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**Statement of  
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**before the**

**Subcommittee on Space and Aeronautics  
Committee on Science and Technology  
U. S. House of Representatives**

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the Astronaut Health Care System Review Committee report. I have the privilege of managing the organization that includes the Astronaut Office and the Aircraft Operations Division at the NASA Johnson Space Center in Houston, Texas. Prior to becoming Director of Flight Crew Operations one year ago, and serving as Deputy Director for 4 years before that, I was a member of the astronaut office for 12 years, and was fortunate enough to fly on four Space Shuttle missions.

The NASA Astronaut Office is made up of very talented and motivated people, who--after years of hard work, exceptional achievement in science and engineering education, and dedication to excellence in their careers--joined the corps through a rigorous and highly competitive selection process. Selection as an astronaut candidate is followed by years of intense preparation, including many types of training as well as work in support of all phases of the development and operations of NASA's human space flight programs. In my experience, astronauts prepare thoroughly and uncompromisingly for their missions. One of my crew mates compared it to preparing for the Olympics: every act that you do every day is designed to make sure that you are at your peak both mentally and physically when you launch into space. But at NASA, we hold our equivalent of the Olympics every few months, every time we launch a crew into space.

About 10 years ago, as we began assembly of the International Space Station (ISS), it became clear that astronaut preparation needed to be raised to a new level in order to accommodate the increased complexity and difficulty of our new mission: establishing and maintaining a permanent human presence in space. Both Shuttle missions to the Station, which can be thought of as "sprints," and the "marathon" long-duration stays onboard ISS, brought new challenges. Along with the Mission Operations Directorate--whose job is to "plan, train, and fly" missions--and the Space Life Sciences Directorate--who ensures the crew's health before, during, and after flight--the Flight Crew Operations Directorate developed new procedures, processes, training, evaluation methods, and fitness standards to meet the challenge of successfully assembling and operating the ISS. These processes and tools have evolved over the past decade, and have served us well in preparing the corps for the rigors of space operations.

**Astronaut Training and Evaluation**

Standards for fitness for duty and for flight assignment are determined, measured, and documented using a number of processes and tools. Formal training, which is subject to both qualitative and quantitative evaluation, is accomplished by each astronaut in many different fields. Most of the training is conducted

by the Space Flight Training Division within the Mission Operations Directorate at the Johnson Space Center. Comments and evaluations by instructors about each astronaut are documented in every phase of training and included in each astronaut's personnel file. These training records are accessible by the individual astronaut, and reviewed by the astronaut's branch chief, and the Chief of the Astronaut Office.

The main areas of training include the following:

**Space Shuttle Systems and Operations, International Space Station System and Operations** (including all International Partners' systems), and **Crew Resource Management** training ranges from tests of basic systems knowledge, to life-like simulations that test a crew's ability to work together to solve challenging failure scenarios.

**Robotics** (including the Shuttle 6-joint arm, the ISS 7-joint arm and new robotic arms from Japan and Europe), **Spacewalking** (which we refer to as Extravehicular Activity or EVA), and **Rendezvous** training follow formal curricula objectives; quantitative evaluations of astronauts during qualification simulations are documented in a database as part of the training records.

**Aircraft training**, including periodic check flights, prepares all astronauts for the high-stress, multi-task space environment, and Shuttle commanders and pilots receive detailed feedback on the hundreds of simulated Shuttle landing approaches that they fly.

**Expedition Interpersonal Training** is a program conducted by the Astronaut Office to provide an in-depth awareness of issues that may develop in an isolated and confined environment, such as during an extended stay on the ISS. Training includes workshops, outdoor teambuilding and supervised leadership courses, and missions in extreme environments such as an undersea facility that place astronauts in the most realistic space analog environment available. These operational opportunities are integrated into the astronaut training program and used to provide feedback both to the astronauts and to astronaut management.

NASA also conducts various other types of training, such as **Russian language training**. Like the operational training discussed above, astronauts are rated and their evaluations are provided to each crewmember and the Chief of the Astronaut Office on a periodic basis.

Other processes that NASA uses to prepare and evaluate astronauts include the following:

The **Space Shuttle Instructor Astronaut Program** provides standardization and evaluation of astronaut candidate training, continuing currency training (with a special emphasis on robotics and EVA), and assigned crew training. This program also reinforces an environment in which mentoring and knowledge sharing thrive.

The **Commander Upgrade Program** prepares mission commanders to manage crew and mission issues pre-flight, during flight, and post-flight. This program has been implemented for all Shuttle commanders since 2000; NASA plans to implement a formal program for ISS commanders to support the 6-person crews that will start in 2009.

The **Astronaut Evaluation Board** is periodically convened by the Astronaut Office to review astronauts completing flight assignments, astronaut candidate training, or other astronauts recommended for review. The purpose of the Astronaut Evaluation Board is to determine the flight status of each astronaut, to decide upon corrective actions if necessary, and to pass recommendations of flight status and corrective actions to the Chief, Astronaut Office for final disposition. Astronauts who have been reviewed by the board are debriefed by the Chief of the Astronaut Office, and the results are documented in their personnel file.

**Mission performance feedback** is provided by Commanders to each crew member after completion of a space mission. This personnel information on each crew member's performance includes strengths and any areas for improvement. Suggested areas of feedback include interpersonal interactions, knowledge base, attitude and work ethic, skills, and ability to balance technical assignments with training.

### **Flight Assignments**

All of the policies, processes, and feedback described above are used by the Chief of the Astronaut Office in the flight assignment recommendation process. A particular crew assignment is based foremost on the specific mission requirements, and crew members are recommended based on their performance during training, systems knowledge and their ability to apply it in an operational environment, previous flight performance, effectiveness in technical job assignments, and assessments of leadership capability, teamwork, and judgment.

Other factors considered in flight assignment include international partner agreements, skill mix, appropriate mix of veteran and rookie crewmembers, anthropometric constraints due to EVA suit and vehicle sizing, and medical eligibility.

### **Medical Fitness for Flight and Duty**

As noted in Dr. Williams' testimony, medical standards for fitness for flight and fitness for duty are developed by the Space Medicine Division of the Space Life Sciences Directorate at the NASA Johnson Space Center, in concert with experts in various medical fields internal and external to NASA. The standards are reviewed and approved at several levels, and are used by the Flight Medicine Clinic and Aerospace Medicine Board to make certification decisions. Certification results are reported to the Astronaut Office in weekly and monthly reports.

Astronaut medical issues affecting flight status for aircraft, and short and long duration spaceflight are also addressed during bi-weekly meetings between the Chief of the Astronaut Office and the Chief of the Space Medicine Division. Any medical issues that affect a member of an assigned crew are also coordinated with me and the Director of Space Life Sciences.

The communication and relationship between Flight Crew Operations and the Space Medicine community is strong and effective, allowing NASA to effectively address concerns regarding safety and crew health. Flight surgeons are aware of their responsibility to assure that an astronaut's health or behavior does not present a risk to themselves or the mission, and the Flight Crew Operations management, as well as NASA's leadership, support their efforts to do so. Medical issues that arise immediately pre-flight or in-flight are discussed among operational, medical, and astronaut management on a need-to-know basis, giving due consideration to privacy, crew member health and safety, and mission impact. NASA currently employs a system for reporting any situation requiring attention that may impact safety of flight that utilizes multiple and independent technical authority pathways outside of the flight program management to elevate and resolve concerns. Similar to the independent technical

authority chain of command that deals with any technical issues related to flight safety, the agency governance structure provides a path for dissenting opinions to be raised through the Health and Medical Technical Authority chain of command. Additional program independent pathways for elevating concerns include the Johnson Space Center Safety and Mission Assurance Director or Center Director, the Center Ombuds, or to NASA Headquarters via the Chief Safety and Mission Assurance Officer, Bryan O'Connor. This governance structure is often reiterated to our employees and we have again re-emphasized these pathways to our astronauts and flight surgeons.

The flight crews are very fortunate to have a group of flight surgeons who are not only excellent physicians, but who understand the training and operational environment of an astronaut and the implications of that environment to astronaut health. The flight surgeons are tireless in their efforts to obtain the best possible care for an astronaut, during training anywhere in the world as well as in space, and they work long hours to ensure that any issue is thoroughly addressed. They are dedicated to maintaining or returning astronauts to flight status when at all possible, keeping within the medical standards that protect astronaut health and mission success.

### **NASA's Response to the Astronaut Health Care Review Committee Report**

Following the events of last February, Johnson Space Center conducted an internal assessment to review and recommend changes to astronaut behavioral health screening and assessment, and NASA Headquarters chartered an Astronaut Health Care Review Committee in order to more broadly review astronaut medical care, including behavioral health. There were some recommendations common to both reviews, including adding a behavioral health assessment as part of the annual astronaut physical examination. In addition, the Health Care Review Committee made a number of suggestions concerning behavioral health care, which are being followed up on by the Space Medicine Division.

While those recommendations were the focus of the review and the report, the report also included a number of comments related to astronaut office behavior and processes, based on meetings between some Committee members and some astronauts, astronaut dependents, and flight surgeons. The Committee did not attempt to determine the veracity of any statement, nor was there any request for information on astronaut office processes, procedures, policy, or anything that could be broadly characterized as astronaut office culture.

In response to the Committee report, NASA has taken decisive steps. As Bryan O'Connor has already testified, his thorough investigation confirmed my own personal experience as both a crew member and a manager of flight crew: we have found no instance where astronauts have used alcohol in the immediate pre-flight period, no instances of astronauts being under the effects or influence of alcohol at launch, and no case where a flight surgeon or astronaut has raised a concern about this to management, and, therefore, in no case was that concern ignored. To ensure that there is no future question regarding use of alcohol, I have taken the opportunity to clarify our space flight alcohol policy, and, based on Bryan O'Connor's review, will determine whether any revision or expansion of the policy is warranted.

NASA has also responded to the Committee's report by developing a systematic, comprehensive, and anonymous survey to determine what, if any, issues actually exist, which will be provided to the astronaut corps and flight surgeons later this month. Both astronauts and flight surgeons will be asked to respond to questions probing the relationship between the two groups and their respective managers as determined by level and quality of communication, trust, and clarity of responsibilities and authorities. Another objective is to understand any potential concerns in raising or responding to issues with flight safety or crew suitability for flight or any barriers that might exist to raising concerns. Additionally, astronauts will be asked about their understanding of and suggested changes or clarifications to policies and procedures dealing with astronaut performance and feedback, crew assignment, and space flight alcohol

use. After a preliminary analysis of the survey responses has been conducted, the Chief of the Astronaut Office will hold astronaut all-hands meetings to clarify and validate the analysis in preparation for a final report. NASA will then develop a plan to address any issues identified through the survey. This is a course of action that the committee itself has indicated they intended as NASA's response to their report.

I am committed to understanding and addressing any issues that are identified by the survey, as are the Chief of the Astronaut Office, Steve Lindsey, the Chief of the Space Medicine Division, Dr. Mike Duncan, and the Director of Space Life Sciences, Dr. Jeff Davis. We are fully accountable to the Director of Johnson Space Center, Mike Coats, who in turn is accountable to the NASA Administrator. We will accomplish this while appropriately balancing these efforts with our primary duties of ensuring mission success and safety of round-the-clock flight operations onboard the ISS Program, and the planning and execution of the challenging Space Shuttle missions to complete the assembly of ISS.

### **Conclusion**

I am extremely proud to represent the Astronaut Office, both within NASA at many different agency and program forums including flight readiness reviews and mission management team meetings, as well as externally – to the members of this Committee, to the media, and to the public. I admire and respect what America's astronauts accomplish day in and day out, while in space, in the air, and on the ground. Their hard work, dedication, and continual commitment to excellence and flight safety are the hallmarks of their profession.

I am confident that our astronauts are well-prepared to carry out the Nation's human space flight program and our next great era of Exploration; they take their responsibility very seriously. The same can be said of the entire NASA team that prepares and executes human space flight missions. The real proof of that lies in the tremendous accomplishments of our human space flight programs.

We just successfully completed STS-118, our 119th Shuttle mission, and the 22nd Shuttle mission to the ISS. Through 92 EVAs totaling 548 hours, we have learned to successfully construct complex structures, and repair and maintain them, even when the individual parts have been built and tested in several different countries with no opportunity to do end-to-end tests prior to launch. A total of 13 countries have sent 140 people to the ISS. With the European and Japanese laboratories scheduled to launch in the near future, international cooperation will extend beyond the operational communities to the science communities. We are able to accomplish these extraordinary feats because of the extraordinary people at NASA, our engineers, flight controllers, scientists, doctors, and our astronauts.

I would be happy to respond to any questions that you have.