

National Aeronautics and
Space Administration

Headquarters

Washington, DC 20546-0001



November 1, 2011

Reply to Attn of:

Human Exploration and Operations Mission Directorate

Dr. Raymond S. Colladay, Chair
Aeronautics and Space Engineering Board
National Research Council
500 Fifth Street, NW
Washington, DC 20001

Dear Dr. Colladay:

Thank you for your facilitation of the Committee on Human Spaceflight Crew Operations' timely and thoughtful review of National Aeronautics and Space Administration astronaut corps planning and crew-related supporting capabilities. The Committee's analysis, findings and recommendations were highly regarded and timely in supporting our formulation of plans to initiate a new Astronaut Training Class in the immediate future. The Agency concurs with the Committee's overall recommendations for assurance that the crew-related ground facilities and training aircraft in the post-shuttle era remain sufficiently robust to provide the flexibility needed to meet known International Space Station requirements and, to prepare for future human space exploration.

As we look forward to the broader development of commercial and exploration travel, I acknowledge the need to continue advancing our United States Astronaut Program, such that future crews demonstrate the same highly qualified, capable, and innovatively responsive character as they have demonstrated throughout history. It is critical for the Nation's future, that the Astronaut Corps remain the personification of "Mission Success".

I have enclosed Dr. Janet Kavandi's response to the Committee's specific recommendations which she has forwarded to me through Mr. Michael Coats, Center Director at the Johnson Space Center. We appreciate of the Committee's work. I hope you find our specific response consistent with the intent of the recommendations provided. Thank you and the Committee for your service to the Agency and Nation.

Sincerely,

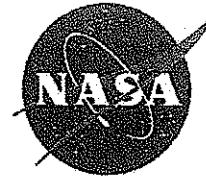
A handwritten signature in black ink. The signature reads "William H. Gerstenmaier". The "W" and "H" are particularly large and stylized.

William H. Gerstenmaier
Associate Administrator
for Human Exploration and Operations

Enclosure

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
2101 NASA Parkway
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September 13, 2011

Reply to Attn of: CA-11-031

TO: NASA Headquarters
Attn: Associate Administrator for Human Exploration and Operations Directorate
THRU: AA/Director *Michael J. Massimino*
FROM: CA/Director, Flight Crew Operations

SEP 16 2011

SUBJECT: Preparing for the High Frontier – The Role and Training of NASA Astronauts in the Post-Space Shuttle Era, Management Response

In response to the recommendations outlined in the National Research Council's Committee on Human Spaceflight Crew Operation's report, "Preparing for the High Frontier – The Role and Training of NASA Astronauts in the Post-Space Shuttle Era," I would like to recommend the following:

Recommendation 2.1:

1. The committee recommends that the factor for uncertainty used by the Astronaut Office in its model to determine minimum staffing requirements for the astronaut corps be increased above the current 25 percent, which is inadequate to provide sufficient flexibility to reliably meet the current flight manifest requirements.
2. In addition to Task 1, the Astronaut Office should maintain the staff required to accomplish Tasks 2 through 6, as listed in Finding 2.1a.

Response:

Concur. When determining the minimum astronaut corps size, accounting for the factor of uncertainty is one of the biggest challenges in ensuring adequate staffing levels in support of human spaceflight. A 50 percent margin of uncertainty was found to be adequate to support the International Space Station (ISS) and the Space Shuttle manifests. However, beginning last year, some significant factors led to the decision to reduce the uncertainty margin from 50 to 25 percent, including the following.

1. With the retirement of the Space Shuttle, there was a significant reduction in the number of available flight opportunities for astronaut crews.
2. As a result of careful selection of the last several astronaut classes and attrition of astronauts who did not meet long-duration flight assignment constraints (e.g., medical anthropometric, etc.), most of the astronaut corps were eligible for ISS flight assignment.

3. Implementation of the ISS "single-training-flow-to-launch" reduced the time between an astronaut's first and second flight. Thus, the original astronaut corps six-year cycle was reduced to a five-year cycle; that is, the time between the start of crew training for the first mission and the start of crew training for the second mission was reduced from six years to five years.

Even with these gained efficiencies, there are still many challenges that continue to contribute to the uncertainty factor. These include the uncertainty in the prediction of attrition rate (currently higher than anticipated), and the appearance of new medical issues resulting from long-duration spaceflight (such as "papilledema," a swelling of the optic disc). A 25 percent margin may indeed be too small, as the committee has pointed out. The Flight Crew Operations Directorate will increase the uncertainty factor in future astronaut corps size calculations to a number that will ensure an adequate astronaut corps size in support of NASA's human spaceflight missions.

With the increase in the uncertainty factor, it is expected that the astronaut corps size will moderately increase, and therefore, more astronauts will be available to support Tasks 2 through 6, as listed in the committee's report.

Recommendation 2.2:

NASA's Flight Crew Operations Directorate should continue to serve as a national resource for United States human spaceflight experience and knowledge that is:

1. Maintained to ensure appropriate staffing and training of the astronaut corps in support of the ISS manifest.
2. Applied to the future development of NASA human spaceflight and exploration activities.
3. Available to the emerging commercial space industry and the Federal Aviation Administration.
4. Applied to support authorized agreements with international partners.

Response:

Concur. Astronauts have been providing engineering and operational support since the first astronaut group was selected in 1959. They help ensure safe and efficient operations due to their knowledge and perspective derived from actual flight experience. Currently, the astronaut corps have been supporting, and will continue to support, the ISS, Commercial Crew Development, the Multi-Purpose Crew Vehicle, and the Space Launch System Programs through evaluation, testing and development of new vehicle designs and hardware; training and operations development; and operations of these vehicles along with missions tasks. The dedication and commitment of the astronaut corps will ensure their future involvement in any NASA effort that advances human spaceflight, including the expansion of permanent human presence beyond low Earth orbit.

Recommendation 3.3:

To ensure continued safety and mission success, NASA should maintain a spaceflight readiness training program that includes high-performance aircraft.

Response:

Concur. High-performance aircraft have been a critical component in the training of astronauts to operate as a team member in a highly dynamic, fast-changing and sometimes unpredictable

Environment, with real-world, life-dependent consequences. The performance of any individual task relies on knowledge (what you know), skills (what you can do), rapid response (how you react), and cognitive processing (how you think). While different types of training facilities optimize each of these different aspects of an operator, very few facilities are capable of providing all of these aspects of training at one time. The Flight Crew Operations Directorate has found that the T-38 high-performance aircraft is an ideal skills trainer. This aircraft offers the ability to repetitively train skills which are essential to the success of human spaceflight operations in a single environment. Because high-performance aircraft have been a proven part of training operator skills since 1959, they will continue to be a part of the astronaut training curricula in the future.

Recommendation 3.4:

NASA should retain the T-38N fleet for spaceflight readiness training and should fund the fleet at a level commensurate with the projected required size of the post-Space Shuttle astronaut corps.

Response:

Concur. Spaceflight readiness training is critical to the success and safety of a spaceflight crew's performance, and as such, the T-38N fleet will continue to be funded at a level commensurate with the projected size of the astronaut corps.

Recommendation 3.5:

NASA should continue to monitor training methods and technologies in related fields for possible ways to enhance the astronaut selection and training process.

Response:

Concur. As part of our commitment for continual improvement and financial responsibility, the Flight Crew Operations Directorate will continue to seek out cost-effective enhancements to training and astronaut selection.

Should you have any questions regarding our comments, please contact me at 281-483-2724.



Janet L. Kavandi

cc:

AB/E. Ochoa
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CA/B. M. Hajek
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