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The President's FY '06 NASA Budget Request

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HIGHLIGHTS

- The FY 2006 budget requests $16.5 billion for the National Aeronautics and Space Administration (NASA), a 2.4 percent increase from the non-emergency FY 2005 appropriation (see Table II-12). Total NASA support of R&D in FY 2006 would increase to $11.5 billion, a 4.6 percent increase.

- With the establishment of a new vision in January 2004, President George W. Bush set a new directive for the nation's future space exploration. Documented in *A Renewed Spirit of Discovery, The President's Vision for U.S. Space Exploration,* the goal is "…to advance U.S. scientific, security, and economic interests through a robust space exploration program." To support the vision, NASA released another document*, The Vision for Space Exploration* that lays out NASA strategy and guiding principles.

- The FY 2006 budget request continues to support the priorities, milestones and schedules of the *Vision for Space Exploration* and is reflected in *The New Age of Exploration: NASA's Direction for 2005 and Beyond*. This recent document not only outlines NASA's strategic planning efforts and the agency's commitment to implementing and achieving the Vision, but also establishes the new NASA Strategic Objectives that are reflected in the FY 2006 budget.

- The budget request supports NASA's continuing organizational and cultural transformation through new management organizations and a revised budget structure consistent with the recommendations of the *President's Commission on Implementation of the United States Space Exploration Policy* (Aldridge Commission).

- In August 2004, NASA reorganized its corporate structure by cutting the number of Headquarters organizations in half. From seven

Enterprises with 18 themes, the agency restructured in four Mission Directorates and 12 themes that align resources with the *Vision for Space Exploration* while allowing flexibility for NASA to succeed its transformation process. The new structure not only consolidates the Science themes but also better defines the Exploration Systems themes. The aeronautics activities are clearly defined as research, and the new structure continues to clearly identify NASA's Education activities

- NASA's FY 2006 budget is organized in 3 appropriation accounts: Science, Aeronautics, and Exploration (SAE), Exploration Capabilities (EC), and Inspector General. Under the first two accounts, the budget is organized according to Mission Directorates, NASA's primary areas of activity, and themes, programmatic subdivisions of Mission Directorates that function as program "investment portfolios." The SAE appropriation account includes the Office of Education and 3 Mission Directorates: Science, Exploration Systems, and Aeronautics Research. The EC account includes the Space Operations Mission Directorate.

- NASA is embedding a safety culture throughout the organization. The agency has reduced workforce accident rates to industrial world-class standards and implemented an Independent Technical Authority to guide NASA's continued improvement.

- NASA is using competitive processes to elicit the best from industry, academia, and NASA's centers. NASA is seeking innovation from all sources by casting a broad net worldwide in search of beneficial partnerships and innovative solutions to technical and management challenges. The agency competitively awarded 118 contracts for exploration technologies based on an overwhelming response to the call for proposals. NASA began the Crew Exploration Vehicle (CEV) competition process, and flight demonstrations are planned for 2008.

- NASA is enhancing long-range planning processes and improving decision-making. The transformed structure includes a Strategic Planning Council and a supporting Office of Advanced Planning and Integration to enable better long-range planning, an Operations Council to integrate NASA's tactical and operational decisions, and a revised advisory council to integrate agency activities. In addition, NASA's 2006 Strategic Plan will be based on a set of strategic and capability roadmaps currently being developed by national teams of external and NASA

experts to ensure that NASA's activities are aligned with the Vision for Space Exploration.

- NASA is making final preparations to return the Space Shuttle to flight, and this year NASA began its fifth year of continuous astronaut presence in space aboard the International Space Station.

- NASA missions are moving further into the solar system. The discoveries and longevity of the Mars rovers, Spirit and Opportunity, were outstanding. After entering Saturn's orbit, the Cassini–Huygens spacecraft sent back images of that planet's rings and moons. The Genesis mission successfully returned primordial samples from space. MESSENGER launched to visit and map Mercury, and Hubble, Chandra, and Spitzer continue to provide images from deep space.

- The agency is putting the building blocks in place to return astronauts to the Moon, and early preparations have begun–including system design and technology tests for nuclear power in place–to ensure that explorers head for Mars and other destinations on schedule.

SCIENCE, AERONAUTICS & EXPLORATION (SAE)

Science Mission Directorate (SMD): The request for Science in FY 2006 is $5.5 billion, a 0.9 percent decrease from FY 2005 (see Table II-12). The Science Mission Directorate reflects the combination of the former Space Science and Earth Science Enterprises. It is comprised of three themes: Solar System Exploration, The Universe, and Earth-Sun System. The Solar System Exploration is the combination of former Solar System Exploration, Mars Exploration, and Lunar Exploration themes. The Universe theme includes the former Astronomical Search for Origins, and Structure and Evolution of the Universe themes. Finally, the new Earth-Sun System theme comprises the former Sun-Earth Connection theme and the Earth Science Enterprise (Earth System Science and Earth Science Applications themes).

The mission of this restructured SMD is to understand the origins, evolution, destiny of the universe, as well as the nature of life and what kinds of life may exist beyond the solar system. The SMD portfolio is contributing to NASA's achievement of the Vision for Space Exploration by striving to: (1) understand the history of Mars and the formation of the solar system, (2) search for Earth-like planets and habitable

environments around other stars, and (3) explore the solar system for scientific purposes while supporting safe robotic and human exploration of space.

The proposed Solar System Exploration (SSE) budget for FY 2006 is $1.9 billion, a 2 percent increase from the FY 2005 budget. This funding includes $858 million for Mars and lunar robotic exploration (a 17 percent increase from FY 2005).

The President's request for The Universe theme in FY 2006 is $1.5 billion and represents a $1 million decrease over FY 2005. This funding includes: $372 million to the James Webb Space Telescope for flight design and long-lead procurement as well as flight hardware fabrication efforts; $191 million to Hubble for operations and data analysis, life extension and development activities for a robotic de-orbit spacecraft, as well as the modification and upkeep of ground operations systems; $109 million to progress the Space Interferometry Mission through the critical design phase of the project; $56 million for Beyond Einstein; and $48 million to support operations readiness of Stratospheric Observatory for Infrared Astronomy (SOFIA).

The FY 2006 request is $2.1 billion for the new Earth-Sun System (ESS) theme, a 4 percent decrease from FY 2005. There are two strategic objectives within this theme: first, to conduct a program of research and technology development that advances Earth observation from space, improves scientific understanding, and demonstrates new technologies with the potential to improve future operational systems; and second, to explore the Sun's connection to the solar system to understand the Sun and its effects on Earth, the solar system, and the space environmental conditions, and demonstrate technologies with the potential to improve future operational systems. The FY 2006 request includes: $845 million for Earth-Sun research; $234 million for Living with a Star; $159 million for Solar Dynamics Observatory; $136 million for Earth System Science Pathfinder; $55.3 million for continued development through critical design and initial test of Aquarius; and $48 million for the launch and initial operations of the Solar Terrestrial Relations Observatory.

Exploration Systems Mission Directorate (ESMD): The FY 2006 Exploration Systems budget of $3.2 billion represents an 18 percent increase from FY 2005. The mission of ESMD is to develop a constellation of new capabilities, supporting technologies, and

foundational research that enables sustained and affordable human and robotic exploration. The Directorate has to develop new capabilities in a pragmatic but also flexible manner, in order to incorporate new technologies and react efficiently to scientific discoveries. In order to meet this challenge, the ESMD will develop exploration capabilities in stages, or "spirals." According to NASA budget documents, each spiral will usher in a set of major new capabilities in support of the Vision. Spirals will be structured based on specific requirements, well-defined goals and endpoints, then-current technologies, manageable risks, an executable budget, and knowledge gained from prior in-space activities.

ESMD consists of four themes that will function cooperatively to enable exploration and scientific discovery: Constellation Systems (formerly the Transportation Systems theme), Exploration Systems Research and Technology (formerly the Human and Robotic Technology theme), Prometheus Nuclear Systems and Technology (formerly within the Human and Robotic Technology theme), and Human Systems Research & Technology (formerly the Biological & Physical Research theme).

The President's request for Constellation Systems is $1.1 billion, a 113 percent increase from FY 2005 (see Table II-12). It includes $753 million for the Crew Exploration Vehicle (CEV), with a flight demonstration planned for 2008. The theme intends to develop, demonstrate, and deploy the collection of systems, collectively known as the "System of Systems," that will enable sustained human and robotic exploration of the Moon, Mars, and beyond. These systems include: the CEV for the transport and support of human crews traveling to destinations beyond low Earth orbit; the launch vehicles for transport of the CEV and cargo to low Earth orbit, and any ground or in-space support infrastructure for communications and operations. The first spiral development will provide the capability to deliver humans to orbit in a CEV by 2014: the Earth Orbit Capability (Spiral 1) Program. The second spiral development will deliver humans to the lunar surface by 2020 (Spiral 2). Spiral 3 is an Extended Lunar Stay Capability and Spiral 4 is a Mars Landing Capability, with further spirals still to be defined.

The FY 2006 request of $919 million—a 27 percent increase from FY 2005—will fund Exploration Systems Research and Technology (ESR&T). The request includes funding for four programs: the Advanced Space Technology, Technology Maturation, Technology Transfer Partnerships and Centennial Challenges. The funding for the Advanced

Space Technology and Technology Maturation programs will allow continuing competitively awarded innovative technology development contracts to NASA Centers, industry, and academia. The request also contains a $34 million increase for a newly restructured Technology Transfer Partnerships project to improve NASA's ability to both spin-out and spin-in new technologies. Additionally, the budget includes $34 million for the Centennial Challenges prize program. The ESR&T theme intends to demonstrate NASA's commitment to the technologies and capabilities necessary to achieve the *Vision for Space Exploration*.

The budget request for Prometheus Nuclear Systems and Technology (PNS&T) is $320 million, a 26 percent decrease from the FY 2005 budget. Through this theme, NASA will develop an advanced technology capability for more complex operations and exploration of the solar system. The Jupiter Icy Moons Orbiter (JIMO) mission will no longer be the first demonstration of the PNS&T as it has been postponed due to costs and technical complexity issues. NASA is now conducting an "Analysis of Alternatives" to identify an alternate mission with less technical, schedule, and operational risks and still relevant to the exploration and scientific goals. The request includes funding for the Nuclear Flight Systems program to continue development of nuclear reactor power and associated spacecraft systems to enhance NASA's abilities to conduct robotic exploration and science operations. Additionally, it includes funding for the Advanced Systems and Technology program to continue the development and demonstration of advanced nuclear technologies and engineered systems. Finally, Project Prometheus' schedule is to test a nuclear reactor in 2008, and fly a demonstration mission within a decade.

The budget request for Human Systems Research and Technology (HSR&T) in FY 2006 is $806 million, representing a 20 percent decrease from FY 2005. The theme is new to the Exploration Systems Mission Directorate and is comprised of several programs of the former Biological and Physical Research Enterprise (BPRE). Under this new organization, the programs of BPRE have been transformed from a discipline focus on biological and physical research, to a requirement-driven product-delivery focus. The transformation of the BPRE structure will allow NASA not only to reprioritize International Space Station (ISS) research but also to realize efficiencies in its investments by focusing them on technologies applicable to human exploration of the solar system, ensuring health, safety, and security. The theme contains

three new programs: Life Support and Habitation; Human Health and Performance; and Human Systems Integration.

Aeronautics Research Mission Directorate (ARMD): The FY 2006 Aeronautics Research budget of $852 million represents a 6 percent decrease from FY 2005. The main focus for the ARMD is to develop the technologies to provide precise knowledge of vehicles and weather conditions, optimize interaction between humans and automated systems, and advance vehicle technologies that will enable a safer, more secure, efficient, and environmentally friendly air transportation system.

The purpose of the Aeronautics Technology theme is to serve the nation through the development of technologies to improve aircraft and air system safety, security and performance; reduce aircraft noise and emissions; and increase the capacity of the National Airspace System (NAS). The theme consists of three integrated programs: Aviation Safety & Security; Airspace systems; and Vehicle Systems. Funding for ARMD maintains the top priorities in aeronautics research: $193 million (a 4 percent increase from FY 2005) for Aviation Safety and Security projects to decrease aviation accident and fatality rates, and $200 million (a 32 percent increase from FY 2005) for Airspace Systems projects to provide technologies that will considerably enhance the capacity and mobility of the nation's air transportation system. Additionally, there would be $459 million for a restructured and improved Vehicle Systems program to demonstrate technologies that will reduce aircraft noise and emissions, and to develop unmanned aerial vehicles for Earth and space science missions.

Office of Education: The FY 2006 request for the Office of Education is $167 million, representing a 23 percent decrease over FY 2005. Through this office, NASA encourages students to pursue careers in science, technology, engineering, and mathematics in order to ensure that a highly trained workforce is prepared to meet mission requirements within NASA, as well as in industry and academia. NASA's mission to understand and explore depends upon educated, motivated people with the ingenuity to invent tools and solve problems.

The FY 2006 request for the Education Programs theme includes: $86 million for the Minority University Research and Education program; $39 million for the Higher Education program; $28 for the Elementary and Secondary Education program; $10 million for the e-Education

program; and $3 million for the Informal Education program. Additional education-related funding is managed by NASA's scientific and technical Mission Directorates, in coordination with the Office of Education. The FY 2006 request also includes $29 million to continue initiatives such as the NASA Explorer Schools and the Science and Technology Scholarship programs.

EXPLORATION CAPABILITIES (EC)

Space Operations Mission Directorate (SOMD): The FY 2006 budget request for Space Operations is $6.8 billion. The purpose of the SOMD is the ensure that the nation will have reliable, safe, and affordable access to space for NASA's human and robotic explorers and open new exploration and research opportunities through the extension of human presence in space. The directorate enables NASA to achieve its goals by providing: transportation systems like the Space Shuttle; operational research facilities in space like the International Space Station (ISS); and space communications systems and its supporting infrastructure.

The FY 2006 International Space Station budget request of $1.9 billion represents an 11 percent increase from FY 2005 (see Table II-12). Funding for this theme includes: $1.7 billion for continuous on-orbit operations and assembly; and $160 million for the acquisition of cargo and crew services to support the ISS.

The budget request for the Space Shuttle is $4.5 billion, a 3 percent decrease from FY 2005. Funding for the Space Shuttle theme should enable a safe return to flight; five Space Shuttle flights to the ISS to continue assembly; and planning for the phase-out of the Space Shuttle program in 2010, after nearly 30 years of service.

The FY 2006 request of $376 million for the Space and Flight Support represents a 22 percent decrease from FY 2005. The theme covers 4 disciplines: Space Communications ($173 million request), Launch Services ($124 million request), Rocket Propulsion Testing ($69 million request), and Crew Health and Safety ($9 million request).

INSPECTOR GENERAL

The FY 2006 request for the Office of the Inspector General is $32 million, an increase of 3.5 percent over FY 2005 appropriations.