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The National Aeronautics and Space Administration: Overview, FY2005 Budget in Brief, and Key Issues for Congress

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Summary

The National Aeronautics and Space Administration (NASA) conducts U.S. civilian space activities. For FY2005, NASA requested $16.244 billion, and Congress appropriated $16.200 billion (not adjusted for the 0.80% across-the board rescission). NASA's FY2004 appropriation was $15.378 billion. The increase for FY2005 is primarily for fulfilling new exploration goals that were announced by President Bush in January 2004 that include returning the space shuttle to flight, completing construction of the International Space Station, and returning humans to the Moon by 2020. The House Appropriations Committee version of the FY2005 VA-HUD-IA appropriations bill (H.R. 5041) had cut NASA's request by $1.1 billion. The Senate Appropriations Committee version (S. 2825) had added $135 million to the request. Separately, NASA received $126 million for hurricane relief in an FY2005 supplemental act (P.L. 108-324). This report is updated regularly.

Agency Overview

The National Aeronautics and Space Administration (NASA) was created by the 1958 National Aeronautics and Space Act (P.L. 85-568). NASA's charter is to conduct civilian space and aeronautics activities. Military space and aeronautics activities are conducted by the Department of Defense (DOD) and the intelligence community. DOD and NASA cooperate in some areas of technology development and occasionally have joint programs. NASA opened its doors on October 1, 1958, almost exactly one year after the Soviet Union ushered in the Space Age with the launch of the world's first satellite, Sputnik, on October 4, 1957. In the more than 45 years that have elapsed, NASA has conducted far reaching programs in human and robotic spaceflight, technology development, and scientific research.

The agency is managed from NASA Headquarters in Washington, D.C. It has nine major field centers around the country: **Ames Research Center**, Moffett Field, CA; **Dryden Flight Research Center**, Edwards, CA; **Glenn Research Center**, Cleveland, OH; **Goddard Space Flight Center**, Greenbelt, MD; **Johnson Space Center**, Houston,

TX; **Kennedy Space Center**, Cape Canaveral, FL: **Langley Research Center**, Hampton, VA; **Marshall Space Flight Center**, Huntsville, AL; **Stennis Space Center**, in Mississippi, near Slidell, LA. The **Jet Propulsion Laboratory**, Pasadena, CA (often counted as a 10th NASA center), is a federally funded research and development center operated for NASA by the California Institute of Technology. Goddard Space Flight Center manages the Goddard Institute of Space Studies (New York, NY), the Independent Validation and Verification Facility (Fairmont, WV); and the Wallops Flight Facility (Wallops, VA). Ames Research Center manages Moffett Federal Airfield, Mountain View, CA. Johnson Space Center manages the White Sands Test Facility, White Sands, NM. Web links are at [http://www.nasa.gov/about/highlights/OrganizationIndex.html]. NASA employs approximately 19,000 civil servants (full time equivalents), and 40,000 contractors and grantees working at or near NASA centers. For more information on NASA's workforce, see [http://nasapeople.nasa.gov/workforce/default.htm].

Mr. Sean O'Keefe is the Administrator of NASA. NASA headquarters has four "mission directorates": Exploration Systems, Space Operations (including the space station and space shuttle), Science, and Aeronautics Research. Links to those mission directorates and individual NASA programs are at [http://www.hq.nasa.gov/hq/org.html].

NASA's FY2005 Budget Request

Table 1: NASA's FY2005 Budget Request (in $ millions)

Category	FY2004 approp.	FY2005 Req.	FY2005 Appropriations ††		
			House Cmte	Sen. Cmte	Final (H.R. 4818)
Exploration, Science, & Aeronautics	**7,830**	**7,760**	**7,621**	**7,937**	**7,743**
Space Science	3,971	4,138			
Earth Science	1,613	1,485			
Biol. & Phys. Res.	985	1,049			
Aeronautics	1,034	919			
Education	226	169			
Exploration Capabilities	**7,521**	**8,456**	**7,497**	**8,411**	**8,426**
Exploration Systems	1,646	1,782			
Space Launch Init.	†	†			
Other	†	†			
Human & Robotic Tech.	*679*	*1,094*			
Transportation Systems	*967*	*689*			
Space Flight	5,875	6,674			
*Space Station**	*1,498*	*1,863*			
Space Shuttle	*3,945*	*4,319*			
Space Flight Support	*432*	*492*			
Inspector General	**27**	**28**	**31**	**32**	**32**
Total	**15,378**	**16,244**	**15,149**	**16,379**	**16,200**

Source: NASA FY2004 and FY2005 budget justifications, and bills or committee reports. Totals may not add due to rounding.

* Not including funds for research aboard the space station, which is in the Biological and Physical Research line. For FY2004, that is $578 million; for FY2005, it is $549 million.

† NASA's FY2005 request assumes cancellation of the Space Launch Initiative, reallocation of its remaining funding, and restructuring of what was called "Crosscutting Technologies," of which SLI was a part..
††The House and Senate Appropriations Committee reports, and H.R. 4818, do not include the level of detail needed to definitively determine totals for the subcategories in this table. The amounts in the H.R. 4818 column do not include an across-the-board 0.80% rescission.

NASA requested $16.244 billion for FY2005, a 5.6% increase over its FY2004 appropriation of $15.4 billion. Congress appropriated $16.200 billion (not adjusted for the 0.80% rescission) in H.R. 4818, the FY2005 Consolidated Appropriations bill. The House Appropriations Committee version of the FY2005 VA-HUD-IA bill (H.R. 5041, H.Rept. 108-674) had cut $1.1 billion from the request. Major reductions included all $438 million from the Crew Exploration Vehicle (CEV); $230 million of the $438 million for Project Prometheus; $190 million from the $1.9 billion for International Space Station (ISS), including $70 million of the $140 million for a new ISS Crew/Cargo Services line; and $103 million of the $309 million for bioastronautics research. The Senate Appropriations Committee (S. 2825, S.Rept. 108-353) recommended $16.4 billion, $135 million over the request, including $800 million designated as emergency spending: $500 million for the space shuttle, and $300 million for a Hubble Space Telescope repair mission. Among the cuts made by the Senate committee were $160 million from CEV, all $115 million from exploration systems technology maturation, $260 million from ISS (including all $140 million from ISS Crew/Cargo), and $124 million from biological research. Neither chamber brought the VA-HUD-IA bill to the floor for a vote. Instead, a compromise version was included in H.R. 4818. It provides NASA considerable latitude to shift funding among the agency's programs. Specific amounts of funding were identified for only a few of NASA's programs. Of those listed above, the Hubble repair mission and the space shuttle have specified funding levels: $291 million, and $4.3 billion, respectively.

Key Issues for Congress

Return to Flight of the Space Shuttle

The space shuttle *Columbia* disintegrated as it returned to Earth on February 1, 2003; all seven astronauts aboard were killed. NASA and its contractors are working to resume shuttle launches as soon as possible, consistent with ensuring the shuttle is as safe as possible. See CRS Report RS21408 for more on *Columbia* and "Return to Flight" (RTF). In the FY2005 budget request released in February 2004, shuttle funding would rise from $4 billion to $4.3 billion. In November 2004, however, NASA informed Congress that $762 million more is needed in FY2005 for RTF activities. In H.R. 4818, Congress appropriated $4.3 billion, but noted that the Administration may request supplemental funding, or reprogram funds within the agency through operating plan adjustments.

One issue involved in RTF is whether President Bush's "Vision for Space Exploration" (see below) may be creating the type of pressures on the shuttle program that existed prior to the *Columbia* tragedy. The *Columbia* Accident Investigation Board (CAIB) cited schedule pressure as one factor in the *Columbia* tragedy. It also noted that funding was taken from the shuttle budget over several years to pay for other NASA programs. President Bush has called for ISS construction to be completed by 2010, at which point the shuttle system would be retired. Ending the shuttle program would free funds for implementing the Vision. NASA's FY2005 request includes "out-year" projections that reduce the shuttle budget by $1.5 billion in FY2008 and FY2009 to help pay for the Vision.

NASA estimates that 28 shuttle launches are required to complete construction. NASA's willingness to slip RTF, most recently to May 12-June 3, 2005, suggests to some that NASA is proceeding cautiously, but the agency's plan to launch 28 flights in less than six years makes others worry that an environment similar to that prior to *Columbia* is being recreated. (The most recent slip was caused in part by hurricane damage at Kennedy Space Center. Congress appropriated $126 million to NASA for hurricane relief in P.L. 108-324.)

President Bush's "Vision for Space Exploration"

On January 14, 2004, President George W. Bush made a major space policy address in which he directed NASA to focus its activities on returning astronauts to the Moon by 2020, and someday sending them to Mars and "worlds beyond" (see CRS Report RS21720). NASA calls it the "Vision for Space Exploration," or simply the "Vision." To accomplish those goals, NASA would terminate the shuttle program in 2010 (discussed above); build a new Crew Exploration Vehicle (CEV) able to take astronauts to Earth orbit by 2014 and ultimately to the Moon; restructure the U.S. ISS-based research program to support only life sciences research associated with achieving the exploration goals; and build robotic probes as "trailblazers" for the astronauts. The President invited other countries to join. Between 2010 when the shuttle is terminated, and 2014 when the CEV would be available, U.S. astronauts would have to rely on Russia to travel to and from ISS.

Cost and Other Issues. Initially, the President and NASA did not provide cost estimates for the Vision, only budget estimates for FY2005-FY2009, and a budget chart (the "sand chart," see below) extending to FY2020. In late February 2004, however, NASA released a cost estimate for landing a crew on the Moon in 2020 — $64 billion (FY2003 dollars): $24 billion (FY2004-2020) to build and operate the Crew Exploration Vehicle; and $40 billion (FY2011-2020) to build the lunar lander portion of that vehicle, a new launch vehicle, and operations. The estimate does not include the cost of robotic missions. An estimate for sending astronauts to Mars was not provided.

The President plans to fund the Vision by redirecting most of the needed funding from other NASA activities. A NASA budget chart (dubbed the "sand chart," and available at [http://www.nasa.gov/pdf/54873main_budget_chart_14jan04.pdf]) covering FY2004-2020 shows a NASA budget that increases 5% in FY2005- 2007, less than 1% in FY2008-2009, and is roughly level with inflation beyond FY2009. NASA says the intent of the chart is to demonstrate there is no "balloon" in funding past FY2009. The total amount of funding represented in the chart appears to be $150-170 billion.

NASA explains that the FY2005 budget request and its projections through FY2009 include an "additional" $12.6 billion for the Vision. However, only $1 billion is new money. The other $11.6 billion is redirected from other NASA programs, leading some to question whether it is an "addition." Redirecting most of the funding from other NASA activities may quell concerns about rising deficits and neglecting other national priorities in order to fund the Vision, but it subjects the plan to criticism that total agency projected funding level is insufficient, and that the plan will preclude other NASA activities. Mr. O'Keefe says that the schedule will be allowed to slip, rather than increasing the budget.

By agreeing to take most of the funding from other NASA activities, NASA has opened the door to questions about the value of those activities even if the Vision is not adopted. If Congress and the public are not persuaded to embark upon the Vision, what

direction should NASA be given for the future? Is it reasonable to assume that the proposed $11.6 billion in cuts can be made in any case? Should U.S. participation in the ISS program continue? Under the Vision, the only apparent reasons for U.S. involvement in ISS are fulfilling its commitments to the other partners, and performing research associated with the President's goals. If the latter rationale is eliminated, are the international commitments sufficient to warrant spending $6.7 billion ($2.4 billion for the space station and $4.3 billion for the shuttle) in FY2005 alone? Are they worth the risk to astronaut lives inherent in human space flight? Or are there other reasons that U.S. taxpayers may wish to continue the human space flight program, such as its oft-cited value in demonstrating U.S. technological leadership, stimulating children to study math and science, or satisfying an intangible "desire written in the human heart" as stated by President Bush following the *Columbia* accident?

FY2005 Budget Request. A NASA chart identifies $4.5 billion of the agency's FY2005 $16.2 billion request as "exploration specific," but that does not include the space shuttle and space station programs, which are related to it. Among the exploration specific projects are: $428 million for Project Prometheus, to design nuclear power and propulsion systems; $428 million for the Crew Exploration Vehicle (CEV) to take astronauts to the Moon; $115 million for technology maturation; and $70 million for robotic lunar probes as precursors to human missions.

Congressional Action. The House Appropriations Committee cut $230 million from Prometheus; all of the funds for the CEV (shown as $438 million in committee documents, but as $428 million in NASA's budget request); and $30 million from technology maturation. Related projects in other parts of NASA that were cut include $12.4 million of the $12.5 million for scientific instruments to be carried aboard JIMO, all $70 million for robotic lunar probes, $103 million from the $309 million for bioastronautics research, $190 million of the $1.9 billion for ISS construction and operations (including $70 million of the $140 million for ISS Crew/Cargo services to fund alternatives to the space shuttle). The Senate Appropriations Committee cut $260 million from the ISS (including all $140 million for ISS Crew/Cargo), $160 million from CEV, $50 million from lunar probes, and $50 million from planning for future Mars probes. Both committees expressed support for the Vision, but cited the constrained budgetary climate as a factor in their decisions. In H.R. 4818 (discussed earlier), conferees did not identify funding levels for any of the programs listed above, giving NASA latitude to decide those funding levels. The conferees noted that they were providing substantial funding for the Vision, "but to date there has been no substantive Congressional action endorsing the initiative." They called upon the appropriate authorizing committees to provide guidance. They also expressed concern that NASA's plan does not properly address "heavy lift" launch vehicle requirements, and that initial planning for the CEV is insufficient.

Hubble Space Telescope

A planned shuttle mission to service the Hubble Space Telescope was cancelled, primarily for safety reasons, in the wake of the *Columbia* accident (for more information, see CRS Report RS21767). NASA now intends to proceed with design of a robotic servicing mission to Hubble. NASA Administrator O'Keefe has been quoted as estimating the cost at $1 billion-$1.6 billion. (Cost estimates are still imprecise because many technical issues remain to be resolved.) The FY2005 budget request did not include funds for this mission because the decision had not yet been made to proceed with design. The

Senate Appropriations Committee provided $300 million in emergency funds for a Hubble servicing mission in its markup of the FY2005 VA-HUD-IA appropriations bill (S. 2825): $100 million in the Exploration Capabilities account and $200 million in the Exploration, Science, and Aeronautics account. The conference report on the FY2005 Consolidated Appropriations Act (H.R. 4818) provided $291 million for a Hubble servicing mission.

Aeronautics

Congress has expressed concern about constraints in NASA's funding for aeronautics R&D for several years. The need to reprioritize NASA spending in light of President Bush's Vision for Space Exploration may exacerbate those concerns. Aeronautics advocates decry a multi-year slide in funding, although this trend has been difficult to track recently because of changes in how NASA presents its annual budget. Aeronautics R&D at NASA was cut by about one-third in the late 1990s, with the termination of programs in high-speed research and advanced subsonic technology. NASA's aeronautics activities have been restructured several times, including the August 2004 reorganization noted above. Critics have argued for several years that NASA lacks a clear vision of its goals and direction in aeronautics, despite the February 2001 *NASA Aeronautics Blueprint* [http://www.aerospace.nasa.gov/aboutus/tf/aero_blueprint/cover.html] and further recommendations by the congressionally established Commission on the Future of the United States Aerospace Industry ([http://www.ita.doc.gov/td/aerospace/aerospacecommission/aerospacecommission.htm]) and the National Research Council ([http://books.nap.edu/html/atp/0309091195.pdf]). The FY2005 request for aeronautics was $919 million, a reduction of 11% from FY2004. Most of the reduction came from eliminating funds for items added at congressional direction in FY2004. Other changes included a $7 million increase for aircraft noise reduction and $15 million to fund rotorcraft research. The House Appropriations Committee directed NASA to develop "a prioritized set of aeronautics goals through 2020," along with associated annual funding requirements, and recommended increases for 24 specific projects, totaling $42.9 million. The Senate Appropriations Committee provided $25 million to continue research on hypersonic engine technologies and recommended increases for 17 specific projects, totaling $33.8 million. The conference report on the FY2005 Consolidated Appropriations Act contained the House language on prioritized goals and provided $25 million for continued design work on the hypersonic X-43C aircraft. It also expressed concern about the impact of full-cost accounting on the operation of NASA's wind tunnels and provided increases for 22 specific projects, totaling $42.8 million.