, too. Milewski and his team have been tasked with modelling that wave action and recommending course headings that will minimize waves inside the well deck, allowing a smoother recovery of the capsule and crew.

Read the full story at <https://www.nasa.gov/feature/wave-trackers-aid-nasa-with-orion-recovery>.

WATER DELUGE TEST COMPLETED AT LAUNCH PAD 39B

A flow test of the Ignition Overpressure Protection and Sound Suppression water deluge system was completed at Launch Pad 39B on Oct. 15, 2018, at NASA's Kennedy Space Center in Florida. At peak flow, the water reached about 100 feet in the air above the pad surface. It flowed at high speed from a holding tank through new and modified piping and valves, the flame trench, flame deflector nozzles and mobile launcher interface risers.

The testing is part of Exploration Ground System's preparation for the new Space Launch System rocket. Modifications were made to the pad after a previous wet flow test, increasing the performance of the system. During the launch of Exploration Mission-1 and subsequent missions, this water deluge system will release about 450,000 gallons of water across the mobile launcher and Flame Deflector to reduce the extreme heat and energy generated by the rocket during ignition and liftoff.

Photo credit: NASA/Kim Shiflett



A flow test of the Ignition Overpressure Protection and Sound Suppression water deluge system was completed at Launch Pad 39B on Oct. 15, 2018, at NASA's Kennedy Space Center in Florida.



A Jacobs technician from the Launch Equipment Shop performs welding on the KAMAG spacecraft transporter on Oct. 26, 2018, inside a facility at the crawler yard at NASA's Kennedy Space Center in Florida. The transporter is designed to carry heavy loads. Welding is being performed on the attach points that will hold the Orion transportation pallet in place. Testing of the pallet will be performed to support validation and verification of the attach fittings in the Multi-Payload Processing Facility. Photo credit: NASA/Ben Smegelsky



Rocket Ranch - Episode 5: [Odd Jobs Around the Ranch](#)
When people think of the Kennedy Space Center, rockets are what likely come to mind. But we have more than rocket scientists here on the Space Coast. In this episode, we meet a few Ranch hands with odd jobs you may not expect to find around these parts.

View the EGS 2017 Year in Review at <https://go.nasa.gov/2C9twKC>.

National Aeronautics and Space Administration

John F. Kennedy Space Center
Kennedy Space Center, FL 32899

www.nasa.gov

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