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NASA'S PROJECT CONSTELLATION AND THE FUTURE OF HUMAN SPACEFLIGHT

On January 14, 2004, President George W. Bush directed NASA to design and develop spacecraft and launch vehicles to return humans to the Moon by 2020 and someday send them to Mars in his "Vision for Space Exploration" speech. This became known as Project Constellation.

Six years later, President Obama decided to cancel the Constellation program and Congress largely agreed. However, as of the date on this fact sheet, NASA is not allowed to terminate Constellation because of language in the FY2010 Consolidated Appropriations Act. It prohibits the agency from terminating Constellation or initiating a different program until Congress permits it to do so in a future appropriations act. That is despite the fact that Congress passed another law, the 2010 NASA Authorization Act, which directs NASA to proceed with a different program. NASA is "stuck" between the two laws.

Shortly after taking office in 2009, President Obama ordered a review of the human spaceflight program. A blue-ribbon committee chaired by retired aerospace industry executive Norman Augustine was established. Its October 2009 report stated that Constellation was "not viable" under the President's FY2010 budget plan and set out a number of options. Because that report was issued late in the congressional budget cycle and Congress wanted time to consider it before any changes were made, in December 2009 it included the language cited above in the FY2010 Consolidated Appropriations Act (P.L. 111-117).

On February 1, 2010, in his FY2011 budget request, President Obama revealed that he had decided to cancel Constellation. He proposed instead to rely on the commercial sector rather than NASA to build new U.S. crew space transportation systems ("commercial crew"") to replace the space shuttle for taking people to and from low Earth orbit (LEO), including the International Space Station. He proposed investing in technologies to enable future human exploration of space beyond LEO, but without any timeline or specific destination. In an April 15, 2010 speech at Kennedy Space Center, FL, the President provided that information saying that he wants to send astronauts to an asteroid by 2025.

Congress was taken by surprise by the President's proposal and held many hearings. Ultimately it passed the 2010 NASA Authorization Act (P.L. 111-267) that adopted a compromise approach in which both NASA and the commercial sector are to develop new crew transportation systems for LEO and NASA is to also develop systems for taking people beyond LEO to other unspecified destinations. Specifically, NASA is directed to develop a new heavy lift launch vehicle and a multipurpose crew vehicle, both of which were aspects of the Constellation program. The agency is directed to build on the work done on Constellation, and for the space shuttle, in designing the new systems.

However, Congress has not passed an appropriations bill that relieves NASA of the constraints in P.L. 111-117, so Constellation is still underway. In January 2011, NASA's Inspector General sent a letter to Congress warning that the agency would unnecessarily spend $215 million on Constellation elements by the end of February 2011, or $575 million by the end of FY2011, if Congress does not act. The House passed a type of appropriations bill called a Continuing Resolution, H.R. 1, on February 19, 2011 that includes a provision allowing Constellation to be

cancelled, but the bill is very controversial for unrelated reasons and not expected to pass the Senate.

Meanwhile, as directed by Congress in the 2010 NASA Authorization Act (P.L. 111-267), NASA is assessing different designs for a new Space Launch System (SLS), which is also called a Heavy Lift Launch Vehicle (HLLV), and a Multi-Purpose Crew Vehicle (MPCV). In an interim report submitted to Congress in January 2011, NASA indicated that the MPCV will utilize the design of the Orion spacecraft developed under the Constellation program and the top contender for the SLS design will utilize some elements of Constellation's Ares launch vehicle.

The Constellation Program Office is at NASA's Johnson Space Center (JSC), Houston, TX. The program has been working on a new launch vehicle to take crews to Earth orbit (Ares I), a new heavy lift launch vehicle to take crews and hardware to the Moon and Mars (Ares V), and a capsule for the crews (Orion). NASA sent a report to Congress as required in section 309 of the 2010 NASA authorization act providing information on its preliminary reference designs for the new heavy lift launch vehicle and crew capsule that are required under that Act. The agency plans to continue using the Orion design for the crew capsule. The heavy lift launch vehicle appears to be a combination of Ares and shuttle designs. However, the agency said that none of the designs it has looked at can be built within the budget and schedule goals stated in the Act.

For reference, the following are short descriptions of the Constellation program elements on which NASA has been working.

Ares I and Ares V launch vehicles (including an Earth departure stage for Ares V)

Ares I is derived from the four-segment Solid Rocket Boosters (SRBs) used today for NASA's space shuttle system. Ares I would use a five-segment SRB as its first stage, plus a new second ("upper") stage on top that is based on the J2-X engine that traces its roots to Apollo's Saturn V rocket. Its main purpose is to launch the Orion spacecraft to LEO. A successful test of the Ares I first stage took place in September 2009. Ares V would be much more capable, able to take 414,000 pounds to LEO or 157,000 pounds to the Moon. The Ares Projects Office is at NASA's Marshall Space Flight Center, Huntsville, AL. Ares 1 prime contractors: ATK Launch Systems for SRBs; Pratt & Whitney Rocketdyne for the J2-X engines; Boeing for manufacture and assembly of the upper stage and avionics integration and checkout.

Orion spacecraft to take astronauts to and from Earth orbit and lunar orbit

Orion is similar in appearance to an Apollo capsule although it would carry four crew members rather than three. Launched atop the Ares I, it initially would be used to take astronauts to and from the ISS. Later Orion spacecraft would take crews to and from lunar orbit and, paired with Altair, allow astronauts to live and work on the lunar surface. Prime contractor: Lockheed Martin.

Altair lunar lander

Altair would be launched into Earth orbit by the Ares V where it and the Ares V Earth departure stage would dock with an Orion spacecraft that would be launched separately. The combined spacecraft would take astronauts to the Moon. Orion would remain in lunar orbit while Altair takes astronauts to and from the lunar surface and houses them on the lunar surface.

