

**Statement of
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before the
Committee on Science
House of Representatives**

Mr. Chairman and Members of the Committee, thank you for this opportunity to appear today to discuss NASA's plans for the future as represented in the President's FY 2006 budget request for NASA.

On January 14, 2004, President George W. Bush announced the Vision for Space Exploration. The President's directive gave NASA clear objectives as well as a new and historic focus. The fundamental goal of this directive for the Nation's space exploration program is "...to advance U.S. scientific, security, and economic interests through a robust space exploration program." In issuing this directive, the President committed the Nation to a journey of exploring the solar system and beyond, returning humans to the Moon, and sending robots and ultimately humans to Mars and other destinations. He challenged us to establish new and innovative programs to enhance our understanding of the planets, to ask new questions, and to answer questions as old as humankind. NASA embraced this directive and began a long-term transformation to enable us to achieve this goal.

In June 2004, the President's Commission on Implementation of the United States Space Exploration Policy, led by E. C. "Pete" Aldridge, Jr. (the Aldridge Commission), reported its findings and recommendations to the President. The Aldridge Commission emphasized the crucial role that technological innovation, national and international partnerships, and organizational transformation must play if we are to implement the President's vision for an affordable and sustainable space exploration program. NASA is committed to making the necessary transformation to achieve the Vision for Space Exploration.

On December 21, 2004, the President signed a new national policy directive that establishes guidelines and implementation actions for United States space transportation programs and activities to ensure the Nation's continued ability to access and use space for national and homeland security, and civil, scientific, and commercial purposes. NASA will play a significant role in implementing this directive, fostering and enabling the development of space transportation capabilities for human space exploration beyond low-Earth orbit with the Crew Exploration Vehicle (CEV), consistent with the goals of the Vision for Space Exploration.

The President demonstrated his commitment to the Vision for Space Exploration by making it a priority in his FY 2005 budget request, and Congress responded positively by providing funding for NASA at the level requested by the President. The President has reaffirmed his commitment to the Vision by again making it a priority in his FY 2006 budget request in a very challenging budget environment. The \$16.46 billion requested for NASA reflects an increase of 2.4% over FY 2005.

While today's hearing concerns the President's FY 2006 budget request for NASA, I must also use this opportunity to update the Committee regarding the difficult choices that need to be made in executing NASA's FY 2005 budget, and my guiding philosophy in dealing with these challenges.

A detailed FY 2005 Operating Plan update was recently provided to all of the Committees in Congress which oversee NASA. With this FY 2005 Operating Plan update, NASA is fully funding—within our FY 2005 budget—the \$762 million increase for returning the Space Shuttle safely to flight, consistent with the recommendations from the Columbia Accident Investigation Board (CAIB), over \$400 million in Congressionally-directed items, \$291 million for Hubble servicing, and over \$500 million in necessary programmatic cost increases, notably to cover cost growth in several space science missions, including the Mars Reconnaissance Orbiter, scheduled to be launched this August, and the New Horizons mission to Pluto set to launch in early January 2006.

Identifying offsets needed to fund these items has created some difficult choices for the Agency. Given a choice, I generally favor eliminating lower-priority programs rather than reducing all programs in the face of budget difficulties, because this allows for the more efficient execution of the programs which remain. Thus, we must set clear priorities to remain within the budget which has been allocated.

Allow me to be as clear as possible on what the impact of these costs means to other programs. The Agency has adopted a "go-as-you-can-pay" approach toward space exploration. Several NASA missions and activities will need to be deferred or accomplished in other ways in order to ensure adequate funding for the priorities of the President and the Congress in FY 2005. NASA cannot do everything that we, and our many stakeholders, would like to accomplish. Several missions will have to be delayed, deferred, or cancelled in order to pay for the missions where the priorities were set by the President and Congress. We have tried to be sensitive to the priorities of the affected research communities, and have listened carefully to their input. For example, we seek to impart a new balance among planetary science, Earth science, solar physics, and astronomy within the overall science program by revisiting our Mars exploration program strategy and mission sequence and the schedule for advanced space telescopes such as the Space Interferometry Mission (SIM) and Terrestrial Planet Finder (TPF).

NASA Priorities

Over the past year, NASA has made great strides in implementing the Vision for Space Exploration and meeting other national priorities:

- *Shuttle Return to Flight* – We are making final preparations for the Space Shuttle return-to-flight planned for mid-July.
- *International Space Station* – The ISS began its fifth year of continuous human presence on-orbit.
- *Exploring our Solar System and the Universe* – The Mars rovers, Spirit and Opportunity, have exceeded all expectations and made unprecedented discoveries; the Cassini/Huygens mission is providing stunning views of Saturn and Titan; the Genesis mission, despite its hard landing, has returned primordial samples from space; new missions have been launched to

Mercury and to comets; and amazing discoveries continue with Hubble, Chandra, and Spitzer.

- *Laying the Groundwork for the Future* – We awarded initial contracts in preparation for a major milestone in 2008 with the mapping of the Moon in unprecedented detail by the Lunar Reconnaissance Orbiter (LRO).
- *Aeronautics* — We are continuing to execute a portfolio of focused, results-oriented technology demonstrations of next-generation aircraft along with aviation safety, security, and airspace systems. NASA, with its industry partners, recently demonstrated the feasibility of significantly reducing the sonic boom from supersonic aircraft, and, last November, NASA's hypersonic X-43A demonstrated that an air-breathing engine can fly at nearly 10 times the speed of sound.
- *Earth Science* — We have completed deployment of the Earth Observing System and are supporting investments in the Global Change Science and Technology Program and the next generation Earth observing satellites for numerous applications, including improved weather forecasts, earthquake prediction, resource management, and other hazard warnings.

NASA's Proposed FY 2006 Authorization Bill

On June 17, 2005, NASA transmitted its proposed FY 2006 Authorization Bill to the Congress. I look forward to working closely with the House Science Committee and Senate Commerce Committee this year to enact this important legislation.

Through NASA's proposed FY 2006 Authorization Bill we are requesting a set of critical tools and authorities to implement the Vision for Space Exploration consistent with the recommendations of the Aldridge Commission. The provisions requested are an integral complement of critical tools and authorities that will better equip NASA to address the challenges we face in implementation of the Vision for Space Exploration.

As the United States implements the *Vision for Space Exploration*, the Administration recognizes the value of effective cooperation with Russia to further our space exploration goals. At the same time, it is essential that we appropriately maintain U.S. nonproliferation policy and objectives in our relationship with Russia. Such a balanced approach must include the Iran Nonproliferation Act of 2000 (INA), which contains certain restrictions that complicate cooperation with Russia on the International Space Station (ISS), and will also have an adverse impact on cooperation with Russia on our future space exploration efforts related to human space flight.

Over the last several months, NASA has been participating in an interagency coordination process related to INA in an effort to develop a solution to this issue that would provide NASA with needed flexibility while still meeting our nation's nonproliferation objectives. The interagency group has proposed a legislative solution in the form of an amendment to the INA, which sustains the Act's nonproliferation core, while allowing for continued NASA-Russian cooperation on the ISS and human space flight endeavors.

It is expected that this approach will be delivered to Congress in the very near future. To that end, the Administration looks forward to working with Congress to ensure that the Vision for Space Exploration is able to succeed while remaining fully consistent with broader U.S. national security and nonproliferation goals.

In the Authorization bill, we are also requesting authority to award prizes through Centennial Challenges. With this authority the Agency will award prizes to stimulate innovation in basic, advanced, and applied research; technology development; and, through prototype demonstrations that have the potential for application for the aeronautics and space activities of NASA. Instead of soliciting proposals for a contract or grant, Centennial Challenges will identify a challenge, the prize amount to be awarded for achieving that challenge, and a set of rules by which teams will compete for that prize. Centennial Challenges will help NASA meet technology challenges while encouraging creativity and innovation in the private sector, particularly in exploration.

NASA is placing a new emphasis on building an agile workforce, with the right mix of permanent civil servants, other-than-permanent civil servants, and contractors. As a result, we are seeking a set of critical workforce management tools needed as the Agency engages in a major transformation and restructures itself to achieve 21st Century goals. Specifically, the agency is seeking the authority to re-hire annuitants without a salary offset to accommodate short-term emergency or critical program needs; the ability to offset the expense of short-term healthcare coverage for employees who are involuntarily separated from the agency and request extended coverage (as currently authorized by law); provide incentives for permanent employees who voluntarily convert to a time-limited appointment to minimize the need for other, less desirable workforce reshaping actions; and provide additional hiring flexibilities under collaborative research activities to further enhance our partnerships.

Furthermore, NASA seeks the ability to realign real property assets with Agency missions by expanding the current enhanced-use lease authority beyond the current two center pilot projects, and allowing NASA to retain the proceeds from the sale of real and personal property.

Lastly, the proposed legislation requests intellectual property, financial management, and administrative improvements to support NASA's mission.

Affordability and Sustainability

In his February 2nd State of the Union Address, the President underscored the need to restrain spending in order to sustain our economic prosperity. As part of this restraint, it is important that total discretionary and non-security spending be held to levels proposed in the FY 2006 Budget. The budget savings and reforms in the Budget are important components of achieving the President's goal of cutting the budget deficit in half by 2009, and we urge the Congress to support these reforms. The FY 2006 Budget includes more than 150 reductions, reforms, and terminations in non-defense discretionary programs, of which 3 affect NASA programs. The Agency wants to work with the Congress to achieve these savings.

To achieve the Vision for Space Exploration, NASA is proceeding, as directed by the President, to plan and implement a sustainable and affordable, integrated robotic and human exploration program, structured with measurable milestones, and executed on the basis of available resources, accumulated experience, and technology readiness. Last year, we provided a long-range roadmap through 2020 to outline this program:

- The Space Shuttle will be retired by 2010. Prior to its retirement, it will be utilized primarily for the assembly of the ISS. Our top priority will be to make each flight safer than the last one.
- The new CEV and its associated launch system will transport crews on exploration missions, and will also be capable of ferrying astronauts to and from the Space Station. The CEV will

be developed in the latter part of this decade and deployed operationally as soon as possible. The CEV will conduct missions in Earth orbit, including missions to the ISS, but its primary mission will be to support exploration of the Moon and other destinations.

- Robotic missions will continue to increase our understanding of our home planet and will continue the exploration of the solar system, traveling to the Moon and Mars in anticipation of later human visits, as well as to other destinations such as Mercury, Saturn, Pluto, asteroids, and comets. Observatories will be deployed to search for Earth-like planets and habitable environments around distant stars, and to explore the universe to understand its origin, structure, evolution, and destiny. The President's Budget requests increased funding for these areas over the coming years, with Science investments growing from 33 percent to 38 percent of the Agency's total budget.
- Human explorers will return to the Moon, possibly as early as 2015—with the CEV as the first core element of a new exploration architecture. Major development of the other elements in the exploration architecture will commence later this decade and will accelerate upon the retirement of the Space Shuttle. These exploration elements will include launch vehicles, in-space transfer systems, lunar landers, and surface habitation systems. Critical research and technology investment decisions will be guided by the development requirements of these elements.

These human and robotic explorers will enable our exploration and scientific plans. A recent report released on February 3, 2005, by the National Research Council, entitled *Science in NASA's Vision for Space Exploration*, states, "Exploration done properly is a form of science. Both robotic spacecraft and human spaceflight should be used to fulfill scientific roles in NASA's mission to explore." To that end, NASA has initiated an Exploration Systems Architecture Study (ESAS), which will provide the analytical support for a number of key near-term decisions for NASA, the White House, and Congress. The ESAS is a 90-day study that is examining many of the larger questions associated with the Vision for Space Exploration. Some of the topics the ESAS is reviewing include the requirements for returning to the Moon and extending human exploration to Mars, as well as possibilities for accelerating the development of the Crew Exploration Vehicle (CEV). This team is expected to complete its work in July and we will keep Congressional Committees informed as this study effort progresses.

This study effort will focus on four primary areas:

- Complete assessment of the top-level CEV requirements and plans to enable the CEV to provide crew transport to the ISS and to accelerate the development of the CEV and crew launch system.
- Definition of top-level requirements and configurations for crew and cargo launch systems to support the lunar and Mars exploration programs.
- Development of a reference lunar exploration architecture concept to support sustained human and robotic Lunar exploration operations.
- Identification of key technologies required to enable and significantly enhance these reference exploration systems, and a re-prioritization of near-term and far-term technology investments.

NASA is also currently examining alternative configurations for the Space Station that meet the goals of the Vision and the needs of our international partners, while maintaining safety as our highest priority. In May 2005, we initiated the Shuttle/Station Configuration Options Team (SSCOT). This team is conducting a 60-day study of the configuration options for the ISS and

assessing the related number of flights needed by the Space Shuttle before it retires no later than the year 2010. The scope of the Shuttle/Station Configuration Options Team study spans ISS assembly, operations, and use and considers such factors as international partner commitments, research utilization, cost, and ISS sustainability. This team is expected to complete its work in June, with those results integrated into the ongoing Exploration Systems Architecture Study (ESAS).

NASA Priorities in the FY 2006 Budget Request

The President's FY 2006 budget request for NASA reaffirms the funding strategy outlined above. NASA's FY 2006 request endeavors to provide a balanced portfolio of programs to meet the needs of our national priorities in aeronautics and civil space. It maintains focus on key priorities, milestones, and schedules for the Vision introduced in the FY 2005 budget.

To support the Administration's goal of reducing the deficit, NASA's budget was reduced \$0.5 billion in FY 2006 below the level planned in the 2005 budget for FY 2006. In addition, returning the Shuttle safely to flight will cost \$0.4 billion more in FY 2006 than previously estimated. To address these and other items, we proposed a budget that provided \$0.4 billion (11 percent) less for Exploration Systems than previously planned for, \$0.3 billion (5 percent) less in Science, \$0.1 billion (11 percent) less in Aeronautics, and \$0.2 billion (4 percent) more in Space Operations. These changes were not easy, but in the end, we made the decisions to protect the priorities outlined above.

Science

The FY 2006 budget request of \$5.5 billion for the Science Mission Directorate will support 55 missions in orbit, 26 in development, and 34 in design phase. By 2010, the Science budget will increase by 23 percent over current levels.

The FY 2006 budget includes \$858 million for Mars and Lunar robotic exploration. The Mars rovers, *Spirit* and *Opportunity*, have far exceeded all goals with their unprecedented discoveries and longevity. Last year, the rovers found definitive evidence of an ancient body of water on the Red Planet, and they continue to gather data more than a year after their successful landing. We recently awarded contracts for six instruments to be flown on the 2008 LRO that promises unprecedented mapping of the Moon's surface. The 2008 LRO will be the first step in revolutionizing our understanding of the Moon, in much the same way that our Mars missions have transformed our understanding of Mars. As mentioned earlier, to simplify the management chain-of-command among mission directorates, our FY 2005 Operating Plan update transfers management responsibility for the Lunar Exploration program, including LRO, to the ESMD. This will help to maximize the exploration and science benefits of this important program.

The budget also includes \$218 million to maintain competitive efforts for the Explorer Program, \$56 million for the Beyond Einstein program to study the universe, \$234 million for studying the Sun in the Living With a Star program, and \$136 million for competitive opportunities in the Earth System Science Pathfinder program. With our international partners, we also continue to add to the constellation of Earth-observing satellites that monitor our planet while extending our reach and presence further into the solar system. NASA launched Aura to look back at Earth and give us a better picture of our atmosphere and changing climate, and the entire Earth Observing System continues to return trillions of bytes of information about our dynamic Earth. In the future, NASA plans to develop a "sensor-web" to provide timely, on-demand data and analysis to

users who can enable practical benefits for scientific research, national policymaking, economic growth, natural hazard mitigation, and the exploration of other planets in this solar system and beyond.

NASA will continue to expand its exploration reach with an armada of existing and new space observatories operating in many different wavelengths and looking at different parts of our exotic universe. The three "Great Observatories" - Hubble, Spitzer, and Chandra - will continue to bring wondrous images to our eyes and exciting new scientific discoveries. Missions such as Kepler will provide a new understanding and knowledge of the planets orbiting stars far from our solar system.

This budget also includes \$372 million to continue developing the James Webb Space Telescope for a 2011 launch and provides \$93 million in development funds for the Hubble Space Telescope. This investment in the Hubble, together with the synergistic use of the other two Great Observatories, and combined with the greatly increased capability of ground-based assets and the emergent science of optical interferometry, will ensure many years of new scientific discoveries.

NASA's decision in January 2004 not to service the Hubble Space Telescope was a very difficult one, given the Hubble's record of spectacular successes. That decision was made at a time when significant uncertainty remained regarding the technical solutions and risks associated with return to flight. After the two successful Space Shuttle flights needed to achieve our return to flight objectives, NASA will have learned a great deal more regarding the risks and operations of the vehicle than was known when the previous decision was made. I am committed to reassessing this earlier decision after return to flight, based on the relative risks to the Space Shuttle as well as the costs and benefits to our Nation's astronomy program. As a result, we are continuing our efforts to preserve the option for a Shuttle servicing mission for Hubble. Consistent with this ongoing activity, NASA's FY 2005 Operating Plan update has fully funded the \$291 million identified in the Conference Report accompanying the FY 2005 Consolidated Appropriations bill and has consolidated the funding and management responsibility within the Science Mission Directorate. NASA will use the balance of the FY 2005 funds to maintain options for HST servicing and deorbit. NASA has also begun the analysis of how a de-orbit module for the Hubble Space Telescope could be added to the manifest of such a Space Shuttle servicing mission. I will make a decision regarding a Shuttle servicing mission for Hubble following the success of the first two Return to Flight missions. In the interim, the Agency will keep all stakeholders apprised as this work progresses. NASA remains committed to a world-class, affordable program of space-based astronomy.

Preparing for Exploration

The FY 2006 budget request of \$3.2 billion for the ESMD includes \$753 million for continuing development of the CEV, the vehicle that will serve as the core element for future exploration beyond Earth orbit. The CEV promises safer travel for astronauts into space, continuing U.S. human access to space after retirement of the Shuttle. The CEV will first conduct missions in Earth orbit, but its primary mission will be to support exploration of the Moon and other destinations. Our earlier plans called for operational deployment of the CEV not later than 2014. However, we are now seeking programmatic alternatives to allow development of the CEV to be completed as soon as possible. Acceleration of the CEV program will be accomplished by down-selecting to a single contractor sooner than originally planned, and by deferring other elements of

the Exploration Systems Research and Technology plan not required for the CEV or for the early phases of human return to the Moon.

The first CEV missions to Earth orbit will include docking with the ISS. NASA's Exploration Systems Mission Directorate will be responsible for developing and acquiring both crew and cargo services to support the International Space Station, and funds have been transferred to that Directorate. We plan to leverage our nation's commercial space industry to meet NASA's needs for ISS cargo logistics and potentially crew support.

Going forward, the Agency will need a launch system for the CEV, one which does not at present exist. Two possibilities exist by which we might obtain such a vehicle. The first is to develop a launch system derived from Shuttle components, specifically the SRB with a new upper stage. The second option is to upgrade the proposed heavy-lift versions of EELV with a new upper stage. As NASA Administrator, I must be a responsible steward of our funds, and a key aspect of the Agency's analysis of alternatives will be to capitalize on existing technical and workforce assets in a cost-effective and efficient way. NASA's goal is to develop a CEV capable of operating safely soon after the retirement of the Space Shuttle.

The FY 2006 budget request included \$919 million (a 27 percent increase) for Exploration Systems Research and Technology (ESR&T) that will enable designs for sustainable exploration; though, as mentioned, elements of that program will now be deferred to accelerated the CEV. Other ESR&T elements include \$34 million for a revamped technology transfer program and \$34 million for the Centennial Challenges prize program. The Agency continues to seek the support of the Congress for authorization to enable larger prize awards.

This budget also includes \$320 million for a restructured Prometheus Nuclear Systems and Technology Theme for space-qualified nuclear systems. The technology and capabilities being developed by the Prometheus Nuclear Systems and Technology Theme are critical for enabling the power and propulsion needs of the Vision for Space Exploration. As part of the Agency's effort to define an Exploration Systems Architecture, NASA will examine alternative nuclear systems, including surface nuclear power, nuclear thermal, and nuclear electric systems. NASA will restructure Prometheus for space-qualified nuclear systems to support human and robotic missions with clear priorities focused on near-term needs. We expect to make program decisions to focus our nuclear technology efforts on our highest priorities for near-term applications as part of the Exploration Architecture study, to be completed this summer. In addition, the FY 2006 budget request provides \$806 million for Human Systems Research and Technology, which has been restructured so that its programs are now linked directly to exploration requirements for human missions to the Moon, Mars, and beyond.

Aeronautics Research

NASA's FY 2006 request for the Aeronautics Research Mission Directorate is \$852 million, a significant portion of the government's overall investment in aeronautics research. To make the most of this investment, NASA's technical expertise and facilities for aeronautics research are becoming more focused and results-oriented. NASA's current aeronautics research is focused on enhancing the public good. NASA is also working to maintain a strong basic aeronautics research program and to establish a series of far-reaching objectives, each of which, if enabled, could significantly transform civil aeronautics. The results from the basic research, technology development, and demonstrations achieved by NASA's Aeronautics efforts will be transitioned

for use by both Government and industry. The President's FY 2006 request increased the vital research of the Aeronautics program in Aviation Safety and Security and in Airspace Systems. These two priority programs are fully funded to ensure timely results critical to meeting national goals. NASA works closely and constructively with other Executive Branch agencies to enhance our Nation's aeronautics capability. In this vein, NASA, along with the Departments of Defense, Homeland Security, Commerce, and Transportation, is a principal member of the interagency Joint Planning and Development Office (JPDO), which was chartered by the Century of Aviation Revitalization Act to oversee research and technology efforts for the Next Generation Air Transportation System. NASA is working closely with industry consortia and other Government agencies to develop advanced aircraft demonstrations, such as those that would expand the capabilities of high-altitude, long-endurance, unmanned aerial vehicles, which could have numerous commercial, scientific, and homeland security applications.

At this time, NASA is also working with other U.S. Government departments and agencies and industry to assess its facilities for aeronautics research. NASA will need to consider the possibility of closing some underutilized aeronautics facilities, while modernizing some others to become state-of-the-art facilities.

As we move forward, a broader national dialog on aeronautics R&D goals may be appropriate as we enter the second century of aviation. These discussions should include a range of stakeholders and customers, including the Congress. This process could lead to a national consensus for aeronautics R&D goals.

Education

NASA's FY 2006 budget request includes \$167 million for the Office of Education to support programs in science, technology, engineering, and math education. NASA will establish clear goals, metrics, and monitoring capabilities for its education initiatives in the coming months to ensure that these funds will achieve the greatest benefit.

Space Shuttle and International Space Station

The FY 2006 budget request of \$6.8 billion for the Space Operations Mission Directorate (SOMD) reflects the first step in the Vision for Space Exploration: returning the Space Shuttle safely to flight and resuming flight operations. Going forward, all SOMD expenditures will be consistent with the retirement of the Space Shuttle by 2010, while maintaining operational safety of flight throughout the program. The FY 2006 budget includes \$4.5 billion for the Space Shuttle program. The budget also provides \$1.9 billion for the ISS. NASA currently is examining configurations for the Space Station that meet the goals of the Vision for Space Exploration and needs of our international partners, while requiring as few Shuttle flights as possible to complete assembly.

A key element in the future of the ISS program is the purchase of alternate cargo transportation services to supplement the Space Shuttle, and the development of new crew transportation capabilities to replace Shuttle when it retires. Because the ESMD has the mission to develop and acquire such crew and cargo capabilities for the ISS and beyond, I have transferred management responsibility for the activities and budget of ISS Cargo/Crew Services to ESMD from SOMD, as stated in the May update to NASA's FY 2005 Operating Plan. The budget request before the Congress provides \$160 million for these services in 2006.

As a top Return to Flight (RTF) priority, NASA has made dozens of changes to the External Tank (ET) design to reduce both foam and ice debris from shedding during ascent. These changes include an improved bipod design that now excludes using foam and a new design for the area around the liquid oxygen feed line bellows. Each of these changes incorporates electric heaters to eliminate an unacceptable debris risk to the Orbiter caused by ice buildup on the ET. The new designs are presently installed on the ET for Discovery's flight (STS-114) and will be included on all those to be used in the future.

We have also made more than 100 major modifications and upgrades to *Discovery* and its supporting systems, including new cabling and wiring for sensors placed in the wing leading edge of each wing, a digital camera for monitoring any debris impacting the underside of the Orbiter, and a boom extension for the Shuttle's robotic arm that will enable us to inspect nearly all the outside areas of the Orbiter's Thermal Protection System after achieving orbit. Additionally, technicians at KSC have installed the redesigned Forward Reaction Control System Carrier Panels and the Reinforced Carbon-Carbon Nose Cap. Technicians have also installed 88 new sensors in the leading edge of each wing, of which 66 will measure acceleration and impact data and 22 will measure temperature profiles during *Discovery's* ascent to orbit. These data will be down-linked to the ground to be used as a cue for pointing to areas in the thermal protection system needing further inspection by the boom mounted sensor system. These are just several of the extensive changes we have made to the hardware to mitigate the effects of debris shedding from the External Tank. *Discovery* and its propulsion elements are now at the launch pad undergoing the final tests and checks required prior to launch, currently scheduled to occur not earlier than July 13, 2005.

Transforming NASA

The CAIB was clear in its assessment that the lack of open communication on technical and programmatic matters was as much a cause of the loss of *Columbia* as the shedding of the foam. We have understood and embraced this assessment, and are absolutely and completely committed to creating an environment of openness and free-flowing communication by continuing to assess our leadership practices.

For the last three decades, NASA and the Nation's human spaceflight program have been focused on the development and operation of the Space Shuttle and the Space Station. In its final report, the CAIB was very forthright in its judgment that these goals are too limited to justify the expense, difficulty, and danger inherent in human spaceflight, given the limitations of today's technology. The CAIB was equally forthright in calling for a national consensus in the establishment of a program having broader strategic goals. The Vision for Space Exploration proposed by the President is that program, and NASA has embraced this new direction. But to effect these changes, NASA must engage in a major transformation—taking the capabilities we have throughout the Agency and restructuring them to achieve these 21st Century goals. This is an enormous challenge, but we have begun to transform our entire organization to foster these changes and to enhance a positive, mission-driven culture.

- *Embracing Competition* – NASA is embracing competition as a way to elicit the best from NASA's Centers, industry, and academia. The Agency is using competitive processes to encourage more cost-effective, innovative solutions to the scientific and technical challenges presented by the Vision. Over the past year, competitive selections in exploration have demonstrated increased collaboration between NASA's Centers and industry and academia.

The engine of competition is the primary force behind the American economy, the greatest the world has ever known, and we plan to make greater use of this engine than has been the case at NASA in the past. NASA plans to pursue appropriate partnerships with the entrepreneurial and commercial space sector to the maximum practical extent.

- *The Role of the Centers* – While competitive processes are crucial to maintaining NASA at the “cutting edge” of science and technology, we must acknowledge that the NASA Centers and other Federal research and development laboratories exist, and have existed for decades, precisely because industrial competition does not serve to accomplish all of our national goals. In order to accomplish the national goals set forth by the President and Congress, NASA must set realistic priorities within limited resources. NASA Centers will have an important role in definition of the architecture and requirements for exploration beyond low-Earth orbit, and for the systems engineering and integration functions used in building the systems of that architecture. We will continue to assess the skill-mix that we require, the number of people we require, their location, and how we are organizing ourselves to fulfill our obligations to the President and Congress. To begin to create some of the workforce flexibility necessary for the future, NASA has offered voluntary separation incentives (buyouts) to employees in positions identified with excess competencies. To the extent that NASA’s workforce needs revitalization, NASA is proposing legislative initiatives to the Congress as part of the Agency’s draft FY 2006 Authorization Bill. Congress’s enactment of the NASA Flexibility Act of 2004 is also helping the Agency toward that end, and additional authorities will provide even more aid in managing the Agency’s workforce.
- *Improved Decision-Making* – NASA recently transformed its organizational reporting in order to provide more integrated decision-making. NASA field Center Directors now report directly to the Administrator, and I am drafting a position description for a new Associate Administrator who will manage the internal activities of the Agency. The Office of Education reports directly to the Director of Strategic Communications, who is also in charge of Public Affairs, External Relations, and Legislative Affairs, in order to provide a more integrated picture of what NASA is doing and can do for its stakeholders and public. NASA’s new Office of Program Analysis and Evaluation has been created in order to provide analyses and assessments for strategic planning and budgeting decisions, independent cost estimates, evaluation of projects at major milestones, and feedback from the Centers on their capabilities and work climate. This is to ensure that the acquisition strategies, if done as planned, are executable, have exit and entrance criteria, contain clear approval milestones, and involve independent reviews.
- *Improving Financial Management* -- For the past two years, NASA has received a disclaimer of audit opinion on its annual financial statements due largely to two issues – financial system conversion, and accounting for property, plant and equipment, and materials and supplies. In FY 2003, NASA converted the 10 separate NASA Center accounting systems and the associated 120 subsidiary systems, along with over 12 years of historical financial data, into a single integrated Agency-wide core accounting system. Problems associated with this conversion have been greater than expected and are taking longer than expected to correct. I regard improvement of NASA’s financial management as one of my priorities.
- *Capital Asset Management* -- The management of NASA's capital assets, valued at \$37.6 billion (83 percent of NASA's assets on the balance sheet), is a significant challenge for the Agency. Historically, the management systems to provide proper valuation and tracking of assets have not been sufficient to meet the rigors of review without significant compensating

controls and manual effort. Another challenge we are facing is that the costs of many facilities that could be deemed "national assets" were being born as direct charges to our projects causing an unequal competitive base among our field centers. Through the Integrated Asset Management (IAM) project we are steadily creating the proper controls to provide tracking and valuation needed to account for the many types of assets that exist within NASA. Realistically, the successful completion of the IAM project will take time. We are validating the requirements for asset management methods to ensure they comply with audit requirements while we simultaneously update existing tracking systems to modern platforms. For our "national assets" we plan to create a new funding structure aimed at ensuring the Centers have a chance to compete on an equal footing. Placing the national asset funding in a separate, carefully managed account will help create a level playing field and encourage broad scale use. A great deal of attention is being placed on asset management to ensure that the new methods and systems we devise provide a robust and enduring solution to the challenges the Agency has faced in resolving this significant issue.

The Nation's Future in Exploration and Discovery

The aftermath of the tragic loss of the Space Shuttle *Columbia* on February 1, 2003, brought us to a watershed moment in the American civil space program. Choices had to be made. The President has put forth a choice, a strategic vision for the space program. That vision has been enunciated with exceptional clarity, and has been subjected to considerable public debate for over a year. While differences of opinion exist, the President's proposal has attained broad strategic acceptance. As a Nation, we can clearly afford well-executed vigorous programs in robotic and human space exploration, Earth science, and aeronautics research.

For America to continue to be preeminent among nations, it is necessary for us to be the preeminent spacefaring nation. It is equally true that great nations need allies and partners in this journey. That is what the Vision for Space Exploration is about.

As President George W. Bush said, "We choose to explore space because doing so improves our lives and lifts our national spirit. So let us continue the journey."

| (Budget authority, \$ in millions) | | | | FULL COST | | | | |
|----------------------------------------------|-----------------------------------|---------------------------------|-------------------------------|------------------|-----------------|-----------------|-----------------|-----------------|
| By Appropriation Account | Initial Operating Plan | April Operating Plan | May Operating Plan | | | | | |
| By Mission Directorate | <u>FY 2005</u> | <u>FY 2005</u> | <u>FY 2005</u> | <u>FY 2006</u> | <u>FY 2007</u> | <u>FY 2008</u> | <u>FY 2009</u> | <u>FY 2010</u> |
| By Theme | | | | | | | | |
| Science, Aeronautics, and Exploration | 9,334.7 | 9,335.0 | 9,051.0 | 9,661.0 | 10,549.8 | 11,214.6 | 12,209.6 | 12,796.1 |
| Science* | 5,527.2 | 5,527.0 | 5,554.0 | 5,476.3 | 5,960.3 | 6,503.4 | 6,853.0 | 6,797.6 |
| Solar System Exploration | 1,858.1 | 1,858.0 | 1,787.0 | 1,900.5 | 2,347.7 | 2,831.8 | 2,998.9 | 3,066.1 |
| The Universe | 1,513.2 | 1,513.0 | 1,475.0 | 1,512.2 | 1,531.5 | 1,539.4 | 1,495.0 | 1,406.7 |
| Earth-Sun System | 2,155.8 | 2,156.0 | 2,291.0 | 2,063.6 | 2,081.2 | 2,132.2 | 2,359.0 | 2,324.8 |
| Exploration Systems** | 2,684.5 | 2,684.5 | 2,356.0 | 3,165.4 | 3,707.0 | 3,825.9 | 4,473.7 | 5,125.5 |
| Constellation Systems | 526.0 | 526.0 | 422.0 | 1,120.1 | 1,579.5 | 1,523.7 | 1,990.9 | 2,452.2 |
| Exploration Systems Research and Technology | 722.8 | 722.8 | 766.0 | 919.2 | 907.3 | 989.2 | 1,050.3 | 1,078.5 |
| Prometheus Nuclear Systems and Technology | 431.7 | 431.7 | 270.3 | 319.6 | 423.5 | 500.6 | 614.0 | 779.0 |
| Human Systems Research and Technology | 1,003.9 | 1,003.9 | 897.7 | 806.5 | 796.7 | 812.4 | 818.5 | 815.8 |
| Aeronautics Research | 906.2 | 906.0 | 962.0 | 852.3 | 727.6 | 730.7 | 727.5 | 717.6 |
| Aeronautics Technology | 906.2 | 906.0 | 962.0 | 852.3 | 727.6 | 730.7 | 727.5 | 717.6 |
| Education Programs | 216.7 | 217.0 | 179.0 | 166.9 | 154.9 | 154.7 | 155.4 | 155.4 |
| Education Programs | 216.7 | 217.0 | 179.0 | 166.9 | 154.9 | 154.7 | 155.4 | 155.4 |
| Exploration Capabilities | 6,704.4 | 6,830.0 | 7,114.0 | 6,763.0 | 6,378.6 | 6,056.7 | 5,367.1 | 5,193.8 |
| Space Operations | 6,704.4 | 6,830.0 | 7,114.0 | 6,763.0 | 6,378.6 | 6,056.7 | 5,367.1 | 5,193.8 |
| International Space Station | 1,676.3 | 1,676.0 | 1,676.0 | 1,856.7 | 1,835.3 | 1,790.9 | 2,152.3 | 2,375.5 |
| Space Shuttle | 4,543.0 | 4,669.0 | 4,964.0 | 4,530.6 | 4,172.4 | 3,865.7 | 2,815.1 | 2,419.2 |
| Space and Flight Support | 485.1 | 485.0 | 474.0 | 375.6 | 370.9 | 400.0 | 399.7 | 399.1 |
| Inspector General | 31.3 | 31.0 | 31.0 | 32.4 | 33.5 | 34.6 | 35.2 | 37.3 |
| TOTAL | 16,070.4 | 16,196.0 | 16,196.0 | 16,456.3 | 16,962.0 | 17,305.9 | 17,611.9 | 18,027.1 |
| Year to year increase | | | | 2.4% | 3.1% | 2.0% | 1.8% | 2.4% |
| Emergency Hurricane Supplemental | 126.0 | | | | | | | |

*Science Mission Directorate reflects the combination of the former Space Science and Earth Science Enterprises.

**Beginning in FY 2006, Exploration Systems moves from Exploration Capabilities to Science, Aeronautics and Exploration.

Exploration Systems Mission Directorate reflects the combination of the former Biological & Physical Research and Exploration Systems Enterprises.

Totals may not add due to rounding.