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The Augustine Committee Review of U.S. Human Spaceflight Plans

In May, President Obama charged a blue-ribbon committee led by Norm Augustine, former CEO of Lockheed Martin, to review and provide options for the National Aeronautics and Space Administration's (NASA's) human space flight program after the retirement of the shuttle. As it is widely believed that the current NASA portfolio is unrealistic, needing either more funding or fewer objectives, many saw the Committee as a way for President Obama to defer major decisions about the program. The Augustine Committee was tasked to consider options that would meet four objectives: expediting a new U.S. capability to transport humans to Low Earth Orbit (LEO); supporting missions beyond LEO; stimulating commercial spaceflight; and fitting within the current human spaceflight budget profile. Advancing science was not one of the official objectives but was a factor considered by the Committee.

The Augustine Committee presented its summary report on September 8 (http://www.nasa.gov/offices/hsf/related_documents/summary_report.html), with the full report expected by the end of September. The Committee found that no plan compatible with the fiscal year (FY) 2010 budget profile would permit human exploration to continue in any meaningful way and offered five potential future options to the Administration (see Appendix A). Two of the options stay within the FY 2010 budget profile and three increase the human spaceflight budget by approximately \$3 billion per year. All of the options are focused on developing new exploration capabilities to replace the space shuttle (e.g. Ares rockets and crew exploration vehicles), when to deorbit the International Space Station and retire the space shuttle, and potential destinations for exploration.

The impact of the Augustine Committee report on the science budget is not yet clear. If NASA receives a scaled-back mission for human exploration, the Administration may prioritize Earth Science as the largest contributor to NASA's success, and science would benefit. However, based on recent Congressional hearings on the report (see Appendix B), Congress is unlikely to accept a scaled-back exploration program. In addition, without a robust human exploration program that leverages international, commercial, and scientific contributions, NASA's overall profile and prestige would be reduced, with potentially negative consequences for the entire agency. While Mr. Augustine has proposed creating a firewall between human space flight funding and the Science Mission Directorate, if one of the more ambitious exploration plans is selected and the necessary resources are not provided, as was the case during the prior Administration, the science budget could continue to be eaten away by cost growth in the human spaceflight program.

The Administration has not released an official reaction to the Committee report at this time, but the final outcome will likely reflect the Administration's overall concerns about growth in federal spending, with the White House unlikely to embrace an option that requires a

significantly increased budget at NASA in the near term. In setting priorities and policies for NASA, the President will consider not only the input from the Augustine Committee but also recommendations from the White House Office of Science and Technology Policy, which is expected to emphasize the importance of NASA science activities. The final decisions about the human spaceflight program will likely be reflected in the FY 2011 President's Budget Request, which is being constructed this fall and will be released in February 2010.

APPENDIX A: Conclusions of the Augustine Committee Report

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The Augustine Committee presented its summary report on September 8 (http://www.nasa.gov/offices/hfs/related_documents/summary_report.html). The full report is expected by the end of September. The Augustine Committee drew one key conclusion and provided five options for the future of the spaceflight program. Two of the options stay within the current budget profile for human space flight and three ramp up the budget to approximately \$3 billion per year over the current outlook by 2014.

- **Conclusion** - No plan compatible with the FY 2010 budget profile permits human space exploration to continue in any meaningful way.
- **Options** -
 1. **Constellation Program (Budget Constrained):**
 - Deorbit the international space station (ISS) in 2016.
 - Ares I Rocket¹ and Orion Crew Exploration Vehicle would be available in 2018.
 - Ares V Rocket² would not be available until the late 2020s.
 - Lunar Lander and Lunar Surface Systems would possibly never be developed.
 2. **ISS Focused (Budget Constrained):**
 - Keep the space station in service through 2020 tended by commercially operated spacecraft.
 - Replace Ares I and Ares V with a single Ares V Lite that would transport cargo and crew to LEO and beyond. Ares V Lite would be available in the late 2020s.
 3. **Constellation Program (\$3 billion per year Budget Increase)**
 - Deorbit the ISS in 2016.
 - Ares I and Orion would be available in 2017.
 - Would reach the moon in the mid-2020s.
 4. **Moon First Alternatives (\$3 billion per year Budget Increase)**
 - Deorbit ISS in 2020.
 - Replace Ares I and Ares V with Ares V Lite or develop a shuttle-derived launch vehicle and keep the shuttle operating until 2015.
 - Would reach the moon in the mid-2020s.

¹ The Ares I Rocket is a smaller lift launch vehicle to transport crew to LEO

² The Ares V Rocket is a heavy lift launch vehicle to transport cargo to LEO and cargo and crew beyond LEO

5. Flexible Path (\$3 billion per year Budget Increase)

- Deorbit ISS in 2020.
- Replace Ares I and Ares V with Ares V Lite or develop a launch vehicle derived from the U.S. Air Force's Evolved Expendable Launch Vehicle Program.
- Allow for a flexible path of destinations including near-Earth asteroids, Lagrange points, planetary flybys, and the moon, with the first destination reached in the mid-2020s.

While the Augustine Committee does not explicitly recommend any of the options, they do suggest that developing a single Ares V Lite rather than both Ares I and Ares V would allow money to be spent on the more valuable extension of the ISS until 2020. In addition, the Augustine Committee seems to prefer the Flexible Path option over the Moon First options. While they found that no viable exploration is possible in the current budget outlook, the report states that “the ultimate goal of human exploration is to chart a path for human expansion into the solar system. This is an ambitious goal, but one worthy of U.S. leadership in concert with a broad range of international partners.”

The Administration reaction is unknown at this time, but there are some likely outcomes. The White House wants to broaden international partnerships in space, and recognizes that a premature end to ISS operations would make it very difficult to engage current ISS partners in future exploration activities. Therefore, the White House may terminate Ares I development in favor of commercial crew services that NASA would incentivize. This would allow the ISS to extend to 2020 and promote the commercial space sector. The Administration is unlikely to propose an increased budget approach and therefore is more likely to choose ISS Focused (Option 2) over Moon First and Flexible Path (Options 3, 4, and 5). The Administration's decisions will probably be reflected in the FY 2011 budget request.

APPENDIX B: Congressional Hearings on the Augustine Committee Report

On September 15, the House Science and Technology Committee held a hearing to discuss the Augustine Committee's report. Mr. Augustine gave a brief description of the findings of the Committee and then there was a long discussion period during which Edward Crawley, another member of the Augustine Committee, joined Mr. Augustine to answer questions. At least 17 members of the House Science Committee were in attendance. Members were very passionate about the human space flight program, but many questioned aspects of the report, including the reliance on commercial partners to reach low earth orbit, the involvement of international partners, and especially the perceived attack on the Constellation Program and Ares-I. Representatives Bart Gordon (Chairman, D-TN), Ralph Hall (Ranking Member, R-TX), Marcia Fudge (D-OH), Michael McCaul (R-TX), Brad Miller (D-NC), Donna Edwards (D-MD), and Pete Olson (R-TX) asked questions suggesting they would prefer increasing funds for the current Constellation Program (Option 3) rather than changing to a new option. Space and Aeronautics Subcommittee Chairman Gabrielle Giffords (D-AZ) was especially upset that alternatives were offered rather than suggestions for how to improve upon the current program. However, most members praised the report, arguing that it focused attention on the key problem of too little funding. In fact, it seemed that all of the members agreed that human space flight was very important and that more money should be given to make a viable program.

A few questions elicited further information on the thinking of the Augustine Committee. Answering a question from Suzanne Kosmas (D-FL) on retaining the NASA workforce, Dr. Crawley indicated that the full report, which will be released by the end of September, will include a ranking of each option along ten parameters (as opposed to the four the Administration originally proposed): science, technology, preparation for exploration, international partnerships, expansion of the commercial sector, public engagement, cost, safety, schedule, and workforce. Representative Alan Grayson (D-FL) quoted President John F. Kennedy's original speech advocating human space flight to the moon and asked which of the options would best meet Kennedy's criteria of organizing and measuring our energy and skills and enriching science and education with new knowledge of the universe and environment. Both Mr. Augustine and Dr. Crawley suggested that while all of the increased budget options would meet those objectives, the Flexible Path Option has the most potential. Dr. Crawley explained that much of the public feedback they received indicated that the moon is no longer an inspiring destination. He argued that the flexible path will create a reality and a perception that the space flight program is doing new and challenging things while providing better preparation to make the long trip to Mars.

A second panel of witnesses consisted of Vice Admiral Joe Dyer, Chair of the Aerospace Safety Advisory Panel, and Michael Griffin, former NASA Administrator. Vice Admiral Dyer was not supportive of starting over with a new spaceflight program, insisting that this would increase safety risks and extend the gap between shuttle retirement and resuming capabilities to fly to LEO. He indicated that he agreed with the Augustine Committee on the budget and on science but did not support extending the shuttle. Dr. Griffin argued that budget erosion is the key issue and that all other questions are moot until the budget situation is resolved. During questioning, he indicated that he supported continuing the Constellation Program with increased funding. Both Vice Admiral Dyer and Dr. Griffin were opposed to relying on commercial partners to reach LEO.

On September 16, the Senate Committee on Commerce, Science and Transportation Subcommittee on Science and Space held its own hearing to discuss the Augustine Committee report. Only three members of the Subcommittee were in attendance, and the atmosphere was much calmer than in the House hearing. All three Senators commended the efforts of Mr. Augustine. Subcommittee Chairman Bill Nelson (D-FL) asked questions that suggested he would be happy to provide even more than \$3 billion per year to the human spaceflight program, but he supported the President's power to choose among the spaceflight options. Senator Kay Bailey Hutchison (R-TX) praised the Augustine Committee for including options which would extend the life of the ISS, expressed support for extending the shuttle program, and had concerns about relying on commercial partners to reach LEO. Senator David Vitter (R-LA) questioned delaying a mission to Mars, suggesting that such a mission is key to inspiring the public. Mr. Augustine responded that the Flexible Path Option has intermediate milestones that the average citizen will find significant and inspiring.

In both the House and Senate hearings, Mr. Augustine proposed creating a firewall between human space flight funding and the Science Mission Directorate, so that the science budget is not continually eaten away by human spaceflight cost growth. For more information about the hearings, please see the websites below:

http://science.house.gov/publications/hearings_markups_details.aspx?newsid=2590

http://commerce.senate.gov/public/index.cfm?FuseAction=Hearings.Hearing&Hearing_ID=29ead2d-8fee-417f-9ef5-21992265f281