

Remarks by NASA Deputy Administrator Lori B. Garver  
20<sup>th</sup> Anniversary Teaming to Win Celebration  
Fairmont West Virginia  
October 15, 2009  
*Speech as Prepared for Delivery*

Thank you, Chairman Mollohan for that gracious introduction and good evening to you all.

On behalf of Charlie Bolden and myself, as well as all of NASA, I would like to express our deepest appreciation to Chairman Mollohan and other Members of the West Virginia delegation for their consistent and unwavering support for NASA and for the nation's civil space program. In particular, Chairman Mollohan's advocacy for NASA's science, aeronautics, spaceflight, exploration, and education programs and his support of our annual budget requests are key to our success on the Hill, year after year. The NASA family is grateful for the continued support of Mr. Mollohan and all the members of the West Virginia Congressional delegation.

Thank you to the organizers of this wonderful Teaming to Win event and to Chairman Mollohan's expert staff who have tirelessly worked to make this event a success.

Additionally, Dr. John Grunsfeld was here today, a NASA astronaut who has flown on five Shuttle missions including the fourth Hubble servicing mission in March 2002 and the fifth Hubble servicing mission just recently completed in May 2009. NASA's Independent Verification and Validation Facility here in Fairmont contributed to the success of John's Shuttle missions through its ongoing work reviewing safety-critical software on the Space Shuttle and through its support for the science instruments installed in the last servicing mission.

Space leadership is not just an idea for inside the Beltway, but is achieved by thousands of us all across America in places like Fairmont, each one an element that makes up our economic strength. For some years now, you have heard NASA leaders talk about something we call the space economy. The space economy includes all of the activities involved in space exploration, space technology development, and space research – activities that create and provide value to the public. The Space Foundation estimates that the space economy generates more than \$257 billion in revenue worldwide. That should not surprise us. Space activities touch nearly every community in America. That especially includes West Virginia and our NASA facility here in Fairmont. NASA and its large and small business

partners are part of the high technology sector so important to West Virginia's future prosperity. One recent study found that – in the region that includes Fairmont, North Central West Virginia – income has grown at a faster rate than the rest of the state — and the nation. The area has had lower unemployment rates than the entire state since the end of 1997. And while nine percent of the jobs within the high-tech corridor are tech industry jobs, those jobs account for 16 percent of all wages paid in the region. What does that add up to for West Virginians? The total economic impact of tech firms in North Central West Virginia in 2006 was more than \$5 billion in economic activity.

So what is NASA's role in this good news story?

It goes without saying that safety is at the heart of every NASA mission – crew safety, public safety, and the safety of the environment. Second only to safety is our goal of mission success. Our missions depend on software integrity to achieve their goals and deliver a successful mission to the American people. At NASA's Independent Verification and Validation Facility here in Fairmont, software destined for space missions is subjected

to intensive analysis and testing to make certain that the most safety-critical software will operate dependably and support mission success.

And our IV&V Program performs leading-edge research that improves methods, practices and tools used in software validation and verification. In addition to the many small businesses that support NASA, our larger industry partners such as L-3 Communications and Northrop Grumman are also here, as are academic institutions such as West Virginia University and Fairmont State University. Simply put, the team here in Fairmont – NASA, academia and industry – makes sure that critical software developed for NASA’s space missions does what it is supposed to do.

Some of NASA’s most important – and most visible – programs are supported at the IV&V facility.

In the International Space Station program, IV&V provides a key independent review of software products that are needed to support the crew in space, maintain station operations, support visiting space vehicles, and perform payload and science operations. IV&V’s input to the ISS program has resulted in more robust software products and has reduced on-orbit problems.

IV&V's work has also played a role in helping emerging new commercial space firms. In 2008, SpaceX and NASA entered into a Space Act Agreement to provide assessment and assurance of safety and mission critical software for NASA's Commercial Orbital Transportation Services project. NASA IV&V reviewed SpaceX software documentation with a focus on the overall architecture and on communications-specific software. In June 2008, IV&V released its findings and this feedback was used by SpaceX to help improve its internal software documentation.

The NASA IV&V team has also been providing support to the individual projects within the Constellation Program since the program began. The NASA IV&V Facility has supported key activities such as the Ares crew launch vehicle's Upper Stage Flight Software early design.

Additionally, the IV&V team that supported the Lunar Reconnaissance Orbiter project was praised as having made a "value added contribution" to the development of the spacecraft's flight software. LRO and its companion mission, the Lunar Crater Observation and Sensing Satellite or LCROSS, launched on June 18. LRO is designed to map the lunar surface and characterize landing sites for future missions. LCROSS impacted the

surface of the moon on October 9 and we are awaiting the data from this exciting event to learn more about the composition of the surface of the moon and to test the theory that water ice may be located there.

But West Virginians aren't only helping NASA and commercial firms reach for the stars, they're helping us improve life on our current home planet.

West Virginians, through IV&V, supported NASA's AURA mission, which for over 5 years has been providing data to improve our knowledge of climate, air quality, and the physical and chemical processes controlling the Earth's ozone layer. Among other things, AURA has measured the largest Antarctic ozone hole on record, monitored air quality during the Beijing Olympics, and tracked ash plumes from volcanic eruptions to aid aircraft in avoiding the plumes.

Through IV&V, West Virginia engineers supported a joint U.S.-French satellite mission, CALIPSO, which provides scientists with vital and previously unavailable information about the altitude of layers of small particles called aerosols in the atmosphere. These aerosols can affect

weather and climate, even changing the lifetime of clouds, affecting how much rainfall can occur, and influencing the composition of the atmosphere.

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But what about the future? The future is about our young people, about inspiring them to study hard and achieve and about providing meaningful work for them when trained. In particular, NASA works with you all and with communities around the country to encourage the next generation to study math, science, and engineering so that they can contribute to our country through their innovation and hard work.

An example of our bright future is the discovery made by Lucas Bolyard. Lucas is a West Virginia high-school student who is 14 years old. He was analyzing data from a giant radio telescope when he discovered a new astronomical object—a strange type of neutron star never discovered before. What's remarkable about Lucas Bolyard's discovery is that he made it after he had studied two thousand data points collected from the Robert Byrd Green Bank Telescope-and originally found nothing. But like many West Virginians, Lucas refused to quit after only trying once, and looked at his data again. His discovery was almost hidden in the radio interference streaming in from space. But he was persistent—he was dedicated. And this student from Harrison High School in Clarksburg made history.

President Obama and First Lady Michelle Obama honored Lucas at the star gazing event on the White House lawn that I had the privilege to attend last week. Lucas reminds us that all of us together have a responsibility to his generation, and to future generations of students and scientists, to make sure the tools of exploration they need will always be available to them—and that a healthy and robust space industry is thriving when the time comes for them to become a part of this great adventure.

In higher education, West Virginia's universities are on the forefront of preparing the next generation of scientists and engineers. The NASA West Virginia Space Grant Consortium was established in August 1991 and includes eighteen West Virginia academic institutions and corporate and scientific partners that have joined together under the sponsorship of NASA. In addition to conducting research, training new faculty, and supporting student internships and fellowships, the consortium is empowering young adults to shape their future. Students at West Virginia University have launched the Student Partnership for the Advancement of Cosmic Exploration (SPACE) to improve upon their experience at college, with a specific emphasis toward developing and furthering space exploration. Under the mentorship of their faculty advisor, a number of engineering

students developed the effort to work on the problems they saw, to provide solutions and to improve their educational experience and that of future generations of students. The students develop outreach programs for the community as well as currently enrolled students to inspire them and offer a connection to those in the space industry. They help connect students to research, funding, internships, networking, and classes throughout the state, and have a goal of becoming a nationally recognized organization, with branches at multiple universities, all promoting space exploration and providing opportunities to the newest generation of explorers.

NASA IV&V supports efforts to encourage students to pursue STEM careers as well. For the last 9 years, IV&V, in collaboration with the West Virginia High Technology Consortium Foundation, has held an annual event called “Day in the Park”. This unique educational event is targeted to North Central West Virginia 7<sup>th</sup> graders, because research shows that many students begin losing interest in STEM around the seventh grade. Day in the Park is intended to re-energize this interest by providing students with opportunities to interact with these subjects in fun and inspirational ways. This year, a special guest, Astronaut Jon McBride, a West Virginia native, talked to the students about “A Day in the Life of an Astronaut.” Day in the

Park has grown over the years, with more and more schools wanting to participate, leading to this first two-day offering that reached over 1500 students!

And that's not all. The NASA IV&V Facility hosts the Engineering Apprentice Program. Students who have an interest in science, technology, mathematics, and engineering, work closely with scientists and engineers who act as their mentors. The program offers students a unique and positive experience in their fields of interest, encouraging them to pursue careers in science and engineering—maybe at NASA. Last August, I learned firsthand about this program when a group of these students presented their projects at NASA Headquarters. I remember their excitement when they told me of their plans for their future careers. In this program, some students are children of bus drivers, some of professors. Some are of minority and disadvantaged backgrounds, others are disabled. Some students commute for over an hour each way from rural areas, some grew up within walking distance of the Fairmont facility. What do they all have in common? They love science, engineering, and the opportunity to work with NASA. They've learned not just the technical aspects of these jobs, but how to interact and contribute as professionals in an engineering organization. The

students report that this experience has made them better prepared for their college experience because they can now see that higher education can lead them to something they have already experienced. Said one student's summer intern evaluation and I quote: "The experience of working with NASA will go beyond anything else I could have ever done this summer." Our partnership with the students, high school sophomores, juniors, and seniors, gives these young minds the chance to become familiar with the engineering and design process. We light a spark that can change a young person's life forever. This is the true value of what we do at NASA: we make the future happen.

To realize these benefits and bring value to our nation requires sustained leadership, leadership that understands the role space plays in the economy, a leadership with vision and purpose. Nearly a half century ago, a young American President possessed just such a vision. In his last speech about space on the day before he was assassinated, President John F. Kennedy spoke about the benefits he believed would flow from American leadership in space. He spoke then at the dedication of the Aerospace Medical Center in San Antonio.

President Kennedy said, “Many Americans make the mistake of assuming that space research has no values here on Earth. Nothing could be further from the truth. For our effort in space is not as some have suggested, a competitor for the natural resources that we need to develop the Earth. It is a working partner and a coproducer of these resources. And nothing makes this clearer than the fact that medicine in space is going to make our lives healthier and happier here on Earth.” He made three predictions, all bold for his time. He predicted that studies of how astronauts would live and work in space could help identify environmental problems here on Earth. He predicted that space medical research might one day help patients on Earth, with new medical devices such as heart monitors and medical instrumentation and ways to help children with eye diseases. And lastly he suggested that protection of astronauts from the radiation hazards from space might lead to safer ways of handling radiation therapies for patients in hospitals and medical clinics.

In our twenty-first century space program, every one of his predictions have not only come true, but have in many instances given rise to whole new industries, populated by dozens if not hundreds of small businesses that employ thousands of workers throughout America. But JFK made another prediction that we would well remember today. He suggested that there

would always be pressure to do something else with the money we spent on space technology and exploration, what he called “temptations to do something else that is perhaps easier.” For more than five decades, America has resisted those temptations thanks to leaders like Alan Mollohan, and continues to build a strong and vibrant space program that remains the leader of the world.

Here in Fairmont, we continue to reap those benefits, with some of the nation’s finest engineers working on many of NASA’s important missions. At the same time, we sow the seeds of the future by providing inspiration to every young student so that we can have more exciting discoveries like that made by Lucas Bolyard. We are helping the next generation of Americans and West Virginians prepare to take their place on this exciting space frontier.

Again, my thanks for the opportunity to speak before you this evening, and may Teaming to Win enjoy another successful twenty years!