



## **Aerospace and Defense Background**

### **Orion Program (and Constellation Program) and Human Deep Space Exploration Background**

- National Aeronautics and Space Administration's (NASA) Constellation space program was the next, safer phase of human space travel set to eventually replace the retiring space shuttle. NASA was developing the Ares I rocket to launch the manned Orion space capsule, as well as the Ares V rocket to launch a separate cargo ship. Lockheed Martin Space Systems is currently developing the four-person Orion crew capsule via a \$4.1 billion initial contract (total amount of the Orion program is \$8.2 billion).
- Lockheed Martin increased their workforce on the Orion project from 78 full-time personnel in 2006 to 947 full-time equivalent (FTE) workers at the end of 2009. The 2009 count included 837 full-time workers plus 1,597 workers that are involved on the project part-time, representing 110 FTE positions. Based on the average annual salary of \$109,044, these 947 FTEs earn a total annual payroll of \$103.3 million. Annual subcontracts related to the Orion project in Colorado total over \$53 million.
- Under President Barack Obama's FY 2011 budget, Constellation is slated to be canceled. With extreme pressure from Colorado's Congressional delegation, Accelerate Colorado and the space community, President Obama announced plans in April to continue Orion as a scaled down, emergency escape vehicle for the crew at the international space station. The technology being developed for Orion will be used as the basis for a deep space exploration vehicle.
- 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 Budget invests an additional \$6 billion in NASA over the next five years – part of an overall \$100 billion commitment to the agency.
  - NASA's enacted FY 2010 budget is \$18.3 billion (an increase of \$500 million from 2009). NASA's requested FY 2011 budget is \$19 billion.

### **FY 2011 President's Budget request of \$1.1 billion in procurement and \$30.2 million in RDT&E for EELV Background**

- The Air Force Evolved Expendable Launch Vehicle (EELV) program replaces older medium-to heavy-lift launch systems with a single modular system having improved reliability, operability, and capability. The first EELV class vehicles were launched in 2002 by Boeing and Lockheed Martin. The Boeing Delta program and Lockheed Martin Atlas program were subsequently combined into the United Launch Alliance joint venture in December 2006.
- The genesis of the EELV program in the mid-1990's was an effort by the US Government to leverage private sector launch vehicle investments, which were made in anticipation of

substantial growth in the commercial satellite industry. Although both Boeing and Lockheed Martin invested significant sums in commercial launch capabilities and facilities, the projected growth in commercial satellite markets did not materialize. Regardless, the Atlas and Delta systems are now operational.

### **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 460<sup>th</sup> 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. Lack of this technology costs Americans \$90 billion in lost time and \$3 billion in wasted fuel annually. We need to keep GPS program fully funded and on schedule.
  - 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 25,870 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 166,620 workers in more than 300 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 2009 concentration of private-sector aerospace employment (25,870). The 2008 average salary for an aerospace and defense worker is \$107,720 (\$85,980 nationwide). A total of \$2.8 billion was spent in 2008 for Colorado's aerospace payroll. There are 28,470 military personnel located within the state for a total of 54,340 direct jobs in the state.
- The Aurora/Denver metro region ranks second out of the 50 largest metro areas for private aerospace employment with 19,870 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.