

**Committee on Science
U.S. House of Representatives
Hearing Charter**

NASA's Fiscal Year 2004 Budget Request

**Thursday, February 27, 2003
10:00 a.m.
2318 Rayburn House Office Building**

1. Purpose

On Thursday, February 27th at 10:00 a.m., the Science Committee will hold a full committee hearing on NASA's FY 2004 budget request. The hearing will examine NASA's plans and programs and the rationale for the funding levels in the agency's FY 2004 budget. The committee will receive testimony from the Honorable Sean O'Keefe, NASA Administrator.

The hearing is not intended to review the status of the ongoing investigation into the *Columbia* accident, but will, in addition to examining the FY 2004 budget request, examine how the grounding of the Space Shuttle fleet will affect other programs.

2. Budget Highlights

NASA's FY 2004 budget request is \$15.5 billion which is a 3.1 percent increase over last year's request and less than a 1 percent increase from the FY 2003 appropriation of \$15.3 billion. FY 2003 levels appropriated for each program are included in the table on the last page.

3. Major Issues

Space Shuttle tragedy ripples through NASA programs: NASA grounded the Space Shuttle fleet on February 1st following the tragic accident that destroyed the Space Shuttle *Columbia* and killed the seven astronauts on board. Clearly, this tragedy dramatically changes NASA's current plans as well as plans for FY 2004 and beyond. An independent panel of experts is investigating the cause of the accident. Meanwhile, NASA and Congress face many near-term policy questions regarding the Space Shuttle, the International Space Station (ISS), and other related programs. Specific near-term policy questions include: What strategy should guide the ISS program while the Shuttle is grounded? What contingency plans is NASA studying if the Shuttle is grounded for an extended period? Should NASA accelerate plans to develop a replacement for the Shuttle system? What are the funding implications for NASA's budget this year and over the next few years?

Project Prometheus: Project Prometheus is intended to develop and demonstrate nuclear power and propulsion systems to enable a satellite to conduct an extended tour of the moons of Jupiter, which are suspected of having oceans underneath their icy crusts. Project Prometheus is an acceleration of the Nuclear Systems Initiative begun last year. NASA has requested \$279 million for Project Prometheus (\$3 billion over five years), of which \$186 million (\$1 billion over five-years) comes from the Nuclear Systems Initiative and \$93 million (\$2 billion over five-years) is for a first flight mission, the Jupiter Icy Moon Orbiter (JIMO), to be flown within a decade. If successful, nuclear power and propulsion technology would enable a much more robust solar system exploration program. Travel times to distant planets and asteroids would be dramatically reduced and probes would not be limited to short

fly-by missions, but could orbit and collect data for extended periods. Previous attempts by NASA to develop nuclear propulsion systems have not succeeded. Key issues include the feasibility, safety, and cost of the concept. In addition, some may question whether NASA should focus first on funding for other programs before beginning such an initiative.

Aeronautics R&D Funding: The Congressionally-created Commission on the Future of the Aerospace Industry chaired by former Science Committee Chairman Bob Walker, reported last November that the nation needs to take immediate action to transform the U.S. air transportation system and to deploy a new highly automated air traffic management system. The Commission recommended the creation of an interagency Joint Program Office to better focus federal investments in aeronautics, particularly for critical long-term research.

NASA proposes to cut funding for aeronautics by 4.5 percent over the next five years while most other programs are being increased. Similarly, the Federal Aviation Administration (FAA) proposes to cut its Research, Engineering, and Development account by nearly 20 percent from \$124 million in FY 2003 to \$100 million in FY 2004. While NASA, FAA and the Department of Defense have taken initial steps to create a Joint Program Office as recommended by the Commission, the budgets for aeronautics at NASA and FAA clearly reflect a dwindling financial commitment.

Restructured Space Launch Initiative (SLI) and the Orbital Space Plane (OSP): With the decline of the commercial launch market, NASA's launch requirements focus solely on servicing the International Space Station. Responding to criticism from the NASA Advisory Committee and recognizing that its current plan would not meet its technology requirements, NASA developed a new Integrated Space Transportation Plan (ISTP) and in November 2002, NASA submitted to Congress an amended FY 2003 budget request. Although total funding for NASA remained unchanged, the budget amendment reflected significant changes to its plans for new launchers, the Space Shuttle and ISS.

In its budget amendment, NASA shifted money from the SLI program into the Space Shuttle and Space Station, and created a new program called Orbital Space Plane (OSP). The OSP is intended to affordably meet crew rescue and crew transportation needs for the Space Station. NASA is in the early stages of this program and the budget amendment was submitted before all the requirements had been developed for the program. NASA finally released the initial set of requirements in early February.

The OSP represents a substantial new commitment to develop a new manned spacecraft and the cost, requirements, and plans should be carefully evaluated to ensure that they are aligned with NASA's needs. Prior to the *Columbia* accident, NASA projected that the crew rescue version of the OSP would be available in 2010 and the crew transfer version in 2012. A critical issue is whether plans for the OSP should be (and could be) accelerated to supersede the Space Shuttle more quickly.

NASA's Workforce: In its most recent report on major management challenges, the General Accounting Office (GAO) placed the management of human capital as one of the top challenges facing NASA. The size of NASA's workforce has been cut significantly over the past decade, dropping from approximately 25,000 in FY 1993 to slightly more than 18,000 in FY 2002. NASA has tried to retain workers with key skills, but has not always been successful because it has relied on voluntary departures to reduce its workforce. The problem is likely to get worse with approximately 15 percent of NASA's science and engineering workforce eligible to retire. Within five years, almost 25 percent of the current workforce will be eligible to retire. Over the next few years the absence of individuals with critical skills could jeopardize NASA's ability to accomplish its mission. Chairman Boehlert will shortly introduce a bill that would give NASA legislative authority to offer additional incentives to retain and recruit people with critical skills. NASA sent up a draft set of proposals last year, and the Chairman's bill is the product of negotiations with NASA over those proposals.

Appropriations Restructuring and Full-Cost Accounting: NASA proposes to restructure its appropriations accounts. The new structure is intended to mirror NASA's new strategic plan, which is designed to more closely link budget with performance and to put more emphasis on science and technology capabilities, rather than on specific projects such as the Space Shuttle or Space Station.

For the first time, NASA's programs are in a full-cost budget format. Full cost means that all direct and indirect costs are identified and included in a given program budget, including civil service salaries. The objective is to provide a direct link between each program and the infrastructure used to more accurately reflect the true cost of programs.

While these changes may make the budget more revealing over time, they make it extremely difficult to compare the FY 2004 proposal with those from previous years. For example, full cost accounting often makes it appear that programs have been increased substantially when in fact the larger numbers may simply reflect an accounting change in which institutional support has been added to the program's funding line.

The problem in making comparisons is exacerbated by the frequent previous changes NASA has made in its budget presentation. These changes make it difficult for Congress to conduct oversight of various programs -- particularly the Space Shuttle and the ISS by making it difficult if not impossible to make year-to-year budget comparisons. (This is one reason it is difficult to answer the seemingly simple question of how much has been spent on Shuttle safety.)

NASA has provided the Committee with FY 2003 request numbers that have been adjusted to reflect "full cost" in order to facilitate comparisons with the FY 2004 budget request. NASA cannot, however, convert the FY 2004 budget request into the format that it previously used. The inability to convert previous years' budgets will make it very difficult to do historical budget analysis.

Integrated Financial Management and Audit. Since 1990 the GAO has identified NASA's contract management as a high-risk activity due to ineffective and often incompatible accounting systems, and nonstandard cost reporting capabilities. Consistent, timely financial information is not available to program managers, making it difficult to ensure that program budgets are executed as planned.

NASA failed its FY 2001 audit last year but was issued a clean opinion on its financial statement for FY 2002. Nonetheless, many issues remain regarding improvements to NASA's accounting and financial management system. To help address these issues, NASA is implementing an Integrated Financial Management system to provide managers with the financial tools to more effectively manage their programs. This new system has experienced some problems during its development and pilot testing, but NASA expects that the core portion of the system will be rolled out across the agency by the end of the 1st quarter of FY 2004. NASA believes the system will be fully implemented across the agency by the end of FY 2005.

4. Details of NASA's FY 2004 Budget

Space Science

The FY2004 request is \$4.0 billion, which includes a \$539 million or 15.5 percent increase above the FY 2003 request (full cost). The Space Science Enterprise seeks to answer fundamental questions about life in the universe, including how the solar system may have originated, whether there are planets with similar environmental systems to Earth's, and where signatures of life can be found. Space Science also seeks to understand how the universe began and evolved, including how stars and galaxies formed. The Space Science program includes three new initiatives.

New Initiative - Project Prometheus: Discussed in Section 3 above.

New Initiative - Optical Communications: The budget request includes \$31 million (\$233 million over five years) to fund a new initiative in Optical Communications. Optical Communication offers the potential for dramatic increases in speed over conventional radio communications. NASA's program builds on advances in laser communications at the Department of Defense and is aimed at demonstrating the technology on a telecommunications satellite that would send data back to Earth while orbiting Mars in 2009.

New Initiative - Beyond Einstein: The budget request includes \$59 million (\$765 million over five years) to answer vexing questions that have been left unanswered by Albert Einstein's theories. To accomplish this, NASA proposes a series of small spacecraft to take measurements of gravity waves and observe black holes, and to conduct investigations of the structure of the universe.

Earth Science

The FY 2004 request is \$1.6 billion, which includes a \$58 million or 3.5 percent cut from the FY 2003 request (full cost). The mission of the Earth Science Enterprise is to develop a scientific understanding of the Earth system to improve prediction of climate, weather, and natural hazards. The decrease is the result of major development programs that are past their peak spending and are preparing for launches in 2004, including AURA, Cloudsat, and Calipso. NASA has requested \$96 million for the NPOESS Preparatory Project (NPP) under development in partnership with the National Oceanographic and Atmospheric Administration (NOAA) and the Department of Defense. NPP transfers critical research instruments to operational agencies and maintains data continuity for NASA-sponsored scientific investigation. NASA has also requested \$60 million for the Landsat data continuity mission, which is an innovative program to seek partnerships with industry to continue receiving critical land remote sensing data. The budget request also includes \$524 million for research and modeling that help answer critical scientific questions on climate change to aid policy and economic decision-makers.

New Initiative - Climate Change Research Initiative Acceleration: The budget request includes \$26 million (\$72 million over five years) to fly an advanced instrument, called a polarimeter^[1], to enhance the ability to evaluate mechanisms affecting climate change not associated with carbon dioxide. Specifically, the instrument will measure methane, tropospheric ozone, aerosols, and black carbon. This initiative accelerates the launch of this instrument by about four years.

Biological and Physical Research

The FY 2004 request is \$973 million, which includes a \$60 million or 6.5 percent increase over the FY 2003 request (full cost). NASA's Biological and Physical Research (BPR) Enterprise conducts interdisciplinary fundamental and applied research that takes advantage of the unique environment of space to study biological and physical processes. BPR provides funding for the research to be conducted on the Space Station, as well as other platforms. As a result of the grounding of the Space Shuttle fleet, BPR's budget outlook and near-term plans are unclear.

New Initiative – Human Research Initiative: The budget request includes \$39 million (\$374 million over five years) to perform research with the goal of extending the ability of crew to safely conduct missions over 100 days beyond low Earth orbit (ISS is in low Earth orbit) where radiation levels are significantly higher.

Aeronautics

The FY 2004 request is \$959 million, which includes a \$10 million or 1 percent increase over the FY 2003 request (full cost). NASA plans to cut Aeronautics by \$43 million or 4.5 percent over the next five

years. The Aeronautics program is intended to invest in technologies to create a safer, more secure, environmentally friendly, and efficient air transportation system. As stated in Section 3, NASA and FAA's investments in aeronautics R&D are dwindling at a time when many, including the Aerospace Commission, are calling for increased investment and collaboration.

New Initiative – Aviation Security: The budget includes \$20 million (\$195 million over five years) to address critical aviation security needs, such as airspace protection, damage tolerant structures and autonomous flight controls.

New Initiative – National Airspace System Transition Augmentation: The budget includes \$27 million (\$100 million over five years) for NASA to work in cooperation with FAA to transition technology needed to develop the next generation National Airspace System. The goal is to increase capacity, efficiency, and security.

New Initiative – Quiet Aircraft Technology: The budget includes \$15 million (\$100 million over five years) to accelerate development and transfer of technologies to cut perceived noise in half by 2007 compared to 1997 levels.

Education Programs

The FY 2004 NASA Education budget request is \$170 million, which includes a \$10 million or 6.3 percent increase over the FY 2003 request (full cost). NASA requested \$78 million for education programs designed to encourage students of all ages to pursue math and science education and the Space Grant and EPSCOR programs. EPSCOR, modeled on a National Science Foundation program, is designed to help institutions in states that traditionally have not received much research funding from the federal government. NASA has targeted \$92 million for minority university research and education grants. In addition, \$55 million in education-related funding is managed by the five other NASA enterprises.

New Initiative – Education Initiative: The budget includes \$26 million (\$130 million over five years) to establish the Educator Astronaut Program; the NASA Explorer Schools Program, which is designed to provide middle school students with the most recent discoveries and technologies; a Scholarship for Service Program, which would use scholarships to attract new employees; and the Explorer Institutes, to link with informal education centers, such as museums and science centers.

International Space Station

The FY 2004 budget request is \$1.7 billion^[2], which includes a \$144 million or 7.8 percent decrease from the FY 2003 budget request (full cost). The primary reason for the decreased funding is that development activities are nearly complete and on-orbit operations and research are the focus of planned activities. The budget outlook and plans for the Space Station in the near-term are unclear while the Space Shuttle fleet is grounded. There is no doubt that the Shuttle grounding will have a significant impact on the program and a prolonged grounding of the Shuttle will likely increase the cost of the Space Station program.

Three crew, two Americans and one Russian, are currently on board the Space Station. A Russian Soyuz crew return capsule is currently docked to the Space Station should the crew need to return for any reason. At the hearing, Administrator O'Keefe is expected to address the contingency plans NASA is considering to maintain and proceed with the program.

The Space Station program has been plagued for years with cost overruns and schedule slips. In 2001, NASA revealed that costs would grow by \$4.8 billion over the ensuing five years. In response, the Office of Management and Budget directed NASA to drop significant technical content from the program to offset the cost growth. Also, NASA appointed a task force to review ISS program management. The ISS

Science, Aero, & Exploration	7,015	7,101	7,661	8,269	8,746	9,201	9,527
Space Science	3,414	3,468	4,007	4,601	4,952	5,279	5,573
Solar System Exploration	976	1,046	1,359	1,648	1,843	1,952	2,054
Mars Exploration	496	551	570	607	550	662	685
Astronomical Search for Origins	698	799	877	968	1,020	1,022	1,061
Structure & Evolution of the Univ.	331	398	432	418	428	475	557
Sun-Earth Connections	544	674	770	959	1,111	1,169	1,216
Institutional	370	--	--	--	--	--	--
Earth Science	1,628	1,610	1,552	1,525	1,598	1,700	1,725
Earth System Science	1,249	1,529	1,477	1,440	1,511	1,606	1,629
Earth Science Applications	62	81	75	85	87	94	96
Institutional	318	--	--	--	--	--	--
Biological & Physical Research	842	913	973	1,042	1,087	1,118	1,143
Biological Sciences Research	245	304	359	399	453	456	481
Physical Sciences Research	247	351	353	392	380	409	401
Commercial Research & Support	170	254	261	251	254	253	262
Institutional + AM + SAGE	181	3	--	--	--	--	--
Aeronautics	986	949	959	932	939	934	916
Aeronautics Technology	541	949	959	932	939	934	916
Institutional	445	--	--	--	--	--	--
Education Programs	144	160	170	169	169	170	170
Education	144	160	170	169	169	170	170
Space Flight Capabilities	7,960	7,875	7,782	7,746	7,881	8,066	8,247
Space Flight	6,131	6,107	6,110	6,027	6,053	6,198	6,401
Space Station	1,492	1,851	1,707	1,587	1,586	1,606	1,603
Space Shuttle	3,208	3,786	3,968	4,020	4,065	4,186	4,369
Space Flight Support	239	471	432	419	402	407	429
Institutional	1,192	--	--	--	--	--	--
Crosscutting Technology	1,829	1,768	1,673	1,720	1,828	1,868	1,846
Space Launch Initiative	879	1,150	1,065	1,124	1,221	1,257	1,224
Mission & Sci. Measurement Tec	275	434	438	435	439	439	444
Innov. Tech Trans. Partnership	147	183	169	161	168	172	179
Institutional	528	--	--	--	--	--	--
Inspector General	25	25	26	28	29	30	31
TOTAL	15,000	15,000	15,469	16,043	16,656	17,297	17,806

Source: NASA FY 2004 budget estimate

Funding Category	FY03 Request	FY03 Approps without 0.65% rescission	FY03 Approps with 0.65% rescission

Human Space Flight	6130.9	6180.9	6161.8
International Space Station	1492.1*	1492.1*	1482.4
Space Shuttle	3208.0	3258.0	3258.0†
Payload and ELV Support	87.5	87.5	86.9
Investment and Support	1178.2	1178.2	1170.5
Space Comm. & Data Systems	117.5	117.5	116.7
Safety, Mission Assur., Engineering	47.6	47.6	47.3
Science, Aeronautics, and Technology	8844.5	9207.7	9147.8
Space Science	3414.3	3524.3	3501.4
Biological, & Physical Research	842.3*	868.8*	863.2
Earth Science	1628.4	1719.0	1707.8
Aero-Space Technology	2815.8	2891.9	2873.1
Academic Programs	143.7	203.5	202.2
Inspector General	24.6	25.6	25.4
TOTAL	15,000.0	15,414.2	15335.0

Source: CRS Report RS21430, Feb 24, 2003, NASA Budget documents and H.Rept. 108-10 to accompany H.J.Res. 2, the Omnibus Continuing Appropriations resolution. Columns may not add due to rounding.

† Space shuttle is exempt from rescission.

* Total funding for the Space station is the sum of the funding under Human Space Flight plus a portion of the funding in Biological and Physical Research. The total FY2003 Request for space station was \$1,839 billion: Congress approved that amount and added \$8 million for ISS plant and animal habitats.

^[1] A polarimeter is a device that measures the polarization of radio waves scattered off the atmosphere. Using polarization data, scientists can determine the concentration of various gases and chemicals.

^[2] The \$1.7 billion includes institutional support costs (new for FY 2004), but does not include space shuttle and research costs associated with ISS.

^[3] Does not include institutional support costs, space shuttle costs or research costs associated with ISS.