GAO Highlights

Highlights of GAO-17-414, a report to congressional committees

April 2017

# NASA HUMAN SPACE EXPLORATION

## Delay Likely for First Exploration Mission

## Why GAO Did This Study

NASA is undertaking a trio of closely related programs to continue human space exploration beyond low-Earth orbit: the SLS vehicle; the Orion capsule, which will launch atop the SLS and carry astronauts; and EGS, the supporting ground systems. NASA's current exploration efforts are estimated to cost almost $24 billion—to include two Orion flights and one each for SLS and EGS—and constitute more than half of NASA's current portfolio development cost baseline. All three programs are necessary for EM-1 and are working toward a launch readiness date of November 2018. In a large body of work on this issue, including two separate July 2016 reports, GAO has found that these programs have a history of working to aggressive schedules.

The House Committee on Appropriations report accompanying H.R. 2578 included a provision for GAO to assess the acquisition progress of the Orion, SLS, and EGS, programs. This report assesses the extent to which these programs have risks that affect their progress toward meeting their commitments for EM-1. To do this work, GAO assessed documentation on schedule and program risks and interviewed program and NASA officials.

## What GAO Recommends

NASA should confirm whether the current EM-1 date is still achievable no later than as part of its fiscal year 2018 budget submission, and propose a new, realistic EM-1 launch readiness date, if warranted, and report its findings to Congress. NASA concurred with both recommendations and agreed that EM-1 will be delayed.

View GAO-17-414. For more information, contact Cristina Chaplain at (202) 512-4841 or chaplainc@gao.gov.

## What GAO Found

With less than 2 years until the planned November 2018 launch date for its first exploration mission (EM-1), the National Aeronautics and Space Administration's (NASA) three human exploration programs—Orion Multi-Purpose Crew Vehicle (Orion), Space Launch System (SLS), and Exploration Ground Systems (EGS)—are making progress on their respective systems, but the EM-1 launch date is likely unachievable as technical challenges continue to cause schedule delays. All three programs face unique challenges in completing development, and each has little to no schedule reserve remaining between now and the EM-1 date, meaning they will have to complete all remaining work with little margin for error for unexpected challenges that may arise. The table below lists the remaining schedule reserve for each of the programs.

**Schedule Reserve to Exploration Mission 1 for Orion Multi-Purpose Crew Vehicle, Space Launch System, and Exploration Ground Systems Programs**

| Program | Schedule reserve to Exploration Mission-1 (in days) |
|---|---|
| Orion Multi-Purpose Crew Vehicle | 0 |
| Space Launch System | 80 |
| Exploration Ground Systems | 28 |

Source: GAO Analysis of NASA data | GAO-17-414

The programs all face challenges that may impact their remaining schedule reserve. For instance

- the Orion program's European Service Module is late and is currently driving the program schedule;
- the SLS program had to stop welding on the core stage—which functions as the SLS's fuel tank and structural backbone—for months after identifying low weld strengths. Program officials stated that welding resumed in April 2017 following the establishment of a corrective action plan;
- the EGS program is considering performing concurrent hardware installation and testing, which officials acknowledge would increase complexity; and
- each program must integrate its own hardware and software individually, after which EGS is responsible for integrating all three programs' components into one effort at Kennedy Space Center.

Low cost reserves further intensify the schedule pressure. Senior NASA officials said they are analyzing the launch schedule and expect that the EM-1 date will have to slip, but they have yet to make a decision on the feasibility of the current date or report on their findings. With budget discussions currently ongoing for fiscal year 2018, the last year prior to launch, Congress does not yet have insight into the feasibility of the EM-1 launch date, or the repercussions that any cost increase or delays could have in terms of cost and schedule impacts for NASA's entire portfolio. Unless NASA provides Congress with up-to-date information on whether the current EM-1 date is still achievable, as of the time the agency submits its 2018 budget request, both NASA and Congress will continue to be at risk of making decisions based on less than the entire picture and on likely unachievable schedules.