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Statement of
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Chair
National Aeronautics and Space Administration's
Aerospace Safety Advisory Panel

Before the

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

Chairwoman Giffords, Ranking Member Olson, and Members of the Subcommittee:
Thank you for the opportunity to discuss the Aerospace Safety Advisory Panel's 2009 Activities and Annual Report. Let me begin by quoting from the Report's conclusion.

CONCLUSION

"The Panel continues to believe, as it did in 2008, that NASA faces unprecedented challenges, perhaps greater than any time in the Agency's history. Important decisions on the future of human spaceflight face NASA, as well as the White House, the Congress, and the Nation.

Commercial entities and international partners will likely have a larger role in transporting both cargo and crew to orbit. It is crucial that NASA focus on establishing the certification requirements, a certification process for orbital transportation vehicles, and a process for validating compliance. The performance and safety requirements must be stated promptly and clearly to enable NASA and non-NASA entities to proceed in the most productive and effective manner possible.

The Ares I vehicle has been designed from the beginning with a clear emphasis on safety. Before any change is made to architecture, the inherent safety of that approach should be assessed to ensure that it offers a level of safety equal to or greater than the program of record.

We recognize that the Shuttle is risky by inherent design, and it is becoming more so because of aging and wear. Extension of its use significantly beyond what is planned through the current manifest is not recommended.

Space exploration is a dangerous enterprise. The risks must be shouldered by NASA, Congress, and the Administration, and those risks must be communicated clearly to the public.

The Panel hopes that our summary of critical safety-related issues will help focus attention on the important decisions and the direction of the Agency."

The 2009 Report has been widely read, strongly commended, and energetically criticized. With those well rounded metrics, we believe we have fulfilled our statutory purpose, which is to infuse safety considerations into an informed debate.

During this period of deliberation and redirection, it is important not to overlook NASA's 2009 accomplishments. In the Report, we highlight several accomplishments that are noteworthy due to the commitment to safety. Highlights include:

- Five successful Shuttle launches,
- Progress on International Space Station (ISS) build out,
- Ares I-X Rocket flight test,
- NASA Safety Center (NSC) Safety & Mission Assurance Technical Excellence Program (STEP),
- ISS cargo resupply,
- Safe and successful Hubble Servicing Mission (SM)-4,
- NASA and the OSHA Voluntary Protection Program (VPP), and
- Continuing successes in deep space missions.

The Panel also highlighted a few critical issues in the Report. The most important one is, "Whatever new policies or vehicles are selected for America's space activities, ensuring human safety must continue to receive the appropriate funding, visibility, and support...."

The Panel spent a good amount of ink on two specific issues: Human Rating Requirements (HRR) for Follow-on Vehicles and Shuttle Extension.

Human Rating Requirements

In our Report, we note that the Commercial Orbital Transportation Services (COTS) vehicles being developed thus far had not been required to meet HRR standards nor were they proven to be appropriate to transport NASA personnel. This is understandable since COTS vehicle contractors are currently tasked only with developing cargo delivery systems. However, since expanding the commercial vehicle mission to include human transport has become an active topic, the Panel highlighted the HRR standards issue at every quarterly meeting in 2009. A principal concern identified at the first meeting in 2009 was that the current HRR procedures, when applied to the development of future human-related vehicles, were not specifically intended to establish requirements for vehicles produced by entities external to NASA. The Panel recommended that NASA stipulate directly the applicable HRR standards and share acceptable risk levels with those other entities. It is essential that any entity that might be creating human-rated transport systems that may transport NASA astronauts must understand the

safety requirements that will be mandatory for such services. Not only should the standards be provided, but the certification mechanism and required validation data should be made clear.

We go on to note that, in the fourth quarter of 2009, NASA made a start at achieving progress to more clearly develop and communicate the standards necessary for any COTS manufacturer if astronauts are to be transported on non-NASA vehicles. However, this will only partially answer the challenge. After the criteria and their applicability are clearly established, a process must be developed for validating and certifying compliance with those criteria. Although the Panel strongly supports the start that NASA has made, the Panel continues to believe that NASA is behind where it needs to be at this point in time. Considerable work must be done, and priority efforts should be established to accelerate the level of effort underway.

For these reasons, the Panel stated, "To abandon Ares I as a baseline vehicle for an alternative without demonstrated capability nor proven superiority is unwise and probably not cost effective. The ability of any current COTS design to "close the gap" or even provide an equivalent degree of safety is speculative."

Shuttle Extension

The Augustine Committee concluded that the only way to reduce the "gap" in human spaceflight launch capability between ISS completion and the planned flights of Ares 1 is by extending the Shuttle program well beyond 2010.

The Panel does not support extending the Shuttle significantly beyond its current manifest. We are especially concerned over any kind of "serial extension" where a few flights at a time might be added. The risk of continuing to fly the Shuttle without a recertification and expending the resources to bring the vehicle up to modern standards is more than what we should ask astronauts to shoulder. The Panel does not believe that there is full transparency to the risk. We recognize that such transparency is challenging due to the difficulty in communicating highly technical issues to a largely non-technical public. Still, NASA must find a way to successfully communicate the level of risk inherent in experimental space flight. The Agency must be supported in doing so by Congress and the Administration. In our opinion, the time to extend the Shuttle was several years ago when there was an opportunity to go forward with an extension certification program of reasonable scope and cost. With sufficient money, manpower, and recertification efforts, it is possible that the Shuttle could be extended. While we are aware of no major systems that are "on the knee of the curve" of wear out, the funds needed to allow full recertification are substantial, and the probability of finding things that demand even more resources during recertification is very real.

The Report goes on to address other issues and opportunities. Those include:

- Integration of Robotics Agency-wide
  - The Panel continues to urge NASA to take a more open-minded and aggressive view towards using robots to reduce human risk whenever possible, consistent with mission accomplishment. This means using robots to replace humans on some missions and to support astronauts on others.

- The Panel notes that the vision for Exploration includes dangerous and challenging work like construction, mining, and manufacturing. In accomplishing this work, there is significant risk to astronauts in their fragile but critical space suits.

- Facilities and Aging Infrastructure

  Over eighty percent of NASA facilities are beyond their design life, and annual maintenance is underfunded.[1] Facilities continue to degrade and facilities failures are starting to impact missions and have safety implications Agency-wide. Evidence for this can be seen in the increasing number of small fires, key equipment losses through failures in material handling and transportation facilities, and in the "weak signals" that we observe in current safety reports. The infrastructure used to launch complex vehicles into space must be reviewed and maintained down to the smallest component to remain safe. In the past, one of NASA's goals was "ten healthy Centers." A considerable investment in facility maintenance, repair, and replacement is needed for this goal to be achieved. This may be unrealistic in the current economic climate. If funding is not available, NASA should consider consolidating its programs and efforts at fewer Centers so that its activities may be safely continued at the remaining facilities. This planning needs to be part of a conscious and deliberate facilities strategy.

If one steps back and observes with a wide lens, the FY 2009 ASAP Annual Report is about three things: the Space Shuttle, safely meeting our nation's goals and objectives for space transportation, and the knowledge needed to safely transport human beings into space.

- The Space Shuttle - We believe every responsible American has concerns about the safety of the Shuttle. The Shuttle has flown 129 flights; there have been two catastrophic accidents and 14 lives lost. The Shuttle's history, age, and its eroding supply and support chain all speak to increasing risk.

- Space Transportation Goals - We must be clear on our goals for space transportation to meet those goals safely. Are they to:
  - Minimize the gap between the Shuttle and America's next human transport vehicle?
  - Privatize the transport of NASA astronauts to low earth orbit?
  - Secure a new launch vehicle with greater lift and potentially greater flexibility?

  The panel believes NASA can accomplish any of these goals, given sufficient time and money, but NASA cannot be expected to accomplish all three safely and concurrently within available budgets.

  To speak clearly about the first goal, the ASAP believes attempting to close the gap or to buy time for new program direction by extending the Shuttle is ill advised.

[1] Presentation "NASA's Construction Program" by Frank Bellinger, Director Facilities Engineering & Real Property Division, NASA Headquarters, to American Council of Engineering Companies, April 27, 2009.

- Competency - The Panel is not against commercial transport of humans but has registered concern in our Report about commercial transport without updated safety standards. These standards have not yet been written by NASA, so no one can truly claim compliance with them. So far in the U.S., only NASA has demonstrated the knowledge and competence needed to transport humans into space and return them safely to the earth. If the U.S. decides to contract for commercial services to transport our astronauts into low earth orbit, there is much work to be done. That work is about transferring knowledge and about developing a process whereby competency and design can be certified.

Whatever the direction forward, the Congress and the White House need to provide NASA with clear guidance. The focus needs to turn to getting the job done as soon as possible.

What causes programs to get into situations where safety is at risk or, sometimes, even a causality? We believe there are most often three common themes:

1. Compressing schedule,
2. Stretching resources,
3. A workforce that looses direction.

With the new budget come significant changes to our Nation's plan for space. The ASAP's advice is to carefully and adequately provide resources and to realistically schedule work. We believe both resources and scheduling must include a "management reserve" to accommodate issues that will arise as new designs evolve and working relationships mature.

Additionally, managing the Shuttle's workforce—both government and contactor—will require new and focused attention. NASA's workforce transition planning that has maintained a stable Shuttle workforce and requisite knowledge is now in jeopardy. It will be a challenge to keep the necessary skill-sets as workers find themselves without a clear future and looking for a safe place to land.

Once again, I thank you for the opportunity to offer the Panel's view on these issues and would be pleased to respond to any questions you or other Members of the Subcommittee may have.