LOOK AHEAD 2020

NASA Rings in Busy New Year in Florida to Prepare for Artemis Missions

BY LINDA HERRIDGE

NASA's Kennedy Space Center in Florida will have a busy year preparing facilities, ground support equipment and space hardware for the launch of **Artemis I**, the first uncrewed launch of the **Space Launch System** (SLS) rocket and the **Orion** spacecraft. In 2020, **Exploration Ground Systems** (EGS) activities will ramp up as launch hardware arrives and teams put systems in place for Artemis I and II missions.

Launch Countdown Simulation Activities

Launch countdown simulations will continue to ramp up in 2020 to train and certify the launch control team for Artemis missions. The types of simulations will build on one another and will walk through the final portions of the launch countdown sequence, called the terminal countdown. Integrated simulations will tie in all NASA centers working the mission to ensure all members of the team are ready to work together, including Mission Control at Johnson Space Center in Houston, and the **SLS Engineering Support Center** at Marshall Space Flight Center in Alabama. Simulations will begin at the end of January and will occur up through one week before launch, with an average of one training exercise each month.

Vehicle Assembly Building

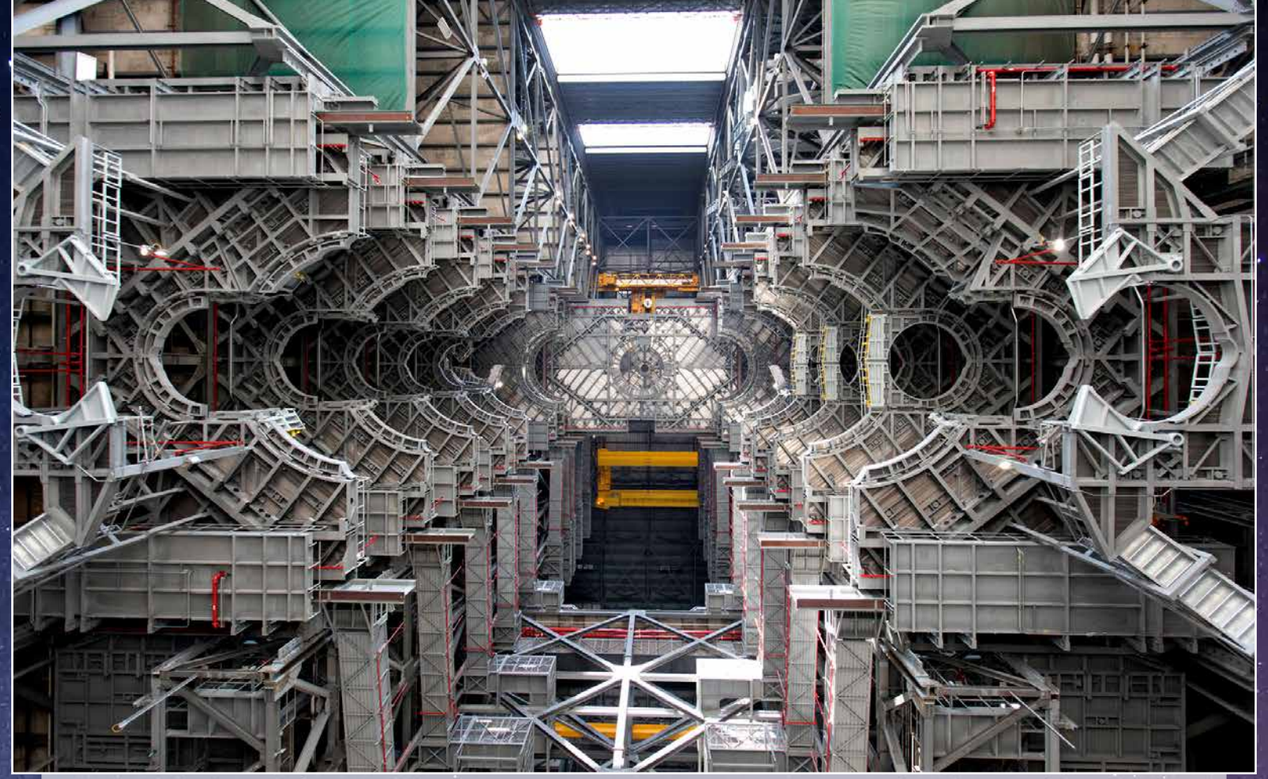
Much of the work in 2020 will be to complete a punch list of detail work inside the Vehicle Assembly Building (VAB). This includes cleaning the platforms and making minor repairs to any platform hardware that will be near flight hardware as the facility prepares for arrival of SLS components and stacking operations.

"We are at a very significant point in NASA's Artemis mission," said Mike Bolger, program manager of EGS. "The EGS team has finished mobile launcher testing at the launch pad and will finish testing at the VAB in January. At that point, all of the launch infrastructure will be tested and ready for operations."

Members of the Artemis I launch team monitor activities during the first formal terminal countdown simulation inside Firing Room 1 in the Launch Control Center at NASA's Kennedy Space Center in Florida. Photo credit: NASA/Kim Shiflett

Launch Complex 39B

Teams will continue work on a new emergency egress system for Pad 39B where flight or ground crew could board a basket with a braking system at the crew access level of the mobile launcher. The crew would ride the basket down a cable and come to a stop near a bunker to the west of the pad surface, providing quick escape



A view looking up at the 10 levels of work platforms in High Bay 3 inside the Vehicle Assembly at NASA's Kennedy Space Center in Florida. The work platforms will surround and provide access for service and processing of the agency's Space Launch System rocket and Orion spacecraft for Artemis missions. Photo credit: NASA/Glenn Benson

in the unlikely event of an emergency. The design phase began in 2019 and construction will be complete in time to support crewed Artemis missions.

The pad is currently getting a liquid hydrogen upgrade. The project involves the integration of a new 1.4 million gallon, liquid hydrogen (LH2) **storage sphere** into the existing Launch Complex 39B system. The new LH2 sphere will work with the current LH2 sphere to supply LH2 for Artemis II and beyond. The larger tank will allow NASA to attempt SLS launches on three consecutive days, instead of opportunities two out of three days, in the event of a scrub. The newer technology reduces liquid hydrogen burn-off, allowing more launch attempts before having to refill the larger tank. Construction began in 2019 and will be complete prior to Artemis II.

Orion Underway Recovery Test 8

The integrated recovery team of NASA, EGS, Lockheed Martin and the U.S. Navy, along with additional contractor support, will head out to sea off the coast of California in March to conduct the eighth **Underway Recovery Test**. Using a Navy ship with a **well deck** and several small boats, the primary objective is to validate Orion recovery operations for Artemis I — including procedures and timelines, and practicing different scenarios.

Orion Spacecraft

This spring, the Orion spacecraft for Artemis I will return from NASA's unique test facility at **Plum Brook Station** in Ohio, where it is currently undergoing **environmental testing** inside the vacuum chamber that simulates the harsh environment of space. Inside the Neil Armstrong Operations and Checkout (O&C) Building at Kennedy, technicians will install the spacecraft's solar array wings before performing final checkouts. EGS will begin Orion ground processing and stacking activities later in the year. The team will process and fuel Orion in the **Multi-Purpose Processing Facility** then transfer it over to the Launch Abort System Facility where engineers will attach the launch abort system. Orion will then roll out to the VAB for inspections before stacking Orion on top of the SLS rocket.

In its early processing stages, the Artemis II crew module milestones inside the O&C include propulsion tank installation, a pressure test and subsystems installations in the spring. The initial power-on of the crew module will occur in early fall. The heat shield that will protect the first crewed mission of Orion will be completed and installed by the end of the year. Processing and testing of the crew module adapter – the ring that connects to the European Service Module – for Artemis II will happen in the first half of the year prior to the arrival of the European Service Module in the fall.