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The International Space Station: Lessons from the Soyuz Rocket Failure and Return to Flight

Witnesses

William Gerstenmaier

Associate Administrator, Human Exploration and Operations Mission Directorate, National Aeronautics and Space Administration

Thomas Stafford

Chairman, International Space Station Advisory Committee

Joseph Dyer

Chairman, Aerospace Safety Advisory Panel

Subcommittee Members Present

Steven Palazzo, Subcommittee Chairman (R-MS)

Jerry Costello, Acting Subcommittee Ranking Member (D-IL)

Sandy Adams (R-FL)

Dana Rohrabacher (R-CA)

Lamar Smith (R-TX)

Donna Edwards (D-MD)

Full Committee Members Present

Ralph Hall, Full Committee Chairman (R-TX)

On October 12, 2011, the House Committee on Science, Space, and Technology Subcommittee on Space and Aeronautics held a hearing to discuss the implications of the August 24, 2011 failure of an unmanned Russian Soyuz rocket on the United States' ability to transport crew and supplies to the International Space Station (ISS). All four crewmembers of STS-135 were in attendance.

As part of STS-135, the last mission of the Space Shuttle Program in July 2011, the orbiter *Atlantis* delivered supplies to provision the ISS through 2012. At the time, the station housed a maximum crew of six researchers. Since the American shuttles were decommissioned and before the private sector can demonstrate its ability to safely travel to and from low Earth orbit (LEO), the National Aeronautics and Space Administration (NASA) is relying on the Russian Soyuz vehicles, managed by the Russian Federal Space Agency (Roscosmos), to transport crew and cargo to the ISS. On August 24, a Russian unmanned cargo vehicle transporting supplies to the ISS crashed during launch in Kazakhstan. According to the Russian commission tasked with finding the anomaly that led to the crash, the Soyuz-U third stage booster in the vehicle shut down before reaching orbital velocity. This booster is very similar to the Soyuz-FG booster used to carry crew into LEO. After the crash, Roscosmos delayed all further planned launches until the commission had completed its failure investigation, all international partners had reviewed the report, and all stakeholders had agreed on a return-to-flight plan. NASA and the Aerospace Safety Advisory Panel (ASAP) have reviewed the Russian commission's report and believe it to be accurate and forthcoming.

Roscosmos and NASA are moving quickly to reassure the community of the safety and reliability of the Soyuz rockets. Though the researchers aboard ISS are not in danger of running out of supplies, their "lifeboats," Soyuz capsules docked to the station, have a usability limit of 200 days.

In his opening statement, Chairman Steven Palazzo (R-MS) noted how important it is for the future of the ISS to remedy this issue. He said the ISS "has a finite lifetime" and it is "imperative that we take advantage of its many capabilities." Acting Ranking Member Jerry Costello (D-IL) acknowledged the crewmembers of STS-135 and raised concerns over NASA's lack of participation in the Russian accident investigation commission.

William Gerstenmaier, Associate Administrator of the Human Exploration and Operations Mission Directorate, assured the

committee in his testimony that the Russian commission's findings were correct. He described the anomaly as a contamination either in the fuel lines or stabilizer valve causing low fuel supply to the generator. An independent NASA panel reviewed the findings and briefed NASA officials the day of the hearing. Gerstenmaier affirmed that NASA's onboard crew is in no immediate danger and that they continue to do "quality research...every day" on the ISS. Though there would be maintenance concerns if the ISS were to be decrewed, Gerstenmaier said research, spanning multiple disciplines including geophysics and remote sensing, would be the primary loss. Retired General Thomas Stafford, chairman of the ISS Advisory Committee, reminded the committee in his testimony that he worked directly with the Soviets on the early stages of the Soyuz project and was very familiar with the technology. He announced that if the upcoming unmanned Soyuz-U launch is successful, the next crew will travel to the ISS "on or about" November 13 and the ISS will return to a six person crew on December 26. Retired Vice Admiral Joseph Dyer noted that while ASAP had only had second-hand contact with the Russian accident investigation of Roscosmos, they view the available information to be credible and of "high fidelity." If there were a long-term disruption in Soyuz transport capability, however, ASAP found there would be risk to the public of an unplanned and unmanned ISS deorbit and the station could be lost. He further discussed the challenges ahead for ASAP as more commercial spacecraft begin to operate in LEO.

Chairman Palazzo asked the witnesses to describe their contact with Roscosmos and the accident investigation panel. Gerstenmaier told the chairman that he had been to Russia to meet with officials who briefed him on their conclusions and why other possibilities were rejected. He said the United States has the ability to ask them to do additional tests and investigations. Costello asked whether ASAP or an independent panel should directly review the Russian findings and asked what safety and regulatory problems will need to be resolved before commercial spacecraft begin to operate. The witnesses reiterated that they found the investigation to be credible and agreed that there will need to be a lot of issues settled before the private sector begins to transport crew and cargo to the ISS. Full Committee Chairman Ralph Hall (R-TX) asked whether ramping up the Soyuz flight rate has put too much pressure on Roscosmos. Gerstenmaier said that it probably has and that NASA is watching this issue. Representative Sandy Adams (R-FL) discussed the United States' reliance on Russian launch capabilities and asked about delays in commercial rocket launch systems. Gerstenmaier said delays are typical of any startup. Representative Dana Rohrabacher (R-CA) asked about the status of the United States' next generation heavy-lift spacecraft Space Launch System. Gerstenmaier told Rohrabacher that the target date for its first test launch, though heavily dependent on budget, is December 2017 with a crew mission in 2021. Rohrabacher pointed out how the Russians were acting in good faith with NASA because they could charge whatever they wanted for their services. He asked whether U.S. commercial launch systems would be in competition with Roscosmos's services to which the witnesses said there would continue to be a need for both. After questioning the witnesses, Rohrabacher wondered whether funding opportunities in "outer outer space" would take away from critical LEO projects like clearing out space debris. Donna Edwards (D-MD) asked what the capacity to gain documentation from commercial space companies will be if an anomaly or accident occurred. Dyer said that transparency will be critical and that ASAP is very focused on this issue. Lamar Smith (R-TX) asked about the likelihood of returning the recently retired shuttles into service. Though Stafford responded it would take about two years, the witnesses agreed that this is highly unlikely. Smith asked whether NASA has a long-term strategy to prevent a brain drain. Gerstenmaier said that it is a concern and a worry but that a "constancy of purpose" would help. Dyer, who also acts as Chief Operating Officer at iRobot Corporation, remarked that his industry is having "tremendous success" in finding students to work in robotics.

Opening statements, witness testimonies, and a webcast of the hearing can be found on the committee web site.
