



Aerospace and Defense Background 2011

The Orion Multi-Purpose Crew Vehicle Program and Human Deep Space Exploration Background

- In February 2010, the President recommended the cancellation of NASA's Constellation Program that was to take the U.S. back to the Moon and on to Mars. Constellation included both the Orion Crew Exploration Vehicle spacecraft and the Ares 1 and Ares 5 launch vehicles.
- Congress objected to the President's plan on a bi-partisan basis and the President modified his proposal to allow for Orion to serve as a rescue vehicle supporting astronauts aboard the International Space Station. Again, Congress rejected this specific proposal, but welcomed the overall re-endorsement of Orion for human space flight.
- Congress (with support and leadership by CO's congressional delegation) finally approved and the President signed into law the 2010 NASA Authorization Act that provides for the Multi-Purpose Crew Vehicle (MPCV) based on the Orion's contract, workforce, design, systems and safety features.
- The first Orion Crew Module, built at NASA's Michoud, LA facility, using advanced friction stir welding techniques, is currently at Lockheed Martin (Prime Contractor to NASA for Orion) preparing for space environment testing to certify its thermal systems and its structural integrity.
- The Orion is scheduled for an orbital test flight in 2013 to support crewed operations by 2016 as called for in the 2010 NASA Authorization Act.
- Orion supports more than 1000 high-tech jobs in CO, while contributing to thousands more indirectly across the state.
- The Orion MPCV will open up a new era of human space exploration supporting missions to asteroids, Lagrange Points, the moons of Mars, and ultimately Mars itself.
- The President's FY2012 budget request reduces funding for Orion and a heavy lift launch vehicle, while substantially adding to funding for commercial space initiatives. Funding for these programs should be readjusted to reflect the priorities agreed to in the 2010 NASA Authorization Act.
- NASA drives advances in science, technology, and exploration to enhance knowledge, education, innovation, economic vitality, stewardship of the Earth, and solutions to national and global challenges. The President's overall FY2012 budget request for NASA (\$18.5B) is needed to ensure continued US leadership in space.

Ground Based Missile Defense Background

- The GMD system is currently the only operation defense of the Homeland against a limited Intercontinental Ballistic Missile attack.
- The Colorado National Guard, located at Schriever AFB, Colorado is responsible for the operational Command and Control of the GMD system; and Admiral Winnefield, Commander, North American Aerospace Defense Command and U.S. Northern Command at Peterson AFB, Colorado, has the overall command authority for the GMD system.
- In addition to the Boeing employees that directly support the GMD program, there is significant Colorado Springs community involvement in the GMD program through military, civilian and contractor positions that support other Colorado-based missile defense activities at

NORAD/NORTHCOM, Cheyenne Mountain, Schriever AFB, Space and Missile Defense Command, and the Colorado Missile Defense Agency facility.

Joint Polar Satellite System (JPSS) Background

- The National Oceanic and Atmospheric Administration's (NOAA) Joint Polar Satellite System (JPSS) is a multi-satellite project that will serve to monitor global environmental conditions to provide data for long-range weather and climate forecasts and for climate research. *Source: Raytheon Company*
- The project is a major upgrade to the existing Polar-orbiting Operational Environmental Satellites (POES), which are outdated. *Source: Raytheon Company*
- Full funding for the JPSS program has been threatened by the current budget situation. FY 2011 funding was recently frozen at the 2010 level of \$382 million, nearly \$700 million short of what the NOAA sought. Insufficient funding and programmatic delays will jeopardize advance warning for severe weather and dramatically increase costs to taxpayers. *Source: Space News*
 - A likely 18-month slip in launch date may affect the quality and timeliness of weather forecasts.
 - Cost growth of up to \$2.5 Billion may result from inadequate resources early in program development. *Source: Ball Aerospace*
- Insufficient funding will inevitably result in the termination of contracts associated with the program, and many highly skilled workers will be laid off. *Source: Space News*
- The nation's civilian weather assets are also critical to national security as the degradation of long-term forecasts will have a negative impact on troop deployments and planning operations. *Source: Ball Aerospace*

Military and Civilian Space Resources Background

- Colorado is a strategic location for the space industry – with four key military commands: Air Force Space Command (AFSPC), U.S. Army Space and Missile Defense Command/U.S. Army Forces Strategic Command (SMDC/ARSTRAT), North American Aerospace Defense Command (NORAD), U.S. Northern Command (USNORTHCOM) – and three space-related Air Force bases: Buckley, Peterson, and Schriever.
 - Buckley Air Force Base – Located in Aurora, Buckley is home to the 460th Space Wing and provides global infrared surveillance, tracking, and missile warning for theater and homeland defense and provides combatant commanders with expeditionary warrior Airmen. Buckley is home to more than 37 other units representing every branch of service and components – Active Duty, National Guard and Reserve.
 - Peterson Air Force Base – Located in Colorado Springs, Peterson is the home of the 21st Space Wing, the Air Force's only organization providing missile warning and space control to unified commanders and combat forces worldwide. Also located at the base are NORAD, USNORTHCOM, AFSPC, SMDC/ARSTRAT, and the 302nd Airlift Wing (AFRES).
 - Schriever Air Force Base – Located in Colorado Springs, Schriever, is the home of the 50th Space Wing, which provides combat effects such as secure satellite communications and precise navigation and timing to warfighters around the world. Also located at the base are the Space Innovation and Development Center (SIDC), 310th Space Wing (AFRES), Missile Defense Integrated Operations Center (MDIOC), and the Joint Functional Command Component – Integrated Missile Defense (JFCC-IMD).
 - Cheyenne Mountain Air Force Station – The Cheyenne Mountain Complex is an underground city in a hollowed-out mountain on the southwest edge of Colorado Springs. It houses the nerve centers of North American Aerospace Defense, USNORTHCOM and AFSPC.

Its mission is to monitor aircraft, missiles and space systems that could threaten North America.

- United Air Force Academy – Located in Colorado Springs, the United States Air Force Academy is recognized as one of the nation's finest four-year institutions of higher learning. Military development is central to the Academy experience and distinguishes it from other institutions of higher learning. Four primary areas are stressed: professional military studies, theoretical and applied leadership experiences, aviation science and airmanship programs, and military training. The intent is to provide cadets the knowledge, skills, values, and behavior patterns necessary to meet the leadership challenges of the 21st century.
- Ft. Carson is a key United States Army installation, critical for the security of our country and important to the economic vitality of Colorado. Support for the expansion of Ft. Carson would also help Colorado companies involved in these projects.
 - Fort Carson is located immediately south of Colorado Springs, primarily in El Paso County and a portion is in Pueblo County. Fort Carson is the home of the 1st, 2nd, 3rd and 4th Brigade Combat Teams of the 4th Infantry Division, the 10th Special Forces Group, the 71st Explosive Ordnance Group, the 4th Engineer Battalion, the 759th Military Police Battalion, the 10th Combat Support Hospital, and the 43rd Sustainment Brigade, among others. The post also hosts units of the Army Reserve, Navy Reserve and the Colorado Army National Guard.
 - Fort Carson is the second largest employer in Colorado with 25,000 active duty military.
- NNSA Line Item infrastructure improvement projects such as the Chemical and Metallurgical Research Replacement (CMRR) and TA-55 Reinvestment at Los Alamos National Laboratory, and the Uranium Processing Facility (UPF) at the Y-12 Nuclear Defense Complex will help Colorado companies involved in these projects.
 - This funding will help maintain the US defense position by upgrading seriously deficient facilities that date back to the 1950's.
- Funding the Cooperative Threat Reduction Program (CTR), and especially the bio-threat reduction program, will help Colorado companies involved in these projects.
 - It is in the continuing high-priority, national security interests, of the United States to continue to fully fund DTRA Cooperative Threat Reduction ("CTR" – "Nunn-Lugar Act"-funded) programs, to reduce the threat from legacy Nuclear, Chemical and Biological Weapons at the source.
- The Global Positioning System Operation Control Segment (GPS OCX) supports future air traffic control system, and smart highways depend on its advancement.
 - This program will enhance system capabilities for military and civilian applications.
 - It is a key enabler for military effects-based operations, net-centric operations and battle-space awareness.
 - Some estimate the commercial GPS market to be over \$300 billion by 2020, creating high-paying jobs for Americans.
 - GPS is at risk of "Brownout" if system is not modernized on time – this program will help to prevent GPS "brownout" and protect against vulnerabilities.

Aerospace and Defense Industry Background

- The aerospace and defense industry is a crucial component of Colorado's technology economy. Also, because of Colorado's geographical location, it provides one-bounce satellite communications to Europe and Asia, and because of our Mountain Time Zone Colorado companies can efficiently conduct business with both continents during the same business day.

- Colorado has approximately 24,740 private-sector aerospace and defense workers in nearly 120 companies that develop products from launch vehicles and satellites to command and control software, sensors, and navigation equipment. If you add suppliers and related businesses, Colorado has over 163,000 workers in more than 400 businesses statewide according to the Colorado Space Coalition. In fact, aerospace and defense employment grew 13.1 percent in the state from 2004 to 2009; the national growth for the same period was 10.1 percent.
- Colorado ranks first in the nation for its 2010 concentration of private-sector aerospace employment (24,740). The 2009 average salary for an aerospace and defense worker is \$108,930 (\$88,420 nationwide). A total of \$2.8 billion was spent in 2009 for Colorado's aerospace payroll. There are 28,700 military personnel located within the state for a total of 53,140 direct jobs in the state. Source: Metro Denver Economic Development Corporation; Colorado Aerospace Cluster Study.
- The Aurora/Denver metro region ranks first out of the 50 largest metro areas for private aerospace employment with 19,170 workers.
- The U.S. Department of Defense (DoD) is a critical anchor tenant in our Colorado business base. This relationship is bolstered through our work with the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA). Colorado hosts numerous laboratories that produce outstanding space science as a result of federal funds and our state's private space companies. The University of Colorado is the single largest recipient of NASA university research dollars in the nation.
- The space industry is evolving, and geographic competition has increased. Growth markets are shifting from capital-intensive manufacturing to ground support and space services. Colorado's space community views these changes as opportunities. We must respond by continuing with commercial growth, while at the same time enhancing the ability of Colorado-based remote sensing and other cutting-edge technologies to compete here in the United States and around the world.
- Colorado provides a fertile environment for smaller aerospace start-ups that offer after-market services and low-cost, off-the-shelf products. Colorado also features an abundance of high-tech companies that are developing viable, cutting-edge technologies in support of aerospace.
- Continued investment in Colorado's academic, military and space infrastructure is vital to making our state a center of excellence for space.
- The National Center for Atmospheric Research (NCAR) conducts collaborative research in atmospheric and Earth system science and provides a broad array of tools and technologies to the scientific community, including:
 - Atmospheric chemistry—such as the chemical structure of healthy and polluted air.
 - Climate—including temperature, rainfall, winds, and extreme events over decades or centuries, from prehistoric times to the present and into the future.
 - Weather ingredients—such as cloud physics, storm structure, and other keys to improved weather forecasting.
 - Weather hazards to transportation—including detection and warning systems for turbulence and icing in the air and on the ground.
 - Interactions between the Sun and Earth—including solar weather.
 - Computer science innovation—for understanding and visualizing the whole Earth system.
 - The role of humanity in both creating change and responding to weather and climate.
- The National Oceanic and Atmospheric Administration (NOAA) conducts science from the surface of the sun to the ocean floor, keeping citizens informed of the changing environment around them.
 - From daily weather forecasts, severe storm warnings and climate monitoring to fisheries management, coastal restoration and supporting marine commerce, NOAA's products and

services support economic vitality and affect more than one-third of America's gross domestic product. NOAA's dedicated scientists use cutting-edge research and high-tech instrumentation to provide citizens, planners, emergency managers and other decision makers with reliable information they need when they need it.

- NOAA's roots date back to 1807, when the Nation's first scientific agency, the Survey of the Coast, was established. Since then, NOAA has evolved to meet the needs of a changing country. NOAA maintains a presence in every state and has emerged as an international leader on scientific and environmental matters.