NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 2002 BUDGET ESTIMATES

NASA'S VISION FOR THE FUTURE

NASA is an investment in America's future. As explorers, pioneers, and innovators, we boldly expand frontiers in air and space to inspire and serve America and to benefit the quality of life on Earth.

NASA's unique mission of exploration, discovery, and innovation has preserved the United States' role as both a leader in world aviation and as the preeminent spacefaring nation. It is NASA's mission to:

- Advance human exploration, use and development of space;
- Advance and communicate scientific knowledge and understanding of the Earth, the Solar System, and the Universe;
- Research, develop, verify and transfer advanced aeronautics and space technologies.

The outcomes of NASA's activities contribute significantly to the achievement of America's goals in five key areas:

- Economic growth and security - NASA conducts aeronautics and space research and develops technology in partnership with industry, academia, and other federal agencies to keep America capable and competitive.
- Increased understanding of science and technology – NASA communicates widely the content, relevancy, and excitement of our mission and discoveries to inspire and increase the understanding and the broad application of science and technology.
- Protection of Earth's Environment - NASA studies the Earth as a planet and as a system to understand global climate change, enabling the world to address environmental issues.
- Educational Excellence - NASA involves the educational community in our endeavors to inspire America's students, create learning opportunities, and enlighten inquisitive minds.
- Peaceful Exploration and Discovery - NASA explores the Universe to enrich human life by stimulating intellectual curiosity, opening new worlds of opportunity, and uniting nations of the world in this quest.

Achieving our goals and objectives over the first quarter of the 21st century will contribute to national priorities: the protection of Earth's fragile environment, educational excellence, peaceful exploration and discovery, and economic growth and security.

STRATEGY FOR ACHIEVING OUR GOALS

The NASA budget request for FY 2002 includes both near-term priorities–flying the Space Shuttle safely and building the International Space Station–and longer-term investments in America's future–developing more affordable, reliable means of access to space and conducting cutting-edge scientific and technological research. It draws on NASA's strengths in engineering and science and reflects the revolutionary insights and capabilities on the horizon in areas such as biotechnology, nanotechnology, and information technology. It describes our vision for expanding air and space frontiers, serving America, and improving life on Earth. The President's budget request for NASA for FY 2002 supports these goals.

NASA's budget request for FY 2002 is reflected in three appropriations:

Human Space Flight (HSF) - provides funding for HSF activities, and for Safety, mission assurance and engineering activities supporting the Agency. The HSF activities include development and operations of the Space Station, the Space Station research program, and operation of the Space Shuttle. This includes development of contingency capabilities for the Space Station, high priority investments to improve the safety of the Space Shuttle, and required construction projects in direct support of the Space Station and Space Shuttle programs. This appropriation also provides for salaries and related expenses (including travel); design, repair, rehabilitation, and modification of facilities and construction of new facilities; maintenance, and operation of facilities; and other operations activities supporting human space flight programs; and space operations, safety, mission assurance and engineering activities that support the Agency.

Science, Aeronautics and Technology (SAT) - provides for the science, aeronautics and technology activities supporting the Agency. These activities include space science, biological and physical research, earth science, aerospace technology, and academic programs. This appropriation also provides for salaries and related expenses (including travel); design, repair, rehabilitation, and modification of facilities and construction of new facilities; maintenance, and operation of facilities; and other operations activities supporting science, aeronautics, and technology programs.

Inspector General – provides funding for the workforce and support required to perform audits and evaluations of NASA's programs and operations.

The NASA Strategic Plan describes how we will pursue our vision, implement our mission, and seek answers to fundamental questions of science and technology that provide the foundation for our goals and objectives. In addition to our vision and mission, NASA's strategic architecture consists of five Strategic Enterprises supported by four Crosscutting Processes. The Strategic Enterprises are NASA's primary mission areas. The Agency's goals and objectives are organized by Strategic Enterprise and Crosscutting Process. These goals and objectives represent a balanced set of science, exploration, and technology development outcomes that we believe can be accomplished over the next 25 years.

The following is a broad description of the focus of each Strategic Enterprise:

Space Science - The activities of the Space Science Enterprise seek to chart the evolution of the universe, from origins to destiny, and understand its galaxies, stars, planetary bodies, and life. The Enterprise asks basic questions that have eternally perplexed human beings: How did the universe begin and evolve? How did we get here? Where are we going? Are we alone? The Space Science Enterprise develops space observatories and directs robotic spacecraft into the solar system and beyond to investigate the nature of the universe.

The quest for this information, and the answers themselves, maintains scientific leadership, excites and inspires our society, strengthens education and scientific literacy, develops and transfers technologies to promote U.S. competitiveness, fosters international cooperation to enhance programs and share their benefits, and sets the stage for future space ventures.

Earth Science - The activities that comprise this Enterprise are dedicated to understanding the total Earth system and the effects of humans on the global environment. This pioneering program of studying global climate change is developing many of the capabilities that will be needed for long-term environment and climate monitoring and prediction. Governments around the world need information based on the strongest possible scientific understanding. The unique vantage-point of space provides information about the Earth's land, atmosphere, ice, oceans, and biota as a global system, which is available in no other way. In concert with the global research community, the Earth Science Enterprise is developing the understanding needed to support the complex environmental policy decisions that lie ahead.

Human Exploration and the Development of Space - The Human Exploration and Development of Space (HEDS) Enterprise seeks to expand the frontiers of space and knowledge by exploring, using, and enabling the development of space. HEDS asks questions to improve human possibilities both on Earth and in space. How do we design systems to make possible safe and efficient human exploration and commercial development of space? What are the resources of the solar system? Where are they? Are they accessible for human use? How can we ensure that humans can be productive in and beyond Earth orbit? HEDS is building the International Space Station to provide a continuously operating research platform and to prepare the way for robotic and human exploration even farther into space.

Biological and Physical Research - The Biological and Physical Research (BPR) Enterprise affirms NASA's commitment to the essential role biology will play in the 21st century, to establish the core of biological and physical sciences research needed to support Agency strategic objectives. BPR will foster and enhance rigorous interdisciplinary research, closely linking fundamental biological and physical sciences in order to develop leading-edge, world-class research programs. BPR is dedicated to using the unique characteristics of the space environment to understand biological, physical, and chemical processes, conducting science and technology research required to enable humans to safely and effectively live and work in space, and transferring knowledge and technologies for Earth benefits. BPR also fosters commercial space research by the private sector towards new or improved products and/or services on Earth, in support of the Agency's mandate to encourage the commercial use of space.

Aerospace Technology - The Aerospace Technology Enterprise works to maintain U.S. preeminence in aerospace research and technology. The Enterprise aims to radically improve air travel, making it safer, faster, and quieter as well as more affordable, accessible, and environmentally sound. The Enterprise is also working to develop more affordable, reliable, and safe access to space; improve the way in which air and space vehicles are designed and built; and ensure new aerospace technologies are available to benefit the public. NASA, and its predecessor, the National Advisory Committee for Aeronautics, have worked closely with U.S. industry, universities, and other Federal agencies to give the United States a preeminent position in Aeronautics. NASA's Aeronautics program pioneers the identification, development, verification, transfer, application and commercialization of high-payoff aeronautics technologies. Activities pursued as part of this Enterprise emphasize customer involvement, encompassing U.S. industry, the Department of Defense, and the Federal Aviation Administration. NASA is playing a leadership role as part of a

Government-industry partnership to develop breakthrough technology that will help the aviation community cut the fatal accident rate five-fold within ten years and ten-fold within twenty years. NASA also supports the development of technologies to address airport crowding, aircraft engine emissions, aircraft noise, and other issues that could constrain future U.S. air system growth. NASA's program to advance space transportation by creating a safe, affordable highway through the air and into space is developing new technologies aimed at access to space. The targeted technologies will reduce launch costs dramatically over the next decade, as well as increase the safety and reliability of current and future generation launch vehicles. Additionally, new plateaus of performance for in-space propulsion will be established, while reducing cost and weight.

NASA's ability to inspire and expand the horizons of present and future generations rests on the success of these efforts to maintain this nation's leadership in aerospace.

PLANS AND ACCOMPLISHMENTS

Human Space Flight

Space Station

The International Space Station (ISS) is an international laboratory in low Earth orbit on which American, Russian, Canadian, European, and Japanese astronauts will conduct unique scientific and technological investigations in a microgravity environment. The goal of the Station is to support activities requiring the unique attributes of humans in space and establish a permanent human presence in Earth orbit. The proposed budget provides funding for the continued development of the vehicle and its research components and for current operations, assembly and utilization of the station. With several assembly missions successfully completed, the budget includes funding to keep subsequent assembly missions on schedule through U.S. Core Station Complete, currently planned for late 2003 – early 2004, and for early research commensurate with the build-up of on-orbit utilization capabilities and resources.

Between January 2000 and January 2001, the Russian Service Module, the Z1 and SO trusses, the control moment gyros, the first photo-voltaic array and battery sets, initial thermal radiators, communication equipment, and the U.S. Laboratory were assembled on-orbit. A permanent human presence in space was achieved with the launch of Expedition 1. The first phases of multi-element integrated testing (MEIT) were completed. Crew training, payload processing, hardware element processing, and mission operations were supported. During the remainder of 2001, Expedition 2 will be deployed, and Phase 2 of the station assembly will be completed with the launch of the airlock. Preparations will continue for the start of Phase 3 and the first shuttle mission dedicated to research utilization is expected to be launched in mid-2002.

Russian Program Assurance (RPA) is contained within the Space Station budget and provides funding for contingency activities to address ISS program requirements resulting from delays or shortfalls on the part of Russia in meeting its commitments to the ISS program. Key elements of the RPA program have been the Interim Control Module (ICM), developed by the U.S. Naval Research Laboratory (NRL), and the U.S. Propulsion Module. With the successful launch of the Russian Service Module, and escalating costs for Space Station, including RPA components, NASA reassessed its Space Station priorities and the need for planned RPA hardware. In FY 2000, the ICM was placed in "call-up" mode and stored at NRL. Work on the original Propulsion Module design was

terminated, and in FY 2001 funds for the Propulsion Module were redirected to cover cost increases in the baseline program. This left logistics contingency funding and funds for potential procurement of safety-related Russian goods and services in the RPA budget. Based on recent operational experience, continuing flight software and hardware integration issues, obsolescence issues, and realization that earlier assembly phase cost estimates were low, NASA concluded that the program baseline could not be executed on schedule within approved funding levels. A reassessment of the ISS Program budget baseline was started in FY 2000 and continued into FY 2001. The initial results, based on conservative estimating assumptions, showed a budget shortfall of up to $4 billion over 5 fiscal years. To remain within the Agency's budget marks, NASA redirected funds from remaining high-risk, high-cost hardware development, including the Habitation Module and Crew Return Vehicle (CRV), as well as funds from the RPA budget mentioned above, to ensure that ISS would stay within budget, while assembly continues though U.S. Core Station Complete (deployment of Node 2 on flight 10A). This will allow for the integration of flight hardware being provided by the International Partners. In addition, the ISS Research Program is being realigned to match the on-orbit capability build-up as the program moves toward U.S. Core Complete. NASA will continue to pursue atmospheric testing of the X-38 and is assessing the affordability of completing the space flight test relative to other program priorities. Options for provision of a crew return capability and Habitat capability to support the desired increase in crew size from 3 to 6 will be discussed with the international partners. However, U.S. contributions to such capabilities will be dependent on the availability of funds within the President's five-year budget plan for Human Space Flight, technical risks, and the Administration's confidence in Agency cost estimates. Over the next several years, the Agency will press ahead with ISS assembly and the integration of the partners' research modules. Research operations on board the ISS have been expanding since they began in FY 2000 and will greatly exceed any previous capabilities for research in space including Skylab, Shuttle, or Mir.

Payload and Expendable Launch Vehicle (ELV) Support

During 2001, six pallets will be used in Space Shuttle missions. In FY 2001 and 2002, over 20 major and secondary payloads will be supported, including major hardware for ISS assembly. The ELV Mission Support budget provides funds for acquiring requisite launch services to meet all NASA requirements and for technical insight of commercially provided launch services. Advanced mission design/analysis and leading edge integration services are provided for the full range of NASA missions under consideration for launch on ELVs. During FY 2000, six ELV missions were successfully launched. Integration and technical management of 13 missions are planned for launch in FY 2001. In FY 2002 support for eight missions is planned.

Investments and Support

The Human Exploration and Development of Space (HEDS) Technology and Commercialization Initiative (HTCI) began in FY 2001. HTCI will continue in FY 2002 to focus on human space exploration and development activities emphasizing highly innovative technologies, advances in science, and enabling synergistic commercial space development efforts.

Project activity will continue in FY 2002 to ensure NASA's rocket propulsion test capabilities are properly managed and maintained in world class condition. The project will significantly enhance our ability to properly manage NASA's rocket testing activities and infrastructure across all four participating NASA centers.

Engineering and technical base (ETB) activity will continue to support the institutional capability in the operation of space flight laboratories, technical facilities, and testbeds; to conduct independent safety, and reliability assessments; and to stimulate science and technical competence in the United States.
Funding for other direct costs associated with Human Space Flight, which were previously funded in the Mission Support account, are now funded as part of investments and support. This includes research and program management costs and non-programmatic construction of facilities costs.

Space Shuttle
The Space Shuttle is a partially reusable space vehicle that provides several unique capabilities to the United States space program. These include retrieving payloads from orbit for reuse, servicing and repairing satellites in space, safely transporting humans to and from space, launching ISS components and providing an assembly platform in space, and operating and returning space laboratories. In FY 2000, the Space Shuttle launched four flights successfully including the emergency HST Servicing Mission 3A which replaced failing gyros on the HST and the Shuttle Radar Topography Mission (SRTM), a joint DOD/NASA payload to study the earth. The Space Shuttle also visited the ISS two more times, for both assembly and maintenance.

Seven flights are planned during FY 2001, all of which are ISS assembly and servicing missions. The first crew began permanent occupation and presence aboard the ISS in FY 2001. In FY 2002, seven flights are planned including a dedicated microgravity research flight and another HST Servicing Mission (HST-3B) and five ISS assembly and servicing missions. The President's Budget supports key Space Shuttle safety investments as part of NASA's Integrated Space Transportation Plan.

Safety, Mission Assurance and Engineering
The goal of this program is to invest in the safety and success of NASA missions by assuring that sound and robust policies, processes, and tools for safety, reliability, quality assurance, and engineering disciplines are in place and applied throughout NASA. The program also examines long-term technology requirements for NASA's strategic objectives.

Science, Aeronautics and Technology

Space Science
The Space Science program seeks to answer fundamental questions concerning: the galaxy and the universe; the connection between the Sun, Earth and heliosphere; the origin and evolution of planetary systems; and the origin and distribution of life in the universe. The Space Science program is comprised of a base program of' research and development activities, including research and flight mission activities, and major space-based facilities.

In 2000, the Space Science program produced many notable scientific accomplishments. Scientists using data from NASA's Mars Global Surveyor spacecraft camera found features that suggest there may be current sources of liquid water at or near the surface of the red planet. The water supply may be about 100 to 400 meters (300 to 1,300 feet) below the surface, and limited to specific regions across the planet. Additional MGS images revealed layers of sedimentary rock that paint a portrait of an ancient Mars that

long ago may have featured numerous lakes and shallow seas. These regions of sedimentary layers on Mars are spread out and scattered around the planet.

Solar and Heliospheric Observatory (SOHO) scientists have, for the first time, imaged solar storm regions on the side of the Sun facing away from the Earth. A week's advance warning of potential bad weather in space is now possible thanks to these SOHO measurements. Detailed images from the Transition Region and Coronal Explorer (TRACE) mission of giant fountains of fast-moving, multimillion-degree gas in the outermost atmosphere of the Sun have revealed an important clue to a long-standing mystery -- the location of the heating mechanism that makes the corona 300 times hotter than the Sun's visible surface. Scientists are interested in the corona, which appears as a halo of light seen by the unaided eye during a total solar eclipse, because eruptive events in this region can disrupt high-technology systems on Earth. Astronomers also hope to use the solar corona studies to better understand other stars.

The balloon-borne BOOMERANG sub-millimeter telescope mapped the faint light left over from the Big Bang, revealing the earliest structure in the Universe that later became the vast, soap bubble-shaped clusters of galaxies that astronomers observe today. BOOMERANG confirmed that the Universe is flat (Euclidean) and that the expansion of the universe is accelerating.

The Shoemaker Near Earth Asteroid Rendezvous (NEAR) mission became the first spacecraft to orbit an asteroid on February 14, 2000. The mission has returned stunning images and other data of the asteroid Eros, resulting in numerous discoveries throughout the year. Most recently, NEAR made history again by becoming the first spacecraft ever to touch down on the surface of a small solar system body.

Scientists used the Chandra X-ray Observatory to examine a mid-mass black hole in the galaxy M82. This black hole may represent the missing link between smaller stellar black holes and the supermassive black holes found at the centers of galaxies. A Hubble Space Telescope census finds that the mass of a supermassive black hole is directly related to the size of a the bulge of stars at the center of its host galaxy. This suggests that the evolution of galaxies and their host black holes is intimately linked.

The Cassini spacecraft, on its way to meet Saturn in 2004, flew by Jupiter in December and performed joint science operations with Galileo.

The Imager for Magnetopause-to-Aurora Global Exploration (IMAGE) was successfully launched in March 2000, and has provided the first large-scale pictures of the Earth's magnetic field.

The NASA budget request for FY 2002 funds a robust program of Mars exploration for the next decade. Following the loss of the Mars Climate Orbiter and the Mars Polar Lander in 1999, an in-depth review of our Mars exploration program found significant flaws in program formulation and execution, and made recommendations for the future exploration of Mars. Consistent with those recommendations, we are pressing forward with the development of a set of future Mars missions to establish a sustained presence at Mars. By means of orbiters, landers, rovers and sample return missions, NASA's revamped campaign to explore Mars is poised to unravel the secrets of the red planet's past environments, the history of its rocks, the many roles of water and, possibly, evidence of past or present life. The Mars Global Surveyor entered Mars orbit in September 1997, and is still performing flawlessly. The 2001

Mars Odyssey will be launched in April 2001, and we have started development of the twin Mars Environmental Rovers for launch in 2003. Additional Mars Exploration Program funding provided in the President's FY 2002 Budget will enable: a robust 2005 Mars Reconnaissance Orbiter; a competitively selected 2007 Mars Scout mission; an accelerated 2009 Mars Mobile Laboratory mission; U.S. participation in foreign missions to Mars; and technologies for the next decade of robotic Mars missions.

Development activities continue on the Relativity (Gravity Probe-B) mission, which is now scheduled for launch in 2002, and the Space Infrared Telescope Facility (SIRTF), with launch planned for July 2002. Launch of the Thermosphere, Ionosphere, Mesosphere Energetics and Dynamics (TIMED) mission is expected to occur this summer (2001). Development activities on the Stratospheric Observatory for Infrared Astronomy (SOFIA) continue. Funding for the Hubble Space Telescope (HST) continues to support operations, and preparations for the last planned Hubble servicing missions, servicing mission 3B in early FY 2002 and servicing mission 4 in FY 2004, when new science instruments will be installed.

In the Explorer program, development activities continue for the Microwave Anisotropy Probe (MAP), which will be launched in summer 2001; the Full-sky Astrometric Mapping Explorer (FAME), scheduled for launch in 2004, and Swift, a multi-wavelength observatory for gamma-ray burst astronomy, to be launched in 2003. Three Small (SMEX) missions continued development in FY 1999: the High Energy Spectroscopic Imager (HESSI) is to launch in spring 2001; the Galaxy Evolution Explorer (GALEX) will launch in early FY 2002; and the Two Wide-Angle Neutral Atom Spectrometers (TWINS) will be launched in 2002 and 2004.

In the Discovery program, the fourth mission, Stardust, was launched on schedule in February 1999, and is operating normally during its cruise to comet Wild-2, with the encounter scheduled for 2004. Two Discovery missions selected in 1997 are proceeding: the Comet Nucleus Tour (CONTOUR) began development in CY 2000 and will be launched in 2002; the Genesis solar wind sample return mission has nearly finished development and will be launched in summer 2001. Two new missions were selected for implementation during 1999: The MErcury Surface, Space ENvironment, GEochemistry and Ranging (MESSENGER) mission to orbit Mercury; and the Deep Impact mission to fly by and fire an impactor into a comet. Both MESSENGER and Deep Impact are planned for launch in 2004.

The New Millennium program is providing flight demonstrations of critical new technologies which will reduce the mass and cost of future science and spacecraft subsystems, while maintaining or improving mission capabilities. In 1999, NASA selected the Nanosat Constellation Trailblazer as the Space Technology-5 New Millennium mission. This mission will feature three very small satellites (each about the size of a large birthday cake), that will fly in formation and test eight technologies in the harsh space environment near the boundary of Earth's protective magnetic field. The Flight Validation program has been restructured to enhance openness and competition as well as to increase the number of opportunities for technologies to be flight-validated. An Announcement of Opportunity for Space Technology-6 technologies was recently released, and in January 2001, eight teams from industry, universities and NASA centers were selected to develop new technology concepts, such as advanced solar power and optical communications, for future NASA missions. The teams will study flight test options during a six-month phase for defining the technology concepts. NASA then plans to select up to five of the concepts for Space Technology-6 (ST-6), the next New Millennium Program project, which will flight-test the new technology concepts in 2003 and 2004.

The President's FY 2002 Budget also provides funding for a new Planetary Propulsion program. This program will competitively develop advanced propulsion systems that will reduce the flight time for future robotic missions to the planets and other science targets in the solar system.

Biological and Physical Research

In FY 2001, the Office of Biological and Physical Research (OBPR) was created as an independent research organization and a fifth strategic enterprise, by the restructuring of the Office of Life and Microgravity Sciences and Applications (OLMSA). The Enterprise uses the unique environment of space to understand the effect of gravity on biological systems and to conduct research in the areas of fluid physics, combustion science, fundamental physics, materials science and biotechnology.

In FY 2000, Space Shuttle Mission STS-101 flew two commercial research payloads which grew large biological crystals in space and investigated the effects of microgravity on the efficiency of genetically transforming plant seeds. Also during FY 2000, the Protein Crystal Growth-Enhanced Gaseous Nitrogen Dewar (PCG-EGN), was used aboard ISS to crystallize proteins for later analysis.

In FY 2001, the first rack of the Human Research Facility (HRF) will be deployed to the International Space Station, and OBPR will begin initial operations of this facility. Construction continues on the Booster Applications Facility at Brookhaven National Laboratory. In FY 2001, research in bioastronautics increased to accelerate development of countermeasures that will improve the health and safety of astronauts aboard the International Space Station (ISS). Devices and countermeasures developed through this initiative may also have many health benefits on Earth. The first four commercial research payloads, investigating antibiotic production, protein crystal growth, agricultural research, and materials research, will be flown on the International Space Station in FY 2001.

During FY 2002, OPBR will continue to demonstrate key technology capabilities for human support, such as advanced techniques for water processing, solid waste processing, air revitalization, biomass production, food processing, and thermal control. In addition, the office will continue work in fundamental biology and bioastronautics to increase knowledge and address critical questions in crew health and safety by conducting investigations on the Space Shuttle and ISS. These will include investigations of the effect of microgravity on skeletal myofibers, avian development in space, the effects of microgravity on bone as a function of age, changes in gene expression in bacteria in space, and the effects of gravity on plant photosynthesis and respiration. New research projects will be selected in the areas of biotechnology, fluid physics, and materials science, and commercial payloads will be flown on both the Shuttle and aboard ISS.

Earth Science

The mission of NASA's Earth Science Enterprise (ESE) is to develop a scientific understanding of the Earth system and its response to natural and human-induced changes to enable improved prediction of climate, weather and natural hazards for present and future generations. ESE seeks to answer a question of fundamental importance to science and society: *How is the Earth system changing, and what are the consequences for life on Earth?* To do so, ESE is developing the interdisciplinary research field of Earth System Science, which recognizes that the Earth's land surface, oceans, atmosphere, ice sheets, and life itself all interact in a highly dynamic system. Earth system science is an area of research with immense benefit to the Nation, leading to new knowledge and tools that may improve weather forecasting, agriculture, urban and regional planning, environmental quality, and natural disaster

management. ESE has established three goals to pursue in order to fulfill its mission: (1) Science – observe, understand, and model the Earth system to learn how it is changing, and the consequences for life on Earth; (2) Applications – expand and accelerate the realization of economic and societal benefits from Earth science, information, and technology; (3) Technology – develop and adopt advanced technologies to enable mission success and serve national priorities.

In ESE Science, 2000 was another year of substantial accomplishment toward understanding the Earth system. In an 11-day Space Shuttle mission, a new inteferometric synthetic aperture radar technique collected data sufficient to produce the first detailed topographic map of the entire land surface of the Earth between 60°N and 56°S. Landsat 7 completed a global survey of land cover, and the Terra satellite observed the global land and ocean biosphere as it underwent seasonal changes, and showed that snow cover over North America was substantially below normal following the warmest winter on record. The QuikSCAT satellite observed a Connecticut-size iceberg break off of the Antarctic polar ice sheet, and the US and Canada mapped Antarctica for the second time with space-based radar in order to compare with the first and determine rates of change. Using data from the US/Japan Tropical Rainfall Measuring Mission, researchers determined that air pollution affects rainfall rates downwind of its sources. Also in 2000, ESE formulated a new Research Strategy for 2000-2010 to guide research over the next decade, identifying 23 societally important research questions in the Earth system paradigm of variability, forcing, response, consequence and prediction. This Research Strategy will guide ESE's science activities and investments over the next decade.

In ESE Applications, ESE has entered into a variety of partnerships that will demonstrate the goods and services made possible by ESE's research. ESE provides QuikSCAT data in real time to NOAA to improve marine weather forecasting, and has used these data to show that severe storms forming over the oceans can be predicted two days in advance. ESE is working with FEMA to use remote sensing tools to update their flood plain maps throughout the US. In a partnership called AG 2020 with USDA and four growers associations representing 100,000 farmers, ESE is demonstrating how to increase crop productivity, reduce risks to crop health, and manage environmental impacts. With the National Institutes of Health, we are exploring the use of satellite data to predict spread of infectious diseases such as malaria that are highly influenced by weather and climate. Throughout the summer, three ESE satellites tracked devastating wildfires in the western US, providing data to the US Forest Service and regional authorities. ESE held three regional workshops across the US to plan the next generation of applications demonstration projects with State and local governments in infrastructure planning and related topics.

In ESE Technology, the Enterprise launched its first New Millennium Program satellite to demonstrate a variety of new technologies for Earth Science. These include a new instrument to produce a Landsat-type sensor one-fourth the size of the current Landsat 7 instrument, and the first hyperspectral imager in space, which views the land surface in hundreds of spectral channels rather than the conventional 5 to 7. Sponsored technology research with universities, industry and other government laboratories moved 20 different remote sensing instrument concepts one step closer to reality on an established scale of technology maturity. These will substantially reduce the cost and enhance the capability of new satellites over the next decade or more.

ESE is in the midst of deployment of the Earth Observing System (EOS), a set of spacecraft and associated interdisciplinary science investigations to initiate a long-term data set of key parameters required for the study of global climate change. The first four EOS satellites are already in orbit, including the flagship Terra mission launched in 1999. The remaining EOS satellites will be launched

through 2003, including Aqua (2001) to study the water cycle and atmospheric circulation, and Aura (2003) to probe the chemistry of the upper and lower atmosphere. Complementing EOS is a series of small, focused Earth System Science Pathfinder missions to explore Earth system processes never before examined globally from space. Data from the EOS satellites already in orbit are being acquired, processed, and distributed by the EOS Data and Information System (EOSDIS), which is currently handling more than 1 terabyte of data per day. EOSDIS handled 1.5 million user queries for over 8 million products in 2000. EOSDIS continues to evolve as new satellites are launched, and as new partners are added to produce data products with innovative applications.

As it deploys EOS, ESE is also planning for the future. For example, a Landsat Data Continuity Mission is being formulated in partnership with USGS, and will be implemented as a commercial data purchase, if possible. ESE is also planning for the transition of several of its key research observations to the Nation's weather satellite system. The DoD, NOAA and NASA have established an Integrated Program Office (IPO) to create a converged civilian and military weather satellite system called the National Polar-orbiting Operational Environmental Satellite System (NPOESS) to replace the present generation of separate systems. NASA and the IPO are jointly funding the NPOESS Preparatory Project (NPP) that will simultaneously continue key measurements begun by EOS and demonstrate instruments for NPOESS. The NPP will save money for both organizations by combining essential atmospheric and Earth surface observations on a single platform, and by seeking to meet both climate science and operational weather requirements with the same advanced instruments.

ESE data products and research are a major contribution to the US Global Change Research Program, an interagency collaboration overseen by the Committee on Natural Resources of the National Science and Technology Council. Because Earth science is inherently global in scope, ESE is engaged in a variety of international partnerships with individual nation's space agencies, and with international consortia such as the World Meteorological Organization. ESE seeks and receives scientific advice on a broad range of topics from the various boards and committees of the National Research Council. These partnerships, together with those above, ensure that NASA's Earth Science Enterprise conducts research at the frontiers of Earth science on questions of practical importance to the Nation.

Aerospace Technology

The mission of this Enterprise is to pioneer the identification, development, verification, transfer, application, and commercialization of high-payoff aerospace technologies. Through its research and technology accomplishments, Aerospace Technology promotes economic growth and national security by supporting a safe, efficient national aviation system and affordable, reliable space transportation. In addition, the Aerospace Technology Program supports the development of crosscutting technology to serve the needs of all NASA Enterprises. To meet this challenge, the Enterprise has established three main technology goals and one goal for commercialization. Within the three technology goals a set of objectives has been defined to address current and future National needs. The technologies associated with these objectives are pre-competitive, long-term, high-risk research endeavors with high payoff in terms of market growth, safety, low acquisition cost, consumer affordability and a cleaner environment. The first goal, Revolutionize Aviation, addresses the fundamental, systemic issues in the aviation system to ensure continued growth and development appropriate to the needs of the national and global economies. These systemic issues–safety, capacity, environmental compatibility, and mobility–cut across markets including large subsonic civil transports, air cargo, commuter and general aviation. NASA coordinates its investments and technology objectives in this area with the Federal Aviation Administration and the Department of Defense through the *National Research and Development Plan for Aviation Security, Efficiency, and Environmental*

Compatibility. The second goal, Advance Space Transportation, will create a safe, affordable highway through the air and into space by improving safety, reliability, and operability, while significantly reducing the cost of space transportation systems. With the creation of the Integrated Space Transportation Plan (ISTP), NASA defined a single, integrated investment strategy for all its diverse space transportation efforts. The third goal, Pioneer Technology Innovation, is unique in that it focuses on broad, crosscutting innovations critical to a number of NASA missions and to the aerospace industry in general. Pursuing technology fields that are in their infancy today, developing the knowledge bases necessary to design radically new aerospace systems, and developing tools for efficient, high-confidence design and development, will enable a revolution in aerospace. The fourth goal, Commercialize Technology, is to extend the commercial application of NASA technology for economic benefit and improved quality of life. By partnering with both aerospace and non-aerospace industry as well as academia, the full range of NASA's assets-- technological expertise, new technologies, and research facilities -- are made available to help the Nation.

As planned in the FY 2001 budget request, the Administration's 2002 request includes an increase in funding for the 2nd Generation Reusable Launch Vehicle (RLV) Program, although this request is lower than last year's projections primarily due to reallocation of Crew Return Vehicle placeholder funding to the International Space Station. Low-cost space transportation remains the key enabler for a more aggressive civil space program. NASA's Integrated Space Transportation Planning activities have identified a strategy based upon competition, safety, industry leadership and affordable requirements. Funding supports aggressive technical risk reduction and advanced development for multiple reusable launch vehicle concepts. Identification and preliminary development of NASA-unique systems and near-term pursuit of technologies required for alternative access for key Space Station needs are also both critical elements of the Integrated Space Transportation Plan (ISTP). All of these efforts combined will move NASA closer to a full and open RLV competition in the middle of this decade to meet NASA's human space flight needs by the end of the decade. In FY 2001, NASA will make the first risk reduction activity awards to industry under the 2nd Generation RLV Program. These risk reduction activities will continue through FY 2002 and feed future steps toward the launch services competition at mid-decade. The President's FY 2002 Budget prescribes several key management reforms in areas like vehicle requirements and program integration that will help ensure the success of this important undertaking.

The Administration's request includes a significant investment in computing and information technology developments and also increases the investment in biotechnology and nanotechnology -- the revolutionary technologies of the 21st Century. To ensure the highest quality research and strong ties to NASA's mission, these investments will be guided by technology development agreements signed by customers in other NASA Enterprises and subject to external, independent reviews. A significant portion of these investments will be externally competed. The Administration's request supports the implementation of six University-based Research, Education, and Training Institutes (RETIs). This will strengthen NASA's ties to the academic community through long-term sustained investment in areas of science and technology critical to NASA's future. To ensure the highest quality research and training and infusion of new ideas, these RETIs will be subject to independent, external reviews and recompetition at regular intervals, including mandatory sunsets after ten years. The Administration's request also supports a 21st Century aerospace vehicle technology program. This research will develop and verify critical technologies that provide leapfrog capabilities for aerospace vehicles that will be able to change their shape in flight like birds to optimize performance or perform complex maneuvers in complete safety, and be capable of self repair when damaged.

The President's request for NASA maintains investments in technology development activities that will address the challenges

(safety, environmental impact, capacity, noise reduction) that face the Nation's air system. As part of NASA's response to the national goal of reducing aircraft accidents by a factor of 5 by the end of FY 2007, NASA began a focused Aviation Safety Program (AvSP) in FY 2000 that builds on the extensive safety related activities of the Base Research and Technology (R&T) Programs. The base technologies provided the foundation for focused safety development efforts in the future, as well as some near-term achievements. For example, in FY 2000, AvSP produced an icing training program for general aviation and commuter pilots, completed a flight evaluation of an initial national capability for digital data link and graphical display of weather information, and demonstrated a concept for the integration of air traffic control runway incursion information onto aircraft flight deck displays. In FY 2001, the AvSP will complete a laboratory demonstration of a fuel system modification to reduce flammability, define the architecture for an integrated onboard health management system, and down-select synthetic vision concepts suitable for retrofit in commercial, business, and general aviation aircraft. The Base R&T Programs will continue to develop the technologies that will contribute to the FY 2007 goal. For example, in FY 2002, NASA will complete an interim progress assessment utilizing the technology products of the Aviation Safety program as well as related Aerospace Base R&T efforts to demonstrate potential to meet the National Goal.

NASA also continued its efforts to reduce the environmental impact associated with aviation systems. The Ultra Efficient Engine Technology (UEET) program is a focused program that began in FY 2000. UEET is planned and designed to develop high-payoff, high-risk technologies to enable the next breakthroughs in propulsion systems and to spawn a new generation of high-performance, operationally efficient and economical, reliable and environmentally compatible U.S. aircraft. In FY 2002, UEET will, in sector combustor tests, demonstrate initial 70% low NOx reduction, relative to 1996 International Civil Aviation Organization (ICAO) standards for Landing/Takeoff conditions in subsonic engines. Similarly, progress is being achieved in noise abatement efforts. In 2000, NASA validated the technologies required to reduce community noise impact by up to 10 dB relative to 1992 technology. In FY 2001 and FY 2002, NASA will: select engine system and airframe system technologies necessary to achieve a 3-dB aircraft system noise reduction beyond the 1997 baseline, establish the influence of wind and temperature gradients on community noise impact, and release the beta version of an improved advanced noise prediction code. Also in FY 2002, source diagnostics tests will be completed, giving engine component designers insight into the fundamental physics of the mechanisms that generate broadband fan noise. The data generated by these tests will be used to improve the computational algorithms used in computer codes to predict engine noise. The design of an advanced concept for reduced jet noise will be initiated for testing at laboratory scale later in the Quiet Aircraft Technology program.

In FY 2000, NASA's Aviation System Capacity program demonstrated technologies in a realistic Terminal Area environment achieving a 12-15% increase in single-runway throughput and proving the ability to space aircraft closer than 3,400 feet on parallel runways while meeting all Federal Aviation Administration (FAA) safety criteria. In FY 2001, NASA will demonstrate transition airspace decision support tools for: (1) Air Traffic Control (ATC)/airline operations center and ATC/cockpit information exchange, and (2) conflict resolution. In FY 2002 NASA will demonstrate an interoperable suite of at least two decision support tools for arrival, surface and departure operations and begin an activity entitled AvSTAR which will undertake a Virtual Airspace Modeling project to produce a high-fidelity computer model of the Nation's aviation system. This model will help the FAA and NASA develop new operational concepts and better understand the benefits of new technologies for reducing aviation system congestion and delays while improving aviation safety.

Building on its world-record-setting performances, the Environmental Research Aircraft and Sensor Technology (ERAST) project modified the Centurion solar-powered remotely piloted aircraft (RPA) to a wingspan configuration of greater than 245 feet, renamed the aircraft Helios, and continued flight testing in FY 2000. This configuration will be more suitable for extreme endurance as well as short flights to the 100,000 ft. altitude. In FY 2001, the Flight Research program will demonstrate a solar-powered RPA at 100,000 ft and complete development of a heavyweight energy storage system under the ERAST project. Both achievements will demonstrate technologies that will provide atmospheric satellites for commercial use, disaster relief efforts such as communication relays and real time sensing, and will increase the Nation's capability to make scientific sampling high in the atmosphere. In FY 2002 flight validation of an experimental, consumable fuel, RPA design will enable an enhanced prototype vehicle that meets the prescribed set of Earth Science RPA platform requirements.

The Commercial Technology Program's focus in FY 2000 was continued investment of 10-20 percent of the NASA R&D budget in commercial partnerships with industry and a more efficiently administered program. Based on experience to date, these commercial partnerships are expected to increase the return on the Government's R&D investment, allowing NASA to do more with limited funds, and strengthening the international competitiveness of key industry sectors. In FY 2001 and 2002, the program will continue to emphasize innovative commercial partnerships with industry and continue to refine and enhance a technology and partnership database. In addition, the Small Business Innovative Research programs will pursue increased use and expanded commercial application of the developed technology.

Space Operations

The primary goal of space operations is to provide highly reliable and cost-effective space operations services in support of NASA's science and aeronautics programs. In addition, support is provided to interagency, international, and commercial space-faring enterprising on a reimbursable basis. The Space Communications program is composed of Operations, Mission and Data Service Upgrades, Tracking and Data Relay Satellite Replenishment, and Technology Projects, as well as spectrum management and data standards coordination. Services are provided to a large number of NASA missions including planetary and interplanetary missions; human space flight missions, near-earth and earth orbiting missions; and sub-orbital and aeronautical flight tests. A Consolidated Space Operations Contract (CSOC) was successfully implemented by the Space Operations Management Office at Johnson Space Center and the Lockheed Martin Space Operations Company. The CSOC provides end-to-end mission and data services to both NASA and non-NASA customers. A total of nine contracts have been consolidated to date, and seven further contracts are to be consolidated in FY 2001 and FY 2002. Management responsibility for all Wide Area Network data distribution services for all human space flight, earth orbiting and deep space missions and NASA administrative communications was outsourced by CSOC in FY 2000. Development of the TDRS Replenishment Spacecraft is ongoing, with the first satellite launched in FY 2000.

Academic Programs

The goal of Academic Programs is educational excellence: NASA involves the educational community in our endeavors to inspire America's students, create learning opportunities, and enlighten inquisitive minds. NASA's Education Program brings students and educators at all levels into its missions and its research as participants and partners, providing opportunities for a diverse group of educators and students to experience first hand involvement with NASA personnel, facilities, and research and development activities. Academic Programs includes the Minority University Research Program, with a goal to expand NASA's research base by strengthening the research capabilities of minority universities and colleges; to contribute to the scientific and technological

workforce; and to promote educational excellence. The range of activities conducted under this program will continue to capture the interest of all students in science and technology, develop talented students at the undergraduate and graduate levels, provide research opportunities for students and faculty members at NASA centers, and strengthen and enhance the research capabilities of the Nation's colleges and universities.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FISCAL YEAR 2002 ESTIMATES
(IN MILLIONS OF REAL YEAR DOLLAR)

	*FY 2000	*FY 2001	*FY 2002 REQUEST
HUMAN SPACE FLIGHT	**7,053.9**	**7,163.4**	**7,296.0**
INTERNATIONAL SPACE STATION	2,323.1	2,112.9	2,087.4
SPACE SHUTTLE	2,999.7	3,118.8	3,283.8
PAYLOAD & ELV SUPPORT	79.9	90.0	91.3
HEDS INVESTMENTS AND SUPPORT	1,112.2	1,272.5	1,303.5
SPACE OPERATIONS	496.0	521.8	482.2
SAFETY, MISSION ASSURANCE & ENGINEERING	43.0	47.4	47.8
SCIENCE, AERONAUTICS & TECHNOLOGY	**6,527.9**	**7,066.9**	**7,191.7**
SPACE SCIENCE	2,524.1	2,624.7	2,786.4
BIOLOGICAL & PHYSICAL RESEARCH	340.3	378.8	360.9
EARTH SCIENCE	1690.3	1716.2	1515.0
AEROSPACE TECHNOLOGY	1,834.4	2,214.5	2,375.7
ACADEMIC PROGRAMS	138.8	132.7	153.7
INSPECTOR GENERAL	**20.0**	**22.9**	**23.7**
TOTAL AGENCY	**13,601.8**	**14,253.2**	**14,511.4**

**Restructured to reflect new appropriation structure.*

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FISCAL YEAR 2002 ESTIMATES
(IN MILLIONS OF REAL YEAR DOLLAR)

SHOWN IN OLD BUDGET STRUCTURE
FOR DISPLAY ONLY

	FY 2000 OPLAN	FY 2001 OPLAN	FY 2002 BUDGET
HUMAN SPACE FLIGHT	**5,487.9**	**5,450.9**	**5,584.5**
INTERNATIONAL SPACE STATION	2,323.1	2,112.9	2,087.4
SPACE SHUTTLE	2,999.7	3,118.8	3,283.8
PAYLOAD & ELV SUPPORT	79.9	90.0	91.3
HEDS INVESTMENTS AND SUPPORT	85.2	129.2	122.0
SCIENCE, AERONAUTICS & TECHNOLOGY	**5,582.4**	**6,177.1**	**6,162.7**
SPACE SCIENCE	2,193.8	2,321.0	2,453.0
BIOLOGICAL & PHYSICAL RESEARCH	274.7	312.9	291.3
EARTH SCIENCE	1,443.4	1,484.6	1,278.0
AEROSPACE TECHNOLOGY	1,125.4	1,404.1	1,504.5
MISSION COMMUNICATIONS SERVICES	406.3		
*SPACE OPERATIONS		521.8	482.2
ACADEMIC PROGRAMS	138.8	132.7	153.7
MISSION SUPPORT	**2,511.5**	**2,602.3**	**2,740.5**
SAFETY, MISSION ASSURANCE & ENGINEERING	43.0	47.4	47.8
SPACE COMMUNICATION SERVICES	89.7		
RESEARCH & PROGRAM MANAGEMENT	2,199.7	2,275.4	2,460.5
CONSTRUCTION OF FACILITIES	179.1	279.5	232.2
INSPECTOR GENERAL	**20.0**	**22.9**	**23.7**
TOTAL AGENCY	**13,601.8**	**14,253.2**	**14,511.4**

**Space Operations reflects the merging of Mission Communication Services and Space Communication Services.*

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FISCAL YEAR 2002 ESTIMATES
SUMMARY RECONCILIATION OF APPROPRIATIONS TO BUDGET PLANS
(IN MILLIONS OF REAL YEAR DOLLARS)

	TOTAL	Human Space Flight	Science, Aero, & Technology	Mission Support	Inspector General
FISCAL YEAR 2000					
VA-HUD INDEPENDENT AGENCIES APPROPRIATIONS ACT, FY 2000 (P.L. 106-74)	**13,652.7**	5,510.9	5,606.7	2,515.1	20.0
FY 2000 RESCISSION (P.L. 106-113)	**-51.9**	-23.0	-25.8	-3.1	
TRANSFERS TO OTHER AGENCIES (P.L. 106-58)	**-0.3**			-0.3	
FY 2000 EMERGENCY SUPPLEMENTAL APPROPRIATIONS ACT, (P.L. 106-246)	**1.5**		1.5		
LAPSE OF FY 2000 UNOBLIGATED FUNDS	**-0.3**			-0.2	-0.1
TOTAL FY 2000 BUDGET PLAN	**13,601.7**	**5,487.9**	**5,582.4**	**2,511.5**	**19.9**
FISCAL YEAR 2001 REQUEST	**14.035.3**	5,499.9	5,929.4	2,584.0	22.0
VA-HUD INDEPENDENT AGENCIES APPROPRIATIONS ACT, FY 2001 (P.L. 106-377) AS PASSED BY CONGRESS, DIRECTION INCLUDED IN CONFERENCE REPORT H.R. 106-988	**250.0**	-37.0	261.3	24.7	1.0
FY 2001 RESCISSION (P.L. 106-554)	**-31.4**	-12.0	-13.6	-5.7	-0.1
TRANSFERS TO OTHER AGENCIES (P.L. 106-554)	**-0.7**			-0.7	
TOTAL FY 2001 BUDGET PLAN	**14,253.2**	**5,450.9**	**6,177.1**	**2,602.3**	**22.9**

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATIONS LANGUAGE

ADMINISTRATIVE PROVISIONS

Notwithstanding the limitation on the availability of funds appropriated for "Human space flight", *or* "Science, aeronautics and technology"[, or "Mission support"] by this appropriations Act, when any activity has been initiated by the incurrence of obligations for construction of facilities as authorized by law, such amount available for such activity shall remain available until expended. This provision does not apply to the amounts appropriated [in "Mission support" pursuant to the authorization] for *institutional* minor revitalization and construction of facilities, and *institutional* facility planning and design.

Notwithstanding the limitation on the availability of funds appropriated for "Human space flight", *or* "Science, aeronautics and technology"[,or "Mission support"] by this appropriations Act, the amounts appropriated for construction of facilities shall remain available until September 30, [2003]*2004.*

[Notwithstanding the limitation on the availability of funds appropriated for "Mission support" and "Office of Inspector General", amounts made available by this Act for personnel and related costs and travel expenses of the National Aeronautics and Space Administration shall remain available until September 30, 2001 and may be used to enter into contracts for training, investigations, costs associated with personnel relocation, and for other services, to be provided during the next fiscal year.] Funds for announced prizes otherwise authorized shall remain available, without fiscal year limitation, until the prize is claimed or the offer is withdrawn.

[Unless otherwise provided for in this Act or in the joint explanatory statement of the committee of conference accompanying this Act, no part of the funds appropriated for "Human space flight" may be used for the development of the International Space Station in excess of the amounts set forth in the budget estimates submitted as part of the budget request for fiscal year 2001]

[No funds in this or any other Appropriations Act may be used to finalize an agreement prior to December 1, 2001 between NASA and a nongovernment organization to conduct research utilization and commercialization management activities of the International Space Station.] *(Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 2001, as enacted by section 1(a)(1) of P.L. 106.377.)*

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATIONS LANGUAGE

GENERAL PROVISIONS

Section 417

Such sums as may be necessary for fiscal year [2001] *2002* pay raises for programs funded by this Act shall be absorbed within the levels appropriated in this Act.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATIONS LANGUAGE

HUMAN SPACE FLIGHT
(INCLUDING TRANSFER OF FUNDS)

For necessary expenses, not otherwise provided for, in the conduct and support of human space flight research and development activities, including research, development, operations, *support* and services; maintenance; construction of facilities including *repair, rehabilitation,* revitalization and modification of facilities, construction of new facilities and additions to existing facilities, facility planning and design, *environmental compliance and restoration,* and acquisition or condemnation of real property, as authorized by law; space flight, spacecraft control and communications activities including operations, production, and services; *program management; personnel and related costs, including uniforms or allowances therefor, as authorized by 5 U.S.C. §§ 5901- 5902; travel expenses; purchase and hire of passenger motor vehicles; not to exceed $20,000 for official reception and representation expenses;* and purchase, lease, charter, maintenance and operation of mission and administrative aircraft, [$5,462,900,000] *$7,296,000,000,* to remain available until September 30, [2002] 2003, *of which amounts as determined by the Administrator for salaries and benefits; training, travel and awards; facility and related costs; information technology services; science, engineering, fabricating and testing services; and other administrative services may be transferred to the Science, Aeronautics and Technology account in accordance with section 312(b) of the National Aeronautics and Space Act of 1958, as amended by Public Law 106-377: Provided, That the authorized funding level for the International Space Station through fiscal year 2006 shall not exceed $8,197,300,000 except in amounts equal to budget reductions in other Human Space Flight programs. (Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 2001, as enacted by section 1(a)(1) of P.L-106-377.)*

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATIONS LANGUAGE

SCIENCE, AERONAUTICS AND TECHNOLOGY
(INCLUDING TRANSFER OF FUNDS)

For necessary expenses, not otherwise provided for, in the conduct and support of science, aeronautics and technology research and development activities, including research, development, operations, *support* and services; maintenance; construction of facilities including *repair, rehabilitation*, revitalization and modification of facilities, construction of new facilities and additions to existing facilities, facility planning and design, *environmental compliance and restoration*, and acquisition or condemnation of real property, as authorized by law; space flight, spacecraft control and communications activities including operations, production, and services; *program management; personnel and related costs, including uniforms or allowances therefor, as authorized by 5 U.S.C. §§ 5901- 5902; travel expenses; purchase and hire of passenger motor vehicles; not to exceed $20,000 for official reception and representation expenses;* and purchase, lease, charter, maintenance and operation of mission and administrative aircraft, [$6,190,700,000] *$7,191,700,000*, to remain available until September 30, [2002] 2003, *of which amounts as determined by the Administrator for salaries and benefits; training, travel and awards; facility and related costs; information technology services; science, engineering, fabricating and testing services; and other administrative services may be transferred to the Human Space Flight account in accordance with section 312(b) of the National Aeronautics and Space Act of 1958, as amended by Public Law 106-377. (Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 2001, as enacted by section 1(a)(1) of P.L-106-377.)*

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATIONS LANGUAGE

INSPECTOR GENERAL

For necessary expenses of the Office of Inspector General in carrying out the Inspector General Act of 1978, as amended, *[$23,000,000] $23,700,000.*

(Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 2001, as enacted by section 1(a)(1) of P.L-106-377.)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 2002 ESTIMATES

DISTRIBUTION OF PROGRAM AMOUNT BY INSTALLATION
(Thousands of Dollars)

	Total			Human Space Flight			Science, Aeronautics and Technology			Mission Support		
	2000	2001	2002	2000	2001	2002	2000	2001	2002	2000	2001	2002
Johnson Space Center	4,155,141	4,230,689	4,467,858	3,374,671	3,400,635	4,280,551	364,136	422,958	187,307	416,334	407,096	0
Kennedy Space Center	897,284	922,272	999,940	377,460	357,400	717,179	221,659	268,039	282,761	298,165	296,833	0
Marshall Space Flight Center	2,218,412	2,223,636	2,201,775	1,434,879	1,372,865	1,426,253	444,208	488,947	775,522	339,325	361,824	0
Stennis Space Center	188,231	249,353	187,821	39,986	58,801	100,057	93,865	101,383	87,764	54,380	89,169	0
Ames Research Center	649,333	720,963	717,611	63,060	74,447	70,091	385,994	431,810	647,520	200,279	214,706	0
Dryden Flight Research Center	217,596	218,857	206,003	7,400	10,935	32,565	141,158	138,107	173,438	69,038	69,815	0
Langley Research Center	579,960	660,040	686,846	3,600	4,645	16,805	320,206	394,278	670,041	256,154	261,117	0
Glenn Research Center	575,750	642,197	598,098	52,489	75,505	119,577	301,312	324,370	478,521	221,949	242,322	0
Goddard Space Flight Center	2,308,270	2,423,171	2,451,155	10,600	26,180	196,420	1,876,779	1,980,942	2,254,735	420,891	416,049	0
Jet Propulsion Laboratory	1,246,405	1,363,096	1,363,276	10,435	14,350	150,462	1,211,541	1,324,210	1,212,814	24,429	24,536	0
Headquarters	545,462	575,933	607,317	113,320	55,117	186,040	221,542	302,031	421,277	210,600	218,785	0
Undistributed:												
Inspector General	20,000	22,949	23,700									
TOTAL NASA	13,601,844	14,253,157	14,511,400	5,487,900	5,450,880	7,296,000	5,582,400	6,177,076	7,191,700	2,511,544	2,602,252	0