



Lockheed Martin Meeting with NASA Presidential Transition Team December 17, 2008

Lockheed Martin Attendees:

Joanne Maguire, Executive Vice President, Lockheed Martin Space Systems Company
John Karas, Vice President and General Manager, Human Space Flight
Eric Thoemmes, Vice President, Space Systems and Operations, Washington Operations

Discussion Topics:

Lockheed Martin's Space Exploration Program Support to NASA
Gap between Shuttle Retirement and Constellation Operations
Progress on Project Orion
Workforce Transition
Lockheed Martin's Science Mission Support to NASA

Lockheed Martin supports the Obama Administration plan as described in "*Advancing the Frontiers of Space Exploration*"

- The Obama Administration has a powerful opportunity to effect real change at NASA by providing economic stimulus to maintain U.S. technological competitiveness and leadership among space faring nations.
- Full funding and a long-term commitment are necessary to fulfill the robust and balanced civilian space program that has been defined by the new Administration.
- Retirement of the Space Shuttle has been identified by the GAO as one of the top 13 urgent issues facing the U.S. It's imperative that we focus on development of the human space flight systems that will replace the Shuttle, enabling us to fully utilize the International Space Station and once again take us beyond low Earth orbit.
- NASA and industry investments in systems to replace the Shuttle are focused on developing capabilities that will enable a broad reach of missions for several generations.
- Healthy funding and a balanced Civil Space portfolio are critical to continuing great U.S. achievements in the scientific and robotic exploration of space and in deploying a global climate change research and monitoring system to help us better understand and preserve our world.
- Space exploration has historically provided the world with a common goal that brings nations together. International cooperation in human space exploration, scientific missions, and Earth monitoring systems will provide a venue for diplomacy and will continue to unite the global community in establishing and investing in long-term goals that will improve our world.
- Investments in Research and Development are essential to supporting technology needs of future human and robotic missions. Government and industry investment in advancement of key technologies will keep the U.S. on the leading edge of capabilities necessary for national and economic security and will enable us to better understand the Earth's origins and changes in our climate so we can protect and improve our world.
- Our nation's space program has historically inspired future generations of explorers to study science, technology, engineering, and math. It is critical that we continue the development of human space flight systems and scientific research spacecraft, thereby providing a pipeline of engineering and technological opportunities to ensure a highly skilled, technologically advanced workforce.
- A strong U.S. scientific and technical workforce is not only critical to our nation's space programs, but is key to a healthy economy and national security. Transition of our workforce from Shuttle operations to the new space exploration systems will require attention and support from the highest levels of the next Administration.



Space Exploration Overview Lockheed Martin December 17, 2008

The United States faces the challenge of having no spacecraft capable of launching astronauts into orbit when our aging shuttle fleet is retired in 2010. In addition, the Nation's current space transportation systems are unsuitable for human exploration beyond low Earth orbit (LEO). The first flight of the Space Shuttle occurred in April 1981, and although the Shuttle has served the nation well for nearly thirty years, it was not designed to travel beyond LEO. In fact, humans have not traveled beyond LEO since the Apollo 17 mission in December 1972.

NASA's Space Exploration Program, which has received strong bi-partisan support from Congress, offers a solution. It will continue the job of the Space Shuttle and will enable sustained human exploration of space to the moon and beyond. NASA currently plans to begin launching the next generation of crewed missions to the surface of the moon in the 2020 timeframe, 48 years after the last human mission beyond low Earth orbit.

The Orion crew capsule, while similar in shape to the Apollo capsule, will accommodate larger crews than Apollo (six crew members for space station servicing missions and four crew members for lunar missions). Orion's simplified aerodynamic shape and its new launch abort system will provide greater operational flexibility, streamlined pre-flight preparations, and enhanced crew safety. The Orion design approach incorporating block upgrades enables the use of a common basic design for multiple mission profiles. This allows it to serve the Nation's human space flight needs for several decades.

Under current funding, the first operational mission of the Orion Crew Exploration Vehicle vehicle to the International Space Station is scheduled to take place in March 2015. There will be a five-year gap in U.S. manned space access once the shuttles are retired. During that time the U.S. will need to rely on Russia for access to the International Space Station, which was recently designated a U.S. national laboratory.

"Why Space Exploration is Important?"

- **US Leadership in Space Is Being Threatened:** The Constellation program will ensure that the US retains world leadership in human space exploration. In the past few years, we have seen the rise of strong national space programs in China, India, Japan, and a resurgence in Russia. Most of these nations are setting their sights on the Moon and beyond. In particular, China has set an ambitious agenda of space research with increasingly sophisticated manned space flights. In an effort to win what analysts are calling an "Asian space race" with Japan and India, they announced a goal of putting a human on the Moon by 2020. Recent Chinese anti-satellite activity demonstrates that, contrary to their statements, not all the Chinese space goals are peaceful in nature.
- **Human Space Exploration Inspires Future Generations:** NASA programs are the Nation's greatest recruitment tool for inspiring students to study science, technology, engineering and math. Surveys show that after a key space goal has been attained – for example the Apollo landing on the moon – there is increased enrollment in science and engineering studies at colleges and universities. In 2004, 600,000 students graduated with engineering degrees in China, and 350,000 received engineering degrees in India, compared to 70,000 engineering degrees in the U.S. The Constellation program will have a powerful effect in attracting students to these disciplines in which the nation is lacking.
- **Human Space Exploration has led to the Development of Over 1500 Healthcare Advances:** AMA calls NASA a "goldmine for medical and basic scientific research". The American Medical Association (AMA) recently passed a special resolution publicly supporting



“NASA’s new commitment for manned space exploration of the moon, Mars, and other celestial bodies for the benefits to medicine and the advances to patient care.” AMA acknowledges the role of human space exploration in over 1500 healthcare advances, including the development of the artificial heart, breast biopsies, insulin pumps, laser surgery, kidney dialysis, ear thermometers, robotic limbs, ultrasound scanners, pacemakers, to name a few.

- **Exploration Provides High Quality Jobs That Fuel Our Economy:** In 2006, U.S. aerospace employment gained 23,000 jobs – the third straight year of growth – to total 635,000 jobs in all 50 states. These jobs range from astronomers, physicists, aerospace engineers, computer software engineers, mathematicians, electronics engineers, chemical engineers, electrical engineers, materials engineers, mechanical engineers, civil engineers, chemists, computer specials, and highly skilled/high tech manufacturing workers who typically average \$25/hr. There is high demand for these jobs. Immediately after NASA’s Orion contract award in August 2006, the Orion contractors needed 1300 new technical positions filled and they received almost 33,000 valid job applications -- 25 responses for each job opening.
- **America’s Future Depends on a Robust US Aerospace Industry:** According to the Aerospace Industries Association, in 2006 U.S. aerospace industry revenues topped \$184B, a record level for the third year in a row, and the U.S. had a trade surplus in the aerospace sector of \$52B, with a level of exports three times the level of imports. The Nation’s aerospace industry is one of the largest positive contributors to the U.S. trade balance.
- **Challenges of Space Exploration Drive Innovation & Technology Advancements:** The money we spend on NASA -- just half a penny of the Federal dollar – and what we do with it, doesn’t happen “out there in space,” it all happens here on earth. NASA space exploration missions drive technology advancements in lightweight structures, thermal protection, electronics, communications, transportation, and health care. Over 1,000 consumer products and services are built on NASA-inspired technologies. From shock-absorbing athletic shoes and radiation-blocking sunglasses, to blackberries, cell phones, and GPS – these products improve our daily lives, and all of them rely on space-based technologies.