Remarks by the Honorable Michael D. Griffin
NASA Administrator
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Good evening and thank you for inviting me. I've been asked to talk about space exploration, but since this is the Farnborough Airshow, I think it's important to offer a few remarks in the context of the vital relationship between aeronautics research and space exploration.

An amazing thing occurred 37 years ago. Not only did Neil Armstrong and Buzz Aldrin set foot on the Moon, but three days beforehand, the New York Times actually issued an apology to one of America's greatest engineers. It seems that back in 1920, the newspaper questioned the technical acumen of Professor Robert Goddard because the Times' editorial board had the mistaken impression that rockets could not operate in the vacuum of space. They said of Goddard: "He only seems to lack the knowledge ladled out daily in high schools."

Goddard's response was a profound statement that speaks to us today: "Every vision is a joke until the first man accomplishes it; once realized, it becomes commonplace." Thus, 49 years later, as Apollo 11 was on its way to the Moon, buried on page 43 of its July 17th, 1969 edition, the New York Times begrudgingly admitted: "It is now definitely established that a rocket can function in a vacuum as well as in the atmosphere. The Times regrets the error."

This story places in context for me what I hope people will say in less than 49 years, I hope—about the Vision for Space Exploration. Some will scoff today at such lofty goals, but once accomplished, I hope that they will later seem almost commonplace, even though the missions before us—space exploration, scientific discovery, and aeronautics research—are the most technically challenging goals of our time.

However, as we try to meet this challenge, the answer is <u>not</u> for NASA to re-organize or abandon one of its core missions to focus on the other two, as some pundits have recommended be done with our aeronautics research program. To do so would be a grave mistake. Aeronautics research and space exploration are inextricably linked, and

to separate the two only serves to sub-optimize the technical benefits that could be gained from aeronautics and astronautics engineers and scientists working collaboratively within one Agency.

The first and last 100 miles in the journey from the Earth to the Moon or Mars and back is through the Earth's atmosphere. Likewise, the atmosphere on Mars is approximately 60 miles thick. The JPL and Ames engineers working on atmospheric entry technologies for the Mars Rovers and the Mars Science Lab advance their craft by leveraging computational fluid dynamics research and experimental data obtained in NASA's aeronautical facilities. Likewise, the Crew Exploration Vehicle will need our unique aeronautical test facilities and expertise. One of the fundamental reasons why those rovers have been able to land on Mars, men have been able to return safely from the Moon, and future human explorers will be able to land and return from Mars is due to the efforts of scientists and engineers who came before them and who are working today in researching various fundamental aeronautics disciplines. Our future space exploration efforts are critically dependent on advancing our state of knowledge in aeronautics.

The other day, the Space Shuttle Discovery landed at Kennedy Space Center after a successful mission. The Shuttle's thermal protection system withstands almost 3,000 degree Fahrenheit temperatures upon re-entry. During the previous Shuttle mission, I took part in detailed discussions about protruding Shuttle tile gap-fillers, and what was known and unknown about the high-speed, high-temperature airflow surrounding the Shuttle upon re-entry. It turned out that we had very little data about such flow regimes, despite having flown the Space Shuttle for 25 years. Thus, on that mission, we asked Steve Robinson to conduct a spacewalk to remove the tile gap-filler, but it became obvious to everyone that more fundamental aeronautics research needs to be done. We will need to advance greatly our understanding in key aeronautics disciplines such as aerodynamics, aerothermodynamics, materials, and structures, across all flight regimes from subsonic through hypersonic, in order to master these disciplines for safety of flight around our own planet and world's beyond.

The overarching goal of NASA's aeronautics program is to conduct high-quality, cutting-edge research that enables revolutionary

advances in both civilian and military aeronautical systems as well as key aeronautical capabilities that support NASA's human and robotic space activities.

In restructuring our aeronautics portfolio, we are taking a long-term, strategic approach to our research to ensure that we pursue the cutting-edge of research across the breadth of aeronautics disciplines required to support revolutionary capabilities in both air vehicles and the airspace in which they fly. NASA's commitment to technical excellence for aeronautics research and space exploration requires a commitment to rigor and discipline, and adherence to the scientific method. Therefore, while experiments both on the ground and in flight will play an important role in our aeronautics research program, we will not conduct large-scale point design demonstrations that lack the traceability and scalability required for true scientific and engineering advancement. We will focus instead on fundamental questions in aeronautics that need to be answered, are appropriate to NASA's unique capabilities, and that will benefit the broad aeronautics community in academia, industry, and Government.

I realize from a short-term business perspective that some in industry may not like this change from expensive, point design demonstrations. However, if you talk to your company's aeronautics researchers and engineers, I believe that you'll find that this change is needed for the overall health of the aeronautics research field, and its long-term viability.

Further, while some lament that NASA's budget for aeronautics research is only 1/16th of the overall NASA budget, I believe that it is far more important that we first consider the intellectual richness of the aeronautics research we plan to conduct before arguing that more money is the answer.

NASA once produced the best technical publications in aeronautics research. With Lisa Porter's help, we intend to reclaim that responsibility as part of our commitment to technical excellence and re-dedication to the mastery and intellectual stewardship of the aeronautics research field. To that end, we intend to publish our research results to the greatest extent possible in as timely a manner as possible. This

benefits the broader research community more than point-design demonstrations.

In many ways, we are re-dedicating NASA to aeronautics research at the same time we are re-dedicating ourselves to the mission of space exploration–completing the assembly of the International Space Station, retiring the Space Shuttle by 2010, bringing the CEV online by 2014 (and possibly earlier with your help), returning to the Moon (this time to stay), and planning for missions to Mars, the near-Earth asteroids, and beyond. Aeronautics research and space exploration are separate missions, but inextricably linked by the physics of the challenges they have in common.

Again, "every vision is a joke until the first man accomplishes it." The only thing I would change to Professor Goddard's axiom is that we cannot limit it to men, because I remain completely delighted that Lisa Porter agreed to join my senior management team. She and I share the same vision, and working together, I believe that we can accomplish a great deal.

Thank you.