

GAO Highlights

Highlights of [GAO-16-612](#), a report to congressional committees

Why GAO Did This Study

NASA is in the midst of developing systems needed to support deep-space exploration by humans. SLS will be NASA's first exploration-class launch vehicle in over 40 years to propel astronauts and cargo beyond low-Earth orbit. The EGS program is developing systems and infrastructure to support both SLS and the crew capsule, known as Orion. Together, the first planned SLS flight, the ground systems for that effort, and the first two Orion flights are estimated to cost almost \$23 billion. In July 2015, GAO found that SLS's limited cost and schedule reserves were placing the program at increased risk of being unable to deliver the launch vehicle on time and within budget.

The House Committee on Appropriations report accompanying H.R. 2578 included a provision for GAO to assess the acquisition progress of the SLS, EGS, and Orion programs. This report assesses the extent to which (1) SLS has made progress meeting cost and schedule commitments, and (2) EGS has made progress in completing modifications to key facilities and equipment. To do this work, GAO examined the results of design reviews, contractor data, and other relevant program documentation, and interviewed relevant officials. GAO plans to report separately on the Orion program in July 2016.

What GAO Recommends

GAO recommends that NASA should reevaluate cost and schedule reserves as part of its integrated design review for the first flight test in order to maximize all remaining cost and schedule reserves. NASA concurred with GAO's recommendation.

View [GAO-16-612](#). For more information, contact Cristina Chaplain at (202) 512-4841 or chaplainc@gao.gov.

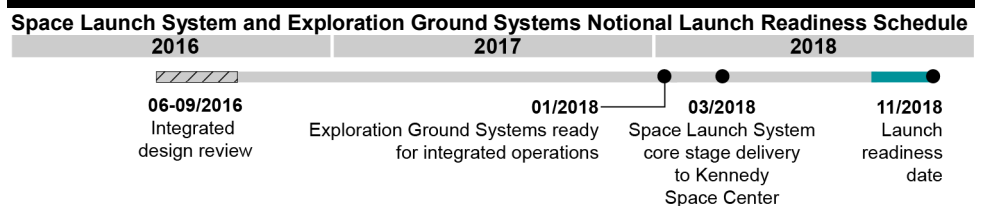
July 2016

NASA HUMAN SPACE EXPLORATION

Opportunity Nears to Reassess Launch Vehicle and Ground Systems Cost and Schedule

What GAO Found

The National Aeronautics and Space Administration's (NASA) new launch vehicle, the Space Launch System (SLS), has resolved some technical issues and matured its design since GAO's July 2015 report, but pressure remains on the program's limited cost and schedule reserves. This pressure, in turn, threatens its committed November 2018 launch readiness goal. The program has made progress in resolving some technical issues—for example, a major alignment problem with the welding tool for the core stage (SLS's structural backbone and fuel tank) was corrected. Nonetheless, SLS development faces known risks moving forward. While such risks are not unusual for large-scale programs, the program's approach to managing them may increase pressure on the limited reserves. For example, the SLS program has not positioned itself well to provide accurate assessments of core stage progress—including forecasting impending schedule delays, cost overruns, and anticipated costs at completion—because at the time of our review it did not anticipate having the baseline to support full reporting on the core stage contract until summer 2016—some 4.5 years after NASA awarded the contract. Further, unforeseen technical challenges are likely to arise once the program reaches its next phase, final integration for SLS and integration of SLS with its related Orion and Exploration Ground Systems (EGS) human spaceflight programs. Any such unexpected challenges are likely to place further pressure on SLS cost and schedule reserves. The figure below shows key events in SLS and EGS launch readiness schedules.



Source: GAO analysis of NASA data. | GAO-16-612

The EGS program is making progress in modifying selected facilities and equipment to support SLS and Orion, but is encountering technical challenges that require time and money to address. Like SLS, the program has reduced cost and schedule reserves, which threatens its committed November 2018 launch readiness goal. Modifications to two main components—the Vehicle Assembly Building, where the SLS is assembled, and the Mobile Launcher, the vehicle used to bring SLS to the launch pad—have already cost more and taken longer than expected as has development of EGS software. In June 2016, after all the systems necessary to support the first flight test are expected to have a stable design, NASA plans to start an integrated design review to demonstrate that the integrated systems will perform as expected. NASA guidance indicates that this type of review should also evaluate whether mission requirements are being met with acceptable risk within cost and schedule constraints. NASA officials stated that this review will have limited discussion of cost and schedule. Proceeding ahead without reassessing resources, however, could result in the EGS or SLS program exhausting limited resources to maintain pace toward an optimistic November 2018 launch readiness date.